

# ŠOFIS - Introducing the Automated e-Society

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**Abstract.** *Through web-related technologies and the use of digital contracts an automated information system for a self-regulating administration of a society is achievable and operable in both technical, as well as legal terms. To achieve a truly democratic “e”-society, the council-less governmental model Župa is implemented into the constitution of a student organization.*

**Keywords.** e-government, e-society, liquid democracy, proxy voting

## 1 Introduction

The harsh rules and unscrupulous methods of interaction in student politics shape the minds and perceptions of future political leaders of nations and regions worldwide. With a very lax legislation, the Slovenian scene of student-politics is an especially interesting field for both observing machiavellian political practices [1], as well as experimenting with new methods of democratic interaction, as we describe in the present paper.

In order to avoid brutality and corruption in an emerging student organization, we developed and implemented the direct democracy model “Župa” which utilizes ICT for managing democratic relations between the individual and the hegemony (I2H).

The rules on the I2H-relation are defined by the “social contract” (Hobbes, Locke, Rousseau, . . .), a virtual or written (e.g. the constitution or laws) rule-set on which every society operates. The social contract defines the relation between those who are ruled (the individuals) and those who rule (the hegemony), as well as the rules for access to common capital (who under which conditions has access to natural resources?, how is property defined

and defended?, . . .) and social interaction between interest entities (e.g. periodic elections of representatives, the structure of political parties).

While the existence of individuals and common capital are crucial for the shaping of a society, interest entities and the hegemony (the dominant interest entity) are factors which evolve and revolve through time.

If a society has many weak interest entities and one strong, the later can obtain full hegemony and control the society in a monarchic fashion by setting agendas for foreign and domestic policies, defining and defending rules, as well as controlling common capital [2]. On the other hand, if the monarchic autocracy is unjust, weak interest entities will join and democratically choose an interest entity among them to empower it with hegemony over their society under agreed upon rules, the social contract [2].

An integral, ever-present part of hegemony is corruption. The definition of this term is a highly disputed topic, as research is still relatively young [3] and many different viewpoints exist, which are determined by both geographic and historic context. Thus, buying parliamentary seats was perfectly normal in England’s emerging parliamentary system in the 17<sup>th</sup> century [4, pg. 18], as was a generally accepted habit for medieval popes to expand their family’s influence through cardinal-nephews [5][2].

For the purpose of this article we shall define corruption as the phenomenon in which bureaucrats who have been trusted with managing public goods, property or services, misuse their power to either satisfy personal needs by enriching themselves or others, or either intentionally or due to absence of proper care cause damage to somebody or something their power affects.

(A special form of corruption involves lobbyists as mediators in the processes of legislation. As lobbyists act as advocates of powerful interest groups, access to people's representatives becomes accessible to those who have money and inaccessible to the democratic majority [6, pg. 438].)

While medieval corruption was relatively limited in its effect regarding individual members of the society due to the fact that state-administration was financed either privately (by the monarch or the oligarchs), or because of the insignificant tax-level (a few percent or even non-existent), corruption in the modern, highly-taxed, "welfare-state" plays a significant economic and legal role when projects are funded clientelistically through hazy open tenders or privatization of common capital is conducted with the help of unclear legal acts.

As corruption is not a part of the "social contract", no effort must be spared to fight it in its initial stage. Corruption is an enemy of clear and honest agreements (regulations like laws) between the hegemony and the society, that can only survive in blurred and shady conditions of lax rules, biased officials and shoddy judges. In order to create a clear I2H relation, the model Župa is proposed and has been implemented as a proof of concept to motivate discourse on this topic.

## 2 The Failure of Existing "e"-Solutions

Since the 1970ies computer aided solutions are being introduced to enhance and modernize the processes of voting [7] and - with the advent of the Web - to modernize governing. Though many ways have been tried, many - if not all of them - failed due to missing the fact that introducing technology alone is not enough to modernize an obsolete system.

Several real-world experiments with electronic voting have been conducted since the advent of the 2nd generation web. Among the first were the US Secure Electronic Registration and Voting Experiment in 2004 and British local elections in 2007, while Estonia managed to implement electronic voting in political elections continuously and on various levels from 2005 until present.

Though implementing ICTs in the electoral process is a big step towards general modernization

of democratic processes, it fails to provide added value to democracy itself, as e-elections simply mimic absentee voting and thus try to motivate people to participate in elections by simplifying their way to the ballot by means of technology. Implementing electronic elections into existing legal and bureaucratic structures is neither cheaper, nor faster than the traditional way [8], while additionally, several electronic voting experiments have failed to gain public trust in technology due to hazy implementations, naive errors and evident fraud [9][10][11][12][7].

The most popular and "soft" way of introducing the "e" into existing governmental structures is an approach which is commonly referred to as online deliberation or e-counselling. e-counselling takes place, when the hegemony either asks for feedback on their upcoming decisions or seeks the general public opinion on problems by providing public web forums or bulletin-boards.

An example for a governmental online-deliberation tool is the Slovenian portal "predlagam.vladi.si" (PVS), through which citizens may propose their ideas to the government. The later will consider them in case at least 5% of all registered members vote on a particular proposal and the majority of them votes in favor. This portal is basically a copy of the Estonian TOM<sup>1</sup> which, though having several thousand registered users had in 2004 an active population of only a handful "famous freaks, that are trying to start new laws" [13]. Among the five most popular causes on PVS was<sup>2</sup> an appeal to lower VAT on children's diapers. It received 15 comments and 39 votes.

As online deliberation mimics public hearings it can be perceived only as a tool for the government to demonstrate openness, but as it does neither grant that agencies will give greater weight to electronically transmitted citizen comments [14], nor any motivation exists for the government to transfer decision-making to "ordinary" people [15], it fails in most parts to provide added value on the I2H relation.

<sup>1</sup>"Tana Otsustan Mina", wider known under its english acronym TID - "Today I Decide".

<sup>2</sup>On date: March 2010

### 3 Župa - the model

Župa is a hierarchic social network that trusts its core rules of interaction to a public-source information-system. The model has been designed to clarify and strengthen most common I2H relations like empowering political representatives, administrating public capital and awarding leadership to interest entities. As Župa is empowering direct-democracy trough the light-speed of ICTs, it may positively affect the transparency of public spending, the tax level and the effectiveness of hegemony. It avoids the possibility for interest groups to forge open tenders and impose new tax, as the society is able to instantly react on the government's monkey business and politicly penalize its leaders (e.g. withdraw their mandate).

Župa focuses on the triangle “individual - society - hegemony”, in which the individual is the basic, selfish and egocentric entity with needs [16], which drive him to join the society in order to gain added value from the membership in that community. Societies are of different size, shape and purpose. They may consist of a handful of people (e.g. the family, a board of directors) or millions (a country or religion), and their membership might be imposed (citizen, family member) or based on free will (membership in a club or political party).

Membership in a society involves both rights and duties, among which are political rights (the right to influence the society and its leadership) and material duties (the duty to pay membership fees or taxes). Both rights and duties may span from nil to unlimited in accordance with the social contract.

#### 3.1 The Hierarchy of Trust

Individuals form their political decisions in the democratic discourse frequently on views of opinion-leaders as demonstrated by the “two-step flow” theory [17]. As opinion leaders often copy the views of other opinion-leaders, a recursive hierarchy is formed that shapes networks of social interaction.

Around individuals, who take the role of opinion-leadership, a group of less active or even passive members is formed, who are prepared to follow the opinion-leader. While being active in local politics and as member of multiple councils, I frequently observed this phenomenon both in the role of follower

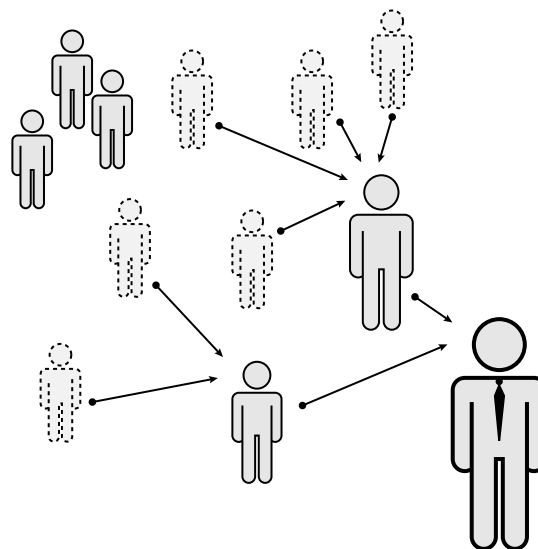


Figure 1: By the individual's temporary transfer of his democratic rights to opinion leaders, a hierarchic social network of trust is formed in which the influence of the individual's opinion is weighted by the number of his supporters. Župa captures this natural paradigm of human interaction and utilizes it in democratic processes.

as well as in the role of opinion-leader. My personal conclusion of this experience was that as soon as the society (council) expects from the individual (council-member) to state a decision on a matter the member has no particular opinion about, he or she will follow a leading member who either has the most profound view or enjoys the personal trust.

As active individuals transform into opinion-leaders, they start becoming interest entities that are able to influence politics within their society. The interest entity does occur in any type of society: it might be an influential farmer in the small village, a political party running for supremacy in the parliament, the cardinal wishing to become pope, or even the pubescent daughter lobbying the small brother to influence plans for the big holidays. Župa provides the technical and legal infrastructure to manage the social hierarchy of networks established between opinion-leaders and their followers in order to allow followers to remain passive

and still support the decision of the opinion-leader. This paradigm is analogous to political parties or elected representatives in the current social system, but allows instant “bottom-up” action (e.g. the withdrawal of support) which is not possible in a system of periodic elections that base on promises and propaganda rather than results and effectiveness of elected leaders.

With the capturing of the natural network of trust towards leaders (Figure 1), defining and empowering the hegemony is pretty easy, as the hegemony is the interest entity with the most populous hierarchy of trust.

### 3.2 The Authority and the Information System

In terms of the Župa model, every formal society is subject to an authority, which is the administrative central that approves and expels members and upholds stability. The authority must not hold any governmental or executive role, as its only purpose is to approve and register individuals, thus giving them rights to participate in the democratic process, as well as to take care of the stability of the underlying electronic information-system.

Authorities are layered according to the layers of the society and provide interfaces (electronically defined rules) for appending any new formal societies. To map this model to the current political system in the EU, we may picture a superior authority, the EU, which defines interfaces for countries to join its society. As soon as a country adopts its (electronic) rule-set to the demands of the EU-interface the society of the country may democratically take the action of joining the EU. On a lower level, the country itself provides electronic interfaces for its citizens to handle administrative tasks (registering property, childbirth and death, ...), while at the same time exposes an authority-unit which provides interfaces for societies that are subjects to its laws. The later may consist of privately-held societies (companies, clubs), or societies of the public sector (schools, hospitals, municipalities, ...). On an even lower level, a club or political party would expose an authority to administer its executive bodies and keep a registry of its members. Every single formal society must conform to the standards of the superior authority and may expose one or more authority-units.

Every authority must provide registers to keep track of their members and stakeholders, as well as rules and mechanisms that allow its members to exercise influence vertically. Thus for example, the state must keep a register of its citizens and its “political parties” (the active interest groups) and provide (based on the social contract) a system of how the parties may compete for supremacy.

### 3.3 The Motion and the Democratic Process

Any individual or interest entity may propose an action within a society it belongs to, by proposing a motion. The proposed action must be published on the Web (e.g. on a web-page, blog or Facebook) and has to provide basic functionality for computer-aided participation. The proposal must define the scope of the desired action (to which society it relates) and state its proposed content.

Before being published, a proposal must be registered at the authority of the society it tries to influence. This step is needed in order to assure integrity of the process and to avoid chaos. The authority validates the motion and accredits it by issuing a certificate and registering the publisher’s main server.

Motions in Župa are not “free-style”, but must be in accordance to actions provided by the society. If members of the society would like to change the available options, the social contract must be revised first. Thus, a clear and unbendable rule-of-law is assured. As the set of available options is known and agreed-upon, according electronic interfaces may be set-up that receive a standardized input and - if accepted - cause agreed-upon output.

If for example a motion with the goal to ban plastic-bags from Europe (and punishing everyone caught using them with a 50EUR fine) would succeed, the register holding goods whose possession is punishable would receive a new entry and every request to import plastic bags to Europe would be automatically rejected. As such registers already exist in the present-day system, speed of action and the direct-democratic aspect would present a pleasant added value and save bureaucratic costs.

When the motion is made, every other interest entity or individual, which is eligible to decide within the particular society, may express its support or oppose the motion. No fixed timeframe is

required to decide about the motion, as decisions are made on a p2p<sup>3</sup>-inspired basis and the motion is accepted as soon as support reaches a predefined percentage of eligible voters (the “democratic floor”, e.g. 51% or 75%, ...). The individual may express its opinion either anonymously by notifying the authority (a one-click process), or they might actively support or oppose the cause by publishing their own opinion individually. In the later case, a “pingback” should be established, so web crawlers can understand the relations.

The motion (as well as the expressed opinions) is stored in a semantic structure, which allows independent recount at any time. Counting and possible recounts shall be done using “web crawlers”, i.e. computer programs, which harvest the web for information of a certain kind. The authority conducts the official counting and the results are stored in a verifiable manner.

### 3.4 The Black “Ballot” Box

While Župa is modeled with primarily transparent relations in mind, anonymous voting and stating decisions may be provided by using an open-source black “ballot” box and extensive use of asynchronous cryptography within a PKI (public-key-infrastructure). Any existing and reliable method for developing an electronic ballot box may be applied, but must provide an output of received votes digitally signed by the ballot box.

Any cast vote must be published on the Web and digitally signed by its publisher - either the individual or the ballot box. As votes comply to agreed-upon standards and are equipped with semantic data about their content (to which motion it relates, does it approve/reject the motion?, when was the vote cast?, ...), anybody could harvest (using a web crawler) and verify the votes on the web to gather knowledge of whether or not the motion was accepted. As the authority accredits the voters and every member of the society trusts the authority, we can conclude that every validly signed vote is genuine. Thus, falsifying voting results is not doable, as counting the votes is a transparent and verifiable process.

Present-day electoral paradigms are mimicked through the black box (Figure 2), thus being

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<sup>3</sup>Peer-to-peer

fully compliant (and vice-versa) with the proposed model. Implementing Župa in an existing democratic social environment would allow a swift transition from old to new, as traditional (paper-ballot) voting could be easily mapped to anonymously cast votes on the electronic level.

## 4 ŠOFIŠ - Implementing the Upgrade to Democracy

The transition from electoral to participatory democracy depends on a change of our perspective of the society. Periodic elections, on which we invest our trust in one particular party or representative, are perceived as being normal, thus the revolution must be done step-by-step.

For the purpose of the emerging Student organization of the Faculty of information studies (ŠOFIŠ), we’ve developed a framework which is designed according to Župa from ground up. As this is work-in-progress no significant results considering the user-satisfaction are yet available. Additionally, due to the fact that the experiment is conducted in a small and local environment, no web crawlers are implemented and the process of voting is exclusively public (i.e. every individual digitally signs his or her decision).

In this society, all members have equal rights and together form the legislative body (skupščina). Their rights and duties are limited by the society’s constitution, which is written in both human- and machine-readable languages. As the code of the business-logic is an supplement to the constitution, it is a legally binding set of rules to which the society agreed upon.

Data (about members, social-networks, motions and votes) is stored in XML flat files, while interfaces to the business-logic are provided through web services and may be accessed via SOAP. Any input must be digitally signed and is thoroughly validated to conform with the rules of the “social contract”, i.e. the constitution.

### 4.1 The Authorities and the Information System

ŠOFIŠ is a society that is subject to the Republic of Slovenia, which does not provide sufficient electronic interfaces to simplify official communication.

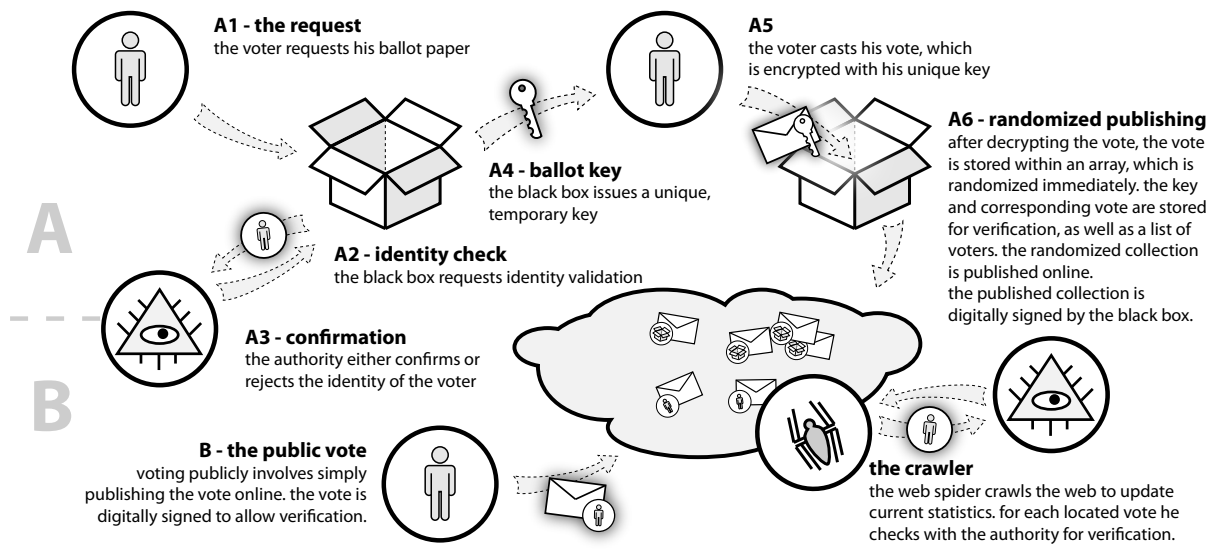


Figure 2: The decision-making process is fully compliant with “offline” electoral paradigms, while it extends them to allow direct expression of opinion.

As ŠOFIŠ is a fully automated society which does not require any human interaction to handle paperwork, possible communication with the Republic is automated using digitally signed e-mail with predefined content (e.g. registering a new representative or address, handling the tax return,...), which is sufficient from a legal point of view.

Each member of the society is equipped with a X.509 qualified certificate, issued by Slovenia’s government certificate authority, SIGEN-CA. As we fully trust this certificate authority, we need no additional internal stores for user-management and identification.

As membership within the student organization depends on whether or not the individual is a student of the faculty, we utilize the faculty itself as an authority, which certifies that membership is still valid. Furthermore, the information-system is hosted at the faculty and administrated by the faculty-staff, which is a measure to prevent unauthorized tempering with the system and its databases.

To provide a human-friendly user interface, a plugin for the popular browser Firefox (targeting its engine Gecko 1.9.2) was developed, which parses semantic data out of published web pages and enables

interaction like voting, supporting a candidate and transferring rights to a proxy.

Semantic data, which may be embedded in any popular blog software (for testing we used Wordpress) or web page, is written using the proprietary namespace “zhupa” in either RDFa or Microformats.

## 4.2 Individuals and Their Actions

Any individual has the right to propose any action that is predefined by the constitution. Though an user interface in form of an “Ajax” application which facilitates forming the request is provided, its use is not mandatory, as the server interacts exclusively through web services, which accept SOAP and plain HTTP-POST requests over a SSL/TLS Internet connection.

Any request conducted by the individual is digitally signed (PKCS#7) in order to assure non-repudiation and data integrity. The digital signature in Slovenia has the same legal status as the handwritten, so the user’s request, action or statement is legally proof even before court.

At the very instance an action is proposed, it is published on the electronic billboard. The “bill-

board” is a read-only XML file which holds entries of proposed actions and the corresponding votes. Changes to this file can only be made by the information system, which handles and archives all incoming requests.

The time frame for voting on the proposal is defined by the constitution and amounts generally to full 30 days. (It would have been pragmatically impossible to implement the “democratic-floor” concept of the Župa-paradigm, as membership in this kind of organization is imposed by law and is bound to being enrolled at a faculty. Members cannot voluntarily leave the organization, nor can they be expelled from it until they lose their matriculation.) After the given time span, no activities are possible and the proposal may be (if accepted by the body) activated by the proposer.

In order to prevent falsifications and fraud, the cast votes are published together with the corresponding proposal. Thus, a recount and a verification of the results can be conducted by anybody at any time.

### 4.3 Grouping, Interest Entities and the Hegemony

Grouping occurs, when an individual (the follower) transfers his right to vote to another individual. The transfer is a two-click process, during which he digitally signs and sends a legally binding statement to transfer his voting rights recursively to the receiver (the leader) until further action.

When the leader votes for a proposed action, he votes both in his name and in the name of every single follower (and his follower’s followers etc.). Nevertheless any follower is free to make an exception on the proxy’s vote by casting his own vote on the particular matter. Thus, the individual’s vote always overrides the will of his representative.

By default, no personal information about any individual is published, unless he or she publishes an action or allows others to transfer their rights to the individual. In the later case, every available information about the individual is published, including whether or not the individual is independent and if not, to whom the individual has transferred his rights. Thus, a clear hierarchy is presented to the community.

Any individual may at any time compete for leadership of the organization. He does so by pub-

lishing his agenda (the manifest). Any manifest must include the proposed budget, which is defined in a standardized structure and encompasses the intended spending of available finances. Individuals may express (or withdraw) their support for the interest entity at any time, thus influencing the distribution of political strength between competing interest entities.

Influence (the access to capital) of the hegemony is restricted by the approved budget agenda, as well as the time span of its mandate. The mandate is an absolutely fixed time span, after which hegemony shifts from the current interest entity in power towards the interest entity, which is supported by most individuals at the end of the mandate.

Any financial transaction must be in accordance with the accepted budget. The bank processes only request that come from within our system (communication is performed using the german EBICS<sup>4</sup> standard) and only the individual who represents the hegemony (the director) is approved to trigger requests. Thus we have established an environment where the director cannot spend more money than approved by the society and any spending is documented and transparent.

As the rules given to the director are clear and non-bendable, he is free to realize his agenda in any way he desired. In case the provided freedom should prove to be in discordance with the society’s will, a redefinition of the rules is possible.

## 5 Risks and hazards

A technical system can be designed to perfection if sufficient knowledge of the natural environment and sufficient knowledge of the interaction between the system’s ingredients is provided. Thus Župa can be engineered to prevent undesired action for its users and shielded from intrusion by hackers, guaranteeing the integrity of both rules and data.

While any potential technical hazard can be eventually excluded, it is impossible to exclude the main security threat which is posed by the human administration of the system. In case of the implementation at ŠOFIŠ, the administrator has full access to both the coded rules, as well as the

<sup>4</sup>The Electronic Banking Internet Communications Standard provides RESTful interfaces for electronic communication.

databases, and thus holds a god-like position. In that case, full trust in this person is crucial.

To minimize the risks of centralized administration, an ex-laboratory implementation must focus on public, machine-readable databases, public rules and web-based expression of opinion. Though this scenario eliminates privacy regarding community-membership and anonymous expression of vote, it transparently enables public verification of any accepted or rejected proposal, at any time.

## 6 Conclusion: Enabling the e-Society

By implementing Župa to take care of I2H issues within a society, we can avoid common problems relating corruption and create a pure rule of law. Thus we avoid the problematic human factor in bureaucratic relations and enable a climate of transparent governance based on clear and unbendable rules.

In order to maintain the natural I2H relationship, we keep, but modernize the existing hegemonic structure with a democratically legalized government backed by a strong, capable and trusted leader. While the society keeps full democratic control over its government, the leadership itself is granted utmost freedom within the ratified agenda.

Currently, the model Župa can be implemented only experimentally in an academic sphere, where a higher level of education and thus the understanding of underlying technologies is granted. It would though be interesting to implement it into a small local environment with sufficient political trust in those who propose the implementation in order to test it "in the wild", or even set-up a multileveled infrastructure with interfaces for full electronic interaction.

As obviously the Web as a medium offers far more possibilities than only publishing content, interdisciplinary approaches must be chosen to set high, hardly reachable goals in order to move our future in a more logic and clear direction.

Technology must serve the individual and may serve the society. If it prevailingly serves the hegemony, technology is misused.

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