

Electronic Government-to-Government Collaboration

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INTRODUCTION

Most of the effort of e-government researchers and practitioners today is focused on G2C (government-to-citizen) and G2B (government-to-business) e-government, aiming at the development of information systems that offer to the citizens and businesses the capability to communicate and perform their transactions with the public administration (e.g., various declarations, applications, etc.) electronically, over the Internet or other electronic channels. Taking into account that the quality of most public administration policies and services (delivered through physical or electronic channels) depends to a large extent on the extent and the quality of the collaboration among many involved public organizations (e.g., ministries, regions, prefectures, municipalities, and so forth), it has been widely recognized that much more research is required concerning the exploitation of information and communication technologies (ICTs) for supporting and enhancing government-to-government (G2G) collaboration (Lenk & Traunmüller, 2002; Leitner, 2003; Traunmüller & Wimmer, 2003, 2004; Scholl, 2005). According to Scholl (2005),

current e-Government research might possibly suffer from the iceberg phenomenon, where most attention is dedicated to the above surface phenomena (i.e. G2C and G2B e-Government), while “sub-surface” phenomena (such as the G2G e-Government, etc.) not readily available to scientific scrutiny have been spared.

The collaboration among public organizations, from the same country or even from different countries, has become today much more important and at the same time much more complex than it was in the past, mainly due to the globalization of the economy (resulting in increased interdependence among national economies), the development of various super-national entities (such as the European Union, the North American Free Trade Association (NAFTA), etc.), the continuous growth of the new digital economy, and so on. Also, the growing complexity and the international nature of many problems of modern societies necessitate extensive collaboration among many public organizations of various administrative levels,

competences, and mentalities, from one or more countries, for the design and implementation of effective public policies for managing these problems. Additionally, in most cases, the participation of representatives of citizens and enterprises is necessary as well. For example, the design and implementation of environmental policies for a wider area, such as for a wider river basin or lake area, requires extensive collaboration among several public organizations of different administrative levels, competences (e.g., concerning environment, agriculture, forests, industry, tourism, etc.), and mentalities. These public organizations initially have to exchange experiences, knowledge, and views on the environmental problems of the area. Afterwards, they have to design collaboratively effective policies for managing these problems; then follows the collaborative implementation of these policies, which very often includes long and complex interorganizational processes, for example, to grant various licenses for projects or activities having an impact on the environment of this area, and so forth. Also, periodic evaluations of these policies and their implementation are required in order to identify weaknesses, and if necessary, to proceed to corrective actions. The growing importance of the various types of public sector interorganizational networks (e.g., policy networks, service delivery networks, knowledge networks, etc.) have been strongly emphasized in the relevant research literature (e.g., Dawes, 2005; Provan & Milward, 1995; Raab, 2002, etc.), which investigates their basic characteristics, forms, performance, and critical success factors.

However, the G2G collaboration required for the design of effective public policies today is based mainly on physical meetings of various interorganizational physical committees, which are costly in terms of time and money, and very often inefficient, unproductive, and slow. Also, the G2G collaboration required for the implementation of these public policies and the production and delivery of the corresponding services is based on the exchange of information among the involved public organizations using “paper documents”, which is costly, slow and inefficient as well. Therefore, it is of critical importance to support electronically the various types of G2G collaboration required for the design of effective public policies (strategic level) and the implementation of them (opera-

Figure 1. Classification of groupware tools

	same place (collocated)	different place (remote)
same time (synchronous)	Electronic Meeting Systems Team Rooms Group Decision Support Syst. Electronic Whiteboards	Videoconferencing Teleconferencing Document Sharing Electronic Whiteboards
different time (asynchronous)	Shared Containers E-Mail Electronic Bulletin Boards Virtual Rooms Document Management Syst.	E-Mail Workflow Management Syst. Formflow Management Systems Messaging Systems Routing & Notification Syst.

tional level). Moreover, the realization of the highly innovative vision of integrated electronic service delivery (online one-stop government) (Kraaijenbrink, 2002; Wimmer, 2002), through virtual public agencies, these terms denoting single access points to many related electronic transactions and services—usually the ones required in a particular life event of the citizens or enterprises, or by a particular group of citizens or enterprises—which are managed by several different public organizations, will necessitate extensive electronic support of G2G collaboration (mainly at the operational level).

In this direction, this article presents an integrated G2G collaboration platform, which has been designed, developed and evaluated in the project ICTE-PAN (Methodologies and Tool for Building Intelligent Collaboration and Transaction Environments for Public Administration Networks) of the Information Society Technologies (IST) Program of the European Union (IST-2001-35120) (<http://www.eurodyn.com/ict-e-pan>). In particular, the next section provides the background concerning the electronic support of G2G collaboration. Then the architecture and the basic components of this G2G collaboration platform are presented. In the final two sections the future trends and the conclusions are outlined.

BACKGROUND

The development of information systems (IS) which can electronically support the collaboration (e.g., the communication, the interaction, the information or knowledge exchange, the coordination of actions) among the members of a team, who can be either remote or at the same place, both at the strategic and at the operational level, has attracted considerable research interest. This research has resulted in the development of various types of software tools, which can electronically support various types of collaboration, collectively referred to as groupware (Beaudouin-Lafon, 1999; Lococo & Yen, 1998; Ehrlich, 1999; Munkvold 2003a, b; Thomas, 1996), and has

given rise to a new research field, referred to as computer-supported collaborative work (CSCW), dealing with the exploitation of ICTs for supporting and enhancing collaboration.

According to Ehrlich (1999), groupware generally supports one or more of the following four basic elements of the teamwork: communication, meetings, information sharing, and coordination of actions. As main groupware tools for supporting communication he mentions videoconferencing, shared whiteboard, group editors, shared documents-applications, media spaces, and e-mail. As groupware tools for supporting meetings, he reports various kinds of software that allow participants to enter ideas and comments on the ideas of the other participants, vote on various issues, and so forth, such as the electronic meeting systems. Information sharing is usually based on enabling any member of the team to store a message or document in a database, which is accessible by all the other members of the team. As main applications for this purpose he mentions electronic bulletin boards and document repositories. Finally as the main groupware applications for supporting the coordination of the actions of the team members, he mentions Workflow Management Systems and Calendar & Scheduling Systems.

In Figure 1 we can see another classification of groupware tools (Lococo & Yen, 1998), which is based on the following two dimensions: (1) whether they support collaboration among participants located at the same place (collocated) or at different places (remote) and (2) whether they support synchronous or asynchronous collaboration.

Groupware tools can be also classified according to the type of collaboration they support into the following two categories:

- a. Structured collaboration support tools, such as the workflow management systems
- b. Unstructured collaboration support tools, for example, the group decision support systems, the forums, and so forth

Moreover, in this area considerable research is conducted concerning the effectiveness of computer supported collaboration and its critical success factors, especially in the case of virtual teams with remote participants (Furst et al., 1999; Larsen et al., 2002; McDonough et al., 2001; Munkvold, 2003a). The main conclusion of this research is that the effectiveness of computer supported collaboration depends both on technological factors, mainly associated with the capabilities and the appropriateness of the utilized ICT, and also on non-technological factors—mainly on organizational, structural, process, and human factors. The most important of these non-technological factors are the design of the team, the organizational context in which it works, the synergy that will be developed among its members, the processes that will be followed by the team and the material resources available to it. Additionally, of critical importance is the planning and organization of the implementation project.

Of critical importance for the electronic support of the collaborative design of public policies, that is, of the G2G collaboration at the strategic level, can be the group decision support systems (GDSSs). As GDSS is defined, it is a collaboration support environment, which supports group decision making processes, aiming at improving the productivity and effectiveness of decision making, by facilitating the exchange of information and knowledge among the members of the group, speeding up the decision-making process and improving the quality of the resulting decisions (Lewkowicz & Zacklad, 2002; Turban & Aronson, 2001). Most GDSSs include a forum component, which enables a synchronous or asynchronous electronic discussion on a specific topic among several participants: each participant can enter an opinion on this topic, and also read the opinions that have been entered by the other participants on the same topic. Also, some Forums additionally offer to each participant the capability to enter an opinion on another opinion that has been entered by another participant on this topic (multithread electronic discussion). In this way, a high level of interaction and collaboration among the participants can be achieved.

At the operational level, of critical importance for the electronic support of the G2G collaboration required for the efficient and effective implementation of public policies (e.g., for the production and delivery of the corresponding services, the examination of applications for permissions or allowances, the enforcement of laws, and so forth) can be the workflow management systems (WFMSs). According to the Workflow Management Coalition (WfMC) (<http://www.wfmc.org>), a non-profit, international organization of WFMS vendors, users, analysts and university-research groups aiming at the promotion and development of these systems, a WFMS is defined as a system offering the capability to define, manage and

execute workflow processes through the execution of software, whose order of execution is driven by a computer representation of the workflow process logic (WfMC, 1995). A typical workflow process consists of a predefined sequence of steps (called activities); each of them is in general executed by one or more human individuals (called “actors”) who can be supported by software applications. The WFMSs in general offer three categories of functionality: (1) build-time functions (they concern the definition and modelling of the specific workflow process we intend to support with the WFMS), (2) run-time control functions (they concern the automation and management of the workflow process for each individual work case and the sequencing of the required workflow process activities, based on the above workflow definition model), and (3) run-time interaction functions (they concern the interaction with human individuals and software applications for each individual work case). The achievement of interoperability between different WFMSs has been the basic target of several technical committees of the WfMC, which have produced several frameworks and specifications for this purpose (e.g., WfMC, 1996, 2001). However, these WFMS interoperability frameworks and specifications have not yet been used sufficiently in practice. For this reason the interoperability between WFMSs of different public organizations, which is often required in order to support the operational collaboration between them, still presents significant complexities, difficulties and costs.

In general, it is common that for the electronic support of G2G collaboration at the operational level some degree of interoperability between the internal ISs of several public organizations is required. There are many definitions of the concept of interoperability. According to Guijaro (2004), interoperability between two ISs is defined as the capability to exchange interpretable data and functionality between them. The European Interoperability Framework (EIF) (European Commission, 2004a, 2004b) adopts a wider definition of interoperability, which includes not only ISs, but also the business processes they support: “Interoperability means not the ability of information and communication technology (ICT) and of the business processes they support to exchange data and to enable the sharing of information and knowledge”. Although initially the interoperability efforts were focused mainly on technical issues (aiming at achieving technical interoperability), it was gradually realized that in many cases it was necessary to address as well difficult issues associated with the meaning (semantics) of the exchanged information (for achieving semantic interoperability) and also with the interconnection of the corresponding business processes of the cooperating public organizations (for achieving business processes interoperability).

Many countries in order to facilitate and reduce the costs of achieving interoperability between the ISs of their public organizations (mainly for the integrated delivery of electronic services based on a life-event approach) have developed interoperability frameworks, which include guidelines, specifications and standards concerning the ways of interaction between ISs. As a typical example we can mention the E-Government Interoperability Framework (e-GIF) of the United Kingdom (Cabinet Office—United Kingdom, 2005a, 2005b). It “defines the essential prerequisites for joined-up and Web-enabled government” and includes “technical policies and specifications for achieving interoperability and ICT systems coherence across the public sector”, mainly concerning four basic areas: interconnection, data integration, content management metadata, and e-services access. It is supplemented by E-Government Metadata Standard (based on Dublin Core), Integrated Public Sector Vocabulary/Government Category List, E-Government Schema Guidelines for XML, Government Data Standards Catalogue, and Security Policy Framework (<http://www.govtalk.gov.uk>). Similar interoperability frameworks have been developed in other countries as well, such as Germany (<http://www.kbst.bund.de>), France (<http://www.adae.gouv.fr>), Greece (<http://www.infosociety.gr>), and so forth. Between them there is a large degree of conformity concerning the technical standards they have selected; they are all based on the technologies of the Internet and the World Wide Web.

The achievement of interoperability between the ISs of public organizations of different countries is much more difficult and costly, due to their different organization, administrative culture, legal framework, business processes, and so forth. In this direction the European Union has developed the European Interoperability Framework (EIF) (European Commission, 2004a, 2004b), aiming at facilitating and reducing the cost of achieving interoperability between ISs of public organizations of its member states at the technical, the semantic and the organizational level, both within and across different policy areas, and at supporting the implementation of pan-European e-government services. Also, in the USA the Federal Enterprise Architecture Framework has been developed (Bellman & Rausch, 2004; Office of Management and Budget—USA, 2005), in order to facilitate the horizontal (cross-federal) and the vertical (federal, state, and local) integration of ISs of public agencies (and in general the cross-agency collaboration), and also reduce overlapping concerning ICTs. It consists of five reference models: the performance reference model, the business reference model, the service component reference model, the data and information reference model, and the technical reference model (<http://www.whitehouse.gov/omb/egov>).

However, most of these public administration interoperability frameworks have not yet been used sufficiently in practice, and need further elaboration and development; therefore the interoperability between ISs of public organizations still presents quite significant complexities, difficulties, and costs.

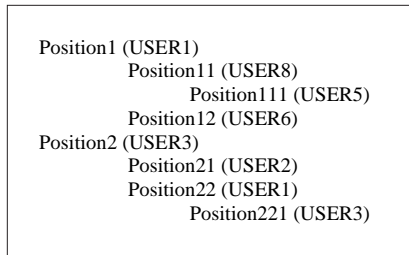
AN INTEGRATED G2G COLLABORATION PLATFORM

In the ICTE-PAN project (<http://www.eurodyn.com/ictapan>) has been developed an integrated G2G collaboration platform named MERMIG (in Latin characters the Greek word for “ant”) (<http://www.mermig.com>). Its design has been based on one hand on the study of the relevant literature on groupware tools and CSCW, and on the other hand on, the detailed analysis of the requirements posed by four representative real-life pilot projects, which were implemented as part of the ICTE-PAN project, aiming at the electronic support of collaboration in four European public organizations (National Environment Research Institute of Denmark, Ministry of Environment of Lower Saxony, Province of Genoa, University of Aegean) which participated in the project as user-partners:

- the (less detailed) examination of the requirements posed by 150 additional collaborative processes from various public organizations of European Union member states,
- the relevant recommendations, standards and specifications of many European Commission Programs, such as the Interchange of Data between Administrations (IDA) Program, and so forth.

A basic objective of this platform was to support the required G2G collaboration throughout the lifecycle of a public policy, both at the strategic level (collaborative design of public policy) and at the implementation level (collaborative implementation of public policy). In this direction for the design of the platform was taken into account the theoretical framework for public policies proposed by OECD (2003), which considers the whole policy making process as a cycle of policy preparation, implementation, and evaluation activities, consisting of five stages: agenda setting, analysis, policy creation, implementation, and monitoring. Also, we adopted a knowledge-based public policy and decision-making view based on the theoretical framework proposed by Holsapple and Whinston (1996). According to this view, public policies, and decisions are considered as pieces of descriptive or procedural knowledge referring to an action commitment for managing a social problem; therefore the public policy

Figure 2. Discussion tree in the consultation module



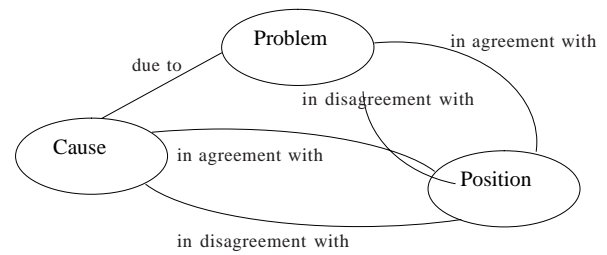
and decision making process can be viewed as a collaborative production of new knowledge, providing a refined understanding of the problem or evidence justifying or challenging alternative actions that might be followed.

Based on these requirements and on the above theoretical frameworks, the modules of this G2G collaboration platform and their functionality were designed, taking into account the features of the existing groupware tools, and also designing innovative features where necessary. The main modules/services of the platform are:

1. Consultation
2. Structured consultation (based on a predefined ontology)
3. Extended workflows management
4. Extended workflows modeling
5. Document management
6. Content management
7. Advanced search
8. Calendar

In particular, the G2G collaboration platform offers initially the capability to create a virtual team, define its members, create its virtual workspace with all the above modules/services (or some of them), and then define for each member his/her access rights to these modules/services. Very important for the support of G2G collaboration at the strategic level, especially for the agenda setting, analysis, policy creation, and monitoring stages, is the consultation module. It offers the capability to organize an electronic consultation on a topic: in the window of the consultation each member of the virtual team can enter “positions” (e.g., views, opinions, etc.) on the topic of the consultation, read the positions entered by the other members on this topic, then on each of these positions enter new positions, and so on (multithread electronic discussion). In this way a discussion tree is created, similar to the one shown in Figure 2, consisting of interconnected positions of the participants, which constitutes a synthesis and visualization of their experiences and knowledge on this topic.

Figure 3. Consultation ontology



However, from the requirements analysis it was concluded that very often a higher level of organization, structure and focus is necessary in public policy consultations in the public administration, especially if the topic is highly specialized and complex, and the participants are heterogeneous (e.g., of different background, mentality, etc.). For this purpose an innovative structured consultation module was developed offering to each member the capability to enter semantically annotated positions, based on a predefined consultation ontology. According to Gruber (1993) an ontology is defined as a “formal explicit specification of a shared conceptualization”. Usually an ontology constitutes an abstract conceptual model of a particular domain, which identifies the kinds of entities existing in this domain and the kinds of relations among them. As consultation ontology is defined the set of the allowed kinds of positions that the participants can enter in a consultation, and of the allowed relations among them. For example, in a structured consultation on the environmental situation of an area, the participants may be allowed to enter only the following three kinds of positions: problems (i.e., environmental problems of the area), causes of each of these problems, and positions in agreement or disagreement with these problems or causes. In this structured consultation the consultation ontology is shown in Figure 3.

The discussion tree that will be gradually created from this structured consultation will be similar to the one shown in Figure 4. In this way we can achieve a higher

Figure 4. Discussion tree in the structured consultation module

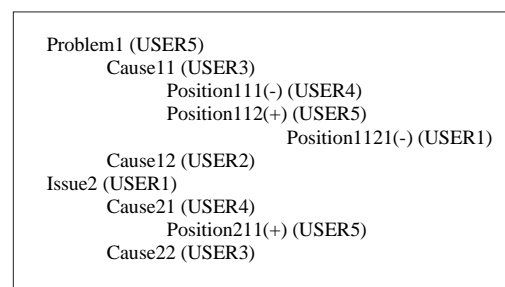
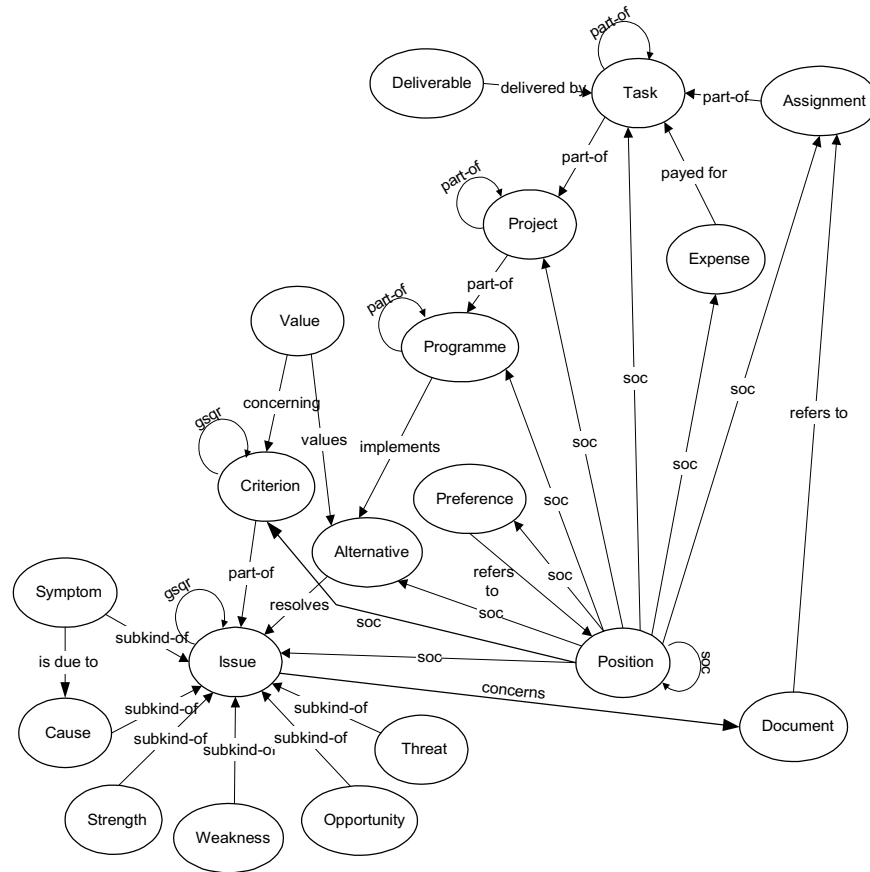


Figure 5. Ontology of public policy design and implementation



Legend
 gsqr = generalise, specialise, question-replace
 soc = supports, objects-to, comments-on

level of discipline and homogeneity in the contributions of the participants, who are often of different background, experience and mentality, usually belonging to several different public organizations from the same country or even from different countries, and therefore a higher level of organization, structure, focus and effectiveness of the consultation. Moreover, this semantic annotation of the contributions of the participants enables a better processing, exploitation and management of them, and in general sets the foundation for a more efficient knowledge management.

In order to support and guide the definition of the specific ontology of a structured consultation, an ontology of public policy design and implementation has been developed and incorporated in this Structured Consultation module (Loukis, 2004). This ontology consists of the main concepts (that is, kinds of discussion elements) used in public policy design and implementation, and the relations among them. It is shown in Figure 5. It is an

“horizontal” ontology, since it can be used in all thematic areas of government activity. For the development of this ontology we have taken into account the ontologies of existing argumentation systems, such as the gIBIS (Conclin, 2003; Conclin & Begeman, 1988, 1989) and the HERMES (Karacapilidis, 2000), and we have complemented them with additional concepts and relations in order to cover the whole public policy lifecycle.

For defining the specific ontology of a new structured consultation we can use an appropriate small subset of the concepts and relations of this ontology of public policy design and implementation, possibly in combination with additional concepts and relations not belonging to this ontology. In general, a structured consultation in order to be efficient and effective should focus on not more than 3-4 concepts and 5-6 relations among them, since more concepts and relations in the same structured consultation might cause confusion and result in inefficiency and ineffectiveness.

The MERMIG platform also supports the required G2G collaboration at the operational level for the implementation of public policies (e.g., for the production and delivery of the corresponding services, the examination of applications for permissions or allowances, the enforcement of laws, etc.), which is usually based on lengthy and complex processes, with the extended workflows modeling and the extended workflows management modules. These two modules offer the capability initially to define/model (in XPDL (XML Process Definition Language) (Workflow Management Coalition, 2005) and then to automate and manage an extended workflow, which includes both single person activities (i.e., activities executed by only one person) and collaborative activities (i.e., activities of unstructured or structured consultation type, in which several persons participate). In this way the concept of the classical workflow, which consists only of single person activities, is extended in order to cover administrative processes including various collective decision-making and consultation phases (e.g., performed by various types of committees), which are quite usual in public administration for planning, budgeting, granting licenses/permits, and so forth. For example, the process of examining applications for granting licenses/permits for significant activities of citizens or enterprises usually includes initially a number of single person activities (e.g., examination of the application by a number of public servants from administrative, financial, technical, and other viewpoints), then it includes some consultations (e.g., among the Directors of the main public organizations involved, etc.), then some more single person activities (e.g., detailed examination of some critical aspects of the application, composition of administrative decision documents, etc.), and finally one or more consultations (e.g., for final decision making). Also, activities planning and budgeting in public administration very often includes a sequence of consultations with many participants, usually in combination with some single person activities between them.

The extended workflows modeling and management modules enable the electronic support of a very broad range of big and complex G2G collaboration tasks of various degrees of structure, which can well be modeled as extended workflows consisting of single person activities and collaborative activities. Each of these activities can invoke another module of the platform, such as the consultation module, the structured consultation module, or other modules (e.g., the document manager, the content manager, the calendar, etc.), or even other external applications.

It should be emphasized that these two modules of MERMIG offer the capability of hosting and implementing big and complex G2G inter-organizational processes (with some activities performed by public organization A,

some other activities by public organization B, etc.), totally on this platform (by giving appropriate access to it to all the involved public organizations, so that each of them can access only the activities). This centralized approach offers the big advantage of avoiding the complexities, difficulties and costs we would face by following a more decentralized approach for achieving interoperability among the heterogeneous IS of all the involved public organizations. These complexities, difficulties and costs are, as mentioned in the previous section, still quite significant, despite the various interoperability frameworks that have been developed. However, if such a centralized approach is not feasible (e.g., for legal, political or administrative reasons), and a more decentralized approach is necessary, then it is possible to interconnect the platform to existing IS of the cooperating public organizations easily and with minimal effort and cost, due to the inherent interoperability capabilities of the platform (since its design has been based on the service-oriented architecture (SOA) paradigm, and for its implementation has been used the J2EE Connector Architecture (JCA)).

FUTURE TRENDS

Already two applications/evaluations of this G2G collaboration platform have been performed. The first of them was in the four real-life pilot projects, which were implemented as part of the ICTE-PAN project, as mentioned in the beginning of the previous section, aiming at supporting collaboration in the four European public organizations (National Environment Research Institute of Denmark, Ministry of Environment of Lower Saxony, Province of Genoa, University of Aegean), which were the user partners in this project. The corresponding evaluation was based on the ISO/IEC 14589 and ISO/IEC 9126 standards (Loukis et al., 2005). The second one concerned an electronic consultation on a public policy issue, and the corresponding evaluation was based on the Technology Acceptance Model (TAM) (Karacapilidis et al., 2005). In both these applications the results of the evaluations were positive.

Moreover, this platform is already used in several other projects, which will give more opportunities of additional evaluations in real-life G2G collaboration types. The most important of these projects are (<http://www.mermig.com>):

- The IST project SecurE-Justice (<http://www.secure-justice.org>), which aims at creating a secure environment for electronically supporting the collaboration among the numerous police and judicial au-

thorities involved in a penal trial, in the whole lifecycle of a criminal case (including the phases of investigation, collection of evidence, debate, and judgment)

- The IST project Intelcities (<http://www.intelcities.com>, intelcities.iti.gr/intelcities), which aims at providing electronic support of the required collaboration among all the public authorities involved in the management of a big city, such as city authorities, regional agencies, national government agencies, utility providers, transport services providers, and so on (and also nongovernment organizations, citizens, enterprises, etc.)
- The project of developing an integrated environment for supporting the required collaboration among the Departments of the General Prosecutor's Office in Georgia

Concerning the area of electronic G2G collaboration, considerable research is in progress, mainly focused on supporting the G2G collaboration at the operational level, which is expected to increase in the future. It is dealing with understanding the numerous technical and nontechnical issues faced for achieving G2G operational interoperability at the IS and at the business process level, elaborating solutions for them and developing interoperability frameworks, and also evaluating their applicability in real-life situations. However, we believe that more research is required in the future on the much more difficult and demanding problem of providing electronic support of G2G collaboration at the strategic level for the design of public policies.

CONCLUSION

In this article initially the fundamentals of electronic collaboration are outlined. Then the G2G collaboration platform MERMIG is presented, which has been developed in the ICTE-PAN project, and can electronically support a wide range of G2G collaboration forms, virtual committees and inter-organizational networks in the public administration. This platform possesses significant innovative features and capabilities:

1. It can support G2G collaboration both at the strategic level (for the design of public policies) and at the operational level (for the implementation of public policies).
2. It includes a module for supporting structured consultations, based on predefined ontologies.
3. It includes modules for modeling, automation, and management of extended workflows.

4. It incorporates an ontology of public policy design and implementation.

A more detailed description of this G2G collaboration platform has been published in other papers (Loukis & Kokolakis, 2003; Loukis & Kokolakis, 2004).

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KEY TERMS

Computer-Supported Collaborative Work (CSCW):

A research field dealing with the exploitation of ICTs for supporting and enhancing collaboration among the members of a team (remote or collocated) who are working for the achievement of a shared objective.

Extended Workflow: A workflow consisting of both single person activities (i.e., activities executed by only one person) and collaborative activities (i.e., activities of unstructured or structured consultation type, in which several persons participate).

G2C (Government-to-Citizen) E-Government: Use of ICTs for offering to the citizens the capability to communicate and perform their transactions with the public administration (e.g., various declarations, applications, etc.) electronically, over the Internet or other electronic channels.

G2B (Government-to-Business) E-Government: Use of ICTs for offering to the businesses the capability to communicate and perform their transactions with the public administration (e.g., various declarations, applications, etc.) electronically, over the Internet or other electronic channels.

G2G (Government-to-Government) E-Government: Use of ICTs for supporting the collaboration (e.g., the communication, the interaction, the information/knowledge exchange, the coordination of actions) among public organizations for achieving a shared objective, both at the strategic level (e.g., for the collaborative design of effective public policies) and at the operational level (e.g., for the collaborative implementation of public policies and provision of corresponding services to citizens and businesses).

Group Decision Support System (GDSS): A collaboration support environment, which supports group decision making processes, aiming at improving the productivity and effectiveness of decision-making, by facilitating the exchange of information and knowledge among the members of the group, speeding up the decision-making process and improving the quality of the resulting decisions.

Groupware: Software tools, which can electronically support various types of collaboration (e.g., communication, information/knowledge exchange, interaction, coordination of actions) among the members of a team (remote or collocated) who are working for the achievement of a shared objective.

Interoperability: the capability to exchange interpretable data and functionality between ISs and the business processes they support.

Interoperability Framework: A set of guidelines, specifications and standards concerning the interaction between ISs of different organizations, which aims at facilitating the interoperability between them.

Ontology: A formal explicit specification of a shared conceptualization; usually it constitutes an abstract conceptual model of a particular domain, which identifies the kinds of entities existing in this domain and the kinds of relations among them.

Electronic Government-to-Government Collaboration

Structured Consultation: A consultation in which each participant is allowed to enter only some pre-defined kinds of semantically annotated positions, with only some pre-defined allowed relations among them (defined by the consultation ontology).

Workflow Management System (WFMS): A system which offers the capability to define, manage and execute workflow processes through the execution of software, whose order of execution is driven by a computer representation of the workflow process logic.

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