David MELICHAR[*], Josef BASL[**]

THE IMPORTANCE OF THE INFORMATION SYSTEM´S QUALITY IN THE CONCEPT OF THE KNOWLEDGE ORGANIZATION AND THE RELATION TO THE PROCESS ANALYSIS (THEORETICAL BASIS AND PRACTICAL EXPERIENCE)

Abstract
This contribution concerns the problems of information system in the broadest meaning of the word and the approaches and methods used to analyse it. This work examines how they are percepted in present days and what is their mutual relationship. It outlines the possibilities and problems of analysis, defines the relationship of information system and processes. Anyway, many analytic instruments and methods´ results give the similar output as our motto.
This contribution emphasizes the importance of the holistic comprehension of the term "information system" and the importance of its general quality in relation to principles of modern management.

Motto:
„We are drowning in the oceans of data, missing the information we need"

E.M.Goldratt

1. INTRODUCTION

The very majority of our ancestors could trust that tomorrow will basically look like the same as today. At the dawn of mankind the stone industry lasting unchangeable for hundreds of thousands of years. Even later the technological progress was gradual and only from time to time appeared a radical change (agriculture, metal industry, book printing, electricity..), which moved the whole civilization to a qualitatively higher level. But such „ jumps" come more and more often as the history goes on – and they also come more quickly in practise[1]. That's why today the extrapolation of the future from the present trends becomes even more difficult.

[*] Ing. David Melichar, University of West Bohemia in Pilsen, Faculty of Mechanical Engineering, Department of Industrial Engineering and Management, Univerzitni 8, 306 14 Plzen (Pilsen), Czech Republic, e-mail: david.melichar@cortis.cz
[**] Prof. Ing., Josef Basl, CSc., University of Economics, Faculty of Informatics and Statistics, Department of Information Technologies, nam. W. Churchilla 4, 130 67 Praha (Prague) 3, Czech Republic, e-mail:basl@vse.cz
[1] Šrámek D. – Descendants of the Moore's Law http://www.scienceworld.cz/; 2004

According to the modified Moore´s Law the acceleration will continue in the future – mathematician Vernon Vigne and inventor Raymond Kurzweil stand for a hypothesis that present society is close to the point of „Technological singularity“ which would mean the change of the paradigm in the area of technology. It is “technooptimistic“ theory. (Kurzweil´s presumption is the year 2023)

The hypothesis of „technological singularity“says, among others, that the exponential growth of technologies, artificial intelligence and therefore the growth of changes will continue.

But the acceleration is not just a matter of technologies, it shows a common effect.

It is also reflected by the trends of management styles – P.F. Drucker defined at the end of eighties the turbulence within the company management, which according to some authors deepens today even to chaos. These approaches create the philosophy of management in variable environment and management becomes the managing of changes[2]. Simply said the reorganization is permanent. The new way of management is described as a „knowledge organization“. Is defined the paradigm of the knowledge organization.

Today’s methods of management and methods of analysis must count in the accelerating transformation of their environment and be able to react on that. It also brings the necessity of flexible methods of analysis and their presentation, which will reflect the dynamic reality.

The „knowledge organization“ is understood as a complex exercise of all principles of management. The management of knowledge and the principles of self-educating enterprise penetrate all activities of the enterprise.

Knowledge is the top of the information pyramid – the quality of the information system in its broadest meaning [3] (its „hard“ and „soft“ parts) is therefore essential for the successful concept of the „knowledge organization“. As well as effective processes.
Information flow must be therefore considered as well as work flow.

2. OVERVIEW OF THE PRESENT STATE OF PROBLEMS

2. 1 Resources overview

There are several possibilities how to analyse information systems. One of them are „ICT World“ approaches which are more focused on hard component – data and ICT *(Information and communication technology*) architecture (Fig. 1). The second view is „the management world“ where are emphasized the approaches of the knowledge organization (emphasize soft components). The process analysis is somewhere in the middle – some approaches to it are harder, some support soft techniques.

It is necessary during the searching of approaches, not mentioning many publications, to proceed from a many kinds of other sources. There are standards, frameworks and methodologies. They are listed at the end of this contribution. There is no simple approach how to divide different kinds of publications and it is not often sure which publication belongs to

[2] Truneček J. – Knowledge organization in the knowledge society

[3] „Information system is defined as complex of people, technical infrastructure and methods, which ensures collection, storage and processing of data in order to creation and presentation of information for management purposes.Prof. Ing. Zdeněk Molnár, CSc

which category. We can use different ways of their separation. In this contribution they are divided into these three main groups:

- Standards: Rules or standards recognized on national or international level. To this category we can put also „de-facto standards" recognizes in interest groups.
- Frameworks: Unofficial, commonly recognized frameworks, which usually aren't detailed like methodologies, but define the meaning space.
- Methodology: Unofficial, commonly recognized documents on common level often connected with particular instrument. Methodology opposite to Frameworks, includes also the description of solution and notation. Some of them (like ARIS) contain the framework as well.

Despite this given division it is very difficult to classify some of the publications to one category. Many of them show characteristics of more categories and - what is more - they are nearly all in permanent evolution, so the information included changes or getting older very quickly.

Not as the last we have to mention important producers of some information and communication technologies, which thanks to their widespread and included „best practises" become not world and could be generalized as best of breed methods (for example SAP).

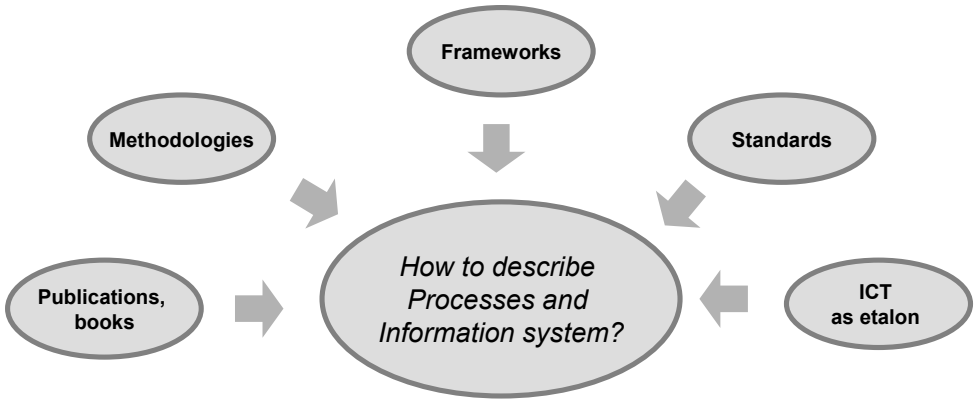

Fig. 1. How to describe reality?

2.2 Enterprise Architecture

Enterprise Architecture (EA) is a discipline, which should cover in the area of modelling and methodology both the worlds – ICT as well as the theory of management. Unfortunately they are getting closer only very slowly in present days.

In the following text the ways and possibilities of enterprise architecture descriptions in whole are developed. Firstly, it is necessary to describe the space, in which the particular approaches and instruments work. As a basic scheme I choose the Zachman Framework, because it is an accepted framework despite some imperfections for specific purposes (e.g. description of IS).

Zachman Framework describes the entire space of enterprise from seven describing perspectives (points of view) and five levels of abstraction (see Fig. 2). It is disadvantage is that it originates from the world of IT and therefore it is more focused on the development and architecture of applications. Despite this it has according to me one essential imperfection – it doesn't distinguish between technologies and processes.

Anyway, it solves one important, often omitted theme: description levels – abstractions and perspectives. By using them we can entitled particular „layers" and cuts in any given analysis.

Perspectives

Abstractions

The Zachman Framework	DATA (What)	FUNCTION (How)	Network (where)	People (Who)	Time (When)	Motivation (Why)
SCOPE (Contextual)	List of things important to the business	List of processes the business performs	List of Locations in which the usiness Operates	List of orgs. Important to the Business	List of Events Significant to the Business	List of Business Goals/Strategies
BUSINESS MODEL (Conceptual)	Semantic Model	Business Process Model	Business Logistics System	Work Flow Model	Master Schedule	Business Plan
SYSTEM MODEL (Logical)	Logical Data Model	Application Architecture	Distributed System Architecture	Human Interface Architecture	Processing Structure	Business Rule Model
TECHNOLOGY MODEL (Physical)	Physical Data Model	System Design	Technology Architecture	Presentation Architecture	Control Structure	Rule Design
DETAILED REPRESENTATION (out-of-context)	Data Definition	Program	Network Architecture	Security Architecture	Timing Definition	Rule Specification

Fig. 2. Zachman Framework

In rising level of details in description rises the necessity of higher formalisation of description as it is shown in the Fig. 3. Formalisation is usually connected with „hard" parts of description. In conformity with today's turbulent environment it is one of the fundamental problems in creating the model of reality. Formally extensive description is demanding on time and money. Often happens that at the time it is completed it does not correspond with reality any more.

Tools and methods can be divided according to their substantial focus into two areas - tools for Business Process Analysis and Enterprise architecture and tools for Software Development (see Fig. 3).

2.3 Possibilities and ways of the enterprise architecture analysis

It is necessary to describe each of the enterprise architecture perspectives in some way. We can deduce that with the growing amount of details must also grow the amount of description formalism. Basically we can use 2 ways of description :

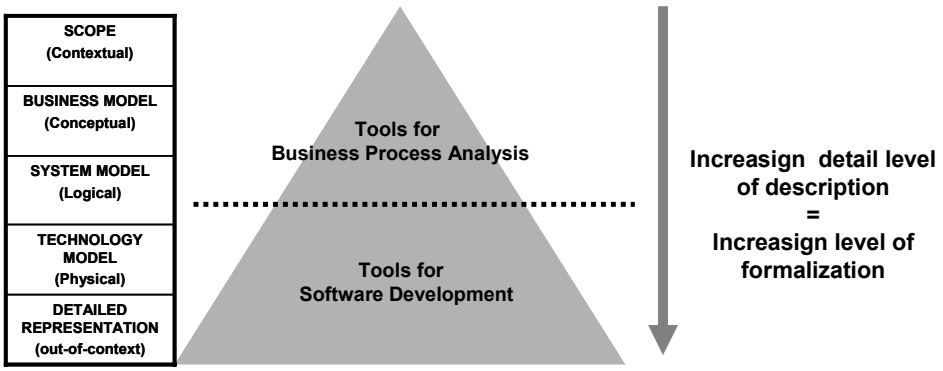

Fig. 3. Levels of abstraction

Graphical form – the advantage of the graphical form is the visualisation of problems, it is supported by software tools. It requires demanding service in a long time horizon and the risk of inconsistent description in broader extent of the work. The advantage of graphical form is more precise interpretation of the matter, removing the communication barriers (misunderstandings) among the enterprise community and towards external subjects (e.g. consulting firm). On the other hand the formalism of expressions could be a barrier (complicated or even not understandable expressions), e.g. in describing complicated processes with many branches and backflows , the expression is often very rigid.

Text form – usually formally structured text – in the form of tables or free structured text. It is often a suitable form for detailed description , usually it is used as an addition to the graphical form (suitable e.g. for ad-hoc processes). But structured text can't be fully condemned face to face the graphical form. Especially for small firms or target-driven teams is this form absolutely admissible.

2.3.1 Costs and attributes of the description form

The description form has a fundamental influence on the costs connected with its acquisition. Costs are not ignorable part for decision which form of analysis to choose (or if to execute the analysis at all). The total costs are influenced by several attributes of the way of description, which can be summarized into the following table 1:

Tab. 1. Cost components

Choosing of the form	Needs to consider the form of expression, which is connected with the aim of description and the time horizon, during which the description must be kept updated(service) The form of expression is also important for acceptation by the staff and for the total costs.
Choosing of approach, standard and methodology	The choosing of complex approach is closely related to the form, standard, framework, methodology or notations. Except the objective consequences is also important the cost consequence – a sophisticated methodology needs broad education of the team, or the entire staff

Choosing of tools	Next, closely connected attribute is the tool. The tool for description can be a text editor, general tool supporting graphical expression (Business diagramming) or a specialised tool. It also influences the costs, when more sophisticated tools causes the rise of costs.
The price of analysis	Creating of models and descriptions is activity requiring a lot of time, which depends on extent and depth of given matter. Important element is the aim of the analysis, which radically influences the depth and extent. Is important to balance costs between internal (personal and other fixed costs] and external costs.
Total price	Total price is given by the sum of particular element‘s costs. The relation between **profit** and **all related costs** must be considered.

2.3.2 Formal description tools

Tools for creating the graphical presentation of models (some tools are able to combine graphical and text forms) can be roughly divided into following groups according to their functions and a focus (see table 2):

Tab. 2. Models of graphical presentation

Diagramming tools	ototype a kind of a system’s „flow chart“ model, e.g.: Visio, Micrografx, ls of the type „flow chart“ for creating miscellaneous diagrams, models demanding, amiable, intuitive for user ap (about 1 000 $), mple: Visio, Micrografx,
Software development tools	used on software development, usually founded on UML me of them have their own database – object depository ually strongly tied to notation (i.e. UML) me support multi – user environment, server client ually includes a level for generating the code ually expensive (3 000 – 15 000 $) lization usually available for professionals – necessity of education cs usually don’t understand the results mple: Rational Rose, Select Enterprise
Enterprise Architecture tools (Business Process Analysis tools)	tensive functionality, suitable for Enterprise modelling ve their own databases – object repository ually strongly tied to notation pport multi – user environment, server client lude reporting, quantity techniques, simulations, ABC analysis ually expensive (3 000 – 15 000 $ and more) lization usually available for professionals – necessity of education cs usually don’t understand the results n’t support the generating of code mple: ARIS, MEGA, System Architect, Troux

2.3.3 Ways and reasons for creating a model

Ways and reasons for creating a model may be from a certain point of view considered as one of the attributes influencing the costs connected with creating a model, because there is an

important relation between the creation and maintaining costs of the enterprise architecture description in real time (Fig. 4).

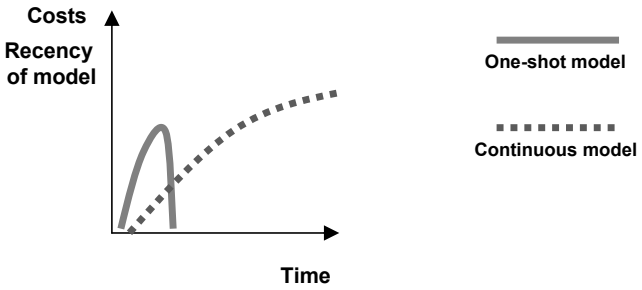

Fig. 4. Costs and recency of models

One-shot model – creation and using has a project character – model is usually created because of the transformation project realisation (changing of processes, organisation or implementation of ICT). Typical life cycle of such a project is fast creation, utilization, moral fall out of use without service (usually together with loss of model source data).

Continual model of „corporate, all-over-enterprise model" – creation of this model is usually initiated by the quality or IT (ICT) departments to obtain a description of all processes within the enterprise. Creation of such model usually requires a lot of time, often is „clued together" by using several particular one-use models from different transformation projects. Typical life cycle of this model is gradual creation, demanding „cluing together" and coordination of its creation, demanding service and actualisation, gradual moral fall out of use.

Approaches differ from each other by extents (complexity). The used tool has a fundamental influence on model's integrity and continuity. Only a utilization (and correct utilization) of suitable tool gives a chance for integral-continual existence of a corporate model.

In praxis the majority of models represent the one-shot models despite their original „continual ambitions". This is given in the first time by existence of a turbulent environment – continual model can paradoxically work on higher levels of abstraction (contextual, conceptual) as a basic framework and on the lowest levels as a keystone. More detailed description of this topic unfortunately exceeds the facility of this contribution.

2.3.4 Tools

Tools for Enterprise Architecture (EA) are usually focused on conceptual level and in particular on conceptual quality of abstraction. Even if some of their parts may reach up to the level of logical description (e.g. ERD diagrams)

Business Process Modelling tools don't posses this approach, because using object-oriented techniques on higher levels of abstraction is connected with problems – in particular on contextual and conceptual levels.

Software development (e.g. UML) is based on strictly object-oriented approach which serves for detailed, strictly structured description in particular on the logical and physical models´ levels.

It is clear that the tool worlds for "Software development" and "Enterprise Architecture" are thanks to different reasons still divided and solve different layers.

Some exceptions appeared in the close past – e.g. ARIS tools family is spread up to the UML level and probably is the first which combines these two worlds. But some differences in approach, perception and in description of reality are still lasting. This partly reflects the different perception on different levels of abstraction of the description (see table 3).

Another thing to realize is what the tools can provide and how they can be (even the most sophisticated tools) helpful for the analysis. The functionality of tools perfectly corresponds to their name – they are just „tools". Considering the absence of AI, the role of an analyst is necessary – tools are not (now) able to consider the objective correctness of reality and they can't propose the future state of things. (Extrapolation of Kurzweil´s hypothesis says that it won't be possible until 2023).

Tab. 3. Tools functionality

What (more sophisticated) tools can do:	What no tools can do:
• Object management • Validation of methodical correctness • Time and finance simulation	• Modelling without analyst • Generate optimised processes • Validation of objective correctness

3. RELATION BETWEEN INFORMATION SYSTEM AND PROCESSES

Back to the real subject of this description: What the IS really is?

3.1. Levels if information system

We can distinguish three levels of IS [4]:

I. ICT supported Information System
II. Formalized Information System, saved also on paper carriers
III. General Information System – socio-technical information system

General information system is in fact a native part o organisation – it can't be entirely removed (e.g. outsourcing). Only some parts of ICT-supported IS can be solved in this way (see Fig. 5).

By the term „IS" is in praxis often (and to say wrongly) percepted the level I (ICT supported IS) And, so to say, in many cases just the software. This is a shortage of the problem only to one of its aspects.

Narrow perception of the term "IS" has its historical justification in the way the IT supported the enterprise activities. The first evolution stage was to process the accounting data (automation). The next development of IT brought widening of possibilities and gradual growing of „information system supported by ICT" area. (MRP → ERP → e-ERP)

Information flows are formed by many circumstances. All these circumstances in some way influence the whole and that's why they must be percepted like a inseparable, native part of the whole system of information.

Level III (General IS) can be recognized as a information – communicative system of the organization.

[4] Basl J. – Podnikové informační systemy, Podnik v informační společnosti

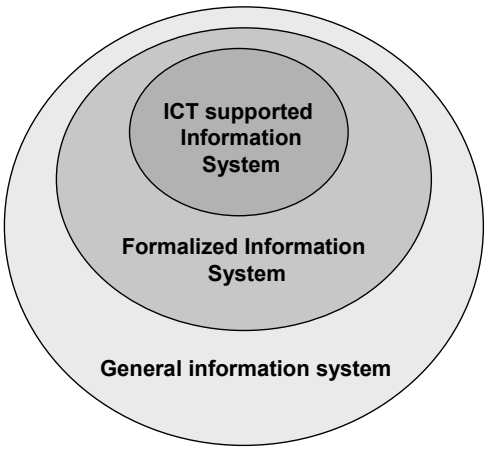

Fig. 5. Different levels of understanding the Information system

Note: More accurate term would be subsystem, because it is not a system with limits in the strict sense of meaning – the system is the organization itself. They are de facto different cuts in this system. But such philosophical concept complicates the whole topic too much, so we will rather stay at the original terminology.

3.2. Definition of the IS within the Zachman Framework

Zachman Framework (see above) defines the space of the entire enterprise architecture – perspectives and abstractions. From the ZF point of view is interesting to define what the IS in fact is. As was already said IS is a native part of reality. According to ZF it is a cut which consist the important IS elements.

- Data (What)
- Function (How)
- Network (Where)
- People (Who)
- Time (When)
- Motivation (Why)

Because of this reason we can say that IS is influenced by all perspectives, but crucial are Data, Functions, People and Network. However, in the same way we can define the space for business processes. What is therefore the difference? In the IS case it is their cut which is important for information architecture and information flows. In the case of business processes it is on the first place the workflow.
ZF perspectives have one basic deficit from the IS point of view – it doesn't explicitly distinguish functions and technologies (in the infrastructure meaning) – which both influence the perspective HOW (how).

3.2.1. Business processes

The common definition of process as a flow of activities is described by many publications. Interesting and relatively self-contained overview is included in the book „Modelling and optimisation of enterprise processes. [5]
Business process is commonly defined as a sequence of activities which demands one or more inputs and produces output, i.e. it brings a value to the customer. [6]
However, there are more types of processes existing in the real world and not all of them work with the flow of activities.

3.2.2. Types of processes – according to the flows

There are several possibilities how to distinguish processes, for purposes of this work is basic to divide them according to the flows they describe.

- Work flow (business process)
- Information Flow (data process)
- Material flow
- Financial flow

If we talk about process analysis we mean those processes which describe work flow (so called Business process).
Except that there are other processes which are concerned on description of other flow. This contribution concerns the description of information process which is focused on the flow of information. Information process can be focused on the flow of information (data) within the frame of technological infrastructure (UML defines this process by using sequential diagrams).

3.2.3. Process interface

Process interface is closely connected with the problems of information process. The information process, information flow is a part of dynamic view, anyway.

There exist relations among particular business processes, by which they influence each other.

- **Workflow interface** (activity, business, work flow) – mutual relationship of two or more processes. The workflow interface is in control of activities among business processes.
- **Information interface** (information flow) – relationship between a business process, where some data or information originates, and a business process utilizing the data or information. It is an important relation and it is not usually solved.
- **Technological (application) interface** – it is a specific modification of information interface – it is not a flow between two business processes, but an information flow between a business process and an application (data file). It is not just „filling information“, but qualitatively higher activity where information may be obtained from originally filled data. It is a kind of application activity (i.e. expert systems)

[5] Basl J., Tůma M, Glasl V., - Modelování a optimalizace podnikových procesů
[6] Basl J., Tůma M, Glasl V., - Modelování a optimalizace podnikových procesů

3.2.4. Time succession – dynamics of information flow

There exists an weakly described problem of **time succession of information and data in processes** connected with the problems of information edge. Time succession and event context, where data or information entity originates and where it is spent is very important. That's caused by more reasons – it may concern the existence of the entity itself (e.g. the existence of master record) or its validity (e.g. updating of master record, list or report). Methodologies a priori demands homogenous, synchronic environment of the IS which, as was already stated, is more an exception in praxis. A very important criterion is the event of IT as a media – which has a big influence to time succession and which radically influences the process.

3.2.5. Information flow – interaction of business processes and information

We will use the following two examples to show the different utilization of information in the process and the possibilities how to express these differences. The method (better say notation) ARIS [7] is used for the demonstration.

First example shows the utilization of data from an order or more orders and creation of its overview. It is not essential if the overview is created manually or automatically in some system. Important is that this is direct utilization of data from an order and their aggregation into the orders overview (Fig. 6).

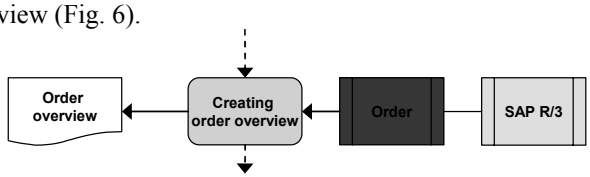

Fig. 6. Example of direct data utilization

Second example shows the utilization of information of an order (filed in application) to inform the customer about the state of his order. In this case we see intermediated utilization of information which is later orally transmitted or manually written down. Other example may be the utilization of information from some rule or statute to finish the process (Fig. 7).

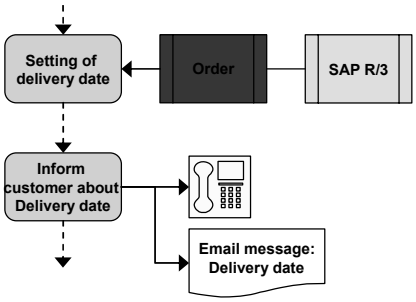

Fig. 7. Example of intermediated information usage

[7] ARIS Methods

Meanwhile the first example operated with data or information in electronic form which were directly used for another information contained in overview report, in the second example were used information vicariously. It is important to distinguish both ways of using the information.

1. Direct, often automated use or receiving of data
    - Data reception (e.g. master record, transaction data)
    - Synchronization of master data between two systems
    - One-time usage (e.g. creating a report)
2. intermediated using – man as an intermediator
    - Check against the list (i.e. blacklist) or master data (check the address)
    - Considering, decision on the basis f given information r data

These two basic ways of using information in business process represents the information flows. They have curtail impact on the information processes because they radically influence the transmission of information (or data) and the way of the business process realisation. The search of available methodology show that the description of information processes is not admissibly encouraged and is often underrated. The system failures are the consequences of this.

3.3 Information management

Information management can be defined in different ways. As any other management discipline the IM went through several stages of development. Leo Vodáček in his book [8] presents 3 stages of evolution:

1st stage

the IM was probably firstly used in 1966 by R.S. Taylor. In this time the perception of information management orientated **to effective solution of mostly hard technical tasks**, respective economical affectivity of managing the technical tasks.

2nd stage

At the break of seventies and eighties the IM became the measure of expression of the IT Professional. Mostly the ways of economical effectiveness of information system project's realization, based on the possibilities of modern information technology, were emphasized.

3rd stage

Third and up to now last stage dates back to the beginning of nineties where the diffusion of information management with management literature. The utilization of ICT for providing good management (effective reaching of aims) is emphasized.

Interesting, but not surprising is the relation of the three stages of IT evolution and the perception of three levels of IS. It proves and deepens the close relation on the line IS – processes – methods of management.

[8] Vodáček L., Rosický A. – Informační management , pojetí, poslání a aplikace

The IM is today understood in the way the ICT is not in the meaning of infrastructure the aim, but effective measure, which has to help facilitate, make more efficient and improve the quality activities and satisfy their individually based information needs.
Rauch [9] defines the IT as a sum of all activities, which leads to reaching the enterprise aims by managing the enterprise data and by their creating.
To the IM belongs not only the tasks related to infrastructure (hardware, software) but also the conceptual and organising tasks but the personal planning and the law matters too.
The structure of IM doesn't explicitly rely to communication despite information and communication make two aspects of not separable activity: there is no communication without information and vice versa.

The terms „complexity of information and management"
The term of enterprise IS is usually defined as a kind of IS which provides all the information needs of the managing person. Anyway, it includes also the verbal communication.
From the economical informatics point of view it is systematically organised information flows in enterprise. These are given by basic characteristics, which are described on the following Fig. 8 [10]:

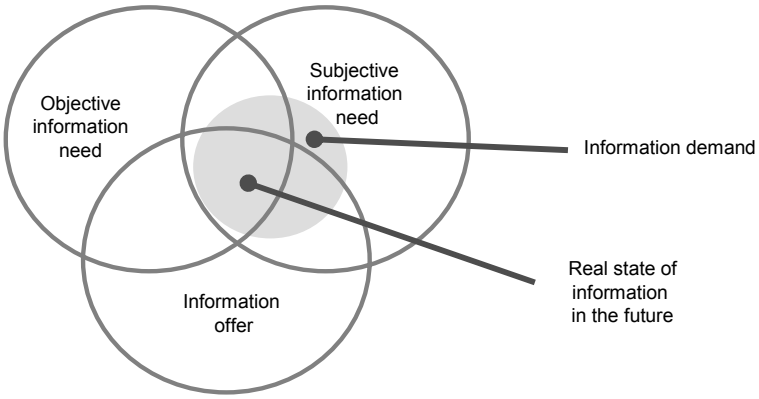

Fig. 8. Complexity of information and management

To be able to administer the enterprise IS the information management must be able to describe the information flows in the enterprise. The description must evolved from the structure and must be able to decompose and classify the reality.
In relation to the process analysis it is for example the interception of information flows with relationship to their classification and the way of processing (technology, process).
Such point of view is provided e.g. the ARIS methodology, such e.g. by using so called EPC diagrams defines the function and assign ICT, organization or data object to it. The problem unsolved by methodology is the explicit distinction of data, information and then utilization in processes.
IM faces today with many problems which have to be solved. The orientation of this contribution perceives first of all the following data and information problems in the enterprise IS.

[9] Rauch E. Anforderungen an Kuftige Informationssysteme
[10] Sokolowsky P. – Informační management 1

- Data and information are not stored on the right place
- The data and information needed don't exist
- Data vend information are not available at the given moment
- Data vend information are not up-to-date
- Data and information are not use data all
- The mutual relations are not clear

3.4. Quality of the information system

The complex quality of general information system is influenced by all of its aspects. One way how to define these aspects is offered by QUICT model, which is able to define and measure the complex quality of the IS. QUICT model is a part of the CorSet Framework. [11]

IS according to QUICT consists of four basic components (see picture 9). These components can be defined and their partial and complex quality can be measured.

Technology (information and communication technology)

Technology plays a basic role as an enabler which provides the operation of IS. Their parts play the particular components – hardware and software. Classical media like papers and binders undoubtedly belongs among the technologies too. Technology represents, from the IS point of view, the way how information and data will be shared, stored and transmitted. Technology has a Fundamental impact on availability, way of use and handling with data and information.

Quality on the technological level depends on the way the information and communication technologies enables the working of the whole IS. That must be considered firstly from the point of view how it fulfils the requirements of functional demands on ICT. More detailed description is above the frame of this contribution.

Information

Each of the information pyramid levels (information aspect) plays its role in the enterprise IS. Different levels of engagement for different levels of information pyramid can be derived.

A common problem in enterprise work which originates from the general heterogeneity of the environment is the unaministered redundancy. It means that particular subsystems are not technically as well as process-based integrated. The problem is significant on the level of raw data (master records and transaction data).Typical expression is reporting which highlights bad quality of IS. The examples are many reports in companies about the same thing with different results.

Redundancy within the enterprise IS is not just a negative phenomenon – there are lot of cases where administered and driven redundancy (on technological or process-base level makes systematic part of enterprise architecture).

Several scientific organizations are interested by quality of information. Probably the most active is MIT[12]. The difference between the terms quality of the data and quality of information is not absolutely clear. That's why only the term quality of information is commonly used.

[11] Source: CorSet © Framework, CORTIS Consulting, s.r.o., 12/2005
[12] MIT – MITIQ, http://mitiq.mit.edu/

Metrics of information quality are not fixed yet[13]. In spite of this the quality of information is a significant parameter of an overall information system quality.

Quality of each piece of information is one of the most important characteristics of its affectivity and utilization. According to some authors[14] the quality of information environment in the enterprise is the bigger the better the system reflects or expresses the real processes in organization and its environment and also it fit perfectly serves to the management (see Fig. 9). It means the usage of information.

Utilization

Processes are the connecting element which brings the dynamics.

People as individuals are structured within the organization structure. Organization structure influences the processes, but individuals have fundamental influence on IS, because every individual by his iterations with data - by his knowledge co-operates on creating the general IS in a common sense. The organizational structure and the human aspect itself (of each individual) have not ignorable influence on the general IS.

With growing extent of the enterprise grows the need to manage the information basis and information changes within the organization – communication on all levels becomes more complicated. Particularly in decentralized organizational structures which behave autonomously and creates a heterogeneous environment in enterprise. The necessity of IS knowledge grows.

Communication

Communication represents the connective element of IS which gives to it the dynamics. It is the flows of data and information between different element of the IS. We can distinguish the communication on the technological level (data communication) or on human factor level (interpersonal communication).

Quality on the communication level has its specific attributes. Because of its character communication is a dynamic element of the general information system at all levels. Simply said it represents the quality of information flows.

The quality must be observed at the level of the III. level of the IS in accordance with the third stage of information management. Such understood quality of the IS goes hand in hand with the quality of process affectivity in organization.

- How to provide .the quality of information/data in the world of dynamic processes? That means how to provide (and describe) the important succession of information interface among processes.
- How to describe the level of generality of the information? Specific (a message) vs. abstract (a template)
- How to define and describe the level of necessity of information?
- What are the parameters of IS quality?

[13] Král V., Atributy a metriky kvality dat, MFF UK, Praha, 2005
[14] Vysušil, Macík 1986

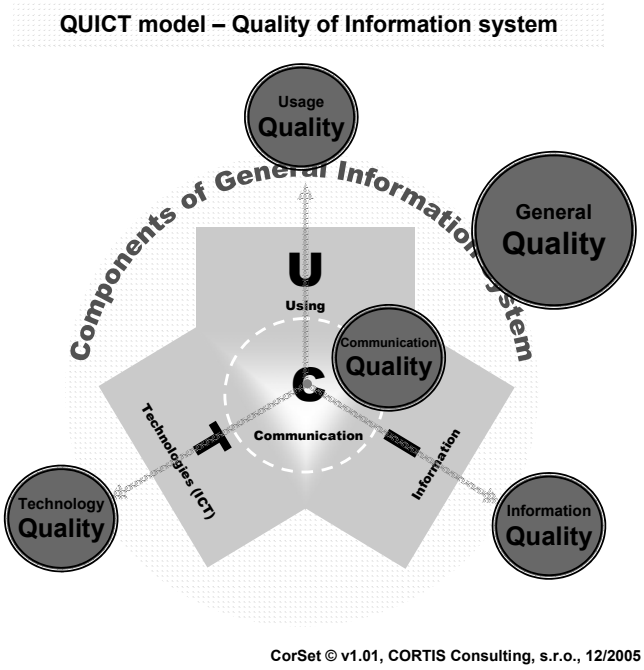

Fig. 9. QUICT model and information system quality

4. CONCLUDING REMARKS

Finally we can say that the description of enterprise IS is a big issue because existing approaches can not provide sufficient transparent and flexible form of description and what is more – they usually come from the ICT world which is not fully "compatible" with the management theories world.

Simply said informatics can usually see only their own world. Their methods, their tools. Managers have their own methods of management, their approaches. But both worlds are united together in one reality, so it can not be distinguished between US and THEM. The future approaches must reflect this fact.

We can say that despite all trends mentioned at the preview the existing and utilized standards, methodologies and approaches for process modelling, respectively for enterprise architecture description, are more or less rigid, they are based on formal way of description. Their common characteristic is their creation by using so called "cerebral model" – they emphasize the procedures, well prepared plan. It may be caused by the fact they often originate from the ICT world. This approach leads to a rigid description of reality which s in contrast with above mentioned management of the knowledge organization in turbulent environment.

From analysis of approaches, standards and methodologies we can see that they are mainly focused on the notation or semantics of the description as itself. They solve how to formalize

the description of reality. Does not matter if we as reality understand processes, information or organizational structure.

Methodology on the other hand do not solve how to decompose, systemize and classify the reality (information, data, and software). Systemization is solved e.g. at the organizational point of view where are more or less given the basic elements – bricks from which the organization can be completed. There are different organizational units, positions, functional places, roles. Despite particular differences among the approaches it is relatively settled view. But it does not stand at the data, process or technological view.

Of course, there exist complete instruments and methods, but their disadvantage is the complicatedness, often fabrication and rigidity. They are not even commonly widespread and accepted, not mentioning the financial aspect. (Their costs)

The approaches, methods and standards must become closer - existing approaches have fundamentals deficiency in the fact they solve their own worlds ignoring the wider context. Modern philosophy of information management must emphasize the convergent ion of different approaches. The mainstreams which should converge in the future are:

- Paradigm of the knowledge organization
- Enterprise architecture
- Metadata and metainformation systems
- Process analysis
- Software development

4.1. Summary

- Enterprise IS are very heterogeneous, there is not any system – application covering the whole space of General Information System.
- Unrestrainedness of the development, heterogeneity and "grafting" of ICT bring the appearance of proprietary applications, which complement the functionality of the main, usually ERP systems
- Methodologies, analysis and publications are focused on the area of structured data, i.e. eERP *(Extended ERP including ERP, CRM, SCM, BI)*, other ICT systems are removed backwards or totally ignored. The whole space of enterprise information architecture is not covered. Despite the important part of general information system is situated out of the space of eERP.
- Methodology are focused on notation of the description, they don't solve the ways of analysis, classification of the reality.
- Implementation of ICT (applications) as a typical example of transformation project – it usually does not solve in praxis the complex impacts into all dimensions (processes, organizational structure, etc.) Technological aspects are emphasized which causes the total imbalance of the IS quality.
- There exists bigger or lesser separation of the ICT world from the rest of the enterprise.
- An inconceptional development of ICT exists in companies – separated from other dimensions, in contradiction with the principles of IM.
- Methodologies and publications about EA do not distinguish the important levels in each point of view (abstraction and perspectives of Zachman Framework)

- The terminology is not clearly defined. There exist different ways of the term IS interpretation. There is not comprehensible dictionary of informatics, international standard, framework or methodologies, which would systemize and classify the terms used. This cause a significant, momentous subjective influence of the analyst.
- The results of analysis are often not-understandable, excerpt for a small group of the project team. It is paradoxically cause by using of sophisticated and formalized instruments, methodologies and approaches.
- There are big costs for creating and service of highly formalized models comparing t its utility value and real contribution. Formalization often unreasonably ties.
- There is a contradiction between formal description (formal expression leads to a rigid description) and approaches to the modern ways of management (paradigm of the knowledge organization).
- It is necessary to solve the creation and utilization of information through theory organizational structure and connection to the process approach.

References

[1] TRUNEČEK J. – Znalostní podnik ve znalostní společnosti, Professional Publishing, 2003
[2] PETERS, T.J.: Driving on Chaos – Handbook for a management Revolution, Macmillan, New York 1987
[3] DRUCKER P.F., Management Challenges for the 21st Century, Management Press, 2001
[4] RIDDERSTRÅLE J, NORDSTRÖM K. – Funky Business, Pearson Education, London, 2002
[5] KOTTER J.P. – John P. Kotter on What Leaders Really Do
[6] BASL J. Podnikové informační systemy – Podnik v informační společnosti
[7] BASL J., Tůma T., Glasl V. – Modelování a optimalizace podnikových procesů, Plzeň: Západočeská unoversita v Plzni, c2002. ISBN 80-7082-936-2
[8] MOLNÁR Z. – Moderní metody řízení informačních systemů
[9] VOŘÍŠEK J. – Strategické řízení informačního systemu a systemová integrace
[10] BUCHALCEVOVÁ A. – Metodiky vývoje a údržby informačních systemů
[11] O'BRIEN James A.– Management Information Systems
[12] SCHEER, A.W. – Od podnikových procesů k informačním systemům
[13] HAMMER, M. CHAMPY J., Reengineering the Corporation: A Manifesto for Business Revolution
[14] ROBSON M., ULLAH F, - A Practical Guide to Business Process Re-Engineering, Management Press, 1998
[15] KAPLAN R.S., NORTON D. – Balanced Scorecard - Management Press
[16] Reengineering a management změn – sborník článků, přednášek a studií
[17] UČEŇ P. a kol. – Metriky v informatice, Grada, Praha, 2001
[18] TŮMA, M.: Tvorba procesní organizace strategických podnikatelských jednotek na základě modelování a optimalizace podnikových procesů, Plzeň, Disertační práce, 2001
[19] RAUCH E. Anforderungen an Kuftige Informationssysteme
[20] MIT MITIQ, http://mitiq.mit.edu/
[21] KRÁL J., Atributy a metriky kvality dat, MFF UK, Praha, 2005
[22] VYSUŠIL, MACÍK, Analýza kvality informací pro řízení, ČVUT, Praha 1986
[23] SOKOLOWSKY P. – Informační management 1, 2 , Karolinum , UK, Praha, 2002
[24] VODÁČEK L., ROSICKÝ A. – Informační management - pojetí, poslání a aplikace, Management Press, Praha, 1997
[25] VERNOR Vinge: Singularita http://www.transhumanismus.cz/library.php?source=kucera
[26] RAYMOND Kurzweil http://www.kurzweilai.net/meme/frame.html?main=/articles/art0134.html
[27] Enterprise Architecture http://www.enterprise-architecture.org
[28] The Information Architecture Institute http://iainstitute.org/

[29] Zachmann Framework http://www.zifa.com
[30] CorSet Framework http://www.cortis.cz/
[31] BRINT Institute http://www.brint.com/
[32] METIS http://www.metis.no/index.html
[33] National Institute of Standards and Technology http://www.nist.gov/

[34] Standards

IEEE 1471-2000
BPMI.org
IDEF GAO Standardy
preEN/ISO 19439:2003
preEN/ISO 19440
ISA 95.00.01:
ISO 15704:2000
ISO 14258:1998
ENV 13550
ENV 12204
ENV 40003
Dublincore

[35] Frameworks

Zachman Framework (ZIFA)
TOGAF
DoDAF, FEAF, eGOV, C4ISR
ARIS
SSADM
CorSet

[36] Methodologies

ARIS
SSADM
CIMOSA
CATALYST
James Martin BRE
UML - Unified Modelling Language
MDA - Model-Driven Architecture
RUP – Rational Unified Process
EUP - Enterprise Unified Process
BPML
BPMN
E2A, E2AMM
BSP- Business System Planning