

# Process Modelling in the Public Administrations & e-Government Gateways: ICTE-PAN

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**Abstract:** The focus of ICTE-PAN is the establishment of an advanced e-Government Groupware platform, based on open source software that offers practical solutions to European Public Administrations for modelling complex business processes. It supports the following core tasks: a) collaboration activities among workgroups; b) Capturing, re-designing and fully automating existing governmental processes; c) Supporting Group Decision making through e.g. the use of the threaded discussions paradigm; and d) Providing interoperability with heterogeneous PA applications and back-office systems through a wide array of tools and interfaces.

## 1 Introduction

e-Government is currently targeting at realising the necessary infrastructure for offering citizens and enterprises the capability to perform electronically their transactions with the Public Administration (e.g. declarations, applications, etc.), through the electronic provision of the necessary public services over the Internet [3], [4]. The technological innovation in this respect is unfortunately limited to the preparation of 'virtual public agencies' through Public Administration portals [5], following European (or other, federal) directives or successful projects in the area of other countries for providing services required to complete the transactions with the Public Sector of a particular life event. Such services in reality are offered and managed by several different Public Organisations [6], [7]. Therefore, the successful provision of such services depends on the organisation of the collaboration among

the responsible agencies that participate in the chain of business processes that comprises each service.

However, the technological innovation potential for reforming and modernising Public Administrations is much larger [5], and has only to a small extent been exploited [8], [4], [9]. Therefore, the notion of e-Government should be extended, exploiting to a much larger degree the potential technology is providing. In this respect, following standards and common frameworks for the development and operation of the supporting infrastructure is essential, in order to sustain interoperability among the various technological platform and data formats, which are used. Therefore, e-Government should be directed not only towards the provision of electronic transactions and services, but also towards the coverage of higher and critical functions of Public Administration [10], [4], comprising:

- Group collaboration and group working among Public Administration workgroups that participate in common business processes.
- Management of Public Administration business processes (capturing, modelling, re-designing and implementing).
- Group decision-making, concerning difficult and complex social problems, or granting licenses and permissions with high social impact, etc.
- Addressing interoperability issues among the infrastructures that support different Public Authorities in various countries.

## 2 Background

The ICTE-PAN project from where the platform resulted has been selected by the European Commission as the e-Government R&D project of the month (August 2004). The project deals with the conceptualisation and realisation of an advanced Collaboration Environment and the development of a process modelling methodology for Public Administrations (PAs). The project resulted in three distinct Open-Source Software applications and one methodology, outlined in the following paragraphs.

Specifically, the modelling methodology follows the Workflow Management Coalition (WfMC) [1] specifications/standards and offers to the Public Authorities the capability to model and describe in detail all the necessary parameters of their business processes in a machine-readable format, subsequently also allowing the modelling of multi-participant collaborative activities. The resulting process description is then used for automating the configuration and customisation of the core e-Government platform modules.

Furthermore, the Dynamic Model Generator (DMG) constitutes a Workflow Process design desktop application, used for the modelling, parameterisation and deployment of PA Processes, using a dedicated workflow engine, embedded in the e-Government collaboration platform. DMG applies the XML Processing Description Language (XPDL) standard and the Workflow Management Coalition specifications, hence offering a common (thus interoperable) exchange format for transferring workflow process definitions among diverse systems.

MERMIG Collaboration Platform constitutes the core of the implemented system and is used to specifically provide collaborative functionalities for e-Government operations. Apart from basic services such as document management, asynchronous and synchronous communication means (forum, email, chat and search engines) and the Decision Support Module, it also provides the appropriate tools to manage and execute workflow process descriptions, which are created through DMG (or any workflow modeller that complies with the WfMC standard) and imported to the platform, using the embedded workflow engine.

Furthermore, the platform is entirely configurable and customisable through a complete set of administration services (access profiling and rights, etc.).

The seamlessly integrated Web Content Management Tool (WCM) is a web-based application that provides tools and support for advanced Portal and Content management operations. Its functionality spans from portal structure creation and content population to efficient portal deployment and operation.

### **3 Technical background – Innovation**

The ICTE-PAN e-Government platform has been designed and developed in order to add value to the expectations and contemporary requirements of Public Administration employees, aiming at establishing an efficient public administration. Its functionality and the provided software tools were specifically designed to empower the European Public Sector in adapting to the rapidly changing working practices through the utilisation of innovative technologies and systems that facilitate the effective collaboration and transaction within and between Public Administrations. The innovative aspects of the e-Government platform comprise:

- A specific design to support e-Government collaboration environments by automating complex bureaucratic processes.
- Software development and business process modelling based on User requirements that were collected from more than 1000 individual interviews with Public sector key-personnel. The requirements collection was carried out, following the *Unified Modelling Language* (UML) standard methodology.
- MERMIG, which is an advanced and secure e-Government platform, capable of supporting collaborative Public Administration business network workflows and simulating different interaction scenarios aiming at any European Public Administration. EU e-Government recommendations, Public Sector best practices and standards (such as the *Dublin Core Metadata Initiative* – DCMI [11]) were also considered as supporting requirements during its design.
- The incorporation of the experience, which the private organisation that realised ICTE-PAN had acquired in delivering e-Government platforms, such as CIRCA, which constitutes a standard groupware software platform within the European Commission.
- Support for currently existing collaboration / communication procedures and practices within Public Administrations and building blocks of currently operating software platforms for guaranteeing platform interoperability.
- Synchronous and asynchronous collaboration, decision-making support, modelling and execution of organisational workflows / processes.
- A wide spectrum of native / generic e-Government functionalities, providing the tools and meta-tools that facilitate the creation of new functionalities for users with standard experience in Internet technologies.

The ICTE-PAN e-Government platform is based on MERMIG and provides a parameterisable and configurable Open Source Software platform for creating and maintaining web-enabled collaboration environments for public administrations, capable of supporting a wide range of Public Administration operations, including complex workflow processes. Such collaboration environments, created and operated through the platform, offer

public officers a wide range of services to carry out their daily tasks, interface with multiple legacy systems, enable synchronous and asynchronous communications, archiving and document managing, as well as, redesigning and automating their existing business processes. The workflow module of the e-Government platform accommodates hierarchical organisational structures and allows administrators to control the flow of data for each process.

It is evident that the unique e-Government platform is specifically designed for addressing the needs of the contemporary Public Administrations and enterprises with dispersed offices and mobile users. It furthermore represents the essence of EUROPEAN DYNAMICS' long experience in building e-Government applications and services for the European Public sector. Furthermore, the platform's design was based on user requirements that were systematically collected during a two-year campaign from Public Administration key-personnel from 10 Member States. Extensions and enhancements of any magnitude, including Distributed Project Management of Public Administration projects features, can be easily deployed, without altering the underlying infrastructure. In fact, the immense space that exists between the real business needs and the underlying infrastructure is reduced by deploying any "new business idea" on the collaboration platform.

From the technological perspective, ICTE-PAN is using state of the art technologies and is based on the Open Source Software framework, in order to guarantee openness, scalability, expandability and interoperability with existing Public Administration software platforms and it is distributed by following the MPL licence.

## **4 ICTE-PAN Modelling Techniques [5]**

### **4.1 Public Administration Operation Modelling Integrated Methodology**

In the context of ICTE-PAN, a methodology for modelling collaborative operations in Public Administration, named *Public Administration Operation Modelling Integrated Methodology* (PA-OMIM), was developed for supporting the organisation and management of the aforementioned Collaboration Environments for Public Administrations. The objective of this methodology is to support:

- The description and understanding of Public Administration business processes, in which several actors (civil servant personnel / departments / Authorities) are involved, by building the "AS-IS" models. These models constitute a snapshot of the business processes as they are followed and executed at this moment in Public Administrations.
- Re-designing of these processes, so as to become more efficient and effective, with the support of ICTE-PAN Platform and its provided tools, by building their corresponding "TO-BE" models. These models, similarly to the "AS-IS" models, constitute the business processes that will be applied in the Public Administration to address the needs discussed in section 1 of the current paper.
- Specifying the requirements for the configuration and customisation of the ICTE-PAN platform, in order to support particular Public Administration business processes and to fulfil their particular requirements, based on the corresponding "TO-BE" models.

In order to achieve the above objectives the PA-OMIM methodology combines ideas from Business Process Redesign (BPR) and Information Systems Development (ISD); it focuses on the domain of the Public Sector, with an emphasis on collaborative processes and activities.

The methodology consists of two components: the PA-OMIM Redesign Method and the PA-OMIM Modelling Language. The PA-OMIM Redesign Method consists of the following seven stages:

1. Definition.
2. Project Initiation.
3. Diagnosis.
4. Redesign.
5. Requirements Specification and Environment Design.
6. Implementation.
7. Evaluation.

## 4.2 PA-OMIM Modelling Language

In the above context the PA-OMIM Modelling Language has been developed to be used in stages 3, 4 and 5 with two aims:

- to model and redesign collaborative processes in Public Administrations
- to support the configuration and customization of the ICTE-PAN system, in conjunction with the PA-OMIM Redesign Method.

The PA-OMIM Modelling Language is a graph-structured language. It is based on the *XML Process Definition Language (XPDL)* of the Workflow Management Coalition [1], [12]. It has an intuitive format that enables model building and understanding by non-experts, and also a comprehensive but effective notation that allows the modelling of the most complex business processes. A multi-view approach has been adopted, in order to include in the models all the significant elements and associations among them. These views comprise:

1. Environment View
2. Process View
3. Organisation View
4. Resource View
5. Information View

In the ‘Process View’ we can build models of processes consisting of both *Single-Person Activities* and *Collaborative Activities (CAs)* or only of Collaborative Activities. It should be emphasised that these views are self-contained and the methodology implementers may choose to build models following only a part or all of them. The views however, are complementary to each other and direct connections exist that link the views together: an element of one view, e.g. an activity in the Process View, may be linked to an element of another view, e.g. an organisation unit or a person in the Organisation View, responsible for implementing (or participating in) the activity, therefore the implementation of all the views is strongly recommended.

## 4.3 Ontology

There is a big variety of business process types in the Public Administration (especially regarding Collaborative Activities), which differ in the kinds of elements contributed by the participants, and the kinds of associations allowed among them. Therefore, it is necessary during the definition of the activities of a collaborative process in the Process View, to define the kinds of elements, which can be contributed by the participants of each

Collaborative Activity and also the kinds of associations which are allowed to be made among these elements. Based on these definitions, the ICTE-PAN Platform for each case creates the appropriate electronic environment for the execution of this (business process) activity.

In order to support the above definitions, an Ontology is required for the domains of Public Administration (e.g. for policies and programmes development, monitoring and evaluation, and also Public Administration decision-making, etc.) consisting of the main concepts used in these domains and their associations. Such an Ontology was developed, based on the relevant research literature in this area [13], [14], [15], [16], [17], on the analysis of the pilots of ICTE-PAN Project and in general of the Public Administrations of the four participating countries, and also on the general experience of the members of the project team in these domains.

By using this Ontology we can easily define the nature of each activity, through the selection of a small subset of the kinds of elements and associations of the Ontology (usually 3-4 kinds of elements and 5-6 kinds of associations from the whole Ontology) to be allowed in this collaborative activity. In this way, a high level of flexibility and adaptability to particular collaborative process requirements can be achieved, and a large variety of business process and their associated activity types of the Public Administration can be supported.

## **5 The Pilots**

Four pilot implementations of ICTE-PAN e-Government platform have been realised in four European Member States respectively, to assess its effectiveness in realising complex governmental processes and demonstrate the wide spectrum of the already available tools and functionalities that are provided by the platform under actual conditions. The Member States that realised the respective pilots are Denmark, Germany, Italy and Greece, with the participation of local Public Authorities. The following paragraphs present the overview of each pilot, the Actors who are involved, the Goals of the pilot and the governmental Key Activities that are addressed.

### **5.1 Denmark**

Denmark involved the Ministry of Environment and Energy, which coordinates activities at national and international level, comprising research, monitoring, consultancy and dissemination of information in the areas of nature management, agriculture and forestry and industrial society. EIONET (European Environment Information and Observation Network) is the Web Platform supporting the operation of the European Environment Agency (EEA).

The Danish Pilot case is the '*Review Process of Documents in EIONET*', which is a process partially automated within EIONET, and currently supported by CIRCA groupware platform. Documents to be reviewed are stored on a central CIRCA server, which also provides a service for dispatching requests and notifications to National Experts (reviewers) and review initiators through email. At this moment, the reporting procedure is supported by the CIRCA LDAP directory service that provides the necessary information to review initiators, for selecting the recipients of each request for review. The department of the Ministry adopted the e-Government collaboration platform to improve the current document review process within EIONET, which combines a very complex procedure to organise and manage the review. The process was re-engineered taking into account issues such as compliance validation of the review request with the policy of each Member State, the correctness of the process implementation, the definition of the different activities that

comprise the workflow of the review, etc. By restructuring and supporting the process through the platform, the document review within EIONET evolved towards a simpler and at the same time more effective implementation.

**Actors:** Members of the EIONET (EEA, National Focal Points and National Reference Centres, National Experts)

**Goals:** Minimise complexity, reduce workload on national reviewers.

**Key Activities:** Document Management, Versioning Control, Directory Services, Workflow.

## 5.2 Germany

The Ministry of Environment of the Lower Saxony government in Germany, participated through a department responsible for the German Environmental Data Catalogue (UDK), a database system for cataloguing environmental information resources. The Ministry defined a Pilot case that aims at developing a Web-based editor and quality assurance service for the German Environmental Data Catalogue (UDK), a database system for cataloguing environmental information resources. The UDK is a meta-information system recording information about all governmental environmental data sources in Lower Saxony. It provides information on the "Who, Where and What" of environmental data.

Typical UDK data objects are e.g. environment-related projects, specialised tasks and programs, as well as emission value records or industrial facility licensing documents. Each German state maintains its own UDK database, which are all integrated in the federal search engine www-UDK (<http://www.umweltdatenkatalog.de>).

The pilot built on developing a web-based database editor for the UDK database. This was embedded in a common Webpace with FAQ and forum functionalities, and was integrated into quality assurance workflows.

**Actors:** UDK authors (per thematic group), UDK states supervisor.

**Goals:** A recent evaluation on the database content uncovered serious problems with the data quality of the Lower Saxony catalogue. In particular following problems were revealed:

- Inhomogeneous hierarchical structure and granularity of objects.
- Inhomogeneous usage, detail and quality of object values.
- Long updating cycles for all objects.
- Different actuality requirements of objects are not taken into account.

Reasons of these problems were located in the decentralised data maintenance without centralised steering or help – the absence of a “competence centre” – and the discontinuous data maintenance. The pilot therefore aims at improving the abovementioned situation by providing technical and organisational means such as:

- Annotation of UDK Objects with an expiration date that will enable automatic updating requests.
- Enhancement of editing procedure by adding quality assurance steps. Modified objects should be able to be reviewed before their deployment to the database.
- Creation of a common space for UDK authors (Forums, FAQ and Articles functionality).
- Database access through Internet tools and Services.

**Key Activities:** Within the context of the Pilot there was the need to develop various automated activities based on information and communication technology, such as an advanced UDK database management system, annotation of UDK Objects with an expiration date, enhancement of editing procedure by adding quality assurance steps, creation of a common space for UDK authors (Forums, FAQ, Articles), database access through Internet

tools and Services, data storage, workflow, electronic record management, etc. to support the government of the state of Lower Saxony.

### 5.3 Italy

Provincia di Genova is one of the four provinces of the Regione Liguria. It is constituted of 67 Communes and 8 Mountain Consortia. Existing legislation establishes Provincia di Genova as a local institution located between the Regione Liguria and the Comune, with as main duty to take care of the provincial community interests, enhancing, at the same time, its development. Regione Liguria has assigned to Provincia di Genova administrative with responsibilities, concerning the areas between its Communes and the fields of the entire provincial area.

The pilot project of the Italian Provincia di Genova was realised by the Tenders and Contracts Department. This Department works as an operating unit supporting all internal structures that have to enter into a contract namely:

- Offer advice on contractual draft.
- Conduct introductory and following administrative activity to the contract drawing up.
- Prepare and manage the selection procedure (competitive tendering).

The Provincia di Genova survey aimed at analysing the first and third of the aforementioned functions, as they are the basic elements of the tendering procedure. The Pilot process commences when the internal customer (Order giving Department – OGD) asks the Tender department (TD) to initiate a tendering procedure, in order to obtain supplies, services or works. The (complex) tendering procedure is strictly regulated by national and European laws since there are specific European rules for Public Works, Supplying and Services Contracts. The basic principle governing the awarding of contracts is competitive tendering. The purpose is twofold:

- To ensure the transparency of operations and
- To obtain the desired quality of services, supplies or works at the best possible price.

**Actors:** Applicants, officers from the Tender and Contract Department

**Goals:**

- A faster and safer compilation of the documents that have to be issued during the different phases of the process and the ability to check the progress of the procedures through an effective document management tool.
- Document storage, archiving and version control for contracts and transactions logging.
- Generation of an online accreditation workflow system. This will also update a database containing personal data of suppliers, as well as information about the general and qualification requirements.

**Key Activities:** Within the context of the Pilot, there was the need to support a number of document management and workflow activities in the context of e-Procurement operations for public administrations.

### 5.4 Greece

The University of Aegean is a highly location-distributed University participating from Greece. It has its administrative headquarters located on Samos island and has 16



Departments, located in 5 different Aegean islands. This geographical distribution creates numerous practical difficulties concerning:

- Central management and coordination of activities distributed in many islands;
- Action planning, problem solving, decision making and evaluation of actions, in cases where many units distributed in many islands are involved;
- Exchange of experience and knowledge among islands.

One of these distributed activities is the Network of the Career Offices. The core role of the Career Office can be characterised as boundary management: helping students to manage the choices and transitions they need to make when completing their studies in order to proceed effectively to the next stage of their life. In this direction the core activities of the Career Office of the University are to:

- a) Provide Career Information (on Employment, Postgraduate Studies, Scholarships): Maintain a career information system, which is continuously updated from various sources (e.g. press, websites, etc.), and open access to the academic community.
- b) Offer Guidance through events: through particular events (with highly experienced speakers from the business world, from universities, from embassies, etc.), the Career Office provides educational, vocational and careers guidance to the students.
- c) Maintain a lifelong communication with the graduates (alumni model): this model uses the alumni of the University as a source of feedback on the studies offered by the University concerning their relevance to employment.

The pilot was implemented, realising the four most important activities of the Career Offices:

Activity 1: Students Career Advice.

Activity 2: Survey about Graduates Career Progress.

Activity 3: Organization of Events.

Activity 4: Activities Planning, Monitoring and Evaluation.

**Actors:** Career Offices, students, academic staff, employers (specialised labour markets) and other departments of the University, other Universities and the Public Administration in general.

**Goals:** The pilot developed an environment for supporting all the required forms of remote collaboration between the 5 Career Offices of the University. The platform will provide a complete environment covering all their collaboration needs.

**Key Activities:** Cooperative problem solving and decision support with the participation of geographically dispersed Career Offices.

## 6 Conclusions

The ICTE-PAN e-Government platform was presented in the previous sections, focusing on its core modules and the provided functionality related to the needs of modern Public Administrations for group collaboration, business process modelling and the support of higher level functions. ICTE-PAN is based on an extension of the classical Groupware and Workflow Model. For the achievement of a high level of flexibility and adaptability to the contemporary business process requirements and public service provision, specific technological solutions and modelling techniques were used and further enhanced. The

assessment of the four pilots that were implemented to Administrations of Greece, Italy, Denmark and Germany, provided very successful results that led to the continuation of the research ICTE-PAN project in terms of further enhancements and applications within Public Administrations. This allowed further research and modifications to be carried out, to cover weaknesses and to enhance the strengths of the platform, which were revealed during the project lifecycle.

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