Structured User Interface Design Methodology

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ABSTRACT
This extended abstract describes the research in progress to develop a methodology to deploy user interface designs based on a layer-conformed structure. Final descriptive designs are achieved when all layers are specified.

Keywords
Design, structured design, user interface, layered design.

INTRODUCTION
Even though there are important methods for developing user interfaces there is still some elements left to the designer's creativity and initiative. Some times those elements are carried out as artistic processes. This somehow "artistic" approach implies some risk that the final product will be of lower quality than expected. The designer could have not considered every aspect there was to be considered.

This work tries to explore the benefits of building a user interface design solution with a series of predefined layer-organized tasks, to guide the development of the design. There is still a lot for the designer to apply creativity, but the simple definition of the layers opens a road to analyze and compare different design solutions and to develop further individualization or subdivision of layers to left less to artistic work.

GENERAL DESCRIPTION
The basic statement for this methodology is that when a user interface is to be designed there are 10 layers to define over one application-specific element: the reality objects that are to be manipulated through the computational system.

The methodology itself starts with the specific identification of the reality the system is going to work with. Over this definition there are 10 layers to define:

1. Representation of the reality elements; 2. Organization of the represented elements; 3. Access method to let the user reach the represented elements; 4. Capture method for getting elements existing "outside" the system into a representation "in" the system; 5. Actualization method for making the "outside" elements to be corresponding to the "inside" elements; 6. Creation method for letting the user get new elements "mind created", into the system; 7. Destruction method so the user can "destroy" elements no longer desired in the system; 8. A collection of methods to let the user interact with the elements of the systems, meaning, to let the user "act" over the objects represented in the system; 9. A method to let the user know what the response of the represented objects has been to the actions performed; and 10. Change notification method to inform the user when an object has been changed due to the actions of other elements in the system or outside it.

Applications of the methodology
The inmediate application of this methodology is the general design of user interfaces and, in general, interaction schemes for information appliances.

The methodology can be of particular interest when the design process reaches a point where a "redesign" or "reengineering" is required. The designer can select those layers whose design form is considered adequate or mature and apply redesign or modifications to those less terminated. For example, it could be possible to have an excellent representation layer buy a weak access or organization. The access design can be discarded, the organization layer could be modified, and so on.

User Centered Design (ISO 13,407) requires the iteration of design solutions meaning that several prototypes are considered for evaluation. This methodology can provide a guide to develop prototypes in each specific layer, achieving a more structured process.

Comparing different interfaces or interaction schemes is also possible with this methodology. If the reality objects that are to be manipulated for two different systems are

similar enough then it is possible to compare their representation layers, their access, organization, creation, destruction, capture, actualization, etc. Comparing interfaces becomes a structured task.

RELATED RESEARCH IN PROGRESS

Additional research has been done to complement the development of the methodology. One of the main assumptions made by the researcher is that every information system is devoted to handle a set of objects coming from the real world. The approach has been of philosophical nature, because there was very fundamental questions. If every system handles a set of real world objects, what are the "real world" objects that virtual reality systems handle? Reality objects that are manipulated in computational systems are not inside any computer, only their information is there, so what is the nature of information? And how can we get the information from an object and store it in an information system? How does the human beings know? Here it was needed to dig a little into psychology, gnoseology, philosophical anthropology, etc.

What is the best way to represent objects from real world in order to make them easier for humans to be informed about them? Every layer of the design process presented in this methodology implies its own fundamental questions. How can be objects organized? What is the difference between a single user action and an action whose purpose is to access an specific object?

On the other hand there is a lot of field research required to sustain the theoretical results. For example, one planed project is to evaluate systems developed by undergraduate students as programming course exercises, in order to have a set of different implementations of the same information systems. It is very difficult to find a big enough set of similar systems. Word processors and electronic spreadsheets are a good choice, but application of the methodology to the evaluation of systems cannot be restricted or influenced by the particular nature of the cases. So students projects are good choices too.

There is also plans to promote the teach of the methodology as a user interface development course, in order to see how projects developed by students applying the methodology to develop their interfaces differ from those who do not know the methodology.

Further development

As mentioned before, the methodology opens an space for further development or individualization of the layers defined. For example. One research can focus on developing the representation layer. Different types of representations can be defined according to the means used to represent, according to the level of exactitude the representation can offer and according to the needs of the final users.

That same process can be done with the rest of the layers. The current research suggest that stronger work will be required on the development of the representation, action, response and change layers basically because that is where most of the action takes place in interactive systems.

Limits of the actual research

The methodology itself is limited. It does not tell the designer how to represent objects or how to provide methods for creating or destroying elements, it only says that those layers exist and that they have to be covered by the design. It does not tell either how to specify each one of the layers it only says they have to be specified in order to achieve a complete design solution.

Those limits can be opened in future research efforts, but the same limits imposed to the methodology are observed in the research. The main purpose of the methodology and the research itself is to prove the validity of a user interface design process in which different layers of design are covered.

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