

Design Process Research: Incorporating Value-design into Interaction design

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1. ABSTRACT

Currently Interaction Design neglects to incorporate into its lifecycle the importance of reaching a balance between stakeholders' vision and existing limited resources (such as time to execute the project, funds allocated to the project, human resources available, etc). Incorporating a Value-driven methodology into each step of Interaction Design should help curb the number of required iterations and thus reaching an optimal solution in lesser number iterations given the limited set of resources. In other words, given a limited number of resources in an Interaction Design process, construct examples that Interaction Design benefits from a Value-driven design and helps reach an optimal balance faster.

An example is a series of usability graphs that can explain how Value-driven design aids in delivering an optimal solution.

An optimal solution is an acceptable solution to the stakeholders, delivered in the least number of iterations using resources within certain limits; being resources time, funds and human resources allocated to the project

From a procedural point of view an optimal solution is sought through operational research by constructing an objective function having as variables time, money and resource allocation.

Usability is abstract concept that varies from project to project, please see the discussion section for more details

2. INTRODUCTION

The Interaction process is a user design centered process and thus it's the user experience that drives the entire design of the product[1]. By going through multiple iterations through the different stage, Interaction design delivers an optimal, user driven solution. Nevertheless, the design process forgets that the entire project in is also a function of resources; being them time, budget and human resources allocated to the project. The Interaction process does not formally bound itself and makes the assumption of unlimited resources at its disposal to reach an acceptable solution to the stakeholders. Adding a Value-Driven methodology to Interaction Design would bring in a

missing component and moreover help aid in making Interaction-design a more attractive model for organizations seeking to deliver usable products following the Interaction Design process.

3. BACKGROUND

With the emergence of ubiquitous technology the complexity of designing useful, usable and desirable artifacts is a major endeavor. The Interaction Design Process' intention is to define both the behavior of an interactive product and how will this product interacts with the user [2]; in particular, focusing on the complex dialogues that occur between people and interactive devices. The core of the process is to follow a user centered design in which attention is paid to capture the goals, tasks, experiences, needs and wants [3], through multiple iterations.

Value-Driven Design is a process in which an optimal solution is reached through a mathematical value model from within a context where requirements permit a degree of flexibility [4]. Given that optimization is not ingrained in the design process, Value Driven Design attempts to set a context for applying optimization in the design of large scale systems. The process, in a bottom up approach, attempts to deliver an optimized system by optimizing every step of the system as it is assembled together. This design process was born in the aeronautical industry where projects quickly ballooned out of the estimates in terms of budget and time as all the stakeholders' interests were considered and incorporated into the project [5].

4. METHOD

The process of Interaction-design can be summarized as a series of refinements through a series of iteration based on user feedback in order to reach the best design. Value-Driven design is a process where the main objective is to find equilibrium between conflicting stakeholders' interest by using operation research.

By walking through common examples of usability graphs, a demonstration is why Interaction Design process can benefit from incorporating Value-Driven Design.

5. RESULTS

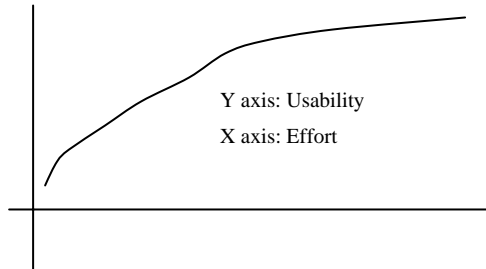


Figure 1

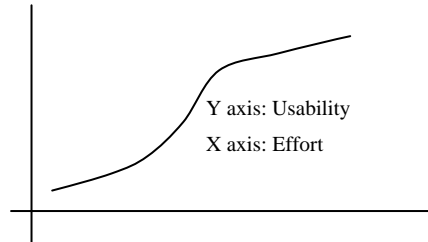


Figure 2

The Graphs (Figure 1 and Figure 2) above shows us classical examples [6] of usability curves; usability represented by the Y axis and resources represented by the X axis. Both graphs reflect the same phenomena encountered in any design process: as time goes by and resources are invested it becomes increasingly more difficult to increment utility, in our case usability.

In Figure 1, rapid progress is made at the beginning; usability increases significantly with initial investment but increasingly it becomes more difficult to achieve gains in usability even though more resources are committed to the project. In contrast, Figure 2 depicts the scenario where little progress is made at the beginning but increasingly faster progress in utility is achieved as more effort is put but eventually reaching the same plateau as Figure 1 where more resources result in increasingly smaller marginal progress in usability..

In theory, the problem for Interaction Design would be easy to solve as one of the resources would eventually become the bottleneck and thus becoming the stop sign for the entire process. Having no stopping criterion defined, the Iteration design process would continue until it exhausts one of the resources. The marginal increase of usability might not have justified the use of the resources, but the project had no idea where to stop investing resources. This is the place where incorporating Value-driven design into the process would yield beforehand what the stopping criterion is by applying an Optimization model of the resources and usability.

Nevertheless a project may have many variables that model a usability curve in a more complex graph that may include multiple local minima and maxima as shown in the following graphs (Figure 3 and Figure 4).

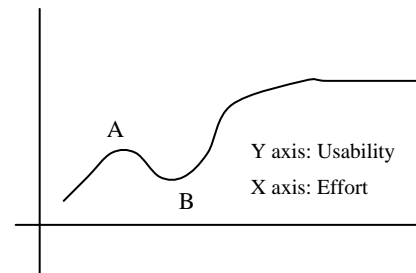


Figure 3

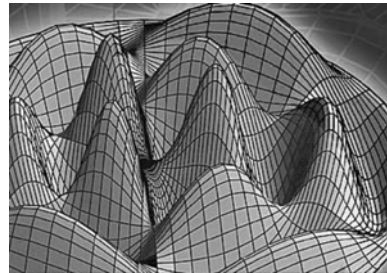


Figure 4

In a in very simple example, Figure 3, the graph depicts a scenario where resources are allocated and a local maxima is reached, but increasing investment of resources does not result in improvements; but rather, perhaps, in a decrease in usability. This might be the case of an application that has the right balance of usability of functionality (Point A). However, stakeholders feel the product doesn't have all the functionality they had envisioned. More feature are added resulting in a complex, not user friendly interface; but this interface is capable of delivering all the functionality stakeholders had in mind. This part would be depicted in the curve by the Point B. Yet more money is invested to simplify the interface without loosing any of the gains in functionality until eventually a better solution is built, but the increase in usability (utility) is not linear to the investment of resources and eventually a the process is stopped based on scarcity of one of the resources.

Figure 4, on the other hand, depicts possibly the same scenario but as a function of three variables: time, human resources and funds. The surface of the graph would represent usability. Many local maxima may exist depending on the limitation of the resources. So Operational Research can be used to find local maxima given limited number resources. Stakeholders will dictate the constraints of the resources. The result of the optimization will suggest suggested criteria to achieve; thus when the development has reached the desired metric they would stop the iteration process and saving resources for what would be small gains in Usability or because a loss of usability would be achieved because additional feature would be added.

6. DISCUSSION

The hard part of this type of incorporating Value-design into Interaction Design is how to quantify usability. Usability cannot be measured directly as it's an abstract concept, it has to be done indirectly; for example, time to complete a task, time to learn a new task, error committed during a task, reported user satisfaction, product sales, time of usage of production to cite a few examples. Bottom line is that a metric for usability depends on the product and what the stakeholders value as successful usability.

Finding an appropriate measure of usability can be hard; furthermore finding ways of expressing this metric in terms of the variable (time, resources and money) can also be a challenge in itself. How does number of developers translate into errors committed during the execution of a task? How do project funds translate to number of steps to complete a given task? The answer lies in management's experience, historical data and pure statistics.

7. REFERENCES

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