Looking into the future: scenarios for e-government in 2020

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Abstract. Scenario building is a technique to stimulate different perspectives and images on the future. This technique allows to better predict the evolution of a certain domain beyond short-term forecasting based on the scenarios developed. The EC co-funded project eGovRTD2020 aims to develop scenarios of e-government in 2020 and beyond. The vision is to transform the EC government landscape into a coherent community, which anticipates customer needs and leverages the potential of the diversity and innovativeness of public agencies. In this paper, we give an overview of the scenario building methodology and develop a first set of scenarios using trend analysis. Four scenarios are derived showing different futures on e-government in 2020. The scenarios contain different aspects of integration, decentralization and centralization of power and governmental departments, democratizing systems and the role of individualisms and collectivism in society. The scenarios were used as a starting point for a series of regional scenario building workshops carried out across Europe. In a next stage, the scenarios will feed into a roadmapping exercise for e-government research.

1 Introduction

Today, governments everywhere in the world face the requirements the upcoming information society entails. Public agencies are more and more requested to interlink and collaborate in different fields. ICT is being used a) to provide citizens, companies and other customers of public administration access to information and services, and b) to support their own working processes within and among government agencies at distinct level of constitution and even beyond national borders. So, much effort in e-government research is focused on providing adequate methodologies and tools to modernize governments. Thereby, the need for a holistic - technology, processes, organization and humans integrating - view has been recognized 13.

Yet, how will governments evolve beyond the next five years – e.g. till 2020? What kind of activities will the public sector be responsible for in 2020? How will the work be carried out? What kind of technology will be in use in about 15 years? And which values will become important by that time? Within an EC co-funded project, eGovRTD2020 (http://www.egovrtd2020.org/), scenarios of the future governments in 2020 are currently being developed. These scenarios will provide images of the future governments, the society and the information technology in about 15 years from now. Based on these scenarios, research activities will be identified as necessary to reach wanted future scenarios and to avoid unwanted developments.

eGovRTD2020 is co-funded by the European Commission within the 6th FP of IST. Its overall aim is to identify and characterize the key research challenges, required constituency, and possible implementation models for holistic and dynamic governments in Europe and around the world in 2020 and beyond. The vision of eGovRTD2020 is to transform the EC government landscape into a coherent community, which anticipates customer needs and leverages the potential of the diversity and innovativeness of public agencies. These project objectives shall be reached by first developing future scenarios of e-government in 2020 thereby going beyond the traditional foresight studies that address the next couple of years. From there, a research roadmap shall be derived to streamline the activities towards the intended future. With the identification and recommendation of key research in the next future, eGovRTD2020 shall contribute to the development of an eGovernment research that helps the EC to become the world leading knowledge society.

This paper introduces the scenario building methodology and it presents the initial list of scenarios derived from the state of play using trend analysis. In the following section, we present the scenario building methodology. Thereafter, the main developments from the state of play are clustered into two key dimensions (uncertainty and impact) resulting in four different scenarios. We conclude with a discussion of the limitations of these findings and introduce the subsequent research steps within the project.

2 Scenario building methodology

2.1 Background

Recently, scenario building has been recognized as a technique to predict and shape the innovation process. It is a technique to stimulate different perspectives or images on the future of a certain area in order to allow better predictions for evolution. There are many different methods of scenario development (see e.g. 2, 7, 9, 11).

Scenario building methodologies received a significant boost when organizations, such as the Shell and the RAND Corporation, turned the simple 'what if' exercises performed by national armies into fully-fledged future research methods 11. Gibson 6 found that in the 1960s and 1970s a general sense of certainty existed about where we were going and how to get there. However, the lesson learned is that nobody can just drive to the future on cruise control. During the twentieth century, we witnessed a more down-to-earth approach to look into the future. Consequently, the scenario method became more mature (e.g. 9, 11).

In general, scenarios are an integral description of various information aspects of a context in non-formal, narrative way 3. Scenarios are being used in distinct contexts, and with different purposes, form, content and lifecycle. A discussion over various scenario usage contexts can be found in 12. In our context of predicting the future beyond short-term forecasts, scenarios depict different - sometimes contradictory or paradoxical - perspectives or images on the future [8]. They are used to sketch an uncharted landscape of the future. Handy [8] argues that only if we understand these different, contradictory and paradoxical perspectives or images on the future we will eventually be able to find roadmaps to deal with desired and unwanted outcomes. Based on the insights from visionary views, concerted and focused actions can be derived to positively or negatively impact future developments.

To develop valuable future scenarios, a scenario development process and a supportive framework for the scenario description are prerequisites. These are introduced in this paper.

2.2 eGovRTD2020 scenario development process

In the eGovRTD2020 project, the following procedure is used to derive scenarios and to integrate the results:

1. *Trend analysis*. Developments were identified in the state of play report 5. Based on that, an initial set of scenarios was derived. These scenarios provided the starting point for conducting a number of regional workshops;
2. *Regional scenario workshops*. Expertise, political visions and circumstances vary among countries. To capture typical elements and to ensure diversity, a number of regional workshops are being conducted (several in Europe, one in North-America) to produce a diverse set of scenarios;
3. *Validation workshop*. The set of scenarios is validated and grouped into clusters of developments, and visionary sketches. The result is a consolidated set of

views on the future e-governments in 2020. These consolidated scenarios provide the input to develop the research roadmap in a later stage.

The paper at hand presents the findings of the phase one – a first list of scenarios derived from the state of play by conducting a trend analysis – and the methodology for the workshops in phase two.

It is important to note that scenario building does not pretend to fully predict the future. The technique facilitates the development of images of the unpredictable future by identifying complementary and/or contrasting alternatives. In our context, a scenario describes a coherent set of visions and archetypal images on a possible future. Scenarios are neutral: they are neither good nor bad futures. Consensus about developments or visions is neither necessary nor wanted. Scenarios may differ one from the other: even extreme opposite scenarios can – and should – be developed. In case of extremely opposing ideas or contradicting visions, scenario axes should be determined to bring the extremes into relation.

2.3 eGovRTD2020 scenarios based on trend analysis – exercise one

The scenarios developed in phase one concern only the next couple of years, as these are derived based on extrapolation of current developments. This approach is called *trend analysis*. A trend has already started and can therefore be identified 11. The scenarios derived thereby investigate the type(s) of future(s) to which these trends may lead. We stress that these scenarios do not reach out till 2020. Even scenarios that may reach out till 2020 are not completely independent: They are biased and might not even capture the future, since every expert participating in such scenario building exercises reflects on his or her past and current knowledge of actual developments and from there extrapolates his or her view on potential futures. When building scenarios, one must be aware of the fact that this implicit bias can never be turned off fully. However, it is important that during the scenario building exercises the environment is relieved and neutralized from past and current states that could then be just projected to the future.

The trend analysis was conducted by performing the following five steps:

1. *Identify the main developments*. This step is characterized by divergent thinking, where developments are not necessarily in concert with the truthfulness, coherence or verifiability. The developments are derived from the state of play conducted in the first phase of the project 1, 5;
2. *Classify the developments*. This step concerns the clustering of the developments using an uncertainty-impact matrix. Those developments likely to result in different scenarios are being identified. In this trend analysis, we aimed at having two variables in order to get a maximum of four scenarios: uncertainty and impact. This step is characterized by convergence and attempts to reveal the variables resulting in contradictory scenarios. We are aware of the fact that the scenarios from the regional workshops will lead to a multidimensional set we will have to cope with (these will be available in deliverable D 2.1 5);
3. *Organize developments*. The developments classified as having a high uncertainty and high impact are clustered into a limited number of key topics.

These key topics are the variables of the scenarios. Similar kinds of developments are clustered to one same topic;

4. *Derive concerted scenarios*. The variables, or key topics, result in a number of scenarios. For the sake of clarity we developed 2*2 scenarios according to the uncertainty-impact matrix. Each scenario is given a typical, easy-to-recognize, and understandable name and the main characteristics for each scenario are added.
5. *Develop scenario stories*. The last step aims at enabling communication of the scenarios to non-involved and non-experts. An easy to read and understandable sketch or story is made of each scenario.

These steps were taken to derive the scenarios described in the next chapter.

2.4 The eGovRTD2020 scenario description framework

Scenarios shall help to imagine the future of e-government in 2020. Since the future is all encompassing, a structured framework was needed. Dym et al. 4 state that the researchers' creativity extends in ways of systematically asking, presenting and viewing elements and developing domain taxonomies as the process unfolds. The lower-level elements relate to the phenomenon under study and attribute to the deeper understanding of the phenomenon itself. For each element, multiple known and unknown alternative answers exist, regardless of being true or false. The elements intend both to disclose the alternative known answers and to generate the unknown possible ones. As such, the elements are characteristics of divergent thinking, where the elements attempt to diverge from single ideas towards a coherent vision that can be created from them.

In 13 and 14, Wimmer developed a holistic reference model for e-government capturing the main elements of e-government. Based on this model, a supportive instrument capturing the essential elements to guide the scenario description of the future was developed 1. It is aimed at guiding the scenario building process and it helps to discuss and develop the scenario(s) along the elements eGovRTD2020 wants to investigate the future of governments and society in their usage of ICT. This scenario description framework identifies four aspects of relevance: customers and contextual environment, governments, technologies, and economics. The eGovRTD2020 scenarios shall describe images of these aspects and their interactions. Consequently, the supportive scenario framework contains the following elements:

- Customers and contextual environment
  - Society - e.g.: How will the society look like? Which role will individuals and communities play? Which attitude will individuals, groups and the society have towards governments?
  - Political system and climate - e.g.: Which societal and democratic values will be important? Which governance value will be important? Which role will transparency, privacy, security, enforcement of laws, compliance to laws and constitution, political system, etc play?
  - Economical climate - e.g.: What employment will exist? Which types of labor will exist? Which age composition and labor force will exist? Which position / role will the country / the EC have in the world?

- Governments and their services
  - Government, administration, polices and law - e.g.: Which roles will governments perform? Which role will European, national and local level of governments play? What relationships will exist with citizens and business?
  - Kinds of services Governments will be providing and customers will be consuming – e.g.: What kind of services will governments provide in 2020?
  - Mode of participation of stakeholders in the democratic processes – e.g.: Which stakeholders will play a role? Who will participate and how? What impact and power of decision-making will certain types of stakeholders have?
  - Government Environment - e.g.: What roles and activities of interest groups will impact government activities? What role will NGOs and private parties play in government service provision and in participation in policy making?
- Technology developments
  - ICT available – e.g.: Which kind of technology will be used in 2020?
  - Interaction modes via ICT – e.g.: How will stakeholders be interacting with this technology in order to provide/consume public services and to participate in political processes?
  - Purpose of ICT usage in interacting with governments – e.g.: For which services and/or intentions of participation will the stakeholders use these technologies for interaction with governments in 2020?

The scenario template ensures that both, e-government aspects (endogenous) and the environment (exogenous) are taken into account. It is used to build the scenarios presented in the next chapter.

3 Building scenarios using trend analysis

3.1 Identifying the main developments

To investigate the state of play in eGovernment research, desk research was chosen. The various partners of eGovRTD2020 analyzed research initiatives, research activities, as well as research programs and strategies in their countries and neighborhoods 5. The analysis of relevant material was aimed at identifying current research programs and strategies for eGovernment in Europe and worldwide. Also, projects identifying eGovernment research trends were studied. The results are documented in the state of play report 5. The developments identified there are summarized in table 1.

3.2 Classifying the developments

For the purpose of deriving scenarios, those developments having a high uncertainty and high impact on the future have to be identified.

Table 1. Classification of developments

High impact ▶	• Ageing of workforce and society • Importing skilled people • Centralizing agencies and sharing services • Web 2.0; Web logs, Wikipedia and so on • Natural language processing and translation • Sensor technology • Use of only open source software • Use of simulation, animation and gaming in policy making • Integration of ICT-health sector • Distance therapy and medicare, and selling of drugs • Surveillance technologies to ensure security • Constant and sustainable monitoring and surveillance for law enforcement and crime mapping • Communication between social workers • Use of geographical information • Information accessibility for those who need massive amounts of archival and real-time information • Development of separate networks to deal with low Internet reliability, security and governance problems • Use of legal systems for automatic jurisdiction	• Individualizing of the society • One citizen super file, privacy and information availability for prevention of crime and terrorism • Convergence of nanotechnology, cognitive science and ICT • Privatization of social systems and health care • Integral approach towards IT governmental projects • Globally regions grow more and more together which will lead to new governmental structures and cooperation across borders and wider landscapes • Slow adoption of legislation to facilitate newest e-government opportunities • Software developments coordinated at central level • Government functions and roles performed by private sector (security, health, insurance) • Customization and standardization of service provisioning • Cooperation among member states • Harmonization of policies and rules and standardization of security and tax systems • Industry activity will decrease in certain geographical regions • Use of knowledge and divide in high and low skilled and rich and poor • Social exclusion of skilled, non-skilled; rich and poor; and disabled people
Low	• Understanding user needs and developing a user centric eGovernment approach • Semantic interoperability of systems • One-stop shop • Broadband adoption • Integration data, voice and video • An inclusive information society by e-learning, lifelong learning, integration of work and learning, and development of public services considering limited skills of some user groups • Ambient intelligence • Infrastructure containing all kinds of services including security, privacy, authorization and payment • Availability of standards, data and process models • Proactive service delivery	• Use of private parties and public-private partnerships for service provisioning • Use of private parties as channel for service provision • Governmental agencies and private companies work together for ICT dissemination • Centralized citizens, health and criminal records • All government communication will be dealt with using the Internet • IT expenditure is increasing • Policy Participation tiredness • Government as director of IT efforts
	Low	High ▶ uncertainty

The rationale is that developments having a high uncertainty and high impact result in contradictory and alternative futures and thus feed into different scenarios. Developments having a high impact and low uncertainty result in one type of future. Developments having a low impact (independently of the level of uncertainty) do not influence the future. We mapped the developments derived in the state of play in a two-by-two matrix as depicted in table 1. The developments used to identify various scenarios are indicated with the grey cell.

3.3 Organizing developments

The developments depicted in the grey-colored cell of table 1 (high uncertainty and high impact) were clustered into categories to identify the main topics. The developments related to each other were merged into key topics having a high impact. The purpose of this step is to end up with only a limited number of principal variables, from which we would be able to derive general characterizations of the scenarios. The first key aspect we identified is whether the European countries are able to create a harmonized and unified Europe. In particular, the uncertainty comes from the difficulties in reforming public administration, coordination of ICT efforts and standardization and harmonization of policies and rules. The second key uncertainty refers to the role of humans in the society. This scenario is derived from societal developments such as the divide between low and high skilled, rich and poor, individualization and so on.

3.4 Deriving eGovRTD2020 scenarios based on trend analysis

The two key uncertainties just described are combined in order to create the four scenarios as depicted in figure 1. The vertical axis focuses on public responsibility on top, and on private responsibility on the bottom. The horizontal axis shows the ability to integrate on the left versus a regional focus on the right. In a fragmented Europe, a big gap exists between policy makers (politicians) and policy execution (public sector employees). In a liberal Europe, most responsibility is left to the persons. In a clustered Europe, several regions cooperate, and governments have a large public responsibility. In social Europe, one unified Europe will have a strong and well-developed social system. To complete the scenarios, the main characteristics for each scenario were identified and placed in figure 1.

The four scenarios represent internally consistent and plausible pictures of possible futures, and they provide contrasting alternatives of the future. The scenarios are different in each of the aspects of the scenario framework described in section 2.4, as societal values and the integration and arrangement of the political and administrative systems vary. As a result, it is likely that in each scenario the need for e-government research varies. However, it is also likely that certain e-government research is needed in all scenarios likewise. The roadmapping activity of the eGovRTD2020 project will elaborate the certain needs of research in eGovernment for the various scenarios.

Fig. 1. Four scenarios based on political and societal dimensions

3.5 Developing scenario stories

The development of scenario stories completes the trend analysis and is being used as input for the scenario building workshops. Without stories, scenarios are difficult to communicate and understand by people who were not involved in the process and/or who are not expert. Scenario stories are difficult to develop as a scenario story should contain enough information to describe the essential elements of the possible future and should be short enough to enable communication and understanding without constraining people's mind. In a scenario, it is not always possible to unequivocally select developments that are consistent with the characterization in the sketches. In our research, the following four stories were derived:

1. Social Europe: In a social Europe, harmonization has succeeded, national sovereignty is limited and we have one integrated public administration taking responsibility for its citizens. A well-developed social welfare, security and healthcare are ensured by governments, the *good big brother*. Transaction costs are close to zero. One large super file exists for each citizen, which is used for prevention from crime and terrorism. Solidarity with the most vulnerable groups is maintained. System development and public service provisioning is centralized in large data centers and interoperability and standardization has succeeded. Local

governments focus primarily on citizens' participation and customization to the local situation.

2. Liberal Europe: The public sector retreats and leaves it up to the market to provide security services, unemployment benefits, healthcare and so on. European governments concentrate on their core tasks, provide only pure public services and set policies for privacy, insurance and so on. Large technology clusters exist and European top universities are created researching particular topics such as nanotechnology. Citizens are not inclined to participate in policy-making and take care of their own welfare. Democracy is synonymous with voting. The negative side of the coin is that governments fail in adequately dealing with market failures, and especially disabled can hardly participate in society, i.e. a big digital divide exists.

3. Clustered Europe: This scenario combines public responsibility with little cooperation among regions. Autonomous countries cooperate in clusters having similar objectives. The main objective of cooperation is to gain efficiency benefits, and cooperation is primarily for accomplishing their own selfish objectives, innovation is fragmented and investments in ICT have a local nature. The labyrinth of policies, organizations and information systems are able to communicate with each other to ensure public safety. There is a shortage of skilled people and a large divide between the skilled and non-skilled and also between rich and poor. Each geographical cluster focuses on different technology developments.

4. Fragmented Europe: Local interests dominate, hardly any harmonization and integration exist, and there is a pluriformity of social, security and healthcare systems. Most of the functions and roles are performed by private parties and public-private partnerships. Countries compete with each other, and have a limited degree of cooperation. Tax incomes decline under the competition among countries. Most countries are unsuccessful in modernizing their public administration. There is only a light degree of governmental intervention and permissive use of citizens' personal data exists. Crime prevention is only accessible for the rich. Ghettos strictly separate the haves and have not. Europe is a minor player in the world and economic growth is limited.

All four scenarios describe a coherent and consistent set of visions on a possible future of government and society in 2020. The future will be likely a combination of elements captured by each scenario. Research actions should be derived from these scenarios to make sure that the wanted aspects will come true and negative aspects will be avoided. For example, the big brother dimension of the social Europe scenario can be avoided by ensuring research and implementation of mechanisms to meet the requirements of ensuring privacy and of preventing the misuse of information for other purposes. Also mechanisms need to be developed to avoid copying and misuse of an entire system and its data by dictators like Saddam Hussein.

4 Conclusions

E-government is complex and multifaceted. Its future is difficult or even impossible to predict. Therefore, scenarios are used in the EU-co-funded specific support action eGovRTD2020 to capture contrasting perspectives on the future and to allow better development of a research roadmap. In this paper, we introduced the eGovRTD2020 methodology for deriving scenarios aimed at sketching possible futures of e-government in 2020.

Based on the methodology, first scenarios have been depicted using trend analysis. From the trends, two main categories of key uncertainties were identified, (1) the level of political and administrative integration and (2) the allocation of public or private responsibility in society. Based on these key uncertainties, four scenarios of potential futures were developed to contrast the variety in their key aspects.

Since the future cannot simply be viewed as a continuation of the past, regional workshops with experts from governments, ICT industry and research are being conducted to gather further scenarios. Though the scenarios presented in this paper are based on the extrapolation of developments, they are suitable for structuring and identifying relevant aspects and they provide the basis for the scenario workshops.

The next steps after the scenario building workshops are to conduct a gap analysis, i.e. to identify weaknesses, problems and needs of future research in order to reach wanted futures and to avoid unwanted ones. Based on these results, a sequence of roadmapping workshops will be carried out to develop a research plan for e-government paving the way for the future. The research roadmap shall guide strategic bodies to launch proper e-government research programs. In this way, key research challenges and the required constituency shall be identified and characterized, as well as possible implementation models for holistic and dynamic governments in 2020 and beyond shall be developed.

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References

1. M. Bicking, M. Janssen, and M.A. Wimmer, Scenarios for eGovernment 2020: Towards a Roadmap for future eGovernment research in Europe. *eChallenges conference*, Barcelona, Spain, 2006, 25-27 October.

2. H. Bouwman, and P.A. van der Duin, Technological forecasting and scenarios matter: research into the use of information and communication technology in the home environment in 2010, Foresight **5**(4), 2003, pp. 8-20.

3. J.M. Carroll, *Scenario-Based Design: Envisioning Work and Technology in System Development*, (Wiley, 1995).

4. C.L. Dym, A.M. Agogino, O. Eris, D.D. Frey, L.J. Leifer, Engineering Design Thinking, Teaching and Learning, *Journal of Engineering Education* **94**(1), 2005, pp. 103-120.

5. eGovRTD2020 consortium. *State of Play in eGovernment Research and strategic policies in Europe and worldwide*. Deliverable D1.1 (2006); http://www.egovrtd2020.org/.

6. R. Gibson, *Rethinking the futures* (Nicholas Brealey Publishing, (London, UK, 1996).

7. J. Glenn, *Futures research methodology* (American Council for the United Nations University, Washington, 1999).

8. C. Handy, *The Empty Raincoat: Making sense of the future* (Harvard Business School Press, Random House, UK, 1995).

9. G. Johnson, K. Scholes and R. Whittingon, *Exploring Corporate Strategy* (Prentice Hall, 2002).

10. G. May, *The future is ours* (Adamantine Press, London, 1996).

11. P. van der Duin, *Futures research and innovation* (Doctoral dissertation, Delft University of Technology, Delft, The Netherlands, 2006).

12. K. Weidenhaupt, K. Pohl, M. Jarke and P. Haumer, Scenarios in System Development: Current Practice. IEEE Software **15**(2), 1998, pp. 34-45.

13. M. A., Wimmer, Integrated service modeling for online one-stop Government. EM – Electronic Markets, special issue on e-Government **12**(3), 2002, pp.1-8.

14. M. Wimmer, Approaching secure and trustful e-government applications: technology won't make it alone! In P. Cunningham, M. Cunningham, P. Fatelnig

(Eds.), Building the Knowledge Economy: Issues, Applications, Case Studies. Part 1, IOS Press, Amsterdam et al, 2003, pp. 626 – 632.