

Democratic process and electronic platforms: concerns of an engineer

Danilo Pianini

`danilo.pianini@unibo.it`

ALMA MATER STUDIORUM—Università di Bologna

The future of democracy
November 3rd, 2016 - Bologna, Italy

- 1 Introduction
- 2 Minimal background on software engineering
- 3 E-democracy and software engineering
- 4 Conclusion

Outline

- 1 Introduction
- 2 Minimal background on software engineering
- 3 E-democracy and software engineering
- 4 Conclusion

Disclaimer

- My core work is on aggregate computations and simulation of complex socio-technical systems
- I'm not an expert in democracy processes and tools
- This talk will raise questions, I won't (can't) provide answers
 - But maybe others here do :)

Main observation

There are multiple models of democracy

- Different models provide different outcomes
- It's not a matter of picking the "right" one

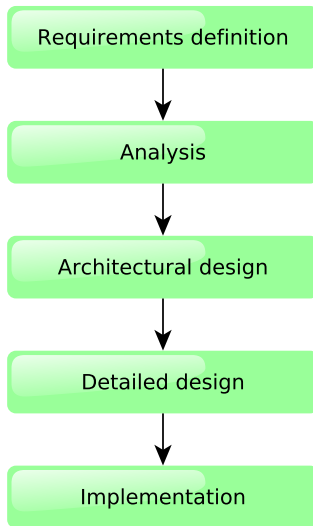
Main question

- What's the relationship between a model of democracy and its (possibly digital) enabling platform?

Outline

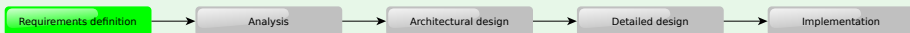
- 1 Introduction
- 2 Minimal background on software engineering**
- 3 E-democracy and software engineering
- 4 Conclusion

Classic (waterfall) software engineering process



Software engineering

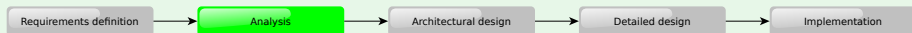
- Each phase outputs some artifacts
 - Possibly formalized (machine understandable)
- Changes in a phase require a revision on all the subsequent phases
 - Changes at the requirement level impact on analysis
 - If the analysis changes, it could impact the whole software design (and its implementation, as a consequence)
 - The stabler the initial phases, the better
- Notes:
 - This is a very simplified schema
 - Verification, deployment, maintenance are completely omitted for simplicity
 - Not the only existing development model...
 - There are normally loops (spiral, incremental)
 - Lots of approaches on how to actually design a solution for a problem
 - Still, analysing the problem is a necessary phase
 - ...but a good starting point



Output

A document stating what it is expected out of the software

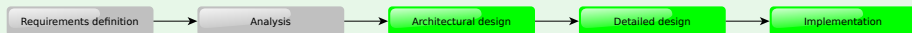
- Possibly formal
- There must be agreement on terminology
- Two categories of requirements
 - **Functional**: what the software should provide, its specific behaviours
 - **Non functional**: further requirements that specifies criteria of quality
 - Performance constrains
 - Security



Output

A formal model of the problem (domain model)

- Including at least the entities composing the problem and their relationships
- Very important phase: its outcome impacts dramatically on the subsequent phases
- In developing a software for democratic processes, this phase is where “what a democratic process is” is described



Output

The software

- After all the phases
 - Intermediate steps have their artifacts too, but that's not our main concern here
-
- We can assume that, if we performed a good analysis, and decided **what** we want out of our system, then we have a rather solid collection of techniques to deliver the final product [ABR09]

Outline

- 1 Introduction
- 2 Minimal background on software engineering
- 3 E-democracy and software engineering**
- 4 Conclusion

Motivation I

Why do we need to follow software engineering principles when designing E-democracy systems?

Focus on the model

- Existing democracy models often fail at capturing many relevant aspects [Gr3]
- Good engineering focuses attention on improving the analysis, rather than immediately moving forward

Motivation II

Tools must follow a democratic model, not dictate it

- The model of democracy should be studied **before** its implementation
- Doing the opposite exposes to the risk that the feature set of the available tools directs the democratic process
- Advanced technology whose scope is not completely grasped by citizens may become unused [CFP⁺10]

Separation between tool and process

- There is no evidence or guarantee that the E-democracy tool really implements the democracy model we want
- What's worse, we may be unaware of this fact

Requirements and E-democracy I

Not just a matter of “implementing the math”

- The democratic process is composed of multiple phases, that go beyond the math required for interpreting the outcome of an election
 - Who can make new proposals?
 - Who can amend them?
 - How to decide whether an amendment or a proposal is acceptable?
 - How does conflict resolution work?
- Picking a mathematical model and “coding” it does not provide a proper tool for E-democracy
- Requirements must be provided

Requirements and E-democracy II

Functional requirements over non functional

- Very much attention is paid to non functional requirements of E-democracy
 - For good reasons: security for instance is a primary concern
- So much attention that little is left for **functional** requirements, that are arguably more important
 - They are arguably more important
 - They should receive (at least) as much attention as security does
- How to raise awareness about the importance of functional requisites?

Requirements and E-democracy III

Completeness of requirements

- Requirements should be as deep and complete as possible
- Which methodologies should be applied to acquire requirements?
- Metrics of quality are required to understand how deep and complete requirements are
- Which metrics are adequate?
- Which methodologies should be applied to measure them correctly?

Requirements and E-democracy IV

Formal requirements and disambiguation

- Without any formal and reproducible requirement collection, there may be ambiguities
- Ambiguities should be dissipated with proper formalisms
- Which formalisms are adequate at capturing the complexity and contemporarily prevent ambiguities?

Analysis and E-democracy I

Completeness

- How to make sure that all the relevant aspects of the democratic process under modelling are taken in account?
- Which measures would quantify our success? [Fra07]
- Which methodologies would guarantee completeness?

Reproducibility

- The approach should be systematic and reproducible
- There is need for a methodological approach [YL10, Gr3]

Analysis and E-democracy II

Measurability

- How to measure participation, involvement, opinion formation?
- Which metrics can be compared across different models?

Comparability

- The lack of methodical, quantifiable methods drives to non-comparable experience
- Which methods and measures could provide comparability between different models of democracy?

Analysis and E-democracy III

Extensibility

- Several aspects of the democratic process are not completely clear yet
 - Which are the requirements for being candidate to some role?
 - What does it mean to abstain at a referendum?
 - Is quorum a good mechanism?
 - ...
- Analysis should take no stance, but provide a formal model flexible enough to embrace all possible choices

Analysis and E-democracy IV

Observability

- Who can supervise the democratic process?
- Which elements are observable, and by who?
- Who, if any, can see how somebody voted?
- Are there roles? Which ones?
- Is there a trade off between observability and security?

Analysis and E-democracy V

Artifacts

- Which artifacts should analysis output?
 - Formal
 - Quantifiable
 - Extensible
 - Complete
 - Observable
- e-government can be a source of inspiration [CPPR10, LL01, PGPA11]
 - But a a focused effort is required for e-democracy, as e-government is not preparatory per se [KS11]

Outline

- 1 Introduction
- 2 Minimal background on software engineering
- 3 E-democracy and software engineering
- 4 Conclusion**

Wrap up

- I'd like to see more emphasis on requirements and analysis when discussing E-democracy platforms
- We are lacking good metrics and methodologies
- The efforts on requirements are disproportionally oriented to the non functional subset
- The analysis phase is hard, and many parts are unclear
- We are at risk of letting E-democracy platforms shape the democratic process, rather than vice-versa

A research line? I

Considerations

- Many insights about how a democratic process should be shaped to be adequate for an Internet-enabled society won't be clear for a while
- Research is required
- Existing tools will contribute with experience and practice

A research line? II

Proposal

A meta-E-democracy tool, where the specific democratic process could be plugged in

- Basically, abstract away most of the analysis by performing a meta-analysis instead
- Consistent engineering challenge
- Multidisciplinary effort required to define which elements are part of the process
- Multidisciplinary effort required to define how such elements are shaped
- Ideally, the democratic process could be (at least partially) built from well formalized requirements

References I



Flavio Corradini, Damiano Falcioni, Andrea Polini, Alberto Polzonetti, and Barbara Re.
Designing Quality Business Processes for E-Government Digital Services, pages 424–435.
 Springer Berlin Heidelberg, Berlin, Heidelberg, 2010.



Flavio Corradini, Andrea Polini, Alberto Polzonetti, and Barbara Re.
 Business processes verification for e-government service delivery.
Information Systems Management, 27(4):293–308, 2010.



Amoretti Francesco.
Benchmarking Electronic Democracy.
 2007.



Åke Grönlund.
 e-democracy: in search of tools and methods for effective participation.
Journal of Multi-Criteria Decision Analysis, 12(2-3):93–100, 2003.



Ahmad A. Kardan and Ayoob Sadeghiani.
 Is e-government a way to e-democracy?: A longitudinal study of the iranian situation.
Government Information Quarterly, 28(4):466 – 473, 2011.



Karen Layne and Jungwoo Lee.
 Developing fully functional e-government: A four stage model.
Government Information Quarterly, 18(2):122 – 136, 2001.

References II



Panagiotis Panagiotopoulos, George Gionis, John Psarras, and Dimitris Askounis.
Supporting public decision making in policy deliberations: an ontological approach.
Operational Research, 11(3):281–298, 2011.



Lihua Yang and G. Zhiyong Lan.
Internet's impact on expert–citizen interactions in public policymaking—a meta analysis.
Government Information Quarterly, 27(4):431 – 441, 2010.
Special Issue: Open/Transparent Government.



Ömer Faruk Aydinli, Sjaak Brinkkemper, and Pascal Ravesteyn.
Business process improvement in organizational design of e-government services.
Electronic Journal of e-Government, 7:123–134, 2009.