SOA Approach in Prototype of Intelligence Information System

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Abstract: Intelligence, as a service has a great significance for the country. An information system for support of intelligence activities is very often in everyday use and from that use comes great influence in the decision making process. Usage of the modern information technology in big way contributes for improvement of the process (activities) which are supporting intelligence cycles (planning, collecting, analyzing and dissemination). Although there is constant improvement as a result of the progress in the area of information technology, significant difference in the quality of work in the field of intelligence has not taken place in the last ten years.

Implementation of Service Oriented Architecture – SOA, i.e. the usage of SOA, is providing possibilities for making new opportunities in the form of expanded solutions for designing intelligence information systems, regarding the more efficient management of information, as well as their use by the end users for whom hum they are intended. In order to keep up with the pace with modern development, short, medium and long term planning is needed for development of information systems for supporting intelligence, in relation to the of IT development.

This paper presents an idea for SOA approach in prototype of Intelligence Information System. Prototype of IIS is a solution which should offer better coordination and Intelligence effectiveness. It is a foundation for establishing integrated system for Intelligence.

SOA approach in information systems is a logical solution, not only for a temporary and short term usage but it is a perspective solution for general strategy in companies and governmental institutions.

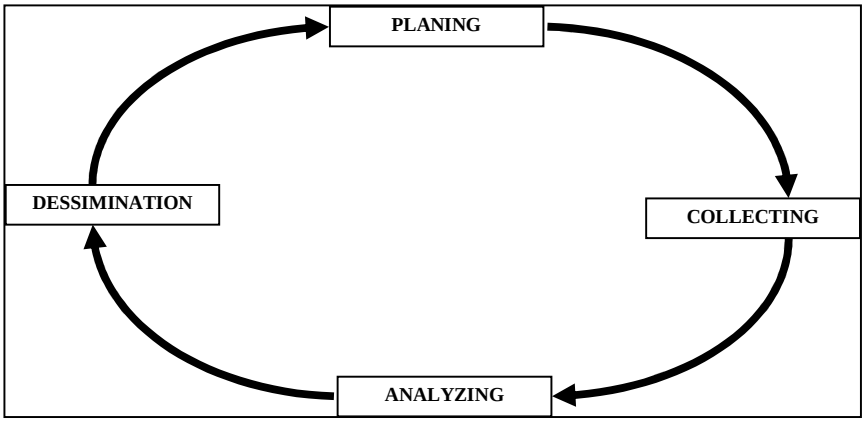
Keywords: Service Oriented Architecture, Intelligence IT solutions, process optimization.

1. Introduction

Every modern intelligence system is based on some type of computer information system. Usage of high technology, especially information – telecommunication technology (ICT), is giving more efficient execution of the

intelligence function in terms of collecting, planning, analyzing, and data dissemination process.

Traditional intelligence cycle is a process with precisely defined steps in which separate departments are focused on their part of the process and the remaining aspects of the intelligence cycle are left to the other departments. This approach is treated as an inadequate against netwar (conflict with complex, dynamic, nonlinear nets, which up till now are the biggest challenges for the intelligence community in the area of information age). As a response, presently, different intelligent agencies have established teams for monitoring and response to events on different locations, by using modern IT solutions for better coordination.



Picture 1 Intelligence cycle

On the other hand, target-centric model of intelligence, especially the analysis process is not new, but it is not formally accepted by the intelligence population. Individuals and small teams are making ad-hoc temporary information database for improving the process information analysis. However, the information databases are designed as temporary inadequate solution for the direct needs of the information analysts. These information databases are mainly made up of piles of paper and are not understandable for outsiders.

After the changing of the traditional hierarchical model in the target-centric model of intelligence, intelligence analysts as a part of the intelligence community are facing the need of new IT solutions, with one goal – achieving better intelligence products.

SOA, one of the possible solutions, as a particular component of a wider IIS, represents a platform for creating a service for exchanging information in IIS.

2. SOA in Information Systems

SOA is a technological approach towards designing information systems, where the primary aim is using IT advances in business process in a way that would produce bigger efficiency, in order to create synergic and symbiotic relations. Furthermore, there are a lot of doubts whether the SOA approach is going to solve many of the technical problems and NEC advantages. That is only partly correct, because the SOA solutions are IT products themselves and are to a great extent dependent on many other factors which are part of the operating process, for instance human or organization factors as components of the Defense system of one state. SOA approach is abstract concept "service", where the service is technology – independent structure which is simplifying the process „loose coupling“ and provides 'platform for making architectural(modular, opened) components.

On business level, business components exchange large-grained business services (e.g. Common Operating Picture (COP)). On technological level fine-grained technological services are exchanged (e.g. data store). SOA approach is a bridge over which mapping of large-grained business services is made in fine-grained technical services.

Up to this moment, MO are not in a position to achieve flexibility for combining, positioning and configuration of software components in an appropriate way or to create some particular new components. SOA approach is offering architectural structure that is making level of integration of the services as a sure sign of satisfying software and business demands, with only one goal - getting products of higher quality. The abovementioned facts justify investment in the use of the SOA approach, although the real validation is the improvement of the working process, synergy changes and information exploitation, which is not the case with the previously used information systems.

In the early phase of the SAO approach implementation it is often very hard to determine the characteristics of the integrated systems development which are to be used in military purposes. Conclusion can be made that, although we come to a point where further integration and interoperating using the existing systems provides additional advantage. Even in the relatively high level military services where the implementation of the SOA approach or Federated Enterprise Service Bus (ESB) is big and where the value of the group applications is again shown as a group of well defined services (business components), all have achieved optimization. While this is clearly desired and generally very useful achievement, the real challenge, or opportunity, the MoD now is pointing in a direction of using much bigger quantity of useful information together with flexibility and degree of fast re-engineering or creating components for re-using which have characteristics for work in service oriented environment.

3. Use of NEC in the decision making process

The purpose of Networked Enabled Capability (NEC) is to support decision making over "on time found and use of information in intelligence" [1]. Influence of NEC is in area of Defense with aim of getting higher military effectiveness.

The concept of the (NEC) in support of information trade is different compared to the solution for Network - Centric environment, where the net is the base on which military capability is made. The use of the concept for NEC is emphasizing the importance of the decision making process by the authorities in the military area with information that is needed for the right decision making.

From the IT perspective, the implementation of NEC environment presents a challenge. The following may be given as an example, where there is need of distribution of the information received from a big number of sensors (UAV, aircraft and other elements from a fighting schedule) and they must be exchanged between different HQ in joint combined operations.

As an addition to the challenge for information distribution over the NEC is the need of fast response to threat. On the basis of the previously mentioned, following 6 (six) characteristics of NEC [2] can be presented:

1. **Adaptiveness** – capability to change the working process and capability of organizational change;
2. **Flexibility** – capability of using more ways for perfect function;
3. **Innovation** – capability to do new things and old things in new ways;
4. **Resilience**- capability to again function after a mistake, recovering after a mistake;
5. **Responsiveness** - capability to adequately react to changes in the environment;
6. **Robustness**- capability for effectiveness across a range of tasks, situations, and conditions.

3.1 IIS and NEC

In conditions of change of the threats IIS(Intelligence Information System) it must be adapting, with one goal of rational usage of the opportunities which NEC is offering. IIS is a information systems for intelligence, in which are contain reports, overviews, estimations, analyses and other intelligence products in function of decision making process.

That means that NEC is very important solution for IIS, because is giving possibility of connecting between the elements of intelligence which are achiving interaction between them self in the operating environment [4]. Need for ensuring the access to the information are:

- The right information to support decision making (while avoiding overloading with information);
- Providing information in right time in decision making process;
- High quality (in terms of achiving information security).

3.2 Supporting IIS

In an operating aspect, effective exploitation of information for support decision making process in a military environment is a key to the military success.

As a military threats are changing, and new capabilities are developing (e.g. sensors) it means that is need change in the practices, system IIS is need to develop in higher stadium.

As a response to the new operative requirements from the clients is use Service Oriented Architecture (SOA) for making IIS.

3.3 SOA solution in IIS

An SOA approach is attractive to enable the evolution of a military C2IS since it offers opportunities to:

- Associate business processes with technical information exchanges;
- Support flexible information exchange mechanisms, for example, subscription services and information pull;
- Exploit commercial technology developments and open standards to enable a heterogeneous system;
- Enable capability evolution through system integration and the introduction of new services.

The aim is to enable customer requirements to be met and, therefore, improve military effectiveness.

4. IIS prototype

In prototype for IIS is needed to provide some tools for support of decision making process with one aim making better operative effectiveness according to following:

- using of tailored suite of digital collaborate support tools;
- better awareness of the stuff with enhanced battlespace elements;
- capability for combined and join digital planning;
- ensuring flexible, integrated and fast way of information flow;
- allowing the co-ordination, synchronization and prosecution over the full range of activities for supporting the mission;
- providing an enhanced information management capability supporting NEC information managements goals.

4.1 Type of users

Type of users that exists in IIS can be analyzed in two aspects:

- Aspect of IIS system functionalities;
- Aspect of IIS users functionalities.

Aspect of IIS systems functionalities defines standard users from system aspect. These are following types of users:

- Administrator of communication infrastructure;
- Administrator of applicative solution (definition of web services, integration in informational systems of the institutions);
- Secure administrator (define of polices).

Those types of users are standard types of users which are existing in any more complex information system. From functional aspect IIS have additional four types of users:

- Requestor of service
- Approval of the services
- Companies Компании
- Intelligences (IMINT, SIGINT, OSINT, MASINT)

Requestor of service are any institution (Center for managing with crises, MOI, Agency for intelligence and other institution) how for needs of their work has need to get information, or to give information (as a notification).

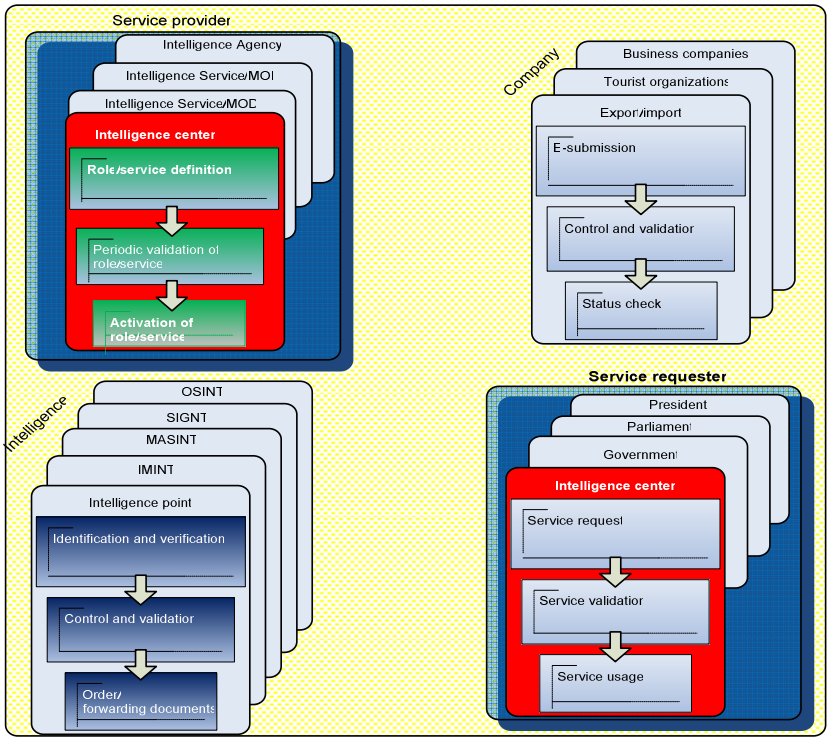
Supplier of services is a user who should supply information (in which can ask for proper authorization according to own secure procedures or according with some external norms (where it should be achieved as a request a favor from IIS)

Companies are external users how can be directly referring to some institution which will make their request (e.g. department or section of Government), but they can ask also some public information which should be approved and secure by IIS.

Intelligence is based on four intelligence disciplines: IMINT, SIGINT, MASINT and OSINT.

Also disciplines are dividing on subdisciplines with different specification in part of the work and can organizational part of many institutions or unites in Defenses forces of the state (Agency for intelligence (AI), MOI, MOD, Ministry of Health, MFA and other subjects), but there role and task is to put in information (information, assessments, analyses, reports and etc.), there verification (which can be subject of support of IIS) and to get notification or (e.g. For political-secure situation in one state in relation with secure of the investment).

On picture 2 are shown those users types and the phases of their general users functions.



Picture 1. User of the system for support the intelligence

4.2 Users functionalities

Users functionalities of the system of IIS can be treated from few aspects according to divided users. This chapter will contain definition of the functionalities of final users of IIS. As it was already explained, there are four types of final users of IIS. Those are:

- Requestor of service
- Approval of the services
- Companies
- Intelligences (IMINT, SIGINT, OSINT, MASINT)

Analyzing the process which should exist in the institution included in IIS, it may came to the solution that the final users can use same target for users scenario, meaning always to work in same general procedure (under procedures). That process is containing three phases. Those phases are:

- Phase of evidential,
- Phase of verification,
- Phase of notification.

Those phases exist in every process connected with IIS, but not always are with support from IIS. Sometimes are supported from intern informational systems of the

institution included in process of IIS. That is additional reason for need of integration of system for support of workflow on mediation level in every institution included in the process of intelligence.

4.3 Services oriented architecture of IIS

Services oriented architecture of IIS should have central system for support intelligence from logic aspect, while his physical position is distributed.

Services oriented architecture of IIS will be described over explaining logical architecture of IIS and layer model architecture of IIS.

4.3.1 Logical architect of IIS

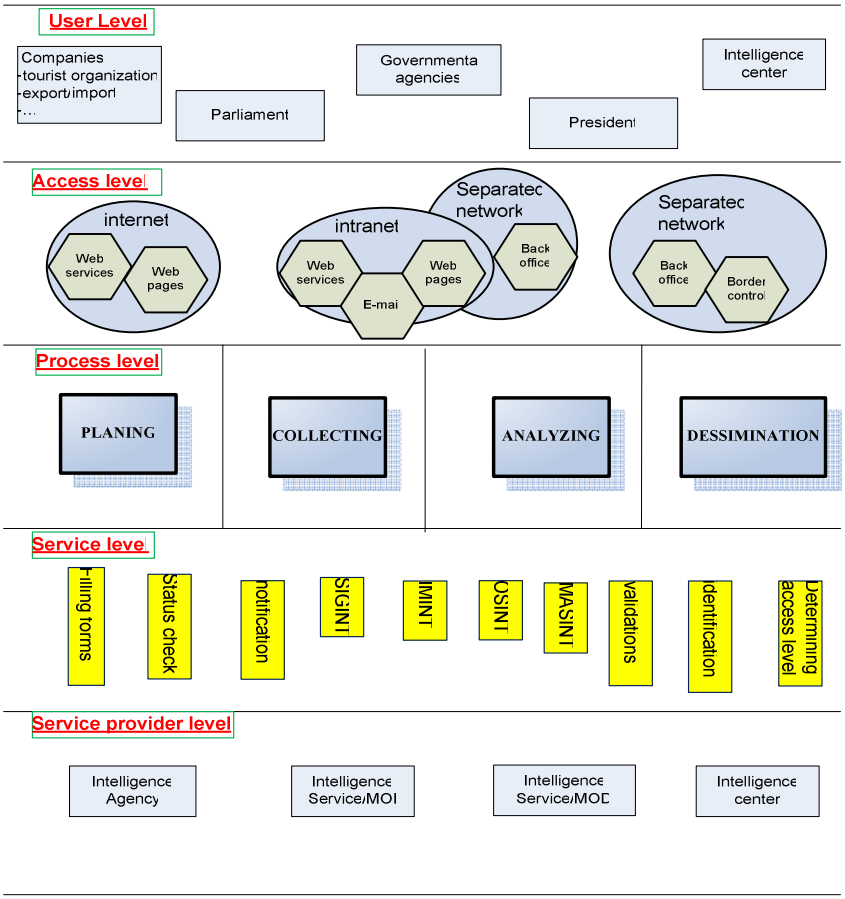
On picture 5n is shown proposed logical architect of the system for support of IIS. She is using model of levels and contains following levels:

- Level of users;
- Access level;
- Level of process;
- Level of services;
- Level of services providers.

The level of service users is giving approach over using appropriate presentational logic from IIS for all types of functional and system users explained in chapter **Type of users**. From organizational aspect those types user are part of: center of intelligence, Crises Management Centre, embassies of MFA, and other government institutes and agencies, but it can be also other users represented by their companies.

Those users according to secure polices have different way of approach to IIS. The way of the approach is defining in the level of the way of approach. It can be over public internet net (e-mails, approach to web page of IIS), private intranet net (over web pages,e-mail and integration with informational systems that exists in the institutions), or over some private net (over widing the system of MOD, MOI and other with possibility of using the services of IIS, and integration in parts of the information system who have special importance for the work of the institutions). Level of the approach, in accordance with defined polices of types of users is determinating the way of approach of every user.

From the way of approach depend unit of all process from the domain of the intelligence to hum the user will have approach. Possibly process are: planning, collecting, analyses and dissemination. Those processes are uniting all hierarchy of possibly scenario of usage which depend from legal/law and inter procedures of the institutions included in the process of the intelligences.



Picture 2. Level of logical architect of system for support of IIS

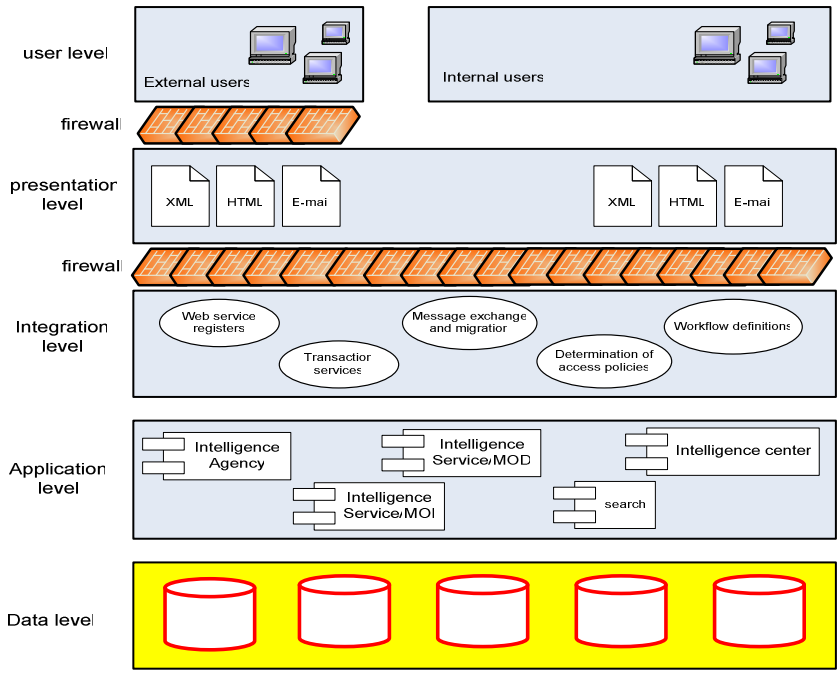
Services which are using are defining in the level of service. They are available for integration in the process which are used by the users in accordance with secure polices and availably points they have right to be used. Those services can be: services of control (if the company or document exists as a point in some base of information), services for collecting information (IMINT, SIGNT, OSINT и MASINT), determination (and change) of right of approach according to some regulation (which understands automatic or manual process of improvement), identification (if the given person or document is appropriate with what is shown on base of the rule (comparison of information, statistical analysis)), following (of goods with help of GPS device), notification (for attendance in mutual control, for statistical evidention, for updating geographical informational on base of signal from GPS device), fulfilling forms (for getting information, evaluation, reports and similar), checking the status of some requests (if the request is recorded, is evaluating, or it is approved).

All services are getting from appropriate service providers through Information systems of government institutions, agencies which are included in Intelligence cycle. It is also possible another Information systems to be service providers for interinstitutional governance. Service providers among system support for workflow processes define web services which are exploited from the users with appropriate security level to service registers.

On that manner is provided flexible architecture which affords to the users of IIS continuous updating and spreading services. In addition, information access is in relation with security polices, but most important is that IIS provides unite approach to the information through set of access points, which is characteristic for centralized systems. Because of that suggested architecture for IIS is centralized systems

4.3.2 IIS architecture

On picture 6 is shown general architecture of IIS prototype. As result of system complexity solution is realized as a layer model of architecture.



Picture 3. Prototype IIS Architecture

On the lowest level, IIS prototype has distributed system which consists of heterogeneous database. In this case, most important database for IIS is database which holds data for users who use it. Intelligence center has responsibility for this database.

Access to a separate database will be made with application logic of module which are part of internal information systems on government institution. This application should provide interfaces to the integration logic level. Integration level is key for IIS prototype. That level should provide services through workflow which will be connected with modules of internal information systems and their transformation into web services. As a result of provided web services, integration level should publicized them into appropriate web services registers depending of security level. Also, this level govern security polices and polices for exchanging and adopting messages from different sources, in case of usage in comparable format. Finally this level is taking care for governance of the services offered by IIS in a way of transactions if it is needed. With one sentences, this level is providing the functionality of the services in IIS.

That service should be available in different categories of users. For the purposes of protecting IIS, behind this level should be install firewall after which follows level of presentational logic. This level can be made in a form of portal which can offer: list of web services over approach to service registries, integration of web services with e-mails or directly as far procedure call of the applications (RPC) in a standard format (XML) , but also as a ordinary HTML text for separated union of services – users.

External cooperatives to the system are determent with another additional secure wall-firewall, this way is accomplish maximum protection from unwonted breaking in the system.

CONCLUSION

In the aim of increasing usage of SOA and according offered opportunities, key challenges should be shown. Generally speaking secure challenge is always a problem. Beside that offered standards for flexibility and extensively are making risk of unsecure design much higher.

Flexible usage and accepting of the services and the opportunity for changing the numerous systems which are not in accordance with the levels of the accredit secure is showing the fact of needed careful approach from authorities side for secure accreditation. This type of architecture should be develop in the aim of increasing ability on SOA approach.

Benefits of operational efficiency which might be offer from SOA in a future they will be challenge about solution of security issue.

SOA approach is modern way for increasing IIS capabilities on operational level. Architecture model can help understanding business process and indentifying services which are important for establishing appropriate level of granularity.

Definition of solution according SOA Governance represents a need in the aim of using advantages which offers SOA approach. SOA Governance should set up stakeholders and their interactions, and define lifecycle of services.

Future development will be in a direction of implementing SOA approach in all IIS domain. This approach will be use to afford integration and interoperability with other systems.

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