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PhD Thesis Summary

Contributions to the Business Process Management in companies

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Content

Introduction

Proposed theme "Contribution to the business process management in companies' behavior a real interest in business on the Romanian market, which is already mature after two decades of market economy and due to continuous struggle for survival and increase market share companies.

In the first chapter we describe the theory and practice related to BPM in companies, based on the principles and practices of BPM. Business Process Modeling approach starts with the most popular continuing with abstract patterns specific to various organizations. These models will be detailed in Chapter 4 and 5.

Below we present the language and techniques of business process modeling in chapter two. After an overview of the main languages of business process modeling, based on the specific activity of organizations, we take into account their classification in industrial modeling languages, modeling languages, based on graphical rule-based modeling, each illustrated with specific solutions and diversified. Description and modeling business processes in BPMN and BPR starts offering comparison criteria that characterize control workflow functionality and capability. Modeling methodologies are discussed in terms of business data solutions K.Kostanhe (1996) and methods for modeling business processes treating solutions offered by Fu-Ren Lin and others (2002). Business processes in organizations as a central business ecosystem architecture (Ulricch and Worter, 2010) and are analyzed in terms of management workflows will then present management systems workflows, ending with BPM tools and techniques.

In chapter four we elaborate on particular aspects that support the usefulness of a collaborative operating model focused on cloud computing solutions. We present levels and components of business models, business process-specific requirements, and we will focus on SaaS solutions implementations full covered in chapter five.

In chapter five we will address specific technical issues related to the implementation of BPMN models and HRM applications, we identify appropriate tools and models for 3 categories of companies: printing, call center companies and IT companies, which are suppliers and customers in a solution of dynamic e-collaboration.

1. BPM in companies

1.1. Principles and practices in BPM

Business model that describes the means and methods used by a company to achieve profitability will contain the set of activities undertaken by the company for taking their resources to achieve the company goal, specific activities related to its creation more value for both customers and more value for the company through its most favorable position in the market.

BPM can work with various management practices such as performance management personnel management or just through its focus on business processes. The three P's of management process in project management business - after William Thom are: **People Management, Process Management** and **Performance Management** (Thom, W, 2009).

Project managers can handle the complexity of type BPM projects and will obtain the expected results of the implementation and practice of BPM systems only by understanding the difficulties in implementing such projects and using a methodology appropriate to the situation in organization context.

These principles will underpin the models developed in subsequent chapters.

1.2. Business Process Modeling

The life cycle of business processes cover the following steps: (Juric, M. & Sasa, A., 2009)

• Process Modeling: defining process models using different methodologies and notations.

• Implement processes: processes using IT tools in order to stage faster and more efficient implementation.

• Execution and monitoring processes to achieve performance indicators.

• Process simulation: simulation executions in order to optimize process performance indicators.

• Process optimization: improving process efficiency, effectiveness, agility, flexibility and transparency.

1.3. TQM role in companies management

Theoreticians and practitioners alike with the TQM principles of ISO 9000 quality standards, but there is a major difference between them at least at the level of process: TQM is geared towards people who are constantly challenged to find solutions when ISO 9000 is facing detailed procedures, written and checked frequently, TQM needs flexible and innovative people and ISO 9000 disciplined people.

Business process reengineering means a radical redesign of organizational processes to achieve major improvements such as: improving time, lower costs, increase quality, or maintain low staff turnover. Initiators concept - Michael Hammer and James Champy in his 1993 "Reengineering the Corporation - A Manifesto for Business Revolution" and James Champy in 1994 in "Reengineering management. The mandate for new leadership "- telling examples show that in an organization the more time is lost with the placement of tasks and responsibilities from one department to another (Hammer, M., Champy, J, 1993) (Champy, J., 1994).

1.4. Organizational Development

The most important component of an organization is human resource. The human resources of the organization is an intervention to increase overall performance and efficiency of employees, called Organizational Development-(OD) strategy for the organization as a system that can be optimized by:

- Human resource development,
- Increase its preparation,
- Increasing communication skills and interaction between employees,
- Empowerment and delegation, etc..

1.5. Conclusions

Building on the BPM role in increasing the performance of companies have highlighted the principles and practices enshrined in BPM. Thus, we studied the three P's of management process presented by William Thom: People Management, Process Management and Performance Management with specific characteristics and each (Thom, W, 2009).

I detailed the purpose, principles and practices BPM according to criteria set by Chang (Chang, 2009).

As we approached business process modeling methodologies such as Six Sigma established as a successful implementation of TQM, then focusing attention upon the role of TQM in management firms. As a natural approach and modern scientific management, ISO 9000 and TQM extends exploit fully the concept of business re-engineering.

Organizational development was addressed by a system that can be optimized by: human resource development, increasing its preparation, increased communication and interaction skills of employees through empowerment and delegation, etc.. Organizational culture was treated both in terms of visible elements and the least visible. These precepts and approaches will be subject to review in detail in the following sections.

2. Modeling languages and techniques of business processes

2.1. Business processes modelling language

We observed a clear distinction between prototype modeling languages, modeling languages industrial and commercial products. Prototypes dedicated modeling languages refers to FlowMake, ADEPTflex and YAWL.

The most common **industrial modeling languages** are:

- Business Process Execution Languages for Web Services – BPEL4WS,
- Business Process Modeling Notation- - BPMN.

The already dedicated commercial **industrial modeling languages** are:

- Tibco Staffware Process Suite,
- Oracle BPEL Process Manager,
- ILOG BPM.

2.2. Description and modeling of business processes

In terms of systems theory *business process*, is a set of activities that transform inputs (inputs) to private individual outputs (outputs), and this will lead to the natural conclusion that a process - a level of abstraction - can be an activity to a higher level. Depending on various business communities, distinguish different uses of the notions of: process, business activities, tasks.

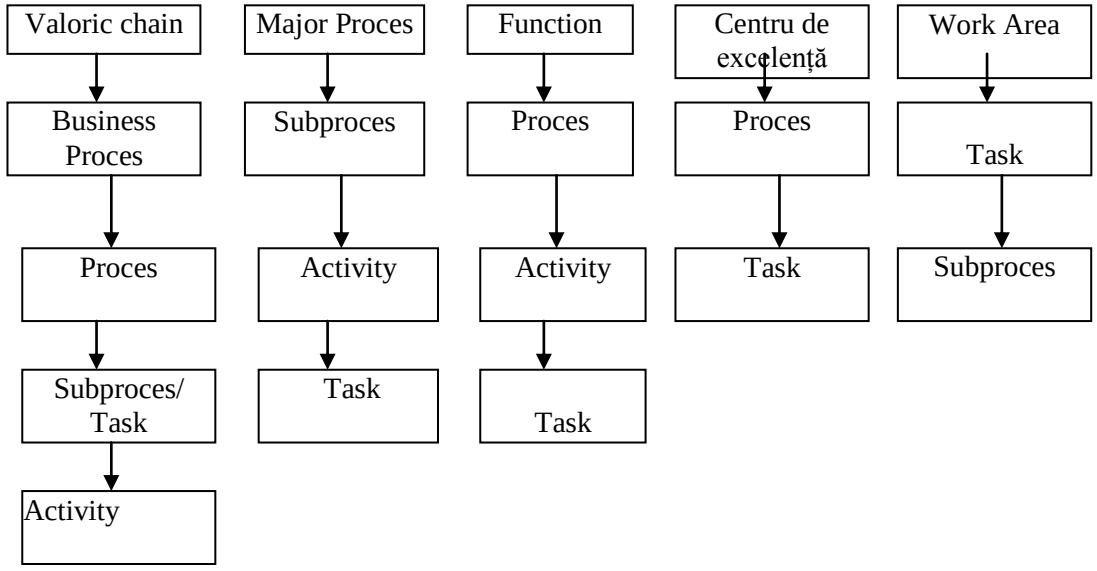
In Figure 1 we see examples of notation used to describe business processes, which may or may not include graphical models of business processes.

In the notation a of the figure is supported and used by two sources: the 2003 book by P. Harmon and the gateway www.bptrends.com. B1 and B2 in the figure are notations that are found in the book of HJHarrington (1997), and that the figure notations are found in the book authors and D.Kutnick A.Bruce (2002), respectively metagrup portal, the last part (d) contains a description of the practical application of engineering requirements modeling business processes, explained in detail in 2003 S.Lausen.

Workflows management is responsible for ensuring efficiency when transmitting information, documents and tasks from one employee (or machine) to another.

A workflow management system (WfMS) is a system that defines, manages and executes workflows through software applications. The order in which operations are performed is dictated by a computer representation of the workflow logic (Hollingswoth, 2005). It can be said that WfMS are bridges between people and software work (van der Aalst, 2005), that optimize workflow in an organization.

Figure 1. Levels of abstraction of business processes[1]



a. b1. b2. c. d.

2.3. Business modeling methodologies

Comparative modeling methods: IDEF0, IDEF1, IDEFIX, IDEF3, RAD, REAL, dynamic modeling, Object Oriented Modeling, AI, MAIS, are presented on the following aspects: component representation, main features, modeling procedure.

[1] Adapted by: Marite Kirikova and Janis Makna, Renaissance of business process modelling**,** Information Systems Development: Advances in Theory, Practice and Education, Edited by O. Vasilecas *et al.*, Springer, 2005

Table 1. Representing the strengths of BPM components (adapted by Fu Ren Ling et all, 2002)

Perspectives(Pi)/ Components(Ci)	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
Functional –P1	3	3	4	3	3	4	4	2	1	1
Behavioral –P2	3	2	4	2	2	4	2	2	1	1
Informational- P3	2	1	2	2	4	4	2	3	1	1
Organizational –P4	3	3	4	3	3	4	4	3	1	1
Verification/validation –P5	2	2	3	1	2	3	3	1	3	3
Procedure modeling –P6	2	3	3	3	3	4	3	2	3	4

Legend: 1-non-accepted; 2- low accepted; 3 – accepted; 4-high accepted.

In Table 1 strengths representation of BPM components is guided by six perspectives: functional (P1), behavioral (P2), informational (P3), organizational (P4), verification / validation (P5), procedure modeling (P6). Components (strengths) after which it is compared are: Activity, Resources, Behavior, Event, Information, Relationship, Agent, Entity, Verification / Validation / Simulation, modeling procedure, denoted C1 to C10.

3. BPMN Implementations

3.1. Cordys BPMS

CORDYS BPMS provides: **speed** by shortening time modeling, development and change, **scalability** - with excellent adaptability and easy expansion, **stability** - ensuring non-stop process execution and business continuity, single view - transparent business data and processes.

The five components that interoperate in a single and unified architecture are:

- **CAF - Composite Application Framework**, which provides support for creating complex web applications based on Web 2.0 technologies;
- **BPM - Business Process Management** solution component design with simple, intuitive design, execution, monitoring and improvement of business processes models are designed to be a bridge between business and IT.
- **Grid SOA - Service Oriented Architecture Grid** - provides performance scalability and stability, allowing simultaneous real-time interoperability between business process layer and existing IT systems through an approach based on Service Bus.
- **BAM - Business Activity Monitoring** - Monitoring component that provides real-time perform railings, which requires analysis of predefined or ad-hoc process and manage - meant events.
- **Non-Stop High Availability Framework** provides stability and continuity allowing easy reconfiguration on demand IT platforms, avoiding downtime to add or delete services.

3.2. SAP Webflow

The most common problem when we create an SAP workflow, is to identify how the workflow initialization, the most common mechanisms Index are:

- data entry by a user in a web form,
- HR processes - HR human resources - such as staffing,
- output - output - document (sending a purchase order to a supplier, the mechanism used specifically for MM and SD modules)
- change the status (achieving budget mechanism mainly used FI and CO modules)
- change master data (customer info to change a record).

Key components include the definition of SAP workflow (**Workflow Definition**) work items (**Work Items**), triggering of events (**Events triggers**) and organizational structure at work (**Organizational Structure**).

3.3. ADONIS –a BPM solution

ADONIS is a program that supports the design and documentation process image, optimizing business processes, reengineering and reducing time and costs in the organization. Among the ADONIS advantages we mentioned: ease of use, short learning curve modeling, simulation and evaluation of business through capacity planning and costing process, support the modeling of different standards and notations - such as BPMN, UML, EPC, and LoveM and interfaces for implementing such process BPEL, XPDL, XMI and powerful web publishing mechanisms.

ADONIS Process Portal provides specific roles for web access models, which allows the direct involvement of people in the cycle of BPM business process modeling, so far only indirect involvement without tool support. The unique role based on the ADONIS Process Portal - APP - provides accurate and functionality required by each of the employees due intuitive and customizable web interface. ADONIS methods are based on the framework of management systems business process - BPMS. ADONIS concepts are based on the phases identified in the work, employing the theory of continuous improvement cycle.

3.4. Conclusions

Execution and monitoring of business processes is facilitated by a workflow engine in the process by which those responsible be assigned, provide all relevant information and take action if there are tasks that are not completed in time (Casati et all, 2005). Engine flow must be specified in a process modeling language almost extended modeling language of business, such as **Event-Driven Process Chains - EPC**s (van der Aalst, et all, 2002) and **Business Process Management Notation BPMN** (Sankar et all 2006). They allow integration process model with other business systems, office software, or intranet portals.

Specific implementations studied were Cordys BPMN BPMS and SAP Webflow. From specific features were studied the 5 specific components Cordys, SAP Workflow and Webflow, specific elements SAP Workflow, SAP webflow using templates.

Another approach was ADONIS open source solution focusing on supply chain management issues ADOlog architecture IT Management and Service Management with ADOit.

4. Collaborative business models

4.2. Business process and its requirements

To properly build or configure a software solution based on business needs, it is necessary to define requirements. This definition is in fact a clear and complete business needs, often called user and will contain information on: the functional and non-functional requirements and integration requirements screen (Silver, 2008, Zachmann, 2009). *Functional requirements* consist of what the system should do and what functionality is required to offer. *Non-functional requirements* are focused on quality requirements to solution performance, responsiveness, security, scalability, maintainability, etc.. *Screen requirements* punctuate human-computer interaction, such as communication between the user and the system must be built. Integration requirements shows how many systems are involved in system integration and solution how to integrate and communicate with other systems.

These requirements are used to manage and arrange the parts of logic, grouped by several techniques: use cases, the description of users, depending on the method used for identification.

4.3. Business processes versus USE CASES

Use Case are annotated with: *actors, the default path / the exception, business rules, data input and output and quality constraints. Actors* is involved in the use case, *the default path* is a combination of steps that will achieve the objective, *path looks exceptional* steps to be taken when an error / problem occurs in the default path. *Business rules* are rules or specific conditions of application (calculations, validation rules, correlation rules), *the input and output informations* must be present before the default path to be executed and the output is delivered by default routes or exceptional ways. *Quality constraints* are more quality criteria for specific measures (delay, response time, rounding). Can be seen in Table 2 several important characteristics and a comparison between the business and Use Case.

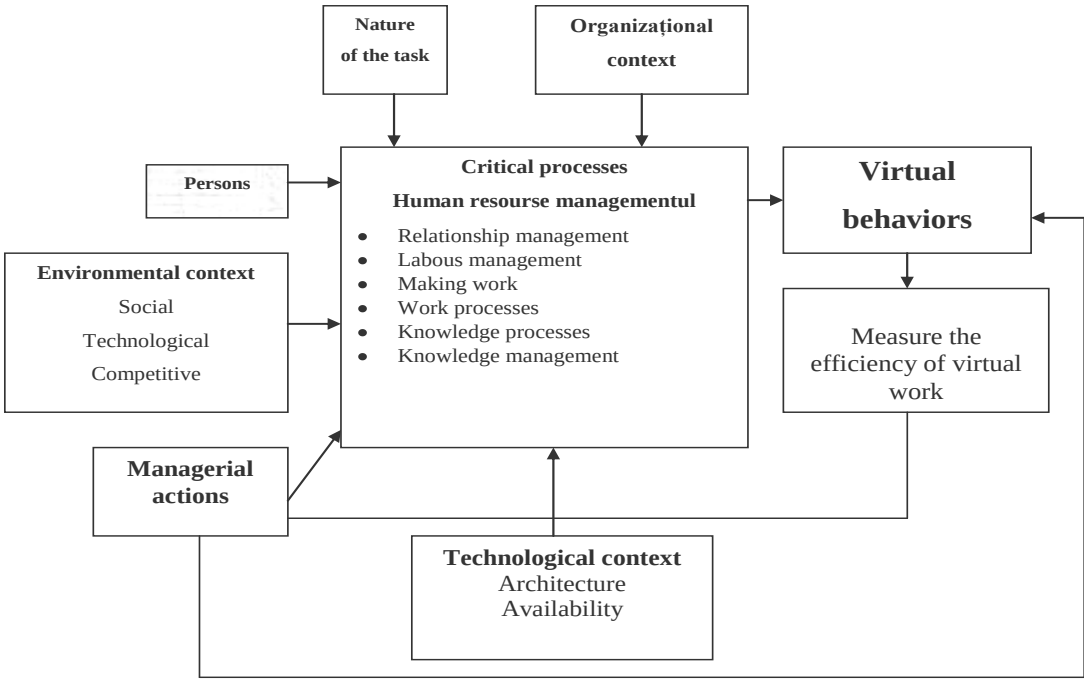
Information from the business process model can be obtained in the detailed definition requirements. This provides traceability requirements management process (Robertson, 2006). So, the next step in automation is that it works with the detailed requirements of process automation steps, if desired.

Table 2. Business Process and Use Case features (Source: Robertson, 2006)

Business process	**Use Case**
Role	Actor
Business standard	Business standard
Data flow	Input/output data
Description of task	Description Use Case
Information	Data: information's, input and output
Intervals and constrains	Quality requirements

4.4. Collaboration in IT projects

Figure 2. The conceptual framework of virtual work (source: Nițchi et all, 2010)



The conceptual framework (Figure 2) can be used to assess the working environment for virtual activities and to develop appropriate strategies for implementation and management of the virtual environment to ensure optimal performance (Nițchi et all, 2010).

4.5. Cloud Computing and colaborative companies

As part of the business modeling concept of cloud computing, SaaS can help in several ways: control of software licensing costs, control rogue software installations, reducing infrastructure costs. Expenditure control licensing of software is reduced by using a software provider licensing services, patches, upgrades and renewal that are well monitored.

A company pays for what it needs a software elasticity. A software provider allows the company to establish a list of approved applications are kept current operation. Also, the IT department no longer has to support random requests specific to one user and support streamline and improve efficiency, experience, keeping all users in a security system through software control installations.

Infrastructure costs are reduced, based on access to web applications that enable companies to purchase only the amount of horsepower desktop (desktop horsepower) required for jobs. Entire Business Suite of applications installed SaaS provider for several roles, low power desktops and virtual operating system (Reese, G, 2009).

5. BPM in companies –case studies

5.1. The Collaborative Business Processes

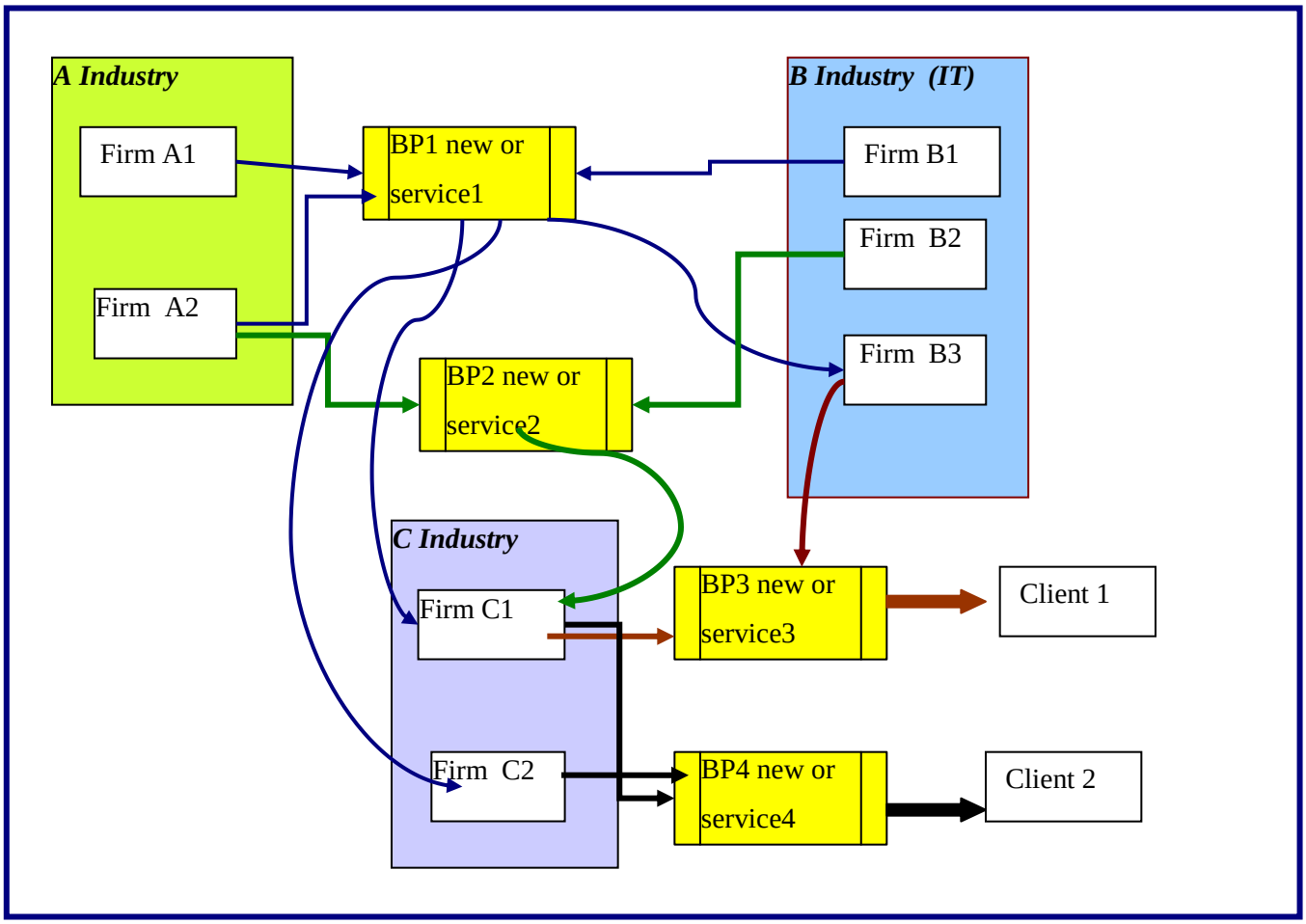
The proposed solution aims to be collaborative involving companies in the same field or in different fields. Flow collaborative and partnership relations with different colors are represented schematically (Figure 3). Model testing was conducted in the fields of industry B (IT companies offering cloud computing solutions), industry A (companies call center) and industry C - printers, as customers of SaaS. A1 and A2 are firm company call center companies shape their business processes using specialized software (NIPO, Telmar, etc.) provided by the Company or the Company B1 B2. These models allow business studies and marketing research firm B3, C1 firm or company C2.

BP1 is a process attended by two companies of call center and IT firm (symbolized by blue flow). Collaborative Another solution is to BP2 (flow symbolized in green), where A2 Company uses a SaaS solution provided by Company B2 and performed market research company C1. BP3 uses a SaaS solution provided by the company B3 required for cost calculation and optimization of production and provide customer service BP3. Collaboration within BP4 not involve IT firms, but takes place in the classic manner (symbolized by black flow).

The partnership allows the company A1 to B1 client company while in turn providing services for companies C1, C2 and B3. A2 is the client company B2, and C1 is the client company B3. We can affirm that there is a competitive relationship (cooperation and competition). On the other hand the two call center and printing companies, operating in a virtual organization temporal based e-collaboration dynamic SaaS providers are the three major software companies.

Business models we develop are based on the level of abstraction of business processes (Figure 3.) Respectively a) and b1) for IT companies, and b2 for publishing the two companies call center.

Figure 3. Collaborative model based on cloud computing solution



5.2. Modeling and optimizing internal company workflow

Our approach to business process modeling starts with publishing activity (company C1 in Figure 3). Based on the structures described in the figure we will try to illustrate the design and implementation of internal workflows customized for a publishing house. Organizational needs include:

- When manuscripts are received, they are managed by reviewing Team Leader.
- reviewing Team Leader decides whom to assign a specific manuscript for initial evaluation.

- Referrer allocated (Reviewer) must complete the task of revising the manuscript and decide whether it meets the requirements of publishing. He can approve or reject the manuscript, on behalf of the publisher.
- If the manuscript is rejected, an email is sent to the author of the manuscript.
- If the manuscript is approved, Proofreading Team Leader is informed that a new manuscript proofreading needs. He assigns one correction to complete this task.
- Correction assigned (Proofreading) is responsible for the correct document.
- Upon completion of the task, the manager is informed that a new book is ready for printing.

For these scenarios described have developed custom workflows using SharePoint Server 2010 SP1 x86 Windows Server, Microsoft Office SharePoint Server and Visual Studio, which allows easy creating them. If the project is run in Visual Studio workflows are automatically integrated into the SharePoint site.

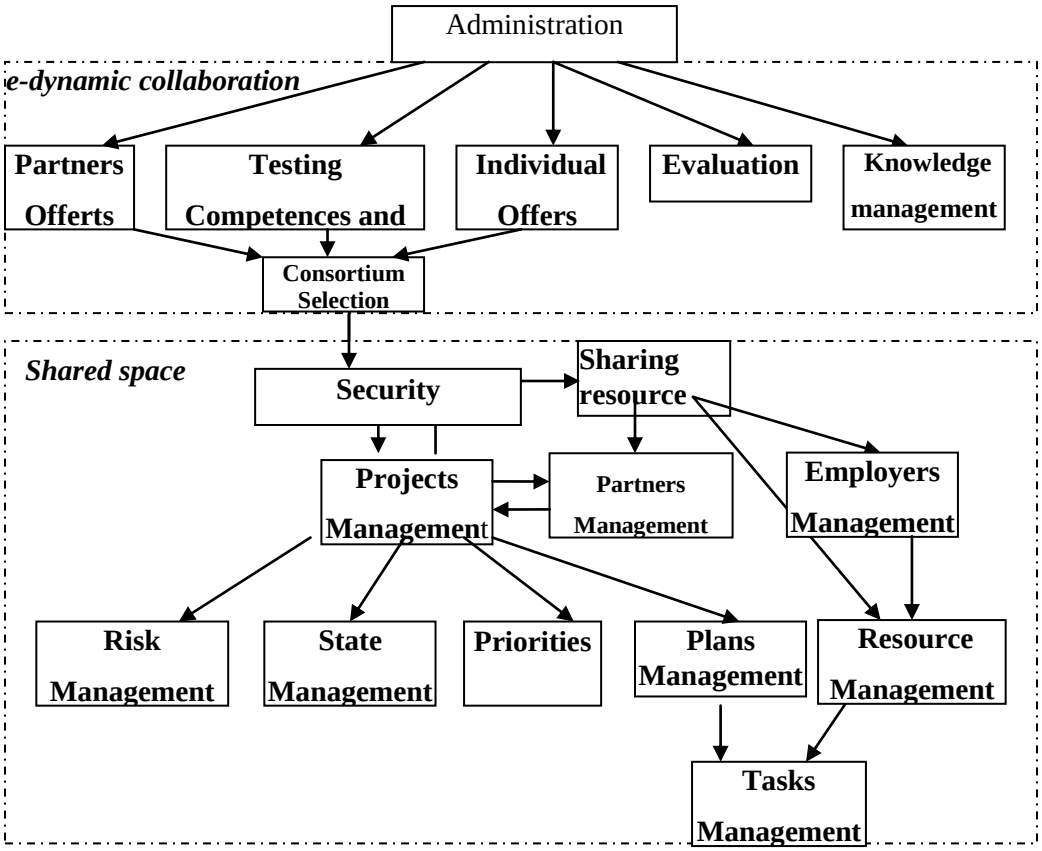
5.3. Business process development in IT companies

5.3.1. Global architecture of collaborative solution

Collaborative model has three dimensions: roles, activities and action logic (Lehtimäki et. All 2005). Analyzing these elements together through these three dimensions, collaboration can be locked in three different ways. First working as actors depict different levels of relationships between collaborating parties, secondly, the collaboration activities - describe interpersonal relationships and - thirdly - action logic describes collaboration as strategic guidance for collaboration.

It appears that the essential element of interpersonal collaboration are becoming the heart / center collaboration and directly or indirectly affect other features. In fact all the collaboration, identified and analyzed, affect each other but it is considered that cooperation is designed, maintained and developed mainly on personal relationships.

Figure 4. A model of dynamic e-collaboration



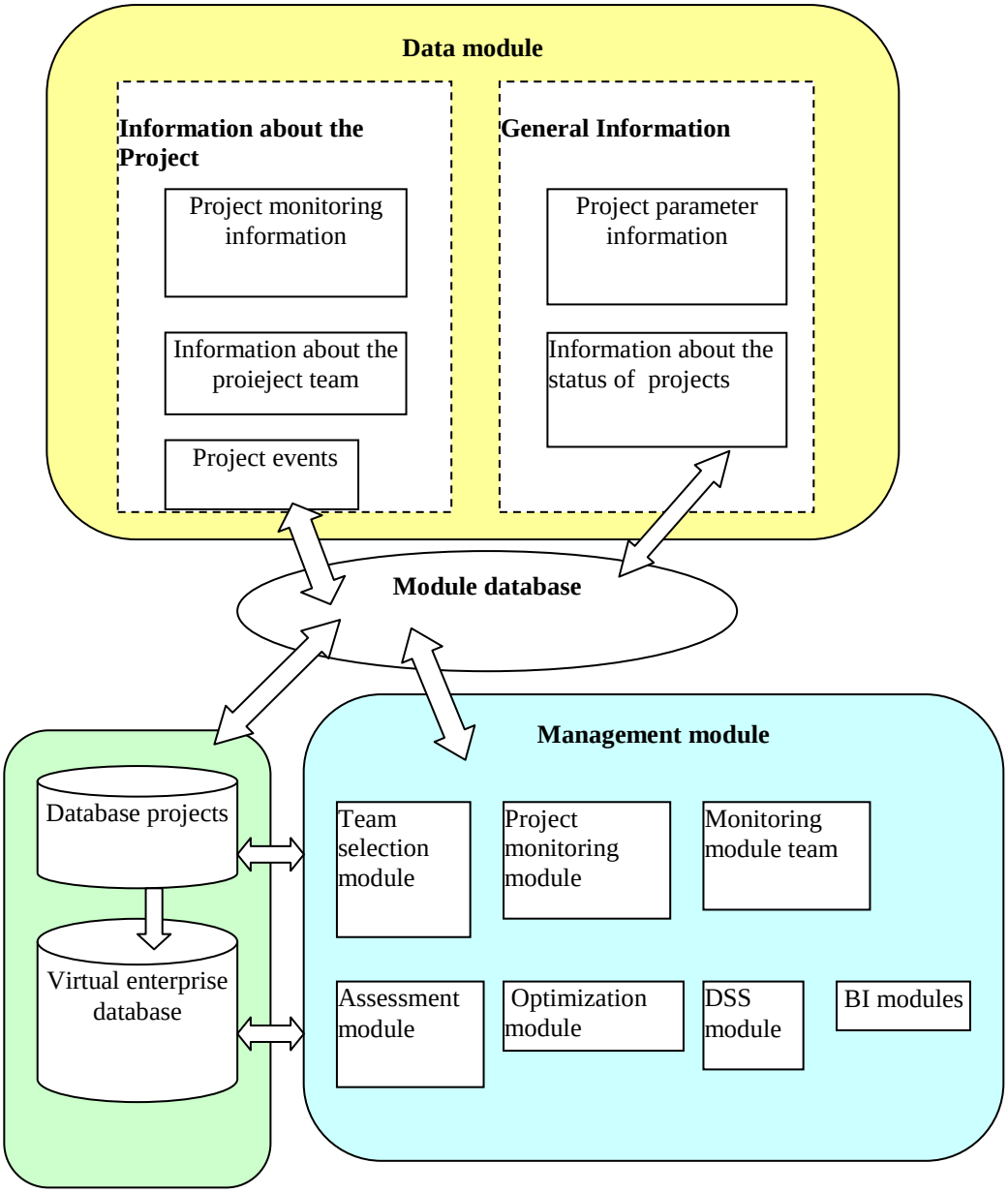
We exemplified these principles on a modular structure that can be grouped into two distinct parts: dynamic collaboration and shared space, both being governed by a strong management module that provides dynamic fucționalități (Figure 4). This solution enables collaborative integration companies B1, B2 and B3 in Figure 13.

5.3.2. Functional architecture

Achieving collaborative portal solution involves dividing it into three distinct parts: data module, management module and how administration database. In the data module will be grouped into distinct categories and General Information and Information Project, because each project is managed separately and has specific activities and phases and their teams.

Project information including: project monitoring components, information about the project team and project related events (deadlines, events, changes in team tasks new etc). General information on project parameters and status.

Figure 5. Virtual Enterprise functional architecture

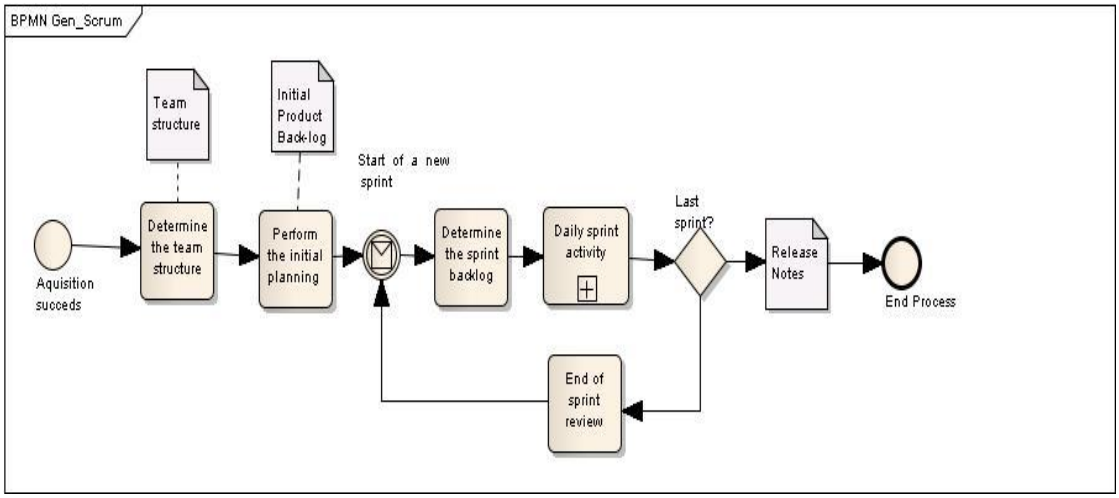


Management module contains several components that provide virtual portal functionalities: the Team selection, project monitoring module, team monitoring module, evaluation module, optimization module and component-specific modules of decision support systems and artificial intelligent (DSS module) and a Business Intelligence (BI). Subsequently develop a Knowledge management module (Figure 5).

5.3.5. Using SCRUM methodology in IT BPM

Scott W. Ambler defines modeling agile (Agile Modeling AM) as a "process of software based practices whose purpose is to describe how to model and document in an efficient and agile". It is agile modeling that can be used in the software, such as Extreme Programming (XP) , Microsoft Solutions Framework (MSF) pentru Agile , Rational Unified Process (RUP) , OpenUp , Agile Unified Process (AUP) , şi procesul de Enterprise Unified (EUP).

Figure 6: Scrum Process Model [2]



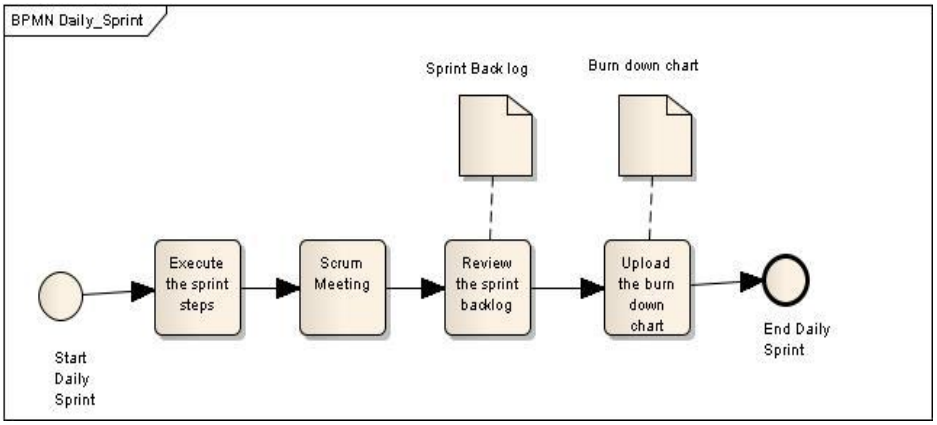
The first three cases cover the AUP covers the complete process development and software, including development and production.

[2] RUSU Lucia , IUGA Marin, **MARȚIȘ Simona**, Business Process Development Using Agile Methodology, 18th International Economic Conference - IECS 2011 - Crises After The Crisis. Inquiries From A National, European And Global Perspective, Sibiu, 19-20 May 2011, pp.215-224, supported by SICOMAP

All these processes include the model and documentation activities, if XP and MSF modeling process should be better defined, and if RUP and EUP modeling processes may be defined to be more agile (Ambler, 2005).

A BPMN model for Scrum process in an IT company can be seen in Figure 7 and Figure 8.

Figure 7: Daily sprint activity model ([2])



Agile methodology promotes a progressive, iterative development functionality (including the signature method), the visibility of test coverage given change impacts. Basically, starting from this premise, the change is cheap if properly supported and is proven to move confrontation with Agile methods because they are more receptive to improvements.

5.4. Business processes modeling in call center companies

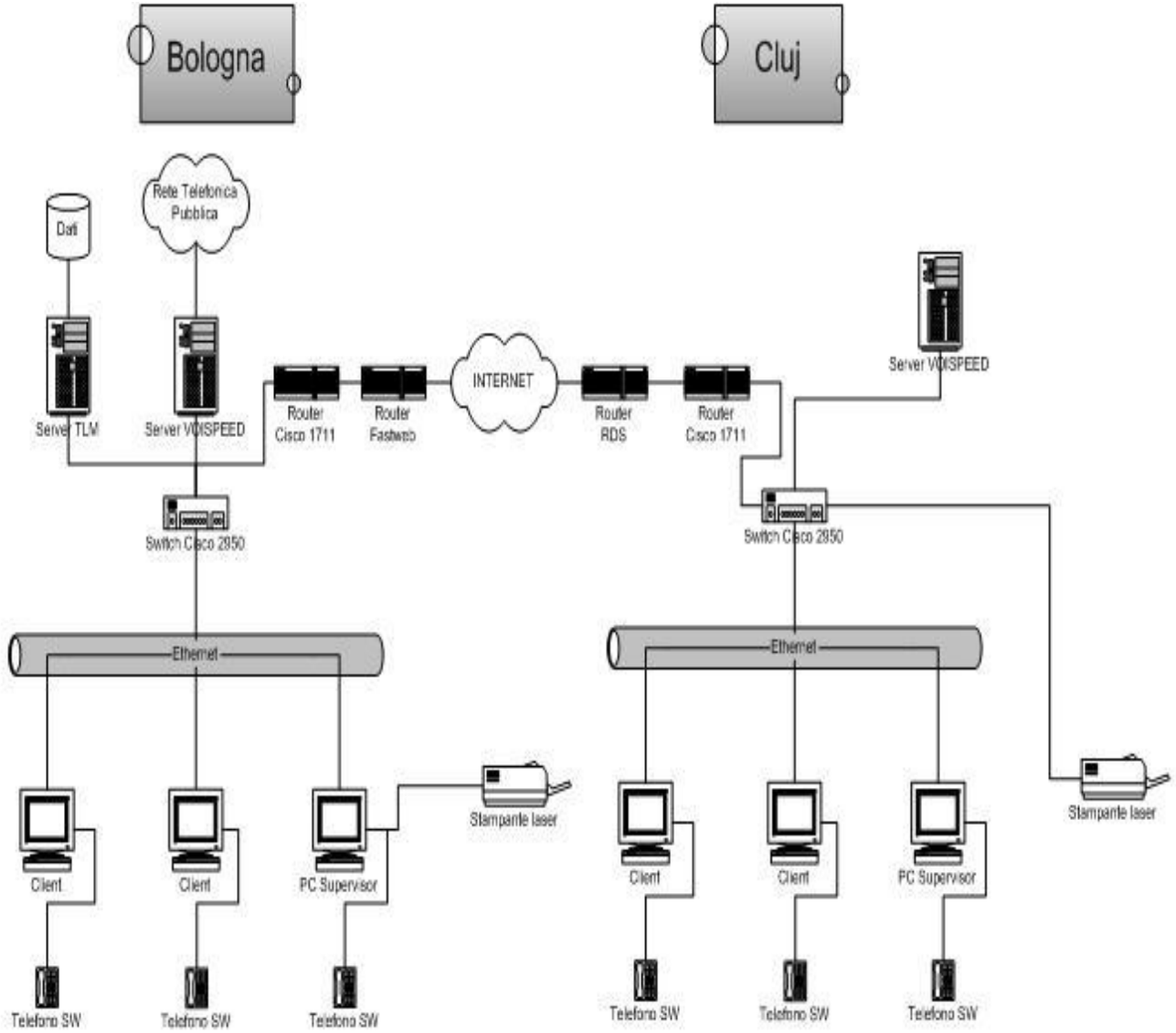
We intend to develop business models (BP1 and BP2) based on interactions described in Figure 3, where we will focus on the interaction between firms A1, A2 and A3 benefiting from cloud computing solutions from industry B. These companies call center I study marketing and recruitment firms in the industry both in industry B and C (Figure 3).

5.4.1. Cloud solutions in call center companies

Cloud Call Center solution for connecting two servers based on VOICESPEED about Cisco routers and RDS. Another switch connects clients to the server and telephone supervisors

(Figure 8). Each server is based on a distributed architecture functionalities and provides for monitoring, geographical location, campaign management, call center employers. Software architecture and give detailed statistics for log analysis, scripts, CATI and other parameters that are specific campaigns and human resource management.

Figure 8. Cloud architecture of a call center[3]



3 **S. Marțiș**, L. RUSU, E. ȚOLEA, A Solution for Improving Human Resource Management in Services Company , Proceedings of The 19th Telecommunications forum TELFOR 2011 Serbia, Belgrade, November 22-24, 2011, ISBN 978-1-4577-1500-6/11, ©2011 IEEE, pp.1273-1276, BPM

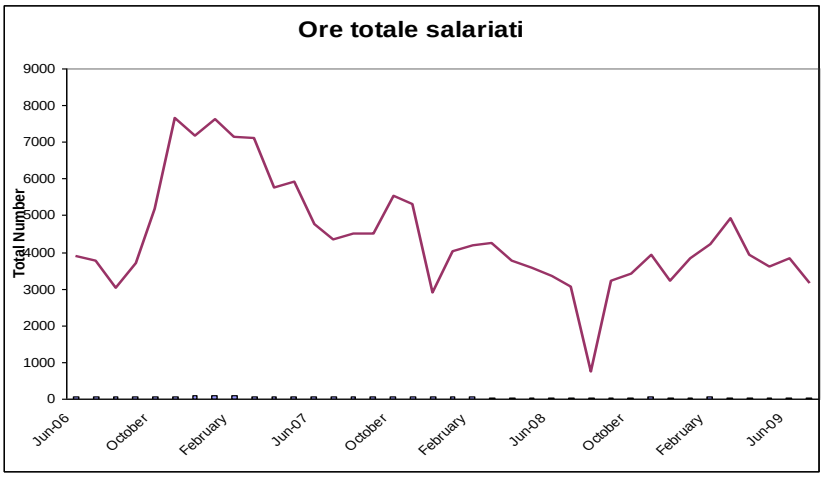
The software has a distributed architecture: a client server solution, phone integration, data import / export, management amount of CATI, map and geo-location, monitoring call center, Log Analyzer, Message server publishing system meetings (Telmar2000, 2009), (Kleinhempel & Rusu, 2010).

Client-server architecture allows a high efficiency, safety data processing, speed of access and / or modification of data. These features allow a database management appreciable performance. Integration with any mobile device and compilation TAPI (Telephony Application Programming Interface) or VoIP technology (Voice over Internet Protocol) (SIP-Session Initiation Protocol Protocol/IAX- Inter-Asterisk eXchange) offers an analogue or digital, or most or traditional phone connections to devices.

5.4.2. Efficiency and managementul in call center companies

We analyze the statistics and dynamics of global human resources using pooled data for the last three years and two relevant campaigns.

Figure 9: Dynamics of hours worked in call center



Number of contacts a call center operator can achieve a time each day depends on:

- Type of business;
- The complexity of speech;

- General difficulty getting in contact with the subject (receiver). If a large companies have dedicated campaigns, it takes time during the arrival of the secretary, the associate director of the company;
- Delay time for results recording.

We related the indicators of efficiency of call centre noted:

• *% off* (percent of off) - fall in 15% of the total time of each system operator;

• 10% contact rate, i.e. nominal 100 call ends with sales to 10;

• *M/h* means Meetings per hour = Total Meeting / Total hours worked (to be within the time specified by the client, somewhere over the value of meeting 0.35 per hour).

If we have a unique indicator for productivity number of meetings per hour *M/h,* for these employers witch can not get only one meeting their productivity is null: M/h=0. In fact if we analyze useful calls we can saw significant results for the several employee which has M/h=0. More than this values, instead all employers from some campaign which has M/h=0 obtained significant number of useful calls.

These indicators has show in Table 3 and Table 4.

After analyzing the data set, we observe that:

• Although the campaign meetings B are increasing, people uninterested in Campaign B nearly double the amount from the campaign;

• lack of campaign B numbers are 1.5 times higher than in the campaign;

• Recall Campaign B assets are 10% lower than in the campaign;

• Contacts failures are 4 times higher in Campaign A Campaign to B;

• The amount of contacts that are "customers" is substantially equal in both campaigns;

• Contacts are at a level of 2.5% in Campaign B to almost 9% in Campaign A.

For comparison we use two sets: number and percentage of time (% T) so that we can globally statistical analysis of two campaigns, using data from Table 3 and Table 4.

Although the number of appointments are higher in Campaign B (53) compared with Campaign A (489), we see the same proportions in other indicators: no answer, busy, active recall, already client. B 1960 campaign have people out in the campaign target the and have no one. If we compare other statuses in both campaigns will get an increase of 29.94 B campaign - which this level of other statuses is 183,848 - while the campaign has this level of other statuses is 6822.

Table 3: Contacts Status in two campaigns

Explanation	Campaign A		Campaign B	
	No.	**%T**	**No.**	**%T**
Meetings	48	1.62	483	0.83
Contacts	257	8.68	1442	2.48
Failed Contacts	436	14.72	381	0.65
Inactive Recalls	107	3.61	6997	12.02
Outside target	0	0	1943	3.34
Already client	43	1.45	417	0.72
Already contactat	36	1.22	1399	2.4
Uninteresting	1085	33.63	36697	63.05
Number not found	269	9.08	7146	12.28
Active Recalls	681	22.99	1293	2.22
TOTAL CONTACTS	2962	100	58201	100

Table 4: Global Statistics of two campaigns

Explanation	**Campaign A**	**Campaign B**
Failed Contacts	436	377
Inactive Recalls	36	2784
Number not found	342	11320
No answer	3394	117047
Busy	1037	9070
Active Recall	1577	43250
Meetings	53	489
Uninteresting	1085	36649
Already contact	36	1396
Already client	47	417
Outside target	0	1940
Total Calls	8043	224739
Useful Contacts	1221	40891
Other status	6822	183848
Total meetings	**53**	**489**

Explanation	Campaign A	Campaign B
Total time	16089	449453
% off	12,83%	13,12%
Ore / campaign	**125,19**	**4225,25**
Meetings total hour = meetings / hour per year	***0,43***	***0,11***

Although the number of meetings per hour - the amount of 0.43 to campaign against 0.11 in Campania B, we conclude that the most efficient campaign A. Although the classes are only campaign dedicated to the 4225.25 125.19 hours devoted campaign B, the first campaign is more efficient, although both are off percentage in the 15% required to practice at a level of 12.83% to 13.12% campaign A and for campaign B .

5.4.3. Quality of business process (QoBP)

Process quality refers to the ability of a process to produce and deliver quality products and covers issues such as accuracy, conformity with specifications, reliability (Anupindi, et all, 1999).

Quality of business (QOBP) was split into four quality dimensions: functions, I / O, non-human resources and human resources (Heravizadeh et all 2009).

To highlight the quality characteristics of functions performed by the system Y NIPO I represented the relevant features and all in a row the number of relevant features to function. Based on such tables, the project manager can perform the functions play an important role in the quality process.

In Table 5, we represent each row and column function is to process quality characteristics. Where relevant quality characteristic is observed with Y (yes - yes) and all in a row the number of features relevant to the function of this line.

Table 5. Dimension of Quality function for Telmar software

Caracteristics	Suitability	Accuracy	Security	Reliability	Understandability	Learnability	Time efficiency	Resource utilization	Effectiveness	Productivity	Safety	Satisfaction	Robustness	Total
C1	Y	Y	Y	Y	Y						Y		Y	**7**
C2	Y	Y		Y	Y	Y		Y				Y		**7**
C3	Y	Y	Y	Y	Y	Y	Y		Y		Y			**9**
C4	Y				Y	Y		Y		Y	Y			**6**
C5	Y	Y		Y	Y		Y		Y	Y		Y		**8**
C6	Y	Y		Y	Y	Y	Y	Y	Y		Y			**9**
C7	Y			Y	Y	Y					Y			**5**
C8	Y	Y		Y			Y		Y			Y		**6**
C9	Y	Y	Y	Y	Y	Y		Y		Y				**8**
C10	Y					Y	Y							**3**
C11	Y	Y	Y	Y										**4**
C12	Y		Y			Y	Y	Y			Y			**6**
C13	Y	Y	Y	Y	Y	Y				Y			Y	**8**
Total	**13**	**9**	**6**	**10**	**7**	**6**	**6**	**5**	**4**	**4**	**6**	**3**	**2**	

Legend: C1-Liability access, C2-information next phone operator, C3-notes and schedule future calls, C4-Call Failed, failed, incorrect numerical notation C5, C6-Rating-already customers, C7-Rating - already called , C8-recharge numbers for the next campaign, C9-Report by e-mail, fax Report C10-, C11-Report archive, C12 - List of appointments, C13-Updating the database.

For example, totals 9 for function calls and programming notes following characteristics indicates that 9 of 13 relevant and important for this function. Scoring functions wrong number, email and report on database update we 8 of 13 relevant characteristics important for these functions. If this table is made for each business process, the process manager can perform the functions play an important role in the quality process.

On the other hand, *adequacy and reliability* are the highest totals, 13 and 10, which indicates that these features are very important as both process and per unique feature of the process - for the adequacy or almost every function - for *reliability*. *Robustness* is the lowest total (2) indicates that it is not of particular importance in this process.

Table 6. Dimension of Quality function for NIPO software

Caracteristics	Suitability	Accuracy	Security	Reliability	Understandability	Learnability	Time efficiency	Resource utilization	Effectiveness	Productivity	Safety	Satisfaction	Robustness	Total
C1	Y	Y	Y	Y	Y						Y		Y	**7**
C2	Y	Y		Y	Y	Y		Y				Y		**7**
C3	Y	Y	Y	Y	Y	Y	Y		Y		Y			**9**
C4	Y				Y	Y		Y		Y	Y			**6**
C5	Y	Y		Y	Y		Y		Y	Y		Y		**8**
C6	Y	Y		Y	Y	Y	Y	Y	Y		Y			**9**
C7	Y	Y	Y	Y	Y	Y	Y		Y		Y			**9**
C8	Y	Y	Y	Y	Y	Y	Y				Y			**8**
C9	Y	Y	Y	Y	Y	Y				Y			Y	**8**
Total	**9**	**8**	**5**	**8**	**9**	**7**	**5**	**3**	**4**	**3**	**6**	**2**	**2**	

Legend: C1-Liability access, C2-Information on the following telephone operator, C3-Notes and schedule future calls, C4-Call Failed (refusal); C5-Rating wrong numbers, C6-Scoring already interviewed, C7-Rating numbers occupied, C8-Rating numbers outside the target group, C9-Updating database

5.4.5. BPM Model in Human resource management

We try to follow four call center companies point of view in recruitment process and human resource management process based on linear business model (Figure 9). After an interview we classified two ability categories for every call center employers: *minimum abilities* and *transfer abilities.*

In first category we have: Ma1- Punctuality, Ma2 -Schedule time, Ma3- Subordination, Ma4-Compliance instructions, Ma5 - Ability to work with minimal supervision, Ma6 – Cooperation, Ma7 - Positive attitude, Ma8 - Trustworthy person, Ma8 – Initiative, Ma9 –

Courtesy, Ma10 – Patience, Ma11 - Ability to allow discussions contradictory, Ma12 – Rationale, Ma13 - Accept suggestions to improve work, Ma14 - Active listening to supervisor, Ma15- Self evaluation, Ma16 - Team spirit.

Figure 9. Human Resource Process Model [4].

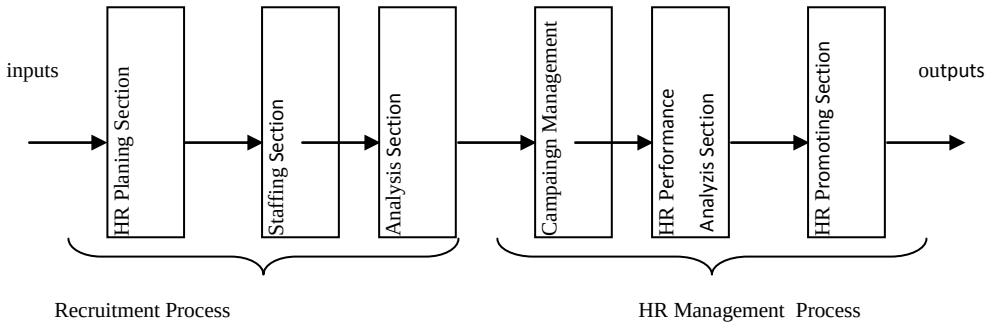


Figure 10. Minimum abilities for call-center job levels([4])

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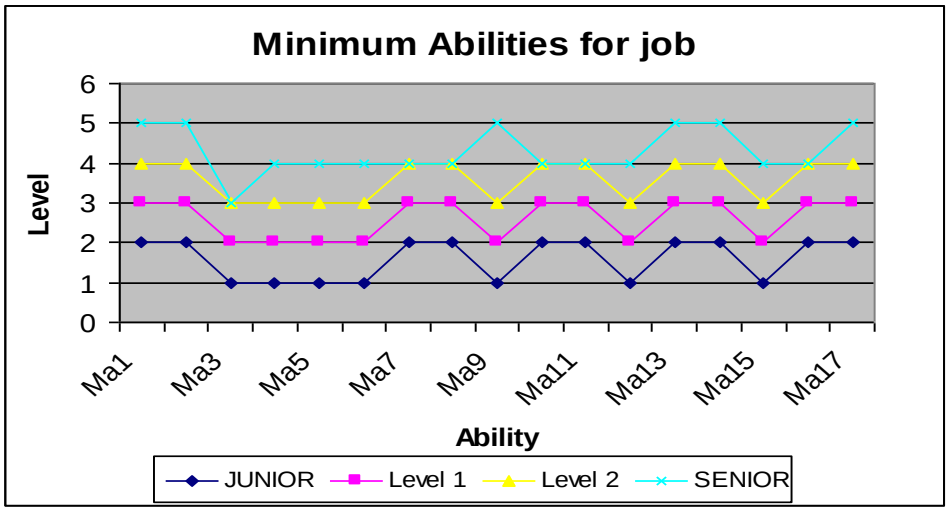
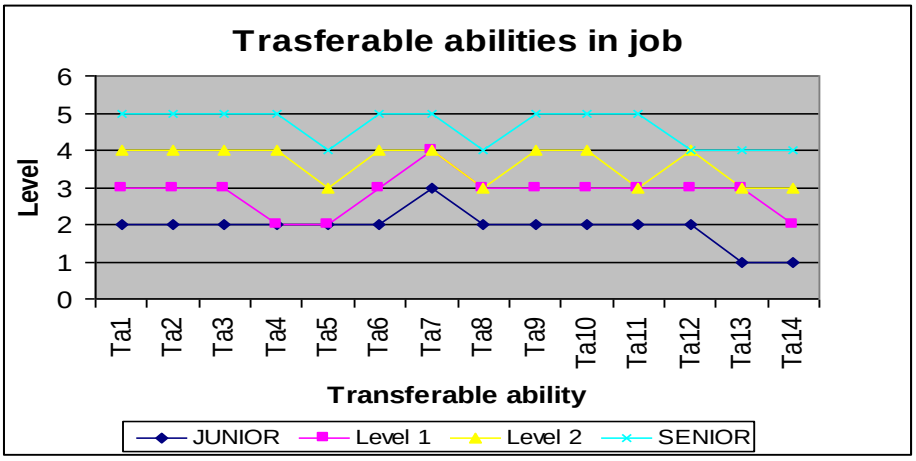


[4] **S. Kleinhempel**, Ş. I. Nițchi, L.Rusu , A BUSINESS MODEL FOR HUMAN RESOURCE MANAGEMENT, "2010 IEEE International Conference on Automation, Quality and Testing, Robotics" AQTR 2010, May 28-30, 2010 CLUJ-NAPOCA, ROMANIA, AQTR, http://www.aqtr.ro, , pp.186-192, ISBN: 978-4244-672-8, IEEE Computer Society, TTTC: Test Technology Technical Council

Transfer abilities contains: Ta1- Interactive problem solving, Ta2 -Individual taking proper decisions, Ta3- Timeliness, Ta4 – Responsibility, Ta5 – Motivation, Ta6 - Verbal expression, Ta7 - Appropriate tone call, Ta8 - Appropriate volume call, Ta9 - Expressing positive feelings through conversation, Ta10 -Condescending towards the interlocutor, Ta11 - Capacity for obtaining acceptances, Ta12 - Change negative rate call, Ta13 - Adaptability according to the call, Ta14 - New ideas for improving the test script. Except Ta6, Ta7, Ta8, Ta9 and Ta12 all of these are fitting to other company's profile.

Figure 11. Transferable abilities for call-center job levels([4])



These costs are recoverable only if the employee will be maintained in the organization a minimum of 6 months of employment. On the other hand, a failure of personnel selection into the training will result from its launch various campaigns it is not effective, do not bring benefits to the organization.

Another growing problem in human resource management call center is a reward system and periodic evaluation of employees, which is finalized by switching to a higher stage level operator, which thus evolves from: *Call Center Junior; Call Center Level 1; Call Center Level 2; Call Center Senior; Call Center Supervisor; Chief telecommunications service*. The transition from one level to another is usually after a period of 1 month between junior and level 1, the 3 months between Level 1 and Level 2, the 6 months between 2 and Senior level for 12 months between Senior level and Supervisor.

In Figure 10 and Figure 11 we pointed *minimum abilities* and *transfer abilities* for Junior, Level 1, Level 2 and Senior, based on a scale from 1 to 5, according to several call center Supervisors opinion, as an average of 7 supervisors opinion.

If a Junior started with minimum 1 at most abilities, for call center Level 1 the requirements starts at 2 or 3 for both categories, and Level 2 median is 3.42. Supervisor has 3 at Ma3- Subordination, and 4 at Ma4-Compliance instructions and other few abilities. His/her median is 4.23.

Even *domain knowledge* is not so high for Junior, *Qualification* and *Certification*, is expensive for a call center company, in fact for every company, and *Experience, Time Management, Communication Skills* are the features which we intended to measure in order to evaluate quality of human resource and promoting from one level to another.

5.4.6. Quantitative analysis of human resource management model (HBPM)

Each human action can be characterized from quantitatively point of view with a set of parameters. If we note T – the time to complete the action, P - human productivity, S - size of the portion of task which is being solved, and D - the difficulty of the portion of the task, we assume that T is equal to the effort E consumed by the person [8].

The work portion W done by the person can be represented as

$$W = EP = TP \qquad (1)$$

The same work portion can be represented as the product of the portion size S and difficulty D.

$$W=SD \qquad (2)$$

If we will equalize expressions (1) and (2) we can obtain a balance equation that incorporates all the quantitative measures of the human's single action:

$$TP = SD \qquad (3)$$

From here we can have an expression for human action's duration:

$$T = \frac{SD}{P} \qquad (4)$$

or we can have an expression for human action's productivity:

$$P = \frac{SD}{T} \qquad (5)$$

In our study we will use equation (5) because every call center software can give detailed sheets about employees time, campaign duration, and several specific indicators about total meetings, % of *off* and other specific indicators.

The simplicity of expressions (4) and (5) hides the obvious fact that all parameters in it are interrelated. Firstly, there is a very complicated functional relationship between difficulty of task *D* and human productivity *P*. Secondly there is another relationship between the size of task and its difficulty. This simply means that any separate change of size, difficulty or human productivity will lead to a change not only for the human action's duration but also for the changes of two remaining parameters. For instance ΔS change of the task's size will lead not only to the change of action's duration, but also to the changes ΔD of task difficulty and ΔP of human productivity. As a resulting ΔT change of task duration will be a complicated function of ΔS, ΔD and ΔP, although we had changed only the size of the task. This phenomenon is well known from the other fields of science and technology. Expression (4) and (5) can be used for several purposes including geometrical modeling of the space of human actions, schedule risk analysis, change analysis (Barseghyan, P.,2009).

In our case study we have same size *S* of tasks but the productivity *P* can be different from a person to other. In this case if we rewrite equation (3) we obtain:

$$\frac{T}{S} = \frac{D}{P} \qquad (5)$$

For a campaign script left member must be constant, because the content of the script is well defined at the beginning of campaign. For this reason two call center operators, which have different productivity P_1 and P_2 will have same constant relation:

$$\frac{D_1}{P_1} = \frac{D_2}{P_2} \equiv cons\tan t \qquad (6)$$

If we note with *M*- number of meetings, *Ct*-number of total calls *Cu*- number of useful calls; *Ac* – number of already clients; *Ao* - number of already contacts; *At* – number of persons out of target; *Ui* – number of uninterested person, *Os* – Other status, we obtain number of useful calls *Cu*:

$$Cu=M+Ac+Ao+Ui+At \quad (7)$$

and *Ct* - number of total calls:

$$Ct=Cu+Os \quad (8)$$

For every customer is very important the number of meetings *M* and *Cu*- number of utile calls. Other status analyze in deep like: *Contact broke, Recall bankrupt, Phone number nonexistent, No answer* or *Busy s*how campaign management inefficiencies such as: wrong period for calling, script problems, un-proper databases.

Table 7. Detailed indicators for campaign 1 ([4])

Employee	Mee-ting (n)	Total Calls (n)	Useful Calls (n)	Tn (h)	Tt (h)	% off	*M/h*
Emp. 8	9	459	88	15.32	9,20	14,48	0.97
Emp. 5	7	658	86	21.97	8,25	9,60	0.84
Emp. 10	5	432	69	14.40	6,5	16,12	0.77
Emp. 12	3	490	103	16.33	7,50	11,39	0.40
Emp. 15	3	429	54	14.30	6,35	13,91	0.47
Emp. 14	3	403	64	13.43	5,15	10,15	0.58
Emp. 2	3	272	46	9.07	4.00	13,61	0.73
Emp. 4	3	245	40	8.17	3,98	12,38	0.77
Emp. 19	2	321	69	10.68	5,80	11,91	0.34
Emp. 6	2	62	11	2.07	1,20	4,06	1.62
Emp. 17	1	430	99	14.33	6,50	15,07	0.15
Emp. 3	1	101	22	3.37	3.00	11,92	0.32
Emp. 7	1	64	4	0.02	128.00	1,96	1.02
Emp. 1	0	276	59	9.20	6,50	15,6	0.00
Emp. 9	0	30	2	1.00	0,25	20,23	0.00
Emp. 11	0	46	8	1.53	1,00	1,34	0.00
Emp. 13	0	70	14	2.33	1,00	7,13	0.00
Emp. 16	0	113	3	3.77	1,00	15,54	0.00
Emp. 18	0	145	24	4.83	4,50	5,79	0.00
Emp. 20	0	128	23	4.27	1,5	5,16	0.00
Emp. 21	0	44	9	1.47	0,55	11,17	0.00
Emp. 22	0	32	4	1.07	0,90	5,44	0.00
Emp. 23	0	95	14	3.17	1,10	8,02	0.00

In management activity there must be considered those times called "*dead stroke*" or "*off times*" consisting in times of operating software for the following activities:

- *Ts*- time for saving information;
- *Tc* – time for saving notes about conversation;
- *Ti* – time to initiating a new call.

For the efficiency and profitability of the organization, time off must not exceed 15% of the total allocated a campaign. This means - in absolute terms - that if we have 60 minutes in the system operator can be inactive only 9 minutes. If the idle time increases, the prognosis is not the same.

Every employers can be paid by nominal time (Tn) which depends on total useful time Tt and off times:

$$Tn=(Tc + Ts + Ti + Tb) + Tt \quad (9)$$

The indicators of efficiency of call center noted:

• *% off* (percent of off) - fall in 15% of the total time of each system operator;

• 10% contact rate, i.e. nominal 100 call ends with sales to 10;

• *M/h* means Meetings per hour = Total Meeting / Total hours worked (to be within the time specified by the client, somewhere over the value of meeting 0.35 per hour).

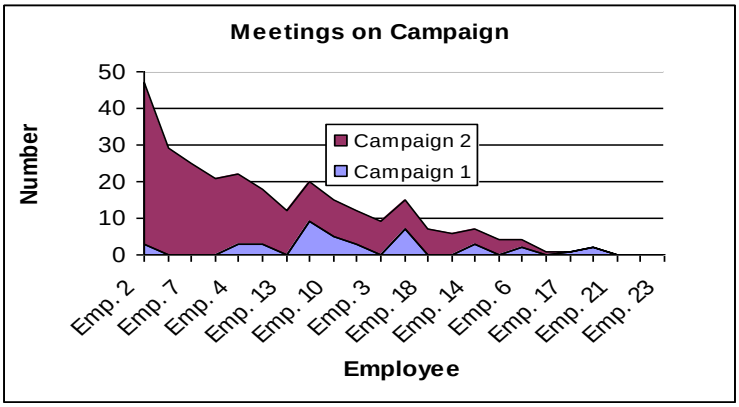
Table 7 and Table 8 describe these indicators for two campaigns which involved 23 employee for Campaign 1 and 17 employee for Campaign 2. Data are sorted by number of meeting *M* and our model will be described based on productivity and efficiency for every employees. We can saw that *Tn* is greater than *Tt* in all situation, the proportions depend on number of meetings and useful calls. The proportion of useful call *Cu* from number of total calls *Ct* will be analyzed in detail, based on employee productivity.

If we have a unique indicator for productivity number of meetings per hour *M/h*, for these employers witch can not get only one meeting their productivity is null: M/h=0. In fact if we analyze useful calls we can saw significant results for the several employee which has M/h=0. Such example is Employee 9 in Campaign 2 which has 28 useful calls and Employee 1 in Campaign 1 which has 276 useful calls and. More than this values, all employers from Campaign 1 which has M/h=0 obtained significant number of useful calls.

Table 8. Detailed indicators for campaign 2 ([4])

Employee C2	Mee -ting (n)	Total Calls (n)	Useful Calls (n)	Tn (h)	Tt (h)	% off	*M/h*
Emp. 8	44	6834	730	227.72	112.00	18.85	0.00
Emp. 2	29	4689	922	156.27	94.50	9.99	0.31
Emp. 19	25	4080	557	136.02	99.7	15.19	0.25
Emp. 7	21	5023	816	167.40	126.30	13.43	0.16
Emp. 11	19	7166	1550	238.82	122.00	13.09	0.15
Emp. 4	15	5521	571	183.97	106.00	18.61	0.14
Emp. 12	12	6246	1041	208.10	105.15	11.85	0.00
Emp. 13	10	6645	1258	221.47	114.50	12.17	8.72
Emp. 10	9	4564	906	152.15	90.18	9.79	9.97
Emp. 15	9	1791	346	59.72	52.15	5.88	0.00
Emp. 3	8	1508	195	50.25	21.00	11.88	0.38
Emp. 5	7	5470	800	182.17	69.83	14.85	0.10
Emp. 18	6	5822	1182	194.10	84.00	10.58	7.14
Emp. 1	4	7342	1351	244.73	111.67	11.62	3.58
Emp. 16	4	2889	477	96.25	65.70	7.91	6.08
Emp. 14	2	4282	379	142.72	66.15	13.83	3.01
Emp. 6	1	1352	252	45.07	21.98	11.74	4.56
Emp. 9	0	222	28	7.40	4.00	17.56	0.00
Emp. 17		2		0.07	0.00	53.33	0.00

Figure 12. Employee hierarchy in two campaign ([4])



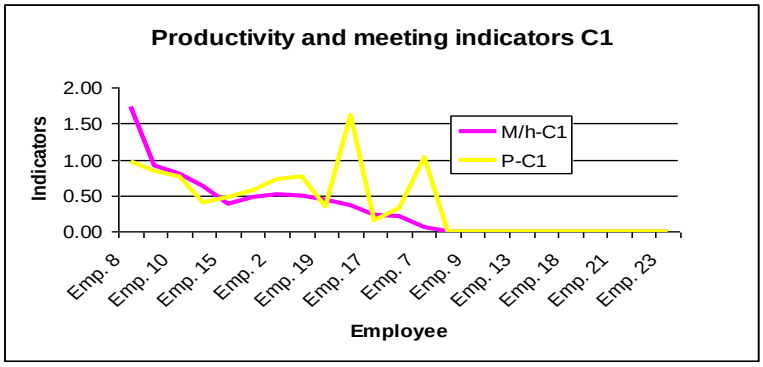
If we consider the report by total calls *Tn* and value of useful calls (*Cu)* we obtain for productivity:

$$P = \frac{Tn}{Cu} = \frac{(\text{Tc} + \text{Ts} + \text{Ti} + \text{Tb}) + \text{Tt}}{\text{M+Ac} + \text{Ao+ Ui+At}} \qquad (10)$$

And for employee efficiency E (or effort):

$$E = \frac{Tt}{Cu} = \frac{\text{Tt}}{\text{M+Ac} + \text{Ao+ Ui+At}} \qquad (11)$$

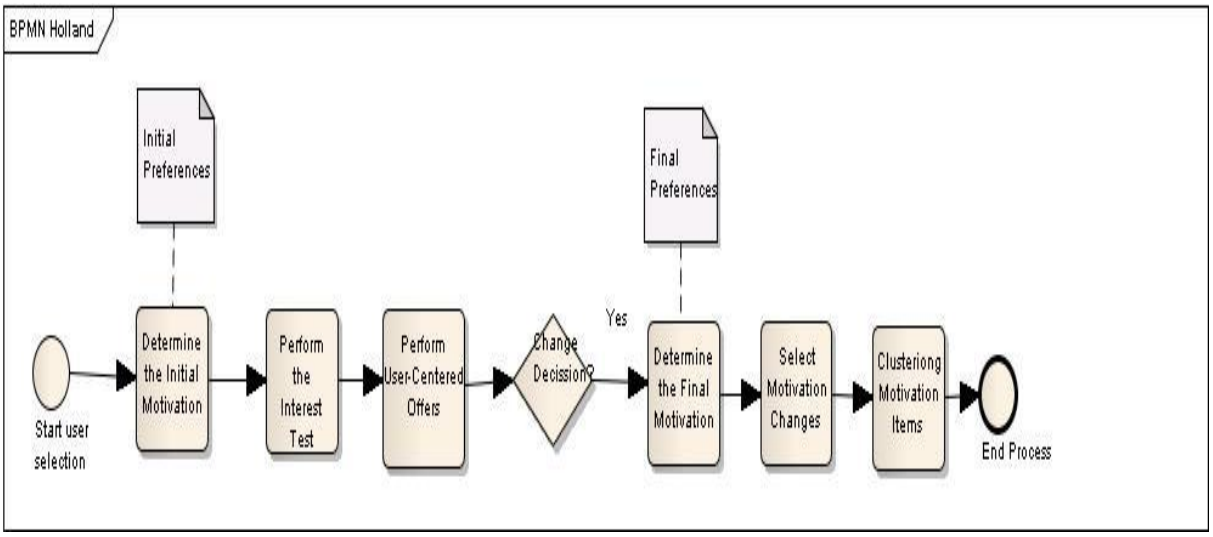
Figure 13. Productivity and meeting in Campaign 1



5.4.7. BPM extended model with HCC specific components

The proposed model (Figure 14.) is extended with specific components of interest questionnaire HCC using Holland- both in the staff selection and promotion during it. The initial motivation of potential employees is analyzed after test completion and evaluation Holland.

Figure 14. The Business Process Human Resource Management (HRM) [5]



Job offer is tailored dominant feature and skills demonstrated on the evaluation Holland tests. Note that this test is applied in parallel with minimum skills assessment tests and those transferable (Figure 1439).

Interest questionnaire used is based on Holland's theory. The author believes that people have different interests to work with people, objects, ideas or facts based on personality types: realistic (R), Investigative (I) Artistic (A) Social (S), enterprising (E) or conventional (C). Applying this questionnaire allowed a better career guidance and guidance to improve their specific and transferable skills, in accordance with various features of the personality of each employee.

Applying this questionnaire allowed a better career guidance and guidance to improve their specific and transferable skills, in accordance with various features of the personality of each employee.

5.5. Conclusions

The central idea of our approach is the model of e-collaboration in which we exemplified proposed dynamic solution offered by IT companies, call center companies that have adopted

[5] L.Rusu, I. Şolderea, **S.Marţis**, D.Muntean, *Career Management Prototype Based on Psychological Types,'* Proceedings of The 7th International Conference on Management of Technological Changes - MTC, 2011, "ISI Web of Knowledge", ISI Proceedings Database , supported by BPM

cloud computing solution and a manufacturing company (printing). This model is analyzed in terms of BPM solutions offered to IT companies and call centers.

Business models that we have developed are based on the level of abstraction of business processes (Figure 1.) Respectively a) and b1) for IT companies and b2 and two publishing companies call center, presented in Chapter 1.

6. Final Conclusions

Dynamic e-collaboration solution approach and cloud computing is a viable option for cooperation and development firms, especially in the extended economic crisis. Based on the comparison between the characteristics of business and use case and we opted for BPM between these solutions development.

We detail the particular issues that have presented their arguments to justify the usefulness of a collaborative operating model (Figure 3), centered on cloud computing solutions. Integrating e-business and e-collaboration is a dynamic competitive advantage for manufacturers and service providers and facilitate attracting more customers. The model was refined for the 3 types of industries, highlighting the features of each and interactions that allow the creation of new business processes. These specific models have been considered specific activity and the two-way dynamics governing e-collaboration: trust and need.

We discussed the technical aspects of the implementation of BPMN models and HRM applications to achieve effective collaboration and BPM to solve some problems and TQM. Our contribution is based on research and identify own models and tools for 3 categories of companies: typography, call center companies and IT companies that are suppliers and customers for processes modeled in e-collaboration solution dynamics.

Agile methodology defines a software development method that minimizes the cost of change, especially in the context of several risk management factors: delay a project or if we are required to adapt project several factors that appear unchecked. AUP methodologies may be more than programming methodologies in order to increase speed in software development.

We tried to create an overview of what BPM is and how it is done in an IT company in typography or a specific solution based on call center activities. I pointed BPM principles and practices, and we exposed the 4 dimensions of quality of business: quality function, size of the input / output quality non-human resources and quality of human resources. We identified characteristics of each dimension of quality in hand, trying to correlate them with specific call center companies. A call center has the potential to facilitate collaborative communication companies, particularly to monitor and manage customers, products and services.

Selected Bibliography

1. Ambler, S.W. (2007a) Agile Modeling and the Rational Unified Process (RUP), John Wiley & Sons 2007
2. Ambler, S.W. (2007b) Agile modeling, John Wiley & Sons ISBN#: 0471202827
3. Anupindi, R., Chopra, S., Deshmukh, S., Mieghem, J., Zemel, E. (1999), Managing Business Process Flows. Prentice Hall, Englewood Cliffs
4. Bruce and D. Kutnick, Building Operational Excellence: IT People and Process Best Practices (Pearson Educational, 2002).
5. Chang, J. F. (2006), Business Process Management Systems – Strategy and implementation, Auerbach Publications, New York
6. Champy, J, Reengineering Management: Tehe Mandate for New Leadership, Publisher : Harper Business, October 1994, ISBN: 0887306985
7. David Hollingsworth, Workflow Management Coalition – The Workflow Reference Model, disponibil online la http://www.wfmc.org,2001, last access 12.10.2011
8. F. Casati, S. Ceri, B. Pernici, G. Pozzi, Conceptual Modeling of Workflows, 2005
9. Fu -Ren. Lin, Meng-Chyn Yang, and Yu-Hua Pai, A generic Structure for business process modeling, Business Process Management Journal 8(1), 19–41 (2002).
10. G.Reese, Cloud Application Architectures: Building Applications and Infrastructure in the Cloud (Theory in Practice (O'Reilly)), 2009, ISBN 978-0-596-15636-7
11. H. J. Harrington, E. K. C. Esseling, and H. van Nimwegen, Business Process Improvement Workbook: Documentation, Analysis, Design, and Management of Business Process Improvement (1997).
12. H. Lehtimäki, J. Kujala, and K. Rehbein, *Examining Strategy Documents in the Internet: How Companies Express MultiVoicedness and Stakeholder Inclusion?,* Frontiers of eBusiness Research, Conference Proceedings, Volume 2, pp. 685-693, 2005.
13. Hammer, M. and Champy, J. (1993), Reengineering the Corporation: A Manifesto for Business Revolution , Harper Business, New York, NY.
14. Heravizadeh, M., Mendling, J., and Rosemann, M. (2009), Dimensions of Business Processes Quality (QoBP), D. Ardagna et al. (Eds.): BPM 2008 Workshops, LNBIP 17, Springer-Verlag Berlin Heidelberg , pp. 80–91,

15. Juric, M., Sasa, A.: Effective Process Modeling with BPM & BPMN, disponibil on-line la http://refcardz.dzone.com/refcardz/bpm-bpmn
16. Kleinhmpel, S. (2010), Calitatea managementului proceselor de afaceri în companiile call center – proiect de cercetare, Cluj Napoca
17. Lehtimäki, Hanna, Kujala, Johanna & Rehbein, Kathleen. 2005. Examining Strategy Documents in the Internet: How Companies Express MultiVoicedness and Stakeholder Inclusion? Feb. 2005, Frontiers of eBusiness Research 2005, Conference Proceedings, Volume 2, pp. 685693.
18. L. Rusu, S. Kleinhempel, D. Benta, Individual Versus Collaborative Decision For Analyzing Companies Performance, - Qmhe2010 - Organized By "Gheorghe Asachi" Technical University Of Iasi, Romania, Through Center For Continuing Education And Training (CETEX) Tulcea, Romania, on July 8th - 9 Th, 2010, Http://Www.Cetex.Ro/Qhme, Supported By Side
19. L. Rusu, S. Kleinhempel, M. Podean, Entrepreneurship Skills Development For Document Management, International Seminar Quality Management In Higher Education – QMHE, 2010 - Organized By "Gheorghe Asachi" Technical University Of Iasi, Romania, Through Center For Continuing Education And Training (Cetex) In Tulcea, Romania, On July 8th - 9 Th, 2010, Http://Www.Cetex.Ro/Qhme, Supported By Sicomap
20. Lucia Rusu, Corina Sima, Simona Kleinhempel, Optimize Internal Workflow Management, The Economy and the NewInformation Technologies Workshop, 19 february 2010, Suceava, Romania, supported by BPM, Journal of Applied Computer Science and Mathematics, Suceava, supported by BPM, , no 7/2010, pp.91-99, eISSN : 2066-3129, ISSN: 2066-4273, ex JACS ISSN:1843-1046, http://jacs.usv.ro, Directory of Open Access Journals DOAJ, ICAAP – Journal Database, Genomics Journal Seek, Thomson Reuters in Scientific Web Plus
21. Lucia Rusu, Marin Iuga, Simona Kleinhempel, Business Process Development in Collaborative IT Companies, The Proceedings of 2nd Symposium on Business Informatics in central and Eastern Europe, 2011, ISBN 978-3-85403-280-9, Oesterreichische Computer Gesellschaft, pp. 268-277, BPM.
22. Lucia Rusu, Simona Kleinhempel, Razvan Costin, Sergiu Jecan A COLLABORATIVE MODEL FOR VIRTUAL ENTERPRISE, Journal of Information Systems & Operations Management, Bucharest, 2010, , Vol. 4, Nr. 2, pg. 33-42, December 2010, ISSN 1843-4711, CNCSIS B+;
23. L.Rusu, I. Şolderea, **S.Marţis**, D.Muntean, *Career Management Prototype Based on Psychological Types,'* Proceedings of The 7th International Conference on Management of Technological Changes - MTC, 2011, "ISI Web of Knowledge", ISI Proceedings Database , supported by BPM

24. Niţ chi Ioan Ştefan, Airinei Dinu, Arba(Cordis-Herbil) Raluca, Benţa Dan, Brandas Claudiu, Buchmann Robert, Crisan Emil Lucian, Homocean Daniel, Jecan Sergiu, **Kleinhempel Simona**, Mihaila Adrian-Alin, Muntean Mihaela, Nagy Ilona Mariana, Petrusel Razvan, Podean Ioan Marius, Rusu Maria Lucia, Sitar-Taut Dan Andrei, book, *Sisteme inteligente de asistare a deciziilor*, Risoprint, Cluj-Napoca, 2010.
25. OMG Business Architecture Special Interest Group , http://bawg.omg.org
26. P. Barseghyan, "Human Effort Dynamics and Schedule Risk Analysis", *PM World Today* – Featured Paper , March 2009
27. Robertson, S. Robertson, J. (2006) Mastering the Requirements Process 2nd Edition, Addison Wesley
28. RUSU Lucia , IUGA Marin, MARŢIŞ Simona, Business Process Development Using Agile Methodology, 18th International Economic Conference - IECS 2011 - Crises After The Crisis. Inquiries From A National, European And Global Perspective, Sibiu, 19-20 May 2011, pp.215-224, SICOMAP
29. S. Kleinhempel, L. Rusu, Quality of Business Process Management in Companies, 17TH International Economic Conference – IECS 2010 "The Economic World' Destiny: Crisis And Globalization"Sibiu, Romania, May 13-14, 2010, pp. 231-241, supported by PN2 91-049/2007 SIDE
30. S. Kleinhempel, Ş. I. Nițchi, L. Rusu, Business Process Management in Service-Oriented Companies, Informatica Ecomonica Mangazine, vol. 14., nr.3/2010, 2010,
31. S. Kleinhempel, Ş. I. Nițchi, L.Rusu , A Business Model For Human Resource Management, "2010 Ieee International Conference On Automation, Quality And Testing, Robotics" Aqtr 2010, May 28-30, 2010 Cluj-Napoca, Romania, Aqtr, Http://Www.Aqtr.Ro, , Pp.186-192, Isbn: 978-4244-672-8, Ieee Computer Society, Tttc: Test Technology Technical Council, Supported By Bpm
32. Sankar, C.S., and Rau, K-H., 2006. Implementation Strategies for SAP R/3 in a Multinational Organization, Cybertech Publishing, Hershey, PA, 2006.
33. Silver, B. Argint, B. (2008) (2008) BPMS Watch : BPMN's Three Levels , www.bpminstitute.org , May 8th, 2008, Reconsidered, www.bpminstitute.org , December 2nd, 2008 BPMS Watch: BPMN de trei niveluri, www.bpminstitute.org , 8 mai, 2008, revizuit, www.bpminstitute.org , 02 decembrie 2008
34. Simona KLEINHEMPEL, Ştefan Ioan NIŢCHI, Lucia RUSU, 2010, Business Process Management in Service-Oriented Companies, Informatica Ecomonica Mangazine, vol. 14., nr.3/2010, pp.189-198

35. Thom, W. (2009), People, Process, and Performance Management in Project Management, disponibil on-line la www.pmhut.com/people-process-and-performance-management-in-project-management
36. Ulrich William, Neal McWhorter,Version 7 - February 22, 2010, Defining requirments for a business architecture standard, http://www.omg.org/cgi-bin/doc?basig/2010-02-01
37. van der Aalst, W.M.P., ter Hofstede, A.H.M.: YAWL - Yet Another Workflow Language. Information Systems, Vol. 30(4) (2005) 245-275
38. Wil van der Aalst, Kees van Hee, Workflow Management. Models, Methods, and Systems, 2002, disponibil online la http://mitpress.mit.edu/books/chapters/0262011891chap1.pdf
39. Zachman, J. (2009) Zachman Framework, (http://www.zachmaninternational.com/),, www.bpminstitute.org, last retrieved: december 18

Adrese Internet

1. http://msdn.microsoft.com
2. http://searchCloudComputing.techtarget.com/sDefinition/0, ,sid201_gci1333074,00.html, last access 19.03.2009
3. http://searchExchange.techtarget.com/sDefinition/0, ,sid43_gci213778,00.html>, last access 19.03.2009
4. http://www.adonis-community.com/business_process_management_home.html
5. http://www.agilemodeling.com/essays/agileModelingRUP.htm , last access 22 december 2010
6. http://www.elfconsulting.ro, last access: 28 december 2009
7. http://www.esspl.com/Methodology/ SoftwareProcess/ tabid /83/Default.aspx
8. http://www.inin.com/ProductSolutions/Pages/Contact-Center.aspx
9. http://www.isixsigma.com/library/content/c010204a.asp
10. http://www.lucascomm.ro/solutii?ref=adwords
11. http://www.marketwatch.ro/articol/3554/Esfera__plusvaloare_pentru_managementul_proceselor/
12. http://www.sheltonblog.com
13. http://www.taskmanagementsoft.com/ solutions/articles /planning-project-lifecycle-by-RUP-methodology.php
14. http://www.xlworld.eu/ro/contacts-general.html
15. www.bpm.org
16. www.bpmi.org;
17. www.businessdictionary.com/definition/process.html
18. www.cordys.com

19. www.esomar.org
20. www.oasis-open.org
21. www.neweraofsoftware.com/saas.aspx, last access 20.05.2010
22. www.pmhut.com/people-process-and-performance-management-in-project-management
23. www.sap.com
24. www.telmar2000.com – BY SIB, last access: 28 december 2009
25. www.wecall4you.com
26. www.wfmc.org;