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An eParticipation acceptance model

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Abstract—This paper investigates the factors influencing user acceptance of eParticipation systems drawing experience not only from previous eParticipation research but also from the Information Systems domain. Subsequently, a model for eParticipation acceptance is constructed by integrating the concepts from TAM literature and eParticipation evaluation literature. The model is validated through statistical analysis and hypothesis testing based on the findings of a multi-national user survey (gathering 299 reliable responses through a structured online questionnaire) and findings are discussed. Finally, a revised model is proposed called ePAM, including TAM's main concepts of Perceived Usefulness, Perceived Ease of Use, and Behavioural Intention to Use, and the four additional concepts of Technological Confidence, Integration to Governmental Processes, Perceived Facilitating Conditions and Social Influences.

Index Terms— acceptance, e-participation, ePAM, evaluation, model, TAM

1 Introduction

In an effort to minimise political apathy and increase openness, transparency and trust in policy-making, governments have been increasingly investing in electronic participation (eParticipation) as an integral part of their national digital strategy. In this context, numerous eParticipation methods and tools emerged that were implemented by different actors (i.e. national and local governments; researchers; civil society and grassroots movements) and at different scales (e.g. national/ regional/ local implementations within a country but also cross-border and multilingual initiatives as well as initiatives targeting selected population segments such as the young people or the elderly) [1], [2]. Consequently, a growing body of eParticipation literature is observed focusing at first at the scope, characteristics, benefits and challenges of the domain (e.g. [3], [4], [5], [6], [7], [8], [9], [10]) and later at success factors, good practices and lessons learnt (e.g. [11], [12], [13], [14]). As regards eParticipation evaluation, there have been various approaches in quantifying success of eParticipation initiatives and proposing frameworks for evaluating eParticipation projects (e.g. [15], [16], [17]), some of them also including concepts of Information Systems (IS) related acceptance (e.g. [15], [18]). However, no previous evaluation approach has been based on traditional IS theories on technology acceptance and adoption and, thus, the body of knowledge available in the IS domain has not been fully exploited yet.

The IS domain offers ample literature on user evaluation, acceptance and adoption of technology that has been extensively tested in numerous contexts and adopted to suit different areas, including the eGovernment applications. The Technology Acceptance Model (TAM) published by Davis [19], [20] is the first and one of the most widely accepted models for assessing information systems. TAM proposes that external variables, such as system's features, influence the perceived usefulness and perceived ease of use which further determine an individual's behavioural intention to use the system, and thus actual system use. TAM has evolved to TAM2 [21] which employs an additional number of external variables relevant to IS utilised in the workplace. A little later, Land [22] proposed the Information Systems Implementation model (ISI) identifying factors that determine users' successful adoption of a new system. The ISI model recognises that the introduction of a technological innovation is essentially a change process that requires planning and managing and is determined by six factors: motivation for introducing the new system, commitment to the system, organisational culture, management of the implementation process, 'distance' between the existing system and the replacement system, and technology itself. At the same time, Rogger's Diffusion of Innovations (DOI) theory [23] was proposed for explaining the rate at which an innovation is adopted, and why it is used or not. DOI suggests that an innovation's adoption rate may be determined through five characteristics of innovation: relative advantage, compatibility, complexity, trialability and observability. Finally, in 2003, DeLone and McLean proposed the Information Systems Success (ISS) theory [24], a model revised from its 1992's first version [25], which defines the relationship between a number of factors and subsequent technology adoption and use. The revised ISS model includes the factors of system quality, information quality, service quality, intention to use/ use, user satisfaction and net benefits. All aforementioned theories have received acceptance as well as criticisms and objections from the academic community. Nevertheless, they still comprise the basis for evaluation, acceptance and adoption of IS (e.g. [26], [27], [28]).

Considering the potential utilisation of the aforementioned theories in the eParticipation domain, a number of limitations are observed. First, some of these theories (i.e. DOI and ISI) define factors relevant to the superiority of a new information system versus a legacy, to-be-replaced system. This is not that relevant to the eParticipation domain where a legacy system does not usually exist, or, even if it exists, one cannot expect users to have used it

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and be able to evaluate it. Furthermore, all aforementioned theories have been developed considering a workplace context, i.e. a corporate IS, and foresee the measurement of factors such as actual system use and actual benefits. Obviously, such measurements cannot be performed in the eParticipation domain and especially within piloting activities. Thus, it is problematic when such "non-measurable" factors seem to be influencing other factors of the model, as is the case in ISS where there is direct influence from net benefits factor to intention to use and user satisfaction factors. Additionally, the workplace context implies evaluation of a system that is usually mandatory, not voluntary as is the case in eParticipation. TAM2, for example, employs external variables that are fully relevant to the workplace and for this reason cannot be utilised in the eParticipation domain.

Apart from the fact that TAM seems to be less affected from the aforementioned limitations, it additionally incorporates a number of important advantages. First, TAM is considered by scholars as the most established model for assessing information systems and has been utilised in many different settings and domains (e.g. eLearning, eCommerce, eBanking, eHealth, etc.) where it has proven to be of quality and yield statically reliable results [29]. Additionally, TAM is the only one of the aforementioned theories with multiple applications in the eGovernment domain that are directly related to eParticipation and are useful for the purposes of this work. In fact, TAM has been found to be the most utilized model for eGovernment research [30]. Finally, TAM is a simple and flexible model that can be easily used for quantitative evaluations and surveys. TAM consists of a few simple and easily understandable factors and, at the same time, makes provisions for adding external variables, which is useful for further adapting the model.

Since TAM has not been applied so far to the eParticipation domain it is interesting to study how such a traditional IS theory can contribute to research on eParticipation acceptance. The work reported in this paper shows that, in the eParticipation domain, perceived usefulness is a stronger acceptance determinant than perceived ease of use. Moreover, it provides useful conclusions on how to attract users to eParticipation systems and how to succeed retaining them as frequent active users.

The main objective of this paper is to study the factors influencing user acceptance of eParticipation systems and to construct an eParticipation acceptance model (ePAM). We set out towards this objective examining the available literature of relevant TAM models but also literature on eParticipation evaluation. Then, we construct the ePAM model and formulate the hypotheses to be tested. Furthermore, we organise the research context, i.e. decide the eParticipation system to be utilised, construct appropriate measurement items and conduct a user survey. Finally, we conduct statistical analysis of the survey findings and conclude with a discussion of the proposed model.

The rest of the paper is structured as follows. Literature review is presented in section 2. Section 3 presents the proposed model and the formulated hypotheses. The research method and survey organisation is reported in section 4, while the survey findings are analysed in section 5. Section 6 presents an overall discussion of the factors influencing eParticipation acceptance, and section 7 concludes the paper.

2 Literature review

Literature review was conducted in two parallel directions, one direction regarding TAM and one direction regarding eParticipation evaluation. Both directions targeted databases of scientific literature (Web of Knowledge, Google Scholar) searching only for publications in peer-reviewed journals or conference proceedings. Due to the fact that literature relevant to eGovernment and eParticipation has been developed over the recent years, we did not expect to find outdated articles. For this reason no chronological limitation was applied to literature review findings.

TAM literature review included not only the originally proposed TAM but also its extensions proposed by other researchers that are relevant to our field of study. The purpose of this literature review was to acquire a comprehensive understanding of TAM literature and of the dependent variables that have been found to influence TAM's main variables, i.e. Perceived Ease of Use, Perceived Usefulness, and Behavioural Intension to Use. The literature review was conducted using the following keywords: TAM, "technology acceptance", eGovernment, eParticipation, eDemocracy, "policy making" and "public sector". Our literature sample finally included 31 relevant papers published between 2003 and 2014.

Literature review on eParticipation evaluation frameworks was conducted with the purpose to identify the concepts and metrics that have been found to assess citizens' acceptance of eParticipation projects and tools. The literature review was conducted using the following keywords: eParticipation, evaluation, and acceptance. Our literature sample finally included 7 relevant papers published between 2008 and 2015.

Literature review results are analysed in the following subsections.

2.1 The Technology Acceptance Model (TAM)

TAM [19] is probably the most established model for assessing Information Systems. The model is based on Fishbein and Ajzen's Theory of Reasoned Action (TRA) [31] and it studies and interconnects the factors that can impact the technology's acceptance level by its users. According to TAM, two concepts drive technology acceptance and thus influence an individual's attitude towards actual system usage. The first one is Perceived Usefulness, defined as "*the degree to which an individual believes that using a particular system would enhance his or her job performance*", and the second one is Perceived Ease of Use, defined as "*the degree to which an individual believes that using a particular system would be free of physical and mental effort*". TAM is a quite flexible model as it proposes that other external variables, such as system's features, influence the Perceived Usefulness and Perceived Ease of Use variables. It is therefore considered that the aforemen-

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tioned three concepts determine an individual's behavioural intention to use an IS system as well as the actual IS system's usage, as shown in Figure 1. In 2000, TAM evolved to TAM2 which employs an additional number of external variables to specifically explore acceptance of technological solutions in the workplace [21].

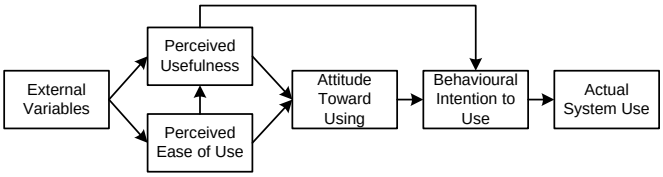

Fig. 1. The Technology Acceptance Model, figure based on [19]

2.2 Technology acceptance in eGovernment and eParticipation

Since its inception, TAM has been used as the basis for many different models proposed by researchers in the fields of eGovernment, eParticipation and eDemocracy. In these publications, TAM is being either extended with external variables according to relevant literature or integrated with other technology adoption models, mostly with Theory of Planned Behaviour (TPB) and DOI.

In our literature review, four publications integrating TAM and TPB were identified: two referred to online tax filing [32], [33], one to SMS-based services [34], and one to eDemocracy adoption [35]. Another four publications integrating TAM and DOI were identified referring to the adoption of eGovernment services [36], [37], [38]. Another popular research stream that emerged in our literature review is the concept of trust and its relevance to TAM variables. Three publications have focused on extending TAM according to relevant trust theories [39], [40], [41], two publications have focused on integrating TAM with both TPB and trust theories [42], [43], and six publications have focused on integrating TAM with both DOI and trust theories [44], [45], [46], [47], [48], [49]. Many other TAM extensions were identified in the literature, including an effort influenced by customer relationship management approaches [50], and an effort focused specifically on senior citizens borrowing theoretical concepts from gerontology [51], [52].

Following the directions for a systematic literature review [53], we organised the literature review results according to a concept-centric rather than an author-centric approach. More specifically, we extracted from literature the variables proposed for addition in TAM and documented them in a concept matrix (Table 1) mapping each concept/ variable to the publications referring it. The most popular variables were the ones relevant to: risk, security and trust; technological aspects; subjective norm and social influence; perceived behavioural control and self-efficacy as regards both the technological and political aspect; facilitating conditions and quality, compatibility, etc.

Table 1. Concepts added to TAM for understanding eGovernment / eParticipation / eDemocracy acceptance (Italian fonts denote possible insignificance)

Concept	Sources
Perceived risk	[38], [32], [42], [69], [50], [40], *[49]*, [34]
(Perceived) Security	[51], [52], [50], [70]
(Perceived) Trust (of technology/internet and of government)	*[44]*, *[45]*, [42], [46], [35], *[39]*, [71], [48], [36], [47], [50], [40], *[49]*, [64], [41], [37], *[43]*
Technology characteristics	*[47]*
Internet Infrastructure	[70]
Website design	[64]
Complexity	[48], [64]
Subjective Norms	[42], [46], [61], *[43]*, [66]
Social Influence	[38], [36], *[61]*, [40], [49], [34]
Persuasion	[47]
Perceived personal relationship	[34]
Image	[44], *[45]*, *[51]*, [48], [49]
Culture	[35], [48], *[36]*
Attitude	[61], [64], [66]
Perceived Behavioural Control	[42], *[61]*, [34], [66]
Self-efficacy (mostly technological but also political)	[62], [32], *[39]*, [63], [61], [49], [34], *[43]*
Prior experience	*[72]*
Job/occupation relevance	*[72]*
Personal experience e-services	[42]
Previous eGov transaction	[38], [39]
Worry about eGovernment	[42]
Internet and PC skills confidence	[38], [52], [64]
Facilitating conditions	[32], *[36]*, [61], [34], [43]
Perceived Quality	[71], [34]
Information Systems Quality	[73], *[74]*
Information Quality	[73], [74], [34]
Service Quality	[40], [49]
Perceived responsiveness	[34]
Reliability	[70], [34]
Perceived Credibility	[62], [73],
Result Demonstrability	*[49]*
(Perceived) Compatibility (with own values, beliefs and lifestyle)	[44], [45], *[51]*, [32], [46], [36], [61], [40], [49], [34], *[64]*, [37]
Perceived public value	[35]
Relative Advantage	[44], *[45]*, [48], *[64]*
(Perceived) Convenience	[70], [34]
Self actualisation	[52]
Satisfaction	[71], [50]
Expectation	[50]
(Perceived) Cost of service/ savings	[52], [40], [34]
Voluntariness	[36]
Civic mindedness	*[36]*

2.3 eParticipation evaluation

Over the last decade scholars have studied different eParticipation theories and practitioners have applied multiple eParticipation tools in practice. Consequently, literature has also examined eParticipation evaluation and citizens' acceptance of different eParticipation tools and initiatives. One of the first attempts to develop an analytical framework for eParticipation evaluation is the one by Macintosh and Whyte [54]. Their framework includes three overlapping perspectives – democratic, project and socio-technical perspective – and was used to evaluate four local, top-down eParticipation projects in the UK. Furthermore, Loukis et al [55] evaluated a GIS eParticipation platform based mainly on TAM concepts' of ease of use and usefulness, and, a little later, Loukis [56] devel-

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oped an evaluation framework comprising concepts from TAM and DeLone & MacLean [24] models classified under three perspectives: process, system and outcome. At the same time and in a similar fashion, Nam [57] proposed a framework for assessing citizen-sourcing initiatives based on three perspectives: process, design and outcomes. More recent attempts to define the factors influencing citizens' online participation include Alathur, Ilavarasan & Gupta's [58] evaluation in India using a framework comprising individual, governance and technology factors and Al-Quraan & Abu-Shanab's [59] survey in Jordan. Finally, Perez Espes, Wimmer & Moreno-Jimenez [60] proposed the EF3 framework on effectiveness, efficacy and efficiency of eParticipation experiences.

Following the same concept-centric approach as previously, we extracted from the literature the criteria proposed for evaluating eParticipation experiences and documented them in a concept matrix (Table 2) mapping each concept/ variable to the publications referring it.

Table 2. Concepts related to eParticipation evaluation

Concept	Sources
Trust, security and privacy	[54], [56], [58]
Accessibility	[54], [56]
Feedback to participants	[54], [56]
Inclusiveness and equality	[54], [57], [56], [58]
Quality of facilitation	[56], [58]
Transparency	[54], [57], [56]
Quality of content	[54], [57], [56]
Error handling	[54], [56], [58]
Ease of use	[54], [55], [56], [59]
Conflict and consensus	[54], [56]
Commitment from government	[56], [58]
Impact to policy	[57], [56]
Effectiveness	[54], [55], [57], [60], [59]
Usefulness	[54], [55], [56] , [59]
Quality of deliberation	[54], [57]
Process design	[54], [55], [57], [56], [60]
Promotion	[56]
Quality of contributions	[56]
Usage	[55], [56]
Willingness to re-use	[56]
Representativeness	[54], [57], [56]
Pluralism and diversity	[57], [56]
Stakeholder satisfaction	[56]
Obtaining better informed opinions	[54]
Efficiency	[54], [56], [60]
Navigation and organisation	[54], [56]
Adequacy of resources	[56]
Engagement and collaboration	[54], [57], [59]
Openness	[57], [56], [58]
Appropriateness of the ICT system	[56], [59]

2.4 Discussion

The main observation on the reviewed literature is that both literature review streams, TAM and eParticipation evaluation, have provided input with many similarities. Concepts proposed in TAM literature seem to be relevant also to eParticipation evaluation criteria. For example, published work on eParticipation evaluation supports that it is important for any eParticipation system that citizens find it relatively easy to use (TAM's perceived ease of use), that citizens and other stakeholders understand its value and potential (TAM's perceived usefulness), that privacy and security issues should be safeguarded (as in TAM literature), that the eParticipation initiative is appropriately organised and operated as regards facilitation, openness, inclusiveness, etc. (perceived facilitating conditions from TAM literature). Obviously, some differences also exist. For example, what is mentioned in relevant TAM models as compatibility and compliance with policy is manifested in eParticipation a little altered focusing more on involvement of government officials in the participatory process and ensuring fit with the governmental processes and legislation.

3 ePAM MODEL AND HYPOTHESES FORMULATION

Based on the dual literature review, we set out to construct a user acceptance model specifically developed to suit the eParticipation domain. The aim was to include the most important and common concepts of the two literature review streams in a simple and concise model. This model, from now on referred to as "ePAM", is depicted in Figure 2. The proposed ePAM model uses the three TAM concepts of Perceived Usefulness, Perceived Ease of Use and Behavioural Intention to Use (concepts within the dotted line) as its core, and includes five additional concepts that address the eParticipation domain: Technological Self-Efficacy, Integration to Governmental Processes, Perceived Facilitating Conditions, Intrinsic Motivation, and Social Influences. The relationships between the concepts depicted in Figure 2 show the dependencies as expected according to the literature.

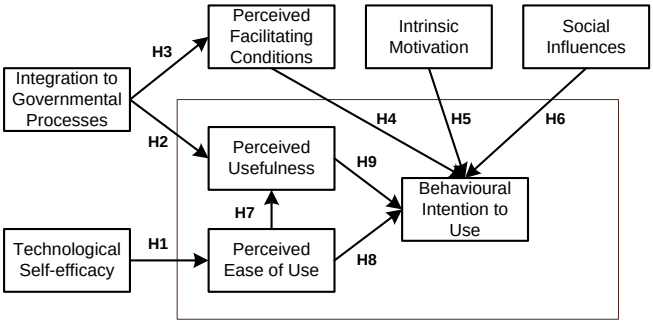

Fig. 2. Proposed eParticipation acceptance model (ePAM)

In specific, the eight concepts of ePAM as well as the formulated research hypotheses are defined as follows:

Technological Self-efficacy (TSE). TSE is a concept originating mainly from the TAM literature stream (e.g. [32], [61]) and may refer to general technology, computer and/ or internet skills (e.g. [62], [39], [63], [64]) but also to specific skills, e.g. use of SMS-based egovernment services [34]. In the proposed model, TSE refers to a user's perceptions of his/ her ability to use relevant technology (computers, internet, etc.) for electronically participating in political processes. It is concerned not only with the skills one has but with self-judgments of what one can do with whatever skills one possesses. According to TAM literature it is expected that TSE is directly related to PEOU, as users of an eParticipation system that do not

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feel confident with technology are more likely to find this system difficult to use.

***H1**: A user's technological self-efficacy positively affects their perceived ease of use of an eParticipation system.*

Integration to Governmental Processes (ITGP). ITGP refers to a user's perception on the degree to which an eParticipation initiative is actually integrated in the policy making process at any governance level (EU, national, local). Real integration to governmental processes refers to any situation between the two extremes of delivering and receiving feedback from government officials (minimum integration) and fully transferring decision-making power to citizens (maximum integration). ITGP is a concept frequently mentioned in eParticipation literature (e.g. [54], [56], [57]) and it is considered a critical factor for a successful eParticipation initiative. At least a minimum degree of integration is sought otherwise the initiative will produce no tangible results and participants will feel 'not being heard' and perceive their participation as pointless. eParticipation literature implies that ITGP is related to PU and PFC concepts of the model.

***H2**: A user's perception of an eParticipation's system integration to governmental processes positively affects their perceived usefulness of the system.*

***H3**: A user's perception of an eParticipation's system integration to governmental processes positively affects the system's perceived facilitating conditions.*

Perceived Facilitating Conditions (PFC). PFC refers to the degree to which a user of an eParticipation system believes that an appropriate organisational and technical infrastructure exists to support use of the system. PFC in eParticipation includes aspects such as quality of moderation and deliberation, trust, privacy and security, independence and transparency, openness and inclusiveness (e.g. [54], [56], [57], [58]). As regards TAM literature, PFC incorporates the "facilitating conditions" concept (e.g. [61], [34]) but also the "security", "trust" and "perceived risk" concepts (e.g. [44], [45], [46], [36], [47], [50], [49]) as in the eParticipation domain such concepts are directly relevant to how an initiative is organised and supported from start to end. Both TAM and eParticipation literature imply that PFC is related to BITU.

***H4**: A user's perception of the facilitating conditions of an eParticipation system positively affects their behavioural intention to use the system.*

Intrinsic Motivation (IM). IM refers to the degree to which a user of an eParticipation system is willing to use a technological innovation. According to TAM literature it is not enough for a system to be easy to use; users' intrinsic motivation to use it influences their behavioural intention to use and thus actual system use. In fact, Davis [19] found that extrinsic and intrinsic rewards of using the system strongly influence a user's efficiency while using it, while Malone [65] pointed out that intrinsic motives play an important role in intention to use, as people use systems in part because they enjoy the usage process, not just because they may be extrinsically rewarded for this usage. Due to the fact that the use of eParticipation systems is optional (as opposed to eGovernment systems that users are obliged to use, e.g. tax systems), intrinsic motivation to use a technological innovation becomes an important concept to examine. Hence, IM was included in the ePAM model and is expected to relate to BITU.

***H5**: A user's intrinsic motivation to use technological innovations positively affects their behavioural intention to use an eParticipation system.*

Social Influences (SI). SI refers to the degree to which a user of an eParticipation system perceives that important others believe he/ she should use the new system. Such others may be government officials and policy makers, but also friends and relatives of the user. This concept comes from TAM literature (e.g. [42], [36], [61], [40], [49], [34], [65]) and, although not mentioned in eParticipation evaluation literature, it seems important to keep in the proposed model especially due to the increasing social character of eParticipation systems, i.e. the utilisation of Web2.0 and social media for eParticipation. According to TAM literature, SI is directly related to BITU.

***H6**: Social influences towards using an eParticipation system positively affect a user's behavioural intention to use the system.*

Perceived Ease of Use (PEOU). PEOU refers to the degree to which a user of an eParticipation system believes that using this system requires minimum physical and mental effort. According to TAM, PEOU relates to PU and BITU.

***H7**: A user's perceived ease of using an eParticipation system positively affects their perceived usefulness of the system.*

***H8**: A user's perceived ease of using an eParticipation system positively affects their behavioural intention to use the system.*

Perceived Usefulness (PU). PU refers to the degree to which a user of an eParticipation system believes that this system is useful to citizens, government and other stakeholders to get informed, consult, and engage with political processes electronically. It is expected that PU directly affects BITU.

***H9**: A user's perceived usefulness of an eParticipation system positively affects their behavioural intention to use the system.*

Behavioural Intention to Use (BITU). BITU refers to the degree to which a user of an eParticipation system intends to adopt a certain behaviour, i.e. to use this system for electronically participating in political processes.

4 Research method

4.1 Research context

The proposed model has been tested in the context of a European eParticipation project called Puzzled by Policy (PbP). PbP aims to reduce the complexity of decision making within the EU and reconnect citizens with decision makers and policy making in an engaging way. The PbP platform consists of three components: the Policy Profiler, u-debate, the PbP widget [67]. The Policy Profiler is a web based tool which provides users the opportunity to find out their preferences within a given policy field and to compare their positions to the existing policy framework. U-debate is a multilingual, pan-European deliberation forum where users can view, discuss and

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share ideas on a policy field, while administrators can easily create consultation reports on different policy topics at local, national or EU level. The widget enables the viral distribution of the PbP platform throughout the web, as it can be embedded, and thus accessed, on any website, blog or social media site on the Internet.

PbP has conducted five pilots on immigration policy (but can be applied to any policy domain). Four pilots had a national scope referring to Greece, Hungary, Italy, and Spain and one pilot had a European scope targeting EU in general. Based on previous analysis of current situation and issues in these four Member States and generally in the EU, each pilot was tailored to the circumstances of its geographical scope, i.e. the Policy Profiler questions and the topics under discussion in u-debate were edited accordingly. Also, each pilot was conducted in a different language, i.e. in Greek, Hungarian, Italian, and Spanish for the four national pilots and in English for the EU pilot.

PbP has been developed on DotNetNuke and incorporates all relevant security features to protect against unauthorized access to or unauthorized alteration, disclosure or destruction of data. Administrators define and assign roles for different user groups and grant access and editing rights to each group. Unregistered users may use the Policy Profiler tool and navigate discussions; however, only registered users can fully use the platform and contribute to u-debate discussions.

Moreover, PbP was built to conform to Directive 95/46/EC, the fundamental European law on the protection of individuals with regard to the processing of personal data and on the free movement of such data. According to PbP Privacy Statement, access to the platform requires the acceptance of relevant Terms of Use and Privacy Policy. The platform ensures the privacy of all the provided personal data required in the registration and in all the data exchange operations. Personal data is stored in a secure database and will never be published without users' consent.

4.2 Measurement items

For testing the hypotheses, a quantitative method was followed employing multiple-item scales for measuring the variables of the model. The list of measurement items per concept is provided in Table 3.

Table 3. Items measuring the model's concepts

ID	Item
TSE1	I feel confident working with computers and using software that I have never used before
TSE2	I do not feel confident using the Internet and Web-based applications
ITGP1	I feel that government officials/policy makers participate to an acceptable degree in the PbP platform
ITGP2	I believe that my input to the PbP platform does not get across to relevant policy-makers and government officials
ITGP3	I believe that the PbP initiative is adequately integrated in the decision-making process
PFC1	Participation through the PbP platform is performed in a clear, open, equal and inclusive way according to the democratic values
PFC2	PbP platform facilitators lack the necessary skills to perform high-quality facilitation and resolve potential conflicts and disagreements
PFC3	PbP platform offers understandable content and high-quality deliberation
PFC4	I believe that PbP platform owners do not handle privacy and security issues with the appropriate attention and respect
PFC5	Overall, I believe that the PbP platform's support and facilitation is well-organised
IM1	I do not like trying out new information technology, such as new Web-based applications
IM2	Adopting new technological systems appeals to me a lot
SI	I believe that the following persons would like me to use the PbP platform (choice among one or more of the following): a. family; b. friends; c. government officials/policy makers
PEOU1	Learning to operate the PbP platform requires a lot of mental effort
PEOU2	My interaction with the PbP platform is clear and understandable
PEOU3	Overall, I find the PbP platform difficult to use
PU1	I feel more informed on immigration after using the PbP platform
PU2	Through the PbP platform I can influence public policy
PU3	Using the PbP platform does not increase my engagement with public matters
PU4	Overall, I find the PbP platform useful for public participation
PU5	Overall, the PbP platform is not a useful tool for public participation
BITU1	I will not use the PbP platform in the future
BITU2	I predict that I would use the PbP platform also for other policy areas apart from immigration

Where possible, items were drawn from pre-validated measures in previous studies of the literature and, if needed, modified to fit our purposes. In specific, seven items (i.e. PEOU1,2,3, PU2,3 and BITU1,2) were adapted from TAM [20] and TAM2 [21]; two items (i.e. TSE1,2) from Wangpipatwong, Chutimaskul & Papasratorn [63] and Carter [39]; one item (i.e. SI) from Suki & Ramayah [61] and Lu et al [33]; and ten items (i.e. PU1,2, ITGP1,2,3 and PFC1,2,3,4,5) were formulated by the authors based on eParticipation evaluation literature. Items for collecting relevant demographic data, i.e. gender, age and educational level of respondents were also included.

Five-point Likert-type scales with anchors ranging from "1: strongly disagree" to "5: strongly agree" and "3: neutral" as middle point were used for all items except for demographic items and the item measuring SI which incorporated three non-exclusive Yes/ No questions, one for each type of social interaction: family/ friends/ government.

It was decided to alternate between negatively and positively worded items in order to minimise acquiescent bias of the responses, i.e. respondents' tendency to mechanically select the points toward one end of the scale [68]. Moreover, it was decided to use a control item in order to detect and discard problematic questionnaires. This was achieved by including item two items (PU4 and PU5) that are nearly the same in a different part of the questionnaire (not next to each other). In this way, questionnaires that provided much diverse answers to PU4 and PU5 (i.e. answers with a distance of three or more points in the 5-point Likert-type scale) could be considered unreliable and be omitted from the analysis.

4.3 Data collection

For gathering responses, the items were included in a self-administered online questionnaire on the website of PbP platform. The questionnaire was promoted during the five PbP pilots – in Greece, Hungary, Italy, Spain and the EU. Due to the fact that each pilot was performed in

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different language – Greek, Hungarian, Italian, Spanish and English respectively – the questionnaire was translated and offered in the relevant languages. Translations, editing and proof-reading of questionnaires have been performed by native-speaking project partners targeting at closely translating the items and concepts and eliminating awkward or confusing terms and phrases.

After eliminating questionnaires with blank answers and checking reliability with the PU4/ PU5 control variables, 299 reliable responses have been extracted to be used in the analysis. Detailed descriptive statistics for the respondents' background are provided in Table 4. Most respondents are young people with high school education or higher, and slightly more women than men.

Table 4. Demographic data

Item	Value	Frequency	Percentage
Age	13-17	12	4.0
	18-24	54	18.1
	25-34	97	32.4
	35-44	73	24.4
	45-54	46	15.4
	55+	17	5.7
Gender	Male	136	45.5
	Female	163	54.5
Education level	Other or N/A	16	5.4
	High school	112	37.5
	BA/College degree	97	32.4
	MA/MSc degree	64	21.4
	Doctoral degree	10	3.3
Pilot	Greece	84	28.1
	Hungary	78	26.1
	Italy	72	24.1
	Spain	34	11.4
	EU	31	10.4

5 Data analysis and findings

Data analysis commenced with testing the validity and reliability of data. Face validity has been performed by experts and construct validity has been performed through factor analysis. The latter resulted in re-grouping of the valid items under seven factors. Consequently, reliability analysis has been performed using Cronbach's alpha. The results of the validity and reliability tests have been incorporated in a revised model and a revised set of hypotheses that were tested through regression analysis. In specific, two tests of simple regression analysis were performed with PEOU and PFC as the dependent variables, and two tests of multiple regression analysis were performed with PU and BITU as the dependent variables.

5.1 Validity

Face validity of the measures has been performed by a panel of experts from the 5 pilots of the PbP project. Construct validity was evaluated by performing factor analysis. Principal Component Analysis with varimax rotation was used in this factor analysis. The Bartlett test of sphericity was significant ($\chi^2 = 2225.561$, $p < 0.01$) and the Kaiser-Meyer-Olkin measures of the sampling adequacy were 0.835 indicating sufficient intercorrelations. In reference to eigenvalues, seven factors with the value greater than one have been extracted, and 59.66% of the variance has been explained. As illustrated in Table 5, the rotated matrix has reduced the initial eight variables to seven main factors. After reviewing the factor loading we were able to re-group the valid items under the seven factors as follows:

- All three items of PEOU loaded in one factor without any significant cross-loadings, thus they are maintained.
- Items of IM and TSE loaded in the same factor implying the measuring of the same concept. Thus, the concepts of TSE and IM were merged under the label Technological Confidence (TC) and TSE1, TSE2 and IM2 renamed to TC1, TC2 and TC3 respectively. IM1 was dropped from the analysis as it was found to cross-load highly with another factor (while its face validity did not imply any relationship with that factor).
- Items PFC1, PFC2 and PFC4 loaded to the same factor without any significant cross-loadings, thus they are maintained. However, factors PFC3 and PFC5 had significant cross loadings with two other factors so they were dropped.
- Items of SI loaded in the same factor and are maintained. Nonetheless, SIc loaded negatively implying a reverse relationship with SIa and SIb.
- All items of ITGP loaded in one factor without any significant cross-loadings, thus they are maintained. Moreover, PU2 loaded to the same factor and its face validity agrees with this loading, thus it is maintained as an additional item and is renamed to ITGP4.
- From PU only items PU4 and PU5 loaded to the same factor, thus these are maintained and the rest are dropped. Moreover, BITU2 loaded to that factor and its face validity agrees with this loading, thus it is maintained as an additional item and is renamed to PU6.
- BITU1 loaded to the final factor and is maintained as the only item of that factor.

Table 5. Factor analysis

	Factor loading						
Item	1:PEOU	2:ITGP	3:TC	4:PU	5:PFC	6:SI	7:BITU
PEOU1	.707						
PEOU2	.636						
PEOU3	.724						
IM1			.501				.534
IM2 (TC3)			.689				
TSE1 (TC1)			.801				
TSE2 (TC2)			.740				
PFC1					.575		
PFC2					.644		
PFC3	.402			.357	.392		
PFC4					.714		
PFC5	.469			.462			
SIa						.497	
SIb						.767	
SIc						-.662	
ITGP1		.589					
ITGP2		.768					

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ITGP3		.666					
PU1		.425					
PU2 (ITGP4)		.733					
PU3	.361	.359			.370		.358
PU4	.391			.671			
PU5	.361			.393			
BITU1				.371			.701
BITU2 (PU6)				.785			
Eigenvalue	6.235	2.109	1.714	1.400	1.331	1.101	1.024
Variance (59.66)	24.939	8.436	6.857	5.602	5.323	4.405	4.097

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. Rotation converged in 9 iterations.
Notes: Loadings less than .350 are not shown.
Underline loadings indicate the inclusion of that item in the factor.

5.2 Reliability

Reliability analysis has been conducted using Cronbach's alpha in order to ensure internal consistency of the revised items. All factors apart from SI display good reliability with Cronbach's alpha ranged from .630 to .744. Moreover, the deletion of any item would result in lower Cronbach's alpha, apart from item PU6 that would correct Cronbach's alpha for only .005. Thus, it was decided that no items should be dropped. Table 6 provides the alphas for each factor as well as the alphas if item deleted.

Table 6. Reliability analysis

Factor	Items	Cr. alpha	Cr. alpha if item deleted	Items dropped
TC	1, 2, 3	.744	.668, .617, .690	0
ITGP	1, 2, 3, 4	.707	.693, .639, .622, .619	0
PFC	1, 2, 4	.645	.543, .564, .535	0
SI	a, b	.408	-	0
SI	c	-	-	0
PEOU	1, 2, 3	.630	.470, .535, .588	0
PU	4, 5, 6	.680	.485, .585, .685	0
BITU	1	-	-	0

As regards SI, due to the negative factor loading of SIc item, reliability was tested only among SIa and SIb resulting in a poor Cronbach's alpha (<0.5). From the results of factor analysis and reliability analysis on variable SI, it was deduced that variable SI refers in fact to three different concepts, one per type of social influence, i.e. family; friends; and government officials/ policy makers. Thus, it was decided to split it in three different variables for hypothesis testing, i.e. SIa, SIb, and SIc.

5.3 Revision of model and hypotheses

The outputs of validity and reliability analysis indicated a few revisions to the proposed model which was revised as in Figure 3. In specific, variables Technological Self-efficacy and Intrinsic Motivation were merged in one variable named Technological Confidence, and Social Influences variable was split in 3 variables per influence type.

Due to the revision of the theoretical model, the initial hypotheses H1, H5 and H6 were also revised to reflect the actual hypotheses for testing. The revised hypotheses are:

H1*: A user's technological confidence positively affects their perceived ease of use of an eParticipation system.*

H5*: A user's technological confidence positively affects their behavioural intention to use an eParticipation system.*

H6a*: Social influences by family members towards using an eParticipation system positively affect a user's behavioural intention to use the system.*

H6b*: Social influences by friends towards using an eParticipation system positively affect a user's behavioural intention to use the system.*

H6c*: Social influences by government officials/ policy makers towards using an eParticipation system positively affect a user's behavioural intention to use the system.*

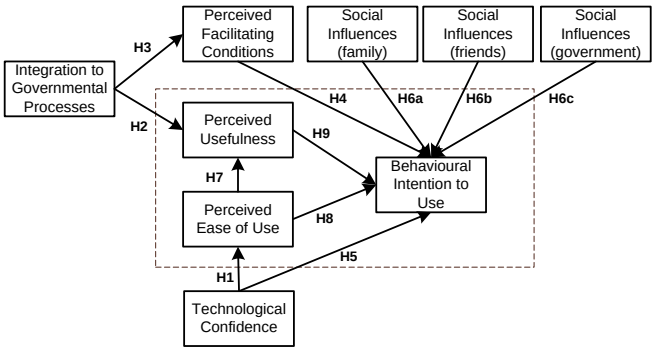

Fig. 3. Revised eParticipation acceptance model (ePAM)

5.4 Hypothesis testing

Regression analysis has been used for testing the hypotheses. Two tests of simple regression analysis were performed with PEOU and PFC as the dependent variables, and two tests of multiple regression analysis were performed with PU and BITU as the dependent variables.

In the first test, a simple regression was run to predict PEOU from TC. TC statistically significantly predicted PEOU explaining 10.2% of its variability: $F(1, 297) = 33.741$, $p < .0005$, $R^2 = .102$. The variable added statistically significantly to the prediction, $p < .05$, thus supporting H1. For the relevant regression curve see Figure 4, left.

In the second test, a simple regression was run to predict PFC from ITGP. ITGP statistically significantly predicted PFC explaining 8.6% of its variability: $F(1, 297) = 28.011$, $p < .0005$, $R^2 = .086$. The variable added statistically significantly to the prediction, $p < .05$, thus supporting H3. For the relevant regression curve see Figure 4, right.

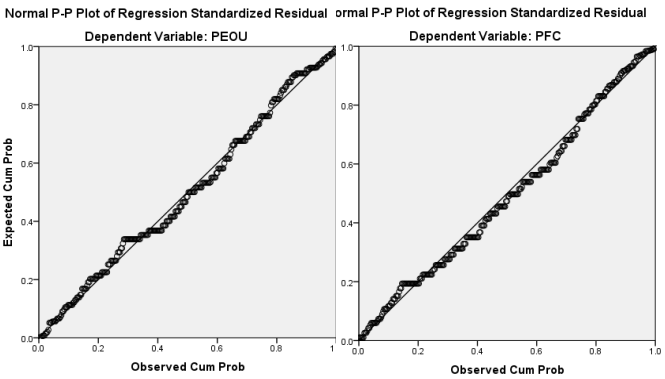

Fig. 4. Regression curves for PEOU and PFC

Following, a multiple regression was run to predict PU from ITGP and PEOU. These variables statistically significantly predicted PU explaining 29.7% of its variability: $F(2, 296) = 62.476$, $p < .0005$, $R^2 = .297$. Both variables added statistically significantly to the prediction, $p < .05$, thus supporting H2 and H7. However, it was observed that also PFC statistically significantly predicted PU increasing variability explanation to 38.4%: $F(3, 295) = 61.188$, $p < .0005$, $R^2 = .384$. All three variables added sta-

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tistically significantly to the prediction, $p < .05$, thus supporting H2, H7 and the newly observed relationship between PFC and PU. For the relevant regression curve see Figure 5, left.

Finally, a multiple regression was run to predict BITU from PFC, TC, SIa, SIb, SIc, PEOU and PU. These variables statistically significantly predicted BITU explaining 21% of its variability: $F(7, 291) = 11.080$, $p < .0005$, $R^2 = .210$. Variables PFC, SIb and PU added statistically significantly to the prediction, $p < .05$, thus supporting H4, H6b and H9. However, hypotheses H5, H6a, H6c and H8 were not supported. For the relevant regression curve see Figure 5, right.

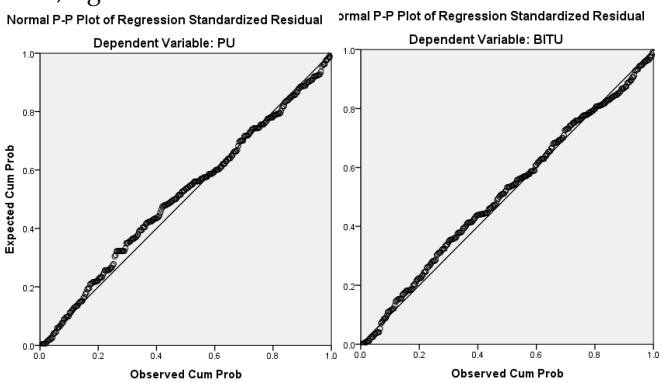

Fig. 5. Regression curves for PU and BITUOverall results of regression analyses and verdicts on hypotheses' support are reported in Table 7 and Figure 6 (dotted relationships represent unsupported hypotheses).

Table 7. Regression analyses and hypotheses testing

Regression	Hypothesis	Variables	β	t	Sig.	Supported
Simple	H1	TC→PEOU	.302	5.809	.000	YES
Simple	H3	ITGP → PFC	.292	5.292	.000	YES
Multiple	H2	ITGP → PU	.266	5.528	.000	YES
	H7	PEOU → PU	.245	5.751	.000	YES
	new	PFC → PU	.334	6.443	.000	YES
Multiple	H4	PFC → BITU	.196	2.301	.022	YES
	H5	TC → BITU	.025	.380	.704	NO
	H6a	SIa →BITU	-.076	-.644	.520	NO
	H6b	Sib → BITU	.280	2.490	.013	YES
	H6c	Sic → BITU	.004	.039	.969	NO
	H8	PEOU → BITU	.032	.460	.646	NO
	H9	PU → BITU	.399	4.596	.000	YES

6 Discussion

6.1 Technological Confidence

TC has been found to positively affect PEOU verifying previous research by Wang [62]; although the latter additionally found a positive relation between TC and PU that is not observed in our work. The positive effect of TC to PEOU shows that users who are confident with their skills on technology (computers, internet, etc.) will find it easier to electronically participate in political processes. Since PEOU directly affects PU which further affects BITU, this conclusion validates digital divide as an important barrier to using eParticipation systems.

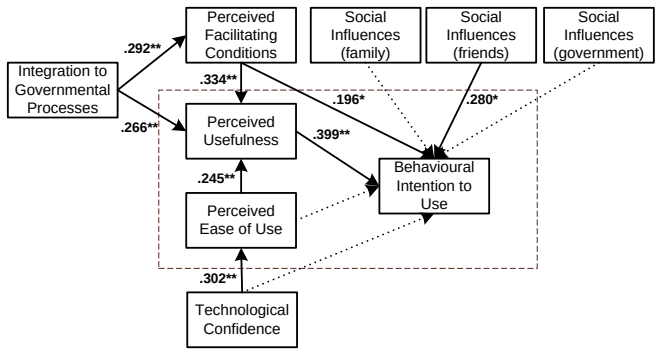

Fig. 6. Validated model for eParticipation acceptance

6.2 Integration to Governmental Processes

It was suggested from theory that ITGP positively affects PU and PFC and both hypotheses have been supported. In fact, ITGP has been found to have a similar impact to PU as PEOU. This conclusion supports the importance of ITGP for ensuring eParticipation success, something stressed already in eParticipation literature, e.g. [54]. Thus, proving relevance of an eParticipation system to policy making can directly and positively affect users' perception on its usefulness and quality of facilitation which consequently contribute to users' behavioural intention to use it.

6.3 Perceived Facilitating Conditions

Literature suggesting a positive direct influence of PFC to BITU ([45], [46], [36], [47], [49], [34]) has been confirmed in this study. Thus, users are more inclined to use an eParticipation system if this system is properly facilitated, i.e. assured privacy and security; openness, equality and inclusiveness; and high-quality information and deliberation, as previous literature suggested ([54], [56], [57], [58]). Furthermore, a strong positive influence of PFC on PU has been detected in this study. In fact, it has been found that PFC has a stronger impact on PU than PEOU or ITGP. This conclusion is not surprising considering that facilitation is a much broader and more critical issue in eParticipation systems, where the user interacts not only with the government but also with any other user, than in other eGovernment systems, where interaction is usually only between citizen and government, e.g. transaction-based interaction.

6.4 Social Influences

The analysis on social influences verified previous research ([61], [40], [49], [65]) only in part. In specific, it was concluded that influences from family members and government officials/ policy makers do not affect users' intention to use an eParticipation system. However, it was found that influence from friends can positively affect eParticipation system usage. This result implies a direct influence of social media to eParticipation take-up, as users are more inclined to use a system recommended by their friends, but not by family or politicians. It is worth noting that previous research did not differentiate between different social relationships (i.e. family, friends, and government) but used general terms in their measurement items, e.g. "people that are important to me" or "people who can influence my behaviour".

6.5 Perceived Usefulness and Perceived Ease of Use

Similarly to TAM, PU has been found to directly relate to PEOU and BITU in this analysis. However, no significant impact of PEOU to BITU has been detected. This finding

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verifies previous research on eGovernment acceptance ([44], [47], [37], [64], [34]) showing that perceived usefulness may positively impact intention to use a system while at the same time perceived ease of use of the system has no effect to users' intention to use it. Furthermore, PEOU has been found to exercise a weaker impact to PU than ITGP and PFC. Thus, overall, PU seems to hold the key role for eParticipation acceptance as it maintains many and strong relationships with external (i.e. non-TAM) variables and offers the strongest impact to BITU. This could be regarded as an indication that ease of use is not that critical as usefulness in eParticipation systems. A reason for this could be that users recognise a certain degree of complexity in eParticipation systems in relation to eGovernment systems. E.g. users would expect an easy, quick system for performing simple eGovernment transactions, whereas understand that online participation to policy making would require more time and effort. Building on this notion, it seems that TC and PEOU are important factors for attracting users to start using an eParticipation system whereas ITGP, PFC and PU are important factors for keeping users and engaging them to actually contribute to policy making.

7 Future research and recommendations

The findings of this study offer useful conclusions for the research field but also for governments and other practitioners in the area of eParticipation.

This study contributes to technology acceptance research by applying TAM to the eParticipation domain for the first time. Moreover, it also contributes to overall eParticipation research by studying user acceptance in this field and by linking eParticipation research with traditional IS research.

An interesting finding of this study is the key role of perceived usefulness for eParticipation acceptance, a role more critical than that of perceived ease of use of eParticipation systems. As previously discussed, this could be attributed to the fact that users recognise a certain degree of complexity in eParticipation systems. Nonetheless, there is definitely an opportunity for deeper investigation in these two factors in order to more effectively address user engagement in eParticipation systems.

Another interesting finding is the increased importance of perceived facilitating conditions for eParticipation acceptance, as this factor was found to exercise the strongest effect on perceived usefulness. Considering also that multiple aspects of facilitation are relevant to eParticipation systems, there seems to exist an opportunity for future research regarding the facilitating conditions.

Future research could also focus on the different social influence types. This study showed that citizens may be influenced by their friends towards using an eParticipation system, something of particular importance for systems integrating social media applications. However, that is not true for influences coming from family and politicians. Considering that previous research did not differentiate between the different social relationships (i.e. family, friends, and government), it would be interesting to assess these findings in other research settings and to further investigate the underlying factors.

Most of the tested hypotheses have been supported through regression analyses and the proposed model can be regarded a valid model for explaining user acceptance of eParticipation systems. However, the model does not sufficiently explain all the variance of usage intention. The identified factors (i.e. technological confidence; integration to governmental processes; perceived facilitating conditions; social influences of different types; perceived usefulness; and perceived ease of use) have been found to influence citizen acceptance of eParticipation, however, there are undoubtedly additional factors that influence citizen acceptance which aren't included in the model. This can be the subject of future research.

Furthermore, the findings of this study let us draw a set of recommendations for governments and other practitioners in the area of eParticipation as follows:

- Relevance of an eParticipation system to policy making has been found to be an important determinant of users' intention to use this system. Thus, practitioners should ensure direct connections between eParticipation systems and policy making processes and effectively demonstrate these connections to target users.
- Facilitation has been found to be another critical aspect of eParticipation systems. Thus, practitioners should carefully plan organisational and technological issues relevant to moderation, quality of deliberation, trust, privacy and security, independence and transparency, openness, inclusiveness, etc.
- It has also been found that eParticipation implementations at large scale cannot be easily realised without efficiently tackling the digital divide barrier. Thus, the digital divide remains high at the governmental agenda.
- Moreover, the observed influence of friends in the users' intention to use an eParticipation system is a clear indication that practitioners should cleverly exploit the potential of social media for eParticipation systems' take-up.
- Finally, it was previously discussed that TC and PEOU are important factors for attracting users to start using an eParticipation system whereas ITGP, PFC and PU are important factors for keeping users and engaging them to actually contribute to policy making. Building on this notion, practitioners can accordingly adjust the targets and engagement strategies of eParticipation systems. For example, focus on easy-to-use systems for population-wide eParticipation systems, but concentrate more on facilitation and integration for eParticipation systems that target at substantial contributions to policy making. Alternatively, practitioners could develop staged eParticipation systems, i.e. develop a first, easy-to-use stage (e.g. for information only) to get users familiarised with the system, and a second, more useful stage (e.g. for actual contributions) to engage the more experienced,

already familiarised users.

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