

DESIGN GUIDELINES FOR IMS USER INTERFACES

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Abstract. This article raises a set of questions concerning the impact of IMS (architecture designed for land-mobile-Internet convergence) on user experience. It also presents the steps in the preparation of a guide proposing the initial ergonomic recommendations for the design and evaluation of IMS services.

1. Introduction

The IMS (IP Multimedia Subsystem) is a standardised Next Generation Network (NGN) architecture designed for the all-IP convergence of telecommunications networks. IMS enables users to access their services and data from land, mobile and Internet terminals. Several parallel sessions are also possible together with mobility access (or roaming). IMS also provides access to quality interactive multimedia services, multi-player games, presence information, the sharing of content, etc.

Traditional services are extended and interconnected: users can send photos while communicating, switch from audio to video during communication, start a PushToTalk session from an IM session (Instant Messaging), etc.

At the end of the day, all of these environments relate to each other: users can play games on their telephone, telephone via their TVs, watch TVs on their computer, etc.

To begin with, we could consider that IMS will not fundamentally change user experience for the technical devices currently used. Users will certainly have access to a greater quantity and a wider range of services, however they will still use (at least to begin with) their mobiles, TVs, Internet and PCs, where they are familiar with the individual operating modes and developments.

The IMS even aims to improve the experience of the final user, e.g. by simplifying switching between services and terminals, by simplifying the

sharing of content, by improving service quality, etc. However, we consider that these technical devices, which are familiar for users, are only the tip of the iceberg. The design of user interfaces (UI) for these new services, these new communication possibilities raises a set of new questions such as:

Convergence - access to one single service from different access points.

How can we design the interfaces of the different terminals providing access to this service? Is it preferable to define one interface and then adapt it to the other mediums? Will that approach be sufficient to ensure consistency and homogeneity between the different UIs in view of the wide range of terminals (display capacities, UI style, type of interaction, etc.)? Can all access points propose the same functionalities, and do they need to? Should design not consider all terminals right from the start?

The integration of services - the aim is to design services which simplify intercommunication and use the same language.

How can the services of an operator be integrated in a terminal which has its own applications while guaranteeing a consistent user experience? One solution is to retain the "look & feel" of the terminal. However, in this case, how can consistency be ensured with the other UIs of other terminals? In the same way, how can we add an application to a set of completely integrated services without endangering the overall construction?

Complexity - how to solve the following equation: propose easy-to-use UI while increasing the number of functionalities and gateways between services?

We need to consider if a user-focused design and compliance with the dialogue principle are adequate for UIs?

Questions also need to be considered for users: What strategies will a user implement to handle this complexity? Are there limits which must not be exceeded? We need to remember that fundamental cognitive skills are stable when answering these questions. In addition, increasingly demanding users are faced with the production of increasingly complex products. These users have varied profiles, but are less specialised and expect to be able to immediately use the new device without need to learn. This is what ETSI (2002) calls the "Usability Gap".

The mental model - in this document this term refers to the operational knowledge of a technical device acquired by the user during interactions.

We can assume that users acquire one representation per field, as the different sectors have retained their own interfaces to date: TV, IT, Internet, telephony, etc. Users activate these representations when using a convergent service where the differences between interfaces fade out. How can we ensure that users understand what they can do and how to do it? Should we provide user accompaniment to enable a reconstruction of existing mental models rather than forcing a rupture?

The mental model issue runs parallel to that of complexity: from a cognitive point of view, is it possible to represent an environment as vast as that offered by the IMS in a consistent and global manner?

Questions also need to be considered for designers: Designers also construct a mental model of the technical device which they design and that of the final user (Norman, 1988). The complexity of the element considered and represented could raise new problems.

Several solutions could be considered for the above:

1. Opting for a **user-focused design policy** - this recommendation is not new in the world of "Human Factors". However, we consider that the need to apply this design process (see ISO 13407, 1999, for an example) and the need to apply a set of design rules (see Scapin & Bastien, 1997, for an example) is even more critical in this case. The attention paid to structuring, guiding, adapting, assisting and standardising UI is essential to help users to find their way in complex environments with a new structure.

In this context, we have prepared initial ergonomic recommendations to assist in the design and evaluation of IMS interfaces.

2. Focus on the field of **innovative interfaces** (e.g. multi-modality, natural language, rich interfaces, 3D) – which, well used, could meet the requirements of functional augmentation.
3. Carry out **research** into certain problems such as convergence, mental models, complex systems, etc.

2. Characteristics of our recommendations guide

This guide has 2 objectives:

1. Represent a common working tool for design teams, enabling the anticipation of certain IMS-specific ergonomic issues.
2. Represent a context for the consideration of the problems identified and capitalise.

These recommendations are not currently long-term, unlike the recommendations which can be found in published documentation. They have been defined in a concomitant manner with the start of the design phase for IMS services in our laboratories. They are intended to be updated as the phase progresses and experience is acquired in the field.

Finally, the user interfaces hosting IMS services already exist, and we do not aim to redefine existing recommendations for these mediums. Neither is the aim to reformulate the main ergonomic trends which are currently defined in published documentation. Therefore, the target is to propose recommendations for IMS-specific elements, without being neither over-precise nor over-general. To this end, we have identified the main functions provided by IMS (and convergence generally speaking). Once these specific

elements had been identified, we considered a set of ergonomic facts and proposed ergonomic recommendations for each of these main functions.

3. Guide design methodology

We based our definition of these "specific IMS characteristics" on the work carried out by an ETSI team (Schneider-Hufschmidt, Von Niman, Ketola, Tate, Williams, Böcker, Parodi and Flygt, 2006).

The originality of this work resided in the interpretation of the difficulties faced by users when configuring their devices or accessing the services in the form of use cases and the conclusion of a set of recommendations.

We particularly retained the idea of questioning people in the field to assist in defining the specific elements of IMS for users, to write the use cases to simplify understanding and identify critical phases and to organise a recommendation validation phase.

3 phases were organised:

1. Identification of the main functions characterising the IMS: we used different sources of information. This mainly required interviews with personnel from our laboratory involved in IMS projects or convergence, reading on the subject and the knowledge of the IMS models available in Orange Labs.

2. Definition of recommendations: globally, initial ergonomic recommendations were proposed for each of the functions identified.

3. Validation of the recommendations: three engineers and three ergonomics' experts read the draft and we subsequently prepared the final version.

4. The main functions of the IMS from the user's viewpoint

8 main IMS functions were identified and were subsequently organised into 11 recommendation sheets.

It must be noted that these are functional possibilities which may be proposed to users by operators and equipment manufacturers. We do not, at this stage, know what users will accept, reject or adapt.

Sheet 1: Access the same content from different terminals

Sheet 2: Manage the following parameters defining user status

- presence, contactability, media capacity and location

Sheet 3: Access the following parameters defining the status of user contacts

- presence, contactability, media capacity and location

Sheets 4, 5, 6 and 7: Managing a "communications' suite"

- choose between various media when initiating a call
- switch from one medium to another during a call with a contact
- manage several communications (multitasks)
- share content during the communication
- transfer content during the communication
- change terminal during communication

Sheet 8: Receive information on the caller

Sheet 9: Access personal data anywhere

- at home, in roaming, on arrival

Sheet 10: Synchronise local and network data

Sheet 11: Configure user convergent services and content

- manage a family account: collective terminals, personal accounts, etc.
- personalisation/individualisation/ Multi-identity
- integrate the user's local network and home equipment.

5. Recommendations

The following is an example of a sheet. All sheets have the same format.

IMS Function ②	Change terminal during communication
Use case	<p>Ian calls his cousin Clara with his fixed telephone. He decides to switch to his PC because he has some photos to send her: it will be more comfortable using the PC.</p> <p>When he has finished, he switches the conversation to TV to enable everyone to listen in.</p>
Advantages/risks for the user	<p>Advantages</p> <p>Choice of the most appropriate terminal for the situation without having to hang up.</p>
Recommendations	<ul style="list-style-type: none"> ☛ Combine the various terminals accessible when a call is made within one access point. This does not stop you proposing split access points according to contexts. But the idea here is to group functions of the same type together by location. This should facilitate the learning process and switching from one medium to another. ☛ Protection against errors during the transfer procedure. During the transition from one terminal to the next, various problems may be encountered making the operation impossible: PC not switched on, terminal engaged, etc. The user must receive clear information throughout the procedure to enable him or her to act accordingly and avoid any problems, losing the current communication in particular. ☛ The procedure for hanging up the source terminal must be sustained by the man-machine dialogue and should be explicit and unambiguous. The objective here is to guarantee that the user can hang up the source terminal without the risk of losing the communication. ☛ Called party identification: <ul style="list-style-type: none"> ○ is used by the system for the transfer. The user does not have to give the called party's contact details again. ○ is correctly maintained on the target terminal.

To summarise, the recommendations proposed for each of the IMS functions identified globally concern the following:

- Homogeneity of the different access interfaces for services.
- Use of interaction modes and UI Style Guides for the various mediums used to access services.
- Integration of all interfaces from the start of the design phase.
- Selection of the functionalities of a service on the basis of user requirements and cognitive capacities rather than according to technical potential.
- Identification of new concepts, new procedures, modifications to functional scope, etc. and then provision of the information required to understand and prevent errors.
- Optimisation of configuration procedures by restricting functionalities to the actual requirements of users, and using maximum automation while enabling users to maintain the control of the interface.
- Refreshment of data in a manner compatible with multi-terminal use.
- Enable users to distinguish between "local" and "network" elements; Define what should be local and what should be networked with the user.
- Called party identification is used by the system for all sessions involving this correspondent: change of media, transfer of data, etc.
- Enable the user to remain within the context of the task underway as far as possible.

6. Conclusion

This work enabled consideration of IMS, its impact on user experience and on the design of user interfaces.

These results encourage us to continue these works by investigating the other possibilities identified: innovative UIs, the research issues previously raised.

This guide was welcomed by the engineering teams concerned by the IMS (proof that a requirement existed). However, the guide was effective mainly thanks to the involvement of us, the specialists in human performance, directly in the design process and by focusing the attention of the project team on the points identified as important.

This particularly refers to the standardisation of the interfaces, the consideration of all UIs from the very beginning, the retaining of the "look & feel" of the host environments, and the avoidance of excessive configuration and too many functionalities, which have proved important structural recommendations in the design process.

In a recent study (Chevalier, Fouquereau and Vanderdonckt, 2007), it was proved that encouraging the, even partial, use of a recommendations' guide, encourages designers to develop a user-focused product.

In the new version of this guide to be developed in the near future, we will attempt to assess this initial version and better understand the means of improving use: expectations, presentation of recommendations, etc.

User tests are also planned for recent mock-up in view of studying certain key IMS problems identified during this work and during the implementation of certain recommendations. These results will also be used to improve the new version.

References

- Chevalier, A., Fouquereau, N. and Vanderdonckt, J.: 2007, L'impact d'un système à base de connaissances sur les processus de génération et d'évaluation des solutions: une étude auprès de concepteurs professionnels, *EPIQUES* (septembre 11-13) France.
- ETSI EG 202 116: 2002, *Human factors (HF); Guidelines for ICT products and services; "design for All"*.
- ISO 13407:1999, *Human-centred design processes for interactive systems*.
- Norman, D.A.: 1988, *The psychology of everyday things*, BasicBooks.
- Scapin, D.L. and Bastien, J.M.C.: 1997, Ergonomic criteria for evaluating the ergonomic quality of interactive systems, *Behaviour and Information Technology*, **6** (4-5), 220-231.
- Schneider-Hufschmidt, M., Von Niman, B., Ketola, P., Tate, M., Williams, D., Böcker, M. Parodi P. and Flygt, M.: 2006, Design Guidelines for Setup Procedures of Mobile Terminals and e-Services, *20th International Symposium on Human Factors in Telecommunication* (March 20-23), France.