

WEAK IDENTITIES FOR DELIBERATIVE E-DEMOCRACY

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Abstract – eParticipation requires some form of authentication. Most of Web 2.0 services are based on virtual identities. As social networks and reputation-based systems for products and services are increasingly complementing people's real world life with new web-based relations and experiences, the referred virtual identities are evolving towards more genuine and less ambiguous references to social identities. We introduce a weak identification model where entities linked to agents could help citizens to select their virtual identities within an electronic deliberative democracy. This approach is implemented in the multichannel eGovernment Inquiry Framework (eGif), suitably extended with weak identity connectors and channel interfaces adapters.

1. Introduction

Democratic systems are built around a representative model centered on national elections, occurring every four-five years [5], where citizens are asked to select parties and candidates. Different levels of (local, national, supra-national) government make use of similar processes. To guarantee the needed strong requirements for authentication/univocity and vote secrecy/anonymity, elections are mainly managed through traditional paper-based voting systems, even if eVoting procedures has been successfully experimented (see [1] for a recent review) and the requirements have been well identified [2], the main difficulties being the identification of techniques to satisfy a full trustability of the process [4].

On the other hand, elective democracy procedures are increasingly [3, 15] supplemented by tools of *deliberative democracy* [6-8]. Public debates, media supported discussions, letters, blogs, are offering a space for expression to citizens other than the simple delegation to a trusted party representative; sometimes this form of democracy is called *dialogic* [10] for the highly participated decision process that the communications trigger between citizens and public Institutions. The results of this process are petitions, public surveys, referenda or similar actions (as different forms of *direct democracy* [11-13]), allowing citizens to directly express opinions on definite questions regarding public choices.

Compared to elections, the tools of direct democracy have several useful characteristics:

- bring *decisions* directly to citizens,
- help to *reduce the temporal gap* between election intervals,
- focus on *specific themes*,
- can be managed through a wider set of *interaction channels*,

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- have *weaker requirements* for authentication, secrecy and anonymity,
- need *not* to reach all the population,
- *cost less*.

Until now, however, these tools had some critical limitations:

1. like in political elections, the ballot card is bound to paper even if there are alternative to polling booths,
2. authentication is still a complex procedure,
3. interaction is limited to just „yes or no“ answers.

The *e-* versions of the tools can help to overcome these limitations, by allowing a more flexible tuning of the (2) identity authentication and (3) citizen interaction that together define the matrix characteristic of direct democracy models (see Fig. 1).

Thanks to the characteristics of direct democracy instruments – namely, weaker authenticity requirements and consequently less constraints for submission channels – research and development on appropriate technology-enhanced tools could address the issues by allowing to more freely move in the authentication/interaction matrix (see [14] for an in-depth analysis). This can be done by: (a) easing citizens to manage the authentication procedures [29, 30], (b) allowing variable sets of questions to be submitted to citizens [41] and (c) experimenting new channels for voting [16, 17].

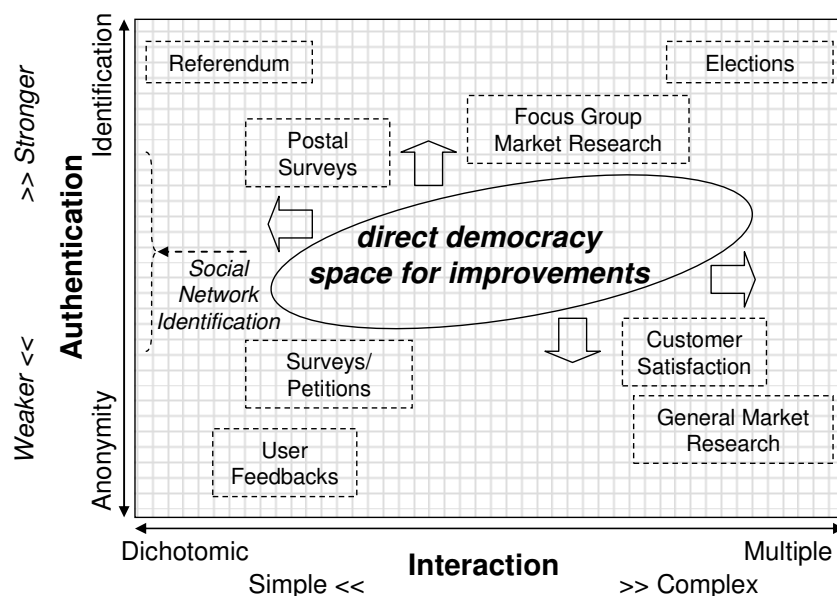


Figure 1: The dimensions of Direct Democracy

To this extent, we developed a new eParticipation tool by evolving our applied research on semantic web for eGovernment. We developed a strategy to make people connect to their web identities, in order to tune the voter authentication procedure, so addressing point (a): the

ever-increasing diffusion of web-accessible, open and reputation-based social networks, professional communities and groups makes this approach effective for a growing percentage of citizens. A structured strategy for „ballot cards“ – point (b) – is proposed, based on a social research, variable-centered scientific approach; this covers also point (c), where a previously developed extensible multichannel architecture [41] gave us the right framework to adequately match identity-channel pairings, like the asymmetric combinations (submit/return) as, for instance, email + web or dtm/dvb + sms.

The paper is organized as follows. In section 2 we outline the (eGovernment) context of our research, through the semantic web ingredients we are using (Subsect. 2.2), the weak identification strategy (Subsect. 2.2) and the interaction / „ballot cards“ framework (Subsect. 2.3). Finally, in section 3 we consider also a third dimension, where communication channels are considered, too: this way, the resulting extendible architecture provides, in our opinion, a complete platform for local government eParticipation. Section 4 concludes.

2. An Extensible eParticipation Architecture for Small Administrations

As explained in [35], in Italy there is a definite strategy to support eGovernment also in small municipalities through service structures managed by mid-level governments (named *Regioni*) as part of a wider goal towards thematic aggregation. The Italian Regione Veneto *myPortal* project [42] addressed this field by offering local (province, comuni, comunità montane) governments free use of a common portal platform.

We located our developments inside a definite track of applied research conducted with Regione Veneto to consolidate the front-side of the *government-to-citizen* (G2C) domain. In G2C, web publishing is used to give information to citizens, to report news regarding taxes procedures or laws as well as local information about events; citizens browse the web searching for specific information but have to know in advance the government *context* where the information is located.

Our eParticipation work can be seen as a specific line of evolution for *e-Government* interactions with citizens.

2.1 The Semantic Web Ingredient

Architecture evolutions are intimately connected to innovations in data representations; the baseline data model for the semantic web architecture has been identified as the *Resource Description Framework* (RDF) [43, 44], an highly flexible XML language where statements are *triples* composed of *subject*, *predicate*, *object*, represented graphically as two nodes connected by an edge. Subject and object are either *resources*, identified through an URI, *blank nodes* or *datatype/XML elements*.

Encoding identity knowledge in RDF should ease the weak profiling needed to match virtual profiles with social identities and is also used for social research analysis of variable relationships. *RDF Schema* (RDFS) [45] gives more expressivity through precise identification of classes, resources, datatypes, allowing the construction of taxonomies and classification of resources, properties, variables relating to domains and ranges (see Fig. 2, following the guidelines depicted in [49]):

Notion	e.g.
Classes	Country, Person, Comune
Attributes	Venetian
Properties	Citizenship (relates Person to Comune), Age (relates Person to an integer domain)

Figure 2: Identity-related attributions

For our needs, RDFS can be sufficient, but we are looking at OWL *Web Ontology Language* [46-49], as the language supports more complex statements that could be needed in order to establish and maintain a reference basis for finer social identity or variable relation network. Ontologies are to be created on the basis of a a common vocabulary, a set of assumptions for the intended meaning and a consistent set of relationships between concepts – a typical situation for Public Administrations. Common standard vocabularies for identity-related ontologies [31] and eGovernment [50], as well as channel-related semantic specializations (as for email, see [51]) could help managing the task.

To deploy native data structures in XML/RDF that can be validated and remains consistent between changes, we used the eXist Open Source XML-native database. We decided to store all data in XML files. The role of XML is not limited to the surveys serialization: user profiles, configurations and all the other data are also stored in hierarchical structured repositories. Flexible data structure is a key point for variable management.

2.2 Authentication: Identity and Trustiness

In order to support smarter initiatives in deliberative democracy, a flexible strategy of *weak profiling* can be now brought forward thanks to the level reached in the mass diffusion of interactive media technologies (internet, cellular phones, digital tv handsets, ...), today sufficient to support a set of adaptable models for identification.

As the authentication requirement for direct democracy is in a weaker form, we propose to adopt a set of strategies to assess a „reputation identity“ for citizens involved in local polls. The goal is indeed to identify the *prevalent opinion* of citizens, and some ambiguities can be tolerated. Anonymity is not acceptable, however, as polls and petitions – differently from general surveys – need to reliably reflect to some extent the public opinion in order to point to local government the wanted directions.

We can represent the authenticity requirement like a line ranging from anonymity (common in surveys) to full identification (needed in electoral processes), where middle positions are eligible for direct democracy tools. The weaker authentication requirements are:

- *distinctness*: no more than one vote per person,
- *secrecy*: privacy on expressed choices,
- *wide diffusion* of the submission channels: strategies are needed to allow more citizens to participate,
- *user friendliness*: a simple authentication procedure to not intimidate voters,

- *low cost*: allowing for more petitions/polls.

Simple user-tracking strategies based on IP number registration and cookies for web users are surely inadequate, as this temporary identification can be reset by simple actions. Email-based authentications have more reliability, but can be falsificated via standard spam techniques. For some polls, the standard simple registration scheme, combining web and email plus some *captcha* test to block automated agents [23] could be sufficient; however, even this simple registration scheme can inhibit many users and, perhaps more seriously, the identification can be totally unrelated to the social reality of the people involved – actions to distort the results of the polls could be made by groups of people with multiple email accounts. X509 personal certificates [22] offer a reliable mechanism to unambiguously connect instantaneous virtual identity to a well established social identity, but remains the problem to authenticate users the first time without requiring complex registration procedures. More interesting, in our view, is the flexible decentralized approach behind OpenID [32], where multiple *Identity Providers* can be used, so decoupling the registration process from the user access phase, and also the (semantic web-based) Friend Of A Friend (FOAF) data model regarding people and their relations [31].

The new element that is strongly changing the relation between virtual (internet) space and physical (relational) identity is the peaked popularity of Social Networks (SNs) and similar community and professional circuits. In striking difference with the traditional *nickname*-type model where the identity was a window on a private world, separated from the social identity, now people like to exhibit (besides perhaps other, more private, identities) a public, *reputation-valued* identity, strongly connected to the social role [27, 28]. The impressive aggregate values reached by Facebook (more than 150 millions of users worldwide, [20]), mySpace (nearly 80 million members), Hi5 (60 million members), see [18] LinkedIn (nearly 8 millions of professional profiles, [19]), only to cite the more diffuse SNs, makes simple to find users with a well established reputation-based virtual identity usable for direct democracy identification purposes [25, 26].

Searching for *area-related* identities to match the needs of district-level polls, SN profiles with town of residence or address information are required, but profiles can also be found in local area virtual communities. These are widely diffused thanks to the availability of easy-to-use social network technology, like Ning [21], with hundreds of thousands of communities operated and more than six millions of users worldwide.⁴ Supplementary approaches can rest on profile information to be found in personal pages / individual blogs or to additional data owned by a host eGovernment web portal; peer-reviewed identity (perhaps FOAF-based) networks could also be experimented.

With these considerations in mind, we designed a flexible weak authentication scheme based on *Identity Connectors* (IC) to relate users to some form of publicly recognized identity that can be found on personal home pages/blogs, public professional roles or social networks. Our ICs act like short-living spiders receiving some input from the users pointing to his/her set of web-based identities. The reliability of our scheme is strongly related to the level of social

⁴For related statistics, see for instance the data from Quantcast, <http://www.quantcast.com/ning.com>. In Regione Veneto, we looked at two popular networks: 40xVenezia, 40xvenezia.ning.com, with 1600 members, and Venessia, venessia.ning.com, with over 600 members.

reputation exhibited in these public identities; a *reputation index* is then attributed to the identity, so polls can be weighted upon reputation. Where the hosting system (e.g. the CMS) has sufficient information, this can also be used to ease the authentication of the users. The ICs can connect to multiple identities in the effort of a more reliable user identification: the identification subsystem is not designed to be perfect, rather its scope is increase the reliability of the polls results. Regarding the distinctness requirement, while it is possible for one person to have more than one identity in home pages/blogs, SNs or professional networks, we aim at reducing the capability to participate twice in important polls.

2.3 Interaction: Ballot Cards and Questionnaires

Ballot cards are built as questionnaires, a sequence of *questions* to be submitted to voters in order to have an instance of the choices selected; we can also leave space for comments through open-format answers. Descriptive statistics can be used to (pre-)classify the variables:

1. *nominal* variables – only classification can be applied;
2. *ordinal* variables – they can be ordered;
3. *cardinal* variables – common operations can also be applied.

The variable classification have effect on the subsequent manipulations by restricting the allowed statistical computations and on the graphics representations that can be used; it will also ease the definition of variable-based ontologies. The dichotomic variables (allowing only two states, like in the common yes/no pattern found in referendums) are a special case of nominal variables where quantitative statistics can still be applied.

Predefined models for managing set of choices – dichotomic, Likert scales and other survey formats – are contained in a variable library. A classification pointing to the role of the variables can ease the path towards the construction of questionnaires ontologies, as the categories can be related to citizen choices or to analyze statistical aggregate values. Social research distinguishes between three kinds of variables:

1. demographic/census data, like age, sex, name, location and other *fixed attributes* of the respondent. These are standard independent variables required for classification purposes and are to be extracted from the interaction with the identity connectors;
2. objective data, like common habits or information about past events/experiences, related to *facts*. Commonly investigated in general questionnaire submissions, these are to be *excluded* from a typical ballot card, but can be used separately in parallel surveys to investigate the link between life style and the preferences (as independent variables);
3. subjective data, like religious or political preferences, taste, interests, motivations, judgements, related to *opinions*. Collecting this data is the main goal of the polls (as dependent variables).

Commonly used demographic variables can be defined and their relations stored in appropriate ontologies easing to questionnaire designers the task of identifying the demographic dimensions of the surveys; a similar approach can be used for non-demographic variables.

We tried to pre-encode variable knowledge by strictly linking the statistical core of the survey campaigns with the questionnaires design. The survey tool has to know *in advance* the statistical characteristics of the variables inspected (being *nominal*, *ordinal*, *cardinal*, in ranges, etc), in order to be able to constrain its user acquisition, to better control the submission channels and to coherently elaborate/report the results. We then applied semantic-web techniques for the accumulation of “usable knowledge” for survey designers, in order to facilitate the construction of “consistent bricks” for surveys to be shared among social researchers. Two kinds of “bags” are necessary: (a) a *knowledge library* for commonly used variables, their statistical properties, their social semantics, their relations with other variables; (b) an *associative memory* containing common [question + predefined answers] blocks, their social semantics and their relations with other blocks and with the inspected variables.

To create and manage polls, a web user interface is used to allow survey designers to manage questionnaires with ease and flexibility. The use of the symbols “?” for *questions* and “!” for *answers* allows better packing of information on the screen and facilitates the user in the creation of questionnaires. We used server-side Echo2 Open Source (OS) GUI libraries.

3. A Multichannel Tool for eParticipation

Given the critical role of surveys for eGovernment and their near link with deliberative democracy, an effort should be done instead to design “intelligent” survey tools. Direct democracy tools, as an evolution of simpler web surveys, are relatively new to social research: surveys [52] emerged in an historical context where questionnaires were designed to fit in paper forms and computers were mainly used for elaboration purposes. Submission of questionnaires through the web [53, 54] or email [55] channel rendered surveys popular and easy to manage; coherent *asymmetric* combinations of traditional media with web (for acquisition) and email (for submission) can even raise the respondent percentage. New interaction models, as are appearing every year – like interactive forms on digital TV handsets, cellular phone interfaces, instant messengers (IM) plug-in, etc – offer several advantages over paper, and are also offering the possibility to better match the (weak) identity requirements for eParticipation. Technology interfaces: (a) are simpler to use and can be software-assisted, (b) facilitate automatic collection of data, (c) can reduce the costs of conventional surveys.

We designed our eParticipation tool extending the scope of the *eGovernment Inquiry Framework* (eGif) – see Fig. 3. eGif [41] was realized to manage, submit and report survey campaigns. We maintained its dual interface towards (a) the G2C local eGovernment Portal *myPortal* and (b) the G2G local eGovernment web-based collaboration tool *myIntranet*. Written in Java, it has been based upon a *web service* (WS) architecture: eGif exposes a WSDL-compliant interface, communicates through SOAP envelopes and can be listed through UDDI compliant registry.

Several key requirements, both technical and practical, have been taken into account during the design of the tool. As one of the main goals of the system is to serve as an abstract survey platform to many and diverse frontends, a standard service interface and a plugin-oriented architecture are both mandatory features. The service interface is used by a wide number of external applications, such as the analysis and reporting tools and the presentation layer of each of the several channel frontends and user interfaces. According to the best practices about services oriented architectures, the services can be exposed through an UDDI registry

and their semantic is explained through WSDL descriptors. In this way, third party applications or extensions are able to connect to the application backend and take advantage of the function they require in a fully decoupled and well documented fashion. The services exposed belong to the domain of user authentication, survey repository access (both for publication or analysis purposes), survey campaign creation and so on.

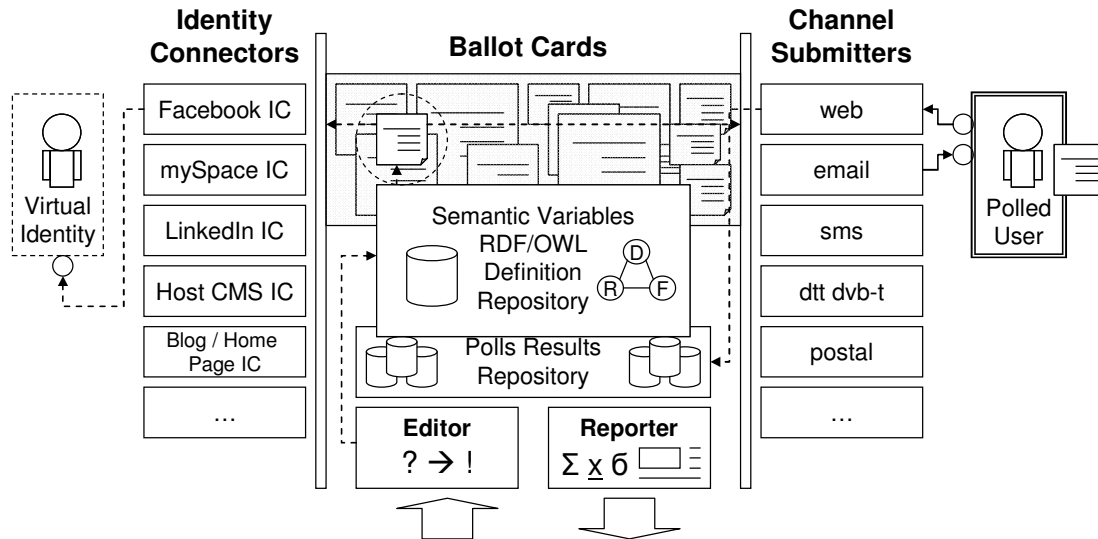


Figure 3: The extensible eParticipation Inquiry Framework showing a possible IC-channel-user path for a ballot card submission and retrieval of results.

A large part of the design effort was devoted to the definition of a deployment system capable to deal with a wide array of different media channels. The goal has been reached by providing a plugin-based multichannel engine; different plugin types are available for the different tasks needed to reach true independence from the publication media. Following eGif multichannel approach, we experimented with plugins for web, email, digital TV set-top boxes and mobile phones. Specialized plugins bring specific informations about users and are built to interoperate with media channels by exchanging demographic variables and identity attributes, in fact adding a third dimension to the direct democracy picture (see Fig. 4).

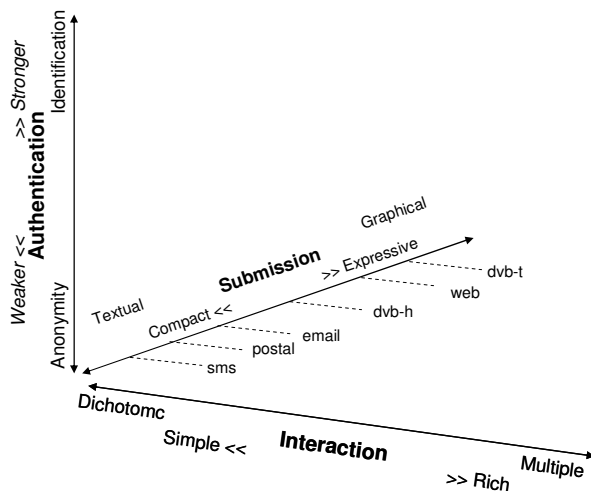


Figure 4: The three-dimensional Direct Democracy picture with the added submission channels dimension

4. Conclusions

A weak profiling strategy research program for eParticipation involving semantic web-based technologies has been conducted. The project has been developed evolving a questionnaire platform developed on-top of eGovernment framework named „myPortal“ based on Open Source technologies. Experimentations with the eParticipation tool will begin in *myPortal*-served local administrations in Veneto. They are part of a wider citizen-oriented strategy for Local Government Portals in Regione Veneto.

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