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The Requirements for the Legal Regulation of Commercial Relations in Cloud Computing

Ivan Pogarcic[1], Marko Pogarcic[2] and Matej Pogarcic[3]
[1]*Polytechnic of Rijeka,*
[2]*Faculty of Law, University of Rijeka,*
[3]*Faculty of Civil and Geodetic, Engineering, University of Ljubljana,*
[1,2]*Croatia*
[3]*Slovenia*

1. Introduction: Users and IT (His highness the user and his court jester)

Definitions of Information System are numerous, as well are the seriously written textbooks that consider that subject. In most cases a pragmatic side of Information System is being emphasized. From the pragmatic aspect, Information System is connected to its users since it is made to match their needs. Nevertheless, a definition rarely explicitly addresses user, tough he is indirectly implied. If Information Systems are defined through users' relationships in usage of technical and technological systems, one usually applies to ICT or Information-Communication Technologies. (Kroenke, 2008) It is essential, out of numerous reasons, to differentiate Information Systems from computer solutions and backup to Information Systems and associated business systems. (O'Brien, 2003). Regardless to definition, business system and Information System are determined by user and his needs. Business processes realize those needs and materialize certain benefits, while effective performance of business processes requires timely information. Simultaneously, business activities are followed by routines and repetitions in usage and acquisition of needed information. Computer is an instrument that man releases primarily from wearisome activities that can be figured in automatic sequence of computer orders or complex calculations that would otherwise require much more time. Development of computer sciences has been followed by a constant need for Information Science education of all users. However, velocity of development of technical instruments and technological applicative solutions has frequently increased to higher levels than the educational level of users. Historically observed, Information Science hasn't necessarily separated term user into two basic groups: "material" or real user who applied services of computer applicative solutions and user who applied potentials of technique and technology in order to provide essential benefits and possibilities to a previous group. The latter group is made of experts and Information Scientists. ICT development has blurred border between these two groups. Out of user-user perspective, as time passed the Information Science education moved closer user-user to user-Information Scientist. Their relationship has during that time period been specific to service industry, respectively service, provider and user occurred. Information Sciences have therefore, been wrongly placed within "service industry sciences".

Term "service science" should in this paper be understood as working name, since, naturally classification of science doesn't recognize that term. Why working name? Information science, formed as science, can be considered as relatively young science with strong trend of development and formation. If information systems are put in the centre of information science, that is, on a position of subject of prevailing research, then even the former claim can be put in question. However, the area of information systems is relatively scientifically unfinished, according to its definition of establishment. Incompleteness is obvious, especially in the area of precise definitions of complex terms and frequent identifying with different terms such as: information systems, management information systems, information management, business information systems, business information technologies and alike. Naturally, each of the mentioned terms has indirectly a pragmatic side of definition within. For instance, (Rose, 2000) information systems can be observed as field of computers and communications, but within social context, so they can be placed in class of social and humanistic sciences. However, if area is anticipated as technical, then it is close to natural sciences. In both cases, development of information systems should be connected to humanistic sciences, such as sociology, psychology, but even the newer ones, as telematics or cognitonics. Naturally, this sort of thinking was a subject to criticism. For instance, (Chekland and Holwell, 1998) this area can be classified as "crucial, but confusing", (Banwille and Landry, 1992) as "fragmented adhocracy", or (Whitley, 1984) as area that "produces diffusive, discursive knowledge of commonsense objects". Most critics (King, 1993) of this area's status as scientific entirety usually claim that it misses "intellectual basis", that is actually, borrowed by other "referential field of sciences".

The fact is processes of information systems have numerous ad hoc situations, so the attitude of "adhocracy" of this area can be accepted and characterised if wanted to be projected as level. Appropriate is missing or low level of obstruction to entering the area, weak coordination of research activities, unidentified tasks as reason of "floating" reputation, lack of standards or possibility of their change, even by unprofessional persons, and finally, confusingly defined terminology with many wrong synonyms based more on commonsense then precise definition. Since this area has neither completely, nor precisely, defined subject of research, it should be considered, at least temporarily, independently from other sciences. Still, using it doesn't imply one-way communication with other sciences. Involvement of computers as technique and programme solutions derived by same platforms is unquestionable in all sciences, so it is manifested as service information science.

Each scientific area should have "intellectual basis" to provide ground for defining scientific settings of area, theories, methodologies, research modes, and finally, control of all mentioned through practical realisations and concrete situations.

Precisely in that relationship between science and theory, according to practice, lies one of the basic reasons of unidentified area of information systems. Accelerated development and improvement of technical basis – hardware, demanded an answer in technology and methodology of development. When user is put in the centre of situation, it becomes complicated, but consequences are considerably clearer. Usage of information technologies demands knowledge, skills and competitions by users. It can be achieved by appropriate education and training of users. Traditional systems of education are inert, and so are modifications and adjustments of education. It is controversial that education is one of the latest areas that have introduced computers. That way, user has, according to his level of education, been late in area of development of hardware and software. Still, the complete

technique and technology have been created in order to easier and more qualitatively satisfy users' needs. Pragmatic side of this relationship is realised through implementation of applicative solutions in users' environment. However, pragmatism is accompanied by relationships applicable in commerce, since all applicative solution is considered to be a product that requires promotion, marketing and treatment of users, usually as buyers of these products. To satisfy customers'-users' needs within such circumstances implies to make a product more simple, easier and closer to user.

Through period of information sciences' development, approaches and generally paradigms of approaching the users have been frequently modified. Basically from monolithic to applicative solutions, specialised only to certain task so to free user from concern and engagements that additionally burden him through grid and cluster architecture of information systems of paradigms that have been changed from recent form known as cloud computing.

If simplification is understood as certain form of abstracting the volume of user's tasks, then the process hides other traps that can become brakes to performing business. The truth is that relationship between users, architecture and structure of information system, that is professional personnel, can be redefined so to maximally free user of tasks that belongs to information scientists. At the same time, the more precise raster of user's needs has been developed. The usual applicative coverage of users' daily needs has been broadened by covering more demanding exceptions that can emerge among those needs.

Cloud computing has supplemented paradigm that accompanied object oriented approach with paradigm of weak binding or binding software components according to task's needs.

Legal aspect of such relationship has been, during the history of Information Sciences, frequently neglected or observed to belong to someone else who regulates such relationships. Today, when most of human needs have been, one way or another, supported by computers, relationship between users and service providers necessarily demands legal regulation in combination with legal regulation of computer products' usage.

2. Overview: From the monolith to the clouds (Le roi s'amuse)

Meaningful usage of computers requires certain programme backup that considers existence of data. Data is being processed according to these programmes respectively algorithms applied in the programmes. Besides programme solutions one requires appropriate communication between user and computer. Realisation of monolith application assumes that programmes and data are physically at the same place – computer, accompanied by user. Although this shape of application is considered to be a beginning of computer backup, the monolith applications are not purely historic since even today specific systems can request such a solution. Specific system has specific users so their position is bonded to special characteristics of system's functions. Legal regulations in such environment are strongly defined since those needs are monolithically connected to such relationship.

Usually, though wrongly, monolithic organisation of application is considered a historical form of organising the information systems (fig 1). Though the majority of monolithic organised systems are historically basic form, that form of organisation exists even today, if system and user are organised in that manner, out of any reason possible. Monolithic assumes coexistence of systems and users in same environment, without more significant

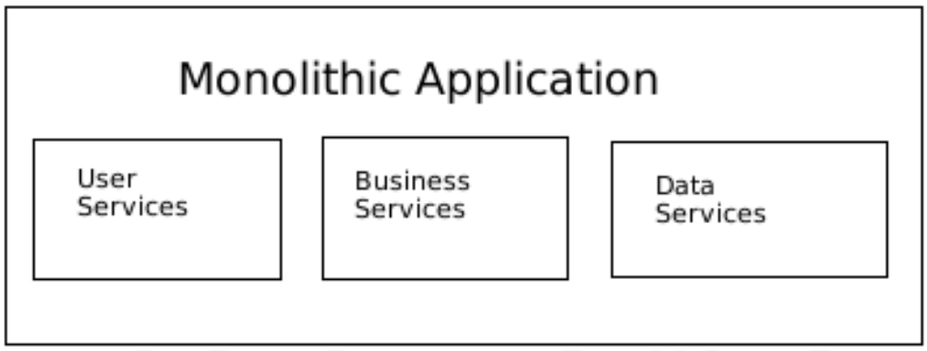


Fig. 1. Monolithic Application. Source: //rubyonrailslink.blogspot.com/2010/09/single-tier-architecture.html

need to communicate with environment. Regulation of rights and obligations in monolithic systems is strictly defined by organisational rules of system to which such information system belongs.

(Batini&Scannapieca, 2006) define area where all information systems are located according to their structure and architecture (fig. 2). Area is defined by coordinates: totally, heterogeneity and distribution. Considering these three characteristics according to measurable intensity, monolithic systems are located in the centre of coordinate system. That is, they are classified as homogenous, not distributive and specialised. Authors have located P2P information systems in a diagonal spot. Systems of type peer to peer are declared as autonomous and independent from computer providers. Such systems are different than usual client-provider architecture. Usually possibilities of all network-connected computers are being used. Scalability is the strongest characteristic of such systems. When user is logged on a network, the complete capacity of a system grows.

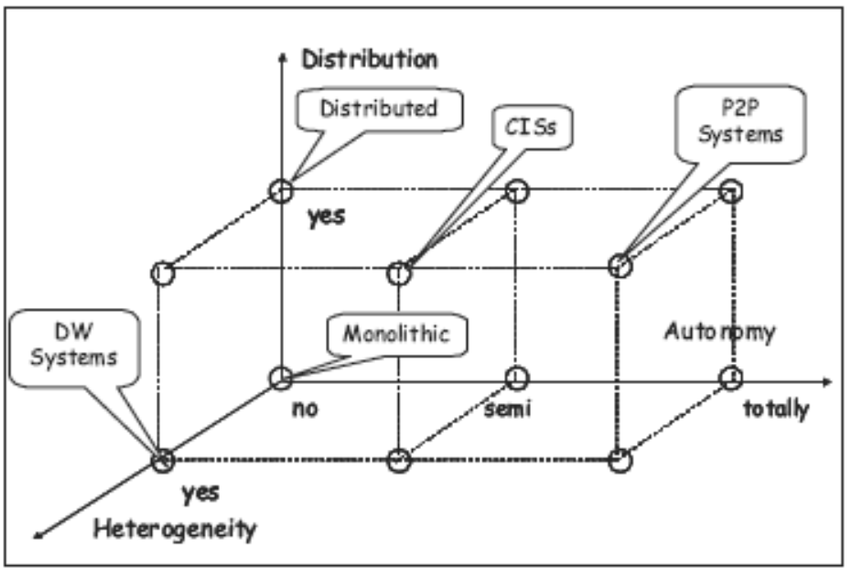


Fig. 2. Type of Information Systems (Batini&Scannapieco, 2006)

Importance of data and need to manage data and to preserve them has led to double and triple-layer organisation of applicative solutions. Indirectly it led to layering a category of users, information scientists and narrower specialization of certain cadres. Specialization of cadres has at the same time meant a diversification of rights derived from obligations given to them. Final or key user of system has in this architecture been extracted, while his approach has been enabled through defined interface. Responsibility for data base has been shifted to skilled and prepared workers, usually information science experts residential to that specific business system. Legal aspects of information system in these architectures have been solved as accompanying problems at level of managerial structures of business systems. Separation of data bases into a special tier has demanded regulation of security mechanisms that necessarily included legal regulation and protection of same. Layering of systems into tiers has more precisely articulated rights that belong to users and information science experts.

Separation of data bases into special tier put users' obligations towards data into frames of concern for accuracy and correctness while organisational and security aspects have resumed in authorisation of IT department. Necessity to manage data and to preserve them led to double-layer and triple-layer organisation of applicative solutions (fig. 3). Indirectly, layering has been made between class of users-information scientists and narrower specialisation of certain cadre. This happened regardless to saving data in a simple file or organising them as more complex form – data basis. When possibility of physical dislocation of users beyond business environment emerged, a need for relationship's organisation known as client-server organisation also emerged. As consequence a need for specialised users who will maintain dataware appeared in line with users who will concern computer networks or working stations – personal computers used by clients. Narrower specialisation of Information Scientists together with increase of consummation possibilities of system led to a need for adjusting system to final user. Graphic interface as solution to communication demands brings more possibilities to user but it imposes need for introduction of the third layer (known as middle tier) which includes logics of applicative solutions. Still, the relationship service user – Information Scientist service provider causes a legal regulation to be solved in general level, usually managerial, by leaving it to personnel outside such a relationship. If the relationships in a prior mentioned architecture of information systems are analysed from time distance, one fact is indisputable and unavoidable. That is relatively low information science education of final users. It also indirectly puts user into inferior position and leaves possibility to information scientists, usually organised in IT department of business system, a freedom that realistically shouldn't be given to them since it can be misinterpreted.

Though only few scientists have concretely analysed that problem, the author can, upon his own experience, confirm frequent conflict between users and information scientists. Sometimes and somewhere the supremacy of information scientist has led to problems in implementation of solutions and left an impression of compulsion by users, with complexes of ignorance and inadequacy to problems. Users' response to such situation was necessary and it was expressed through need for information education and a simpler usage and managing of computer products. Simplification suited to both groups, so it has led to innovation and improvement within area of hardware and software. That trend led to multi-tier architecture and consequently to stronger diversification of information science cadre. (Fig. 4) Data-tier is divided into data tier and data-access-tier. Necessity of implementing the business-tier more intensively includes final user into organisation, though his inclusion into information science tasks remains at level of consummation.

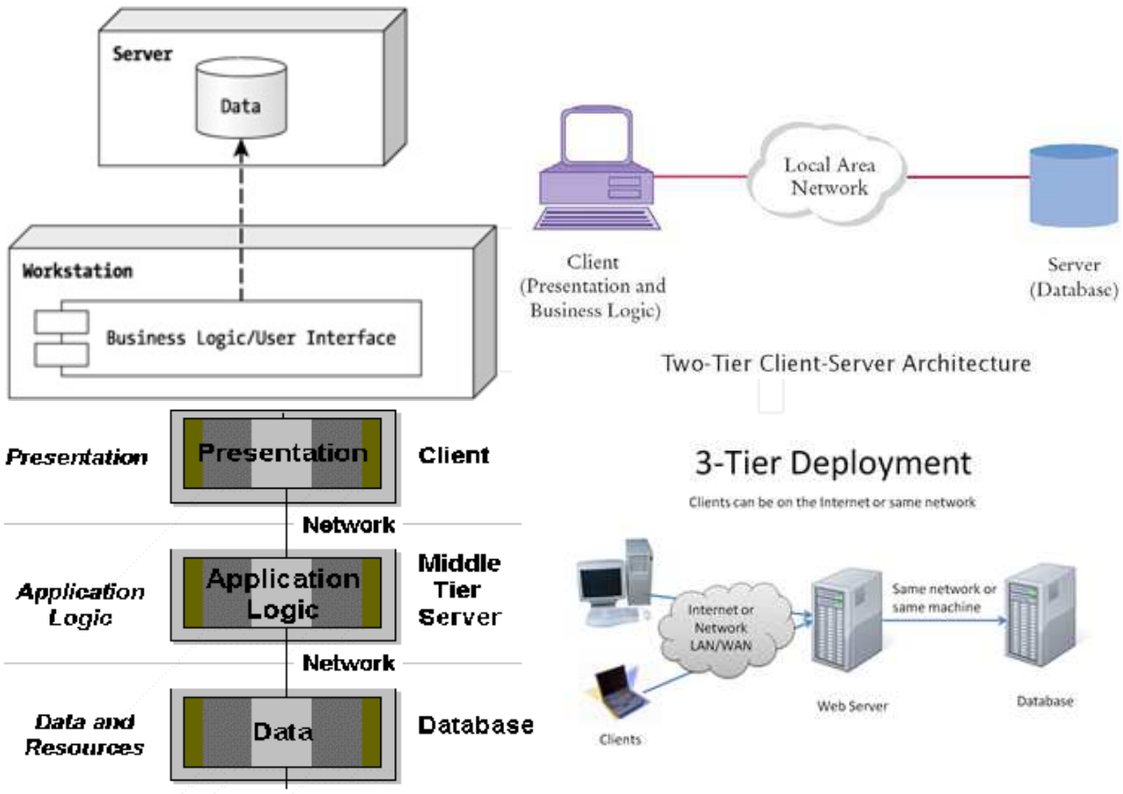
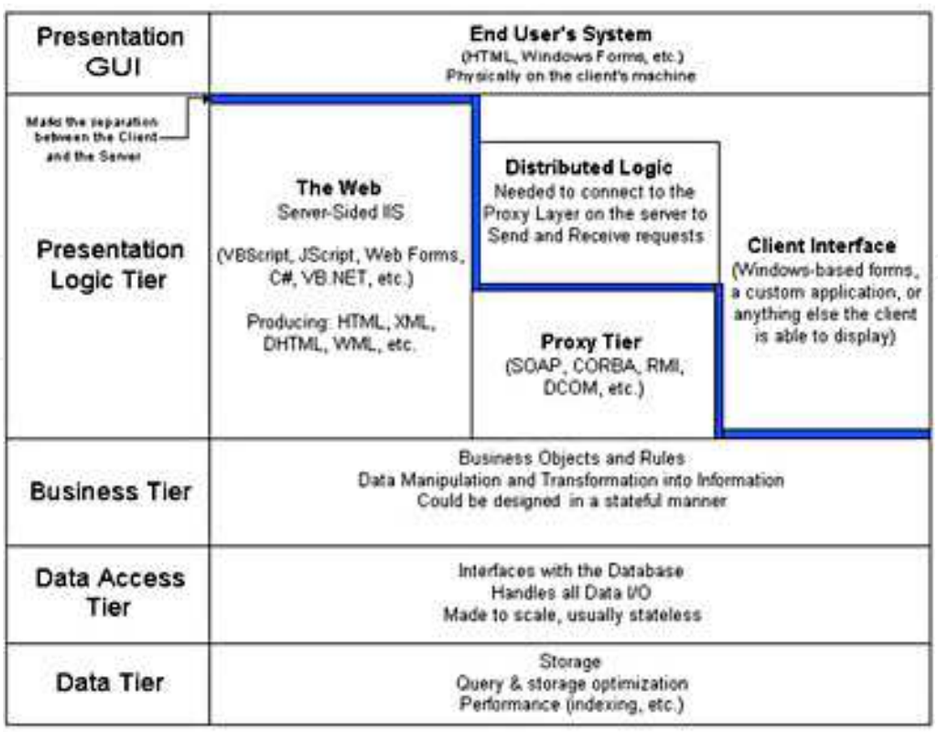


Fig. 3. Two and three tier Architecture (Source: http://www.iro.umontreal.ca/~pift1025/bigjava/Ch27/ch27.html, http://flylib.com/books/en/2.642.1.11/1/)



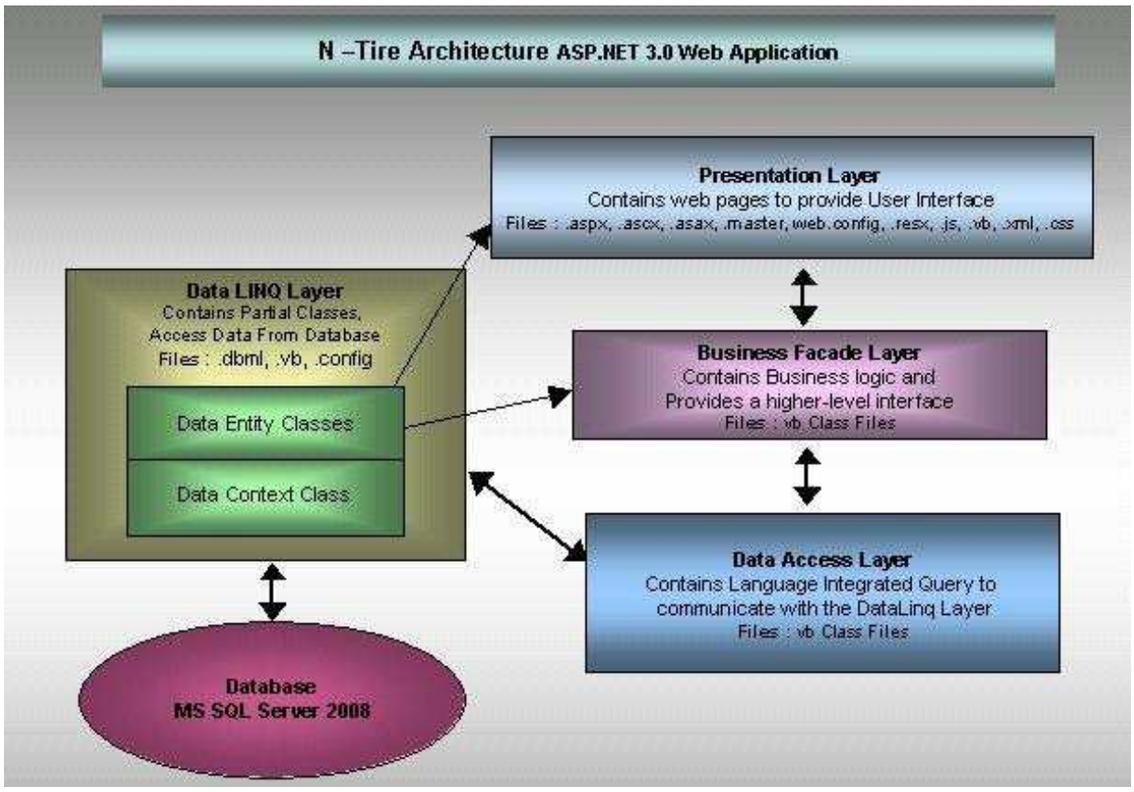


Fig. 4. Multi tier Architecture (Source: http://www.15seconds.com/issue/011023.htm and http://www.codeproject.com/KB/aspnet/NTierApp_UsingLINQ.aspx)

Simultaneously, Information Science education of system's users has increased while his demands are becoming broader, bigger and frequenter. Technical tools are becoming more sophisticated as technological solutions. Technological solutions as product undergo through all rights and regulations that accompany any other market product.

3. Elaboration: Paradigm shift (Mixing cards with the war for middle-earth)

Necessity for separating computer solutions into layers or multi tier organisation has resulted in more detailed diversification of activities in their development. Changes in approach and consideration of the complete issue moved barycentre from structural system towards system's architecture as a new centre of gravity. Modifications in paradigms are most obvious in the approach to projecting and programming. Object oriented software is the cause and consequence of changes that will result in emergence of opened platforms and multiply usable software. In order to satisfy increased appetites of users, a proclaimed paradigm of inheritance within object oriented approach has provided multiple uses.

However, object oriented approach has also caused a "rearrangement" of role and position of user by regulating approaches to software through mechanisms of encapsulation. That way the system's structure can be observed as a method of its construction or compliance and combination of its parts. Possibility of organising the Information System within conditions of detachment of business system refers to organisation of computer network of different possibilities and purposes. Along with significant improvement and upraise of

technical possibilities, computers evidently, by virtue of increasing memory capacities and speed of processing, should be differently organised. The centre of gravity has been moved from structure to architecture. Architecture of computer systems includes structure's moderation together with organisation of technical backbone and applicative solutions so the architecture is both conceptually and realistically broader than structure.

Object-oriented paradigms have primarily, through proclamation of late binding, initiated reorganisation of programming, though object-oriented approach gives advantage to projecting instead of programming. That is understandable, since programme demands are biggest source of misunderstanding among information scientists. When object-oriented approach has emerged and developed, the final users were already well educated in field of information science so their demands represented greater problems to information scientists. Though at the time prices of hardware were dropping and opened platforms of operative systems were intensively used, to each business system investing into information science represents an issue that requires ultimate attention. At that time Sollow paradox became famous: "total income of business system decreases as investments in information science become higher". That should initiate considerations of real usage and need of IT sector as organised fragment of business system. It will also bring IT employees into a considerably different position than the one their forerunners have had.

If historical aspect of information scientists – experts is considered, than, with a considerable attention, conclusion can be made that their position has frequently weakened. From position of unavoidable expert-wizard who was highly respectable his position changed into "someone who is an expert in his field", but doesn't necessarily get paid for his work. Evaluation and assessment of full business contribution of "internal" information scientists has started.

Each individual business process or use care, as it is commonly named, is maybe specific but not to the point where business is made strictly from that phenomena. Case of usage is more a category where concrete realisation of same cases can be placed. Repeating the same cases is measure of need for programming and considering specificities that determine exceptions in same realisation. This attitude is prevailing in initiating, and later on, intensifying intention for outsourcing the IT sector. This helped to pronounce information-science backup as service within business system. Only time will tell how correct that is. It is important to mention that this declaration has a certain delusion within, that is, it makes information-science backup as sporadic need which is absolutely not the case. However, that kind of attitude towards information science has been inherent continuously from the first formation of IT sector within business system up to the moment of excluding IT management from process of making important business decisions. It is especially important that decisions made upon level of business system include CEO of information science, which is often not the case.

The prior paragraph has been given an allegoric subtitle "king is amused" as a result of author's experienced thinking about relation user-information scientist. All misunderstandings upon this line are consequence of dissatisfaction of one or other group of participants of the mutual act. Attempt of upgrading, of any side of participants, will lead to psychological consequences awkward to relationships and business itself.

In an attractive blog title "10 dirty secrets in IT business" Jason Hiner from TechRepublic site mentions a set of "secrets" that confirm the above mentioned. http:// www. techrepublic.com/blog/hiner/10-dirty-little-secrets-you-should-know-about-working-in-

it/546. The fact is information science experts are making themselves a huge favour. One shouldn't engage into a serious business to conclude how usage of slang among information scientists can be frustrating to users so to make them think that something is being covered up. Reason can also be found in usage of technology that will help IT to firm its position, but not with actual help to business making. Next, the older IT experts will regularly be averse to introduction of new technologies. All situations mentioned are not amusing to users, especially since user is directly responsible for realisation of business processes and existence of business system. It is normal that detronization of information science in this case becomes inevitable. Psychological state of mind within these frames defines level of satisfaction with users and information scientists. Unsatisfied user will in each situation re-evaluate his obligations and the ones of information scientists as service provider.

Further on, every evaluation of obligations causes re-evaluation of rights that belong to them. In business systems it will regularly lead to, more or less, conflict situations and disturbed personal relationships. The final result is destructive to making a business. When business system has its own IT sector, these conflict situations have internal character so they are internally solved. Legal aspects of those misunderstandings are within domain of specialised business system that is mostly connected to HR sector.

Separating users from information-science assignments provides contribution to both sides under condition that information-science backup is qualitative and timely. At the same time, assignments are delegated more precisely thus making obligations more understandable and better defined. It also expresses better rights of users and information scientists. Object-oriented approach has enabled these relationships and caused further changes of paradigms that will lead to SOA paradigm (fig. 5).

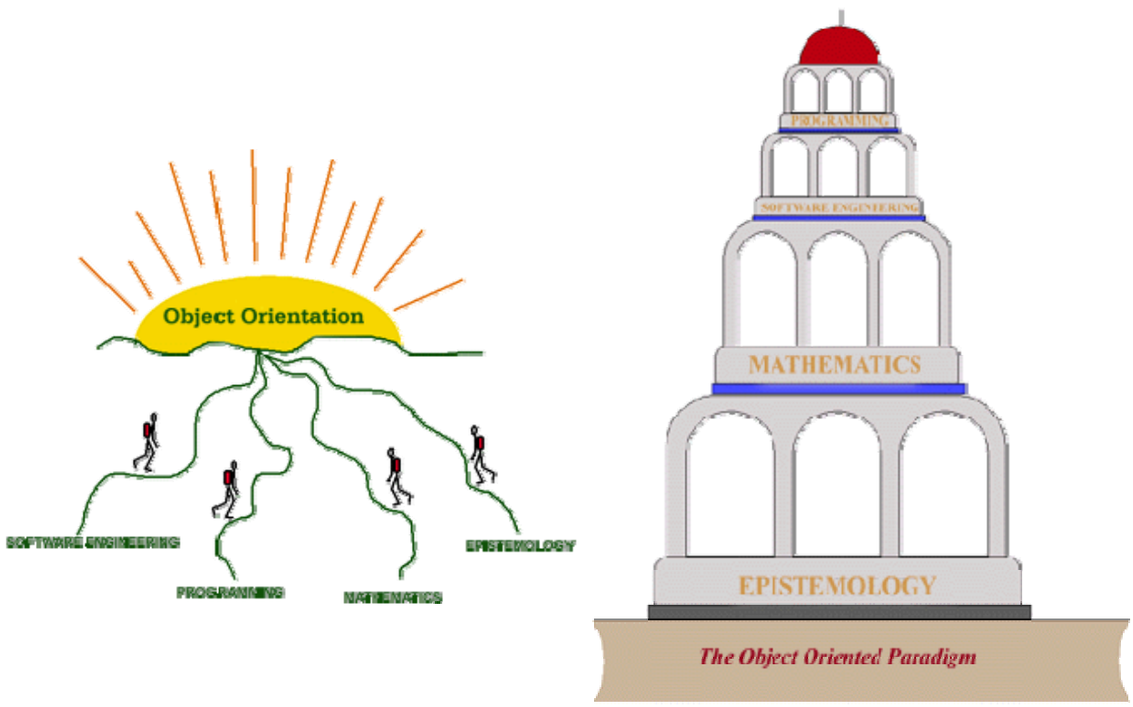


Fig. 5. OO Paradigm (Source: www.hl7labs.gr/pages/ Edsger/Edsger/tower.gif and www.hl7labs.gr/ pages/Edsger/Edsger/oop.htm)

When discussed about architecture, SOA (Service Oriented Architecture) can be observed as politics, practice and frame that enable application of functionalities which have to be provided through collective services. (Liebow, 2005) Services are being offered to the applicants by virtue of standardised interface. (CORE.gov, 2005) In SOA environment, term user has been replaced with benefit user who shares services. Service applicant is user of services provided by system but it is indirectly underlined that user is also driver of activities used for realisation of services. SOA also more pronouncedly affirms paradigm postulates of object oriented approach especially of so-called late binding resources. This turns late binding into weak binding in SOA environment while final operative form of application becomes a dynamic category active only in time of performance. It helps to achieve full effect of application that can be acquitted through optimisation and proper monitoring of costs. IBM (Balzer, 2004) defines principles of basic regulations for development, maintenance and usage of SOA architecture (fig. 6). These are:

- Possibility of multiple usage of programme solutions (reusability)
- Granularity
- Modularity
- Possible usage of composability (a system design principle that deals with the inter-relationships of components)
- Ability to decompose in components
- Interoperability
- Standard-compliance, common and for specific kind of industry
- Possibility of services identification and categorization
- Possibility of ordering, provisioning and delivery
- Monitoring and tracking

SOA architecture is made of functional elements and elements that provide system's quality, and are connected to policy of launching services to market.

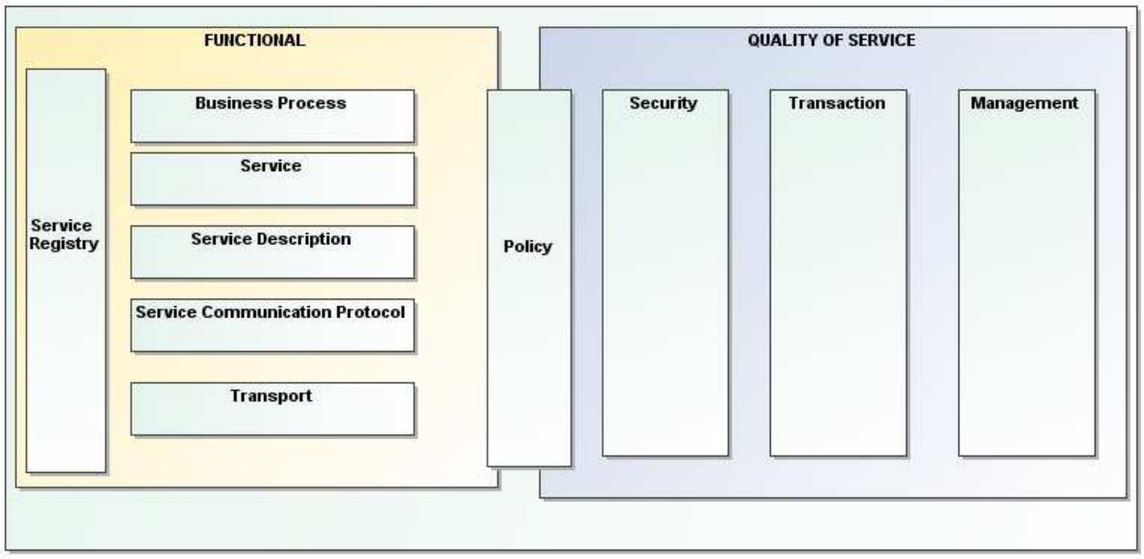


Fig. 6. SOA Architecture (Source: http://www.mondotechnologies.com/en /index.asp ?w=0|0|1)

Functional elements make service register with description of services, business processes, defined communication protocol, defined services and mode of delivery. Elements of insuring the quality are: safety of services, realised transaction and service management (fig. 7). Still, the quality of service and its functionality is ensured by politics that integrate these two parts and present them to user who will eventually benefit from it. Politics of realisation of services can be observed as binding material that connects constructing elements of SOA architecture SOA architecture should provide several attributes to business systems: to propose simple, flexible and efficient system that will provide needed information services with lower costs of providing services and insuring their integration and migration. When settings of SOA architecture are considered, one can assume further development in application of object-oriented paradigms and more expressed implementation of information science architecture. If one analyses terminology, he can notice that some classical terms are replaced with newer.

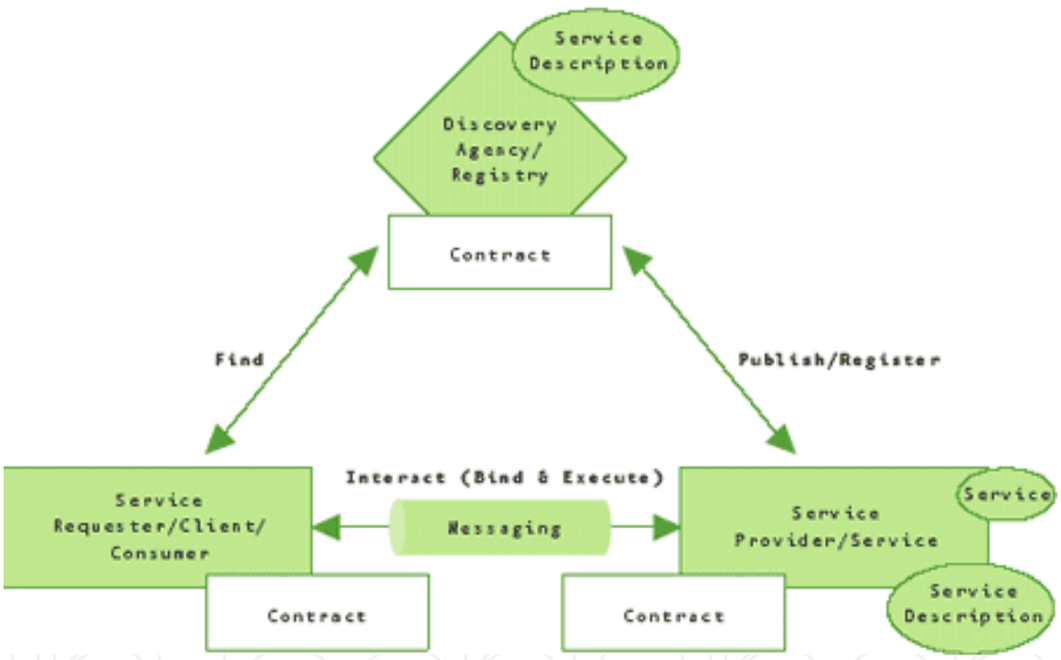


Fig. 7. Contracts in SOA Architecture (Source:http://msdn.microsoft.com/en-us/library/aa480027.aspx#aj2mpsoarch_topic2)

So that user can frequently be called consumer or service client while service creators are named service providers. If consistence in application (and around it) is insisted on, the one that is named information system, then this could lead to semantic mess. User can be asked who is actually a service provider: the one who interferes or the one who actually provides the same services. This kind of relationship makes a good basis for paradigm shift that will end up in SOA evolution to cloud computing. So to conclude, precise definition of terms is necessary. Whoever experienced functioning of SOA architecture or web services (though these are two different things), experienced all advantages of such realisation of information system, but also all disadvantages that can emerge when using services through such systems (fig. 8).

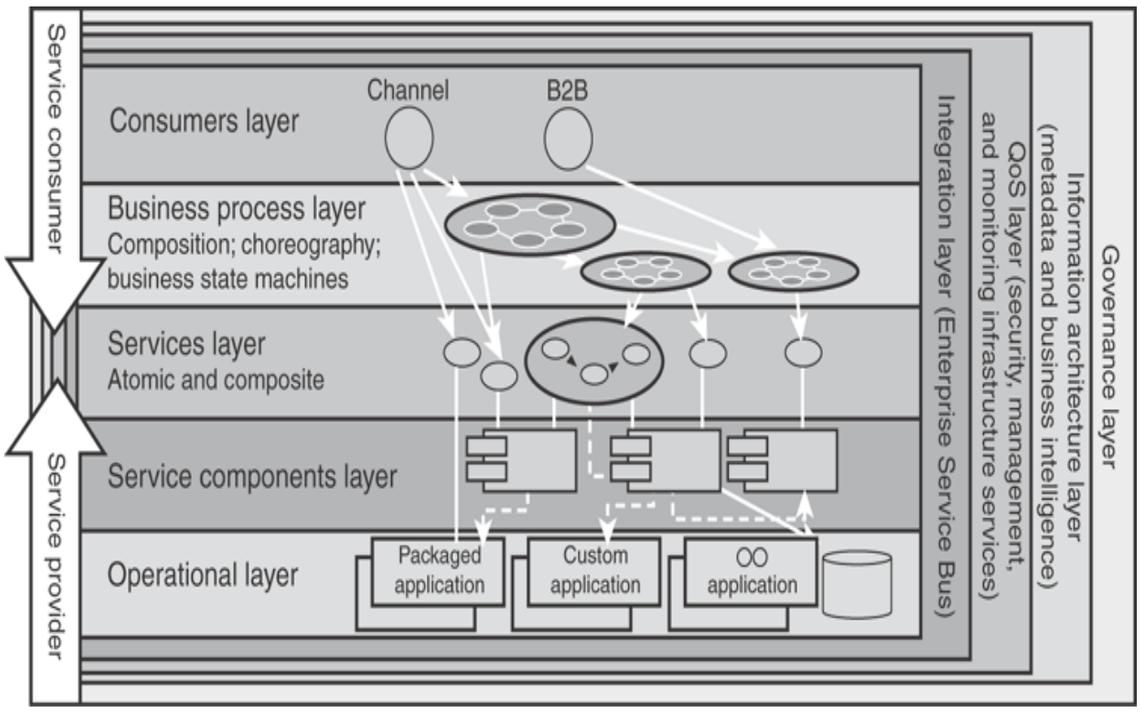


Fig. 8. Logical view of SOA Reference Architecture (Bieberstein at all, 2008)

Though it may be thought that users-information scientists and active users within business systems are put aside the truth is different. Separation of applicative solutions to its finer parts – services – that are activated accordingly can represent a nightmare for Information Scientists, especially when on the other side are users who cannot articulate their demand in mutually understandable manner. Segment of service providing policies within SOA architecture that can solve this kind of misunderstandings in practice is known as help desk institution. Though as an idea it can be accepted, good realisation of help desk activities is rare in practice. User of help desk regularly receives incomplete instructions that don't help him to solve problem. If help desk is analysed in context of developing relationship user – information scientists and development and upgrade of ICT, one can acquire extremely unpleasant impression. Help desk eliminates not only physical but also virtual communication between final user of application and its professional creator-author. Help desk employee have usually gone through training that should correspond to user with frequent anticipation that they do not understand essence of processes that are information-science supported. User's need for help desk is a sign that his daily business functioning is brought into question through applicative non-functionality.

If help desk employee isn't able to provide adequate help and to eliminate problem that user declared, a situation could turn to conflict. Picture (Fig. 8) indicates that all architecture relies on precise and well defined contracts between actors of providing and consuming the services. Contract is specification of method by which consumer or user of service will communicate to service provider. Contract defines format of demands and mode of answers that are expected through services. Contract of services can demand various conditions and pre-conditions. Pre- and post-conditions describe how service should be performed in order

to satisfy specific function. Contract should define quality of service and specify non-functional aspects of services.

It is clear here that realisation of recent forms of information systems should involve more intensively legal profession. Contract is legal category so it should be confined to those who are professional in that field. Exactly those kinds of situations and necessary facts are to be underlined in this paper.

Required legal protections of both users' categories which appear in such environment is essentially different since it returns relationships to a level that existed in time when real users were supposed to have lower level of Information Science knowledge and congruent capability of using the application. At the same time emerged a possibility of so-called Outsourcing or extracting the IT sector from business system as an activity that is not core business activity. It is not a coincidence that simultaneously a need and possibility for outsourcing emerges, that is excluding IT sector from business system as activity which is so-called core business activity.

4. Interlude: We are in the cloud; we need some barrister (Hypothetic use case)

Business logic and applicative tier have already, in the position of organising system according to three tiers or multi tier structure, been categorised as middle tier that is "inter-level tier". That also led to excluding the responsibility for contents belonging to specific tier from those to whom it doesn't actually belong. If Fig. 9. is analysed and completed with human component, then on the left side, one can perceive only users, that is, service consumers according to SOA terminology. Suggesting the Cloud computing isn't relevant at the moment. More important are possibilities provided by Internet. Naturally, that is possible if Internet is actually available. On the extreme right side one can perceive data tier. If human component is to be implemented, it becomes clear that it also requires attendance of consumers and providers of services. Traditionally put, all users become involved. However, it is clear that structure, organisation and maintenance of data remains activity within domain of information science experts, while data remain within domain of users. Quality of data is, therefore, responsibility of users, while quantity and frames remain within sphere of information science experts.

However, presence and possibilities offered by Internet have improved attitudes toward proclaiming SOA paradigms towards finding solutions that will be categorised Cloud computing. Cloud computing improves SOA concepts together with object-oriented paradigms.

For instance, (Miller, 2008) according to some authors CC has common characteristics with autonomous computer systems when latter is capable of self-managing, (Reese, 2002), CC inherits important settings of client-server architecture, (Papadopoulos, 2009), CC structure has characteristics of grid computing since it can overtake the form of distributive or parallel computing where computers can be organised through clusters or weakly connected networks or mainframe computers for needs of big organisations with critical applications such as enterprise resource planning, and financial transaction processing. (Vaquero at al., 2009) recognized in cloud computing Utility computing — The "packaging of computing resources, such as computation and storage, as a metered service similar to a traditional public utility, such as electricity. " (Wei&Blake, 2010) recognized structure Peer-to-peer —

Distributed architecture without the need for central coordination, with participants being at the same time both suppliers and consumers of resources (in contrast to the traditional client–server model) and finally Service-oriented computing – software-as-a-service. That way one can turn weak binding into paradigm of loosely binding.

New architecture follows structural diversification of systems. In this sense, CC offers architectural complex structure in three forms: Saas – software as a Service, IaaS – Infrastructure as a service and Paas – Platform as a Service (fig. 9)

Terminology once again has a mild modification. So, besides weak binding, components are no longer in tiers (that basically means binding) but are also organised through layers.

Layers reflect architecture (fig. 10):

- **Client (Cloud clients):** computers and/or computer programmes available to Cloud computing for delivery of applications as the most important part (Malik, 2008)
- **Application (**Cloud applications): applications as services or "Software as a Service" provided as services by Internet, without required installation and initiation of application on client computers combined with simpler maintenance and backup (Mathur&Nishchal, 2010),

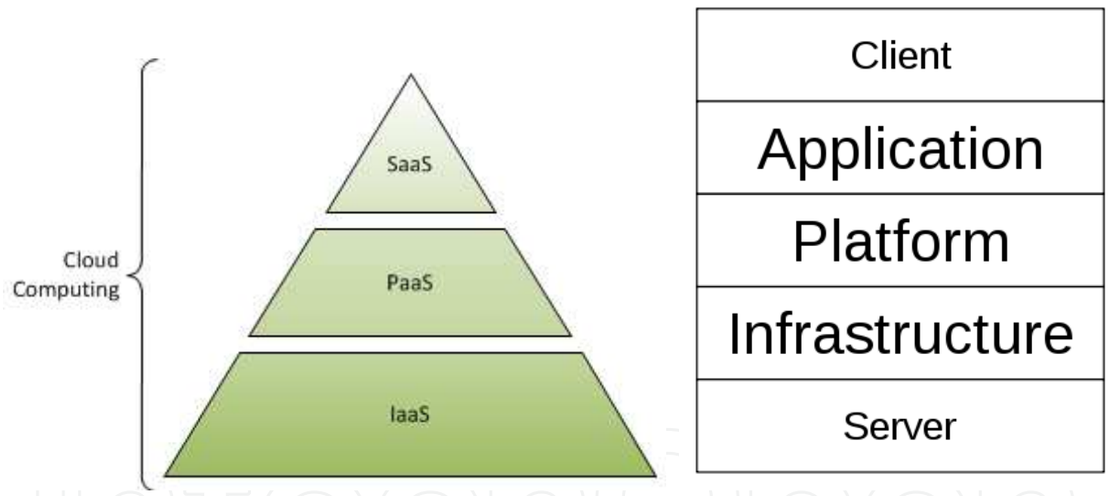


Fig. 9. Cloud Computing architecture(Source: http://www.chades.net/?tag=churchill-club

- **Platform (**Cloud platforms): "Platform as a Service", providing computer platform as service combined with usage of infrastructure and maintenance of applications. It provides implementation of application without costs, obligatory purchase and managing hardware and software on basic level. (Schofield, 2008)
- **Infrastructure (**Cloud infrastructure): Cloud Infrastructure Services or "Infrastructure as a Service", providing computer infrastructure – virtualisation of a platform, environment – as a service, combined with frame for data processing and networking. Instead of buying the provider, software, central memory and network equipment, users buy client versions, that is, complete all external resources as service. Service providers charge upon communal bills, or, price depends upon time of consummation (Pariseau, 2008).

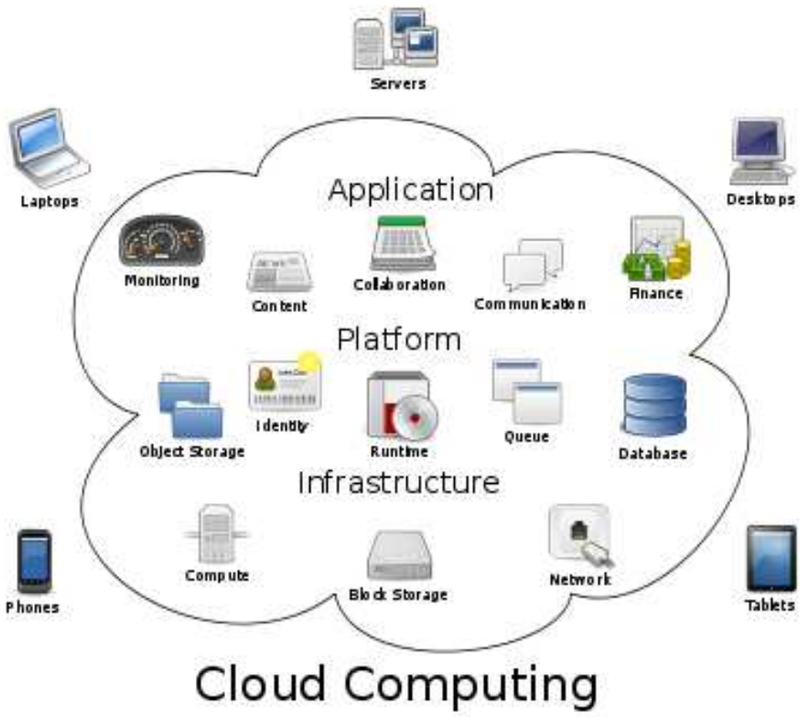


Fig. 10. Cloud Computing (Source: http://en.wikipedia.org/wiki/Cloud_computing)

Server: Provider tier comprises of computers and / or computer programmes especially designed for service delivery, including the multi-core processors, cloud of specific operative systems and combination of offers. (Markoff, 2008)

Diversification to tiers implies that most of activities realised in environment that represents information system supported by computers is being treated as service. Every service of that kind requires carefully prepared contract according to which it will be consumed. However, contract doesn't regulate just the above mentioned services. For service provider sufficient is the list on contract that refers to individual service, which is not the case with service consumer. Consumer should frame his needs within appropriate lines.

To a consumer frame or cloud could be (fig. 12):

- Public cloud: Type of cloud in which services, such as applications and storage are made available to a wider public over the Internet. These are usually located outside the user's offices and provide possibility of reducing risks and costs of providing flexible and temporary broadening of infrastructure (Frank, 2008)
- Community cloud: Cloud of certain organisation. It is usually formed by several business systems with mutual needs (safety, harmonisation, authorisation etc.), regardless to inner or outdoor management. Costs of functioning are lower than costs of public cloud, but higher then ones in private cloud.
- Hybrid cloud: hybrid cloud is comprised of two or more clouds (private, mutual or public) which are unique as community but insures a possibility of multiple implementation of a concrete model.

- Private cloud: infrastructure which exists for individual or individual organisation that can be managed within or outside the organisation (Mell&Grance, 2011)

If named classifications are analysed, it becomes clear that cloud can expressively and efficiently be realised with attentive arrangements and clearly defined contract or contracts. Depending on users /consumer's needs and demands, or what sort of organisation he requires, he'll have to sign the same amount of individual or several combined contracts.

Simultaneously to shifting the paradigms towards definitions of services and modes of their realisation, the importance of regulating performance and ensuring service's results contributed to shaping a need for proper type of contract specific to this area. Basic definition of contract is: Contract is approving declaration of two or more parties directed towards achieving a certain goal. Contract in general form demands:

- Consent and will of parties to sign a contract
- Subject of contract
- Clause or basis for completion
- Other conditions important to signing a contract

Consent and declared will is important condition for signing the contract. However, it doesn't have to be sufficient. Term of sufficiency is completed by defining the subject of contract and clause. Sometimes contract can have a certain form. In that sense, relationships of this kind included, after certain amount of time, form of contract known as SLA (Service Level Agreement).

SLA (Service level agreement) is a contract or part of it that defines services between two parties, where one party is a buyer – demander, while the other party is service provider. Subject of contract is service. As legal institution contract can be used for services or realisations. SLA necessarily has to include:

- Name of service – complete description of package promised by provider
- Way of delivery
- Way of service verification, time of usage and measurement of usability
- Way of treating the mishandling of contract

Qualitatively prepared SLA will help service provider to explain user what, how and in which way he delivers service and gives a guaranty that promised and expected level of service will be delivered.

SLA can be defined in different levels:

- Evaluation upon SLA: arrangement with individual group of buyers in line with covering all services used. For instance, SLA between providers (of IT services) and big service organisation such as financial systems, payment systems, systems of charging, systems of procurement etc.
- Services upon SLA: contract for all buyers who use service is being delivered to service provider.
- Multi-tier SLA: SLA divided into different tiers, with each tier handling different groups of buyers of same service, within same SLA.
- Corporative SLA tier: contract covers all demands of each buyer in a complete business system.

- Evaluation of SLA tier for evaluation of tier: covers all SLM (Service Level Management) questions relevant to specific group of buyers, regardless to services used.
- Service on SLA tier: covers all SLM (Service Level Management) questions relevant to certain services, that is, specific group of buyers.

SLA is treated as contracts of services in which tier of service is formally arranged. In practice term SLA is sometimes used in comparison to contracted deliveries (of services) or performances. SLA is regularly a legal biding formal or informal "contract" (fig. 11).

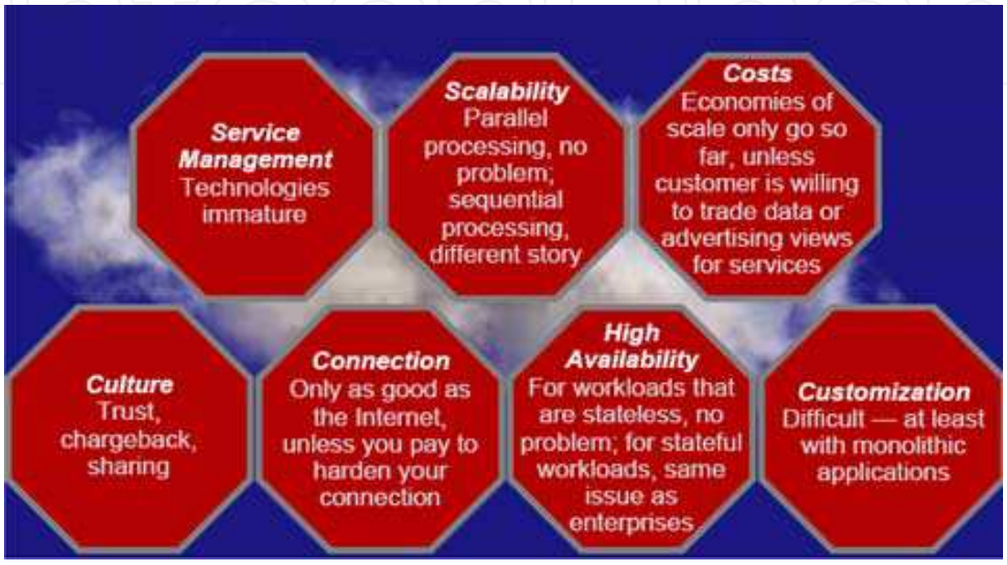


Fig. 11. What's Holding Cloud Computing Back?
(Source: http://helloanilyadav.blogspot.com/2010/07/cloud-computing.html)

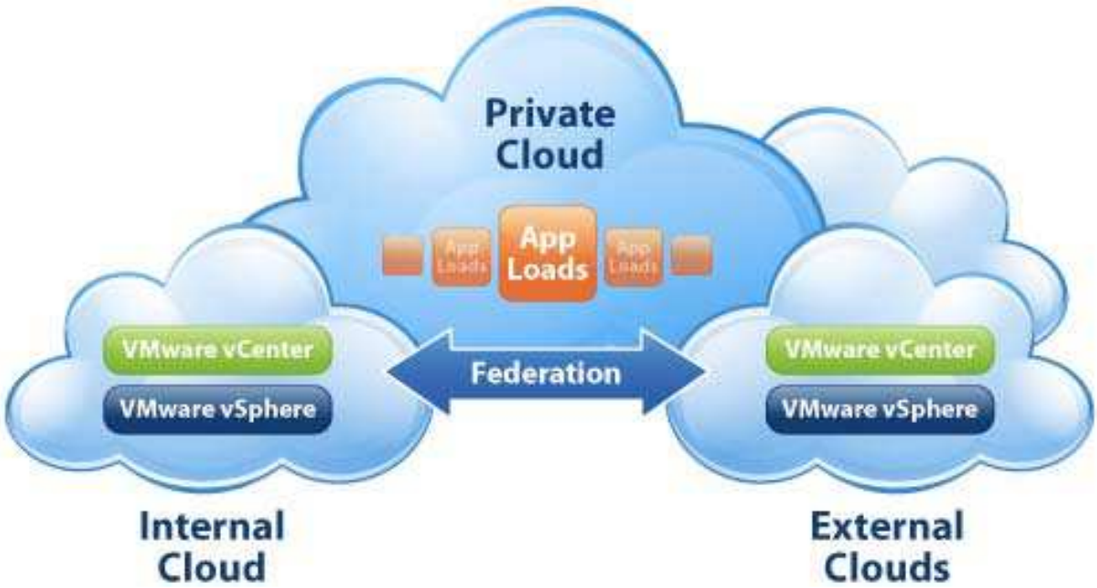


Fig. 12. Type of Clouds (Source: http://computinged.com/business/cloud-computing-facilities-implementations-and-costs-planning/)

However, there is also a wrong situation when contract between service provider and other parties isn't SLA – since the services tier has been defined by (main) buyer. Every field or range of services should have defined "tier of services". SLA can determine level of availability, usability, efficiency, performance or other characteristics and services, such as mode of charge. "Tier of service" can also be mentioned as goal and minimum which enable users to be informed about expected minimum that ensures measurable, usually average aimed value that implies level of performance. Some contracts can arrange penalties in case of not respecting SLA. In practice SLA is sometimes used to define relations for contracted deliveries of services or performances.

4.1 Postlude: A hypothetical use case, if the cloud computing is guilty?

In everyday life more and more people are using services of which they don't know the precise definitions, or they haven't been timely explained to them, so they don't know the possible consequences. For instance, widely used net-banking represents a service which is simply defined web service. User in this kind of situations usually doesn't know where the service provider is, that is, where data are located, though he's not introduced with complete infrastructure, and there's no need of that. Further on, mobile phones made these services free of time and geographic location. Advantages are impressive, risk considerably lower, but still possible. Provider of such services is obliged to ensure user with proper information of all possible outcomes during the service providing and afterwards, especially if there is a possibility for user to suffer from any sort of damage.

Among generally accepted services one could count the GPS (Global Positioning System) navigator for automobiles. GPS navigator is using spatial information about location and time anywhere on the Earth, or near it, GIS (Geographic Information System) based upon Global Navigation Satellite System (GNSS) in all weather conditions, with undisturbed line of views from four or more GPS satellites. It is maintained by USA Government and is freely available to all using GPS receiver with some technical restraints that can be removed only for military users. (http://en.wikipedia.org/wiki/Global_Positioning_System). Hence, to most GPS users GIS service represents cloud service or it can be treated that way. GIS is then proclaimed as a system that represents integrated hardware and software with data for collecting, managing, analysing and presenting all modes of geographic information. The purpose of GIS is to enable insight, understanding, making enquiries with interpretation and visualisation of data in form of maps, graphs, reports and charts. Procedure of formation and models of reports are maximally simplified so to be available and understandable to all users. Still, the basic advantage of GIS technology is a possibility of its integration into any form of information system with purpose of ensuring the most qualitative business.

In this part of paper authors analyse hypothetical case in which automobile accident has happened due to mistakes in navigation caused by wrong data provided at the same moment. Emphasis has been given to possible legal consequences of such case, but primarily to legal shortage of defined relations between service provider and service user.

Hypothetical case:

Owner of an expensive automobile equipped with equally expensive devices that include GPS is a male person in his thirties. During a longer journey he has been using services of

GIS system that is implemented into latest GPS device. During the journey he followed instructions given by GPS device, so he faced situation and circumstances on highway which mostly haven't correspond to information provided by GPS device. In that specific situation the automobile has been completely ruined, while the owner has been experienced severe body contusions which haven't threatened his life, but could contribute to consequences of minor body disability.

Epilogue:

Afore mentioned hypothetical case has all characteristics required to fall a dispute and to claim indemnification of a victim. For purpose of this paper it is important to determine an essential need for legal definition of using services, which are, in this situation, cause of a possible accident.

- Though it is disputable, for this hypothetical case and paper it is needed to determine an important fact: how is GIS treated. Is that Cloud computing service or not? If it is, in which form of Cloud computing a victim could be introduced? These are primary conditions that could be used in eventual dispute with purpose of indemnification.

There is a version of web GIS concept according to which web GIS is every GIS using web technology, or, in narrower sense, it is every GIS that uses web to connect system components. (Fun Sun, 2010). Every such service should necessarily have its own SLA – contract of usage.

Some Service Level Agreement (SLA) ere enforceable as contract but many are really agreements that are more along the lines on operating level agreements (OLA) and may not have the force of law. It is good to have an attorney review this document before you make a major commitment to a Cloud provider. (Sosinsky, 2011).

Indemnification of a victim will necessarily depend upon quality of SLA, its content and form of declaration, if such exists. Since usage of GPS devices is an independent fact in this case, arbiter, seller of GPS devise and selling of devices emerge as factor that additionally complicates described situation. However, accident hasn't been caused by device but instead by data and information provided by device. Within these circumstances responsibility is thrown to provider of data basis and mode of its delivery since responsibility for data (or data basis in information science terms) service provider responds for consequences when data haven't been used properly.

This hypothetical case is only an attempt of directing attention to an urge for more intensive legal treatment of relations that can emerge between service providers and service users within Cloud computing. Service provider should be prepared to provide SLA palette that will correspond to implemented form of Cloud computing. Public cloud carries within dangers similar to outcomes named in a prior hypothetical case. Service provider is usually, in practice, somehow prudishly concealed behind institution of help desk that usually doesn't provide sufficient help, but only smooth communication. Therefore a transparency of relations and their strict regulation is most required.

5. Epilogue: Who really need IT and informatics? (The empire strikes back)

Motto "I am not interested how you do the job, just do it" has been transferred from object oriented environment to SOA environment by simultaneous modification of late binding

paradigm into a more declared weak binding paradigm. Graphic interface and object oriented paradigms have broadened possibilities for all users' categories. Programmers as user category have been significantly disburdened in their work by possibility of applying the package and libraries of final programme modes which, combined with minor modification and change, can be used in every situation imposed by concrete problem in business environment. Basic paradigms from object oriented environment have been further improved and applied in SOA environment. SOA environment as paradigm is characterised by assembly of mutually connected services. Services have minimal interdependence and constant distinction. Should all services be united in one portfolio of services and should they be made disposable to the user, all his needs should be satisfied. Projecting based on analysis of use case permits such a granularity of software solutions. It is important that user is introduced with a possibility that he can use such solutions when need emerges. That way a possibility is offered which necessarily doesn't have to be consummated, but it is important to know that it exists. Extraction of IT sector as non-core business out of business system's frame demands a different attitude towards the ICT experts so it presents them in different light.

Application of all accomplishments of good practice from the above mentioned modes of organising computer supported Information Systems through integrating all possibilities offered by Internet and Web, appreciation of users' needs and a possibility of their modification have been united in a new approach known as cloud computing. (Korri, 2006) Basic advantages of cloud computing are: reductions in duration of performance and response, lower costs of approach, decrease of risks in field of infrastructure, maintaining the level of innovations, reliability, possibility of development, safety and sustainability. Since cloud computing is proclaimed by slogan pay-for-what-you-use the fact is it represents a model similar to the one of spending electricity, fuel and water. Cloud can be public or private. Public cloud sells services unlimited respectively those services that are available with fee to anyone on the Internet. Private cloud is usually an owner of private network and data that provide services to a limited number of users. In such circumstances Information Science necessarily demands appropriate legal treatment of every service individually. Both categories of users should be maximally protected but so should be every service as a product, tool or an instrument used by both sides. Legal aspect has been maximally underlined in all levels up to a measure that it requires a special legal regulation. Service as product can lead to unwanted results that can cause certain damage to user or service applicant. Necessity of protection has been articulated through forms known as SLA and the beginning has been denoted in Cloud that has a prospect of becoming a dominant form of computer backup to business in a long term period.

6. Conclusion: What can we do without IT? (Adam, why are you naked?)

User or requestor of Information System's services has, during the time flow, been put in different relationships and different positions. Primal need of users' high specialisation in knowledge and skills within Information Science has been lost. Business systems that insisted on computer backup, approached to organisation of private IT sectors that employed such experts. Reference to such category of users has changed with the time flow. Difference in basic knowledge of Information Science among experts users and users themselves has disappeared while cognition of own possibilities has grown and user increased his knowledge of own possibilities. Final user has in such circumstances become

aware of himself and his possibilities but has also fallen in trap of overestimating the same. On the other hand, underestimating the role of information scientists and wrong interpretation of need for such personnel in business brought to outsourcing IT sector and leaving the computer backup service such as Cloud computing.

Insecurity, non-transparency, indecisiveness and many similar negative characteristics doesn't have to accompany cloud solutions but they remain as possible side effects. User coming from business system has perceived Cloud as vulnerable and "stripped" to the level where it has to provide information services precisely ensured and regulated to a level securing the legal strength. Business system's user has in Cloud realised that he has to have Information Science services completely protected by law. Only that way will they be able to reinforce themselves with required tools and backup in accelerated business and fiercer market competition. Information Science asks for law to be its companion. Information science requires law as constant associate in business making and providing information to business needs. Development of information system will demand a person in team professional enough to perform that assignment. Actually a qualitative synergy between law and information science is obligatory.

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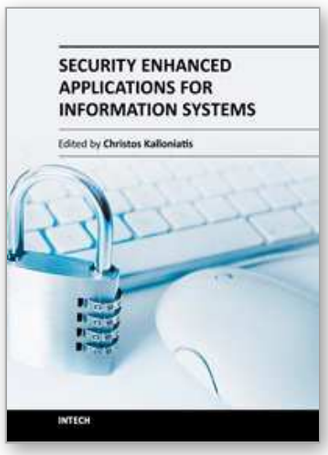

Security Enhanced Applications for Information Systems

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Every day, more users access services and electronically transmit information which is usually disseminated over insecure networks and processed by websites and databases, which lack proper security protection mechanisms and tools. This may have an impact on both the users' trust as well as the reputation of the system's stakeholders. Designing and implementing security enhanced systems is of vital importance. Therefore, this book aims to present a number of innovative security enhanced applications. It is titled "Security Enhanced Applications for Information Systems" and includes 11 chapters. This book is a quality guide for teaching purposes as well as for young researchers since it presents leading innovative contributions on security enhanced applications on various Information Systems. It involves cases based on the standalone, network and Cloud environments.

InTech Europe
University Campus STeP Ri
Slavka Krautzeka 83/A
51000 Rijeka, Croatia
Phone: +385 (51) 770 447
Fax: +385 (51) 686 166
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Unit 405, Office Block, Hotel Equatorial Shanghai
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Phone: +86-21-62489820
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