Assessing and Evaluating Value and Cost Effectiveness of E-Government Initiatives: Focusing the Step of the Financial Evaluation

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ABSTRACT

We propose a framework to assess the value and cost effectiveness of E-Government; the instrument supports lead and management of E-Government initiatives and programs. Furthermore it takes different stakeholder perspectives into account. The process for analysis consists of four steps: with an initial measurement framework we raise context and goals of the specific E-Government decision making. In a second step a financial evaluation takes place and in a third one a qualitative analysis completes the data collection process. In the last step of the methodology we consolidate the findings of the previous measurements and develop a line of argument respectively—when comparing different projects—we make a ranking. In this paper we focus on the elements of the financial evaluation for measuring the economic value for the society: we propose a traditional Net Present Value (NPV) methodology enhanced by real option analysis, a module on risk management and sensitivity analysis. In the closing remarks we assess chances and challenges of the financial evaluation in the E-Government field and draw a connection to the other elements of our framework.

Categories and Subject Descriptors

B.8.0 [PERFORMANCE AND RELIABILITY] General. C.4 [PERFORMANCE OF SYSTEMS] – Measurement techniques. D.2.9 [SOFTWARE ENGINEERING]: Management – Cost estimation. J.1 [ADMINISTRATIVE DATA PROCESSING] Government.

General Terms

Management, Measurement, Economics, Theory, Verification,

Keywords

Value of E-Government, Financial Evaluation, Net Present Value, Real Options.

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1. INTRODUCTION

Valuing investments in Information and Communication Technologies (ICT) has been a recurrent topic in research for many years [18]. Until recently ICT investments were understood as a technological challenge rather than an opportunity to create value [16]. And even though in recent years ICT has become a "commodity" instead of a competitive advantage [5], ICT still is one of the biggest challenges of Capital Budgeting [11]. In addition to these problems, the evaluation of E-Government projects needs to account for political and social aspects, which makes the quantification of expected value creation much more difficult [19]. Governments have been aware of this problem and have launched initiatives [1, 6, 9, 19, 20] to understand this value creation. Taking into account the particularities of the Swiss context, we have developed a new methodology to evaluate E-Government projects.

All investments, whether undertaken by governments or businesses, share the objective of creating value. In times of fiscal constraint, publicly funded E-Government initiatives have the added burden of demonstrating political legitimacy. Limited resources force governments to prioritize their E-Government activities based upon the value they create which is best shown in light of various contexts and stakeholders.

2. VALUE AND COST EFFECTIVENESS.

The analytical framework we developed relies upon four field indicators: resources, output, impact and integration. With these fields we can determine the following competence potentials: economy, efficiency, effectiveness and transformation [15]. The resulting achievements take into particular account the E-Government strategy in force, the IT-maturity as well as the perspectives of the different stakeholders. Ideally, applying the instrument facilitates project management, including stakeholder management, and the methodology supports benefit management over the entire course of an initiative; changing the frames of assessments accounts for "moving targets" and shifting administrative, political and legal contexts. A further feature of this framework is that it is conceived to be compatible with methods and tools currently used within the Swiss administration

(i.e. HERMES[1]). In other words, we propose a hands-on methodology.

Some models and instruments such as BEGIX[2], eGOV-Rechner, WiBe4.0[3] or SCM[4] have been established in the European context. Our framework is based on a broad assessment of the literature and methodological approaches in the field of E-Government evaluation as well as interviews with experts and local practitioners who assess their requirements of the instrument. For a more extensive review of the literature see [19]. Within the broad range of existing methodologies, the measurement framework by the European Commission's eGovernment Economics Project (eGEP) [7, 9] and the French MAREVA [1] methodology provided an especially useful starting point for assessing cost effectiveness. In order to account for the non-financial or qualitative value of E-Government initiatives as well, we extended existing approaches and defined a process for analysis along four modules (cf. Figure 1): 1) Measurement Framework (evaluation of strategy alignment and definition of indicators of value based on reflection and discussion) 2) Financial Evaluation (the measure of economic value for society based upon an NPV calculation, risk analysis, mapping options and a sensitivity analysis), 3) Qualitative Evaluation (the measure of the intangible and transformational benefits based on a non-financial score, risk analysis and sensitivity analysis), 4) Arguments / Ranking (prioritizing and establishing an argument based on sources of value and risks).

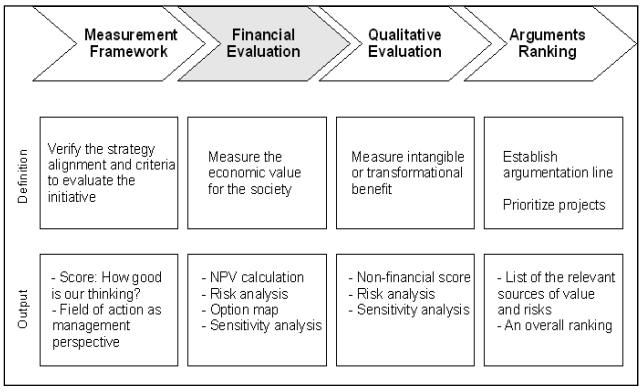

Figure 1. The four modules of the integrated framework

This article features the Financial Evaluation.

3. THE FINANCIAL EVALUATION

The financial evaluation is central to an E-Government project appraisal. It quantifies the resources used and the potential economic benefits or losses from the endeavor. When financial and quality evaluations are combined they give a cost framework to the potential "non-quantifiable" benefits of an E-Government project. In other words, aside from the quantitative appraisal, the financial evaluation helps to price the qualitative benefits of an E-Government project.

From a purely financial perspective the Net Present Value (NPV) is the most effective way to evaluate investments and establish a ranking of projects [4, 16].

$$NPV = \sum_{t=0}^{i} E[C(t)]d(t)\,;\; d(t) = \frac{1}{(1+r)^t}$$

where:
t is the time (in years)
i is the last year in which the project will have a cash flow
E[C(t)] are the Expected Cash Flows in time *t*
and *d(t)* is the discounting factor from *t* to *1*
r is the cost of capital in annual terms.

The economic decision rule states that all projects with a NPV positive are recommended and that projects with higher NPV are preferable to those with lower NPV.

NPV is the methodological most valuable instrument in financial analysis. It is used widely throughout all economics, even for complicated financial instruments. However, in the particular context of an E-Government project the NPV alone is insufficient. First, it does not show who benefits from the project; secondly the NPV deals with Expected Cash Flows which are uncertain by definition[5]; and thirdly, because the NPV captures neither the strategic value of an investment nor the value of flexibility.

The notion of benefits in the economic theory is clear. Each factor involved in the production is paid as per a pre-existing agreement. Labor and suppliers (including debt service) are remunerated through negotiated contracts. Capital is paid with dividends and/ or an increase in the value of the firm. A project with a positive NPV increases the value of the firm; and therefore benefits the owners of the project (Capital providers).

When the public sector engages in a project, labor and suppliers are remunerated through negotiated contracts too; however a clear scope of the benefits must be predetermined because the ownership of the capital is spread across the population. For instance, the creation of a new highway may benefit one company but harm its competitor which is also a taxpayer. In this case, the political decision must be supported by a precise understanding of who benefits from a project.

With regard to the uncertainty of Expected Cash Flows, the NPV is based on predictions for the future which are always biased. This is a common problem with investments in both the private and public sectors. There are a few methodologies which fix this problem in finance; we have chosen the sensitivity analysis for it is relatively simple to implement and widely known.

Last but not least, the NPV cannot capture the strategic value or the value of the flexibility, as it is a static number built on the "best" presumption about the future. The NPV assumes that management will not take any decision about the project during its lifetime and that the only relevant value of a project is future cash flows.

Calculating the value of an Information and Communication Technology (ICT) investment is quite difficult, as many of the

[1] HERMES: project management method

[2] balanced e-government index

[3] Federal Government of Germany

[4] Standard Cost Model

[5] If X is a discrete random variable with probability mass function p(x), then the expected value is $E(X) = \sum_i x_i p(x_i)$

benefits are hidden in the future of an organization. Many investments appear to do something else which may or may not be directly related to the investment itself. This intrinsic value is out of the scope of the traditional NPV.

In order to deal with those issues we enhanced the NPV methodology. Figure 2 explains the new methodology we propose:

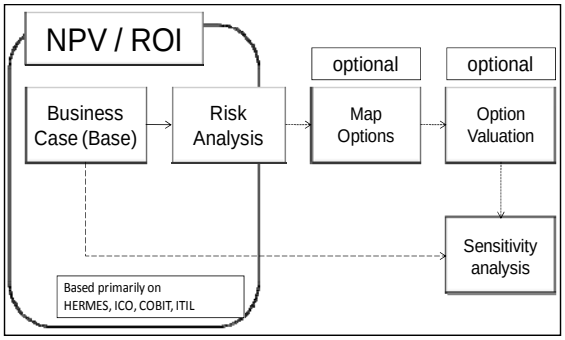

Figure 2. Financial Analysis Process

The financial evaluation consists of five steps:

1. Base Business Case
2. Risk Analysis
3. Options Map (Identify the embedded options)
4. Option Valuation (Valuation of the embedded options)
5. Sensitivity Analysis.

The methodology was conceived to be compatible with current systems used by various authorities in Switzerland to control and monitor projects: HERMES, ICO[6], COBIT and ITIL. In any case, the evaluation of a project should not be seen as an additional burden for project proponents but instead be used as a road map to for the objectives and critical points in the project.

A new key element in our methodology is the inclusion of real option analysis. Firms and other organizations have difficulty evaluating the benefits from investing in ICT [5]. One of the key aspects of this problem is that traditional financial appraisals do not include the value of flexibility and of strategic benefit: Technology as an organizational enabler and/or platform for future projects.

3.1 Base Business Case

The Base Business Case is the traditional NPV calculation; however "income"[7] must be categorized by beneficiary in order to understand who derives overall benefits from the project. There are three commonly differentiated types of beneficiaries from an E-Government project: (1) Citizens, (2) Business and (3) Government.

While an "eTaxes" system may reduce cost to both citizens and businesses, the weight of the outcome for strategy purposes may be different. For instance, if the overall E-Government strategy consists of fostering business rather than providing services for citizens, the positive impact of the eTaxes on businesses has a higher strategic value. By keeping track of the benefits, strategic decisions can be made better. E-Government strategy in Switzerland can be consulted on line. [8]

What are the economic benefits of an E-Government project? As with any business, identifying the value of an ICT investment is rather difficult [5]. In general, the return of such an investment is in the form of a simplified process, a less time-consuming formality or a trip which is avoided. Therefore the return on investment must be calculated over the base of "business as usual" the current path versus the outcome of a project which is implemented.

In this kind of investment there are essentially three ways to save financial resources; money, time and emission reductions[8].

Here, it is important to clearly specify and compare the particular source of "savings" with the various scenarios. For example, if the implementation of an E-Government project eliminates a car trip, to a citizen, society will benefit from the following savings: 1) time saved in the trip, 2) use of the car (transport), 3) fuel expenses.

It is clear that in a country like Switzerland with an average wage of 31.8 USD/hr.[9] the cost of time is very high. Time is one of the key elements of this calculation. However, the calculation would be incomplete if the implementation cost was not recorded. All the cost associated with the completion of the project should be subtracted as well. Note that such implementation costs can be difficult to measure and are often perceived as organizational resistance. Other important and unexpected sources of cost (including reduced benefit) are delays of implementation and execution.

3.2 Risk Analysis

Risk analysis identifies and recognizes factors that could prevent a project from delivering the expected benefits. All sources of risk in a project can be grouped in (1) Rising Cost of implementation and (2) Failure to deliver the promised good or service.

Risk analysis assigns a probability of a disruptive event and takes the appropriate measures to reduce that probability.

A typical risk methodology includes the following:

1. identify, characterize, and assess threats
2. assess the vulnerability of critical assets to specific threats
3. determine the risk, calculate its weighted costs
4. identify ways to reduce those risks
5. prioritize risk reduction measures based on weighted costs and the strategy

[6] IT Controlling (ICO) method

[7] Net Savings should be understood as Income as well

[8] For countries that have ratified Kyoto's protocol with a reduction target (Annex 1 countries) net GHG emission reductions are revenue as emissions are a net cost for the society.

[9] Median wage in Switzerland Oct. 2008 CHF 5,777. (Source: Swiss Statistics http://www.bfs.admin.ch/bfs/portal/en/index/themen/03/04/blank/data/01/06_01.html). Average Working hours per employee per year 2007 in Switzerland = 1927 hrs. (Source: Swiss Statistics http://www.bfs.admin.ch/bfs/portal/en/index/themen/03/02/blank/data/00.html#parsys_0016). Average Exchange rate (Nov.06-Nov.09) = 1.1301 USD/CHF (Source: Swiss National Bank http://www.snb.ch/en/iabout/stat/statpub/akziwe/stats/akziwe/akziwe_S1_Wechsel)

6. return to the NPV calculation to make changes according to the chosen measures[10]

In order to do this we adopted the Swiss Confederation methodology to manage ICT risk, i.e. the ICO methodology which monitors and documents economic efficiency, goals, and resources of solutions in ICT over their entire lifespan[11]. Within the context of E-Government projects we also took into account the guidelines of success factors in ICT projects, and the audit sheet proposed by Kühn et al. [14].

3.3 Mapping Embedded Options

Although the NPV is the best indicator for determining the financial feasibility of a project, it cannot capture all financial values as it is a static measure at a specific point in time. The NPV assumes that management will be passive once the investment is committed. Reality is very different. Managers in both the public and private sector are constantly making decisions about on-going projects [4]. These projects can be stopped, scaled up or down, deferred, outsourced, leased, etc. The project could have strategic value as an enabler for further investments and other projects. Having the ability respectively the flexibility to take those measures must have a value that can be added to the NPV estimation.

In the financial world "options" are contracts that allow firms or individuals to buy or sell other assets (underlying). These contracts have a specific value for which investors and other market participants are willing to pay. In other words, flexibility has a precise value that can be priced.

The "Real Options" (RO) or "Real Option Analysis" (ROA) is a field of corporate finance that assigns a value to flexibility for projects and capital budget decisions. It essentially incorporates techniques to price financial options (Call or Put[12]) to project valuation and capital budget decisions.

As large-scale E-Government initiatives are substantial ICT investments with a common goal or strategy, they are a perfect fit for the theory of RO [3]. ROA can provide insight to the real value of a project [6]. Official methodologies to evaluate E-Government projects have not yet used this powerful tool so it is likely that they do not fully attain the desired objective [7].

Unlike financial markets, options in projects are somehow hidden within it. The first element of any ROA is to "map" or discover the "embedded" options. The following is a non-exhaustive list of the most common real options in the financial literature [2]: (1) Defer option: the flexibility to wait before committing to an investment. (2) Explore option: the flexibility to partially invest in a pilot or prototype effort without full commitment to a technology, it allows the investor to understand risk and problems without the burden of the entire cost. (3) Stage option: the flexibility to parcel an investment out and to abandon it in the future. (4) Change Scale option: the flexibility to increase or decrease an investment in response to changing market conditions. (5) Exit option: it allows flexibility to get out from a project and use the resources for another purpose. (6) Outsource option: the flexibility to pass critical risk to another firm or organization. (7) Option to expand: Flexibility for new projects or strategic growth, the investment creates capabilities and opportunities for follow-up investments.

A particularly useful technique that is used to map options is the decision tree. When planning a project decision trees can verify where the critical decisions of the project can be made. Figure 3 shows a decision tree for an option to Expand. The reader can see, that when some conditions are satisfied the project could grow, this feature adds value to the project in time 0 even if the conditions are not fulfilled in period 1. In case of a low demand the option to expand will not be exercised (Options do not have "down" side).

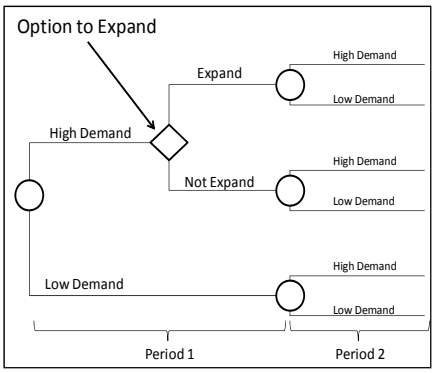

Figure 3. Example: option to expand

Figure 4 shows a decision tree of strategic value. In this example, by digitalizing the catalogue of a public library, its owner is actually acquiring the option to put the catalog on the Internet.

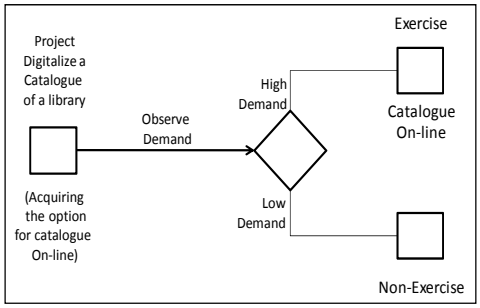

Figure 4. Example: strategic value from options

3.4 Valuating Embedded Options

Although real options are an important source of value, it is very difficult to calculate them with precision. Estimations may require numerical methods such as Monte Carlo Simulation[13] [2] or complicate estimations [6]. There are methodologies to apply real option analysis into ICT projects; however the adaption of these in the field of E-Government is not as available though badly needed.

[10] The probability of risks must be updated to reflect the planned measures.

[11] eGovernment Factsheet - Switzerland - Strategy http://www.epractice.eu/en/document/288427

[12] A "call" is the right to buy and a "put" is the right to sell. For more information about financial options see [4] and [13].

[13] Monte Carlo methods are algorithms that use random numbers to estimate a likely outcome when modeling phenomena with high uncertainty.

That said, we present some alternatives to "price" real option: (1) Do nothing to estimate the value of the options that have been identified. Even though the actual benefit is not measured the decision maker is aware that some financial value is apparent and that the NPV underestimates the actual value of the project. (2) Compare the NPV of a similar project that does not allow for options. The difference in the NPV is the value of the options [4]. (3) Estimate the Real options by using values of assets in the financial markets for underling price, volatility and strike price. To do this, it is necessary to find an appropriate asset with "similar" characteristics. (4) Use vendor benchmarks. In many cases the E-Government solution requires the acquisition of assets from the private sector. The provider of the solution must present a history of its success rate when implementing similar solutions, along with the observed risk associated with such implementation. With this information it is possible to estimate the value of Real Options from a given project. For more on common mistakes when valuating real options see [10].

3.5 Sensitivity Analysis

Sensitivity analysis is the "analysis of the effect on project profitability of possible changes in sales, cost and so on" [4].

As we explained above the NPV tends to be biased as it is based on predictions for the future. By testing each input in the NPV model, it is possible to determine the impact of any single variable on the outcome of a project. Sensitivity analysis consists of evaluating the outcome of a model by changing a variable and leaving the rest unchanged.

Sensitivity analysis enriches an E-Government project evaluation by providing an answer to potential critics about the hypothesis of the NPV calculation. It helps spot critical inputs, variables and mistakes in the model [17], and it helps to create trust among the different stakeholders of an E-Government project by challenging the hypothesis and assumptions that were made in the financial calculation.

3.6 Output and Implementation

The first output of a financial evaluation is a value (NPV) expressed in today's local currency. If the NPV is positive, the financial benefits of the project are higher than its financial costs, therefore the project is recommended. If the NPV is equal to zero, the financial cost equals the financial benefits in real terms. Lastly, if the NPV is negative the financial benefits of the project are lower than the financial cost.

In the first two cases "qualitative" benefits are windfalls, even if they were the very motive for the project in the first place. On the other hand if the NPV is negative, the net cost to society for such "qualitative" benefits in real terms is the NPV.

Our methodology enhances this output. First of all, it maps critical decisions within a project. Secondly, it identifies who gets the benefits from the project. Through the sensitivity analysis it spots the crucial sources of value and the points of inflexion of the project. Thirdly, our methodology incorporates a dynamic framework through real options.

From a strategic perspective the financial evaluation in our methodology facilitates communication among stakeholders. This is as important in an E-Government context as the final decision: Deciding upon a project involves difficult negotiations across political and regional lines, etc. Implementation remains an important challenge. In general, project leaders are already overwhelmed with work, and additional requirements to gain project approval may be perceived as an added burden. Moreover, a project's proponents and leaders may not be familiar with basic financial techniques, so implementation could be viewed as difficult. However the greatest challenge is to create a new mindset. Passing from atechnology driven to value driven is extraordinarily difficult, especially if the overall objectives are not carefully defined and explained to all stakeholders. That is why the first step of our methodology, measurement framework, is of extreme importance. (see Figure 1).

In the proposed framework for assessing and evaluating value and costs of E-Government initiatives, we offer one final step to unite the results of the financial evaluation with the qualitative one. Then we integrate it in a line of argument for project legitimization or overall estimation of rank for various proposals in a portfolio. Topics like strategy conformity, financial implications, qualitative and economic value or benefit, organization maturity, policy and law maturity, as well as whether or not it is necessary to act right now, are included.

Unlike other methodologies, ours keeps financial evaluation and qualitative evaluation independent from each other. It also anticipates measuring problems by forcing project leaders and proponents to identify relevant metrics and to build their projects from them. Finally it puts equal weight to both financial and qualitative evaluations.

4. DEMONSTRATION IN A CASE STUDY

In this section we present the implementation of the proposed financial evaluation using as our example the introduction of a flat company identifier number in Switzerland, "", UID, which is a prioritized advanced E-Government initiative in Switzerland[14]. The law for the UID will be discussed in 2010 in the two chambers of the Swiss parliament. The financial evaluation, that is presented here as an example, was run 2009 in the preparation phase of this law. The evaluation was done in the context of a regulation analysis ordered by the Swiss administration [12].

4.1 UID: Base Business Case

For the financial evaluation the base business case with the implementation of UID is defined as scenario 1, while scenario 2 describes the situation without the introduction of UID. Scenario 1 has a huge number of direct effects, because the implementation of UID implies, that all administrations on all federal levels have to replace their own local company numbers within five years. Scenario 2 does not describe today's situation, but accounts for the most likely outcome in the case that the law would not pass the parliament.

For the evaluation of the business case the two scenarios were rated from the perspective of fourteen types of stakeholders representing the 250 most concerned administrations (out of 4000) at the communal, cantonal and national level. The data was collected through more than 80 personal interviews. The interview partners were selected in a way that allowed validating the figures along the administrative processes. Quite a number of figures were taken from the Swiss Federal Statistical Office.[15]

[14] For more information: http://www.bfs.admin.ch/bfs/portal/de/index/news/00/09.html

[15] www.bfs.admin.ch

The considered cost categories embrace (1) Investments, such as hardware and software, labor costs for initialization, data preparation, communication and education, (2) operational costs and (3) personal costs; costs for new registration, mutations, closing, data transfer, data care, identifier business). As discounting rate we took 5% (cf. Figure 5).

Analysis of the project UID											
		Years									
Base Case	0	1	2	3	4	5	6	7	8	9	10
Impact (Savings)	**4,350**	**4,350**	**6,350**	**6,350**	**7,100**	**7,850**	**6,350**	**6,350**	**6,350**	**6,350**	**6,350**
Business as usual (without law)	**3,500**	**3,500**	**6,350**	**6,350**	**6,350**	**6,350**	**6,350**	**6,350**	**6,350**	**6,350**	**6,350**
Avoidable Investment	**850**	**850**	-	-	**750**	**1,500**	-	-	-	-	-
Investments	**5,000**	**5,000**	**3,300**	**1,650**	**1,650**	-	-	-	-	-	-
Costs	**2,200**	**2,200**	**2,200**	**2,600**	**2,600**	**2,750**	**2,750**	**2,750**	**2,750**	**2,750**	**2,750**
Operational Cost	600	600	600	1000	1000	1150	1150	1150	1150	1150	1150
Personal Cost	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
Discount Factors	1.00	0.95	0.91	0.86	0.82	0.78	0.75	0.71	0.68	0.64	0.61
Net "Cash" Flows	-2,850	-2,850	850	2,100	2,850	5,100	3,600	3,600	3,600	3,600	3,600
Discounted "Cash Flows"	-2,850	-2,714	771	1,814	2,345	3,996	2,686	2,558	2,437	2,321	2,210
NET PRESENT VALUE	15,574										

Figure 5. UID case study: Net Present Value

This financial evaluation was the second in this project. The first was done about half a year earlier, just estimating all the figures by the project manager himself. The overall judgment and magnitude of the figures were about the same. In both financial evaluations the direct impact on the 800'000 companies receiving a new company identifier was not considered in the financial evaluation. The effect on them is clearly positive. However, because of the huge variety of the companies, we were not able to identify the indicators supporting a relevant financial evaluation.

This large number of different types of stakeholders with a huge number of instances is one of the most unique characteristics of this E-Government project. Because of the large number of stakeholders the investment period in this E-Government initiative is quite long, although the change as such (introducing a new company identifier) seems to be very small.

4.2 UID: Risk Analysis

It is critical in this step to estimate what could go wrong, i.e. unexpected changes in the context, scheduling delays, etc. Delicate points should be taken into account in the sensitivity analysis. Examples of potential risks for the UID project are (a) the first release of the UID-implementation does not fulfill the requirements, (b) registers are not on schedule or (c) another format becomes widely accepted in Europe. Early implementation brings some higher costs and some small risks, which shall be considered in the Business Case. Similarly, long term implementation has an impact on the different positions in the business case. Risk Analysis is integrated in the numbers of Figure 5, however implicitly.

An especially late introduction of the UID for the old-age and survivors' insurances might influence the benefit of the project substantially. The project management of the UID project therefore took remarks concerning the proposed solution coming from the old-age and survivors' insurances very seriously. The measures now proposed make it much easier for the old age insurances to introduce the UID with very limited additional costs. Due to this measure, the risk of late introduction has lowered substantially.

4.3 UID: Mapping and Valuating embedded options

In this late phase of the initiative there are no real options with a positive effect. One option is to consider a modification, i.e. 50% of registers with a two year delay. Positive would be that an investment part would incur later. This option would have the following negative impacts: (a) benefits are realized with a delay, (b) additional poor investments arise. The option has a summa summarum negative quantitative effect.

4.4 UID: Sensitivity Analysis

With the sensitivity analysis we preclude incorrect statements due to incorrect assumptions. The old-age and survivors' insurance is an example of alternative calculation does not adopt UID. The resetting costs on the 104 compensation funds are not realized; therefore these cannot benefit of the optimized Swissdec[16] services. Overall, the audit has the expected negative quantitative effect. The calculation as such still shows a clear positive NPV.

4.5 UID: Evaluating the use of the method

The NPV method allowed us to evaluate scenario 1. This is done be comparing it with the evaluation of scenario 2. Like this it was easy to give the investments in scenario 1 a value. The fact, that the NPV is positive without including the positive effects on all the companies is also a convincing argument for the parliament. Beside this, the risk analysis, the discussion of real options and the sensitivity analysis gave feed-back to the project management that made them change the implementation plan.

5. CONCLUSION

We developed four indicator fields for assessing and evaluating value and costs of E-Government: resources, output, impact and integration. With these, we can offer concrete proof of the following competence potentials: economy, efficiency, effectiveness and transformation. By evaluating the set of indicators suggested by [7], we noted that economy and efficiency are easier to quantify than effectiveness and transformation. This makes clear that projects should not be evaluated by financial measures only, because there are important effects that are difficult to quantify.

Instead of playing financial alchemy in the financial evaluation, trying to introduce qualitative factors, a totally independent qualitative evaluation must be done.

In this article, we propose to use the net present value method (NPV) for assessing the financial value of an E-Government project. However, this evaluation must be enhanced by real options analysis in order to capture strategic value; with a module on risk management in order to anticipate possible problems and/or undesired outcomes, and with sensitivity analysis in order to eliminate bias and to create trust among the stakeholders.

Our experience with the qualitative interviews and consultancy has shown that the evaluation itself must add value to the projects without immensely increasing the workload of project leaders or proponents. Therefore, evaluations should be compatible with other on-going processes, requirement or methods. In addition we discovered that project managers who are aware of the most valuable outcomes and options in their projects tend to lead their

[16] http://www.swissdec.ch/

projects differently. They demonstrate a sensible approach to countermeasures against the highest evaluated risks.

Although we propose a formal methodology to evaluate E-Government initiatives, we watched carefully that it remained practicable at all levels of Government without resorting to difficult calculations—even in the real option analysis.

In order to optimize the measurement, we will investigate further the integration of qualitative and quantitative evaluation steps of the analyzed initiatives [15].

In sum, we propose small and pragmatic steps in accordance with results already achieved. We strongly suggest omitting huge and complex processes and calculations, but taking several views on the project. The varying viewpoints provide valuable input on where it makes sense to offer more concrete financial evaluation. Avoid adding detail when project management no longer benefits from the information. But repeat these steps, because this supports the project by focusing on value and risk.

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