Evaluation of Life-Event Portals: Multi-attribute Model and Case Study

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Abstract. The provision of life-event based public services is one of popular development trends of e-government programmes that have emerged in recent years. In the article, first a concept of life-event portal is briefly presented. The main emphasis of the article is on the methodology for the evaluation of life-event portals, which is based on multi-attribute modelling. The methodology helps to assess and compare electronic services, life-events and portals as a whole. The results of an analysis of sixteen life-event portals are presented.

1 Introduction

1.1 The Concepts of an Active Life-Event Portal

Government portals as one of the development trends of e-government programs have an important role in the provision of public services. They allow us to join or even integrate services that are in the competence of different public institutions into one single entry point via the Internet. One of the key questions in developing such portals is how to structure and design services to gain real benefits for the customer (citizens and business) and the government as well.

The problem lies in the fact that the existent organization of government is based on a division of work between several fields or competences. Accordingly, government processes and services are adapted and distributed over several public institutions. However, the problems of customers do not usually apply merely to one single competence or one single public institution. The solution of customer's problem typically requires starting several different administrative procedures at several different public institutions. Moreover, businesses are often involved as well. In such situations a citizen often knows only what *he* wants (e.g. get married, build a house), but does not know which administrative procedures are relevant in his particular case, in what order, which public institution is competent for handling that case and what else is needed to complete the procedure (what application, which supplements, where and how to find all the necessary information, etc).

One of the possible solutions in this respect is the development of services based on life-events. This approach considers government operation from the perspective of everyday life and customer's needs rather than the internal needs of the government.

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1.2 Background

A preliminary study of existent life-event portals, carried out in the beginning of 2002, indicated that portals differ mainly in the following characteristics:

- the selection of instruments that are used to identify and select an adequate life-event,
- the extent to which a particular life-event corresponds to the real user's problem,
- the way how life-events are designed and represented to the user together with the corresponding electronic services, and
- the level of on-line sophistication at which life-events and electronic services are offered to the user.

These findings suggested that detailed analyses of portals should be conducted. Therefore, a methodology for the evaluation of life-event portals was developed to assess the state of the art of portals in terms of contents and applied technology, to identify portals' strong and weak characteristics, and to compare the portals. This methodology and the results of the analysis of 16 life-event portals are presented in this paper.

2 Methodology for Evaluation of Life-Event Portals

2.1 Underlying Methodology

The core of our assessment of life-event portals was based on multi-attribute models. This approach, which originates in the field of decision analysis [3], is aimed at assessing the utility of options (or alternatives) that occur in decision-making problems. In principle, a multi-attribute model represents a decomposition of a decision problem into smaller and less complex subproblems. A model consists of attributes and utility functions. Attributes (sometimes also referred to as performance variables or parameters) are variables that represent decision subproblems. They are organized hierarchically so that the attributes that occur on higher levels of the hierarchy depend on the lower-level ones. According to their position in the hierarchy, we distinguish between basic attributes (leaves or terminal nodes) and aggregate attributes (internal nodes, including the roots of the hierarchy). Basic attributes represent inputs of the model, while the roots represent its output. Utility functions define the relationship between the attributes at different levels, i.e., for each aggregate attribute they define a mapping from its immediate descendants in the hierarchy to that attribute. Thus, utility functions serve for the aggregation of partial subproblems into the overall evaluation or classification.

For the purpose of our research, we have developed qualitative models using the software tool DEXi. Qualitative models contain qualitative (cardinal or ordinal) attributes, and use if-then rules for the aggregation of attributes. DEXi [6] is a decision-support computer program that facilitates the development of qualitative multi-attribute models and the evaluation of alternatives. The developed model is comprehensible; it allows validation, different analyses and simulations (such as what-if analysis), as well as the interpretation, justification and graphical representation of results. DEXi and its predecessor DEX [1, 2] have been used in

more than fifty real-life decision problems in various areas [9], such as selection and evaluation of computer hardware and software, performance evaluation of enterprises and business partners, project evaluation, and personnel management.

We have developed three qualitative models for the assessment of life-event portals at three different levels: (1) electronic services, (2) life-events and (3) life-event portals as a whole. The latter is the model at the highest level, as each life-event portal supports one or more life-events. Thus, the model for assessing life-events subsumes one or more evaluations of life-events. Similarly, each life-event offers one or more electronic services, so again each life-event model refers to one or more models for assessing electronic services.

When assessing particular life-event portal, first the electronic services of each selected life-event (see section 3.1) are assessed. The assessments of services influence the assessment of the life-event in which these services are included (see section 2.4). Finally, the assessment of observed life-events at particular life-event portal is included in the assessment of this portal (see section 2.5).

2.2 Model for Assessing Electronic Services

The European Commission, DG Information Society [5] proposes a four-staged framework for the classification of e-services regarding the level of on-line sophistication, as follows:

- Stage 1 - Information: online information about public services;
- Stage 2 - Interaction: downloading of forms;
- Stage 3 - Two-way interaction: processing of forms, including authentication;
- Stage 4 - Transaction: case handling, decision and delivery (payment).

In our methodology, this framework was used as a basis for the development of the model for assessing e-services. In this model, the individual characteristics that define a particular stage are analysed separately and then combined (aggregated) into the overall assessment of e-service. In addition to these characteristics, the clarity of e-services is also considered (Fig. 2).

Fig. 2. The hierarchical tree of attributes of the model for assessing electronic services

2.3 Model for Assessing Life-Events

In the proposed model, the final assessment of life-event is aggregated from the assessments of the following attributes (Fig. 3): life-event maturity, life-event usage and clarity of life-event.

Fig. 3. The hierarchical tree of attributes of the model for assessing life-events and corresponding attribute scales

The maturity of life-event is further composed of life-event on-line sophistication, the scope of life-event and life-event coordination. These attributes are described in more detail, since they form a very important part of the overall assessment of life-event.

A life event comprises different electronic services. Some of these services are vital for the life-event, meaning that if they are not accomplished, the life event cannot be considered as solved. For example, the company has to be registered before you can start a business; thus, the service 'registering the company' is a vital service for the life-event 'starting a business'. Other services within life-event are considered as additional as they contribute to the quality of life-event or add the value to the final result. For example, information about benefits and weaknesses of different business types can simplify the decision about which business type corresponds to a particular user's situation.

According to this classification, the scope of life-event is defined to evaluate how well a particular life-event is covered with electronic services. This characteristic is evaluated for the vital services and additional services separately and then aggregated into the final assessment of the scope of life-event.

A life-event can be considered a complex electronic service. Thus, the level of on-line sophistication is one of the characteristics for the assessment of life-events. In the

proposed model, this characteristic is calculated from the assessments of electronic services assessed in a particular life-event in the following way:

1. The average assessment is calculated separately for the vital and additional services within life-event.
2. The average assessment for the life-event (LE_{avg}) is a weighted sum of the average assessment for the vital services (VS_{avg}) and average assessment for the additional services (AS_{avg}): $LE_{avg} = 2/3 VS_{avg} + 1/3 AS_{avg}$.
3. Finally, the intervals to transform the average assessments into the assessment of life-event on-line sophistication are defined as follows:

Average assessment of services	Life-event on-line sophistication
between 1 and 1.7	1 - unacceptable
between 1.8 and 2.5	2 - acceptable
between 2.6 and 3.3	3 - good
Between 3.4 and 4.1	4 - very good
between 4.2 and 5	5 - excellent

The *level of coordination* within a life-event defines the way in which electronic services are combined into a particular life-event. The manner of the integration of the processes that correspond to these services is not an issue here. This characteristic evaluates only the coordination, as it is perceived by the user. The levels of coordination are defined as (Fig. 3):

- dispersion: services, which are normally comprehended within particular life-event, are provided on different web sites;
- one entry point: this entry point offers links to the web sites of institutions, where the corresponding services are provided;
- step-by-step coordination: the services are provided on one web site; however, the user must apply each process that corresponds to the electronic service separately, and wait until it is finished before applying the next one;
- one-step coordination: the user applies only the first process, and the next one is triggered automatically when the preceding one is finished.

The *use of life-event* combines two elements: the access to services and the standardization of electronic services design and structure. The access to services evaluates different instruments helping to access electronic services within life-event. In addition to standard instruments (e.g. the list and the description of key steps, check-list with the most important services and frequently asked questions with answers helping the user to solve his problem), an 'intelligent' electronic-guide through life-event (see section 1.1) is specially included in the proposed model.

The *clarity of life-event* was added to the model during the assessment of portals. Sometimes so little information about particular life-event was provided that it was difficult to evaluate especially which services are vital and which are additional, or to determine the structure of the life-event.

Maturity	Use of LE	Clarity of LE	Life-event
35% 1 unacceptable	31% *	34% *	unacceptable
2 <=acceptable	unsuitable	unacceptable	unacceptable
3 <=acceptable	unsuitable	inadequate	unacceptable
4 acceptable	partly-suitable/suitable	*	acceptable
5 acceptable	>partly-suitable	<=partly-adequate	acceptable
6 acceptable: very-good	>partly-suitable	inadequate	acceptable
7 >=acceptable	partly-suitable/suitable	inadequate	acceptable
8 >=good	unsuitable	>partly-adequate	acceptable
9 acceptable	very suitable	adequate	good
10 good	partly-suitable/suitable	>partly-adequate	good
11 good	>partly-suitable	partly-adequate	good
12 good: very-good	partly-suitable/suitable	partly-adequate	good
13 >=good	partly-suitable	>partly-adequate	good
14 excellent	very suitable	inadequate	good
15 good: very-good	very suitable	adequate	very-good
16 very-good	>=suitable	adequate	very-good
17 very-good	very suitable	>partly-adequate	very-good
18 >= very-good	very suitable	partly-adequate	very-good
19 excellent	>=suitable	partly-adequate	very-good
20 excellent	>=suitable	adequate	excellent

LE Sophistication	Scope of LE	Coordination within LE	Maturity
34% 1 unacceptable	34% *	32% *	unacceptable
2 <=acceptable	inadequate	*	unacceptable
3 <=acceptable	inadequate	<=one entry point	unacceptable
4 <=good	inadequate	<=one entry point	unacceptable
5 <=good	*	dispersed	unacceptable
6 *	inadequate	dispersed	unacceptable
7 acceptable	>=partly-adequate	>=step-by-step	acceptable
8 good	inadequate	>=step-by-step	acceptable
9 >=good	inadequate	step-by-step	acceptable
10 good	>=partly-adequate	one entry point	acceptable
11 >=good	partly-adequate	one entry point	acceptable
12 >= very-good	inadequate	one entry point: step-by-step	acceptable
13 >= very-good	>=partly-adequate	one entry point	acceptable
14 >= very-good	partly-adequate	<=one entry point	acceptable
15 >= very-good	>=partly-adequate	dispersed	acceptable
16 good: very-good	partly-adequate	>=step-by-step	good
17 >=good	partly-adequate	step-by-step	good
18 very-good	<=partly-adequate	one-step	good
19 >= very-good	inadequate	one-step	good
20 very-good	adequate	one entry point	good
21 good	adequate	>=step-by-step	very-good
22 good: very-good	adequate	step-by-step	very-good
23 excellent	partly-adequate	one-step	very-good
24 excellent	adequate	one entry point	very-good
25 >= very-good	adequate	one-step	excellent
26 excellent	adequate	>=step-by-step	excellent

Vital scope of LE	Additional scope of LE	Scope of LE
71% 1 inadequate	29% *	inadequate
2 partly-adequate	<=partly-adequate	partly-adequate
3 >=partly-adequate	inadequate	partly-adequate
4 >=partly-adequate	adequate	adequate
5 adequate	>=partly-adequate	adequate

Access to Services	Standardisation of Services	Use of LE
63% 1 unsuitable	*	unsuitable
2 <=partly-suitable	inadequate	unsuitable
3 partly-suitable	partly-adequate	partly-suitable
4 suitable	inadequate	partly-suitable
5 partly-suitable/suitable	adequate	suitable
6 suitable	>=partly-adequate	suitable
7 very suitable	inadequate	suitable
8 very suitable	>=partly-adequate	very suitable

Access Instruments	E-guide	Access to Services
55% 1 unsuitable	<=partly-adequate	unsuitable
2 unsuitable	adequate	partly-suitable
3 partly-suitable	<=partly-adequate	partly-suitable
4 partly-suitable/suitable	inadequate	partly-suitable
5 partly-suitable	adequate	suitable
6 suitable	partly-adequate	suitable
7 very suitable	inadequate	suitable
8 >=suitable	adequate	very suitable
9 very suitable	>=partly-adequate	very suitable

Key Steps	Check List	FAQ	Access Instruments
33% 1 inadequate	inadequate	<=partly-adequate	unsuitable
2 inadequate	<=partly-adequate	inadequate	unsuitable
3 <=partly-adequate	inadequate	inadequate	unsuitable
4 inadequate	<=partly-adequate	adequate	partly-suitable
5 <=partly-adequate	inadequate	adequate	partly-suitable
6 inadequate	partly-adequate	>=partly-adequate	partly-suitable
7 inadequate	>=partly-adequate	partly-adequate	partly-suitable
8 inadequate	adequate	<=partly-adequate	partly-suitable
9 <=partly-adequate	adequate	inadequate	partly-suitable
10 partly-adequate	inadequate	<=partly-adequate	partly-suitable
11 >=partly-adequate	inadequate	partly-adequate	partly-suitable
12 partly-adequate	>=partly-adequate	inadequate	partly-suitable
13 >=partly-adequate	partly-adequate	inadequate	partly-suitable
14 adequate	inadequate	<=partly-adequate	partly-suitable
15 adequate	<=partly-adequate	inadequate	partly-suitable
16 inadequate	adequate	adequate	suitable
17 partly-adequate	partly-adequate	>=partly-adequate	suitable
18 partly-adequate	>=partly-adequate	partly-adequate	suitable
19 >=partly-adequate	partly-adequate	partly-adequate	suitable
20 adequate	inadequate	adequate	suitable
21 adequate	adequate	inadequate	suitable
22 >=partly-adequate	adequate	adequate	very suitable
23 adequate	>=partly-adequate	adequate	very suitable
24 adequate	adequate	>=partly-adequate	very suitable

Fig. 4. Utility functions for the aggregated attributes of the model for assessing life-events

The attributes that occur in the model for assessing life-events (Fig. 3) are aggregated according to the utility functions shown in Fig. 4. Utility functions are represented in tabular form. For each aggregate attribute, a corresponding table defines how the value of that attribute is determined from the values of lower-level attributes.

For example, the topmost table on the left of Fig. 4 defines the mapping of the attributes *Maturity*, *Use of LE* and *Clarity of LE* into the final assessment of *Life-event*. Each row of the table represents a rule that defines the value of *Life-event* for some combination of values of the former three attributes. Rule 1, for example, defines that *Life-event* is unacceptable, whenever *Maturity* is unacceptable, regardless on the assessment of the *Use* and *Clarity of LE* (notice that the asterisk represents any value of the corresponding attribute). Similarly, rule 2 specifies that *Life-event* is unacceptable, too, whenever *Maturity* is worse than or equal to acceptable, and *Use of LE* is unsuitable, regardless on *Clarity*. All the remaining rules can be interpreted in a similar way.

2.4 Model for Assessing Life-Event Portals

The assessments of life-events influence the final assessment of life-event portal through the characteristic that evaluates the way in which life-events are handled. The

intervals to transform the average assessment of life-events into the assessment of life-event handling are as follows:

Average assessment for life-events	Life-event handling
between 1 and 1.4	1 – unacceptable
between 1.5 and 2.3	2 – acceptable
between 2.4 and 3.3	3 – good
between 3.4 and 4.2	4 - very good
between 4.3 and 5	5 – excellent

Other characteristics, included in the proposed model (Fig. 5), evaluate the scope of life-event portal (how well the portal is covered with life-event and topics), different instruments helping to identify an adequate life-event (access to life-events), the standardization of life-events design and structure and personalization.

Fig. 5. The hierarchical tree of attributes of the model for assessing life-event portals

3 Analysis of the Life-Event Portals

3.1 Scope of the Analysis

This analysis, which was conducted in August 2002, was aimed at the assessment of a selected sample of sixteen life-event portals (Table 1).. The portals were selected for analysis according to the following criteria:

- The portal provides services based on life-events.
- The portal is considered a good practice with respect to the structure of the portal or to the level of on-line sophistication.
- The services, provided by portals, are comparable with services that are provided by the state government in Slovenia. In some countries, these services are provided by the cities (for example in Germany) or by the federal lands or provinces (for example in Germany and Australia).
- The portal should be available in one of the languages that are adequately mastered by the research team members (English, French, Spanish, Italian, German, Slovene).
- The research focused mostly to European countries, but included also some representative portals from the rest of the world.

The number and selection of life-events provided by the portals varies considerably. Thus, only a few common life-events were selected and analysed at each of the selected portals:

- moving a home,
- driving license (learning to drive and getting a driving license),
- passport (applying for or renewing a passport),
- starting a business.

In this analysis, about 300 services were evaluated within 65 life-events.

3.2 Results of the Analysis

The final assessments of analysed portals (Fig. 6) show that these portals are still at the early stages of development of life-event based electronic services, as half of the portals are assessed as unacceptable. The assessments for life-event handling mostly contribute to these poor results. The remaining characteristics included in the model for assessing life-event portals were generally assessed quite well. The scope of life-event portals mostly (at 10 portals) reached the highest possible value, whereas the elements of portals' usage (personalization of portal, standardization of life-events and instruments helping to identify an adequate life-event) were assessed at least as suitable at 11 of the observed portals.

Table 1. The list of analysed life-event portals

State/Land-Province/City	Internet Address
<i>Europe</i>	
France: Service Publique	http://www.service-public.fr
Italy: Italia.gov.it	http://www.italia.gov.it
Spain: Administración.es	http://www.administracion.es
Great Britain: UKonline	http://www.ukonline.gov.uk
Ireland: Information on the Irish State	http://www.irlgov.gov.ie
Austria: Internet service HELP	http://www.help.gv.at
German Federal Land Rheinland-Pfalz-Lotse: RLP-Lothse	http://rlp.bund.de/rlp-lotse.htm http://www.rlp-buergerservice.de/
The city of Bremen (Germany): Bremer-online-service	http://www.bremer-online-service.de/
Slovenia: e-Uprava	http://e-gov.gov.si/e-uprava/index.html
<i>Rest of the world</i>	
Australia-Commonwealth	http://www.fed.gov.au/KSP/
Australian Province Capital Territory	http://www.act.gov.au/
Australian Province Tasmania: ServiceTasmania	http://www.servicetasmania.tas.gov.au
Australian Province New South Wales	http://www.nsw.gov.au/
Canada: Government of Canada	http://canada.gc.ca/
Singapore: eCitizen	http://www.ecitizen.gov.sg
Hong Kong: Government Services	http://www.info.gov.hk/eindex.htm

In general, the Singapore eCitizen portal is evaluated as the best, as all characteristics (except the handling of life-events and personal conformability of the portal) have reached the highest possible assessment.

The assessments for life-event handling are very poor (Fig. 7). At almost a half of observed portals, this characteristic was evaluated as unacceptable, mostly because of the lowest possible assessment for the life-event on-line sophistication. On the other hand, at the Singapore eCitizen portal and the portal Bremer-online-service, the life-event handling is evaluated as good. However, one must take into account, that at Bremer-online-service only one life-event was analysed.

Fig. 6. The final assessments of the analysed portals

At the eCitizen portal, five life-events were analysed. Three of them ('getting married', 'starting a business' and 'issuing a passport') were assessed as very good, mostly because of the highly evaluated life-event maturity, which combines the level of on-line sophistication, the level of coordination and the scope of life-event. The other two life-events at this portal ('moving a house' and 'getting a driving license') were on the contrary assessed as unacceptable (the lowest possible value), mostly because of poor assessments for the on-line sophistication and the level of coordination.

4 Conclusions

The idea of life-event based electronic services seems to be widely recognized as an appropriate way of providing public services. However, the analysis of life-event portals revealed different approaches to developing electronic services, based on life-events. In some cases, the focus of the development is placed on a high on-line sophistication with a limited scope of life-events offered to the public (for example the Bremer-online-service), whereas some other portals provide a wide range of well-

structured and defined life-events with good information and a possibility to download corresponding forms (Austrian HELP portal, British UKonline). We believe that both aspects are important. On the other hand, some other important aspects of design and development of life-events are still somehow neglected, such as for example a high level of coordination of services within life-events and the tools, helping to navigate through life-events, which is still inadequately designed.

Fig. 7. The assessments for life-event handling at analysed portals

The proposed methodology provides a powerful tool for assessing the life-event portals and life-events themselves, and for comparing them. When implemented in the periodical analyses (for example once or twice a year), it may also show the trends in developing electronic services based on life-events. It offers a vehicle to understand the characteristics of life-event based services provided through government portals. On the other hand, it can serve as a guideline to outgrow the present state and to develop public services of higher quality.

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