INGENIEUR EN SCIENCES INFORMATIQUES

RAPPORT DE SYNTHESE SUR LES TRAVAUX DE RECHERCHE

DESIGN CRITERIA FOR PUBLIC DISPLAY USER INTERFACES

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I. Summary of Article

This article is mainly about introducing a set of design criteria for the information selection and presentation in public displays. It focuses only on public displays which provide dynamic output but don't support the possibility of user interactions. After reading this article, I have a preliminary understanding on how to select the relevant content and present it in such a way to take into account the features of the specific devices and the context in which the public displays are used.

II. Context of Use

According to the course, usage context includes three aspects:

  •**Users**: The public, which can be embodied according to different environments.

  •**Platforms /Supports**: Large displays in the range of 40-60 inches that can vary in terms of orientations and technologies used (LCD, plasma, various types of projectors, etc).

  •**Environments**: Public places whose deployment can occur both in outdoor and indoor environments such as trains stations, airports, hospitals, public offices, museums, universities, shopping centers, bars and restaurants, etc.

III. Requirement of Plasticity

Plasticity of public display user interfaces is required *in execution stage* in order to pleasant user experience. The requirement of plasticity comes along with the context of use described as above.

•**Change of environments**: For public displays, the change of environments brings about the most requirement of plasticity. We should think about what information to provide and how to present it on the basis of a real environment. Where the display is located has an impact on the choice of the most suitable type of information and presentation, some locations are suitable for longer information access while others are places of transit and thus users dedicate rapid limited attention.

•**Change of users**: In our case, the change of users is related closely to the change of environments. Different environments decide the groups of users, users' expertise, users' reading habitudes, etc.

•**Change of supports**: The most important point is the differences between the size of screens. Because it could result in layout's rebuilt of an interface. And also technologies used in display devices. But this aspect isn't taken into consideration in this article.

IV. Design criteria for public displays (Proposed Solution)

According to the article, there are three relative aspects when designing user interfaces for public displays. In this part, I've extracted many sentences from the article because it's necessary to explain why these factors should be considered as important aspects. The authors' thinking is perhaps what I should learn the most. **As it's just a text description, I can't associate it to an underlying model**.

1. Context of use in which the public displays is deployed and accessed

Position and time are the two most relevant contextual aspects. The reason for position to be an important factor has already been explained as above. Time is also significant because different

contents can be more relevant depending on the time they are shown, for example if the display is located in places where new events occur frequently, then it is useful to exploit such changing events and immediately indicate those happening in the upcoming relevant time period. After well explaining the importance of these two factors, I've summarized solutions for them basing on proposed design criteria by authors.

•**Position**: The place where to locate the display should be accessible, visible, in a heavily trafficked place, at eye level or above. It can be indoor or outdoor. Depending on the position various aspects can vary: the information displayed, the dynamicity of the information, the structure of the layout, timing.

Example: A display at the entrance can show various screens with essential information repeated periodically, while a display in a waiting room can show various, more detailed, pieces of information at the same time, available for longer time. In a street it can be useful to have some multimedia elements with animations in order to draw the attention.

•**Time**: The type of content should be well suited to the time of its display in order to highlight useful information for the next hours. Such information can be general or specific to the context in which the public display is located.

Example: In the morning it can be useful to show weather forecast for the day or the timing for public opening, while in the afternoon it can be useful to indicate events that occur in the evening nearby, while in the evening it can be useful to show the weather forecast and meetings that are scheduled for the day after.

2. How to select and organize the content

As it is important to carefully select the type of information, the source channel and media used to communicate, type is an important factor that depends on the environment in which the display is located, the target users, and its purpose. What's more, number of information items and the text are also factors that cannot be ignored. Solutions as below:

•**Type**: The content types should be multimedia by integrating various types of texts with images, videos, maps, etc, but should also simple to ease their interpretation. The important point is that external content should be filtered and structured in order to be included consistently in the public display user interface.

Example: Content derived from news channels could be useful when updating information, however, social networks can't be considered as a valid source because the information provided hasn't been carefully checked.

•**Number of information items**: It depends on the purpose of the display, the user interface structure and where it is located. If the purpose of the display is informative then greater amount of information is expected, even provided dynamically through multiple presentations. The location is relevant since it determines how long people can look at the screen, and consequently the number of topics that can be considered.

Example: Waiting rooms or public offices imply the possibility of standing for longer time than entrances and corridors where people have to move and so the texts should be read quickly.

Each topic is associated with an area in the public display, usually we have a range from 3 to 6 informative areas.

•**Text**: It should be communicated with short clear expressions, in very few lines, left or center aligned, sometimes using bulleted lists. The main message should be communicated with a few, clear, and simple words (from 2/3 to 5/6 words), and a limited number of rows (from 1/2 to 6/7 rows). Titles should be with at most 22 characters, texts with at most 27-30 words, verbs used in active form, describing actions and stimulating involvement by using key words.

3. How to present the content in such a way to allow effective and efficient access to it

•**Layout**: The layout should be organized in such a way to capture the users' attention and drive their visual scan. It should be composed of three to five areas associated with the main information topics whose space depends on their importance. The resulting structure should be regular and easy to interpret. In general, there is one main area in the central part, which should attract the user's attention and provide the most important information, and some secondary areas with various spaces. Thus, symmetric layouts where two or more main areas have similar size do not seem to provide a useful hierarchy for driving the user view.

•**Color**: The classical 7± 2 colors can be applied because when too many colors are used, our eyes do not know where to look first. Contrast is a key element in color choice in order to make sure that the message is easily readable. The choice of the color should also consider the type of lighting available in the location where the public display is deployed.

•**Font**: The font should be simple and readable in order to better support the communication. It is better to avoid the use of fanciful or small fonts, which can be difficult to read. The titles should have a font size larger than texts with a ratio that can go from 1 : 1,5 up to 1 : 2.

•**Dynamicity**: Usually the interaction between the user and the display is short and casual. The user's full attention is usually limited to 2-3 seconds. Then, before deciding whether reading carefully or moving the gaze somewhere else the content is looked for 10-15 seconds. In an entrance or hallway it can be 2-3 minutes while in a waiting room it can be 7-8 minutes. In the case of various pieces of information that are shown in a cyclic way then the average time for each presentation should be around 3-5 minutes with some variations depending on the location.

V.   Design Example Illustration

In order to show how to apply the design criteria to real conception of public display user interfaces, I make three examples applications: a hospital waiting room, a museum, and a research center. Such contexts are different and thus determine the communication of different types of information in a different way.

Museum

Analysis: In a museum context using a public display to show static information such as fares and opening time would have limited effectiveness, while exploiting the large screen in order to show dynamic content that supplements the static descriptions accompanying the various artworks could improve the user experience.

Example: In a museum showing sculptures, it can be used to show where the quarries from which the material for such sculptures was extracted are located, the techniques used to extract such material, where the artists processed them, other artworks made by the same artists or similar artworks that are located in other museums.

Hospital waiting room

Analysis: Hospital waiting rooms are destined for use by people who often have to wait for long times, and thus may be willing to read more elaborated content. Health organizations can take this opportunity to provide users with information regarding the current services situation and how to access them (waiting list, expected duration, booking modalities, services currently available) but also for stimulating interest on how to improve personal behavior and health or for some prevention and awareness campaign.

Example: Use public displays also for some campaign against smoking or alcoholism or for suggesting better diets and physical exercises. They can also be exploited for advertising events such as donor days. In order to enrich the informative content some information not strictly health related can be provided, such as local and national news, weather forecast, photo galleries of the sights of the area.

Research center

In the case of a research center, public display represents a tool that can be exploited for providing students and visitors with overviews on the most recent research results and activities, also through images and videos showing some engaging demos, in order to stimulate interest in them. Such content can be accompanied by some general information regarding the town and weather forecast, and news related to the relevant research areas (such as forthcoming conferences, recently published papers by other groups, etc).

VI.   My Opinions

As a software engineer, designing user interfaces for Web desktop applications is much more familiar to me than for large displays. The differences between them is that in desktop Web applications users usually access their applications alone, while sitting, and with the possibility of spending some time for searching and reading information, which can be located on any Web server. While public displays are usually accessed in public areas, where people are on the move and have little time to observe them. Moreover, the information that is accessible in such displays is predefined, with limited or no possibility for users to select the content.

Despite these differences, this article has taught me what factors should be considered about when designing user interfaces for a certain device with some specifics. It has made a great example that conception and implementation of user interfaces should always be adapted to the real environment. Honestly, designing interfaces for public displays means a new field to me and I may never set foot in it, but it does have inspired me with its consideration and resolution of different factors and aspects.

The plasticity shown in this article is mainly focused on the change of content with different context of uses. Thus inevitably, it still leaves many other problems related to the plasticity to be discussed such as how to deal with the difference of different screens' sizes, how to handle the problem with surrounded environment (a display in a dark bar/in the bright stadium), etc.