Lessons Learned in Usability Consulting

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Abstract. User-centered design in varying domains and contexts defines the daily routine of (external) usability consultants. Understanding users, their tasks and goals is essential for a successful project. This can be quite challenging, especially in more complex domains. Documenting design decisions and solutions provides a sound basis for efficient and sustainable further development by reusing design knowledge and artifacts.

Keywords: Usability consulting · Return on investment · Sustainability · Design reuse · Documentation

1   The Usability Consulting Profession

A consultant is a professional, usually specialized in a specific area, such as management, finance, science etc., who provides expert advice to clients ("Consultant" 2004). As a usability consultant you are mandated to cater for an overall good user experience (UX) of a product or service. Applying the user-centered design framework in varying fields and domains – including learning the ropes on a daily basis is business as usual. Knowing your users, their tasks and the context of use is essential for effective results. The more complex the domain, the more effort has to be made to truly understand the context, processes and current problems. In order to ensure more sustainable solutions, documenting findings and design decisions is crucial. These results may guide subsequent extensions and enhancements of the product or service. Taking action to redesign an application or service for a better UX in many cases has to be justified considering the return on investment (ROI) by relating the input and the potential benefits of an investment.

This paper is composed as follows: In the first section benefits and the return of investment of usability engineering are described. In the following sections user-centered design activities are characterized and it is argued for an extended framework including the documentation of designed solutions. A description of lessons learned in usability consulting completes the paper.

2   The ROI of Usability

Taking a look at the reasons why software projects fail might provide valuable insights and links for optimization: The CHAOS Report[1] is a survey-based study analyzing influencing factors for success and failure of IT projects on a year-on-year basis. It is published and updated by The Standish Group[2]. The most important reasons why projects struggle or fail are incomplete requirements and the lack of user input and involvement (The Standish Group 1994). Yet almost 20 years later, user involvement is still rated under the top two project success factors (The Standish Group 2013). These results already illustrate the general benefits of usability engineering, user research and user involvement being one of the core activities in the user-centered design process.

Defining the ROI of usability engineering and user experience design activities has been subject to numerous studies and has been addressed in several publications and white papers (e.g. Graefe, Keeenan and Bowen 2003; Marcus 2005; Turner 2011; Weinschenk 2005). One of the most influential publication on this topic still is *Cost-Justifying Usability* by Randolph G. Bias and Deborah J. Mayhew (1994)[3]. Even though the accurate calculation of the ROI by means of a precise amount of money is a complex issue (Rosenberg 2004; Weinschenk 2005), there is broad consensus that there are numerous benefits of applying a user-centered design process: "The benefits of usable technology include reduced training costs, limited user risk, and enhanced performance (…). American industry and government will become even more productive if they take advantage of usability engineering techniques." (Gore 1998)

The following list covers some more benefits (Bias and Mayhew 1994, p. 17f.; Weinschenk 2005, p. 3–10):

- Increased ease of use and productivity.
- Increased efficiency and satisfaction.
- Increased sales and conversion rates (e.g. e-commerce).
- Decreased user errors and less frustration.
- Decreased development and maintenance costs.
- Decreased training and support costs.

The Nielsen Norman group collected data from 72 case studies of website redesigns and compared their usability applying the same metrics before and after the redesign (Nielsen et al. 2008). Table 1 shows the average usability improvements after the redesign.

A systematic and iterative user-centered design process is the basis for profiting from the benefits listed above. ISO 9241-210 (2010) provides a basic framework and guidance on activities in the human-centered design process.

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[1] The Chaos Report was first published in 1994; variants of the Chaos Report under varying names are updated every year ever since (The Standish Group 2015).

[2] http://www.standishgroup.com/.

[3] In 2005 an updated edition was published (Bias and Mayhew 2005).

Table 1. Average usability improvements after website redesign (Nielsen et al. 2008, p. 5).

Metric	Average Improvement Across Web Projects
Sales / conversion rate	87%
Traffic / visitor count	91%
User performance / productivity	112%
Use of specific (desired) features	174%

3   Human-Centered Design Process

The framework describes an iterative process to design and develop interactive products. It is based on comprehensive user involvement and feedback and accepts failure as part of the process (see Fig. 1). It is essentially structured in five activities:

1. Plan the human-centered design process.
2. Understand and specify the context of use.
3. Specify the user requirements.
4. Produce design solutions to meet user requirements.
5. Evaluate the designs against requirements.
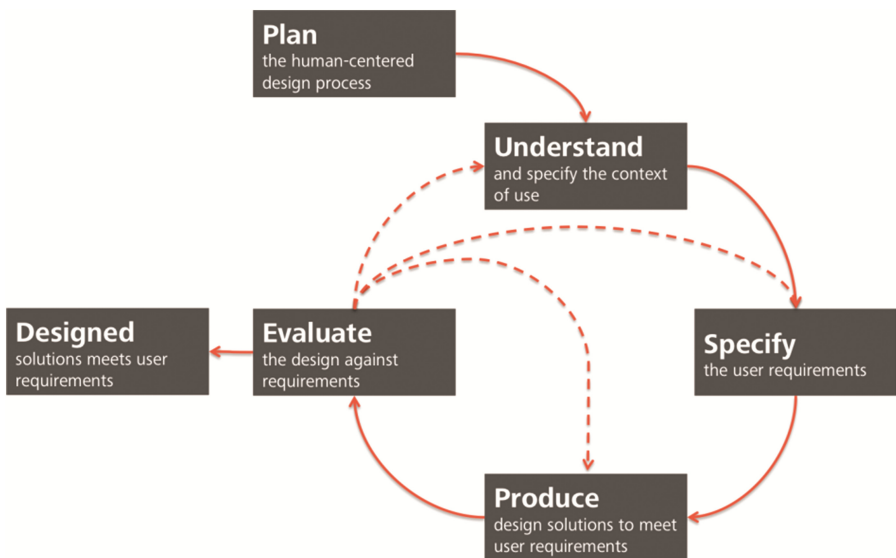
Fig. 1. Human-centered design process (own illustration based on ISO 9241-210 2010, p. 15)

3.1 Plan the Human-Centered Design Process

In the first activity, resources, roles as well as responsibilities are defined, suitable methods to be applied in the design process are preselected, user interface design guidelines are provided (e.g. for a specific operating system), (business) goals are defined and criteria to measure the success of the project (especially regarding the usability) are set (ISO 9241-210 2010, p. 13f.).

3.2 Understand and Specify the Context of Use

It is essential to identify, analyze and describe the user characteristics, tasks, physical and social environment, current problems, as well as user needs and goals (ISO 9241-210 2010, p. 16f.).

3.3 Specify the User Requirements

The goals and needs identified so far are analyzed and requirements are derived. The requirements are prioritized regarding different aspects, including relevance to the user, practicability and economic considerations. User requirements are the basis for the design and evaluation of the interactive system and are most crucial for all following activities (ISO 9241-210 2010, p. 17f.).

### 3.4 Produce Design Solutions to Meet User Requirements

Based on the context of use, the identified requirements, and in consideration of special domain characteristics and design guidelines suitable design solutions are developed (usually in terms of (interactive) prototypes). This includes information design and architecture, interaction design and the design of the user interface (ISO 9241-210 2010, pp. 18–21).

3.5 Evaluate the Design Against Requirements

User feedback is substantial for an iterative optimization of design solutions. The evaluation can be conducted applying user- or expert-based methods (e.g. heuristic walkthrough), in situ or long-term studies, formative or summative usability tests. Choosing appropriate methods depends on available resources, (non-functional) requirements, and other domain context factors (ISO 9241-210 2010, pp. 22–24).

4 Sustainable Design: Extended Human-Centered Design Process

When the designed solution successfully meets the user requirements, it also marks the end of the development life cycle described in ISO 9241-210. Catering for a more sustainable process, the framework needs to be extended by documenting the design decisions made during the process, the final designs as well as potential guidelines for
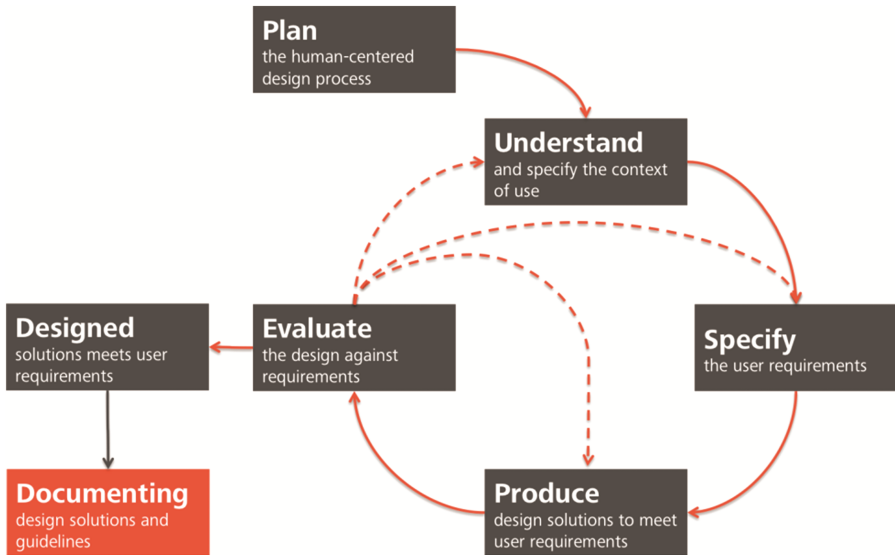
Fig. 2. Extended human-centered design process (own illustration based on ISO 9241-210 2010, p. 15).

further development (see Fig. 2). This is especially crucial if you are working as an external consultant.

"Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs." (World Commission On Environment and Development 1990, p. 41)

Sustainable design therefore cares about the responsible and efficient management of available resources (Shedroff 2009, p. 3). Different strategies can be applied to enhance sustainability in product design: Reduce, reuse, recycle, restore, rethink and redesign (Kramer 2012, p. 7f.; Shedroff 2009, p. xi). Documenting design solutions primarily supports reducing the amount of resources and materials needed in the development life cycle and the reuse of design knowledge and artifacts. Design reuse aims at assisting the designer in developing products with a maximum of user satisfaction and a minimum of resources, cost and effort (Sivaloganathan and Shahin 1999, p. 641).

Reusing design knowledge and artifacts requires a well-structured documentation adjusted to its purpose. This can be the reuse of artifacts in future projects for reoccurring problems (e.g. form design, checkout process) or to provide guidance on further development of the designed product or product family (e.g. style guide, corporate identity). This not only ensures consistency throughout the design, but also reduces time and cost as you can rely on the design decisions that already have been made.

There are plenty of different forms of design documentation varying in their applicability (e.g. general or product specific) and the level of detail (e.g. design patterns including a detailed description of the problem and the solution or more superficial design heuristics). The solutions proposed also vary concerning their level of formality from open document formats to formal XML-based description languages (Bolchini and

Randazzo 2005; Feiner et al. 2010). These design documents can be generated as a result of the design process (see Fig. 2) or may be available from other professionals, institutions or companies (e.g. Apple's iOS Human Interface Guidelines). The documents can be useful for different activities in the user-centered design process, e.g. design guidelines for a specific operating system define the basic design language, whereas design patterns provide structured solutions for more generic problems (e.g. how to design a wizard).

5   Lessons Learned in Usability Consulting

As a consultant you work with different clients, in different domains, trying to achieve varying goals depending on the project context. The resources needed to understand the context of use and to specify the user requirements may vary depending on the domain you are currently working in; the more complex the domain the more effort has to be made. Therefore it makes a huge difference if you are asked to evaluate a web shop that an average user without special knowledge should be able to use or if you are in charge of redesigning the user interface of a wind power station control unit that is designed for a specific target group who needs to have detailed domain understanding (sometimes years of training/experience). This is a recurring challenge usability consultants are facing, who naturally do not have long term experience or a specific training in this domain.

In a study conducted by Chilana, Wobbrock and Ko 21 experienced usability professionals (in-house experts, external consultants, managers) that frequently work in complex domains were interviewed concerning their experiences and challenges. They found that all of the interviewees irrespective of their personal experience rated the work in complex domains as challenging: Collaboration and the availability of domain experts was identified as a critical success factor. Hence the best results are achieved when both usability experts and domain experts are part of the design team (Chilana, Wobbrock and Ko 2010).

Although the resources and effort needed may vary regarding the domain the following findings and lessons learned based on my experience might be helpful (independent of the complexity of the domain):

- **The Understanding of the Domain is Depending on the Project Progress:** Based on my experience especially in more complex domains there is a typical confidence and learning curve varying depending on the project progress (see Fig. 3; Schneidermeier, Heckner and Fuchs 2014): At the beginning of the project you are excited about new challenges and design solutions to come (1). After the project honeymoon is over the complexity of the domain becomes clearer (2). First design drafts are sketched based on user requirements and knowledge gained from intense training on the domain (3). In many cases these design drafts fail first user tests and you realize that you only have a superficial understanding of the domain and that it will take much more effort to truly master it (4). Continued exchange with end users and domain experts finally leads to a design that meets the user requirements (5).
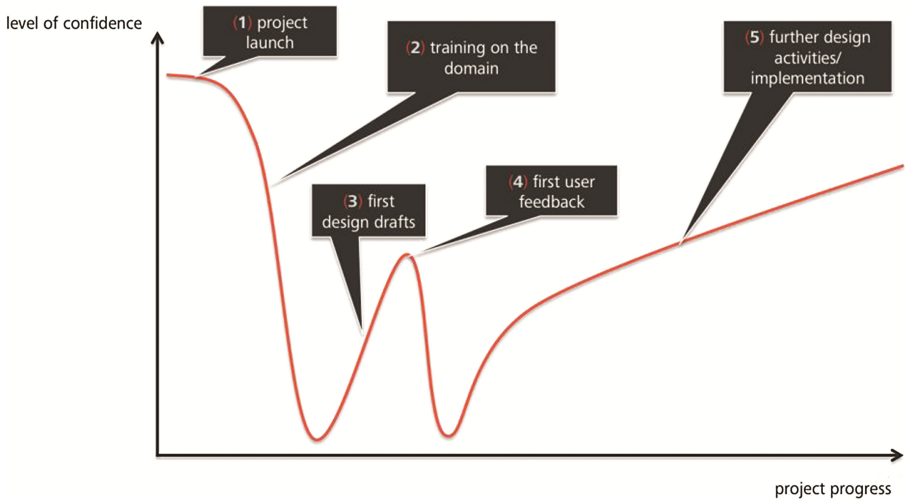
Fig. 3.   Level of confidence according to the project progress

- **A General Understanding of the Domain is Required for Successful Requirements Engineering:** Lacking important previous knowledge may lead to a misinterpretation and faulty categorization (important, not important) of results gained e.g. from contextual inquiries or focus groups. Consulting additional resources such as specialist reading material or conducting pre-interviews may be necessary.
- **Clients Tend to Underestimate Time and Effort:** The complexity of the domain and the effort needed for the usability consultant to become acquainted with it often gets underestimated by clients, especially it they are domain experts themselves. For the client the domain is business as usual while the consultant may need to start from scratch.
- **Complex Domains Require More Time and Effort:** In many cases the full extent of complexity is revealed only during the project duration. Therefore it is essential to respond with the right methods and tools. Furthermore important domain knowledge needed to design user-friendly solutions may only be available implicitly and has to be acquired through interviews, feedback loops and user tests.
- **The Better Your Understanding of the Domain and the Context of Use, the Better Your Design Solutions:** A successful project is based on a regular exchange with target users and the availability of domain experts throughout the project. This may be even more important in complex domains.
- **Adapt Your Methods and Toolbox to Domain and Context Factors:** Different domains and contexts may need a customizable set of methods. Be prepared to think outside the box. Managing your resources well is crucial for a successful and smooth course of the project.
- **Document Your Design Solutions:** Whether you are working in-house or as an external consultant, documenting your work and the decisions made during the design process is essential for a more sustainable design. This can be personas, design patterns, prototypes, style guides etc. These documents provide a sound basis to build

upon in further developments and allow the reuse of design knowledge and artifacts. Documenting your design knowledge additionally enables tacit knowledge to be made explicit.

6   Conclusion

Working as a usability consultant is a diversified and challenging field: Today you redesign a customer relationship (CRM) software, tomorrow you may be in charge of eliciting requirements for a mobile application for chimney sweepers and wandering above the city roofs. Making informed decisions based on user requirements, testing your designs, respecting user feedback and documenting your design decisions and solutions lays the foundations for easy-to-use products with good user experience and a sustainable design process – independently from project or domain context.

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