EVALUATING THE QUALITY OF E-DEMOCRACY PROCESSES: AN EMPIRICAL STUDY IN THE GREEK CONTEXT

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Abstract: A significant number of studies have appeared on how Information and Communication Technologies (ICTs) have a strong impact on e-democracy, which, in a few words, is the online citizen engagement and participation in public policy making. However, only few studies focus on the aspect of quality in e-democracy. This paper aims to raise questions on how e-democracy processes are perceived by the citizens and define the main characteristics of quality in an e-democracy system. Answering these questions will contribute to the identification of topics and issues that have to be prioritized in an e-democracy service delivery system. Based on our literature review, a four-dimensional framework is used to evaluate quality of e-democracy processes. This framework comprises the following dimensions: coordination, control, sharing, and transparency. Coordination is the capability of public agencies to combine their efforts in order to accomplish the delivery of their services to citizens. Control refers to how the activation and delivery of e-democracy services are controlled. By the term sharing we mean the way in which the public agencies handle and share citizens' data with other agencies. Finally, transparency is the ability of public agencies to increase citizens' trust in them. The framework is validated through an empirical research conducted among Greek citizens. Using confirmatory Principal Component Analysis, our findings reveal that the sixteen quality characteristics we selected indeed comprise the four dimensions of the aforementioned framework. Additionally, the benefits of e-democracy and the obstacles to enhance its quality are identified and analyzed.

Keywords: e-democracy, ICT, quality evaluation, quality framework

1. Introduction

Plato's philosophy about democracy in ancient Athens is considered to be the foundation of democracy upon which advanced post-monarchial regimes were established. Democracy of Athens can be used as a model for societal decision making in which all citizens are able to input their views and have an impact on government's policies. The ideal is the belief that freedom and equality are sacred and participation of citizens in governance enhances human dignity [Lan, 2005].

In the early 1990s, the emergence of a new medium, the Internet, offered the potential to connect citizens to decision-makers and raised high expectations of the advent of a more "Athens-style" democracy, as its democratic possibilities, such as information richness, decentralization, absence of censorship, and the rise of user-generated interactive platforms were glorified. The Internet now offers the equivalent of the open space in which free people gathered in ancient Athens to debate and decide on public affairs. However, there has been a shift from Plato's ideal to the new political means of communication, which encourage interaction between citizens and public officials providing a rich forum for discussion of contentious political issues [Milakovich, 2010]. Consequently, ICTs provide public authorities and government

with tools to improve interaction and communication with citizens, design new ways to access and participate in democratic processes, and share the responsibility of political decision processes, leading to a new model of governance, the model of e-democracy.

The emergence of the model of e-democracy is beneficiary for all the stakeholders. Firstly, for the citizens, as they can express and share their views enhancing the bottom-up interaction, making communication more horizontal, and having a first-person voice in the political agenda. Secondly, for the political parties, as e-democracy contributes to the decrease of the democratic deficit, increasing the participation of mainly young people to the political processes. Thirdly, for the governments, as they enforce the transparency and the accountability on public issues with the application of the model of open government with open data and open communication channels [Peña-López, 2010].

However, the implementation of e-democracy is not without obstacles [Council of Europe, 2008]. There are mainly institutional barriers, as there may be such an increase in demand for e-democracy, such as e-participation, e-voting, etc., that the administrations can not cope with it. Additionally, it expands the digital divide between those who are connected to the Internet and those who are not, as well as between those who can exploit the Internet to a large extent and those who cannot. There are also legal barriers, as e-democracy requires rules and regulations that need to focus upon the needs of the citizen, while being carefully balanced. E-demicracy should protect the citizens' rights, their privacy and personal data, as well as their intellectual property. However, regardless the barriers, e-democracy is above all about democracy and not simply about technology. Its main objective is to support democracy, democratic institutions, and democratic processes, as well as to contribute to the diffusion of democratic values [Council of Europe, 2009].

Undoubtfully, e-democracy is an uprising subject that many researchers have approached it, focusing mainly on the analysis of e-democracy sectors, such as e-participation [Cartwright and Atkinson, 2009; Macintosh, 2008, Peristeras et al., 2009], e-consultation [Nijland et al., 2009], e-voting [Spycher and Haenni, 2010; Backes et al., 2008].

In this paper, efforts have been made to shed light on e-democracy and more specifically the quality characteristics of e-democracy. The next section gives an overview of the definitions of e-democracy. Section 3 presents the various sectors of e-democracy, wheras Section 4 focuses on the models of e-democracy. Section 5 presents the "C2ST" framework, which is adopted in this study for the evaluation of the quality of e-democracy. The methodology of the study is included in Section 6, while a synopsis of our research findings is given in Section 7. Finally, this paper concludes in Section 8.

2. Definitions of e-democracy

There have been various definitions of e-democracy, depending on the perspective it can be seen. Earlier definitions mainly focus on the technological part and the so-called collaborative platforms, with the latest emphasizing mostly on the principles and values that are connected to. E-democracy can broadly be described as the use of ICTs to increase and enhance citizens' engagement in democratic processes [Milakovich, 2010; Shirazi et al., 2010; Yigit and Colak, 2010]. According to the Council of Europe, e-democracy could be described as the use of ICTs by "democratic sectors" within the political processes of local communities, regions,

states, and nations [Council of Europe, 2009]. By the term "democratic sectors" the following items are meant [Clift, 2004]:

- Governments.
- Elected officials.
- Media (including online portals).
- Political parties and interested groups.
- Civil society organizations.
- International governmental organizations.
- Citizens – voters.

Through the use of different forms of ICTs, such as the Internet and mobile devices, there is the opportunity not only to carry out more effective work and organize it better but also to contact those who do not normally participate in political issues. In a bottom-up perspective, citizens and organisations can use the ICTs as resources to get their voice heard; political parties use them for campaigning, while public agencies for improving the quality of the services that they deliver to citizens.

In 2004, in the conference of the legislative federal state parliaments of Europe [Lizarralde et al., 2007] the following features of e-democracy were specified: "*new technologies and communication in practice are extraordinarily useful for the public administrations in promoting the transparency of their activities, stimulating the public's interest in what happens in the Parliament and offering the mechanisms to follow the decision making processes and participate in them. By using technologies in that way, we believe that they will contribute to the improvement of our democracy's quality and add value to the role that our institutions are currently carrying out and, in short, foster efficiency and effectiveness in public policy*".

In 2006, ePlanIT, i.e., the Local e-Democracy National Project in Great Britain gave the following definition [Lizarralde et al., 2007]: "*e-democracy is the use of ICTs, including the Internet, mobile technologies, and interactive digital television, to create new deliberative discussions between government and its citizens and between citizens themselves. It complements traditional methods of community engagement, such as public meetings and workshops so therefore it should not be viewed as a different model of democratic governance*".

Many researchers claim that there is no such a thing as electronic democracy, as exactly there is no such a thing as paper democracy; democracy is simply democracy, meaning that what the new digital technologies have changed is the environment in which democracy takes place. It makes no difference whether the citizens vote by hand or through digital means. On the contrary, Li [2010] claims that what characterizes e-democracy is the prefix for "electronic". Being electronic is not only a trivial but a fundamental and crucial difference from democracy in its classical meaning.

3. Sectors of e-democracy

According to the Recommendation of the Committee of Ministers to EU member states concerning e-democracy [Council of Europe, 2009], e-democracy includes e-parliament, e-legislation, e-justice, e-mediation, e-environment, e-voting, e-consultation, e-participation, e-initiatives, e-petitioning, e-campaigning, and e-polling / e-surveying (Figure 1). Based on the recommendation mentioned above, each one of the sectors is analyzed below:
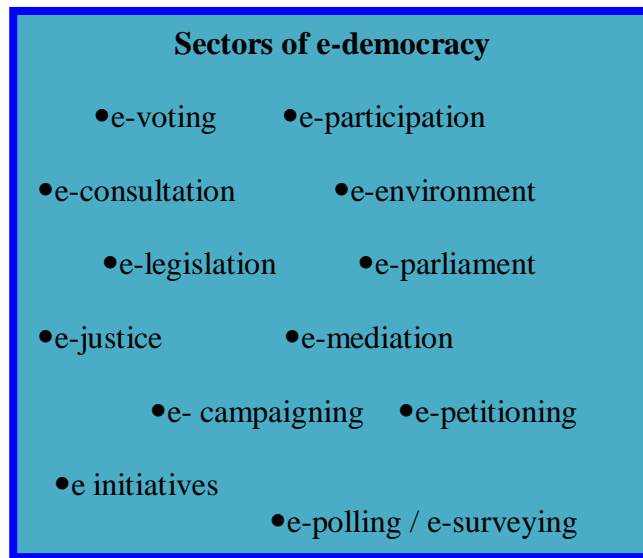
Figure 1. Sectors of e-democracy

E-parliament is considered to be the use of ICTs by elected representative assemblies, their members, and political and administrative staff in the conduct of their tasks, in particular for the purposes of actively involving citizens. E-parliament concerns legislative, consultative, and deliberative assemblies at international, national, regional, and local level.

E-legislation is the use of ICTs for commenting on, consulting, structuring, formatting, submitting, amending, voting on, and publishing laws passed by elected assemblies. It makes legislative procedures more transparent, improves the content and readability of legislation, provides better access to it, and thereby enhances public knowledge of the law.

E-justice is the use of ICTs in the conduct of justice by all stakeholders of the judiciary in order to improve the efficiency and quality of the public services, in particular for individuals and businesses. It includes electronic communication and data exchange, as well as access to judicial information.

E-mediation is the use of ICTs to find the means of resolving disputes without the physical presence of the opposing parties; a lot of digital tools can serve as mediators.

E-environment is the use and promotion of ICTs for the purposes of environmental assessment and protection, spatial planning, and the sustainable use of natural resources. Using ICTs to introduce or enhance public participation can improve democratic governance in respect of environmental issues.

E-voting is an election or referendum that involves the use of electronic means in, at least, the casting of the vote. E-voting speeds up procedures, enables voting to be electronically monitored, and facilitates participation from greater distances and by persons with special needs.

E-consultation is a way of collecting the opinions of designated persons or the public at large on a specific policy issue without necessarily obliging the decision maker to act in accordance with the outcome. There are various forms of e-consultation, formal and informal, public-authority-regulated and unregulated.

E-participation refers to the active participation of citizens to political issues and policies. The democratic political participation must involve the mechanisms and means for allowing citizens to take part in the public decision-making process.

E-initiatives allow citizens to develop and put forward political proposals by means of ICTs, engaging them in political agenda setting.

E-petitioning is the electronic delivery of a protest or recommendation to a democratic institution. Citizens sign a petition and possibly engage in a discussion on the subject by putting their names and addresses online.

E-campaigning is carried out by electronic means, encouraging people to engage with one another in order to mobilise individuals in electoral and other campaigns and/or persuade them to promote a particular cause, in an endeavour directly or indirectly to influence the shaping or implementation of public policy.

E-polling / e-surveying allow opinions to be obtained informally, by electronic means, from random or selected persons, usually in connection with specific proposals and a set of possible responses.

4. Models of e-democracy

The models of e-democracy are frameworks that relate the use of technology to the various forms of political organizations, mainly emphasizing on the impact of ICTs on processes of public decision-making. According to our literature review, the following models are noteworthy to be mentioned:

- The four e-democracy models [Päivärinta and Sæbø, 2006] are based on two fundamental characteristics, namely, inclusion in decisions and control of the agenda. Inclusion means that all adults who belong to a society should be allowed to participate in political debates and be involved in decision-making processes. Control of the agenda deals with the issue of who decides and what the decision should be about. In particular, this gives the right to the citizens to raise issues and actively participate in decision-making processes. The four e-democracy models are presented in Table 1.

	Partisan e-democracy	Direct e-democracy
Citizens set the agenda	Citizens express bottom-up opinions and criticize existing power structures. No explicit connection to the existing government or political decision-making processes is defined beforehand. Citizens set the agenda for public discussions, but not for decision-making. ICTs seek to obtain visibility for alternative political expressions uninterrupted by political elite.	Citizens participate directly in decision-making processes. The citizens are online affecting the decisions to be made (mostly at the local level). Citizens set the agenda for both public discussion and decision-making. ICTs are a crucial pre-condition for democracy to support coordination among decision-makers.
	Liberal e-democracy	Deliberative e-democracy
Government (politicians and officers) set(s) the agenda	Government serves citizens who participate in elections and related debates. Government would like to inform and be informed by the citizens. There is no clear connection to decision-making activities. ICTs seek to improve the amount and quality of information exchange between government and citizens.	E-democracy projects are used for specific purposes, involving citizens in public decision-making processes. Citizens have a good reason to expect that their voices are heard concerning a particular matter. ICTs are developed for increased citizen participation and involvement in decision-making processes.

Table 1. Models of e-democracy (Source: Päivärinta and Sæbø, 2006)

- The Organization for Economic Co-operation and Development [OECD, 2003] defines the follwong three types of e-democracy:

  Information: a one-way relation in which the government produces and delivers information to be used by citizens. It covers both "passive" access to information upon demand by citizens and "active" measures by government to disseminate information to citizens (e.g. access to public records, governmental Web sites).

  Consultation: a two-way relationship where citizens provide feedback on government's issues as citizens take part in consultations initiated by the local authorities or the government with the aim of enhancing the community involvement in democratic processes (e.g. public opinion surveys, comments on draft legislation).

  Active participation: a partnership relationship with government, where citizens are actively involved in the decision- and policy-making process. It is acknowledged the role of citizens in proposing policy options and shaping the policy dialogue, even though the final decision rests on the government.

- The Institute of Electronic Development proposes a four–stage model of e-democracy, which is not limited to the citizen-to-government point of view, mapping the four progressive scenarios from an informed to an engaged citizen. It also serves as a scorecard of digital understanding of how successfully a governmental entity (an elected representative, a legislative body, a political party, etc.) interprets and responds to the digital world and exploits the technology accordingly to advance influence [Caldow, 2004]. This model helps leaders to implement tactical and strategic e-democracy efforts into an overall e-government strategy. At this point, it should be clarified that the tactical side of e-democracy refers to the fact that Information Technology has advanced communication and the access to information better than any known medium, while the strategic side tries to give an answer to the question *"how can a government use digital media to both actively engage citizens and advance its public policies to the world community?"* [Caldow, 2004]. Taking a look at this model, a government can identify its current position against characteristics at various sophistication levels and see what e-intiatives are needed to proceed to the next level. There are two axes, as shown in Table 2: the vertical axis measures the degree of engagement and the horizontal axis measures influence.

Quadrant Two	Quadrant Four
E-mail Online opinion polls Online surveys Email alerts Electronic voting methods	E-petition GLOBAL E-consultation Policy Diplomacy Transparency DOMESTIC Digital Divide
Quadrant One	Quadrant Three
Passive, One Way, Asynchronous Search information View Web casts Track legislation Look-up representatives	Collaborative, Interactive Dynamic monitoring of news media & Internet Volunteer recruitment & coordination Fundraising Online forum

Table 2. A four-stage model of e-democracy (Source: Caldow, 2004)

Let us shortly analyze the four quadrants [Caldow, 2004]:

- Quadrant One: a fundamental step in e-democracy tactics for most governmental entities, such as governments, legislative bodies, international organizations, political parties, etc., is to make information available online. This can be measured, for example, by the frequency of the visits of Web sites in general, the visits of governmental Web sites by the citizens in order to search information for public policy issues (e.g., information about how to cast their votes).

- Quadrant Two: entities in this quadrant have made great efforts to start two-way communication. Every public institution and those who serve them are obliged to move beyond information dissemination to open two-way communication channels. The two-way communication includes the holding of online surveys and online polls, the use of e-voting methods, and the sending of e-mail messages to the governmental bodies and the politicians. Without any doubt, the entities that belong to this quadrant have achieved two-way capability, though its nature is still asynchronous, meaning that a percentage of the governmental bodies do not respond, for example, to citizens' demands.

- Quadrant Three: though still asynchronous, this quadrant extends interactive capability, meaning that communication begins to evolve into collaboration. Most visible in this stage are political players and the electoral process with tactics, such as recruiting and organizing volunteers online, online fundraising, campaigning, communication with constituents and the media, voter registration, and voting.

- Quadrant Four: it represents the highest level of e-democracy sophistication – strategic, interactive, synchronous, and global in nature.

- Clift's conceptual model, depicted in Figure 2, is composed of five components: ICT, e-citizens, government, civil society, and media [Shirazi et al., 2010].
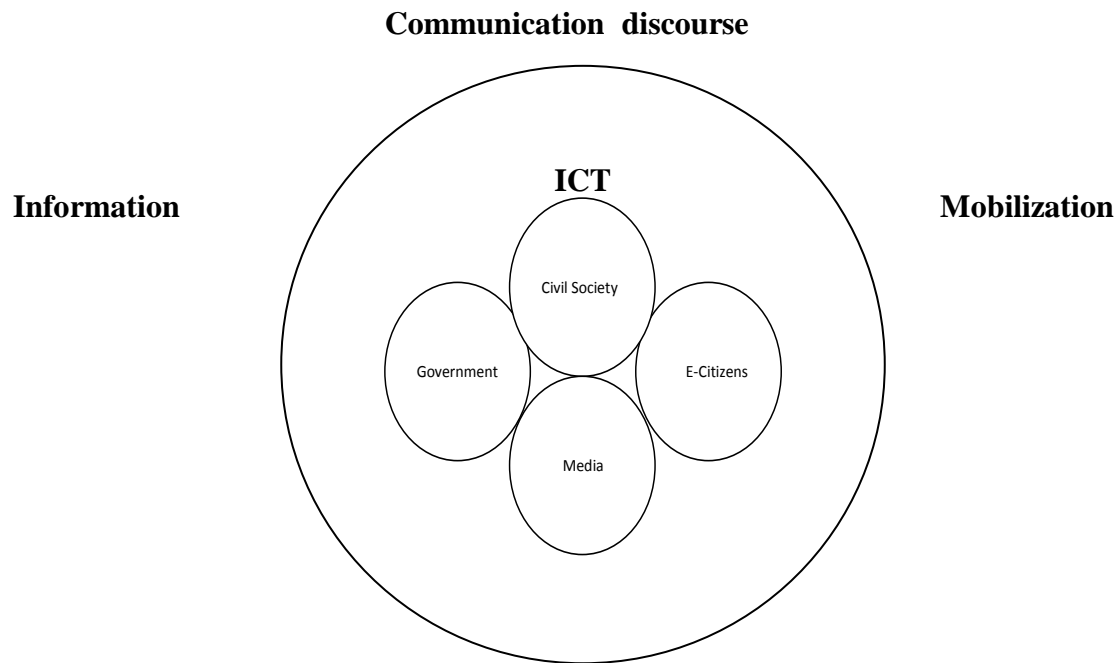
Communication discourse

Information

ICT

Civil Society

Government   E-Citizens

Media

Mobilization

Figure 2. Clift's conceptual model (Source: Shirazi et al., 2010)

E-citizens are individuals that use ICTs to participate in democratization process: citizens through the Internet can interact with social groups, political parties, the government, and they succeed in that way the creation and the dissemination of information, increasing their participation in the debates and the social dialogue.

Civil society includes national governmental organizations, trade unions, political organizations that use ICTs with the aim of "good" governance and democratic development.

Government in this model represents e-government that provides citizens, civil society, private sector, and media with excessive access to information electronically in order to support the functions that a government performs.

Media as ICTs have got the power to destabilize the control of the production and circulation of information held by the traditional media [Shirazi et al, 2010]. ICTs possess an interactive comparative advantage compared to the traditional mass media as regards the establishment of communication between citizen and politics, providing the political communication with new means and enhancing at the same time the direct democracy.

- The European e-Democracy working group for IT4ALL, comprising eight European regional parliaments with experience in e-Democracy projects, has defined and analyzed the key factors to support and enable e-democracy as below [Lizarralde et al., 2007]:
  - Commitment: it refers, not only to the achievement of objectives, but also to the formation of the basis on which the strategic design and the corporate culture of the representative institutions are supported. This includes the budgetary undertakings and the measures that the organizations should take and are linked to the specific values.
  - Transparency: the public institutions are obliged to operate with openness and facilitate participation of citizens in their decision-making processes.

- Proactivity: the information and participation mechanisms that enable the new technologies should simplify the process of obtaining information and establish proactive services, while at the same time the organizations should provide original and complete information in real-time, arranged with the demand defined by the citizens and their organizations.
- Multi-channel: ICTs are useful tools for the application of the principles of transparency, participation, openness in the decision-making process, though the possibilities offered by ICTs should be combined with those offered by the traditional means of communication (e.g., telephone, radio, television).
- Training in civic values: the public institutions should encourage the citizen participation in the decision-making processes by simplifying languages and procedures, giving maximum visibility to the results arising from civic contributions. Additionally, training should be provided to the youngest in society concerning issues of responsibility and participation.

Based on the above key factors, the e-democracy model with the key factors has been formed and can be viewed as an incremental process that is comprised by the following stages:

- On an initial stage, services of openness and transparency are stressed as unidirectional services from public authorities to citizens.
- On a second stage, pro-active services appear, promoting bi-directional flow of information, such as services to submit queries, suggestions, etc.
- On the last stage, the services that appear promote dialogue and discussion among citizens, including deliberations on information needed as a basis for decision-making and suggestions to improve and encourage active citizen participation, as citizens are able to decide by voting, consultation or a well structured referendum [Lizarralde et al., 2007].

5. The quality framework to evaluate e-democracy

The quality framework to evaluate e-democracy is structured on the basis of a business process, i.e., the collection of related and structured activities undertaken by one or more organizations in order to pursue some particular goals [Corradini et al., 2009]. The execution of a business porcess involves humans, software applications, documents, methods, and techniques to design, control, and analyze operational activities, while there is sometimes interrelation among the business processes within the same or other organizations [Lindsay et al., 2003]. The business process plays a crucial role in the success of a business activity and for that reason in the recent years the Business Process Management (BPM) has been developed to denote that the entire management of an organization – strategy, goal setting, controlling and planning – should be based on its core processes. Quality plays a crucial role for the BPM and it is remarkable that quality models have reinforced the implementation of BPM, such as Total Quality Management [Bandara et al., 2007].

The business process of the quality evaluation of e-democracy refers to all the activities and methods that should be taken in order to implement the e-democracy project, involving all the stakeholders, i.e., citizens, government, civil society, and media. In our paper, we have tried to identify specific quality requirements for e-democracy combining the "C2ST", i.e., a four dimensional quality framework for the delivery of e-services [Corradini et al., 2009] with the models of e-democracy.

The C2ST dimensional framework refers to the assessment of e-services delivery according to the four quality dimensions, while it should be clarified that the

implementation of each quality dimension requires different business process levels. The C2ST framework considers the following dimensions [Corradini et al., 2009]:

Co-ordination: the term co-ordination means the capability of two or more public administrations to work together with the aim of accomplishing common goals using ICTs through the delivery of a governmental digital service to a citizen. It is clear that in the e-government coordination, people and information systems play a significant role for the implementation of a specific service.

Control: the quality dimension of control includes the proactive control in the provision of the e-service; the administration may work as a proactive participant as the e-service may be available through direct communications to interested citizens providing precise references. Generally, it refers to the policies that should be activated with the aim of achieving the service delivery from its start to its final fulfillment.

Sharing: it refers to the way in which the public authorities handle and share citizens' data with other administrations in order to participate in the delivery of a specific service, as it is widely acceptable that citizens generally feel uncomfortable when they use a service that asks for authorization to store citizens' data.

Transparency: it is the ability of the administrations to make citizens aware of the delivery process so as to improve citizens' trust and inclusion, as citizens feel more satisfied when they have got a clear and reliable view on how the service is delivered.

Based on the above C2ST four-dimensional quality framework for the delivery of e-services, we have attempted to structure the quality framework for the evaluation of e-democracy, i.e., the C2ST framework adjusted to the e-democracy context. The suggested quality framework for e-democracy consists of four quality dimensions, as described below:

Co-ordination

In the quality evaluation of e-democracy, co-ordination refers to the degree of co-operation between public authorities using ICTs. This degree of co-operation dramatically affects the implementation of e-democracy. The harmonious cooperation of all the stakeholders involved in the implementation of e-democracy is a prerequisite for the function of e-democracy in the different stages and the different sectors (e-participation, e-consultation, etc.) that it is implemented.

Control

This dimension refers to the specific, original, complete information given for e-democracy by the authorities for the implementation of e-democracy with the aim of increasing the control of the politicians. Governments should play a proactive role in the online world. Firstly, it is necessary to maintain existing democratic practices in spite of pressures coming from the information age. Secondly, they should adapt and incorporate online strategies and technologies with the aim of leading efforts that expand and enhance democracy.

Sharing

In the e-democracy framework, sharing refers to the way in which the public authorities handle and share citizens' data with other administrations. The protection of personal data is a key principle for e-democracy since the citizens need to be aware that their personal data are used only for the purpose they are given. E-democracy processes should protect above all citizens' rights, their privacy and personal data, as well as their intellectual property. Public authorities should take all the necessary legal measures in that direction. Otherwise, citizens' trust on e-democracy may be lost and as a consequence, the whole project of e-democracy will be jeopardised.

Transparency

In e-democracy, the dimension of transparency refers to the obligation of the institutions to operate with openness and to make citizens fully aware of the decision making-process, aiming at facilitating their participation. Transparency improves citizen's trust on the political system as it constitutes a layman's basic map of the organization as depicted in the information on the site and reveals the depth of access it allows, the depth of knowledge about processes it is willing to reveal, and the level of attention to the citizen [Weich and Hinnant, 2003].

6. Methodology

We applied confirmatory factor analysis to investigate whether the four aforementioned dimensions of e-democracy are indeed the core dimensions of this construct. The dimensions of e-democracy were analyzed to specific quality criteria as follows (the corresponding variables are given in parentheses):

Coordination:
- E-democracy presupposes the design and development of an integrated information system in every public agency (v37).
- Integrating the information systems of all public agencies is a necessary condition for the fulfilment of e-democracy (v38).
- The personnel of a public agency responds much better when the citizens' requests concerning issues of authority exercise are electronically submitted (v39).
- The coordination of the acts of the personnel of all public agencies is a necessary condition for the fulfilment of e-democracy (v40).

Control:
- E-democracy reinforces the control of central government by citizens (v41).
- Citizens are able, through the Internet, to express their opinions and control the activities of politicians (v42).
- E-polling results constitute a tool of developing and controlling the governmental policies (v43).
- E-consultation, e-legislation, and e-petitioning assist citizens to control the Parliament's functioning (v44).

Sharing:
- The personal data of citizens are protected in an e-democracy system (v45).
- Citizen's data transfer from one public agency to another public agency explicitly assumes citizen's authorization (v46).
- The accompishment of political campaigns through the Internet contributes to sensitization and mobilization of citizens regarding political issues (v47).
- Citizen's awareness regarding e-legislation makes easier the implementation of the law (v48).

Transparency:
- E-voting results are reliable and valid (v49).
- Citizens get fully informed, through the Internet, about governmental authority issues (v50).
- E-democracy enhances citizen's trust to the democratic rules (v51).
- E-participation makes the political decisions more transparent (v52).

The sixteen quality criteria, formulated in the way mentioned above, were rated by means of a survey conducted among citizens in the broader area of Thessaloniki, Greece. Since the survey is still in progress, the sample size used in this work was 208

citizens without any constraints concerning the gender and their occupation. The only constraints pertained their age (over than 18 years old) and education (at least secondary education graduates). The sample size was acceptable for factor analysis, since the minimum size required is five times the number of variables, i.e., 80 individuals. The data were collected through personal interviews and electronic mail messages using a structured questionnaire, which is divided into three main sections (familiarization with e-democracy sectors, assessment of benefits and obstacles of e-democracy, and, rating of e-democracy quality criteria). For the purpose of rating the quality criteria, a five-point Likert scale was used (i.e., strongly agree, agree, neither agree nor disagree, disagree, strongly disagree).

We selected Principal Component Analysis (PCA) as a factor extraction method. It should be mentioned that when the values of most of the communalities (estimates of variables' common variance) exceed the value 0.6 (as indicated in Table 8), then PCA and common factor analysis provide essentially identical results.

7. Research findings

Table 3 shows the communalities of the variables v37 to v52, which correspond to the quality criteria in which the four dimensions of e-democracy, namely, coordination, control, sharing, and transarency, were analyzed. As indicated in the table, all the communalities get high values, meaning that all the variables relate to certain components.

Variable	Initial	Extraction
v37	1.000	0.689
v38	1.000	0.618
v39	1.000	0.432
v40	1.000	0.67
v41	1.000	0.69
v42	1.000	0.604
v43	1.000	0.515
v44	1.000	0.702
v45	1.000	0.365
v46	1.000	0.697
v47	1.000	0.413
v48	1.000	0.396
v49	1.000	0.626
v50	1.000	0.684
v51	1.000	0.674
v52	1.000	0.603

Table 3. Communalities (extraction method: Principal Component Analysis)

The eigenvalues, i.e. the percentages of each variable's variance which is accounted for by the component, are presented in Table 4. The table shows 16 components, as exactly the number of the variables. However, the eigenvalues are high (over than the unity) only for 4 components. As we can see in the last column, 58% of the total variance is accounted for by four components (in general, a percentage over than fifty per cent is considered satisfactory).

Component	Eigenvalue	% of Variance	Cumulative %
1	5.209	32.556	32.556
2	1.725	10.784	43.34
3	1.229	7.683	51.023
4	1.154	7.211	58.235
5	.901	5.632	63.866
6	.876	5.478	69.344
7	.76	4.747	74.092
8	.629	3.934	78.026
9	.615	3.843	81.869
10	.572	3.577	85.446
11	.499	3.12	88.566
12	.461	2.878	91.445
13	.45	2.811	94.256
14	.375	2.346	96.601
15	.293	1.832	98.433
16	.251	1.567	100

Table 4. Total variance explained

The Rotated Component Matrix, in Table 5, shows the loadings, i.e. the correlations between the variables and the corresponding component. Rotation converged in 5 iterations. The first component has high loadings for the variables v37 to v40, the second one for the variables v41 to v44, the third one for the variables v45 to v48, and finally the fourth component has high loadings for the variables v49 to v52. It is reminded that the variables v37-v52 correspond to the sixteen quality criteria, which comprise the four core dimensions of e-democracy.

	Component			
Variable	1	2	3	4
v37	**0.784**	0.208	0.136	-0.227
v38	**0.773**	0.023	0.088	-0.173
v39	**0.723**	-0.03	-0.041	0.274
v40	**0.586**	0.214	0.289	0.159
v41	0.07	**0.571**	0.202	0.157
v42	-0.005	**0.806**	0.313	-0.191
v43	-0.042	**0.75**	0.19	0.046
v44	0.274	**0.559**	0.009	0.05
v45	0.092	0.233	**0.818**	-0.045
v46	0.133	-0.087	**0.736**	0.269
v47	0.13	0.189	**0.494**	0.114
v48	0.141	-0.24	**0.43**	0.282
v49	0.173	-0.211	0.301	**0.653**
v50	-0.083	0.064	-0.172	**0.537**
v51	0.049	0.117	0.038	**0.768**
v52	-0.262	0.192	0.065	**0.471**

Extraction Method: Principal Component Analysis
Rotation Method: Varimax with Kaiser Normalization
Table 5. Rotated component matrix

8. Conclusion
According to the findings of confirmatory PCA, the sixteen quality criteria were properly grouped into the four core dimensions of e-democracy, i.e., coordination, control, sharing, and transparency. This work should be considered as a step to better

comprehend the construct of e-democracy. This can only be done through the analysis and further examination of its components. In order to validate even more the quality framework of the four core dimensions, it is suggested to test it in other countries, where citizens are more familiar with the concept of e-democracy. This is a limitation of our study since the majority of Greeks have not seen in real life many of the aspects of e-democracy. Moreover, the assessment of the relative importance of the four dimensions is a topic which needs further consideration.

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