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# Interaction Design Guidance for Interactive Television Applications in Pattern Form

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## Abstract

In this paper a pattern approach to interaction design guidance for digital interactive TV (iTV) applications is presented. One interaction design pattern example is given for iTV shop applications. In order to find high quality iTV solutions that can serve for the development of interaction design patterns the criteria of usability has been drawn upon.

## Keywords

Interaction design patterns, design patterns, Unified Modelling Language (UML)

## Introduction

In the discipline of Human-Computer Interaction (HCI) an interaction design pattern is the structured description of a proven solution for a repeating interaction design problem in a given context. Interaction design patterns serve as guidance for the design of interactive systems. For the design of interactive systems different collections of interaction design patterns exist [Tidwell, 1999. van Welie, 2000. Borchers, 2001. van Duyne et al., 2003]. Interaction design patterns are user-centered. They describe problems users have as opposed to problems of designers or developers. The term “design pattern” was first introduced by Christopher Alexander to the discipline of architecture [Alexander, 1977]. For interactive TV applications in particular no interaction design patterns are available so far. This paper presents a first example.

## Finding Proven iTV Solutions

When developing interaction design patterns for a new domain like iTV, it has to be taken into account, that unlike in architecture rather few iTV application exist. iTV applications have not been through a selection process over a long period of time and by a wider user group. Instead high usability of the underlying iTV applications can ensure the quality of the patterns. In order to find easy to use solutions various iTV applications have been evaluated regarding their usability using the heuristic inspection method. Shneidermans “Eight Golden Rules of Interface Design” [Shneiderman, 1998] have been selected as set of heuristics because of their abstraction from the technological platform. These are:

- Strive for consistency

- Enable frequent users to use shortcuts
- Offer informative feed-back
- Design dialogs to yield closure
- Offer error prevention and simple error handling
- Permit easy reversal of actions
- Support internal locus and control
- Reduce short-term memory load

Only those iTV applications and functionalities evaluated as easy to use due to their implementation of Shneidermans guidance have been used to develop interaction design patterns.

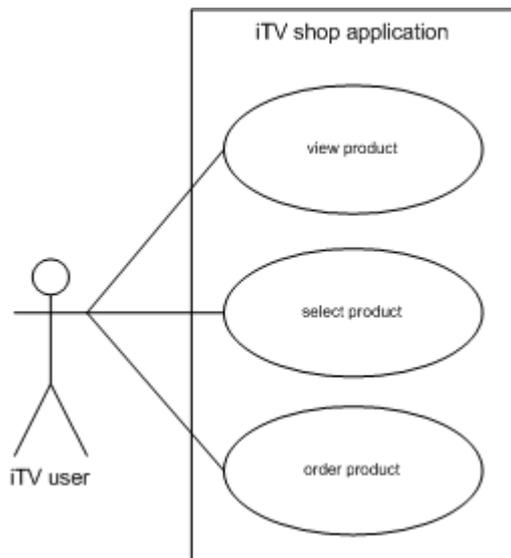
## Interaction Design Pattern Example for iTV

### **Name**

iTV shop application

### **Problem**

How can a user view, select and order products within an iTV application?



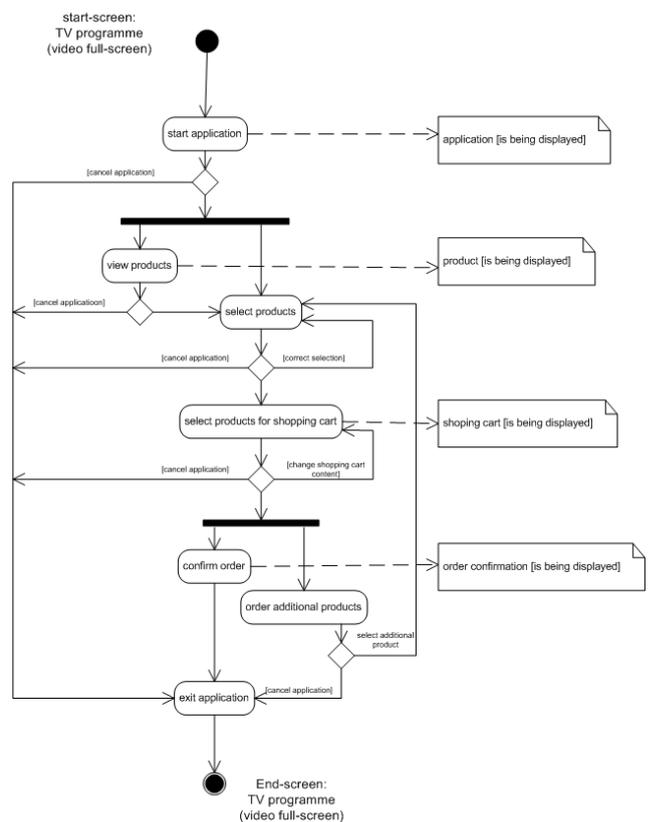
**Figure 1.** UML use case diagram of the problem

### Forces

- User seeks overview of product range and product information.
- User wants to be leaded through the order process step by step with short help messages.
- User wants control over the order process, wants to be able to change or cancel the order any time before the final order placement.
- When ordering more than one product the user wants to be able to check the total price of the products in the shopping cart at any time.
- User wants to access product information without the need to place an order.
- User requires secure order process.
- User wants to be able to select product attributes (colour, size, amount).

### Solution

The order process should follow a given sequence of steps guiding the user from product selection to order confirmation. Help should be provided when needed and security maintained.



**Figure 2.** UML activity diagram of the solution

### Example

QVC on Sky Digital, UK:

The screen of the application consists of four areas:

- Programme/video stream incl. the offered products
- Form to enter product properties
- Product information incl. price
- Navigation menu

For selecting a product the user has two options:

- Confirming the product that is presently presented in the video stream using the yellow colour key.
- Pressing the green colour key and entering a product number in the form on the right side.

Entering the desired product attributes in the form on the right side (colour, size, amount, payment option).

Before the connecting to the broadcaster is being established the user has to enter a user number and pin code to confirm and secure the transaction. All important information (product, price, payment option) is being displayed. Until the connection is completed the order process can be stopped or cancelled by using the back or cancel key.

At any time throughout the order process a help function can be activated using the "i" key on the remote control.

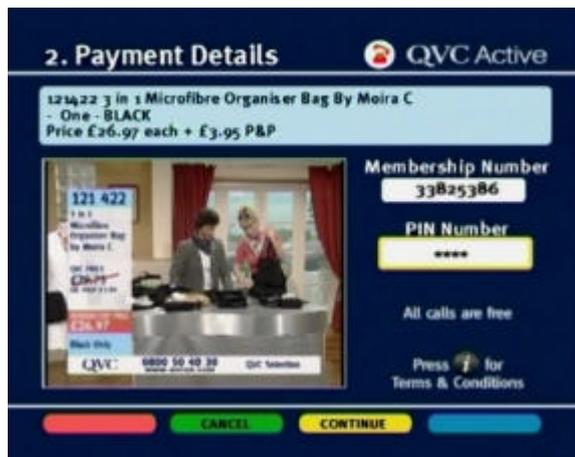


Figure 3. Screenshot of QVC on Sky Digital, UK

## Format of the Interaction Design Pattern Example

For interaction design patterns different formats have been proposed [Tidwell, 1999. van Welie, 2000. Borchers, 2001. van Duyne et al., 2003]. All of them are based on the form of design patterns introduced by Alexander [Alexander, 1977]. They vary in their elements, the number of elements and the elements' title and order. Existing interaction design pattern collections cover visual presentation as well as dialog level aspects without explicitly distinguishing between the two.

### **Integrating UML Use Case and UML Activity Diagrams**

The presented example focuses on the dialog level and is task-related. Presentational aspects are not documented. To support the integration of this example pattern into a user-centred software development process a use case based approach has been chosen. To additionally facilitate the integration of the pattern into the object-oriented software development process a Unified Modelling Language (UML) use case diagram illustrates the problem element and a UML activity diagram illustrates the solution.

This format for interaction design pattern has been evaluated in another context. Applied to the domain of desktop-based E-Learning applications an

interaction design pattern collection has been developed in this format. For the evaluation the developed interaction design patterns have been presented to various heterogeneous designers and developers of E-Learning applications and then expert interviews have been carried out with them. The majority of the interviewed designers and developers rated the format as highly useful to support the integration of interaction design guidance into their daily work. However, evaluation for the design of iTV applications has to follow.

## Conclusion

At this early state of iTV evolution interaction design solutions for iTV applications can only be pattern proposals which need to be optimised and discussed with other iTV designers and developers.

Further research is needed to evaluate the usefulness of interaction design guidance for iTV applications in form of design patterns. Additional evaluation is needed regarding the usefulness of the developed interaction design pattern format that integrates UML use case and UML activity diagrams.

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