

e- Government systems architecture: contextual and conceptual level

Ioannis Savvas¹, Elias Pimenidis², Alexander B. Sideridis¹

¹Informatics Laboratory, Agricultural University of Athens, Greece

²School of Computing, Information Technology and Engineering, University of East London, UK

INTRODUCTION

A common problem in the selection of appropriate e-government systems and the relevant software development is the consideration of the whole set of stakeholders and their requirements. This is the most critical phase in establishing a problem's environment or in representing a “real world domain”. We usually refer to it as the contextual level (why questions). It provides context information. In Cap Gemini's Integrated Architecture Framework (IAF) (CapGemini, 2006) for systems design, four levels of abstraction are recognized: contextual, conceptual, logical and physical. The first, contextual, is for answering the “why” question providing context information and key principles that support the value proposition for the architecture to be developed. The conceptual level addresses the “what” aspect of architecture design. It defines the services that are required and what is required from each service. The logical level derives “how” the customer needs can be realized, showing how components interrelate and where components ‘implement’ services. The last one, physical, level addresses the “with what” aspects of architecture design and defines standards, products (catalogues), guidelines, etc. for further development and implementation.

In this chapter the authors propose a methodology that identifies all stakeholders in e-government domain. Through Public Administration (PA) theory and practice, stakeholder categories can be identified. These can provide a full set of principles which will govern a new architecture. Principles are guiding statements about fundamental beliefs, truths, rules and qualities that guide objectives and the decision making process. Architecture is linked to business needs through these principles. The principles / (non-functional) requirements are deduced through publications, formal documents, expressed opinions and experience. Coherent analysis of these high level non-functional requirements can lead to more specific ones. Even if the final result cannot be as detailed as an implementation engineer would like it to be, it provides a very satisfactory context allowing, requirements control. Instantiation of stakeholders' categories can lead to individual needs within the limits of each category.

As the efforts for having a software meeting the needs of the whole set of stakeholders begun from the enterprises themselves, findings from such efforts can be transferred to the e-government field as best practices. However, an evident and explicitly stated difference between PA and the private sector appears to be forgotten. While PA can no longer be a “bureaucratic monster”, but a structured citizen and business oriented service, it cannot set aside its fundamental principles though.

In the following a modelling of PA’s function is presented. The modelling refers mainly to PA of the “normative” countries but it could be expanded to the operational model countries as well. This modelling provides the conceptual level of the architectural design for e-government systems. The different groupings of styles of PA found in Europe are discussed at a later point in the chapter.

In this work’s functional model, PA’s function is represented in an independent way. Goals and limitations, quantitative objectives and law restrictions are being made obvious allowing tradeoffs and negotiations between trends. It highlights areas where controversies can deploy and allows instantiations for real life argumentation.

Finally towards the end of the chapter the authors provide application examples of this approach tested in the reality of the Greek PA system.

CONTEXTUAL LEVEL

In Savvas et al. (2007a), PA’s stakeholders were identified and their strategic relationships in the socioeconomic environment, at national and supranational level were defined. Stakeholders were defined on both sides of public service provision, supply and demand.

- The demand side includes citizens (also as employees) and businesses. Judicial power (administrative courts) and Legislative power can also be classified here. Parliament receives PA services in law making process and it is interested in the application of the laws it provides. Courts are control mechanisms regarding public service provision. They are interested in the application of their decisions concerning administrative acts and they support administrative processes providing jurisprudence.
- The supply side includes the indivisible of governance. Government national and supranational (EU case). When we are referring to a certain service though, final provision is being made from one Public Organization (PO). The demand side then might include other POs too.

Especially for the case study of the Greek PA a first set of stakeholder requirements has been presented. In this case, stakeholders are not only national but supranational as well, as Greece is part of the E.U. Stakeholders belong to the direct and the indirect environment of PA and have been defined as: Government, the EU, citizens/businesses, public organizations, public servants, the Law courts and country’s Parliament.

Various papers and documents were used to determine goals of each stakeholder category and in thus identify and elicit their needs. These papers and documents used to form the first set of requirements are provided below in form of categories. In each category a set of indicative documents are given. The purpose of the use of these documents is to identify the basic principles. Thus if there is an official document explicitly expressing the principles of a stakeholder category this could be sufficient:

1. Strategic papers and reports as well as fact sheets of every member state (see an indicative list at the end of the references)

2. E-Government Communications, (e.g. COM (2003)567, 26 Sept 2003), Working Papers (e.g. on eGovernment Beyond 2005”), White Papers (e.g. on European Governance”, COM (2001)428, 25/7/2001), The new European strategy for Information Society i2010.

3. Projects (e.g. e-Government Economics Project (eGEP): e-Government Unit, DG Information Society, European Commission, 4/2006), Surveys (e.g. “Online Availability of Public Services: How Is Europe Progressing?” Web Based Survey on Electronic Public Services Report of the 6th Measurement, Capgemini, June 2006), Studies (e.g. “Study for problem’s management of citizens and businesses”. The “KAFKA” Plan, April 2006, Greek IS Observatory, “National Study on New technologies and IS held on Greek and foreigners”, 2005, EDET S.A)

4. Organizational reports regarding performance of public organizations and thus expressing personal experiences of higher executive officers and their requirements for a proper and sound function of the organization they govern/administer. These reports can be found in public organizations' sites like the site of the ministry of interior (www.gspa.gr)

5. Documents from the website (www.adedy.gr) of the major labour union for public servants in Greece.

6. Articles of high ranked judges and presidents of the highest courts

7. Mission of the Parliament and statements of the President of the Parliament

Then sets of needs per stakeholder are formed correspondingly as follows:

1. Development, prosperity, equity, justice, freedom, democracy– transparency -participation form *group A*. These goals are for the functional definition of PA consequences. These goals are to be achieved with Efficiency-effectiveness-economy.

2. Additionally to the above, Pan-European sustainable- innovative services.

Transparency belongs in *group J*. Inclusive services in *group C*. “Inclusive” concerns the external communication between PA and citizens/businesses, which has to include the whole of the population. Thus the approach should be *multi-channel*: (sites, fax, mobiles, unified administrative offices, call centres, m– government, infokiosks). Accessibility, multi language, security form *group D*.

3. Public money exploitation-equity, Less time, less trouble belong in *group A*. Sufficient information in *group J*. Protection (Personal data protection, Identification – authentication, Identity management, Data and network security, Battle against e-crime) form *group E*.

4. Interoperability (technical-organizational form *group G*-semantic form *group F*). These groups comprise European Interoperability Framework's principles, like Accessibility, Multilanguage, Security, Privacy, Subsidiarity, Usage of open standards, Assessment of the advantages of open source software, Usage of Multilateral solutions, Collaboration culture, right data and their usage form *group H*.

5. Lower work load -less routine tasks in *group I*– education – training

6. Courts care for the execution by the PA of their decisions and for the soundness of acts issued so as to be relieved from the burden of appeals.

7. *Group B* refers to principles of administrative law like reasoning, fairness, trust, proportionality etc. Additionally, parliament uses PA for the preparation of laws and for getting feedback from their application

These needs concern, in the case of e-government, technology resources that would in turn pose specific requirements on human and financial resources

The above can be further explained in the following notes:

Efficiency and effectiveness based on van Dooren's (2006) work are expressed as ratios: Efficiency = input/output and Effectiveness = output/effect (1), and effect/consequence (2). Output is the administrative act, effect is the service and consequence refers to the first measurable specification of goals of the constitution or politics. Further analysis is provided in next section's PA's functional model.

Citizens' and businesses' needs for faster services are concurrent to governments' requirements for efficient administration. Time is included as parameter in the ratio of efficiency, both in person-hours and in terms of communication resources.

The needs for less discomfort and less bureaucracy are also included in the above ratio and concern the number of internal entities required and the swiftness and effectiveness of communication.

An additional issue is for the new administrative systems to earn the trust of the citizens and their legal consolidation. The three main categories of legal issues being, (a) legal validity of e-government, (b) e-government trust and security and (c) legal remedies of e-government.

The ability of the citizens to understand administrative language and practice or the ability of PA to address the external environment in a language that is understandable, in order to collect/provide useful and sound information is a further point of consideration. This affects the semantic interoperability between PA and external entities.

Public servants as stakeholders might pose additional points for consideration, such as (a) resistance to change (e.g., introduction of technological solutions), due to fear of losing vested interests and (b) lack of knowledge sharing because of fear of losing competitive advantage for promotion.

In all the above points there is an evident conclusion that stakeholder needs may often be contradictory to each other. In such cases a decision as to which is the prevailing stakeholder must be made. Negotiation between stakeholders could be discussed through various theories in the field and it is beyond the scope of this chapter. In the case discussed here, this decision-making is ad-hoc, depending on the service, that is the legal and the operational practices. Thus national government might draw back in favour of an EU decision if the Greek Constitution will allow it. There are cases, though, where strong cultural characteristics are present in public servants' and citizens' requirements and partially in those of public organizations. In such situations the order of prevalence may be reversed.

CONCEPTUAL LEVEL

The conceptual level addresses the "what" aspect of architecture design. It defines the services that are required and what is required from each service. The architecture is intended to provide services to the operational environment. To determine these supporting services normally an analysis of business processes is performed. In this case a generic solution, applicable to several widely different types of services is sought after.

E-government often coincides with the reorganization of processes and methods followed in public service provision. E-government systems though have to suit/facilitate a PA's rationale. This work addresses the function of PA at top level reusable mode. The approach adopted here is a goal oriented one, placing the administrative act at the centre of PA's function. To this effect, a method is proposed which in addition can spot problematic areas in public service provision and suggest actions and the introduction of appropriate e-government systems aiming to remedy the situation.

In its daily function, PA repeats a sequence of activities in order to achieve its mission, to serve citizens and businesses. Even if for the majority of the citizens terms PA and bureaucracy bring forth negative associations (Wilson, 1993) this has nothing to do with the real meaning of these terms. From Weber's definition (1946) to more recent trends (Peters and Savoie, 1998) and introduction of "New Public Management" theories (Boston et. al., 1991), bureaucracy's function is a prerequisite for the success of governmental programmes, effective and good governance. This activity is not always in accordance to contemporary or short term rationale, but in line with "public weal" or in other words in a sustainable and constitutionally sound way.

PA aims at achieving goals like development, prosperity, equity, transparency, justice, freedom, democracy. To achieve these goals PA provides certain *services*. In order to provide services PA issues administrative acts. The issuing of acts is the core activity of PA; it is always a State activity and concerns e-government. PA services could be divided into material (e.g., construction of a road) and non-material (e.g. Change of the marital status in a personal details database).

In this work, material activities are considered up to the issuing of the act that commands them, as the following activities are of no interest to the e-government domain. Contrary to that, non-material activities are fully in-scope with e-government as they comprise an additional circle of communication – information in order to implement a transactional service. Material services could be outsourced more readily.

A European PA classification

There are several criteria for classifying PA profiles across Europe. Napoleonic and non, civil and common law, continental and Anglo-Saxon etc.

In a previous work (Savvas et al., 2007b) the authors classified the PAs of the fifteen older member states of the EU on the basis of vision and objectives for e-government, in two dominant trends: a) the empowerment of democracy through an open, transparent and participatory society (social state model) and b) improvement on monetary performance through cuts on state expenses or on returns based on raising competitiveness and on increasing of the number jobs offered by businesses. Citizens obtain additional gains through tax reduction. (Market driven model)

A different classification by Billiets et al. (2006) distinguishes between "normative" and "operational" models:

1. A normative model is characterized by increased interest for legal formality. A distinctive type of law, public law, governs the functioning of the state as well as the relations between public entities and civil society. Such PAs are rule oriented mechanisms

2. "Operational" administrative systems are result-oriented mechanisms. Legal tools are not ignored, but quantitative methods based on the use of performance indicators, strategic and operational planning, cost-benefit analysis and other similar techniques, mostly borrowed from business management, are the backbone of administrative working methodologies.

In both the above mentioned approaches Southern European countries like Greece, Spain, Italy, Portugal, and those of continental Europe like Belgium, France, Luxembourg, Germany, Austria are grouped together as to the first of the dominant trends identified. The model of PA's function discussed in this work adopts an independent point of view. Goals and limitations, quantitative objectives and legal restrictions are being made obvious allowing tradeoffs and negotiations across different trends. It identifies areas where controversies can be deployed and allows instantiations for real life argumentation.

The above concurs with Sabucedo and Rifon's (2006) point of view that in all democracies across the world the use of documentary evidence to support PA operations is a common feature.

A Public Administration's functional model

To represent PA's operation the authors use an input-output model:

FIGURE 1 HERE

Figure 1. A simplified input/output model on PA's function

The above modified input/output model for public sector function results from van Dooren's work (2006), which in turn was based on Pollitt and Bouckaert (2004).

Within society there are socioeconomic issues that create needs to citizens and businesses. Such needs are usually translated by politicians to policy objectives. In response to these objectives, inputs are assigned in the form of resources which by certain processes produce/provide outputs. Under the influence of the environment these outputs produce outcomes (effects and consequences). These respond to existing socioeconomic issues or prevent new ones from arising. PA in its broader sense is where governance as formed by politicians is exercised and embraces the whole cycle as pictured in figure 1 above. Public Organizations' and public servants' tasks are usually kept to efficiency matters.

The ratio of input over output expresses a measure of efficiency (horizontal axis). The outputs are expected to have outcomes on society. These outcomes can be intermediate (usually short-term, effects) or final outcomes (usually long-term, consequences). The final outcomes in particular, are influenced by the environment on which the organization or the program has a limited or no impact. The ratios of output over effect and effect over consequence are two effectiveness measures (vertical axis to the right).

FIGURE 2 HERE

Figure 2. PA's function (different shapes used do not follow any notation, but are used to emphasize differences)

Based on the above input-output model (figure 1) and setting service as effect, administrative act as output and finally as consequence of an administrative action, the long term effect of which is going to be aligned with the aggregation of goals of the stakeholders as set by politicians, the above diagram is derived.

PA comprises Public Organizations (POs). To issue an act a PO has to fill a template, which is a product of a knowledge process and it is incumbent upon the Administrative Law and the rules for the composition of an administrative document (Savvas and Bassiliades, 2008). These rules provide a minimum for the issuing of sound administrative acts that could sustain to objections for typical reasons. In order to fill the template, a PO needs information which may exist either in its own database or in a database of another administrative entity, - i.e. databases of law courts (legal cases), parliament (law) and citizens or businesses (certifications, declarations). To acquire this information a PO performs either retrieval from one of the databases that it can have access

to or communicates with other entities (sending an informative document). As a result the information supplied will be in the form of an administrative act or a legal case or a citizen/business document.

To communicate, a PO may use informative documents, documents that ask for information (they are not acts). Triggering of the process described above could be done by: a) Citizen/business applying for a service, b) Law Courts that decide for or against an administrative act, c) Parliament that votes for a new law (that changes or abolishes an older one) and decides probably the provision of a new service or change the preconditions of an older one, or d) Administrative entity seeking for information or orders the provision of a service.

The final act which commands a service is communicated to the entity that triggered the procedure and to the responsible administrative entity which might be different from the one issuing the act, in order to proceed to actions that change the world (e.g. Changes in database records, money transfer)

The core of PA's function: the administrative act

PA's core function concludes with the issuing of an act. The act has: a) Effects (short term) and b) Consequences (long term).

Service is the effect of an administrative act. A goal of governance is to identify consequences of an administrative act with the aggregation of goals (ideal case).

Public documents are structured by following certain rules and forms. The rationale across European countries especially between the ones grouping together in the above mentioned models is the same. To illustrate the structure of acts we use the case of the administrative act in Greek PA. The distinction between elements that each public document must possess is as follows (Greek Administrative Process Code, 1999): a) before main text elements, b) main text's elements and c) after main text elements

Especially concerning Decisions of Public Administration (acts), the main text has its own basic rules regarding structure and appearance. The basic characteristics of decision texts are explicitness, accurateness, brevity, rationalism and use of simple language. Decisions are legislative acts and they might be normative or personal/individual. They are divided in two parts: preamble and pronouncement.

In the *preamble*, all the valid legislation that provides the administration with the obligation or ability to produce the act is presented. At the end of the preamble, the reason for which this act is produced is presented, in other words its grounds for decision, either because this is required by the regulation or because it is obligatory by the act's nature. *Reasoning* generally refers to the legislation that regulates the production of an administrative act and its interpretation.

Concluding the above, the composition of an act by a PO follows certain steps (model)

- administrative process code sets the template
- PA's and Law experts set the law mix
- law mix sets preconditions (as interpreted by PA experts)
- preconditions ask for specific information
- specific and general information is interpreted by civil servant (discretion margin)
- interpretation forms an aspect

A service is ordered by an act. Act is ruled by a law mix, not a single law and this could differentiate decisions. Law mix is defined in its majority by domain knowledge.

The triple functional requirement/need of PA

The information that PA is looking for may be distinguished in: General (stable/repeated) or Special (ad hoc/new). Informational need defines the identity of the entities (or databases), which are going to provide the information needed.

Communication can be divided in: Internal (between PA's entities) or External (between PA – Citizen/businesses etc). Communicational need defines the type of communications between the above defined entities.

Finally, expression concerns impressed thoughts and decisions of PA on documents. These documents may be Informative or Acts. They have form (structure) (information apposition) and content (information interpretation) (non-structured). The expressional need relates to the record of the communicated information and the recording of the justification of the decision (reasoning).

Taking a closer look at an act's construction, there is primary need for information. To acquire information there is a need for communication or retrieval and later there is a need for interpretation, for an expression of thoughts.

Act needs three types of information

- i. information for the general provisions or decisions of the preamble
- ii. information about the specific preconditions that the law mix sets
- iii. information for similar cases and legal cases which aids the decision making

First one, (i) is about expert knowledge and law databases. Third one, (iii) is about knowledge and courts databases

For the second type of information:

- ✓ a PO is seeking information from other POs or citizens and businesses
- ✓ it needs to communicate
- ✓ depending on legal barriers (personal data protection) it might need an intermediary or it can retrieve
- ✓ depending on interoperability barriers (semantic, technical, organizational) it could need an intermediary.
- ✓ depending on both (legal and interoperability barriers) it could possibly define type of communication (electronic, fax, personal, telephone etc.)
- ✓ depending on legal barriers it could use data or information
- ✓ depending on all the above centralized or distributed databases will be built

According to what has been discussed above there is a triple functional need/requirement of PA: Informational, Communicational, and Expressional/representational/expressive.

The authors argue that a document (act) is the place where all the knowledge of PA is laid down. Even tacit knowledge of all public servants has to be explicit on an administrative act if provisions of administrative processes code are going to be followed.

The analysis of PA's functional needs apart from a methodological approach underlies a tool for the trace of bottlenecks and warps of its function. Identifying these areas makes it easier to choose or design the strategy of the solution.

STAKEHOLDER GOALS IN CONCEPTUAL MODELLING

To incorporate stakeholders' goals/needs to the whole of a PO's function and every single process, one can start from the effectiveness part. Effectiveness is the measure of achieving goals

that are not necessary financial. They could be goals relating to issues such as democracy, equality, etc. and according to contemporary theories they should reflect stakeholders' needs.

Step 1. The effectiveness part. Effectiveness is expressed by two ratios: Effect/Consequence and Output/Effect

i) **Effect/Consequence.** The ideal situation is to identify consequences of the administrative action with goals/objectives as set by politicians. These objectives are measurable interpretations of the abstract goals of the stakeholders. Effect in this case is the service in question. The ratio is expressed as actual over prospective, meaning that the service either achieves the goal that the government and the politicians had set, or not. A problem expressed in the values produced by this ratio, reflects for example policy objectives setting and law making problems.

ii) **Output/Effect.** This is expressed as act/service. It refers to the number of the acts that actually provide the requested service (note even the denial of a request is considered as a service). It concerns the number of acts that are invalid due to objections or appeals, number of acts that provide service to persons that are not entitled to that and number of acts that provide the service to people who are beneficiaries of a better similar service. Such problems call for changes to the quality of acts (structural and typical matters, matters of interpretation of the legal framework and discretion margins of public servants, matters of dissemination of information.)

Step 2. The efficiency part. Efficiency is described as the ratio of Input/ Output. Acts as outputs need three types of inputs: information, communication and expression as resources. All three are tested versus two variables, time and cost.

Information can be divided in three types as shown in the “triple functional need” section above:

Information in (i) and (iii) concerns administrative knowledge. It deals with knowledge management systems and personnel training, HR culture and development. It addresses the very sensitive matter of discretion margins.

For (ii), information for the preconditions set by the law is required. This information is usually possessed by other POs or by other entities like citizens and businesses. Provisions of laws about personal data protection define direct or indirect access to the information from where it lays (it also help decisions about databases and their data). Technical interoperability issues define direct electronic retrieval or communication between entities through document exchange (informative). For the latter, issues of communication material and type have to be solved (telephone, fax, email, paper etc). There are also matters of organizational and semantic interoperability between either organizations exchanging information or citizens. Such interoperability barriers can further define the type of communication required.

APPLICATIONS

To validate this method a Greek Public Organization was used. To this effect two critical procedures of the Greek PA, as applied in a directorate of one of the country's regions, have been analysed and proposals for the introduction of appropriate systems have been made.

The first procedure refers to the management of the Programme of Public Investments. The method primarily assesses the informational needs of the specific procedure and suggests the development of a database which in a sense is not an integrated e-government initiative. It is used though to illustrate how functional requirements concerning informational needs are determined.

The second project concerns the whole function of a PO's department. Services that the department provides are examined according to stakeholders' needs and are being met by the use of e-government systems. Matters of effectiveness are also addressed here.

A. An application for the management of the Public Investments Programme (PIP) in the Region of Central Macedonia (RCM).

To determine the informational needs of the department responsible for the management of the PIP the acts that the department issues are identified. To fill the template of the acts certain information is needed. For the composition of acts and concerning expressional needs it is essential to form the part of the preamble which lists the laws that rule each procedure. Thus the additional information required relates to (Savvas and Bassiliades, 2008):

the laws in force and their amendments.

supporting material of previous acts and case laws (jurisprudence) that will help the public servant to form an opinion based on administrative case based reasoning.

Concerning the second (ii) type of information (preconditions set by law) for each act the following procedure takes place.

The documents that the department issues and their relevant informational needs are described below:

1. Proposal to the Ministry of Finance (MoF) for the allocation of the financial resources per project and collective decision. For this act information is required about, (a) the approved payment limits per Collective Decision must be kept (encyclical from MoF), (b) data relating to the implementation level of a project (credits, payments etc) and (c) estimation proposals from the organization that implements the project for the future course.

2. Notification of all agencies which implement projects for the approved credit per project. No special information except from the addresses of the agencies should be kept.

3. Notification to the MoF for the subsumption of a project to the PIP. Information required for the subsumption in the Regional Operational Programme (acts from the Managing Authority of ROP).

4. Notification of agencies for the subsumption of their projects to PIP. Another organization's (MoF) act, change the world (data of projects) in the database of RCM.

5. Project's credit approval. Information required about, (a) subsumption in ROP, (b) subsumption in PIP, (c) budget, (d) credit, (e) contract details and (f) auctioning details.

6. Order to the Bank of Greece for project financing

Information required in this case is (a) approved credit per project, (b) payment details per project, and (c) requests for financing

From the above six documents only three of them are acts (1,5,6). The other three are notifications required due to communication barriers set by the administration. The above mentioned information required by the acts is described in abstraction. For example for act no. 5 above, (project credit approval), further details for the six points are given below:

- subsumption in ROP - number of the act of the Managing Authority, date, number of subprojects, time-schedule, budget allocation, agency which will implement, territory (prefecture, municipality), etc

- Subsumption in PIP - number of individual or collective decision of the MoF, date, category, subcategory, special number, number and date of proposal, project's name, etc

- Budget - current, initial, numbers and dates of acts of modifications, number and dates of proposals for modifications.

- Credit - current, initial, number and dates of acts of modifications, number and dates of proposal of modifications
- Contract - amount, name of the contractor, number and date of the contract, subcontractors, time-schedule, etc
- auctioning details - numbers and dates of acts that approved auctioning details, etc.

Note that for all of the above categories it is useful to have temporal changes of the information types.

In this way information that should be included in the database to be is defined and the way that it should be retrieved is described.

B. One stop shop for investors in Region of Central Macedonia.

At this moment the department of private investments of RCM provides one service as we can understand from the acts that issues: “*Financing/denial of financing of a proposal for a private investment up to 4 MEURO*”.

Starting from the effectiveness part the corresponding ratio effect/consequence, with

effect=service=“financing of private investments” and

consequence=rise of the GDP in the whole of the country and regionally.

was checked. This ratio was too high meaning that the service “financing of private investments” was not contributing as much as the government would like to be for the development of the country. Thus, the law that ruled the services provided for investors in Greece has recently changed due to effectiveness deficit.

Afterwards, the ratio output/effect was discovered getting lower identifying another effectiveness problem. This happened due to the fact that the number of rejection acts had been increased. A rejection decision is reached due to either reasons of formality or due to concrete reasons. Reasons of formality refer to incompleteness of the applicants file; while concrete refer to an investor's capability or investment's feasibility.

Both types of reasons originate from the preceding communication.

Potential investors or their consultants were gathering information for investment opportunities by calling RCM, by visiting RCM or simply by reading the law. This was a semiformal type of contact and the provision of information occurred verbally or through brochures. This type of communication is implicated in two kinds of problems. First, it was not so helpful for people conducting RCM and second, it couldn't easily directed to potential investors that had not conducted RCM before (e.g. Foreigners, young and inexperienced investors etc.)

This informal procedure should be formalised and is going to be supported by a portal subsystem, to increase competition and to secure that funding is going to be assigned to the right investors and investments, for the promotion of Development. For the portal subsystem functional needs concerning information provided, expression used and communication recipients, restrictions set by the corresponding stakeholders' goals are groups C,D,E,F,G,J.

Thus following for example group C (“Inclusive”) needs, a phonetic portal will also be established to include the whole of the potential investors. Requirement for multi language communication will also be regarded (group D) to attract foreign investors. Also personal data protection, identification – authentication (group E) will be taken under consideration. There would be an attempt to provide all the information needed for a potential investor (group J) not in administrative language but in a way to match investor's (maybe) vague needs to administrative procedures (semantic Interoperability - group F).

Further analysis made is not presented here for brevity reasons.

The establishment of the portal will be a new service, an e-government service, which addresses both efficiency and effectiveness issues. Effectiveness issues are addressed through the publication of the investments' choices that the law provides, in order to increase competition between investors. The right guidance of potential investors through the whole set of funding programmes in region's borders helps so as each potential investor will address the right funding programme. This concerns the quality and abilities of the investors to whom the acts of subsumptions are addressed. It is this effectiveness deficit that brought forth this new service.

Concerning efficiency, if the information given by the portal is accurate and complete, then the number of phone calls or personal visits in RCM will be reduced considerably, allowing servants to work for back office operations like assessments/evaluations.

The e-government project which will be introduced will concern the whole administrative procedure and will address all the three functional requirements of PA. Thus it is going to help the composition of documents, organization, retrieval and accessibility in information and communication with internal and mainly external entities.

Collectively concerning required information, this will be about: a) Completeness of applicant's file (all the necessary documents), b) other PO acts that declare agreement or disagreement to the investment (prefecture agencies, agencies for antiquities etc.), c) database for assessors and inspection committee's d) records of working committee's (keeping and storage), e) government's journal details, f) autopsies' details g) acts for appointment of assessors and inspectors, h) suggestions of assessors and inspectors, i) investors' written reasoning and j) responsible tax offices for every investor.

This information comes from other entities (other POs and potential investors), but mainly from the databases of the RCM itself. Further analysis of the functional requirements detected is made in the same way as in the case of PIP above.

RELATED WORK

Related work presented here relates to a) the identification of stakeholders of their needs and b) modelling of a PA's function.

Architecting PA involves designing PAs to reflect the political and public managers' decisions at a strategic level in operational activities and decisions (Janssen and Hjort-Madsen, 2007).

There are many efforts in modelling PA's processes and function. These attempts are classified in fields like Process Modelling, Business Process Modelling/Reengineering, Enterprise Architecture, and Enterprise Modelling.

Business Process Modelling (BPM) has emerged as an immensely popular theme of conceptual modelling in practice. Research on BPM is based on diverse topics of research methods and covers a wide area including modelling techniques, methodologies, methods and tools, but increasingly also empirical studies related to success factors, complexity drivers, experience reports and success measures (Bandara et.al, 2007).

Glassey (2008) compares three process modelling techniques in order to find common concepts and to identify significant differences. He bases this comparison around three general questions: a) what are the objectives of the organization? b) Who is doing what with which resources? c) How does the organization work?

Bandara et.al., (2006) specifies success factors in BPM. The final validated model employs 15 measures of the three dimensions: Model Quality, Process Impacts and Project Efficiency. PM-

success can also be an important independent variable in research that aims to explore causal relations further along the Information Systems Development process value chain.

Simon and Olbrich (2005), argue that the laws themselves specify a process, which can be adapted for the definition of the public processes, which agrees with the authors' perspective.

In their paper Chourabi et.al., 2008 present a new BPM approach. It is based on Business Process Mapping and the UN/CEFACT Modelling Methodology (UMM). The BPM Mapping provides an overall view of the business processes showing their inputs, outputs and interdependencies.

In King and Johnson (2006) process variety in order to be modeled is described in three dimensions – variety in the range of tasks performed (task variety), variety in the order that these tasks are performed in (sequential variety) and variety in the inputs and outputs of the process (content variety) and suggest that the same approach could be explored using Petri Nets or UML.

Stemberger et.al, (2007), present the business process change methodology suitable for public sector, while the objective of the PICTURE (Becker et al., 2007) modelling approach has been to develop a domain specific modelling method which meets the particular conditions of PAs.

Finally Palkovits and Wimmer (2003) argue that process modelling and process reorganization, have been recognized as being of utmost importance for making e-government implementations success. They present a solution to support PAs in the reorganization and re-engineering of administrative processes towards online service provision.

Modelling of Service Provision mainly refers to administrative and service provision related functions and not other parts of the PA domain like Policy Formulation. In addition this work focuses on conceptual perspectives rather than technical.

Thus, SAP's Public Sector Solution Map Holistic models (2000) and The Government Process Classification Scheme (1996) are not considered here as they don't focus on service provision. Furthermore, the ONTOGOV service ontology (2005) and the WebDG Ontologies (2003) are not considered as they have far too technical focus.

Other initiatives that could be mentioned are The UK Government Common Information Model (2002), The DIP E-Government Ontology (2004), The Governance Enterprise Architecture (2004), the three spheres in e-Governance (2005), The Gartner Government Performance Framework (2003), A Faceted Classification of Public Administration and Generic Administrative Processes and The Federal Enterprise Architecture (FEA) Ontology.

In this proposal PA has predefined functional areas. Its function is ruled by laws. This stands for all countries, at least those that apply a normative administrative model (e.g. France, Germany, Austria, Spain, Portugal, Italy, Greece etc) (Billiets et. al., 2006). It also has a certain rationale, which is always the same for every procedure/service. PA is trying to fulfil all stakeholders' goals functioning in a certain legitimate pattern. Thus providing services is a different procedure than law making for a service. And furthermore there is no service for PA unless there is a law that orders it. Only then a citizen could claim his rights.

To set functional requirements the common, repeated pattern of each procedure, a generic functional triple need for every procedure of PA has been identified. Through the act that PA issues for this procedure/service, definition of functional requirements is possible. The proposed triple need is generic and applicable to every procedure. Finally, this proposal allows for the consideration of PA as a whole. POs and agencies are instantiations of PA. Entrusting a public service to one of them might be occasional and the rationale that led to it might be revised.

There is though a large body of literature in the area of strategic management which discusses organisations in terms of a stakeholder model (Sharp et al., 1999). The literature suggests

examples of stakeholders, but does not provide help in identifying stakeholders for a specific system.

Towards this goal, literature on network approaches to stakeholder analysis in other domains. Social Network Theory and Industrial Networks; work in domain networks and goal reduction may also provide useful techniques. Other work, worthy of investigation, includes algorithms built into space planning software for interior design which incorporate arithmetic for dealing with similar options.

From the works above to more contemporary ones like: Pouloudi and Whitley (1997) and Kaler's (2003) definitions and to Onion models (Alexander and Robertson, 2004) and outcome based approaches and problem decomposition techniques (Wooldridge et.al., 2007), the efforts of defining stakeholders and their needs continued.

In the approach proposed by the authors, stakeholders of PA's function are defined based on the standard PA's environment and the supply and demand side of service provision. The groups that constitute this environment are certain and stable.

Finally in the RE field related work is primarily based on the i^* modelling framework (Yu, 1995) for analyzing requirements. One of the most known and representative work is TROPOS methodology. There is an example of use of the TROPOS methodology in e-government projects, developed for the local government of Trentino (Bresciani et.al., 2004).

In that case a requirements engineer identifies stakeholders for a certain procedure that is examined. This is an ad hoc identification procedure. The identified stakeholders are actually shareholders, not interested in the whole administrative function but only in the specific procedure. As a result there is no stakeholder like government (or public organization), the EU, or public servant. It is much easier to identify requirements/goals of each stakeholder in a domain level (once) and it is sounder to use official documents and views instead of individual perspectives. Stakeholders in any procedure can be seen as instantiations of the stakeholders which are considered for the whole PA function and their requirements can only be the same or instantiations of the requirements that are presented here.

In this proposal stakeholders are not responsible for achieving goals. PA and its administrative function are. Stakeholders are not part of its function. PA is conceived as a black box. It has no predefined actors (seamless). It only has a rationale. So, which actor (component of an e-government system) is associated with what goals is something that the requirements analysis will show.

SUMMARY - CONCLUSIONS

A common problem in the selection of the appropriate e-government systems for the reorganization of processes and methods followed in public service provision is the determination of the whole set of stakeholders and their requirements. E-government systems though have to suit/facilitate a PA's rationale to avoid oversimplifying the process of digitizing services and missing out important features of the service. A goal-oriented method for identifying stakeholder requirements has been adopted. This can be applied through the key functional requirements of a PA. A model to identify these functional requirements at conceptual level has been discussed here. To verify its applicability the method has been put to test through two cases from the Greek PA system. The goals and requirements of the specific services are explored through the administrative act documents which identify scope and stakeholders relevant to the service and

the legal framework it abides to. The application of the method culminates in identifying suitable e-government systems that could improve the efficiency and effectiveness of the services under investigation, without overlooking any of the stakeholders' requirements. The results so far have been encouraging and the authors are looking into expanding this work by applying it to cases from other PA in Europe.

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