Data Pattern for Allocating User Experience Meta-Data to User Experience Research Data

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Abstract. The vision of user experience is making life of users of products as convenient as possible, especially during the interaction with a productor a service. An important aspect of perceived convenience is the user experience of a product. The visual design and especially the interaction design has a major influence on this perception. In order to achieve the vision, user experience experts apply different types of tasks. One type of task is to analyze how users carry out tasks and what user's needs or problems are. Another type of task is to design user experience solutions and other typical task type deals with carrying out usability evaluations in order to find problems in using software application. In the course of user experience activities, many data are being collected. Many of the collected data relates to certain activities of users. For the user experience area there exist just a few tools, which support typical tasks in different ways. None of the tools supports linking results of user experience work to user experience meta-data. Why is it a problem? The current tools do not support an access to user experience project data with generic search and filter criteria like "industry", "application area", "use case" etc. This makes the access to user experience research data difficult and the comparison of user experience project data between different projects inefficient. In general, results of different user experience projects are difficult to reuse. The core idea of data pattern for allocating user experience Meta-Data to User Experience research data is to associate user experience project data with user experience meta-data. The data pattern considers associating user experience project data with user experience meta-data partially automatically and partially manually by the user. The key idea is that we want to reuse project data like the project sponsor, the application area, the industry, use cases etc. as user experience meta-data and assign them to user experience research data. The benefits of the data pattern are: Reusing results of user experience research projects. Making access to available results more efficient. Direct comparison of available results is supported and more efficient. UX Office is the typical instance for application.

Keywords: User Experience, Project Data, Research Data, Meta-Data.

1 Background of Data Pattern

1.1 The Field of Data Pattern

The vision of user experience is making life of users of products (e.g. software products, home appliances, consumer products etc.) as convenient as possible, especially

during the interaction with a product (e.g. mobile phone, PC) or a service (e.g. online book shop). An important aspect of perceived convenience is the user experience of a product. The visual design and especially the interaction design has a major influence on this perception.

In order to achieve the vision, user experience experts apply different types of tasks. One type of task is to analyze how users carry out tasks and what user's needs or problems are (use context analysis). Another type of task is to design user experience solutions (design) and other typical task type deals with carrying out usability evaluations (e.g. summative or formative usability tests) in order to find problems in using software application (usability evaluation). In the course of user experience activities or the typical user experience tasks (e.g. Analysis, Concept, Evaluation, Prototyping, Implementation), many data are being collected. Many of the collected data relates to certain activities of users. For example: A typical question is which problems to users have in sending a picture message to somebody via a mobile phone. This activity could be in the focus of the use context analysis (in order to understand the problems), in the focus of the design (in order to design a user experience solution) and of the evaluation (in order to identify problems of the user while s/he is using the solution).

1.2 Information of Related Field

For the user experience area there exist just a few tools, which support typical tasks in different ways. There are tools, which support the use context analysis, e.g. card sorting tools. There are typical tools, which support design activities, like rapid prototyping tools, picture editing tools, vector graphic tools. And there are also tools, which support usability evaluation activities, like tools supporting usability tests.

But all of these tools can support some user experience activity only. These tools likely belong to the different companies, which can bring a big matter. we find that it's too difficult to connect the information or result of a activity to another activity. For example: when we use some tools to help us to complete the usability tests, we hope the result of the test can be directly used in design work and guided to fix the design. In another word, It should not be a report which covered by all words, and instead of it, we prefer to get the visualized result which can be used in the design tools.

Through the experience of ISAR, user experience data can be divided into two parts, Project Data and Research Data. Project Data means any kind of data which describe characteristics of the user experience project. It's just a data type not an instance. For examples, project name, project objective, project success criteria, project approach, user experience activity, user experience method, project tasks, project deliverables, project resources, project risks, project status, project flag, target user group, use case, scenario, and so on. Research Data is any kind of data which is a result of a user experience activity. In general, it's also a data type. For example: requirements, storyboards, strengths, weaknesses, goals, goal trees, tasks, storyboards, process requirements, product requirements, service requirements, completion time, completion information, usability flaws, usability flaw cluster, usability severity, effort to fix, flaw classes, recorded sounds of user experience activities, results of usability analysis, and so on.

1.3 Related Problems

So, what is the problem for us? That is none of the mentioned tools supports linking results of user experience work (herein called user experience research data) to user experience meta-data. And why is it a problem? The current tools do not support an access to user experience project data with generic search and filter criteria like "industry", "application area", "use case" etc. We can't abstract the useful data from the data of project. And it's difficult to setup a connection between the project data and the research data by ourselves. Even we don't know which data should be saved in project library in order that we can use it in the next similar project or product. This makes the access to user experience research data difficult and the comparison of user experience project data between different projects inefficient. In general, results of different user experience projects are difficult to reuse. And even the same project, the results arise from different activities are difficult to connect automatic.

2 Summary of the Data Pattern

Through the experience of ISAR, user experience data can be divided into two parts, Project Data and Research Data. Project Data means any kind of data which describe characteristics of the user experience project. It's just a data type not an instance. For examples, project name, project objective, project success criteria, project approach, user experience activity, user experience method, project tasks, project deliverables, project resources, project risks, project status, project flag, target user group, use case, scenario, and so on. Research Data is any kind of data which is a result of a user experience activity. In general, it's also a data type. For example: requirements, storyboards, strengths, weaknesses, goals, goal trees, tasks, storyboards, process requirements, product requirements, service requirements, completion time, completion information, usability flaws, usability flaw cluster, usability severity, effort to fix, flaw classes, recorded sounds of user experience activities, results of usability analysis, and so on.

The core idea of the user experience data pattern is to associate user experience project data with user experience meta-data. Including, user experience meta-data is a type of data which is assigned to user experience Research Data. The Data pattern considers associating user experience project data with user experience meta-data partially automatically and partially manually by the user. The key idea is that we want to reuse user experience project data as user experience meta-data and assign them to user experience research data.

The benefits of the data pattern are:

- Reusing results of user experience research projects
- Making access to available results more efficient
- Direct comparison of available results is supported and more efficient

3 Detailed Description of the Data Pattern

3.1 Core Idea

User experience Meta-Data stem usually from user experience Project Data. They can be extended with user defined user experience Meta-Data. An instance of user

experience Meta-Data is a single value of a user experience Meta-Data, like the use case, target user group.

User experience data pattern covers two parts: The first part includes how user experience Meta-Data are identified and assigned to user experience Research Data. The second part contains how user experience Meta-Data are used in order to realize the benefits of the user experience Meta-Data.

This data pattern allows deriving user experience Meta-Data automatically from available user experience Project Data. The data pattern includes also assigning user experience Meta-Data to user experience Research Data automatically and supports the user in assigning user experience Meta-Data to user experience Research Data manually.

It is assumed that user experience Project Data are already stored in the system and some user experience Research Data are already available in the system. The data pattern can be applied if the user enters new user experience Project Data and new user experience Research Data later to the system.

The user experience Meta-Data are selected from user experience Project Data which can be assigned to selected user experience Research Data. Part of the data pattern can manage the allocation between selected user experience Project Data and user experience Research Data. This allocation is a set of data which establishes the user experience Meta-Data. And the allocation can be changed by the user.

3.2 Allocation Rules

A core part of the user experience data pattern is how to assigns user experience Project Data to user experience Research Data. In order to do so, the mechanism requires allocation rules which defines which user experience Research Data and which user experience Project Data can be allocated. It considers an allocation conditions which needs to be fulfilled. If an allocation condition is fulfilled, a related allocation rule is being selected. According to project experience for user experience from ISAR, some user experience Project Data can be directly used in Research Data, and some should associate other data. For example, it is assumed that information instances of user experience Project Data instances of user experience Research Data are available. The allocation rules determine which instances of user experience project data are associated with which instances of user experience research data.

Examples of allocation rules are:

- Conditions: Usability flaw available (user experience Research Data), test scenario available (user experience Project Data); Allocation rule: Allocate test scenario (user experience Project Data) to usability flaw (user experience Research Data)
- Conditions: Problem available (user experience Research Data), target user group available (user experience Project Data); Allocation rule: Allocate target user group (user experience Project Data) to problem (user experience Research Data)
- Conditions: Storyboard available (user experience Research Data), use case available (user experience Project Data); Allocation rule: Allocate storyboard (user experience Project Data) to use case (user experience Research Data)

3.3 Allocation Mechanism

Another core part of the user experience data pattern is an allocation mechanism which allocates instances of user experience Project data to instances of user experience Research data, based on the allocation rules. After an instance of the user experience research data is available, the allocation mechanism allocates instances of user experience Project Data by carrying out the respective allocation rule as defined.

Example of the allocation mechanisms are: If the user enters a usability flaw in the context of a usability test (instance of a user experience Research Data) for a preselected scenario (instance of a user experience Project Data), the allocation mechanism reads the allocation rule.

3.4 Allocation Results

Another core part of the data pattern is to store the results of the allocation mechanism and make them available as user experience Meta-Data. This is specifically a connection between instances of user experience Project Data and user experience Research Data.

There are different ways to implement the allocation results. One way is to store it in a central storage where a reference from a user experience Product Data instance is connected to a reference to a user experience Research Data instance and vice versa (centralized solution). The instances can be grouped in user experience Product Data and user experience Research Data each. This allows an efficient access to the data.

Another way is to store the user experience Meta-Data decentralized. Each instance of a user experience Project Data is connected with at least one or more placeholder for references which can be connected to user experience Research Data (and vice versa) (decentralized solution).

An extension of the data pattern is that the user can edit the allocation results directly or indirectly and therefore change it. Changing the allocation results does not necessarily mean that the user changes the related user experience Project Data instances or the user experience Research Data instances, but the user experience Meta-Data which reflects the connection between user experience Research Data instance(s) and user experience Project Data instance(s).

3.5 Selection Mechanism (via User Experience Research Data)

The user experience data pattern includes also a selection mechanism by selecting user experience Research Data in order to realize the benefits. The required input for the selection mechanism is typically user experience Research Data, e.g. usability flaws, flaw cluster etc. Typically, the user needs to select which user experience Research Data he/she is interested in before initiating the selection mechanism. Another option is not to restrict the selection of user experience Research Data and let the mechanism select all available data. The mechanism uses the allocation results in order to execute the selection and collect the results.

Example of selection requests are:

– What are usability flaws (user experience Research Data) for a certain use case (user experience Project Data)?

- What are usability flaws (user experience Research Data) for a certain research object, e.g. a mobile phone (user experience Project Data)?
- What are the differences of usability flaws (user experience Research Data) between different research objects (e.g. between mobile phone A and mobile phone B)
- What are the differences of usability flaws (user experience Research Data) between different countries (user experience Project Data) for a certain research objects?
- What is the usability industry benchmark (user experience Research Data) of a certain research object (e.g. a mobile phone)?
- What are most relevant problems (user experience Research Data) for a certain target user group (user experience Project Data) for a certain domain?
- What are the most critical usability flaws (user experience Research Results) for a certain research object (user experience Project Data) and what are the related (user experience Project Data)?

3.6   Selection Mechanism (via User Experience Meta-Data)

The user experience data pattern includes also a selection mechanism for the instances of user experience Meta-Data in order to realize the benefits. The required input for the selection mechanism are instances of user experience Meta-Data, e.g. use cases, domains, applications, research objects, target user groups etc. The results are typically user experience Research Data. Typically, the user needs to select which user experience Research Data he/she is interested in before initiating the selection mechanism. Another option is not to restrict the selection and let the mechanism select all available information. The mechanism uses the allocation results in order to execute the selection and collect the results.

Example of user experience Meta-Data are:

- For a certain use case (instance of user experience Meta-Data): Select all usability flaws, all completion time, all participants subjective ratings, all videos with usability flaws (all user experience Research Data)
- For a certain research object (instance of user experience Meta-Data): Select all usability flaws, all critical usability flaws, average participants subjective ratings, all videos with critical usability flaws (all user experience Research Data)
- For a application (instance of user experience Meta-Data): Research object with best usability results, (all user experience Research Data)
- For a domain (instance of user experience Meta-Data): Critical usability flaws, usability flaw clusters, use cases with least usability flaws (all user experience Research Data)

The connection between the instance of project data and the instance of research data is the Meta-data. The project data and research data can build some relation via allocation rules and selection Mechanism. Generally, the concept of Meta-data can be used in database setup in computer field. Now we use this data pattern in user experience data. UX Office is the typical instance for application.

4 Application

UX Office system is developed by Beijing ISAR User Interface Design L.td and German partners together, used to conduct the Usability Evaluation and the user experience management.

The system was composed by two main modules: the usability evaluation and project management, and four assisted modules: client management, data management, resource management and administration.

In a professional usability evaluation process-oriented, guide and assist all types of personnel to test user experience, data analysis and report writing of different kinds of products, the main part include:

Fig. 1.

The data pattern of the meta-data has been used in the concept and the function of this system.

When a new evaluation starts, the preparation should be done first, it concludes Evaluation setup, Recruiting and evaluation guide. The Evaluation setup contents evaluation type, evaluation product, evaluation objective, use case, user group, location, evaluation units, evaluation teams, facility and experiential design. The function of Evaluation setup is to define the related data of the preparation for pre-test, and the Recruiting aims to recruit participant which meets the definition of evaluation unit. And the Evaluation guide includes Scenario, Questionnaires and Checklist. The function here is to guide the user experience experts to establish the test process.

When the preparation is finished, the test could be conducted, and in this part, the data of the test could be recorded. If the data is not recorded perfectly during the conducting process,(the time that a recorder can use is very limited during the conduct evaluation process) the user experience experts can use the Refinement to refine the recorded data.

When the data of the test has been collected well, the system supplies statistics and video editor to analysis the collected data. The statistics contain the analysis of flaw, questionnaires and scenarios. The video editor can make a high light video from the whole video data for a specific flaw or a usability problem.

When the data analysis has been finished, the user experience experts move to the report part, the system supply the CIF report template, and the test editing function to finish a report.

The data in the whole process is related to each other, now we can take the evaluation unit as an example. The data in the evaluation setup content both the project data and the research data, the evaluation unit contents such data types: evaluation product, location, user group, the number of participant in the evaluation unit and the start date and the end date of the test. The data type is defined under the guidance of this data pattern.

The data of the Evaluation setup, the data of the Recruiting and the data of the Evaluation guide are associated to each other. In this system, the data defined in one part can be used in other parts which are related with the originally part.

For example, the information of the user group, evaluation product and the location affect the data and the definition of Evaluation unit. And when the user experience expert has already defined the user group, evaluation product and the location, the information of these parts can be used automatically when the Evaluation Unit need to be done. And when an evaluation has been established by such information, the recruiting has to collect the participant under the profile in the user group, which is defined when a user group is established.

Also the data in preparation (content evaluation setup, recruiting and evaluation guide) is the basic of the work when conducing evaluation, when a test is conducting, the data during the test should be recorded by some rules and some information. In this system, the observer can record the test data by the guidance of the Checklist, Scenarios and the Questionnaires. For example, the test content is according to the scenario which is define in the evaluation guide before, the usability problem which would be found in the test has much to do with the use case, when a usability flaw is recorded, it has belong to one scenario, and the flaw has many other property, for it related to the user group, the use context and so on. And the whole test is conducted by the arrangement of the recruiting and evaluation unit.

When the data is collected already, the analysis of the data should be done. When doing statistics, the data can be analyzed in user group, location, evaluation product, scenarios, questionnaires, evaluation units and participant. For example, question A has been define in the Questionnaires part of the evaluation guide, and the answer of each participant has been recorded during the conducing test process, then the data of this question A can be statistics by different method for different need. The data can be analyzed the answer between different user group in the different location, or the different evaluation unit in each scenario, and so on.

When the data has been analyzed, and the result has been created, the user experience experts would write the report of the usability evaluation. We supply the CIF template as a standard structure, all the data before in any part, which is useful for the report, can be used here automatically or manually. For example, when the content of the report template is about the product, the information of the evaluation product can
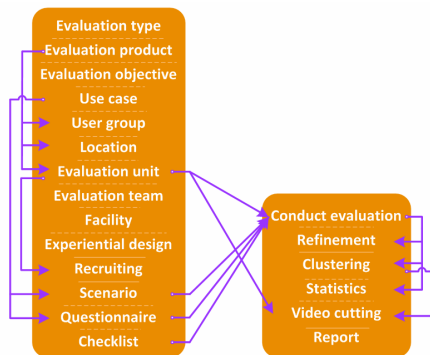

Fig. 2.

be used here automatically, and when the data is not in the default content, the data can be transferred from anywhere in the system. If a usability flaw has to be show with 2 related analysis results, the results can be transferred from the analysis part easily, but not to input them manually.

Fig. 3.

From the above description, the conclusion can be seen that the data pattern is used in the whole system, and the whole relationship can be seen in the following figure.

The examples above are all about the way that to store and use the Meta-Data de-centralized. And another way to store the Meta-Data is to store all of them in storage. In this system, the Meta-Data is stored in the Library Module by the different type, the structure can be managed and edited by the administrator. The data in the library can be used in any new related project, and it also can be compared when the data is accumulated.

By using the data pattern, the system, you can get these benefits as following:

1) Provide professional processes and methods of usability evaluation
2) Effective coordination of the work of user experience team
3) Support multiple people observation and recording of the usability test at the same time.
4) Capture the real-time video data, observe and record the test data in the progress of usability test
5) Analyze record data, create data chart and table
6) Classify the video clips and create video groups Collection
7) To create report speedily, and export to MS Word document

5   Conclusion

The user experience pattern is same as thought of the database setup. The data struc-ture of user experience Office is guided by this user experience data pattern. It can support the users to store, reuse of data and data evaluation (such as statistical forms,

questionnaires, and other information) rapidly, also user can define data and templates, greatly increased the efficiency. The user experience Project Data can be used in user Research Data, and as the connection, the user experience Meta-Data is the core of this system. The data pattern makes the system more automatically and more intelligent, and it help us to do the user experience project more efficiently.

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