A Collaborative Method for Agile Knowledge Management in Public Administrations

Spyridon Ntioudis1, Dimitris Apostolou1, Gregoris Mentzas

1 Department of Informatics, University of Piraeus, 80 Karaoli & Dimitriou Str., 18534 Athens, Greece
dapost@unipi.gr

2 Institute of Communication and Computer Systems, National Technical University of Athens, 9 Iroon Polytechniou Str., 15773 Athens, Greece
dioudis@mail.ntua.gr

Abstract. Knowledge has been and is still a major government’s resource. In this paper we present a collaborative methodology for implementing agile knowledge management programs in public administrations. The SAKE KM methodology is modular, supports all phases of the knowledge management programme, from strategic design to evaluation, and is based on the semantic annotation of the public administrations’ knowledge sources for easy information manipulation and retrieval. We also present our work towards the development of a knowledge management evaluation framework that employs as core axes the three primary measures of performance for government in the conduct of the determinative decision making: cost, quality and accountability.

1 Introduction

Knowledge has been and is still a major government’s resource. The employment of highly trained, legally educated and specialized civil servants is considered as one of the main characteristics of government. Since knowledge is regularly localised or even personal and difficult to share, it becomes immediately evident that even though there is indeed a lot of knowledge, it is not necessarily available anywhere, anytime for anybody. It means that not all parts of a public organisation can necessarily benefit from that knowledge. Consequently, a lot of “wheel reinventing” is going on in public administration. Even worse, a recently performed study1 shows that a frequently reported problem regarding users’ satisfaction with the e-government is the heterogeneity of decisions, i.e. the decision process still heavily depends on the knowledge of a public servant. This puts forward the issue of quality of the decision making process. Moreover, several factors make knowledge in public administrations subject to continual change, (i) the legal environment in which a public administration operates can change, (ii) public servants’ knowledge requirements often change and (iii) the processing of unpredictable requests and exceptions arises unanticipated

“knowledge needs”, to name but a few. Therefore, there is an inevitable need for the better management of continually changing knowledge in order to retain the high quality and homogeneity of the decision making process.

In the last years, many approaches have been established as very promising for the management of knowledge, starting from efficient document management, to the nowadays peer-to-peer-based collaborative frameworks that reflect the existing social networking in a more realistic manner. In the public sector, special focus is put on process-oriented knowledge management [13], where abstract activity descriptions serve as the primary means to capture, organize, and distribute knowledge assets that are relevant during individual, actual process steps.

Often, knowledge management programmes in the public sector are facilitated by formal methodologies, as outlined in the second section of our paper. Existing methodologies are quite static in nature however, in the sense that they are inadequate for analysing highly dynamic and complex administrative processes, which involve a large number of roles and knowledge assets. Moreover, most methodologies are top-down: they start by assisting senior management identify the knowledge management strategy for the organisation and work downwards by translating the strategy into knowledge management processes, roles and systems. However, numerous case studies have shown that pure top-down approaches can not guarantee consensus among the multiple of stakeholders involved and are not easily adopted by knowledge workers. Furthermore, top-down approaches are not easily sustainable; they require significant investment in change management and in establishing formal knowledge processes and organisational structures. Finally, most methodologies are not designed to be applied by distributed teams with multiple stakeholders involved in the knowledge management development programme.

In this paper we present a collaborative methodology for implementing agile knowledge management programs in public administrations. Specific requirements for the proposed methodology included:

- Modularisation: the methodology should consist of loosely-coupled, autonomous modules. Each module should have concrete goals and value-adding outcomes.
- Support for local adaptation such as the ability to apply the methodology in different languages.
- Information structuring: information collected using the methodology should be organised for easy retrieval.
- Support for all phases of the knowledge management programme, from strategic design to evaluation.

In the remaining of the paper, we present the landscape of knowledge management methodologies in the public sector, we outline the proposed methodology for agile knowledge management in public administrations, we demonstrate a tool developed to support the application of the proposed methodology, we present a framework for evaluating the impact of knowledge management on the quality of decision making in public administrations and we conclude with the open research issues and future steps.
2 Landscape of KM methodologies in the Public Sector

The field of Knowledge Management methodologies is, by definition, a field of extremely broad scope. For the purposes of delimiting the landscape of KM methodologies in the Public sector, we opted to review those methodologies that comply with the following definition:

methodology\(^2\) - An organised, documented set of procedures and guidelines for one or more phases of the software life cycle, such as analysis or design. Many methodologies include a diagramming notation for documenting the results of the procedure; a step-by-step “cookbook” approach to carry out the procedure; and an objective (ideally quantified) set of criteria for determining whether the results of the procedure are of acceptable quality.

Consequently, the landscape of KM methodologies, that have been used to support and guide the application of knowledge management initiatives in the public sector, comprises:

- The Know-Net method [5], which constitutes a phased approach to fully implementing Knowledge Management in an organisational setting.
- The CommonKADS methodology [8] which offers a structured approach towards the development of knowledge-based systems and is one of the most widely applied methodologies in the respective area.
- The DECOR Methodology [6] which provides the methodological guidance for running a Business Process oriented Knowledge Management project.
- Knowledge Maps [12] which are considered as a feasible KM method to coordinate, simplify, highlight and navigate through complex webs of knowledge possessed by institutions.
- The Knowledge Management Toolkit [9] which is a four-phase, 10-step approach for capturing and disseminating knowledge, and measuring the impact of an organisation’s efforts in the form of Return On Investment (ROI) and other performance metrics.
- The United Nations KM Methodology [10] which proposes four phases in order to implement any knowledge management initiative. These phases involve primarily (i) the development of a knowledge vision and strategy, (ii) the selection of the appropriate technological platforms, software tools and knowledge representation mechanisms, (iii) the definition of roles for knowledge providers and users in order to generate and facilitate communities of practice and (iv) the development of the necessary knowledge culture.
- The Community of Practice Practitioner’s Guide [7] which is designed as a four phased methodology for establishing and sustaining communities of practice. Communities of Practice promote and strengthen the effective use of knowledge in an organisation comprising therefore one of the cornerstones of successful Knowledge Management.

The aforementioned methodologies have been applied to a number of KM initiatives varying, indicatively, from the Greek Ministry of Finance (Know-Net method) to the

\(^2\) http://computing-dictionary.thefreedictionary.com/Methodology
Greek Social Security Institute (DECOR Methodology), the Australian Government Entry Point (Knowledge Maps) and the NAVSEA department of the United States of America Navy (Community of Practice Practitioner’s Guide).

3 Outline of the SAKE KM Methodology

The SAKE KM Methodology supports the design, development, and deployment of a semantic-enriched knowledge infrastructure. Its primary goals include (re-) structuring the public administrations’ knowledge sources, supporting the adaptation of changes in policy, strategy and law from the public sector (for example the need for continuous harmonization with European Union regulations for the new member states), and facilitating the planning of the organisational changes and the business process reengineering within the public administration environment. The SAKE KM methodology constitutes a holistic solution for delivering semantic-enabled Agile Knowledge Management in public organisations.

The SAKE KM methodology consists of the following steps (see Figure 1):

- **Step 1: Knowledge as-is analysis:** it involves the identification of the current state of the Knowledge Infrastructure in the public administration from two perspectives: what currently exists and what is missing.

- **Step 2: Description of selected focus area:** this step involves the selection of one focus area (i.e. a knowledge-intensive business process) from the candidate ones identified in Step 1. The selected business process is further described in terms of its constituent tasks, of the roles involved and of the respective knowledge sources (e.g. key people, source material, knowledge assets, etc).

- **Step 3: Detailed knowledge sources analysis:** a more detailed analysis of the knowledge sources identified in the previous step is performed here. The analysis revolves around issues pertinent to change in the context of the selected knowledge-intensive business process, e.g. what changed and when, by whom, who approved the respective changes etc. The analysis touches also communication issues triggered by (or originating from the need to respond to) these changes, e.g. who communicated with whom for requesting assistance with respect to an information need (expert finder). The outcomes of this step provide essential information that will assist the agile response of the public administration to changes (in the context of the specific business process) with the use of the SAKE system.

- **Step 4: Deployment of basic functionality and process modelling:** this step comprises the deployment of the basic functionality of the SAKE system in order to gather the necessary feedback, as far as functionality issues are concerned, from the public administration. Furthermore, the semantic analysis and modelling of business processes and knowledge networks (using mainly information from the execution of Steps 2 and 3) takes place, in order to implement the semantic-based knowledge infrastructure of the public administration.
• Step 5: Development of a pilot plan: A concise plan for the trial of the SAKE solution is developed in this step. The plan should include a detailed time and resource plan, with identified roles and actions for each involved stakeholder.

• Step 6: Evaluation: In the frame of this step, an evaluation mechanism is developed that will drive a qualitative and quantitative evaluation of the performance of the implemented SAKE System on trial. This evaluation mechanism will be a specific “instantiation” of a generic evaluation framework for quality of decision making in public administrations. The proposed evaluation framework for the quality of decision making in public administrations will be presented in section 4.

Fig. 1. The SAKE KM Methodology

3 Wiki-based Methodology Application Support

By recognising the fact that there is a large number of stakeholders involved in the development of knowledge management programmes in public administrations, we opted for a mechanism that would allow for these stakeholders to collaboratively apply the knowledge management methodology. That is, collaboratively enter information required by the different modules of the methodology. Relevant stakeholders are in many cases located in different offices and may work at different times. Distributed collaboration over distance and time must face the loss of the rich, subtle interactions that collocated teams use to coordinate their work. Relevant research suggests that working across sites introduces substantial delays to the development cycle because of reduced communication, difficulty in finding the right person and establishing contact, as well as not having an effective collaborative session [3].
Social software for communication and collaboration is increasingly finding its way on the Web. Web 2.0, a term made popular by Tim O’Reilly, puts forward the Web as platform for social and collaborative exchange where ordinary users can meet, collaborate and share information. Popular examples include del.icio.us, Flickr, Wikipedia, etc. Arguably the most popular Web 2.0 technology is Wikis. A Wiki is “a piece of software that allows users to freely create and edit Web page content using any Web browser. Wiki supports hyperlinks and has a simple text syntax for creating new pages and crosslinks between internal pages on the fly”\(^4\). Wikis rely on the cooperation, checks and balances of its members, and a belief in sharing of ideas. Problems with traditional wikis are mainly related to their inability to propose and enforce some structuring of information which in turn leads to inefficient information re-use [1]. A wiki that has an underlying model of the knowledge described in its pages is called semantic wiki. Semantic wikis allow capturing or identifying further information about the pages (metadata) and their relations, a characteristic that renders them appropriate as a medium for applying structured methodologies.

We have implemented the various modules of our methodology as wiki articles (see Fig. 2) using the Semantic Media Wiki [11]. Semantic MediaWiki is an extension of the Media Wiki\(^5\) software and, in addition to the existing system of categories used in MediaWiki, provides the following means of structuring the wiki: (i) Relations, which are used to describe the meaning of a certain hyperlink between articles. (ii) Attributes allow users to assign further information to an article by specifying data values for certain characteristic features.

The main purpose of adding relations and attributes is to impose a certain structure on the wiki articles, therefore guiding stakeholders involved in the application of the methodology in correctly entering the appropriate information. Moreover, the imposed structure allows stakeholders to navigate through a quite complex set of methodological modules and templates and find information more efficiently within the wiki. The Semantic Media Wiki has the following mechanisms for doing so: (i) Infoboxes, which display all annotations that are given in some article at the end of the article. The main purpose is to give some feedback to the users what Semantic MediaWiki actually "understood" when reading the annotations. (ii) Inline queries and simple searches, that allows accessing the semantic contents of the wiki.

We have implemented in the semantic wiki, a number of relations between articles and attributes. Example relations include “performed by” between “agent” and “role”; “works in” between “agent” and “organisation”, “involved in” between “agent” and “task”; “communicates with” between two “agents”; “possessed by” between “knowledge asset” and “agent”, etc. An example attribute is the attribute “communication mode” which can have the following values (in person, email, online, telephone, fax).

\(^4\) http://wiki.org
\(^5\) www.mediawiki.org
Fig. 2. Wiki-based Methodology Application Support
4 Public Sector Knowledge Management Evaluation Framework

To our knowledge, a knowledge management evaluation framework serving as the basis for the assessment of the quality of decision making in public administrations, is still missing. Determinative decision making relates to decisions by public administrations that determine the rights, entitlements or obligations of citizens. There are three primary measures of performance for government in the conduct of the determinative decision making: cost, quality and accountability [4].

We currently work towards the development of a knowledge management evaluation framework having as core axes the three aforementioned measures, namely cost, quality and accountability. Some of the major factors that must be taken into account to determine the quality of a determinative decision-making function are accuracy, currency, responsiveness to change, timeliness, fairness, transparency, productivity etc. A first application of our evaluation framework is the Decision Making Quality Ontology (see Figure 3) comprising the aforementioned factors plus some indicative, generic, evaluation metrics for performance of public administrations’ decision making processes (e.g. response time to a citizen’s request, number of issued decisions, number of officially filed complaints etc). The Decision Making Quality ontology is formalised using OWL⁶ and has been developed using an open source ontology editor, namely Protégé⁷.

Fig. 3. The Decision Making Quality Ontology

⁶ http://www.w3.org/2001/sw/WebOnt/
⁷ http://protege.stanford.edu/
5 Conclusions and Future Work

From the review of the landscape of KM methods in the public sector it became apparent that existing methodologies have proven, in general, to be:

- inadequate in analysing highly dynamic and complex administrative processes due to their static nature,
- unsuitable to guarantee consensus among the multiple of stakeholders involved in the KM initiative due to the adoption of pure top-down approaches during the implementation phase,
- unsuitable to be executed by distributed teams with multiple stakeholders involved in the knowledge management development programme.

The SAKE KM methodology presented in this paper attempts to address these issues by:

- taking into account the dynamic and complex nature of administrative processes by explicitly addressing issues pertinent to change (in Step 3),
- not adhering to a specific analysis approach during the implementation of the knowledge management programme,
- prevision for collaborative execution via the use of wikis in an effort to involve a large number of stakeholders in the process.

It should be noted that our work with respect to the SAKE KM methodology, could not be expected to include “reinventing the wheel” but, instead, was based upon two existing methodologies, namely the Know-Net and the CommonKADS methods, which we extended and modified according to the e-government specificities that we wanted to cater (e.g. agility in changes). Our evaluation framework for the decision making process in public administrations is unique, to our knowledge.

In the context of the SAKE project, the SAKE KM methodology is currently being applied in 3 public administrations located, respectively, in Poland, Hungary and Slovakia. Future steps include the finalisation of the evaluation framework and its use (via the Decision Making Quality Ontology) in order to proceed with an initial evaluation of the SAKE KM methodology for the 3 aforementioned public administrations.

Acknowledgement

We would like to thank the European Commission for funding the SAKE project through the IST programme.

References


---

8 http://www.sake-project.org/