



CATHOLIC UNIVERSITY OF LOUVAIN
LOUVAIN SCHOOL OF MANAGEMENT

Building an ergonomic guide
for multi-platform interfaces

Director:

M. Jean VANDERDONCKT

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Presented by

NGUYEN Thanh-Diane

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*"An interface is humane if it is responsive to human needs
and considerate of human frailties."*

Jef Raskin (1943-2005)

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0.3 List of guidelines

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1 INTRODUCTION

There is a huge variety and availability of devices and hardware/software platforms. User interfaces with good usability must be developed for all of them. Several usability guidelines aiming at helping developers to develop user interfaces with good usability exists.

The problem is that these guidelines are all scattered, disorganized, not always illustrated or/and not always accurate.

Moreover, they are rarely applied in correct way, nor even applied at all. The main objective of the creation of an ergonomics guideline set, for all the type of users, is a visually pleasing with clarity, compatibility, comprehensibility, efficiency and flexibility aspect on devices' interfaces. That also benefits to developers who want to be in line with the requirements of customers and researchers to understand better some points in graphical usability interface domain.

1.1 Goals

The main goal of this work is to ***enhance the support that is provided to user interface developers regarding usability for multi-platform interfaces.***

In order to achieve the main goal, the following sub-goals must be reached:

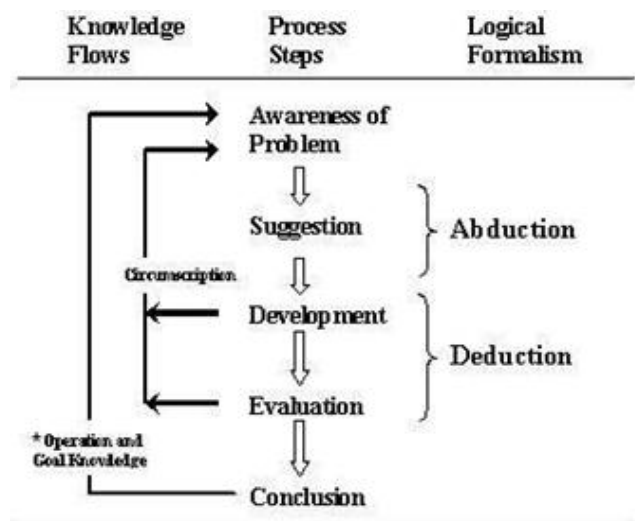
- Know the state of the art related to guidelines for multi-platform interfaces.
 - Definition and evolution of graphical user interface
 - Inform about different devices, platform, potential categories to insert guidelines
 - Select references related to some categories
- Create an ergonomic guide for multi-platform interfaces.
- Disseminate the ergonomic guide among research groups devoted to improve usability of software systems.
- Apply guidelines from the ergonomic guide in order to assess their usefulness

1.2 Methodology

The methodology approach is based on reasoning in the Design Cycle.

AWARENESS OF PROBLEM

Step 1: Introduction to the problem



The main problem is that multiple sources provide a set of guidelines for interfaces of interactive systems due to a set innovation device but they can be characterized by a lack of precision. In this step, a part of reflection on this problem is established. The context, the environment, research questions, the main elements which influence the problem and motivation of researches are distinguished

SUGGESTION

Step 2: Objectives and Sub-Objectives

Identify the main solution to resolve the problem and sub-goal to reach this one.

Step 3: Discuss about a possible plan

Establish a potential methodology to respect and reach the purposes.

Step 4: Review of state of the art

➤ **Inform the reader on the base principles of GUI**

To place the reader in a comfortable situation, a review of different concept around GUI is presented though a definition and characteristic with a brief historical context.

➤ **Identify the categories of users, platform, environment, types of task and domain.**

Website or web application covers almost all domains and targets all users who can use a computer. That begins with small children to seniors including disabled person. Frequently, when a person needs an answer about a question, if a network connection is possible, this person searches an issue on the internet. Thanks to an increased innovation, many devices offer the possibility to connect on Internet or to install applications. Consequently, the research to a response can be done though a variety of platforms.

This level implies the identification of each task and in what environment this one can be used. The combination of environment and task founds the different domains. For instance, the finance task and a trade environment can form the hostel or restaurant domain. Indeed, the hostel activity requests to have an accountant which is a financial element. Moreover, this last one is a trade environment due to the payment in exchange of a service.

➤ **Collect reference which can be of interest and used in the creation of usability guidelines based on website use and different platform.**

A short description on the choice of reference, and how they have been categorized and why.

➤ **Creation of usability guideline**

Each guideline had been written in a specific structure: we can find after the name and description of this one, here are two examples: wrong and good. In addition to the reason of this one, each guideline had been categorized in display element group which the last category in the fixing categories part. Other categories were used to valid the guidelines

➤ **The software Destine**

An application with a summary of this ergonomic guide is available and named Destine Software. This product is created by Defimedia society in Belgium. The purpose is to facilitate the developer to access in a free way at to guide.

DEVELOPMENT

Step5: Lecture of OO-Method and ONME

That can be summarized with the class about "Model-Driven Development: The OO-Method Approach" given by M. Oscar Pastor Lopez and its different Practice Class.

The book about "Model-Driven Architecture in Practice: A Software Production Environment Based on Conceptual Modelling" written by Juan Carlos Molina and Oscar Pastor is the key element to understand the principle about OO-Method and the concept on which the OLIVANOVA software is based.

The OO-Method builds an automatic generation of software products from conceptual modelling patterns, also named conceptual Model. The conceptual model is structured in four parts: Object Model, Dynamic Model, Functional Model and Presentation Model. This fourth component (Presentation Model) specifies the user interface requirements. Here, the accent is highlighted into the issue on how the users interact with the system.

Step 6: Conceptualization a Model in ONME

Create an example in order to obtain a desk view and web view

Step7: Apply this model in relation with the ergonomic guide

To reach the main purpose, the ergonomic platform is applied in the celebrate platform Android.

EVALUATION

Step 8: Performance measures

A critical aspect is given on all activities.

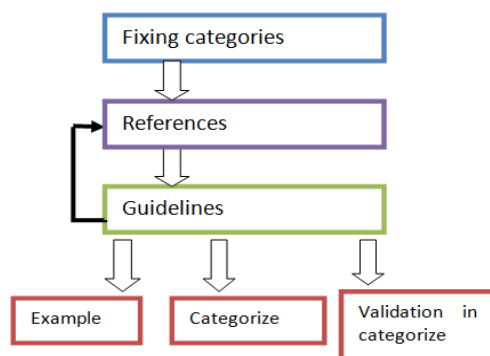
CONCLUSION

Step 9: Identify the reached objective, contribution, limitation and future activities

1.3 Reading map

Section 1 presents the main problem with its context. The motivation, the objectives of the work and the methodology used were described. The next information is given to establish the ergonomic guideline.

Section 2 describes existing work and concepts which are used to form the ergonomic guide. This section is synonymous to the literary part. Indeed, first of all, a brief description and history of GUI is given in order to position the users in an understanding context.



Secondly, a part of reflection on how to categorize each guideline had been requested. This part is fundamental to form the ergonomic guide. Indeed, a set of references had been chosen according to different defined categories. Then, guidelines could be extracted from a variety of references. When a list of guidelines had been built, all guidelines were reviewed again in each reference and categories to valid them and to show why they had been

chosen.

In using the software Destine from Defimedia Society, some guidelines from this second approach will be inserted in it with a short description and, at the end, to form the ergonomic guide which will present a public access.

Section 3 describes the collaboration with the Valencia polytechnic University. The main purpose of this section is the application of some different ergonomic guidelines extracted from the section 2. In order to reach this third part, the learning of OO-Method in practice and theory is requested. The OO-Method builds an automatic generation of software products from conceptual modelling patterns, also named conceptual Model. The conceptual model is structured in four: Object Model, Dynamic Model, Functional Model and Presentation Model. This fourth component (Presentation Model) specifies the user interface requirements. This last model is highlighted into the issue on how the users interact with the system. The OO-Method is supported by the OLIVANOVA software from CARE Technologies society. In using this software, two different views (Desktop View and Web View) have been defined through an example.

The guidelines defined in the second section will be applied and analyzed through a mobile view used with Android platform and different views obtained with OLIVANOVA.

The last section presents the conclusion of this work with a description of the reached purposes, the contribution and limitation of this work, and the future possible activities.

2 STATE OF THE ART

2.1 Graphical user interface History

The **graphical user interface** is the use of graphic icons and of a pointing device to control a computer (in its broader meaning). It has a four decade history of incremental built on some constant core principles. There have been a few significant breakthroughs in terms of use, but the same organizational metaphors and interactions are still in use.

We must go back to the 60s to find radar and the embryos of interfaces with computer graphics. The first "window" appears in the SAGE project, while the Xerox Alto is the first demonstration of a real graphical user interface (late 70). This will enable the next generation of constructors (Apple, Microsoft, Sun, Amiga...) to chain the improvements like menus, push buttons, scrollbars, and different types of pointers...

The 90s saw the democratization of the "A computer in every home" philosophy with Windows 95 that will set the foundation for the most common interfaces for many years, adding features with each version: sidebars, shadows ... This leaves little place for competitors even if in the late 90s, the "Open" systems with Linux desktops with KDE or Gnome and of course Apple returned to the business.

A recent trend in desktop management is the inclusion of 3D effects. New effects common to several projects are scale resizing and zooming, windows transformations and animations (wobbling windows, smooth minimization to system tray...), composition of images (used for window drop shadows and transparency) and enhancing the global organization of open windows (zooming to virtual desktops, desktop cube, etc.)

But what about mobile devices? Portable devices such as mp3 players and cell phones are great areas of deployment for GUIs in recent years. A vast majority of portables get high screen resolutions and sizes (The iPhone's 640x960 display for example). These devices have their own famed user interfaces and operating systems that have large "homebrew" communities dedicated to creating their own visual elements, such as Icons, Menus, Wallpapers, and more.

The possibilities of evolutions from generation to generation of devices are perpetual and almost infinite.

In this evolution context, some ergonomic guidelines have been developed in order to facilitate the use with an appropriate interface.

2.2 Usability guideline definition

Usability is the capability of the software product to be understood, learned, used and liked by the user. The term "user" may include operator, end user and indirect user of the software in any necessary environment.

To define usability we must take other concepts into account:

- Understandability: the software shall enable the user to understand how it can be used for particular tasks. This will depend on the documentation and initial impressions given by the software.
- Learnability: the software shall enable the user to learn its application.
- Operability: it corresponds to controllability, error tolerance and conformity with user expectations of the software
- Attractiveness: refers to attributes of the software intended to make it more attractive to the user, such as the use of colours and graphical design.
- Compliance: the software shall adhere to standards, conventions, style guides or regulations relating to usability.

Usability can also be affected by the following aspects: functionality, reliability and efficiency.

The usability guidelines presented in this work are ergonomic rules designed to best fulfil the above criteria.

2.3 How to categorize usability guidelines

Guidelines are established in a particular context. Some in the list of usability guidelines are taken into account. All parameters provide a set of questions: How, who, where and why using a specific application or website?

Obviously, these components regroup a major part of the current situation but it is possible to have more. Guidelines will be put in relation with each category and a result will be displayed through a serious observation. All components are regrouped on the Table 1 and are detailed immediately below. below of it.

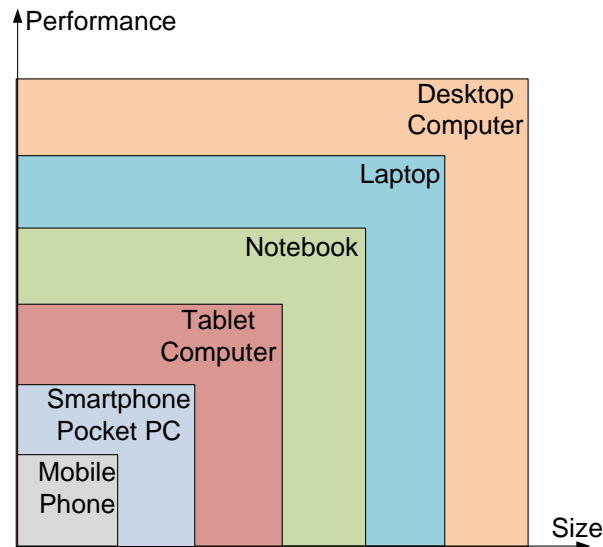
How to categorize usability guidelines	
TYPES OF PLATFORM	
<ul style="list-style-type: none"> ▪ Computer ▪ Laptop ▪ Notebook ▪ Tablet pc (personal computer) ▪ Tablet computer or electronically tablet 	<ul style="list-style-type: none"> ▪ Widescreen ▪ Smartphone ▪ PDA ▪ Pocket pc phone
CATEGORY OF USER	
<ul style="list-style-type: none"> • Children • Teenagers • Adults 	<ul style="list-style-type: none"> • Senior people • Disability users
TYPES OF TASK	
<ul style="list-style-type: none"> ▪ Task on earth ▪ Office task ▪ Technical task ▪ Financial task ▪ Household task 	<ul style="list-style-type: none"> ▪ Human Relation task ▪ Research task ▪ Learning task ▪ Health task ▪ Hobby task
ENVIRONMENT TYPE	
<ul style="list-style-type: none"> • Nature: • Meeting • Factory • On the road (Drivers) • Vehicle 	<ul style="list-style-type: none"> • Home • Public place • Restaurant-Hotel • Airplane mode and hospital • School
DOMAIN	
<ul style="list-style-type: none"> ▪ Domain 1: Agriculture, hunting, fishing and forestry ▪ Domain 2: Mining and Quarrying ▪ Domain 3: Manufacture ▪ Domain 4: Electricity, gas and water supply ▪ Domain 5: Construction 	

<ul style="list-style-type: none"> ▪ Domain 6: Wholesale and retail trade; repair of all type vehicles, motorcycles and personal and household goods ▪ Domain 7: Hotels and restaurants ▪ Domain 8: Transport, storage, and communication <ul style="list-style-type: none"> ✓ Domain 8-1: Land Transport; Transport via pipelines ✓ Domain 8-2: Storage ✓ Domain 8-3: Communication ▪ Domain 9: Financial intermediation ▪ Domain 10: Business activities <ul style="list-style-type: none"> ✓ Domain 10-1: Real states and renting vehicles and equipment ✓ Domain 10-2: Computer and related activities ✓ Domain 10-3: Research and Development (R&D) ✓ Domain 10-4: Legal Activities ✓ Domain 10-5: Advertising ✓ Domain 10-6: Labor recruitment and provision of personnel ▪ Domain 11: Public Administration and Defence-Compulsory Social Security ▪ Domain 12: Education ▪ Domain 13: Health and social work ▪ Domain 14 : Other community, social and personal service activities <ul style="list-style-type: none"> ✓ Domain 14-1: Waste ✓ Domain 14-2: Religion Activities ✓ Domain 14-3 Recreational, cultural and sporting activities ✓ Domain 14-4 Library, archives, museums and other cultural activities ▪ Domain 15: Extra-territorial organizations and bodies 	
DISPLAY ELEMENT	
<ul style="list-style-type: none"> ▪ Screen ▪ Home page ▪ Menu ▪ Content ▪ Action 	<ul style="list-style-type: none"> ▪ Form ▪ email ▪ Help ▪ Evaluation and feedback

Table 1: how to categorize usability guideline

2.3.1 Types of platform

In the current context of innovation, many devices appeared to become more performance and mobile. The problem is that the smaller the size, the weaker the performances become.



Computer is defined as a large and solid possibility of storage on the hardware. The product can be heavy and has a larger screen than others. Moreover, an additional screen can be used.



Laptop is generally used in a professional context. More businessmen, teachers, students use it in their tasks. A mobile environment should be taken into account in the development of software. The product is less heavy than a fixed computer therefore the screen is often smaller than a fixed screen. Generally, students prefer to take this one in convenience way.



Notebook is a smaller computer than a laptop. It offers the users less operations (games, CD using,...). It is often bought for the convenience mobile aspect and to facilitate the work.



Tablet pc (personal computer)

In 2001, Microsoft presented, for the first time, the name and the device proclaimed Tablet PC. The operating system (OS) of this Microsoft device derives from the popular OS, Windows XP.

The distinction between the Notebook and this device is demonstrated by the general manager Alexandra Loeb from Microsoft New Center in 2000: "What the Tablet PC adds is the simplicity of pen and paper. Because you can write on the screen, it's optimized for tasks that are very common in business computing -- like taking notes at a meeting or annotating a document, or for immersive reading"(Microsoft News Center , 2000). A tablet PC differs from the PDA by the size of the screen and by the OS integrated. Tablet PC is a subjacent product from the tablet computer created by Microsoft.



Tablet computer or electronically tablet

The first Tablet computer was developed under the name: iPad. This product offers less operations than a Notebook but the tactile aspect facilitates the transportation and the interactive process. A tablet computer is a particular model between Smartphone and laptop. The particular attribute of this device is its light weight with a large screen. The touchscreen allows to obtain a keyboard manifested on the screen and then not to use a physical keyboard on a laptop. In 2011 the iPad, Android and Windows tablets are the three major tablet platforms on the market, each one of them runs applications for their own operating systems only.

The difference between Tablet computer and Tablet pc is not clearly presented. The distinction is mainly located in the different employed OS. Tablet PC are employed in two confusing situations. Generally, Tablet PC are more used on term of the standard name defined by Microsoft. On the other hand, the term "tablet pc" also designates all devices presenting characteristics similar to the Microsoft device but with their own OS, which can be different of Windows XP.

The tablet computer doesn't use a generic OS created for fixed computer. Moreover, some tablet computers need for most action such backup, data synchronization and for a software update, a connection with another computer. The quality of tablet computer is the 3G and WI-FI capacity.



Widescreen

Large screen are often employed during a presentation, meeting, movie, a game, .. In the cinematography, the movie is often displayed with black large band.



Smartphone: This light device has the characteristics to navigate on the internet and to have phone access, several applications on different domains (game, management

tools,...)The price is not larger than before and so they are more affordable to people. Many manufacturers have their own operating system. So, the software, for instance Skype, should be adapted for different platforms. More information about different manufacturers on their market shares are presented in figure 1.

We can find different operating systems for Smartphone providing these different manufactories: Android (Google inc.), Smbian (Nokia), iOS (Apple inc.), RIM, Microsoft Windows Mobile, Linux and other OS (MeeGo (Inter-Nokia), Bada (Samsung) and WebOS (Palm)).

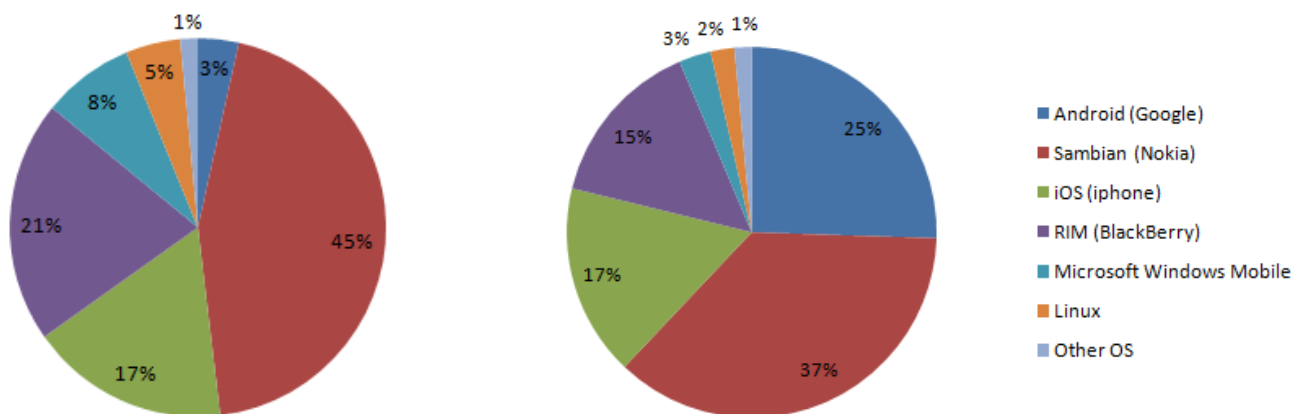


Figure 1: Worldwide Smartphone Sales to End Users by Operating System in 2009 and 2010

With this Figure 1 showing figures exposed on the Gartner publication on “Worldwide Smartphone Sales to End Users by Operating System in 2009 and 2010” (Appendix A), we can observe that Android had known an unbelievable growth between 2009 and 2010. Consequently, in this work, we would mainly focus on this platform Android and iOS by a common agreement during the internship at Valencia.



PDA is also called pocket pc. This product is generally defined as a personnel assistant in different tasks of the owner through different applications (calendar, notepad and address book, navigate on the web, send the email...) as other modern devices (pc and modern cellphones).



Pocket pc phone owns the same system than a simple pocket pc but this device is extended by an integrated communication voice. Then, a normal communication as a mobile phone is possible. By these new characteristics, a relevant question can emerged: what the difference between the Smartphone and this one? (Pocket PC Central, 2009)

Smartphone	Pocket pc phone
If you need to just read email, navigate occasionally on the internet, listen sometimes to music, make lots of phone calls, keep it in the pocket, to have a small budget in a mobile phone, smaller, thinner, lighter device, this phone is more convenience than the pocket pc phone.	This device proposes a mobile computer with built-in calling feature, larger keyboard, typing easier email or message, a better system of management contacts, quickly use of application though great processor, more robust set of customization options, make easier professional task with application for viewing and editing document than we cannot find on Smartphones.

Table 2 : Smartphone and pocket pc phone

2.3.2 Category of user

Age or physical aspect influences the cognitive style of people. Indeed, people differ by their capacity to think on a specific problem. The capacity to learn and to be performant with a system is also certainly influenced by the age and the physical characteristics of users. Physical handicap such as blindness, motor handicaps is also a characteristic that affects the performance. In this category of users we just take into consideration the demography aspect and not the gender, ethnic aspect (colour of skin), culture (religious, ethics context,...) .

Children: the youngest of category who are able to use an application on different platform. They are less experiences and need more redundant information in order to catch it and facilitate future operations without an assist behind them.

Teenagers: (between 12 year and 18 year) they don't need someone to help them in different applications because they are patient enough to search alone and it is often a hobby to pass their time to navigate on the internet. Their manual dexterity is stronger than retired people's.

Adults: It is important to distinct the people (between 18 year and the legal age of pension) and retired people who are often olds. This type of people can catch more ability and experiences. They are more patient and use more internet than elder people.

Senior peoples: They have less experience and often don't want to acquire new abilities. In consequence, they often need more information on the category of website, and an easy visual, facilitating direct access, is also required. An important assist in their task deeply influence their satisfaction to navigate or use application on their device. Their dexterity declines faster than other categories of people and then a simple action as a double click in a specific context can be difficult to understand. Another example: the use of their cursor to click on the link of device shutdown can be difficult to target due to many clicks before. Then, generally, they prefer to put on the "off" button. Elder people generally prefer to have a poor interface with more features which enable them to achieve their objectives quickly.

Disability users: this last type of person introduces people who have a (or some) weak physical point(s). For instance, we can meet people who are not able to see all available colour in a window.

2.3.3 Type of Tasks

Different types of action will be structured into several following categories:

Task on earth: regroup all tasks about environment and animals. This task also includes pollution-generating activities.

Office task: this type of task is more focused on active peoples who currently have a job and navigate on the internet, use application in a professional way. This task is defined by an intensive use of the computer.

Technical task: Used in the conception of a product or to repair a device. Physical task is the key point in this heading. Conception means, in this case, all aspect in the creation of product: Transformation and distribution (supply chain).

Financial task: the expenses, sales, the investments, audit...are specific tasks around the management of an amount of money. The distribution of a product is reserved in the above task. The sales mean to having a money trade.

Human Relation task: interaction between two human beings. For instance, in a factory, a human relationship will be the Union member and the director. Another example: the potential worker and the director of human resource.

Research task: that Enables the extension of knowledge to extend the knowledge and abilities in a domain. Innovation is another central point in this task. Researches enable to innovate or to improve a product or a theory.

Learning task: the user expects to gain experience and acquire new capacities, new knowledge. That differentiates with the above task by the human aspect. The learning means to gain experience or a skill but not to improve a product quality.

Health task: two issues are related this task. Firstly, that means the fact that people want to obtain information about medicine products or to understand and search a solution of their symptoms. We can also include advice with health announcements. Secondly, the presentation of a product or a specific disease is written in scientific words. This includes psychology, health, pharmaceutical domain, etc.

Hobby task: During the leisure time, people can play on games on websites, chat with other people, check their email, watch movies, and listen to music... All tasks which people will enjoy doing during their free time.

Household task: This class is not concerned with the Home environment but on all human activities, precisely, on routine tasks as cooking, cleaning. The activity about raising children is in the human relation task.

2.3.4 Environment Types

Nature: Vegetables, animals, planets and space compose this environment.

Meeting: Presentation, group of persons, discussion, plan strategies, taking decisions define this environment

Factory: Establishment where raw materials are transformed into a product which are sold at final customers.

Trade: Buying and selling a product or in exchange of a service. The relation and the behaviour in front of the customers are highlighted.

Office: This space includes desk, chair, several times fixed pc. In some cases, in an office, we can find a group of workers sharing the same environment.

On the road (Drivers): when a person is driving a car, the device use is limited. Guideline as having a voice communication rather than a display can be preferred.

Vehicle: here only passengers are introduced in this environment.

School: in this place, we just consider student environment. The learning is the main subject. Administration service of the school establishment is not included.

Home: rooms where people usually live in it in a long period of their life.

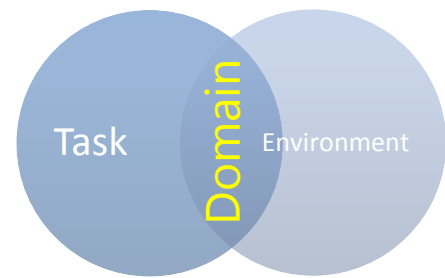
Public place: (road, pavement, public square and parks) Environment which people can meet other person, enjoy a place without paying anything.

Restaurant-Hotel: A place where people want to rest or have a lunch. The difference with public place is that this environment involves the economic aspect.

Airplane mode and hospital: as a mobile phone can cause interferences with plane devices or in a hospital, air companies or hospitals prohibits the use of cell phones in their environments. In consequence, many manufacturers propose at their customers: an "air mode" integrated in their cell phone. The objective is to enable many users to continue to listen to music and check appointments, manipulate their professional tasks on their mobile phone without any interferences of their device with others. Many following function cannot be used with this type of function, for instance on the iPhone: GPS, Wifi, Bluetooth and functions related to communication voice or message using the network. Those functions are permitted with the agreement of the aircraft operator or the application of the rules and regulations.

2.3.5 Domain of activity

All sections written above can be mixed in a group called domain. For instance, the learning task is included in the school environment. This set forms a domain named Education. Other tasks as administration or financial also are component of the education domain. Therefore, a domain is a combination of some tasks in a specific environment.



The different domains are structured under a long list inspired by the Nace code published in 1989. Nace code means the “Statistical Classification of Economic Activities in the European Community”. This EU classification system is regrouped under six digit code (Repak : Nace codes, 2011). The Nace code is different of the NAFE CODE revision 2 which is the specific French activity nomenclature and is directly nested in the Nace code revision 2 appeared in 2008.

The Nace code list owns too many sections. Consequently, general sections have been extracted and structured to produce a better understanding.

Domain 1: Agriculture, hunting, fishing and forestry¹

This section is related to all activities though agriculture, fishing, hunting and forestry. Only activities about the work with animals, plants or soil are considered. Activities about economics, transformation to the product such as the production of foreshins, marketing, the supply chain domain, veterinary activities or installation of material, equipments, organization of shows and fairs are not included and refer to domain of business activities and manufacture. Therefore, this domain mainly requests the work of the earth and benefits of nature, human relation and office task or other task can be involve but those points remain a little part of this domain.

Domain 2: Mining and Quarrying²

This section is composed in two actions: extraction of natural solids (coal and ores), liquids (petroleum) or gases (natural gas) and operations (transport, marketing) on it.

The section C of the Nace code provides more details and what this section excludes.

¹ Section A-B in the Nace Code

² Section C in the Nace Code

Domain 3: Manufacture³

Manufacture concerns all production, transformation of a product (animal or physical) in order to sell or consume them.

Domain 4: Electricity, gas and water supply⁴

Energy requirement covers this domain. That also includes the set up of infrastructure, networks and pipes.

Domain 5: Construction⁵

This section is similar to the Nace code-construction. Indeed, that includes all elements about general (Building, road, water and energy infrastructure) construction. The particularity is that the architectural and engineering are not included in this part.

Domain 6: Wholesale and retail trade; repair of all type vehicles, motorcycles and personal and household goods⁶

Firstly, that concerns all final products in the distribution chain. These products are created to be sold and distributed. The domain not covered the transformation and the process to final goods. The particularity of this domain is the repair of vehicle. This domain differs from the section G in the Nace code by the repair of all type vehicles and not only vehicles on two wheels and with great motor power. That also concerns all common activities of lifestyle (Household goods can concern to obtain a recipe or idea to home decoration).

Domain 7: Hotels and restaurants⁷

This section is defined by the provision to the customers to enjoy a meals, snacks, beverage and short-term accommodation. In this domain, a screen's layout and appearance affect a person in their wellness to pay for this service. Many visuals aspects are necessary in order to let a great impression for the customers. The customers are expected to have a pleasant service. For an unknown establishment, a clear and enjoyable presentation of the label can create a charming first impression. Others aspects as a good assist in the reservation reduce the stress and frustration of the customer.

³ Section D in the Nace code

⁴ Section E in the Nace code

⁵ Section F in the Nace code

⁶ Section G in the Nace code

⁷ Section H in the Nace code

Moreover, that lets the customers in an impression which the service in the establishment will be in the same way than the task proposed on their site. Hotels need to have up-dated information for a possible reservation. Some Hotel propose the possibility to create or/and participate to the conference in the establishment.

Domain 8: Transport, storage, and communication⁸

Domain 8-1: Land Transport; Transport via pipelines

Transport by different way via railways, road, aircraft use a communication in different issue than others. The up-dated communication is the important point in this domain.

In the transport domain, an outdated content is recognized as disorganized and unreliable. The customer expects to have their order or their travel in a pleasant condition with a good schedule.

Domain 8-2: Storage

This section is also defined by activities such as "terminal and parking facilities, cargo handling, storage, etc. This section is not supporting by major repair or alteration of transport equipment, construction and maintenance of road, vehicles, renting of transport equipment. Domain 6 and 10-1 cover these mentioned activities.

Domain 8-3: Communication

This section proposes taxi operation, post and courier activities,.. which they need to have a deep representation in their communication with customers.

Domain 9: Financial intermediation⁹

Financial operations can be made in different ways. The main subject in financial operation is related to insurance company, pension fund or/and spare. The second subject concerns the auditing aspect as the publication of balance sheet or result of the enterprise. Another subject is about the real estate context. That doesn't include the business activities described in the next domain. Accurate and up-dated information is required. The society often offers a site with a specialized aspect in order to shows their competencies on detailed aspect to attract the customer.

Domain 10: Business activities¹⁰

"All activities covered by this section can be provided to private households, too, e.g. renting of personal and household goods, database activities, legal activities, investigation and security services, interior decoration or photographic activities."

⁸ Section I in the Nace code

⁹ Section J in the Nace code

¹⁰ Section K in the Nace code

Domain 10-1: Real estates and vehicles and equipment renting

It includes real estates activities, vehicles or equipment renting for all type of materials. An organized structure incites customers toward a satisfied first impression and can encourage them to deal with the agencies.

Domain 10-2: Computer and related activities

Computer and related activities concern hardware or software consultancy which specialized application or consultation are applied to show a professional and efficiency presentation.

Domain 10-3: Research and Development (R&D)

This section is focused on R&D which is divided into three categories: Basic research, applied research and experimental development.

Domain 10-4: Legal Activities

These domains have a legal representation with many specialized in legal rules, regulation, legislative act and procedures. Specialized aspect, accuracy, coherence, updated information are strongly necessary to shows the honesty of the information.

Domain 10-5: Advertising

Campaign made to attract the attention of customers on a specific subject through media representation, newspapers, websites, distribution of samples, creating and placing of outdoor advertising. A good and interactive visual can attract new customers. A system to keep the loyalty of customers should also be proposed.

Domain 10-6: Labor recruitment and provision of personnel

This section is usually adapted for Human Resource Department in provision to recruit someone in a specific work.

Domain 11: Public Administration and Defense-Compulsory Social Security¹¹

All public activities are inserted in this section. These activities enable the local administration to deal with a proper issue. "Defense, justice, police, foreign affairs, general administration and supervision in the field of social and economic life, management of compulsory social security schemes,.. are included in this domain". Military aspect is also implied in this domain.

¹¹ Section L of Nace Code

Domain 12: Education¹²

This domain involves the task of learning which is focused on the acquirement of new skills or the development of others and the education environment. The education environment can be ambiguous but the domain here is not only the school environment but all form of education as driving education. Private and publics education are also concerned in this rubric. The education through media, as television, radio is also included.

Domain 13: Health and social work¹³

All forms of activities related to hospital or medical and dental practices. Health activities in military part, ambulance and rescue activities and dental domain are included in this section compared to the section N in the Nace Code. Private consultants' services to in-patients are put in Business activities in this code but here, we prefer to include it in convenience fashion.

Domain 14: Other community, social and personal service activities¹⁴

Domain 14-1: waste

There are all types of waste which don't require an industrial transformation and then are not used in an industrial manufacturing process.

Domain 14-2: Religion activities

All activities on religious and philosophical aspects.

Domain 14-3 Recreational, cultural and sporting activities

All activities concerning the different point present on the title through media, competition, etc.

Domain 14-4 Library, archives, museums and other cultural activities

Reading, buying a book are not the only activities in this domain but also the participation of organization during the "a collection, making catalogues, lending and storage of books, maps, periodicals, films, records, works of art, retrieval activities in order to comply with information requests, etc."¹⁵

¹² Section M of Nace Code

¹³ Section N of Nace Code

¹⁴ Section O of Nace Code

¹⁵ Section P of Nace code

Domain 15: Extra-territorial organizations and bodies¹⁶

"This section allows the employees of extra-territorial organizations to state the activity of their employer in censuses or studies, even though the employer is considered to be outside the economic territory of a country (although within the geographical territory). "

Ex: European Free Trade Association, Organization for Economic Cooperation and Development,...

2.3.6 Display elements

- Screen: settings that affect the screen format and size, arrangement of elements, their location and possible actions on them (see, reduce, minimize, etc.)
- Home page: Page that welcomes and invites the user to enter details of the website or application. It contains a brief summary of the content.
- Menu: A tool or a display for easy navigation to different pages of a website and / or permits to undertake action.
- Content: useful information on a page, specific used part. Some content elements can also be found on the homepage.
- Actions: Interaction between the user and the website or application. Different of the form.
- Forms: Data field to complete to register, send information, place an order, etc.
- E-mail: method to send en receive digital messages through a network
- Help, Evaluation and Feedback: Sections which provide using tips, site map, frequently asked questions and the answers, or a form that the user can fill in to give his opinion and contact the developer.

¹⁶ Section Q of Nace code

2.4 Works about usability guidelines

The methodology in the creation of guidelines list is based according to literary researches. Many materials on GUI design are available to enhance at public a higher quality of the content and presentation of a web site or an application. In whole publication, a list of guidelines or a description and/or an illustration of few among them, sometimes with an opposite example of the guidelines (Blooper), are presented.

Among these materials, numerous references have been selected following their relevant and complete content or their characteristics focused on specific uses. One purpose of the work is the analysis of selected references and to extract from them relevant and common guidelines, and to put them in line with specific uses. The references follow this template:

- (1) Reference [Letter]: this is a sequential numbering alphabetic for each reference.
- (2) Reference Title : this is the title of the reference
- (3) Reference Authors: authors and publication date are put in brackets which correspond to a reference to the bibliography for full title
- (4) Reference Description: shows a presentation of the reference and motivation to select it.
- (5) Reference Table: all selected references are summarized in a table.

Ref [a] : Web bloopers, 60 Common Web Design Mistakes and How to avoid them. (Johnson, 2003)

Since 1978, Jeff Johnson has been interested in Human-Computer Interaction. His interest in this domain enables him to publish several articles and books. His book on Web Bloopers is particularly interesting. But what means a blooper? It is an awkward mistake which occur, in our case, on web design.

Ref [b] : Top Ten Mistakes in Web Design.(Nielsen, Top Ten Mistakes in Web Design, 2007)

The 10 worst mistakes in Web design were written by the popular web usability consultant: Jakob Nielsen. He is also a Ph.D in human computer interaction from DTU (Technical University of Denmark)

Ref [c] : Research-Based Web Design & Usability Guidelines. (Leavitt & Sneiderman, 2006)

Due to an increased interaction between public and government web sites, the U.S. Department of Health and Human Services began in 2004 a project on Usability Guidelines. An intensive research on the subject was established with the objective to aid in correcting the lack of usability of web sites. The background and the methodology used in this book are very interesting. This method is based on seven steps which are not only based on the creation of a list of guidelines. Indeed, an evaluation on the relative importance and strength of evidence has been determined in addition to graphics examples. Another aspect is the feedback of the guidelines which has been reviewed and updated. At the end, a list of 209 guidelines has been published, including 40 new or revised guidelines.

***Ref [d] : 7 usability guidelines for websites on mobile devices, October 2007
Consulted in 17 Feb 2011(Webcredible, 2007)***

The core of this article is not only about websites but it also included the modern device, mobile phone with Internet access. 7 usability guidelines were drawn from a method based on actual users with mobile phones. The task of this test consisted of using typical action on popular websites by using a mobile phone browser.

Ref [e] : Usability of Rich Internet Applications and Web-Based Tools (Nielsen, Lorange, & Shade, 2002)

Another article from Jakob Nielsen with a complete and detailed content based on the popular graphic animation program: Macromedia Flash or Adobe Flash. Guidelines based on this program result from a participation of users in 3 different countries and continent (USA, Japan and Germany) and 46 varied Flash applications. Currently, this plugin is still used in popular web browser. Consequently it is useful to put it in relation to the creation of the guidelines list.

Ref [f] : Patterns in interaction Design (Welie, 2008)

This well structured website suggests a list of patterns which can bring toward a better practice in Interaction Design. A unique issue do not exist due to different contexts of use. The particularity of this website is that the author keep this point in mind account of this point and does not hesitate to insert a con example and his opinion.

Ref [g] : 247 Web usability guidelines (Travis, 2009)

USERFOCUS is a constancy and training company which has developed 247 web usability guidelines in order to promote consistency, good practice and increased profits by creating great customer experiences. This great resource gives only a list of guidelines on web usability without explication, justification and illustration.

Ref [h] : Ergonomie du logiciel et design web (Nogier, 2008)

Jean-François Nogier, a PhD in informatics engineering offers a complete work on the field of human-machine interfaces. This book presents a set of guidelines focused on software and web design.

Ref [i] : The essential guide to user interface design, an introduction to GUI design principles and techniques (Galitz, 1997)

Guidelines are not a new concept. The creation of effective and usable interfaces provides a proper design and a large benefit for both clients and webmasters. Therefore, the motivation to provide a collection of guidelines has been the main purpose of WILBERT O. GALITZ across his published work. The disadvantage with this reference is the antique context. With new technologies and knowledge, others guidelines have appeared. In spite of this ones, the structure and basic ideas can be exploited though this thesis.

Ref [j] : Guidelines for designing user interface software (Sidney & Mosier, 1986)

This reference is used to compare and to structure the list of guidelines presented in this work in spite of its non current content.

Ref [k] : Sixty Guidelines From 1986 Revisited (Nielsen, 2005)

Jakob Nielsen is interest in all domains of GUI, in particular in the durability of usability guidelines. He did not hesitate to revise 60 of these 944 guidelines put out in 1986 by "MITRE Corporation funded by "the U.S. Air Force's Electronic Systems Division".

Ref [l] : Beyond ALT Text: Making the Web Easy to Use for Users with Disabilities (Pernice & Nielsen, 2001)

Usability guideline list in this article is the result of the participation of disability users (employees and customers). This report presents the usability of websites and intranet for these peoples. Only the part about usability of websites is interesting for establishing the guideline list. This reference also makes the comparison between the guideline list and one specific type of user possible.

Ref [m] : Web Usability and Age: How Design Changes Can Improve Performance (Chadwick-Dias, McNulty, & Tullis, 2003)

Two studies were practiced though different experiences. The first study of this work is analyzing the results of a participation of 49 persons ranging in age from 20 to 82 whose tasks were centralized on the interaction with the web and their performance in a change of text size. Using the results of the experience in this study, the site was redesigned to correct the usability problems of senior participants in order to create the second study. The second study offers the view the results from two new users who were invited to use the redesigned website.

These studies offered the opportunity to create the link between the created list of guidelines and different type of users excepted disable people. The document loses a few its value with the lack of dating.

Ref [n] : Evaluation of Websites for Older Adults: How “Senior-Friendly Are They?” (Hart, 2004)

This reference contents a result of a survey on thirty-six websites specifically for seniors evaluated as "to how well they complied to 25 senior-friendly guidelines recommended by the National Institute of Aging". A list of guidelines is offered with a percentage of the websites number adhering to guideline.

Ref [o] : How Widescreen Monitors Affect Web Site Usability (Stoy, How Widescreen Monitors Affect Web Site Usability, 2010)

This reference highlights one specific platform, widescreen, and web pages. Through the answer of the author about some question such as "Should You Make Your Website Widescreen-Friendly?" or "Why Widescreen Monitors Are So Different in Terms of Usability", guidelines can be extracted and compared with the created list of guidelines.

Ref [p] : Usability Guidelines for Widescreen Monitors: Widescreen Design (Stoy, 2010)

In opposition to the previous article, the author does not answer to a set of questions. He had established a list of guidelines applicable to widescreen according to his mind.

Ref [q] : iOS Human Interface Guidelines (Apple Inc., 2011)

The manufacturer of iphone has made available to public, a downloadable book on the guideline on operating system (iOS) of their famous device iphone. The iOS devices offer the possibility to develop two kinds of software:

-iOS apps are common features such as calendar, email and others. These applications are directly inserted in the device or can be installed.

-Web content is related to website and defined into three categories:

- *Web app* uses the network connection and owns almost similar proprieties of iOS apps
- *Optimized webpage* in Safari browser. Webpage are adjusted to be optimal in iOS device.
- *Compatible webpage* remains on the principle that the webpage is display in consistency view and relevant practice without any additional practice to optimize the page for iOS devices.

Ref [r] : User Interface Guidelines (Google Inc., 2011)

It is a myth that Android, bought by Google, exists only on Smartphone. Android is an open source project also established on PDA. Due to its considerable growth, the interests of visual and interaction design of Android applications have been the main target of the Android UI team. This team has developed a package of guidelines available on the own site (source.android.com).

Ref [s] : 45 most useful guidelines for mobile web design & development (Firtman, 2010)

A set of link related to website and different OS for phone device. Here, it is not a presentation of a list of guidelines but rather different references which can complete the list.

Ref [t] : iPhone Apps Need Low Starting Hurdles (Nielsen, 2010)

This article resumes an aspect of the current Smartphone: iPhone. That not shows a set of guidelines. It shortly explains why applications are more popular than website and bring an example on app benefit of user experience. The idea is that this article can also be applied for other device and not only on iPhone. Moreover, that can useful to position apps and websites.

Ref [u] : Safari Web content guide (Apple Inc., 2010)

This browser web is the main application used in iPhone, iPod touch, and iPad. This guide leads toward the optimized webpage. Our purpose remains the compatible rule on different platform but with this guide, we can extracted the others rules and observe what guidelines can lead toward an optimal interaction between human and iOS system.

The following table resumes all references which are used in the creation of the guideline list.

Furthermore, these references have yet been detailed above the table. This table is created to have a global view and supported the reader in the lecture of each description of a guideline.

Reference	Short Description	Valid for:	
Ref [a] : Web bloopers, 60 Common Web Design Mistakes and How to avoid them. (Johnson, 2003)	Example of mistakes made on different websites	platform	All
		user	All
		task	All
		environment	All
		domain	All
Ref [b] : Top Ten Mistakes in Web Design.(Nielsen, Top Ten Mistakes in Web Design, 2007)	A list of guidelines of the 10 worst mistakes in web design	platform	All
		user	All
		task	All
		environment	All
		domain	All
Ref [c] : Research-Based Web Design & Usability Guidelines. (Leavitt & Sneiderman, 2006)	A list of 209 guidelines (including 40 new or revised guidelines) due to the growth of the government websites interest.	platform	Computer Laptop
		user	All
		task	All
		environment	All
		domain	All
Ref [d] : 7 usability guidelines for websites on mobile devices, October 2007 Consulted in 17 Feb 2011(Webcredible, 2007)	7 guidelines about websites on mobile devices	platform	Smartphone
		user	All
		task	All
		environment	All
		domain	All
Ref [e] : Usability of Rich Internet Applications and Web-Based Tools (Nielsen, Lorange, & Shade, 2002)	A bunch of guidelines resulting of tests on different types of users with 46 different Flash applications.	platform	All
		user	All
		task	All
		environment	All
		domain	All
Ref [f] : Patterns in interaction Design (Welie, 2008)	Structured patterns with illustration and con example on each ones which can be use in other contexts.	platform	All
		user	All
		task	All
		environment	All
		domain	All
Ref [g] : 247 Web usability guidelines (Travis, 2009)	Only a list of web usability guidelines	platform	All
		user	All
		task	All
		environment	All
		domain	All
Ref [h] : Ergonomie du logiciel et design web (Nogier, 2008)	A manual on user interface grouping primitive and web guidelines and software	platform	All
		user	All
		task	All
		environment	All
		domain	All
Ref [i] : The	This old book contents a large list	platform	Computer Laptop

essential guide to user interface design, an introduction to GUI design principles and techniques (Galitz, 1997)	of general guidelines	user	All
		task	All
		environment	All
		domain	All
Ref [j] : Guidelines for designing user interface software (Sidney & Mosier, 1986)	This French book contents a large list of guidelines on software and on design web	platform	Computer Laptop
		user	All
		task	All
		environment	All
Ref [k] : Sixty Guidelines From 1986 Revisited (Nielsen, 2005)	Guidelines revised and centralized on their durability	platform	Computer Laptop
		user	All
		task	All
		environment	All
Ref [l] : Beyond ALT Text: Making the Web Easy to Use for Users with Disabilities (Pernice & Nielsen, 2001)	A list of guidelines related to disable people	platform	Computer Laptop
		user	Disable people
		task	All
		environment	All
Ref [m] : Web Usability and Age: How Design Changes Can Improve Performance (Chadwick-Dias, McNulty, & Tullis, 2003)	Researches about the capacity of people between 20 to 82 to interact on websites	platform	Computer Laptop
		user	All without children
		task	All
		environment	All
Ref [n] : Evaluation of Websites for Older Adults: How "Senior-Friendly Are They? (Hart, 2004)	The particularity of this article in addition to its list of guidelines is a percentage of websites which are assumed adequate for senior people.	platform	All
		user	Senior people
		task	All
		environment	All
Ref [o] : How Widescreen Monitors Affect Web Site Usability (Stoy, How Widescreen Monitors Affect Web Site Usability, 2010)	A discussion on widescreen and websites	platform	Widescreen
		user	All
		task	All
		environment	All
		domain	All

Ref [p] : Usability Guidelines for Widescreen Monitors: Widescreen Design (Stoy, 2010)	Guidelines on widescreen and websites	platform	Widescreen
		user	All
		task	All
		environment	All
		domain	All
Ref [q] : iOS Human Interface Guidelines (Apple Inc., 2011)	Guidelines on operating system of iPhone	platform	Smartphone
		user	All
		task	All
		environment	All
		domain	All
Ref [r] : User Interface Guidelines (Google Inc., 2011)	Guidelines on operating system Android and websites	platform	Smartphone
		user	All
		task	All
		environment	All
		domain	All
Ref [s] : 45 most useful guidelines for mobile web design & development (Firtman, 2010)	A set of link toward guidelines of different operating system for mobile phone	platform	Smartphone
		user	All
		task	All
		environment	All
		domain	All
Ref [t] : iPhone Apps Need Low Starting Hurdles (Nielsen, 2010)	Article about Iphone and the applications/website usability	platform	Smartphone
		user	All
		task	All
		environment	All
		domain	All
Ref [u] : Safari Web content guide (Apple Inc., 2010)	Optimisation guide for webpage with the browser Safari on iPad, iPhone and iPhone touch.	platform	Smartphone/Tablet PC
		user	All
		task	All
		environment	All
		domain	All

2.4.1 Limitations of current works about guidelines

Currently, guidelines are rarely applied. The reasons are:

- Incompleteness: a guideline is useless if it is not quite understandable to developers. This lack of understanding may be due to a lack of description or illustration. In addition to a good example, the guideline should have a wrong illustration to be complete. Unfortunately, it is not always easy to find a bad example.
- Heavy description: in opposite with the previous case, guidelines can present too much information and lost its main purpose.
- Difficult interpretation: some guideline use technical language which developer need to search the definition
- Conflicting issues: a guideline can be in conflict with another due to a lack of experimentation studies. For instance, in the Ref [h] we will see a conflict between two guidelines in subject to let the user to choose the policy. Indeed, one guideline says to use CSS which imposes a style, in other hand, another guideline advises to let the user to choose its policy.
- Out of date information: guidelines can be out of date due to new device, the system offer new patterns or automatic issue.
- The large number of available guidelines: can discourage the developer to be in line with the requirement users.
- The lack of classification of guidelines: It is not enough to present a list of guidelines. These guidelines have to be in good structure in order to facilitate developer in research.
- General guidelines vs specific guidelines :
 - General guideline means this guideline can be used on all platform
 - Specific guideline is a rule applied on a specific platform. Two type of guideline exist in the definition of a specific guideline: a guideline which is applied on a specific platform but it can be generalized and the other guideline which is applied only one platform and not other.

Current works present a guide focused on only one type of guideline. The particularity of this built ergonomic guide is to join these types of guidelines and not focused only one.

2.4.2 Insert Guidelines in Destine Software

DESTINE is a software based on the ergonomic evaluation of websites. The approach used in this software is a compatible XML language called GDL (Guideline Definition Language).

This software includes all the built guidelines with a shortly description and the validation of them in categories. Therefore, Destine software is the ergonomic guide with less detail than this document. The particularity of this software is its structure which allows to see what are the categories referred to guideline This software will be available to everyone. In Appendix B, the figure A represents the guide. The figure B shows a representation of on guideline. In each tab, the user can see which category the guideline is validated.

3 ERGONOMIC GUIDE FOR MULTI-PLATFORM INTERFACES

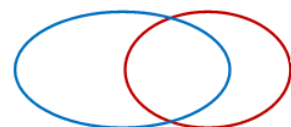
In order to deal with the limitations of current works on usability guidelines, this work presents a new ergonomic guide for multi-platform interfaces. The Guidelines are extracted from the list of references in the previous section. The presentation of guidelines follows a specific template:

- (1) Guideline Category: First, each guideline has been categorized in Display Element.
- (2) Guideline number: this is a sequential numeration for the guideline.
- (3) Guideline is presented in one sentence only.
- (4) Guideline description: this is an additional text and motivation that describes and explains the guideline when necessary.
- (5) Guideline reference: that shows that this guideline is also in other references.
- (6) Positive example: this pictogram 🟢 shows a good figure if it is possible.
- (7) Negative example: this pictogram 🛑 shows a wrong figure if it is possible.
- (8) Comment part: Guidelines are validated in other categories (platform, user, task, environment and domain) which will not be presented here but will be presented in Appendix #. Some guidelines can present a comment part which describes the particular results of this validation.

(1) The display category												
(2)Guideline number: (3)one sentence												
(4)Description or additional information												
(5)Guideline references												
(6) 🟢 Positive example (7) 🛑 Negative example (8) the table in Appendix :	Valid for	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 2px 5px;">platform</td> <td style="width: 50px;"></td> </tr> <tr> <td style="padding: 2px 5px;">user</td> <td></td> </tr> <tr> <td style="padding: 2px 5px;">task</td> <td></td> </tr> <tr> <td style="padding: 2px 5px;">environment</td> <td></td> </tr> <tr> <td style="padding: 2px 5px;">domain</td> <td></td> </tr> </table>	platform		user		task		environment		domain	
platform												
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task												
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domain												

The main motivations while choosing the guidelines was their compatibility with the definition of usability guideline and how compatible they were with all the categories presented in section 2.

General Guidelines



Guidelines for Smartphone

Obviously, some guidelines are only compatible with only one platform but the purpose of this work is to be as general and compatible as possible on all platforms. For instance, this Guide presents a large

part of general guideline and some specific guidelines for Smartphone's. Indeed, the new functions applied only on Smartphone's such as the rotation screen requests specific guidelines.

3.1 Window Screen

The main objective of this display element is a blend visually pleasing with the following features:

3.1.1 Window Frame

The appropriate view in a window is the coherence idea applied in each scenario. The term coherence, in our case, regroups the following characteristics: unity, balance and symmetry.

The purpose is to offer a positive and pleasing view.

Guideline 1 : Elements of a window have to be align
Grouped elements, images or texts have to be arranged in line and coordinated to provide a good impression. An aligned text appears to be in the same context and is easy to read.
This guideline is in Ref [i] p95, 97, 103, , Ref [c] p51

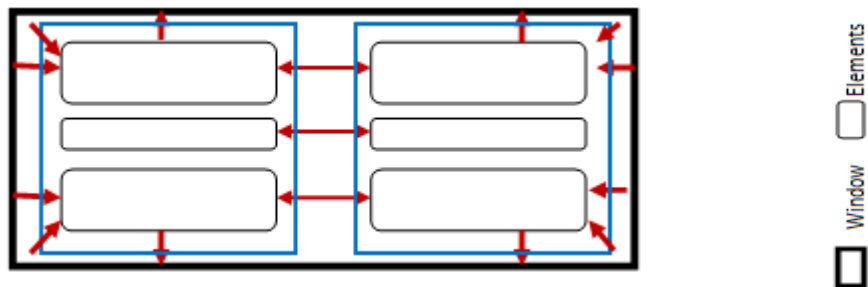


Figure 2: Alignment, unicity, balance and symmetry

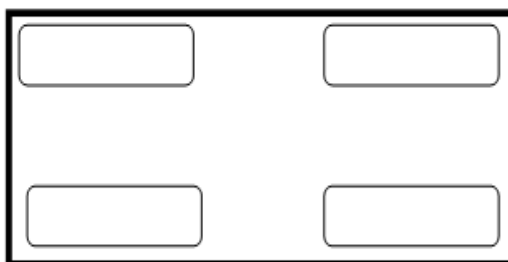


Figure 3 : Fragmentation

Guideline 2 : Create a screen balanced by distributing the weight of the items displayed between the parts right, left, top and bottom

This guideline is in **Ref [i]** p97. The reference on widescreens suggests using fixed widths. Regardless of the orientation (portrait or landscape) or the size of the screen, this way enables to have a good distribution.

Guideline 3 : Insert regularity and harmony in the way of a set ordered elements from a central point

This guideline is in **Ref [i]** p101

This guideline implies to have a form of symmetry on the first time. That means that the website must not own a blank space in left and be overcrowded in the right part. Symmetry case means to have almost the same quantity of elements on the left and right columns. on the second time, a sequentiality form is preferred to random case.



Figure 4: Sequentiality (on the left) and random (on the right)

Guideline 4 : Assembling objects consistently provides better overview.

The assembling objects are called unicity. The set seems to belong together. The opposite of this method is called fragmentation where each piece retains its own characteristics.

This guideline is in **Ref [i]** p103

That means "to use similar size, shapes or colours for related information". The issue enables to have the information grouped in a visual unity and then an impression which each element appearing to belong together. The opposite of this method (unity) is fragmentation where each piece retains its own characteristics. To obtain a unity case, the alignment, balance and symmetry and sequentiality of elements have to be respected, else we cannot obtain Figure 2.

Guideline 5 : A conventional order or plan allows predicting the rest of the unlooked content.

Predicted scenario allows guiding easily the user through the different steps of an action.

This guideline is in **Ref [i]** p103

For instance, when a user has to fill some forms, it implies to fill the form in before seeing the button which links to the following step.



Figure 5: Example of balanced window : igoogle

In Figure 5, the elements seem to belong together, each category are align, balanced and respect a harmony aspect.



Figure 6 : The Moon Phase core gadget in the Android browser

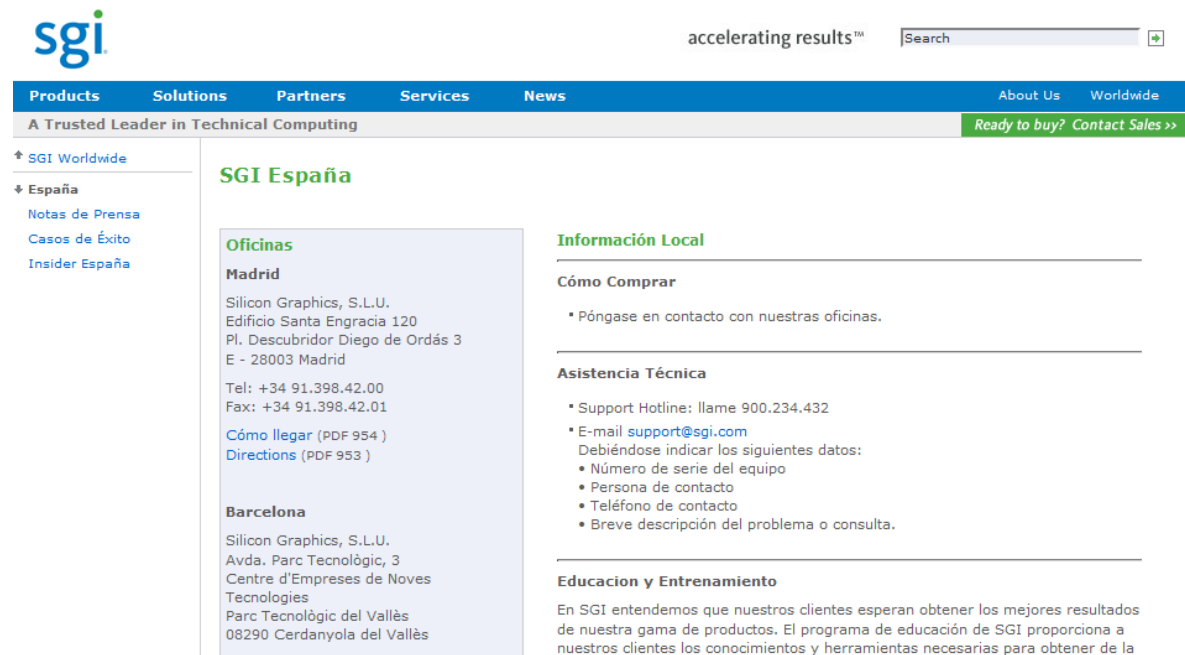
Example of incorrect window: on the mobile phone, some windows are often more fragmented. Here we have The Moon Phase core gadget in the Android browser.

Guideline 6 : For clarity and comprehending aspect, an optimal number of elements on a screen are inserted.

The alignment points (horizontal or columnar) are minimized. Elements are positioned on standard grids of horizontal and vertical lines. The different elements are icons, buttons, fields or any graphical component and text.

This guideline is in **Ref [i]** p116

Elements are positioned in the correct column standard and reflect just enough elements for the user to understand as seen on Figure 7.



✓ **Figure 7 : SGI**

Guideline 7 : Present the components in order of use (Previous, Next, Modify, Cancel)

This is also applicable to other elements. Buttons which continue the activity such as Ok, Submit, and Select... are put on left before action of cancel or close.

This guideline is in **Ref [i]** p337, **Ref [f]** title stepping



✓ **Figure 8 : live messenger**

In Figure 8, when we are in other country (in our example in Spain) the website asks users to choose a language before opening the content. If people don't know the national language they can choose their preference and click on the button of validation which is always on the left of the cancel button in respect of this guideline.

Guideline 8 : For each consolidated information in a frame, insert a document title

This guideline is in **Ref [i]** p254; **Ref [a]** p109

For instance, in Figure 7, the title of web page is SGI Espana.

Guideline 9 : The window title has to be short and not ambiguous

This guideline is in **Ref [i]** p254

The title of Figure 7, "SGI Espana" is relatively short and presents the society.

Guideline 10 : User has to find quickly the open and close action of an application

The open action is shown by a specific icon of the application. The close action is generally represents by the action icon on the window. The close icon is shown by the symbol X and on the right of the frame as we can see on the Figure 9

This guideline is in **Ref [h]** p43; **Ref [i]** p248, **Ref [e]** p193



Figure 9: Actions of a window

Guideline 11 : Allow to move away the window from initial place

That means a window can be reduced in small window with the action button on the right of the window and be moved across the screen.

This guideline is in **Ref [i]** p246

Guideline 12 : Dimensions of the window do not affect the content and graphic disposition

These guidelines will join all rotation scenario of different platform. Indeed, Smartphones allows using an application in landscape or portrait context.

Guideline 13: For a frequent use, the user can reduce the window

That joins the **Guideline 11**: to move away a window, the user has to reduce it before.

The second action button on Figure 9 allows reducing the window.

Guideline 14: Use a centred layout

The adaptation of different size of screen and the attention of users is highlighted. Generally, users are focused on the central place of the window.

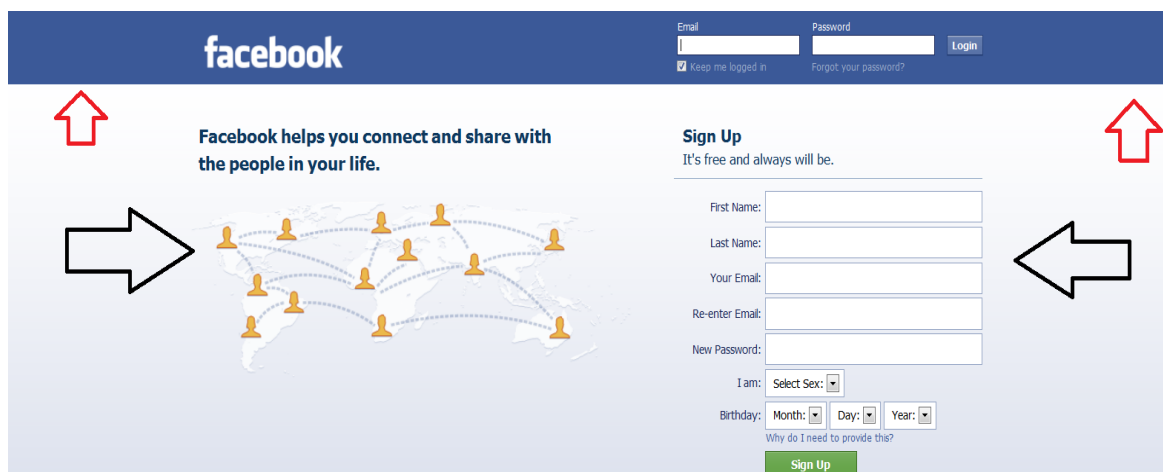
This guideline is in **Ref [i]** p338, **Ref [f]** title Overview by Center Page

Figure 10 shows a website where all content is centered.



✓ **Figure 10 : Centred layout**

The popular social website, Facebook, presents a particular aspect. Indeed, this site respects the guidelines. All content is centered but it extends the border layout and background. The main elements are in front of users and the website can be in a flexible way. Moreover, the website is displayed in all screens but the content stays centred.



✓ **Figure 11 : Centred layout (Facebook)**

A last instance for this guideline: in February 2011, the website of the low cost company Ryanair does not present a centred layout (old home page).



 **Figure 12 : Not centred layout (Ryanair)**

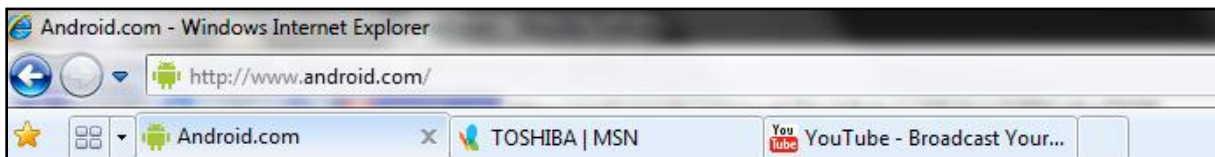
3.1.2 Windows Tab


Guideline 15 : Each window tab is easy to recognize

A logo or a title is presented to define the content of the window tab. The title of the tab is linked to the content.

This guideline is in **Ref [h]** p145; **Ref [a]** p109

In the following instance, the logo of Android or MSN or Youtube with the title enables user to switch easily toward the correct website.



 **Figure 13 : window tab**

Guideline 16 : Prefer a tab window or replace the content than using a pop-up window

User hates unwanted pop-up window due to their experiences on advertisement under pop-up form

This guideline is in **Ref [b]**, **Ref [1]** pt.11

3.2 Home Page

3.2.1 General

Guideline 17 : The home page remains a traditional home page

Lower pages in the site don't show other information that a brief summary of the content or the purpose of the site and many offered directions. Traditional home page contents are logos, titles, menus, short description of the society or the content in a correct place which will be described in the following section. The home page is not heavy in the content. This guideline joins the idea "The site avoids marketing waffle" (Travis, 2009)

This guideline is in **Ref [h]** p178, , **Ref [c]** p38

For instance, the senior safety site () proposes on the home page, when we scroll down, a large description of the content of the site and nothing else. When we click on the menu button, it leads directly toward the concerned article. The home page contains more information than a traditional homepage as we can see on the figure 14 which shows us the home page and only a piece of information of it, on the right. The description of website made two pages when we copied only the text in a document with normal style!

Medical Alert Systems are often your **first alert** that a senior may need a **lifeline** because they may have fallen. Maybe they went out to get the mail, put out the trash, were working in their garden, basement or garage... a good medical alarm will get them help when they need it most, when they can't reach the phone for help.

Comparing "Life Alert", "Lifeline" and Senior Safety Medical Alarms

Life Alert and Lifeline are often compared to the Senior Safety medical alert system. We hear that Life Alert costs approximately \$49 per month and Lifeline costs up to \$45 per month depending on your zip code. Senior Safety is \$24.95 per month wherever you live and we will never raise your price. We just love when people call us back to order after they have conducted reviews and comparisons of all three of us out telling us American Senior Safety Agency is their choice because they think we are the best medical alert system.

We take great pride in our Customer Service (truly the most important part of any medical alert service), often we spend more than an hour helping our clients out over the phone...we take all the time they need. It's clear to us that as age creeps up on us, sometimes we need a little more caring help...someone to listen to you.

The Stories Some Medical Alert Company Salesmen Use to Scare or Pressure You to Buy

If you feel that you are being pressured to buy or a salesman is telling you bad things about another company...beware!

Many people call us and ask if this or that is true... prompted by some salesman at another company trying to make a sale... they want to pressure and scare you. They give you a list of things for you to ask other companies.

We get a good laugh when someone calls us because one large company likes to say that we monitor our clients in India. Actually, I helped pioneer the medical alarm industry in 1980 and I don't know of a single company in the United States that monitors medical alarm clients in India. We have redundant UL Listed monitoring centers in both California and Texas. If they would lie to you about this type of information... what other lies might they be telling you?

Another silly question that they tell you to ask is, "Do they own their own monitoring center?" Now what difference would that make? There are good privately owned monitoring centers and there are good contracted monitoring centers. The important questions to ask about a monitoring center are:

✖ **Figure 14 : A piece of Description site on Homepage**

Guideline 18 : A brief and real content is shown in the home page

That can be done by a description or an example. That joins the idea of the following guideline in the content part to have a short description of the content before an action.

This guideline is in **Ref [h]** p176, , **Ref [c]** p38

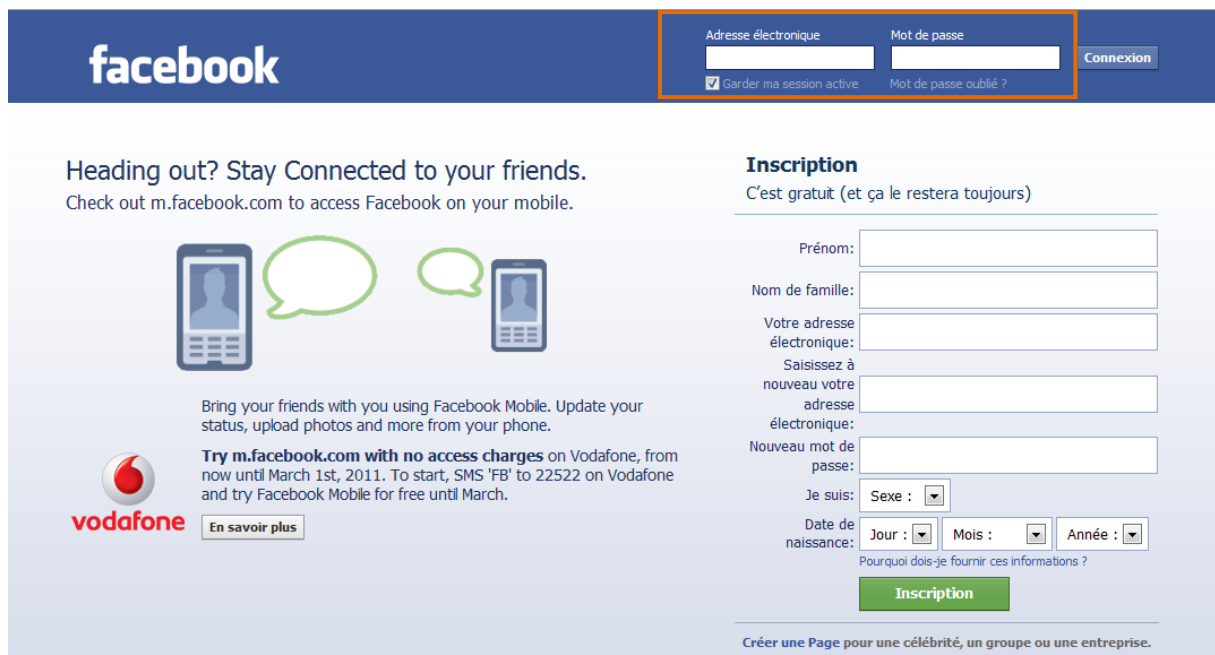
For instance the figure contents a larger description.

Another example by an analysis of the different versions of Facebook homepages:



✔ **Figure 15 : former Facebook homepage**

Here, we have a former homepage of Facebook. The entry in the website by its login is located on left of the page. An example of the content is presented. In addition to the example, a short description about what the web site contains is clearly explained. The logo and the main colour of the label are also very visible. When we look to the new version of the homepage below, we can observe that the example of the content (in red colour) has disappeared. Furthermore, more entries are present such as the confirmation of the email address. That invites the users to check if this one is correctly inserted but in lazy fashion, the user can just “copy and paste” the previous written email.



✘ **Figure 16 : New Facebook homepage**

The button “Memory” becomes “Keep active my session”. A representation of the logo is shown just one time.

Guideline 19 : The logo must also be a reference to the homepage

This guideline is in Ref [c] p29, p146

The logo is the logo featured on each page and not the logo on the table. That means to have a direct link with the homepage. The function of the logo is not only used as a visual aspect but also as a practice part.

3.2.2 Email service

This section will observe three popular email services:

Homail.com, Gmail.com and Yahoo.com

Hotmail.com, the popular message service provided by msn.com offers a similar homepage that the previous Facebook homepage in the sense that the presentation of content is described by icons and comments. It is the same way for Gmail.com. We can predict the following standards through these below examples.



Figure 17 : Hotmail log-in page



Figure 18 : Gmail log-in page

These following guidelines also apply for email service:

- On the left of the email service homepage, we can find the logo, a short description with an interactive logo
- The label is presented in one sentence only
- This short description is below the Logo

Other new guidelines can be extracted:

Guideline 20 : The content is presented with a defined sequence

1. Explication of the available volume offered by the site.
2. Application of an anti-spam
3. Monitoring email and other task are possible on Mobile phone

Guideline 21 : A button for the connection to entry in the inbox on the right

Guideline 22 : A button registering for new user

Guideline 23 : A link to condition using this service

When we analyze, the email service from Yahoo operates in a different manner. Indeed, the content on the left just displays a large marketing presentation of Yahoo mail and excludes a static presentation on Hotmail and Gmail. A common possibility, between Yahoo and Gmail, is the maintenance of the logon user in a large time (until the user wishes to disconnect from the service).



Figure 19 :Yahoo! mail log-in

Guideline 24 : Make possible to stay connected by a checked button

Obviously some guidelines are also involve in this part as guideline 5.7: "Login and password will be entry by a justified field on the right"

3.3 Menu

3.3.1 Menu bar

Guideline 25 : Menu bar must have only one explicit word-title as description of content

This guideline is in **Ref [f]** p61

On the Figure 20 "SGI" the menu bar is very explicit. Important elements are shown first.



Figure 20 : Menu bar

Guideline 26 : Menu bar must be visible on each page of website

That joins the idea to have a menu bar using the symbol ">" to show the path of the current website

This guideline is in **Ref [q]** p5

Guideline 27 : Items (file, tools, help, contact, about us) which are most frequent, are shown in the Menu

For business website, the term as product, service or solution is the most appropriate term to use on menu bar. For an application, “file”, “tools”, “help” and “about us” are usually element of the menu.

This guideline is in **Ref [h]** p61; **Ref [i]** p271, **Ref [f]** title meta navigation

3.3.2 Icon pictogram

Guideline 28 : Menu bar should be interactive with a representation and helpful icons

This guideline is in **Ref [n]**, **Ref [e]** p29

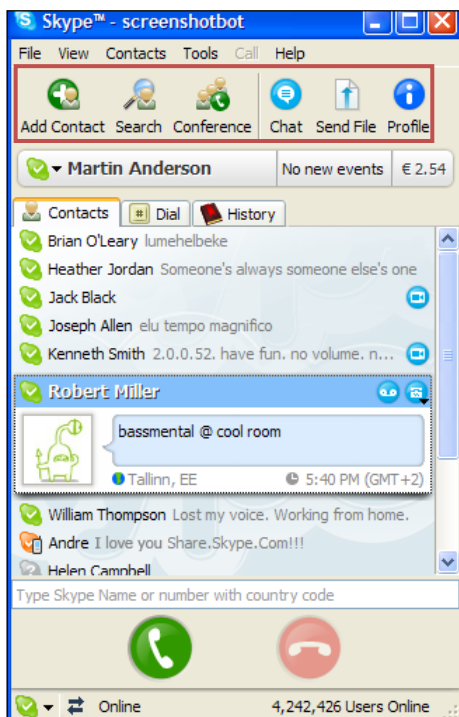


Figure 21: Skype : icon menu

On the red rectangle, the Skype application shows us an understanding icon with only one word to describe each element. For all type of users, these interactive possibilities are easy to recognize and everybody can use in a practice way the application.

Moreover, when we observe in details this instance, we can notice that the conference icon showing the possibility to have a video meeting with not only one other person. The user experience is enhanced by these additional graphics.

From the researches of Traci A. Hart on the “Evaluation of Websites for Older Adults”, 69.4% of selected sites adheres to this guideline.

Guideline 29 : For a specific and relevant task, an icon with a short word describe the task

This guideline requests to insert a legend on each icon. This guideline is linked with Guideline 21. The icon presents the most frequent action or use as a shortcut of the recurrent action.

This guideline is in **Ref [h]** p148. **Ref [n]**



In this example, each icon owns an unique word related to its description.



Figure 22: Facebook on iPhone

Guideline 30: The icon must reference directly to the link itself

This guideline is in **Ref [h]** p18.

Guideline 31 : Limit the number of icons in a appropriate way

That joins the idea of Guideline 6

This guideline is in **Ref [h]** p19.

3.3.3 Vertical-Cascading menu

A pull-down submenu, on the left of a content, that appears while the cursor points over an item on the higher-level menu.

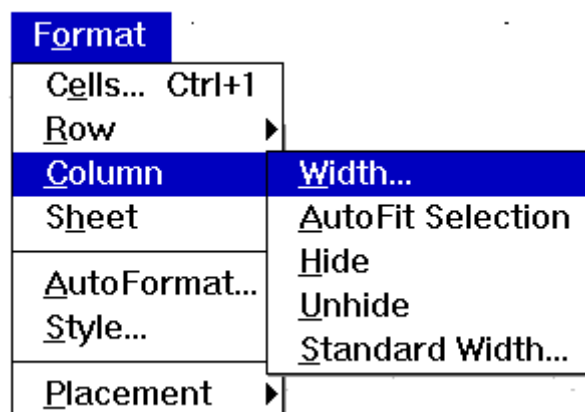


Figure 23 : Cascade menu

By this illustration, we can define that a menu bar should be in the following structure:

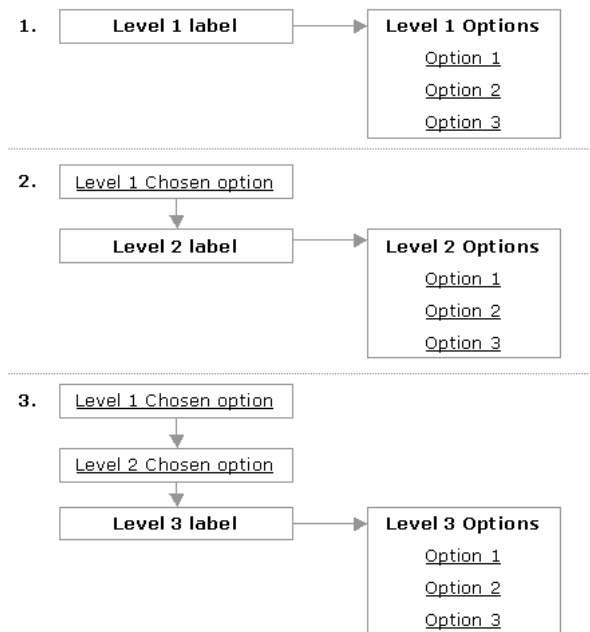


Figure 24 : Menu structure

The first part of this illustration presents the first level which these options are displayed on the right of the label. On the second level in the menu, this level is clearly underlined compared to the level one. These options are also shown on its right. For other levels, the same issue is applied. By these instances, following guidelines have been identified.

Guideline 32 : Use Vertical -Hierarchical menus under cascading form and toward the down screen

This guideline is in **Ref [i]** p257, **Ref [n]**, **Ref [f]** title “headerless menu”

The researches of Traci A. Hart on the “Evaluation of Websites for Older Adults” join this guideline with the results from a survey on thirty-six websites specifically for seniors: 97.2% of selected sites adhering to this guideline.

Guideline 33 : Two cascade menus (represented by three menu levels) is preferred.

This guideline is in **Ref [i]** p223, , **Ref [f]** title fly-out menu

The number of cascades is proportional to the intensification of visual cluster and the reduction of an easy access. DECwindows (Good, 1988) proposes to maintain only two cascades. Apple is stricter and suggests not exceeding one cascade (Galitz, 1997). To avoid an important visual cluster, it is necessary to create additional pull-down menus.

Guideline 34 : The title of the cascading menu is not useful.

This guideline is in **Ref [i]** p223

Before having a cascade menu, the user choice the title of the higher level menu, then to have again the title on submenu is not important.

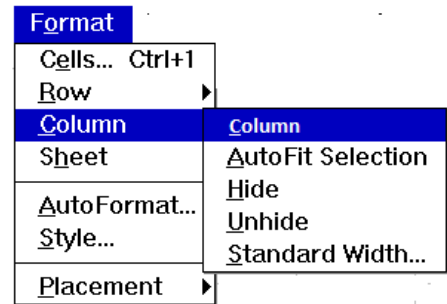


Figure 25 : Menu title

3.3.4 Toggled Menu Item

Guideline 35 : Use shortcut commands that are accessed frequently.

The menu item shows clearly that the opposite condition currently exists

In addition to the useful icons on applications, mobile phones give the possibility to users to have a direct access to different applications with shortcut icons on the home menu. For instance, on the iPhone, four icons obviously represent the different applications available. That enables using them quickly in any environment.



Figure 26: Quick Menu on iPhone

Guideline 36 : Each menu item should be assigned to a keyboard equivalent mnemonic to facilitate keyboard selection

The mnemonic is the first character of the item description and should be underlined if the first character is the same than another word. The second word should be underlined or used in the guideline on keyboard accelerator

This guideline is in **Ref [h]** p25; **Ref [i]** p190, p264

In all application, the file, view and help are the most frequent items in the menu. Generally, all applications offer the mnemonic way to facilitate using it as we can see on the Skype application (Figure 27)



Figure 27 : Menu item (Skype)



Guideline 37 : Pressing two keys simultaneously is preferred as shortcut

- Use a sign + to indicate the key to be pressed simultaneously
- Separate the accelerator from the item description by three spaces
- That can be confused with the predecessor guideline on using shortcut commands but here that requests two key on the same time and not only one key of the keyboard.

On the Skype application (Figure 28), to make a research is possible when user press the key "Ctrl" and the key "F".

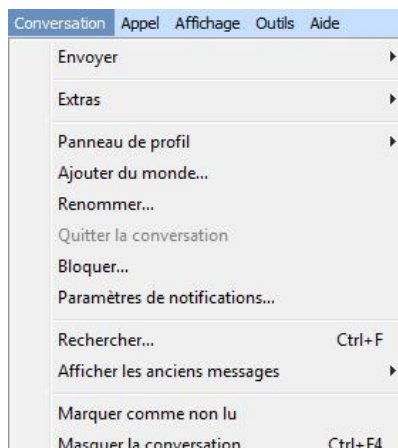


Figure 28 : Skype menu

3.3.5 Navigation

The navigation got two meaning in this work. We will deal the term in function to navigate between some pages and is another type of menu. But the main meaning of the navigation is to guide the user.

Guideline 38 : Navigation guide have to be displayed on left-top

This guideline is in **Ref [d]**, **Ref [h]** p 40-138, **Ref [c]** p02, **Ref [n]**, **Ref [e]** p27, **Ref [f]** title "breadcrumbs"

Example: the in red square.

Guideline 39 : Use this symbol ">" or "/"to show the path of the current page from home page

This guideline is in **Ref [h]** p153. **Ref [f]** title breadcrumbs



✔ **Figure 29 : Navigation**

The particularities of this instance are:

- Use of simple navigation symbols ">"
- Presentation on the first line of the large game product before a menu to attract the user on a variety of choices.
- The Menu is shown below the large video compare to the search bar remains up the content. It is also done for a commercial reason. The customer can search another product through the search frame before other action such as contact the society. A wrong presentation is the logo that is not in correct position.



✓ **Figure 30 : Repak.ie example**

In another example, the website "Repak.ie" precises the location of the current page with an indication and using "/" symbol as the path in a directory. Moreover, it is possible to link each word to the content as they are graphically representative.

Guideline 40 : Small size on the titles of the navigation

The size of word on the navigation has to be smaller than the menu and the title of the site.

This guideline is in **Ref [a]** p109

Guideline 41: The title of the navigation is clear and is the same that the linked page

This can be confusing if the title is not the same as on its linked page.

This guideline is in **Ref [a]** p110, **Ref [f]** title breadcrumbs

Guideline 42 : Repeat the navigation issue at the end of the page if the content is large

That avoids scrolling up to the top navigation.

This guideline is in **Ref [d], Ref [h]** p138

Guideline 43 : Limit the number of navigation area

To access quickly to the usual information. The ideal situation is to have a navigation bar on top and left side bottom if the content is large.

This guideline is in **Ref [h]** p140; **Ref [a]** p91

Guideline 44 : The navigation between two pages does not exceed more 2 till 6 seconds.

This guideline is in **Ref [e]** p27

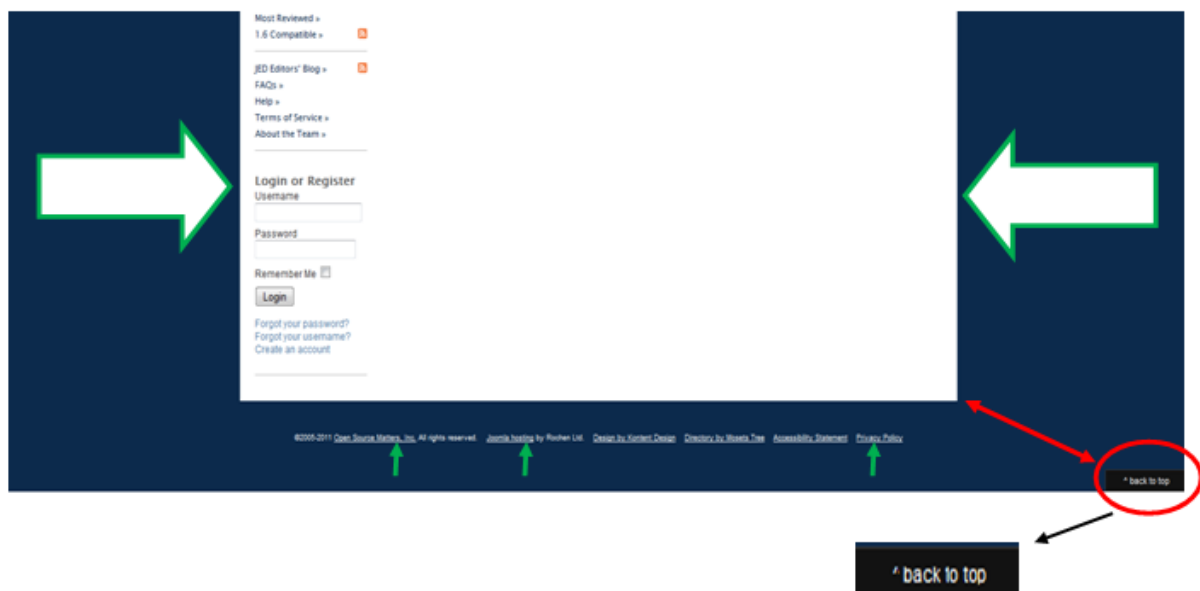
Guideline 45 : A long waiting of one charged page have a notice message about it or an icon on the mouse

This guideline is a consequence of the previous guideline of a long waiting time.

Guideline 46 : Use a strategic location to put a link in order to come back to the top

The strategic location means a place where the user can recognize in easy way the function.

This guideline is in **Ref [f]** title to-the-top link



❌ Figure 31 : “back to the top”

In this example, the button to return on the top of the content is not really in an appropriate place because the eyes of the users are focused on the centre of the window. Then, the whole site is in central layout. In consequence, putting this button out of the content is not a good strategy.

Guideline 47: Indicate the page already visited

For this guideline, another colour on the link of the page can indicate a visited content. In the guide of navigation, to reach a page, the user has visited other pages which are displayed in the navigation.

This guideline is in **Ref [h]** p131

Guideline 48 : Indicate the position of the user in each page

This guideline can combine Guideline 38 and Guideline 39 : the guide of navigation shows where the current page seen by the user on the whole website is.

This guideline is in **Ref [d]**, **Ref [h]** p131, **Ref [c]** p62, **Ref [f]** title breadcrumbs

3.3.6 Cursor**Guideline 49 : Show clearly what the user is pointing to on the menu or an item**

This guideline is in **Ref [i]** p257, **Ref [c]** p95



To click on button, this picture is shown to make sure that it is the correct item that the users want.

3.3.7 Scrolling**Guideline 50 : Minimize scrolling**

That means not having a long content, text, or graphic. If information follows the correct order defined in the following guidelines: objectives-conclusion-summarize, the user can know if the content reaches his objective and stays on the page.

This guideline is in **Ref [1]** pt. 27

Guideline 51 : Eliminate horizontal scrolling

Reading a text with horizontal scrolling is slow and tedious. That can show a lack of professional way because the content is not in line with the users' requirements.

This guideline is in **Ref [c]** p22., p72

3.4 The Content

3.4.1 Label-View

Guideline 52 : The logo must be visibly on every page and not only on the home page.

This guideline is in Ref [f] title Home link

Guideline 53: Each title of a page should be short and not ambiguous

This guideline is in Ref [a] p196
--

Guideline 54 : Use a brief description about the content

This guideline can be categorized in the following section, the text. But, on the first view, it is interesting to look toward a short description before accessing to all content of this information. Generally, that concerns enterprises using business activities and want to inform about offered product or services and then invite the customer to entry in more details of it.
--

This guideline is in Ref [b], Ref [d]
--

Using a short description or a summary of the website content is appropriate to have a first good impression on what objectives that the site wants to communicate to users are. On a mobile phone, without using wireless connection, the download of package to show all the content of the website is paying and can be expensive. From the description of the website, the user could have the possibility to choose whether he wants to continue the load of the website. Frequently websites, applications such as Facebook, Google... don't use any explanation of their content : they judge that their label is known enough thanks to a large popularity of use.

People mainly navigate on specialized websites from their mobile phone (for instance) and therefore don't need the precise description of what the society makes.

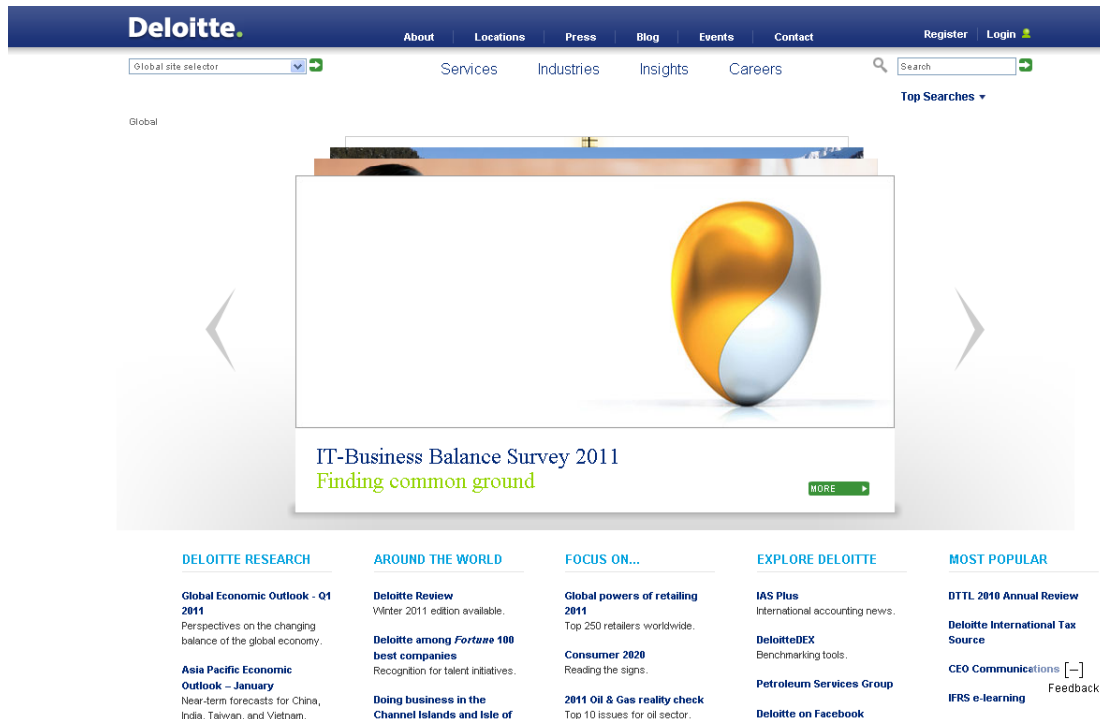


Figure 32 : short description (Deloitte)

Guideline 55 : A visual consistency of frequently application should be the same on all platforms

According to IntuiLab SA¹⁷: " a user sending emails from his mobile telephone complained that he could not add his correspondent's electronic address directly from his address book, as he was used to doing on his PC." For people who have no patience or have less experience, they could deduct that the function is not available at all on their mobile phone although the option is just not visible on the first look because the button appear under another format. The article, from IntuiLab Sa., underlines that a procedural consistency cannot represent the best solution. In several context of mobile use, voice interaction is more appropriate for a pleasing use even with a similar approach of the application display. For instance, when a person is driving, a vocal communication of the email is less dangerous than in the case where the drivers take the mobile. That is why this guideline is presented by a verb "should" because we can see in the next section that this guideline need more details or extra guidelines.

¹⁷ Denis C. and Karsenty L.: "Inter-Usability of Multi-Device Systems : A conceptual Framework" of IntuiLab p.8

The following illustration (Figure 33) enables the analysis of the display of Windows Mobile for Pocket PCs on the left and for Smartphones on the right. At first, , Windows Mobile shows an attractive and facilitates visual with large icons for more convenience. Moreover, the contents are more selected and restrained. With his larger screen, Windows Mobile for Pocket PC displays more robust set of customization options and then more options expansion in the root display than Smartphone. Then the guideline could not be respected by the fact that different platform own a screen offering more possibilities to display features, then the enterprise such as Windows want to optimize all used materials

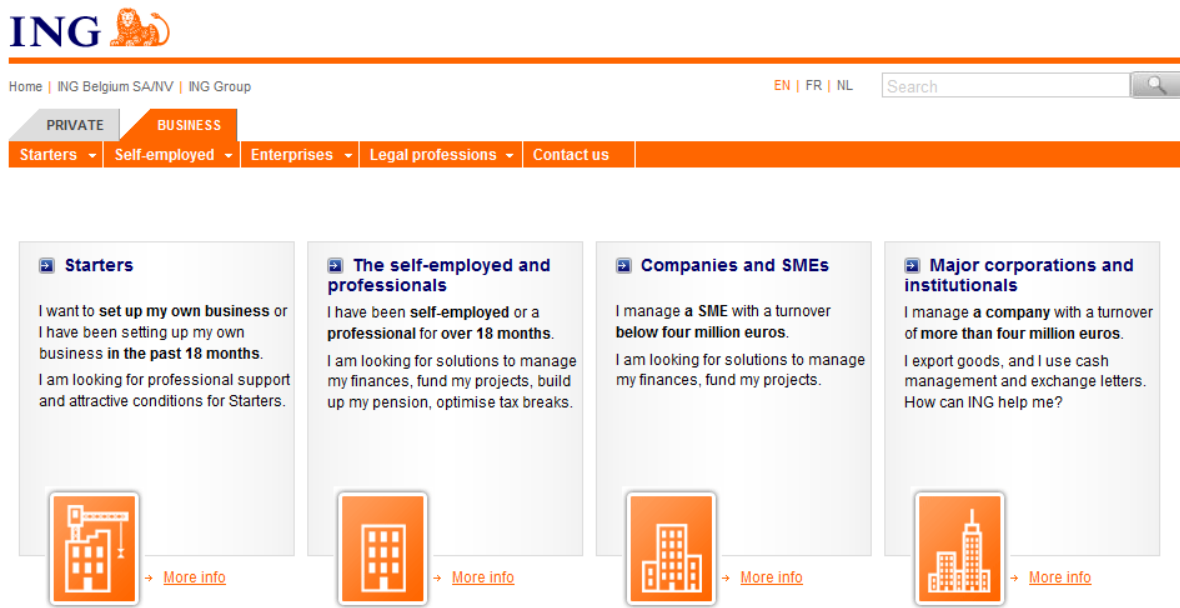


❌ **Figure 33 : Windows Mobiles for Pocket PC Phone and Smartphone (Pocket PC Central, 2009)**

Guideline 56 : In order to recognize the same site, each page must have the same brand or title and colour

The colours of the label should be the same that the one found on the home page or all background of each content. The logo of the enterprise is always visible.

For instance, the colours of the famous ING Bank are the orange and white. Then these colours should be highlighted on each page. This website has further extended the use of this symbolic colour in their different icons.



✔ **Figure 34 : Colour content (ING Bank)**

Guideline 57 : Not let blank page on website

That concerns websites under construction or in updated way. That can show a lack of serious from the webmaster.

3.4.2 Classification

Guideline 58 : The content of each category is logical and not too heavy

The content means a text group or elements (images, a set of item link, icons,..) in a group. A correct structure avoids a frustration of users and a gain of time. That also incites the users to visit back the site.

This guideline is in Ref [h] p6, Ref [f] title Customizable Window

Guideline 59 : Give a title for each object group

This title, as the guideline 9, has to be short and not ambiguous.

This guideline is in **Ref [b]**

Guideline 60 : Avoid the most possible to have the same word for each title

The same word in title can reduce the visibility results for a search.

Ref [b] on “Page Titles With Low Search Engine Visibility”.

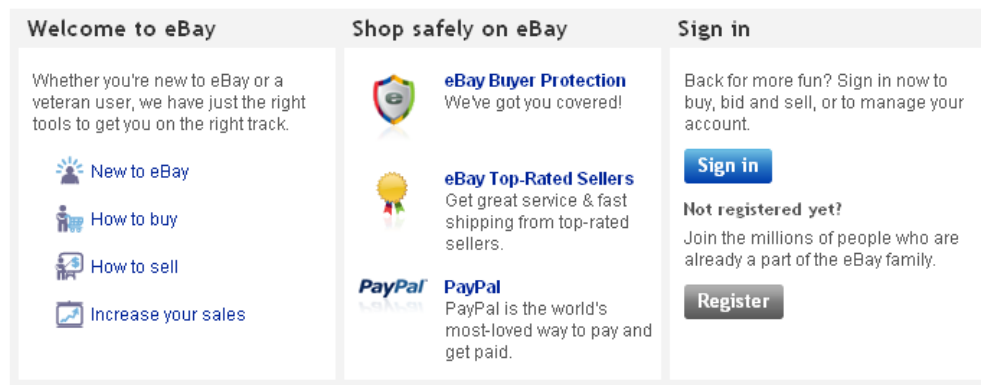


Figure 35 : Title of each group (Ebay)

“Welcome to eBay” regroup all actions or information for a first visit.

Other titles of this instance show different actions related to the title.

3.4.3 Information-Text

Information or a text has to be written as an editor paper. This sentence resumes all following guidelines.

Guideline 61 : Do not center a text in a bad location

This guideline also means: do not center all text content. All centered texts show a poor quality of graphic and are tedious to read . This guideline joins guideline 3 about the harmony of the content.

This guideline is in **Ref [a]** p256

Guideline 62: Amount of information should be correct, proper, relevant and appropriate.

This guideline presents the proper and correct-credible way of the amount of information for the task: too little can be ineffective and can present a lack of understanding for users, too much can be confusing and can make more difficult to achieve the goals/objectives/priorities of users. This guideline joins the idea “Provide content that is engaging, relevant, and appropriate to the audience.” **(Leavitt & Sneiderman, 2006)**

This guideline is in **Ref [b]** on “mistake of non-scannable text.”, **Ref [d]**

Here we have an example of a window on a computer which is not consistent with all the features presented in pleasant conditions. As we observe, in this window, there are too much information. For instance, the image (in the blue circle) is presented by the title eyes on the right of this one. On the first look, it is difficult to understand immediately the legend of the image on the right. On the mobile

phone, with a little screen format, the understanding can be more difficult. In opposition, the screen presents the following components: symmetry, regularity, sequentially, pleasant proportion and unity.

For Vodafone in India, a Swift but Bumpy Rise

By HEATHER TIMMONS
Published: March 27, 2011



Sanjit Das for The New York Times
Vodafone banners at a boat club in Central Delhi. After a deal in 2007 gave it a presence in India, Vodafone has added tens of millions of customers to become the No. 3 cellphone company.

Related

Next Obstacle for Vodafone in Indian Deal Is Maintaining Discipline (February 13, 2007)
Add to Portfolio

- + AT&T Inc
- + Deutsche Bank AG
- + Vodafone Group Plc

Go to your Portfolio »

the much-needed industry consolidation, making it impossible to predict when Vodafone's profits will improve.

Within India, Vodafone trails Bharti Airtel, the pioneering company that created India's private mobile market in the 1990s and snapped up many of its most-lucrative customers. The country's No. 2 carrier is Reliance Communications, which is part of the billionaire Anil Ambani's conglomerate.

In emerging markets "there are new hurdles every day, and they can change the rules of the market as you are playing it," Marten Pieters, the chief executive of Vodafone's India business, said in a recent telephone interview.

The lesson from India? "If you don't have the stomach for that," Mr. Pieters said, "please don't come."

NEW DELHI — When the British mobile phone giant Vodafone bought an Indian wireless company for \$11 billion in 2007, the chief executive at the time, Arun Sarin, praised the new "tremendously exciting, fast-moving market."

But despite adding tens of millions of customers to become India's third-largest mobile phone company, Vodafone has found this vaunted high-growth market full of unexpected hazards.

First came a surprise tax bill, estimated at \$2.5 billion, that Vodafone is still appealing to the Indian Supreme Court. And a brace of new competitors has squeezed margins so tight that Vodafone last May wrote down the value of its India operations by \$3.5 billion.

Most recently, a government corruption scandal over the awarding of additional wireless radio spectrum has delayed

RECOMMEND
TWITTER
SIGN IN TO E-MAIL
PRINT
REPRINTS
SHARE

SNOW FLOWER
SECRET FAN
WATCH THE TRAILER

This window is more appropriate for an office environment and a computer with a larger screen than a mobile phone. Especially when the user wants to access in the searching for gadgets on the right of the figure, that is more difficult to access than with a computer.

For senior people, too information grouped on a single window can be not efficiency. It is the same situation for a new user who will probably be confused by this overload of information. Searching the useful information can take more time than with experienced users. The role of the expert is to imagine and to show these inexperienced people the possible locations for the subject.

The amount of information concerns the email display. In this topic, email is more visible on a large screen than on a Smartphone.

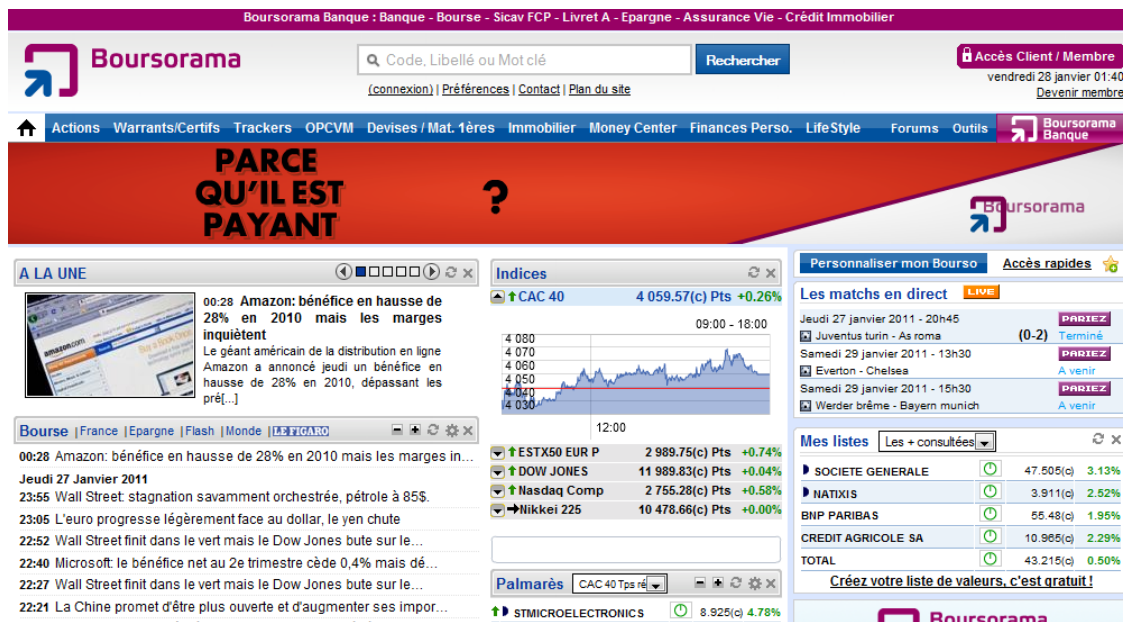
✔ Figure 36: Text example(New York Times)

Long emails are more difficult to be loaded all at once. Few lines are shown in the first place. The users can decide to load the rest of the message or not. This type of act is represented in other ways on different platforms. "On the other hand, a user who does not have this technical knowledge does not understand why some of their messages are abbreviated. The user considers it a drawback of the service"¹⁸

The example above is an article from a press website. This one contains a large part of the following guidelines.

Another example for professional and competent user: Boursorama. The value of stock option always changes. The content of this example has to show these correct changes in line with the type of user, therefore the main information is centred.

¹⁸ Charles Denis and Laurent Karsenty: "Inter-Usability of Multi-Device Systems : A conceptual Framework" of IntuiLab p.4



✓ **Figure 37 : Boursorama home page**

Guideline 63 : The content must avoid having out of date information

This guideline is in **Ref [a]**

The Figure 37 contents current information due its objective to inform of current value of stock option.

Guideline 64 : All available resources should be use to know and understand the user's requirement

This guideline is in **Ref [c]** p02

“These could include customer support lines, customer surveys and interviews, bulletin boards, sales people, user groups, trade show experiences, focus groups, etc. Successful projects require at least four (and average five) different sources of information.”(Leavitt & Sneiderman, 2006)

Guideline 65: A text should not be written entirely in capital letters

This guideline is in **Ref [i]** p132, , **Ref [c]** p119

Only words which present a name of a unique element such as an enterprise can be in capital letter.

Guideline 66 : Use dark letters on a light background and inversely

This guideline is in **Ref [h]** p15.; **Ref [a]** p109, p256, **Ref [l]** pt 51 **Ref [n]**, **Ref [e]** p29



On Figure 38, on the left, the letters are in dark way on a light background. In opposite, on the right, the word and background are in light colour and then, the visual is not clear.

Figure 38: text with background**Guideline 67 : The first letter of a sentence should be capitalized**

This guideline is in **Ref [h]** p14.

Guideline 68 : Using a familiar straight police in a general text (if not a quote) with normal size

Normal size means 12-14 point for body text and more point for title. For professional use, the policy is familiar-normal (not a fantasy policy) For children or other context such as poetry domain, another policy can be used but that has to remain easy to read and understand.

Ref [b] : the font is readability for senior people, **Ref [c]** p106

If it is content for business activities, the policy has to be chosen in a professional style. A normal style is like the Figure 39 where only the first square presents a normal style.

For instance, the Figure 36 presents a diary new and the text is written in a normal style to read easier.

**Figure 39: style of police****Figure 40: Style of police (TFOU) for children****Guideline 69 : Allow the user to change the letter policy**

Ref [b] : The problem with CSS¹⁹ sheet is that the font size stays the same. It is impossible for users to change it. The font generally uses a tiny fixed size. Then, that can be difficult for adult over the age 40 year and senior people.

¹⁹ CCS = Cascading Style Sheets

In opposite to **Ref [b]**, the **Ref [h]** p179 suggests to use CSS to define a style of policy. **Ref [l]** pt.10

In **Ref [h]** we have a contradiction in p 179, this reference prefers to use CSS and in p197, it as to allow user to change the letter style.

The **Ref [b]** is better for sernior people.

This guideline is optional. The goal of an application or website is to inform users. Therefore, the information has to be in easy way to read by developers and users.



Figure 41 : font size options (Web credible)

Guideline 70 : Put symbol (puce) for a better structure and visibility

This guideline is in **Ref [b]** on “miskate of non-scannable text”, **Ref [h]** p25, p195



Figure 42: Using symbol for the structure (Sony Vaio)

Sony Vaio has chosen the puce “V” to indicate a validation and accentuate a characteristic.

Guideline 71 : Do not insert symbol (puce) for decorative

The function of puce has to help user to separate information and to have the content in a structure issue.

This guideline is in **Ref [b]** on “miskate of non-scannable text”, **Ref [h]** p25

Guideline 72: Use less negation and avoid double negation in a section

Double negation in a sentence can be difficult to understand the meaning

This guideline is in **Ref [h]** p32

Guideline 73: Do not use the right justification in an inappropriate way**Guideline 74: Information has to be present in a correct order**

This guideline is in **Ref [d]**, **Ref [h]** p95,

Guideline 75: First order is the Objective

This guideline is in **Ref [d]**, **Ref [h]** p95,

Guideline 76: Secondly a short conclusion, action to realise this goal are shown and details will follow above

This guideline is in **Ref [d]**, **Ref [h]** p95, p193,

Guideline 77: Action text should not use the future sentence

Action text means the text for an action has not been written in future grammar.

This guideline is in **Ref [h]** p99,

By example we don't see:



You will click on OK



Click on OK

Guideline 78: Help user when the content have some difficult words to understand

To indicate this possibility, the user can click on difficult word and a meaning is shown.

This guideline is in , **Ref [c]** p19

Guideline 79: Use formal language

This guideline is in **Ref [k]**, **Ref [d]**, **Ref [h]** p25-94, **Ref [c]** p161, **Ref [e]** p27

For instance, when a website invites the user to register, the formal sentence should be like the Figure 43. It is more professional than this type of sentence "I think you have to register to purchase this Article". The formal language can may not be used if the content is for children.

ACM DL DIGITAL LIBRARY

SIGN IN SIGN UP

SEARCH

Purchase this Article:
Analyse empirique de l'inter-utilisabilité d'un service multisupport Web et téléphone
 Laurent Karsenty, Valérie Bothereau

Step 1 Sign in or create a free Web account

Sign in with your Web account
 Web Account
 Password
 sign in

-or-

Create a free Web account
 Email Address
 continue

cancel

Step 2 Pricing and access depends on your membership or subscriptions with ACM.

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Figure 43: Formal Language (ACM DL)

Guideline 80: Avoid abbreviations without a given definition

This guideline is in **Ref [k]**, **Ref [d]**, **Ref [h]** p25-94, **Ref [c]** p162

Guideline 81: Gathering the information of the same activity in the same window

This guideline joins the guideline 51

This guideline is in **Ref [h]** p25

All information presents in Figure 44 concerns a theme, the gadgets.

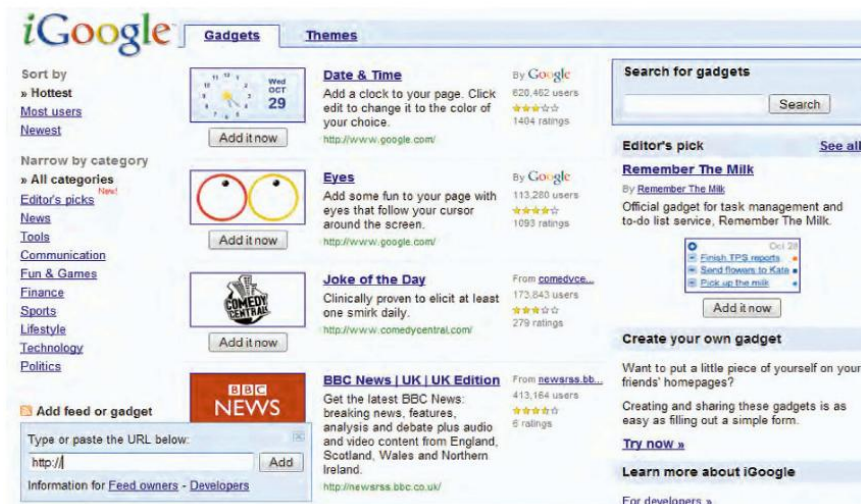


Figure 44 : Information (iGoogle)

Guideline 82: F is preferable and by this way the website provides easy word

Short memory means that people use it more than their long memory. By this theory, developer has to show a content which is easy to retain.

This guideline is in **Ref [h]** p81, , **Ref [c]** p12

Guideline 83: Mental calculation has to be minimized or tools have to be provided for this usage

That joins Guideline 71 in which the webmaster and developer emphasize the short memory of users. For senior people, it is the best.

This guideline is in **Ref [h]** p82, , **Ref [c]** p12

Guideline 84: Highlight only key words

This guideline extends Guideline 67. Indeed, not only the difficult words have to be highlighted but also the words summarizing the content.

This guideline is in **Ref [b]** on “mistake of non-scannable text.”, **Ref [h]** p156, p189

Guideline 85: Avoid repeating the same useless information more than once

Only information concerning the private data or an information reminder is necessary to have a second presentation. That also concerns the logos, except if the content needs to have more than one logo or label.

Ref [b] on “mistake of non-scannable text.”

Example: the Figure 15 shows the old homepage of the famous social network website, Facebook, we can observe more than once the logo.

3.4.4 Button-Link

Guideline 86 : A tiny centred text appears to describe the application before the user clicks on the link or button

This guideline joins Guideline 59, Guideline 60 and Guideline 63 on correct text.

This guideline is in **Ref [a]** p214, p254

Guideline 87 : Avoid link not clickable

It is better to have only links referring to another correct content

This guideline is in **Ref [c]** p89. **Ref [e]** p27

Guideline 88 : Avoid "click here" as button or a link without define the following content

That forces the user to click on the link of the web site. That can be used in a marketing way or due to an advice on the website which can influence its professional content.

This guideline is in **Ref [a]** p236

To register on a site, generally, a button with the label “register” is shown, see the Figure 35

Guideline 89 : Avoid link don't look like link

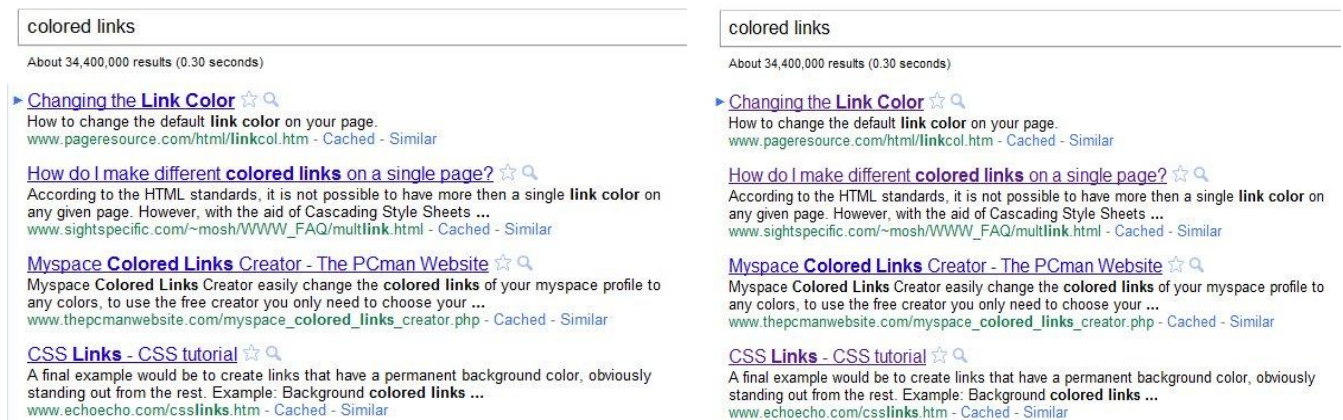
A textual link is underlined in blue or similar colour. Therefore, it is preferable not to underline a word in a text if it is not a link. It is better to put it in bold style. The link not available is clearly shown using for instance the grey colour.

This guideline is in **Ref [a]** p222, **Ref [f]** title guided tour

Guideline 90 : The passage of user on a website by clicking on a link must be displayed by another colour.

If users don't find the correct information, they can try on other pages that he or she had not already visited. Moreover, to find information from a past link and to identify an unvisited page is easier.

Ref [b] presents that the most second mistake is not changing the colour of visited link. This guideline is in **Ref [a]** p246



 **Figure 45 : coloured links**

For instance, on the left, we have all websites not yet visited. On the right, when a website had been used, the link is turned into another colour.

Guideline 91: No multiple links to refer to the same address on one page

It is not useless to multiply the same link or to have different texts which also act as links and refer to the same page.

This guideline is in **Ref [a]** p94 , **Ref [e]** p27

Guideline 92 : One verb as label on button should define the action when the user click on

The verb describe the action on button. Frequently, for validating a form, the verb on the button has to be “submitted”. For validating a profile, the appropriate verb is “register”.

This guideline is in **Ref [1]** point 44. **Ref [a]** p168, **Ref [1]** pt.18, **Ref [f]** title action button

The Figure 35 shows the button “register” in which the label is a verb

Guideline 93 : Small size on verbs of each button

This guideline is in **Ref [a]** p196

Guideline 94 : Button without possible action on it should not be active

This guideline is in **Ref [a]** p31, **Ref [e]** p27

Guideline 95 : Warn users that the page will request important download of components

This guideline is in **Ref [i]** p414

3.4.5 Graphics

Guideline 96 : Use decorate graphics in a useful way such as showing the real content

By the professional graphics, the home page can create a positive first impression. Then, that will enable to motivate people to explore the site. Graphic also means the flash colour on a text. This one has to be used to attract user in a correct context such as alerting an error.

This guideline is in **Ref [b]** on “violating graphical convention”, **Ref [h]** p18-178-185, **Ref [e]** p30

For a mobile, using a minimum of decorative graphics is preferred. Large and heavy graphics can be costly to load the whole web page. For instance, in the Partners section of the SGI website, a large picture is displayed but for a mobile phone, the load of this picture is not necessary to the comprehension of the content. Senior people appreciate this kind of representation due to their deficient seeing. For adults, that shows the real content and then that can be interpreted as an introduction of the content.

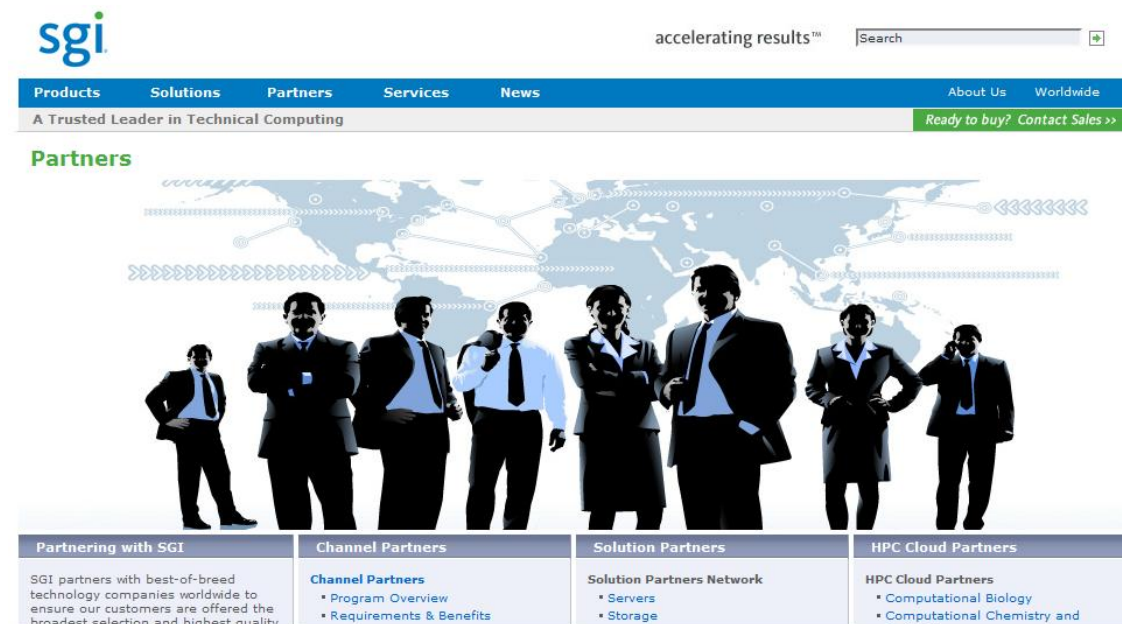


Figure 46 : Graphic representation (SGI)



✗ **Figure 47 : Graphic representation (Talk-Mania)**

On this figure, we don't precisely see what the web site proposes on the first time with its short description below the title. Moreover, the graphical use on the menu can be confused for inexperienced users. On the red rectangle, these components are an extra of the menu above that one. It can be wrongly interpreted on the first look with the different pieces of advice between the menu and this other part of menu.

Guideline 97 : Minimize the weight of the image

That joins the **Guideline 93** if a download of an element is important; the application has to prevent users.

This guideline is in **Ref [h]** p181; **Ref [l]** pt.2, , **Ref [c]** p37, p145

Guideline 98 : Prioritize on the quality of the picture than the size

A very small-size picture can be useless to understand its representation.

This guideline is in **Ref [h]** p181

Guideline 99 : The key "alt" allows to show a short description of the picture

This guideline is in **Ref [h]** p182, , **Ref [c]** p25

Guideline 100 : The picture can also be a link to another page

The picture can refer to another page but the representation of this picture is linked with this next page.

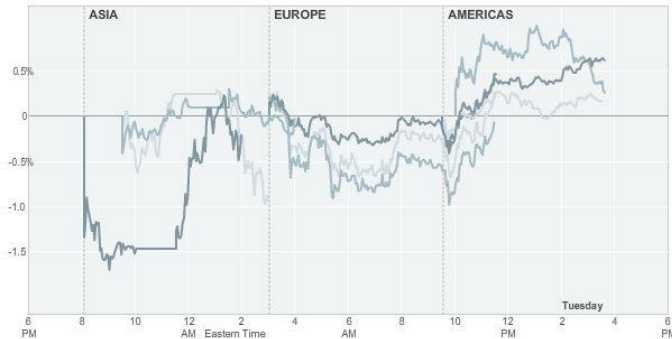
This guideline is in **Ref [h]** p182

Guideline 101 : A representation on different tools (Video, graphic ...) is sometimes preferable than a large text (because users can quickly catch the meaning.)

This guideline is in **Ref [b]** on “violating graphical convention”, **Ref [h]** p185

World Markets

POWERED BY
THOMSON REUTERS



Market Summary

At 3:52 PM ET: In Asia, the indexes closed down at the end of the day's trading, with the Shanghai Composite having fallen the most, by 0.87%. In Europe, the indexes closed mixed at the end of the day's trading, with the FTSE 100 having had the greatest change, up by 0.47%. In current trading the indexes are on an upswing, with the S.&P. 500 in the U.S. making the greatest gains, up by 0.67%.

It is most the case for economy activity and business domain



Figure 48 : Graphe example

Guideline 102 : Do not launch directly the animation when the page is charged

The animation concerns video, music. This does not concern the graphic animation.

Ref [b] on “violating graphical convention”

For instance, commercial website uses additional applications on their pages to invite customers to see the new advertisement.

Youtube is a relevant evidence. This site offers to user a long list before accessing the video.

Guideline 103 : Do not launch directly a sound with the animation when the page is charge

That joins Guideline 102 and avoids downloading useless elements which are linked to Guideline 93

Ref [b] on “violating graphical convention”

Guideline 104 : The user is able to stop the animation whenever he wants

A button stop is necessary to reach this guideline

Ref [b] on “violating graphical convention”, **Ref [e]** p28

Guideline 105 : Commercial web sites have to use animation to complete a product (tutorial or marketing issue)

Guideline 102 Guideline 93 and Guideline 96 have to be respected before this guideline.

Ref [b] on “violating graphical convention”
--

The Figure 29 on Audi A5 shows the possibility to launch an animation to have a first view on the product

Guideline 106 : Present a correct convention for each chart and graph
--

- | |
|--|
| <ul style="list-style-type: none"> -Effectively shows the amount of each point of the chart or graph -Correct numeric is used -Labels are correctly presented -Legend, Title is inserted |
|--|

This guideline is in Ref [k]

The Figure 48 shows the correct points: numeric, legend, title, amount of each point.

3.4.6 Audition

Guideline 107 : Use of audible alarms in a correct situation

This guideline is more general than the Guideline 103 which is more focused on animation aspect. Moreover, this is used to describe that the website cannot launch a loud sound

This guideline is in Ref [h] p25, Ref [e] p28

Guideline 108 : Do not annoy the user with unnecessary noise

This guideline is in Ref [h] p25, , Ref [c] p146
--

3.5 Actions

Guideline 109 : The website or application should propose the target links in a direct way

That joins the idea proposed in reference Ref [i] :” The number of screens required per task has been minimised.”
--

This guideline is in Ref [i] p139
--

For business activities, the offered products are linked to their owned characteristic in order to insist on the purchase of products.

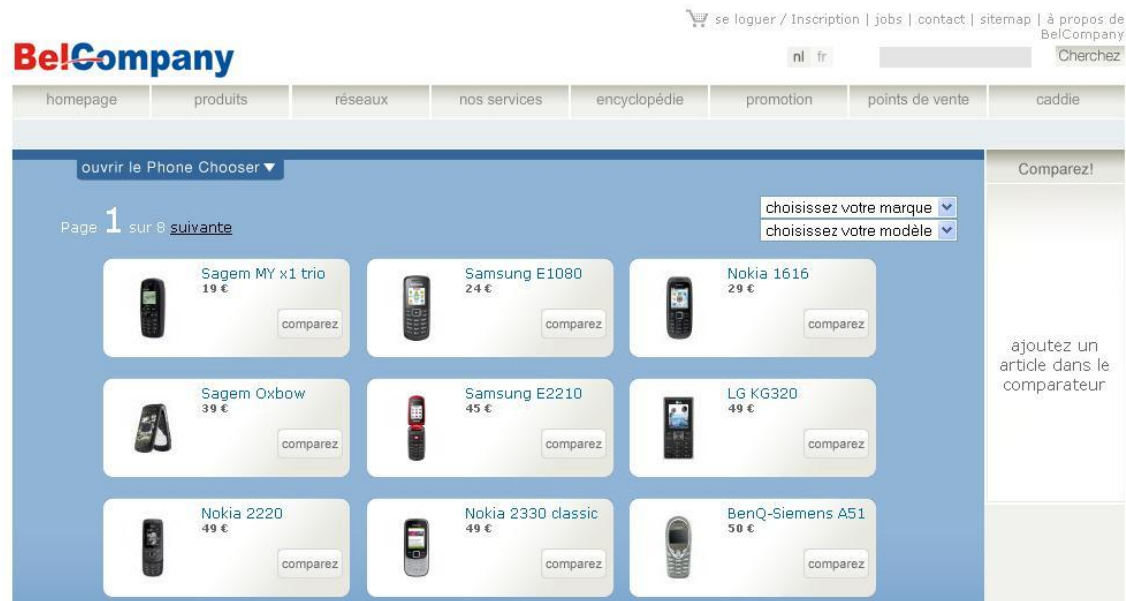


Figure 49 : Illustrated links (BelCompany)



Figure 50: Direct links (Auchan)

But others markets are not focused on the marketing aspect and prefer to make an easy use by proposing a direct link in the category.

Guideline 110 : Provide a fully spelled-out description of the action

This guideline is in **Ref [f]** title Overview by Detail

Shop safely on eBay



eBay Buyer Protection
We've got you covered!



eBay Top-Rated Sellers
Get great service & fast shipping from top-rated sellers.



PayPal
PayPal is the world's most-loved way to pay and get paid.

For instance, with the eBay website, on its home page, the customer can click on the title where a small description of the content is presented. Before making a deal, the users have the opportunity to have more information of their futures actions.

Guideline 111 : Avoid repeating the same action more than once

The user has to log in just once to access the whole website or application content.

Guideline 112 : The functionality of new device controls is explicit

This guideline is more focused when an application has been upgraded.

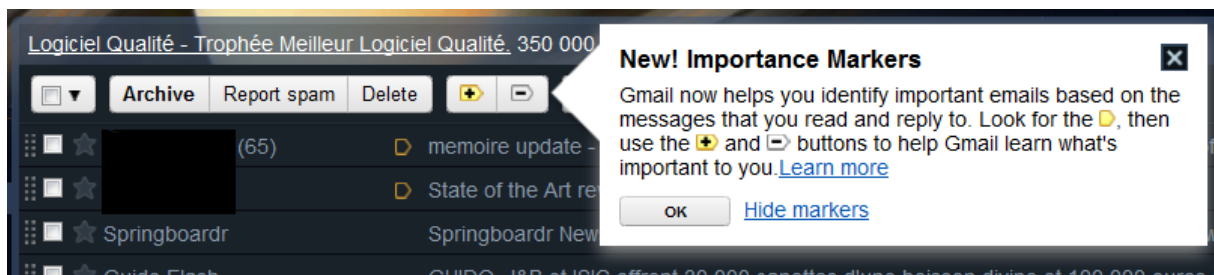


Figure 51 : Explanations for a new function in Gmail

Guideline 113 : When the time is out, the web site must log off the user

This guideline is available if the user has not made the choice to stay signed in

Guideline 114 : The content will be print in correct format

This guideline is **Ref [k], Ref [c]** p18

Guideline 115 : Login and password will be entry by a justified field on the right

Guideline 116 : Make sure the private information

This guideline presents the data protection such as login and password. For instance, the password entry must not be displayed.

This guideline is in **Ref [a]** p124

Guideline 117 : Allow users to chose their own password

It is easier to remember the password

This guideline is **Ref [k]**

Guideline 118 : Allow user to change password

This guideline is in **Ref [k]**

Guideline 119 : Limit the number of unsuccessful log on

A message with the login and password has been sent to users in case of unsuccessful logs on

This guideline is in **Ref [k]**

Guideline 120 : A message with the login and password has been sent to users in unsuccessful log on case

This guideline is in **Ref [k]**

3.6 Forms

3.6.1 General

Guideline 121 : Not automatically tab action by the computer

Let the user decide when use the tab action to switch from one entry field to the next himself. Error can accidentally appear due to multiple smaller boxes like phone number

This guideline is in **Ref [k], Ref [i]** p156

Guideline 122 : Avoid unnecessary registration

Registration is mandatory to get a product or to have access to payable information.

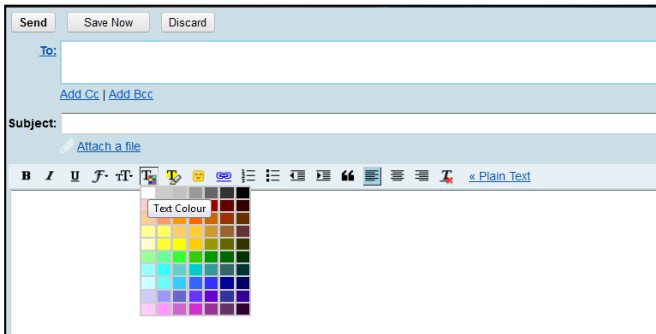
This guideline is in **Ref [f]** title Login

For business activities such as eBay, the registration is necessary.

Guideline 123 : Use a "web-safe" tool to choose the colour

A tool is necessary to guide the user in their choice of colour

This guideline is in **Ref [i]** p365



Generally, in popular email services or forums, such as Gmail on Figure 52, a "web-safe" tool is presented to change the colour of letters.



Figure 52: "web-safe" tool (GMAIL)

Guideline 124 : Radio button is preferable than a long selection list

This is the case for a limited choice of elements.

This guideline is in **Ref [i]** p257

3.6.2 Data Field

Two solutions to show a form: the guideline 113 or 114

Guideline 125 : Leave one space between the longest caption and the data field column

Left justify both captions and data fields

This guideline is in **Ref [i]** p137, **Ref [n]**

Premier pas avec Gmail

Prenom:

Nom:

Nom de connexion demandé: ↔

Choisissez un mot de passe:

Confirmez le mot de passe :

Question secrète:

@gmail.com
 Exemples : JSentier, Julien.Sentier

 Niveau de sécurité du mot de passe :
 Minimum 8 caractères.

☒ Rester connecté
☒ Activer Historique Web [En savoir plus](#)
 Choisissez une question...
 Si vous oubliez votre mot de passe, nous vous demanderons de fournir la réponse à votre question secrète: [En savoir plus](#)

Figure 53 : Gmail data fields

As we can see on the Figure 53, the column of label separate by one space of the second column on fields.

Guideline 126 : Left justify data fields and right-justify captions to data fields

This guideline is in **Ref [i]** p134, p136

facebook

Adresse électronique: Mot de passe:

☐ Oui, c'est ma session active. [Mot de passe oublié ?](#)

Facebook vous permet de rester en contact avec les personnes qui comptent dans votre vie.

Inscription
C'est gratuit (et ça le restera toujours)

Prénom:

Nom de famille:

Votre adresse électronique:

Saisissez à nouveau votre adresse électronique:

Nouveau mot de passe:

Je suis: Sexe:

Date de naissance: Jour: Mois: Année:

Créer une Page pour une célébrité, un groupe ou une entreprise.

Here, we can see another approach of the first guideline about the justify label-data on right and not left. That means to leave only one space between each column.

Figure 54 : Facebook data fields



Guideline 127 : Label and field should be align and not so far to make the correspondence view

Leave a little space between each label and field and in correct horizontal align

This guideline is in **Ref [a]** p143

Guideline 128 : A single field is preferred than multiple boxes

That avoids the automatically tab action in **Guideline 121**

This guideline is in **Ref [a]** p128

3.6.3 Data Entry**Guideline 129 : Ask most useful information on the first time**

The name and the last name are the most important information to obtain.

This guideline is in **Ref [1]** pt.35, , **Ref [c]** p125, **Ref [e]** p193, **Ref [f]** title Form

User : New User

Status: Ready

Insert

First Name

Last Name*

User ID*

User Password*

Confirm Password*

PIN *

Confirm PIN *

Telephone Number

Manager User ID

Department

User Locale

Enable CTI Application Use ☒

Call Park Retrieval Allowed ☐

Enable Calling Party Number Modification ☐

* indicates required item.

Optional and required item are shown. This figure also asks a long list of information and makes a large request which may not incite the user to fill the document in. Automatic id and a long list of department by example can help the users. In consequence, the creation of the following guidelines is appropriate.



Figure 55 : Data entry example (CISCO)

Guideline 130 : Minimize the demand of data

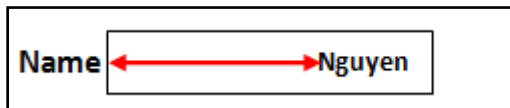
That joins the guideline above. If information is not necessary, the number of children for example, it should not be asked. Therefore just the information necessary to join the user or to identify him should be asked.

This guideline is in **Ref [i]** p116, **Ref [c]** p131

Guideline 131 : Entries must be automatically justified and not aligned in right position

Ref [k] reviews this guidelines and said that currently, the system automatically justify each data field in advance.

Right position implies a large space between the label and the fill with the data, which is not an optimal view.



Showing a data in right position does not look as well as we can see in this instance.

Guideline 132 : Required and optional data fields are clearly displayed

It is a way to obtain useful information on the first time.

This guideline is in **Ref [c]** p121

Figure 55 also displays the mandatory input by a star symbol close the requested label. Furthermore, extra information about the meaning of this element is presented.

Guideline 133 : Visible length of a field of the data requirement or present a mask as indication

It guides the user to insert correct data (zip code, phone number, serial device, bank card...)

This guideline is in **Ref [a]** p127

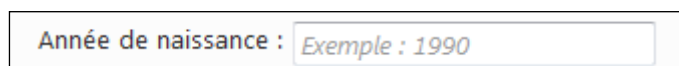
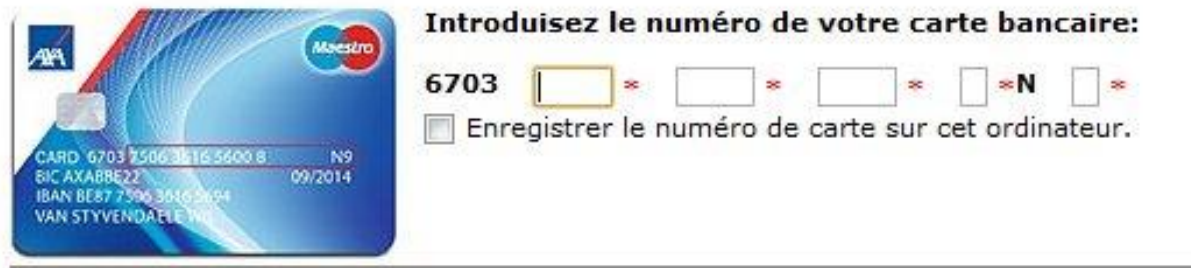


Figure 56 : Hotmail sign-up

To entry birth year can be difficult because many formats exist. A mask by example can be useful. Or for more convenience, having a calendar to define the exact date of birth is better.

In the following figure, a length for each set of figures is fixed. That can help the users to define the good set of numbers.



The image shows a blue Axa credit card on the left with the following details: CARD 6703 7506 3616 5600 8, N9, BIC AXABBE22, IBAN BE87 7506 3616 5604, VAN STYVENDAELE, 09/2014. To the right is a form titled "Introduisez le numéro de votre carte bancaire:". The form displays the first four digits "6703" followed by five empty boxes separated by red "x" symbols. The fifth box contains the letter "N". Below the boxes is a checkbox labeled "Enregistrer le numéro de carte sur cet ordinateur."

✔ **Figure 57 : Axa Homebanking interface** ²⁰

Guideline 134 : Notice data form (data, symbol, space, unit of measurement)

The user should not be allowed to entry data with his intuition. The website must guide users into specific pattern. Common form is preferred in this case and must be indicated. The reference **Ref [i]** indicates: "Data formats follow appropriate cultural conventions" That can be difficult if the site is an international way and then an indication of the unit is more appropriately.

This guideline is in **Ref [i]** p16

Ex: Date form, name of the enterprise (H&M, sometimes, the website want users to write H And M), entry a numerous of serial of a device (Space?Capital Letter?), specify what unit of measurement the website will use.

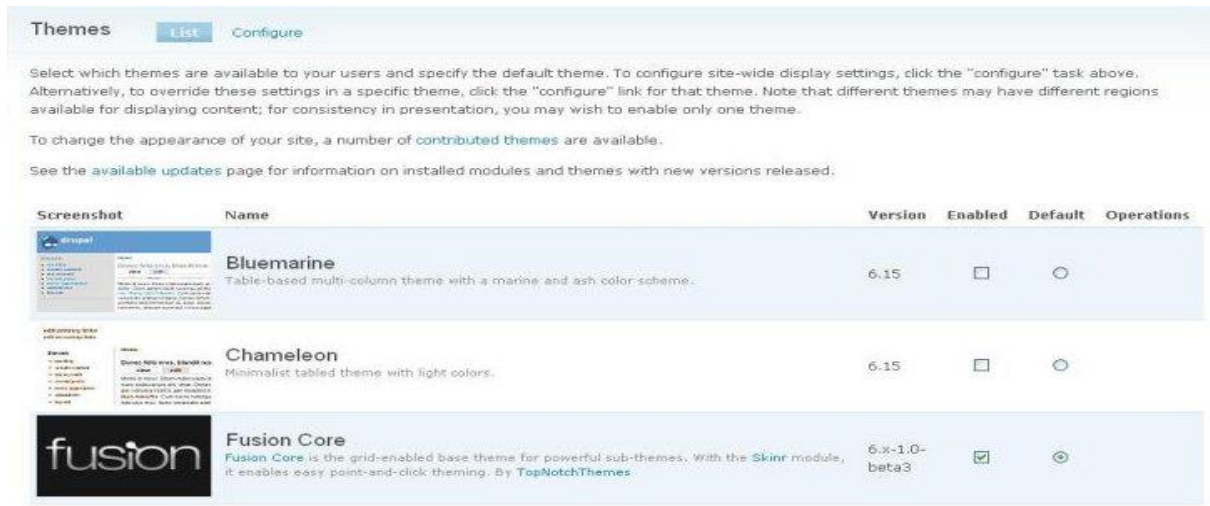
Guideline 135 : Use default value in possible case

That allows to focus on other important field. Default value is used when user has the choice for a data. (selection box, radiobutton)

Some websites abuse of the default value. Indeed, the radiobutton of agreement that data will be used in a commercial way is "yes". The web user can be careless and quickly pass the information and then receive innumerable spam in their inbox which will be difficult to be detached.

This guideline is in **Ref [i]** p264

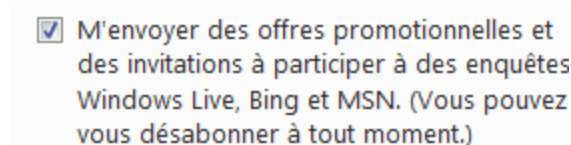
²⁰ AXA Bank : <http://www.axa.be/hb/fr/home.html> (17-02-2011)



✔ **Figure 58 : Radiobuttons ²¹**

In the above figure, a default theme is selected for users.

When a user has to sign in on hotmail.com, the web site automatically inserts a positive response to the invitation in participation of survey and to receipt promotional. The inbox of user can be overcrowded of useless messages.



✗ **Figure 59 : Sign-in checkbox (hotmail)**

A last illustration is in business task as Ryanair, button or checkbox are automatically put in default value. For instance, before inserting any entry, in flights tab, the default value between the choice "return" and "one way" is return. And in a common way, the checkbox for a flexible travel is positive.

Figure 60 : radiobuttons and checkboxes (Ryanair)

²¹ Making a website using Drupal : <http://www.refinedhoarder.com/page/2/>

Guideline 136 : Radiobutton is preferred for choosing one of several options

The radiobutton shows the preference of user among options and can replace the checkbox function but a default value has to be inserted.

This guideline is in **Ref [a]** p.146, 122

For instance the Figure 60, user can chooses between "one way" and "Return".

A frequent illustration is when the user chooses between male or female option.

Guideline 137 : Checkbox is used for validating one choice (Yes or Not)

It is better to have one checkbox to validate an option. That means, when it is clicked on, the user shows that he agrees with the option. Avoid answering yes and no simultaneously.

This guideline is in **Ref [i]** p155, **Ref [c]** p131

For instance the Figure 60.

Guideline 138 : A validation request occurs before the form is definitely submitted

A validation is necessary to make sure the user will entry all correct information requirements before saving it in the database. Often, a link is requested to be validated by the email which user will receive in his inbox.

This guideline is in **Ref [i]**, **Ref [l]** pt.44

Guideline 139 : To fill a form, either let the user choose the unit, either the websites have to define and explain at users
Guideline 140 : Precise the format for the entry data

For the birth date or other, multiple format exist.

This guideline is in **Ref [k]**, **Ref [h]** p57, , **Ref [c]** p11, **Ref [f]** title Constraint input

Guideline 141 : Allow to select all data if users have to select items

This guideline is in **Ref [f]** title Table Filter

Guideline 142 : If an error occurs, the input is easy corrected

Only the input has to be corrected; other entries stay in the field. Therefore, users won't have to fill all the form again

Guideline 143 : Suggest an automatically set of word when user is writing a beginning word

This guideline is in **Ref [a]** p123-124

Guideline 144 : Use alphabetic order for selection tool

It is easier to find an option

This guideline is in **Ref [i]** p255

Guideline 145 : options not available in a tool (radiobutton, selection, checkboxes) are missed or in light colour and cannot be chosen .

This guideline is in **Ref [i]** p 334

3.7 Help, Evaluation and Feedback

3.7.1 Research

Guideline 146 : Make the possibility to search a specific content on the website, in each page on the right-top

This issue is obvious and is a form to assist the users in the navigate on site

This guideline is in **Ref [1]** pt. 57, **Ref [e]** p193, **Ref [f]** title Searchbox



For business activities, having a search tool shows the professionalism of the society such as SGI on the

Figure 61: Search field



To be assisted by a tutorial or communicating with a person working on the website enables the senior people to be confident on the contents and encourage them to continue their navigation. Moreover,



Figure 62 : Search field

Another instance, the Figure 30 on “Repak.ie” is particularly interesting by its research way. Traditionally, the “site search” is not in this place. To place like it, developers want to catch the attention of users below the menu navigation.

Guideline 147 : the length for a research in search boxes is optimal

Ref [f] suggests: “The search box is long enough to handle common query lengths.”

Guideline 148 : indicate the possibility to have different kinds of search functionality.

This guideline is in Ref [f] title advanced search

Business domain, large international websites offer this guideline on their website due to numerous categories of products. For instance, Dell Company put three choices on their own website: a research based on all word, on just the least one or for a specific section and domain.

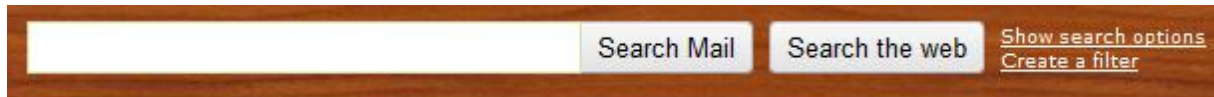


Figure 63: Search Tool (Dell Company)

for the navigation on Mobile phone, this offered capacity is very useful to target immediately the objective.

Here we have a website dedicated for senior people but unfortunately with these commercial representation, this site does not propose any accelerating research which can show a lack of organisation.

This guideline is generally used in email service. For instance, in Gmail, the user has the possibility to search the information among his email or directly on the web.



✔ **Figure 64 : Gmail search tool**

Guideline 149 : Make the possibility to search in a sub group
--

That joins the idea of the first guideline of research section but here, more precisions are requested.

The Figure 63 allows the users to choose in a sub-section.

Guideline 150 : Show the results in relevant order

That joins the guideline 63 to show the most important information on the first time.

Ref [b] adds a detail about the results from a search tool. Ref [f] title search results
--

Currently, the results show more content the more times the word appears rather than the relevant and important document.

Guideline 151 : Do not multiply the search tool in a window if the search function is the same.
--

We can have two search tools in one search for a specific group and the second in other groups. Developers wanted to attract the attention with two search tools but that can affect the quality of the content.
--

This guideline is in Ref [a] p169. Ref [1] pt.59
--

For instance, the figure 67 on the right, shows two same search tools.

3.7.2 Alert-Error message

Guideline 152 : Message to prevent the user of the irreversible action have to be displayed and confirmation of a relevant action
--

For business activities, such as a purchase of a product, a confirm message is mandatory. For a registration, it is good to have a confirmation message to enter on the site.

This guideline is in Ref [k] , Ref [h] p30-84

Guideline 153 : A message alert-error should be short and make the understanding easy (not search requirement)

This guideline is in **Ref [a]** p165,199, **Ref [f]** title Input Error Message

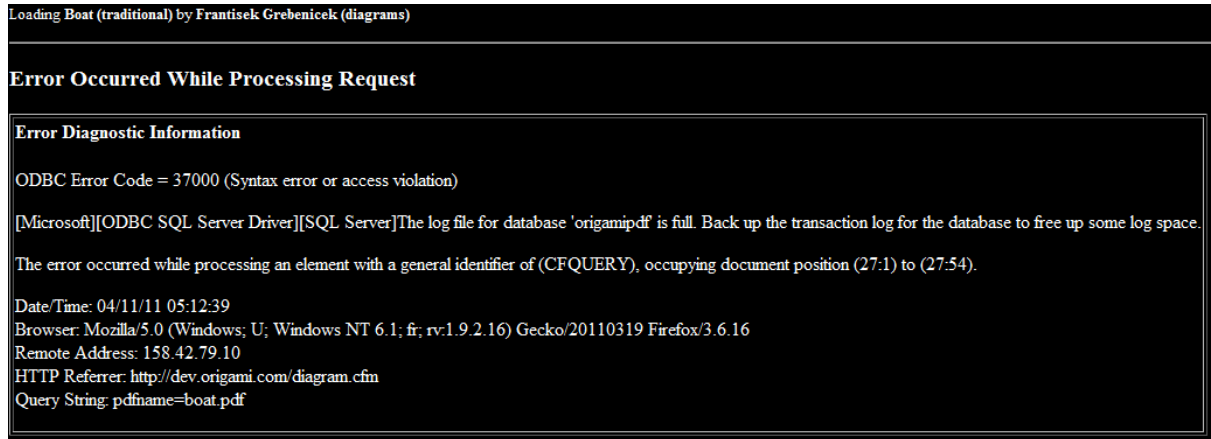


Figure 65 : Error message

In this figure, the language used is the SQL request. A user without any knowledge about it does not understand the meaning of the error. This figure is also an example of wrong issue for the guidelines 154, 155, 157, 158 described in the following pages.

Guideline 154 : Prevent an issue to interrupt processes due to a long waiting of charging with a profile copy

This guideline is in **Ref [a]** p205

Guideline 155 : Error Message allow the user to access in direct fashion at the problem or how to solve it.

This guideline means that the problem is directly displayed to the user and he can fix it easily. This rule is more appropriate when a wrong or miss data in a form is found. Indeed, it is easier to point the user in the error. If it is difficult to directly have access to the problem, the message has to describe how to solve the problem in an understandable way and without using technical language (guideline 142-146)

This guideline is in **Ref [a]** p199, **Ref [e]** p28

For a problem in the code, such as in instance 63, the user cannot do anything. Only the webmaster can fix the problem. Moreover, the error message does not allow the user to contact directly the webmaster. He has to go to the previous page and search the link to contact him.

Guideline 156 : Do not use the message as "error fatal" that can stress the users
--

This guideline is Ref [h] p89.

Guideline 157 : The alert-error message should use an understandable and formal language

This guideline is in Ref [a] p165,199, Ref [e] p28
--

The formal language consists of using an understandable issue and not to be familiar with the user. For example: "you are so sweet for trying to confirm your form but you forgot something to fill in" This type of error message is ridiculous and just makes fun of the user but are not professional at all. Moreover, that can remove all the credibility of the site. Figure 63 uses too much complicated words which are reserved to webmasters.

Guideline 158 : The alert-error message has to appear directly in front of the user view where the action had taken
--

This guideline is in Ref [k], Ref [h] p86
--

Guideline 159 : Error message has to describe the solution to solve the problem or explain the situation not require any additional action to understand it.

That means the message should use a normal language (avoid technique language)
--

This guideline is in Ref [k], Ref [h] p87-88, Ref [e] p28

The instance in Figure 65 explains the solution to fix the problem but it is only reserved to the webmaster and therefore are not useful for users.

Guideline 160 : Give an issue when a message system appears "404-page not found"

Do not let the user in uncomfortable situation and always guiding the user in the navigation.

This guideline is in Ref [a] p119., Ref [e] p28

3.7.3 Help Contact

Guideline 161 : Show that the web site offers the possibility to enter in contact with an agent of the enterprise

When user fails to looki for information or additional information, he can contact an agent.

This guideline is in **Ref [b]** , **Ref [h]** p86, **Ref [n]** , **Ref [e]** p28

To be in communication with a real agent is often the case for business activities. That shows the professional task. The future customer can check its product or to put a reclamation at their enterprise by this way.



The ideal photo layout solution for your most memorable photos!

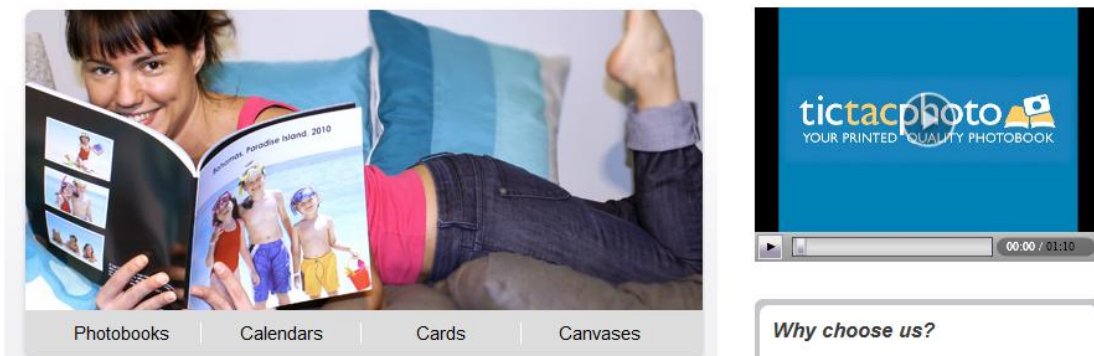


Figure 66 : Contact link (tictacphoto)

In the case of email service, if we analyze 3 popular services that we had taken in the homepage content section, the result is that only one out of three offers the possibility to access at an help center!

On the figure 65 of the SGI representation, on the left, we can find a link about the enterprise but contrary to the previous instance, a link to contact the enterprise is not available.



Figure 67 : SGI : no "contact" link

Guideline 162 : Frequently Asked Questions (FAQ) with answer should be provided

This guideline is in **Ref [n]**, **Ref [f]** title FAQ

Before contacting the help center of the site, users prefer looking over all rubrics related to his problem. With a FAQ, they can find a potential answer to their question and no wait the reply of the website contact.

Top Solutions



- ▶ Which Dell systems are impacted by Intel's stop ship of Cougar Point Chipset ?
- ▶ How do I install & set up my new Dell?
- ▶ What I should know about the Android 2.2 upgrade for my Dell Streak
- ▶ I need help restoring my computer or reinstalling Windows
- ▶ My computer doesn't start successfully
- ▶ My computer freezes, blue screens or locks up when using it
- ▶ How do I run basic diagnostic tests on my computer?
- ▶ More Top Solutions

A FAQ is generally proposed by ecommerce, business activities and community. That avoids a repetition of similar questions and an important time benefit. For retired people, this form of helping can guide them in their specific researches.



Figure 68 : FAQ (Dell)

Guideline 163 : When submitting the form and a lack of information occurs, the site should position the user at this location.
Guideline 164 : Show that the help centre had received the question by a message

That can be an email to confirm that the centre had received the question and will deal with it.

This guideline is in **Ref [e]** p28

Guideline 165 : The Answer to the question is given in a short time

A short time is a reasonable time, not one month later.

Guideline 166 : Suggest an automatically set of word when user is writing a beginning word

This Guideline is also linked with an automatic entry in a field from a form

This guideline is in **Ref [f]** title Autocomplete

3.7.4 Update without confusion

Guideline 167 : User experience is also able to return to the site and perform the same tasks

The new version of a website can cause many problems and confuse the user.

Ref [f] : “When they return to the site, users will remember how to carry out the key tasks.”

On the new version of Facebook, the search tool, list of friends and advice had changed of position. Additional devices were available. Moreover, the new search in a friend list is also available and can be confused with the other search tool. But a description of this new tool is available by a mask text.



Figure 69 : Left: old version of Facebook. Right: new version

3.7.5 Feedback

Guideline 168 : Make a possible report to the website when a problem occurs

The report is delivered only if the user indicates it. Details of the errors and to charge the screenshot must put available in the report.

This guideline is in **Ref [f]** title Help Wizard

✓ **Figure 70 : Facebook feedback**

Facebook presents an available form to report a problem on the page. The particular element in this form is the choice to present a report, a bug or to submit a feedback about this feature.

The site makes it easy to correct errors (e.g. when a form is incomplete, positioning the cursor at the location where correction is required).

✓ **Figure 71 : Missing information in a form (Ryanair)**

3.8 Generalized guidelines for Smartphones

In the Smartphone case, we will only use two popular applications: Android and iOS. On the first part, we will compare this list of guidelines based on defined references with three others related to iOS:

- Ref [q] : iOS Human Interface Guidelines (Apple Inc., 2011)
- Ref [t] : iPhone Apps Need Low Starting Hurdles (Nielsen, 2010)
- Ref [u] : Safari Web content guide (Apple Inc., 2010)

Secondly, the Android application will be analyzed through different references: the official UI guidelines of Android system and an article, "Android UI Design Tips"²².

3.8.1 Guidelines for all operating systems

We will begin by two general guidelines for smartphones, whatever is the operating system.

Guideline 169 : Only one column for a content
--

This guideline is in Ref [d]

Guideline 170 : The interface shall be adapted for both touchscreen and no touchscreen use.
--

This guideline is in Ref [d]

3.8.2 Guidelines for iOS

The iOS devices offer the possibility to develop two kinds of softwares:

-**iOS apps** are common features such as calendar, email and others. These applications are directly inserted in the device or can be installed.

-**Web content** is related to website and defined into three categories:

- **Web app** uses the network connection and owns almost similar proprieties of iOS apps
- **Optimized webpage** in Safari browser. Webpage are adjusted to be optimal in iOS device.
- **Compatible webpage** remains on the principle that the webpage is display in consistency view and relevant practice without any additional practice to optimize the page for iOS devices.

²² ANDROID UI DESIGN TIPS. 2010. CONSULTED : 31 MAR 2011.
<http://www.slideshare.net/AndroidDev/android-ui-design-tips>

The list of guidelines defined in the previous chapter has been built in using different reference into specific categories. This list is compared with other three different references focused only on iOS devices:

3.8.2.1 Guidelines and the reference “iOS Human Interface Guidelines”

The first reference “**iOS Human Interface Guidelines**” **does** not mention all guidelines in a list. But in some examples, we can extract some rules related to our list. For instance, in page 27, the section “don’t stop there” means to add feature in an appropriate way corresponding to guideline 5 on optimal number of elements in the screen. The result is another guideline list gathered guidelines from chapter V compatible with the iOS system and guidelines of these iOS references, and also presents in the Appendix #. The first reference brings more guidelines than our current list from the previous chapter. The reason is the additional functionality of the iPhone device. The rotation of this device changes the screen format. By consequence, that involves guidelines on graphic aspect, button, icon, menu bar and text format. In addition to rotation, tappable action also requests new sets of guidelines and deletes some guidelines from our list. Moreover, iOS system brings some useful extra patterns that programmers can attach in their created application. These auxiliary patterns can complete some current guidelines or bring new ones to improve user experience. We will present some guidelines of this pattern owing iOS system, the details can be read in the article.

♦ For instance, the **orientation change** means that the device allows to display the content in different orientations.

Guideline 171 : Adapt all elements in portrait or landscape aspect

Guideline 172 : If your application or websites need only one orientation, keep all elements in this format (Then the user knows the appropriate format and keeps view on it)

Guideline 173 : Respond to 180 rotation if only use in landscape case

Guideline 174 : Users should not be asked to rotate their device.

Guideline 175 : Rearrange the layout of the user interface to content more information on the screen

Guideline 176 : Keep a similar format of elements in rotation

Guideline 177 : Each orientation should have a unique launch image

♦ **Tappable** invites persons to use their fingers in click button on the screen.

Gestiture mean the standard defined movement of the finger on the screen by the system.

Guideline 178 : Tappable elements could be in an area of about 44 x 44 points

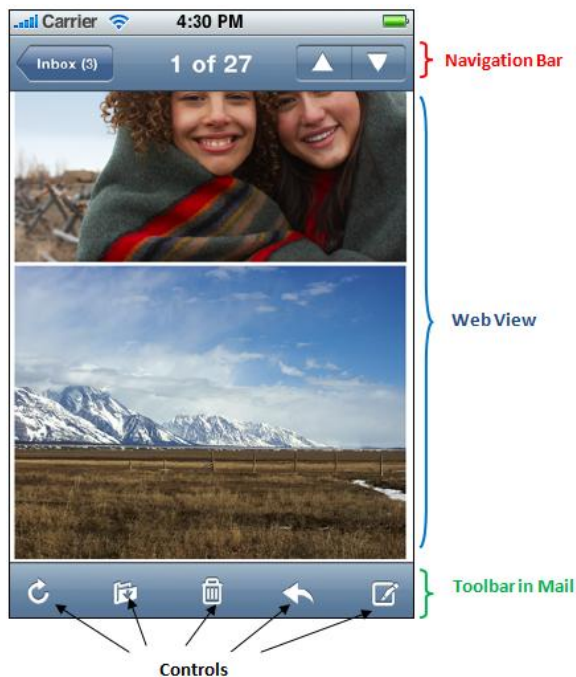
Guideline 179 : Do not change the meaning of standard known gesture

Guideline 180 : Complex gesture should also have another issue to perform this task

Guideline 181 : The new gesture owns a logical meaning

Guideline 182 : Avoid new gesture if possible

In addition to these iOS functionality, the system offers other patterns which can be introduced in applications:



-**Toolbar** is a bar in horizontal or vertical position grouping a set of buttons as a shortcut, and a search bar. It can be considered as a Menu bar but with a representation by icon or field for the search.

-**Controls** or object represented by an icon and perform a specific task on the application

-**Tab bar** is a bar offering the possibility to switch between different subtasks, views, or modes.

-**Web view** allows seeing a web page in a application without using safari browser.

-**Table view** presents a list of multiple rows where

only column of data is displayed. This function owns others elements which can extend the list.



-**Text view** offers some not visible lines on which the user can "write" a text.

-**Segmented controls** can replace the Navigation bar and offer different view by different buttons (generally, three buttons are put in this segment bar)

-**Action sheet** can correspond to cascading menu.

-**Edit Menu** (in red) is used in the written text to perform basic actions on text such as cut, paste, select...



-**Activity Indicator** uses a label to show a running task



-Static text in a field to fill a data is called **label** in iOS case.

-Menu in iOS is represented in vertical way

Guidelines directly applied on this pattern are presented in the article and are not relevant for our work. Other guidelines on applications, such as “how an application has to be in the launching of it”, are also introduced in this reference.

Some guidelines are useful to explain because it can replace or extend our current guidelines:

Additional guidelines:

• **Screen**

Guideline 183 : Avoid coded value that identify screen dimension automatically

• **Icon:**

Guideline 184 : Never use standard icon for other use - That can confuse the user

• **Menu bar**

Guideline 185 : The toolbar is compatible with general guidelines of “menu bar”.

• **Navigation:**

Guideline 186 : Make the path in logical order

Guideline 187 : Navigation bar have to be shown just below status bar

Guideline 188 : The title in the current page is the same that in the Navigation bar

Guideline 189 : A previous button is shown on the left of Navigation bar and labeled with the title of the previous page.

Guideline 190 : For more additional action, toolbar is preferred to extend Navigation Bar.

Guideline 191 : Text in the Navigation Bar is understandable and easy to read

Guideline 192 : Replace the Navigation Bar by segmented control at the top level to make the navigation or view easier and make sure to have the back button

Guideline 193 : Segmented controls do not have a title

Guideline 194 : The Navigation Bar contains only the title of the current content, a back button and one control that act on the current content.

Guideline 195 : Specify a custom colour to look well with the application or translucency fashion to extend the view.

Guideline 196 : Icon size navigation bar should be 20 x 20 pixels or 40 x 40 pixels in high definition.

Guideline 197 : Indicate the position of the user only once .

- **Action**

Guideline 198 : Allows user to interrupt a modal task.

Guideline 199 : Balance any request for input by users with what you offer users in return.

- **Button**

Guideline 200 : Use detail button to bring additional information.

Guideline 201 : Use info button to show more details of the application and position it on the back of the screen display and not on the current interface

Guideline 202 : Use a rounded rectangle button for action button

Guideline 203 : Use a switch to let user chose a state, such as active or inactive, of list items.

Guideline 204 : The switch have got a coherent and diametrically opposed pair.

Guideline 205 : Undo and Redo Buttons are inserted only in the fundamental case

• Data Entry

Guideline 206 : The label has to be understandable, in great font and in legible colour

This guideline is in **Ref [a]** p154

Guideline 207 : Only one line of user entry in a field.

Guideline 208 : Put the objective on left of the text field.

Guideline 209 : Put additional feature on right of the text field.

Guideline 210 : Clear button is in the right of the text field.

Guideline 211 : Show a text in the field to help user to enter information.

Guideline 212 : Help user with different keyboard types provided from the iOS system.

Deleted Guidelines

Description	Size for iPhone and iPod touch (in pixels)
Application icon (required)	57 x 57 114 x 114 (high resolution)
App Store icon (required)	512 x 512
Small icon for Spotlight search results and Settings (recommended)	29 x 29 58 x 58 (high resolution)
Document icon (recommended for custom document types)	22 x 29 44 x 58 (high resolution)
Web clip icon (recommended for web applications and websites)	57 x 57 114 x 114 (high resolution)
Toolbar and navigation bar icon (optional)	Approximately 20 x 20 Approximately 40 x 40 (high resolution)
Tab bar icon (optional)	Approximately 30 x 30 Approximately 60 x 60 (high resolution)
Launch image (required)	320 x 480 640 x 960 (high resolution)

➤ Guidelines on menu bar which can be replaced by the navigation bar, toolbar, segmented controls or Action sheet. The closest element of menu bar is the action sheet in which a cascading menu is possible to be displayed.

➤ Label as the logo on each page can be presented like a standard banner but the rules are different due to its size or its adaptation on different rotation device.

➤ With the following guideline “Make it easy for users to input their choices”, that can gather a set of guidelines: 134,135,139,1340,141,143,144. These guidelines offer the user some ways to simplify the entry of data.

➤ Another guideline “Use appropriate animation to further enhance realism in your application” owns

the same meaning than guidelines 96, 101 and 105 on graphic issue.

- The guideline on text “Think like a newspaper editor, and strive to convey information in a condensed, headline style.” is in general issue and implies a lot of guidelines such as 82, 84, 85 which describes the formal fashion for a text.

The particularity of this first reference is the insistence on the standard buttons, icon and size of pictures. The insistence is focused on the size and the function way.

The reason of this focus is an application or website displays on only one screen and has to be adapted to smaller formats. Moreover, this guide takes into account the finger action, also called tiny GUI in the second reference, and then defines guidelines on it. Finally, this reference mixes applications and website guidelines.

3.8.2.2 Guidelines and the reference “iPhone Apps Need Low Starting Hurdles”

The second article, “iPhone Apps Need Low Starting Hurdles” from Jakob Nielsen, shows that users prefer applications than websites. The reason is that applications are more accommodating than websites by the graphic which must correspond perfectly to the platform for an optimal use. Therefore, the effort in the creation of an application is greater than with websites, webmasters research more compatible fashion than a direct practice on a specific platform. For example, the Symbian Operating System has performed Skype only on expensive Smartphone. This application has been reworked to be compatible with their system for a large category of Nokia Smartphones.

The second article brings an evidence of the guideline “Not use unless registration” for iOS device. The author, Jakob Nielsen, highlights the fact that the current increase of applications needs to have a registration before being used. Consequently, that discourages people to employ them and can lose the business activities through this application. That takes time and it cannot match user expectations. The example of the Pizza ordering application from Pizza Hut is relevant. Indeed, the author shows there are too many steps, including the registration, before seeing a real pizza.

In addition to burdensome registration and this instance, he presents another guideline:

Guideline 213 : Do not offer a demo feature without it being in “store’s perspective”

There is no sense in applying a demo to order a pizza. Therefore, this demo application does not use the main aspect of UI that indicates to be in user position and provide user requirement.

Jakob Nielsen also emphasizes the intermittent use of mobile. The intermittent use results in the lack of commitment from users. Indeed, they usually download a lot of applications without using all of them.

This reference focused more on applications than websites. Then, it is interesting to look more closely on websites in iOS system.

The subject of the third reference is the Safari browser guides and leads the reader toward optimized web pages on iOS devices.

3.8.2.3 Guidelines and the reference "Safari Web Content Guide"

This reference offers the possibility to add more guidelines in order to make web pages in compatible issue.

The iOS does not offers scroll bars. By consequence, the system has created frameset and gives the following guidelines:

Guideline 214 : Implies complicated framesets related to scroll ability

This reference shows more details on the code to insert different elements offered by iOS system, which are detailed above.

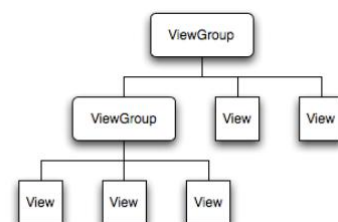
Optimized web requests to use, if possible, the pattern of iOS system and to respect all standard elements of it.

Each operating system has its own standard format and similar elements. The following section shows an analysis of the official UI guidelines from Android with our current list and some difference or similarity with iOS.

3.8.3 Guidelines for Android

As iOS system, Android offers to the programmer or webmaster a collection of objects.

The activity of UI defined by Android is structured in a tree with nodes which are defined as a hierarchy of View and ViewGroup nodes. The creator of UI has got the choice in set of patterns defined by Android or to create custom Views. The section "How Android Draws Views" brings more details about this diagram and the creation of Views.



Android provides a collection of widget, known under the name View object. These widgets are created under different functions to improve the interaction between user and the system in different tasks:

- fill a form: widgets like checkboxes, buttons and text-entry fields
- widgets for more complex action like a clock, date picker or zoom controls

As in the previous section, different widgets of Android will be presented:

Icons have almost the same representation. Then, we will just show guidelines of one of them.

• Menu Icon

Guideline 215 : Menu icons have to be drawn in a flat-front perspective and in greyscale.

Guideline 216 : Avoid inserting 3D icon.

This guideline is in **Ref [i]** p324

Guideline 217 : Create icon sets for different aspect of the screen (low, medium, high-density screens).

Guideline 218 : Menu icons have rounded corner in appropriate cases.

Guideline 219 : All menu icons have to be used in the same colour palette and effects

Guideline 220 : Menu icons have to be created at 48 x 48 pixels and as a transparent PNG file

The fact to offer owned objects needs to have more new guidelines or extended existing guidelines or their replacement.

• Size web page

Guideline 221 : The default format for loaded page is in zoomed-out perspective.

Guideline 222 : Graphic elements have to be adapted to different densities.

Guideline 223 : If necessary, bring alternative graphics for different screen densities.

Guideline 224 : Use Viewport Metadata on the web page to control the best visual representation on screen densities (resize correctly the web page).

Guideline 225 : Use the tool like Minify to compress files to increase the speed of the page load.

•Navigation

Guideline 226 : Make the navigation with a scroll up and down, and avoid scrolling left and right.

Guideline 227 : For alignment of all visual element of the content use a vertical linear layout (grid layout)

• Picture

Guideline 228 : Not use general units, such as pixels, but relative measurement such as "density-independent pixel units (dp)".

• Menu bar = Action Bar of Android = Navigation bar of iPhone

Guideline 229 : Action bar have to be at the top of the screen.

Guideline 230 : Application logo is positioned on the left of the Action Bar.

Guideline 231 : Activity title and available elements on the right of the Action Bar.

Guideline 232 : Search box can be inserted in the Action Bar.

Guideline 233 : Action items in the Action Bar can be represented by an icon and/or a text.

Guideline 234 : Action items are additional tasks and are not placed in the overflow menu.

Guideline 235 : Navigation under tab format can be displayed in the Action Bar.

Guideline 236 : The current selected tab is saved and returned back when the activity has been interrupted.

• Alert iOS = Dialog Android or toast Notification

Guideline 237 : A dialog can manage zero, one, two, or three buttons, and/or a list of selectable items that can include checkboxes or radio button.

This guideline is the same of the iOS one, when it mentions to limit the number of button but differs in the management of zero button and offer the advice to insert checkboxes or radio button.

In addition to these guidelines, we can observe that Android guide also use the same pattern but with a different name. For instance, a cascading menu is called "Drop-down Navigation".

The second reference on Android UI guidelines shows the same way but it is more general as to present logo as clickable and focused on actions such as to limit the number actions. This reference does not add more guidelines as in previous sections but the author just reminds to position the creator of the application or the website into the user's shoes which has already been mentioned in the previous chapter.

4 APPLICATION OF THE ERGONOMIC GUIDE FOR MULTI-PLATFORM INTERFACES TO THE OO-METHOD

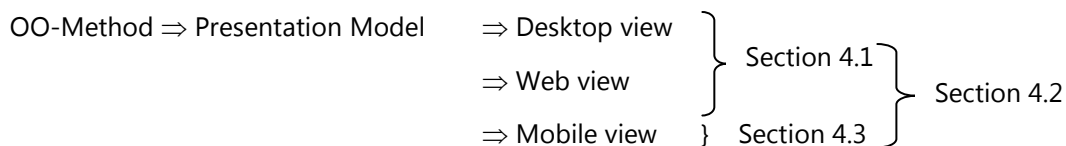
4.1 The OO-Method

In this chapter, a part of Object-Oriented theory is presented through software system ONME. The conceptual model will be reviewed along with its four parts: Object Model, Dynamic Model, Functional Model and Presentation Model. The last model is the main point of the subject and will be explained in details. This model is requested to create different views: the office and web case. With these variety views in different scenario, we can develop the final purpose, which is to take all auxiliary patterns and to insert them in a mobile view. The particularity consists of this last view is in accordance with guidelines defined in the previous chapter. This chapter brings all the success keys to understand and to target the objective defined in the next chapter.

The section 4.1 describes OO-Method driven to Desktop View and Web View.

The section 4.2 shows a suggestion of mobile view through a comparison of different views defined in the previous point.

The section 4.3 describes an application of the ergonomic guide on a specific platform.



4.1.1 Description of the OO-Method Pattern

OlivaNova Model Execution System (ONME) developed by Oscar Pastor²³ and Juan Carlos Molina²⁴ is a software system derived from model transformation technology. This system includes the Object-Oriented approach also called the OO-Method. The supports for ONME are, in addition to the OO-Method, OASIS and Just-UI.

- OASIS is a “formal textual language” and is adapted to the Model Drive Architecture (MDA) context. This language builds a formal OO-System in a relevant way, using specifications in declarative environment.

²³ In addition to professor function at Valencia University of technology (Spain), Mr. Oscar Pastor explores object-oriented development domain and is the head of Care Technologies Scientific Advisory Board.

²⁴ Juan Carlos Molina is Research & Developer Manager at CARE Technologies

- The OO-Method responds to the space problem which is defined on “how it is implemented as a software product”. This method provides a graphical aspect based on the model diagramming (UML) using a formal specification, OASIS. Two modelling components characterize this system: the conceptual Model and the execution Model.
- Moreover, a representation of appropriate theory on a pattern language Just-UI (user interface) extends the OO-Method. By a set of pattern provided by this language, the final achievement is to provide an automatic generation techniques to implement the user interface for business applications for different devices such as the Web, Windows, X11, UMTS or PDAs. That represents an extension to the OO-Method due to the analysis of the user interface requirements from the OO-Method Presentation Model.

Through all these points, we can emphasize that the OO-Method builds an automatic generation of software products from conceptual modelling patterns, also named conceptual Model.

The interaction model of the OO-Method will be the core of our article. The conceptual model is structured in four: Object Model, Dynamic Model, Functional Model and Presentation Model.

In conclusion of this introduction, the combination of spontaneous and passionate researches on “Model-Driven Architecture in Practice” led the authors to turn the philosophy where the code is predicted as the model into the reversing of this statement. Therefore, “The model is the Code” become real.

- **Object model**

This point is characterized by a graphical representation of a Class Diagram inspired by the popular diagram model of UML language. The difference with UML is the reduced complicity and the lack of ambiguity associated to this language by a relevant core of primitives.

The class configuration diagram is built in different steps which defines the classes including attributes, services, agents and their relationship (Association and inheritance).

At the end, we obtain a model with static features of the interactive application.

- **Dynamic Model**

The achievement in this Model makes the success of conceptual schema construction.

The definition of a valid sequence of events (life cycle) for application objects is the key in this Dynamic Model. Furthermore, this model also defines the different features described into the interaction of these objects. Two different diagrams are used in order to target the goal which can be summarized by the definition of the state of objects over time:

- **State Transition Diagram**

This diagram establishes the first definition described above in the achievement of dynamic model: the valid life cycles. In this part, each state transition diagram represents different situation describing the possible state of an object in a particular moment of its lifetime.

- **Interaction Diagram**

Two kinds of mechanisms for inter-object communication, associated with the valid life cycle, are involved:

- Triggers** (from OASIS):

A satisfied condition automatically activates the object services.

- Global Transactions and Global Operations:**

These transactions and Operations are composed of multiple services from different objects, forming a unit of execution. Local transaction (operation) defines events transactions or operations belonging to the same class.

- **Functional Model**

The concept of categorization of attributes is highlighted in this development of conceptual model. The objective of the Functional Model is to specify the static-dynamic relationship. Precisely, this section specifies the semantics related to the effects that events have on object state. To do so, the diagram used was ignored and was replaced by a dialog describing "how the execution of events changes the value of class attributes".

- **Presentation Model**

This fourth view specifies the user interface requirements. The issue over user interactions with the system is highlighted. All information collected in the literary methodology constitutes a set of relevant guidelines and will be used in the interaction model of the OO-Method. Indeed, the properties of user interface requirements will be integrated into a fundamental model for each different platforms. Therefore, The OO-Method Presentation Model is the essential part of this work.

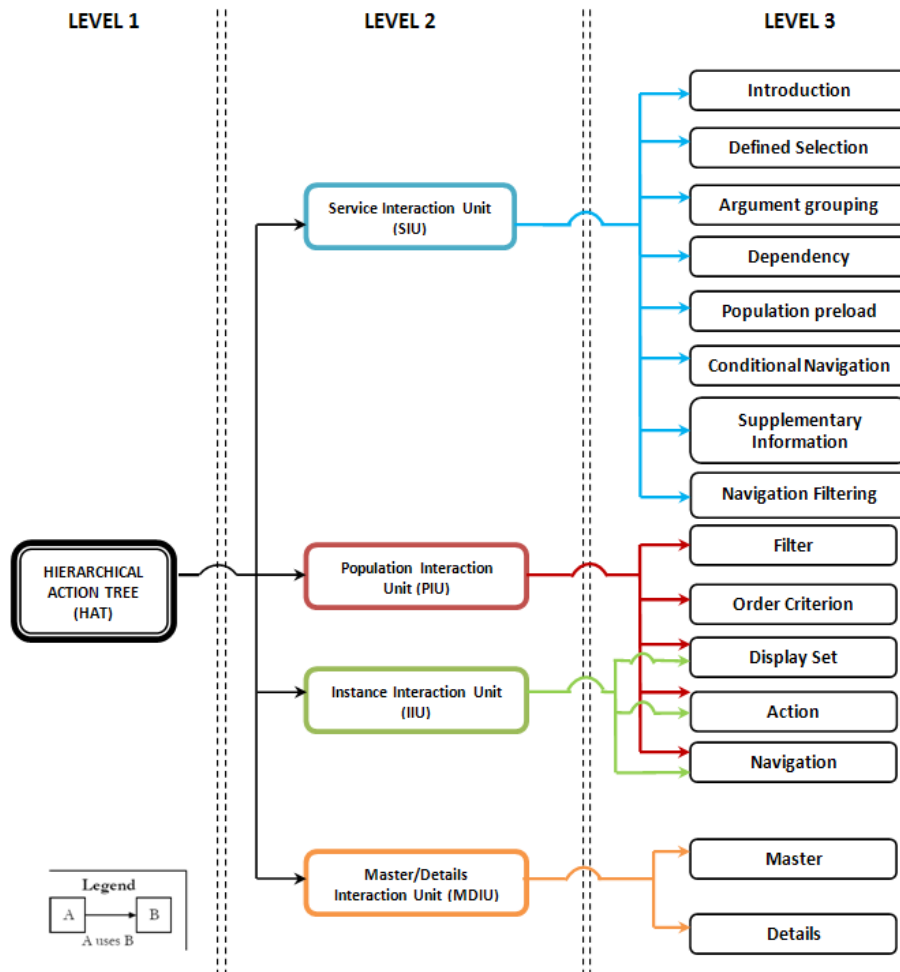


Figure 72 : The Interaction Model of OO-Method

Presentation Model extends the Conceptual Model by an interaction pattern set organized in three layers (Figure 6.1):

Level 1: Hierarchical Action Tree (HAT):

HAT is also called system access structure. This level helps establish the issue in which the user interacts with the system through a tree-shaped abstraction.

Level 2: Interaction Units (IUs):

Each element composing the IUs represents a possible scenario through which users can perform tasks. This middle level is composed of four different types of Interaction Units.

Level 3: Elementary Patterns (EPs):

This last level is defined by a large set of basic elements, also named building blocks from which variety scenarios (IUs) are founded.

This short introduction of the 3-level structure will be detailed in following sections with a basic illustration as explained. At the end of the Presentation Model, an application should be generated in different formats: Office view or Web view. Differences are just found in the representation of different Elementary patterns of level 3. The principle of Interaction Units remains the same.

The following information explains in detail the elementary patterns of level 3 based on this instance:

EXAMPLE:

Employees of the company are affected to each projects. Each employee is enrolled in a database with information on mandatory private entries (Name, Age and Gender) and optional data (address, email, phone,..). For each project, one (or more) expense report(s) is (are) opened involving various types of expenditure and whose total is stated after the deduction of advance payment.

The Pattern of SIU is presented with an example extracted from these views. The examples of patterns in the level 3 for other interaction units are showed in the following section describing the level 2.

- **Introduction:** The function of a useful pattern is to define the specific format of an entry: edit masks, valid value range, calendar, etc. For instance, the telephone data must be written in digit code between 0 and 9. If users try to insert a letter or symbol, everything will be displayed. This scenario is only applied into Office view.

Date format can be specified in this pattern. Different manners are possible. One scenario for date format is showed below. When users click on the icon next the field of Date, a calendar appears.

Figure 73 : Date example

- **Defined Selection**

Interaction between the system and the user, a helpful tool, is provided. The user has to select a valid value from a defined collection in the system. Those valid values are associated to attribute and allow a

restriction set of possible arguments. The most used is, for instance, in the definition of user gender or the status of an element (in our example the status of expense report).

Figure 74 : Defined selection

- **Argument Grouping**

A final representation with a group or sub group of arranged intern variables is presented to the users by argument grouping, argument grouping. In our example, during the creation of an employee profile, the user can observe that specific arguments are assembled in specific categories: information about Personal Data or Contact Data.

Figure 75 : Argument grouping

- **Argument Dependency**

An element can take a value or be active by a dependency relationship. ECA rules (event, condition, action) are applied in this pattern. These rules mean that an argument status or value can change due to a change of another dependent argument. In order words, when an argument fills the condition defined in the system and an even occurs on the argument, an action applies on the dependent argument.

Figure 76 : Argument dependency

In this example, when a user creates a employee profile, he has the possibility to entry his country, which defines a visible help value by pressing the "tab" key. In our example, Belgium is the event and the condition (not visible for the user, was the field and is not empty) is filled. Therefore, this visible input, "Tel" depends of the entry in the Country field and takes a value defined in the action formula.

- **Population preload**

As the name of the pattern indicating its functionality is "all instance population of the corresponding class must be loaded" whatever the interaction context. It is the same principle with the defined selection, in which case it can be selected in a list of elements by the user. The difference is that the list element reflects all instance of population for the class.

In the creation service of an Expense Report, a list of all available projects is showed to users.

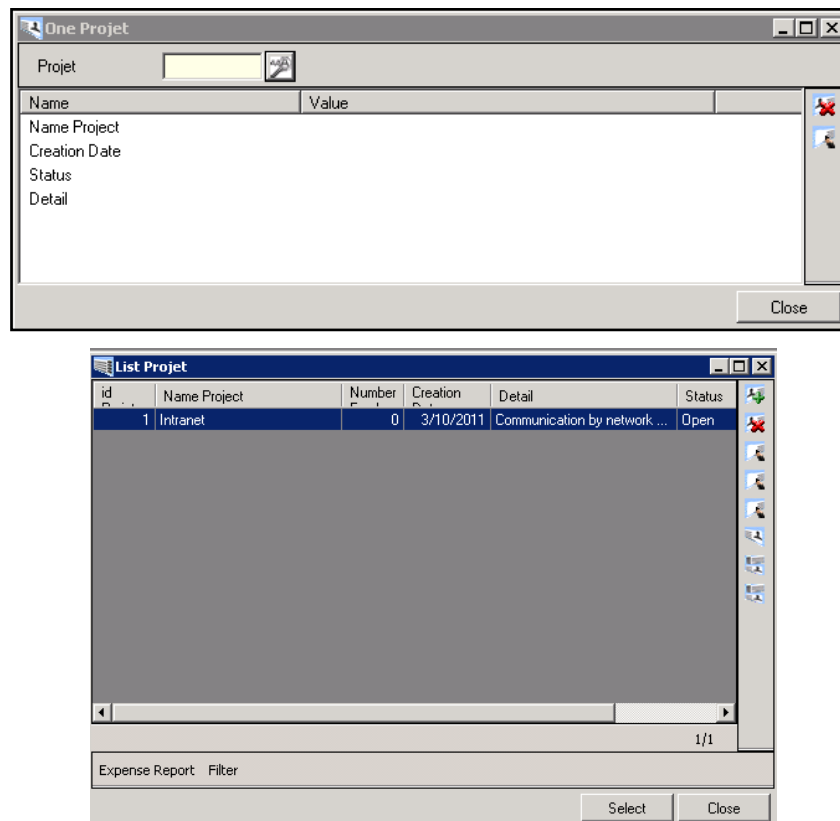


Figure 77 : Population preload

The difference between the web application and the office application is that in the web case, the button "Select" is only active when the project has been chosen. Moreover, buttons refreshing the page and the number of element in the list are available.

LIST PROJET					
					Elements per page 40
id Projet	Name Project	Number Employees	Creation Date	Detail	Status
1	Intranet	0	3/10/2011	Communication by network on the all building	Open

1,1/1 elements

Select Close

Figure 78 : population preload desk view

- Conditional Navigation

This pattern offers the possibility to move toward another Interaction Unit when the service accomplishes or fails the service. A Boolean condition has to be defined in the system.

- Supplementary Information

Additional information is used to confirm a selection.

In the example, the name of the project is displayed close to its selected ID.

Project	1	testwork
---------	---	----------

- Navigation filtering

A population filter is displayed. This filter depend the condition of an argument.

The difference with a simply filter is that this one is applied on the navigation showing a population IU.

In our example, the list of employee in the creation of expense report just shows only all employees working into the defined project.

Details	
Advance Payment	
Reason	
Project	
Employee	

- Filter

This pattern is used to facilitate the research and selection in a list on the population according to class. The condition of this population has to be defined. For instance, the user is more comfortable to search a specific profile with using a last name.

- **Order criterion**

In addition to Filter, order criterion also helps the user in his research. The representation of the result will be in ascending or descending way of the chosen argument.

For instance, the user can choose to see the ordering last name.

- **Display Set**

This pattern only is mandatory for PUI. Others elementary patterns are optional. Provide a convenient display to user. It is in convenient way because a set of properties are chosen in logical order and decide what useful attributes have to be visible or not. For instance, in first approach, only the name and lastname of employee are showed. Address, telephone or other argument are optional in the display view because we can think it is more important to have these showed elements than others.

- **Action**

That makes the definition of a possible set of task to carry out in a population interaction unit or an instance interaction unit. These tasks related to service are structured and chosen to be visible by their frequency of use.

- **Navigation**

This element corresponds to the navigation between different display sets and in order to get information directly without having access to the menu again. That involves a relationship between classes.

4.1.2 Description of the interaction Model of OO-Method

4.1.3 Interaction Units and Elementary Patterns

The diagram of the illustration presented below was built from the object models, the conceptual Model till Presentation Model:

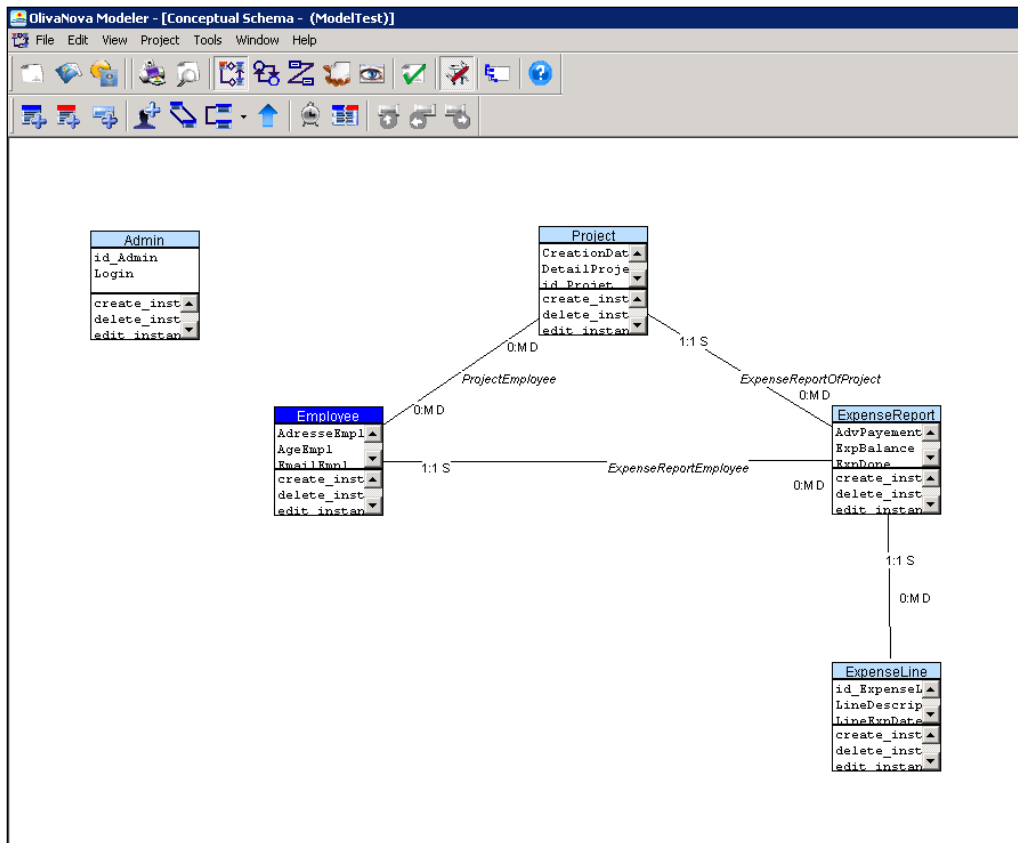


Figure 79 : Interaction unit

One of the remarks is that the class "Admin" was included as the agent of the whole model.

The basics elements of the presentation model are defined as elementary patterns corresponding to different interaction units:

- Service Interaction Unit (SIU)
- Population Interaction Unit (PIU)
- Instance Interaction Unit (IIU)
- Master/Detail Interaction Unit (MDIU)

4.1.3.1 Service Interaction Unit:

In addition to the execution of a service and to the manipulation of an (or a set of) object(s), this IU provides a scenario in which we can find an interaction between the user and the system. For instance, the creation of an Employee constitutes a service interaction Unit.

Figure 80 : Service interaction unit

4.1.3.2 Population Interaction Unit

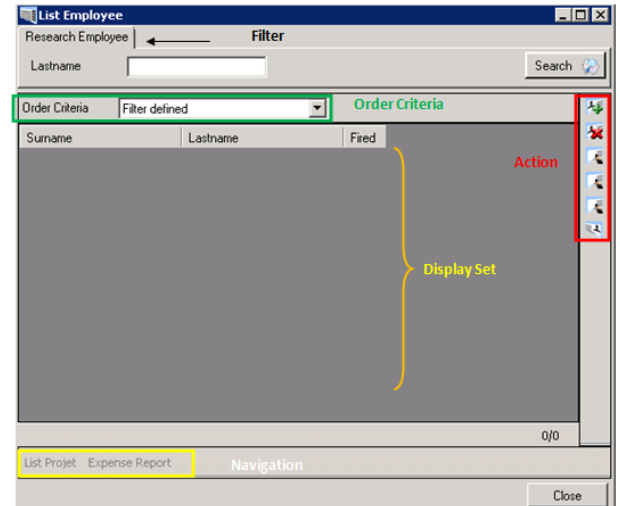
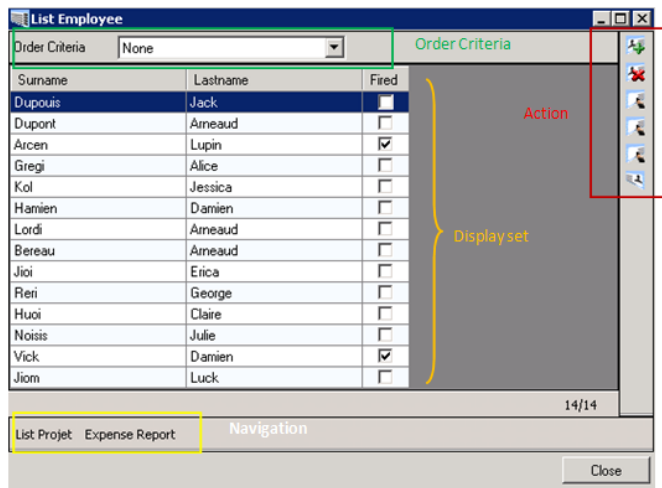
This interaction unit offers the possibility to have a structured representation of information through different manipulations of a collection object. Therefore, different scenarios are possible. Five elementary patterns constitute these scenarios: Filter, Order criteria, Display set, Action and Navigation.

	Surname	Lastname	Fired
<input type="checkbox"/>	Dupouit	Jack	False
<input type="checkbox"/>	Dupont	Arneaud	False
<input type="checkbox"/>	Arcen	Lupin	True
<input type="checkbox"/>	Gregi	Alice	False
<input type="checkbox"/>	Kol	Jessica	False
<input type="checkbox"/>	Hamien	Damien	False
<input type="checkbox"/>	Lordi	Arneaud	False
<input type="checkbox"/>	Bereau	Arneaud	False
<input type="checkbox"/>	Jiol	Erica	False
<input type="checkbox"/>	Reri	George	False
<input type="checkbox"/>	Huol	Claire	False
<input type="checkbox"/>	Noisis	Julie	False
<input type="checkbox"/>	Vick	Damien	True

Figure 81 : Population interaction unit

The figure shown above includes all the different auxiliary patterns included in the employee's PIU. In the following figure, the office application shows the same elements but in different way. Moreover, we can observe that navigation is only displayed in the last instance.

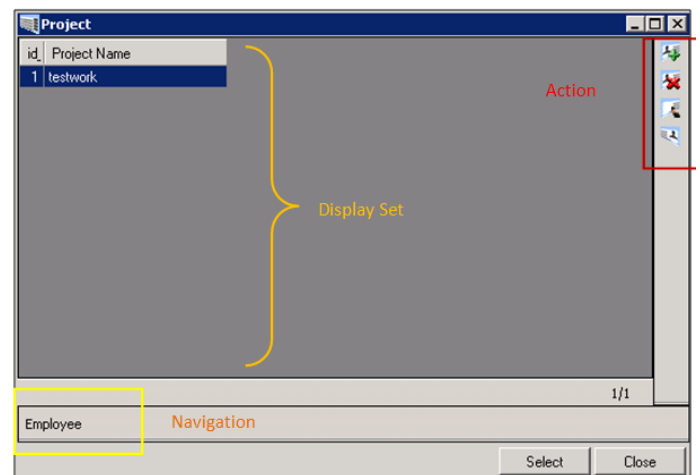
In order to show an optional pattern, on the left, we can find a list "Employee" without a Filter and on the right the opposite case.



4.1.3.3 Instance Interaction Unit

The IIU involves only one single object. Its function is based on the management of the elementary pattern set in order to offer a scenario with a list of serviced and a possible navigation between different showed information.

Only three of auxiliary patterns are available on this interaction unit: Display set, action and navigation. Moreover, only the display set is mandatory to have a basic IU.



The management of only one individual object is the core of interaction between users and system.

In our example, a list of projects has to be select before to show detail of one specific scenario.

4.1.3.4 Master/Detail Interaction Unit (MDIU)

The particularity of this interaction unit is the combination of the three interaction units already introduced previously. Many interaction units can be included in a scenario presented by MDIU. Two types of role define the scenario using multiple collections of objects:

- Master role implies only the instance Interaction Unit or the Population Interaction Unit and is the core of the interaction scenario.
- Detail role brings supplementary information and an extra interaction scenario which remains synchronized with the master role.

For instance, information on a specific project can be shown by the Master Interaction Unit and information of all involved employees in the Detail Interaction Unit.



Figure 82 : Master / detail interaction unit

Hierarchical Action Tree (HAT)

The coordination and the final scenario of all defined IUs are presented by the HAT. The figure # shows that the HAT node corresponds to access to all main interaction units with their elementary patterns. The purpose of the HAT is to establish a final scenario with a structure of defined interaction units to users.



The difference is that, in an office application, the window and help menu are automatically included, contrary to the web application.

4.2 Comparisons

In the first case, we will compare the different views through the example defined in the previous section and the GUI on Smartphones. In the second part, the mobile view will be developed in accordance to this analysis and the created guidelines.

For instance, we take the **population interaction unit**,

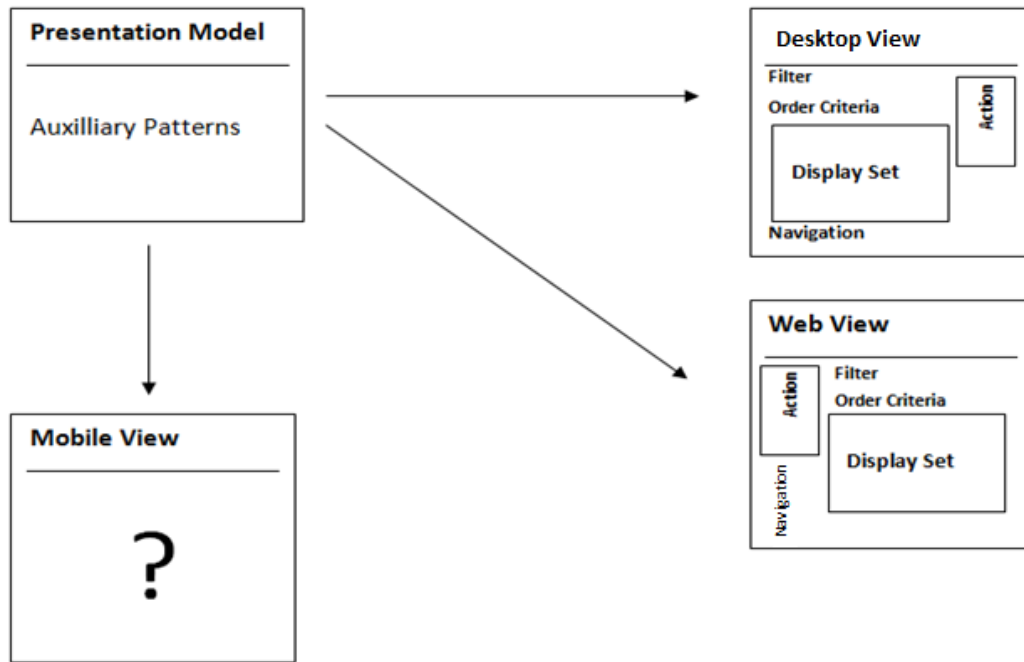


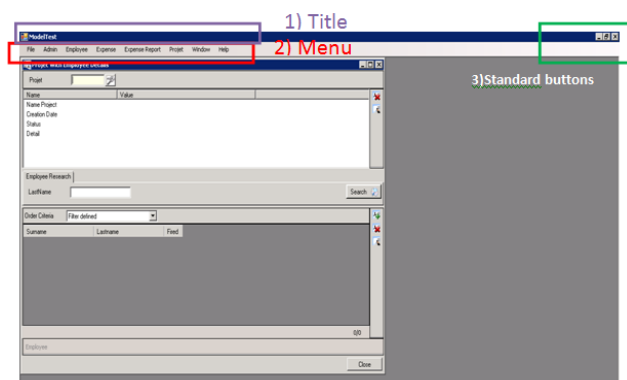
Figure 83 : Comparison view schema

iOS and Android systems offer a multitude of possibilities to insert in the user interface (UI). Both insist on the simplicity and accommodate rules to insert during the creation of applications or websites. Jakob Nickelsen, the famous author of a variety of articles on interaction Human-System through a large list of guidelines, brings evidence of the successful use of applications over websites. By a presentation model, Olivanova helps to generate an office view which can be considered as an application-using network. Guidelines of both operating systems from previous chapter will be analyzed in the defined instance.

4.2.1 General aspect and Hat

• Office view

- 1) The **title** is short, not ambiguous and is well related to the application. iOS system usually positions the title in the middle of the navigation bar, which is on top of the display. On each page appears a window of the application, the title remains in the same position but in iOS, when the application goes to the details, , the title in the navigation uses the



current title of the content. iOS considers that the user know the name of the application and just want to know its current position through the current title of the view.

- 2) The **menu** in iOS is replaced by a configuration in the vertical. Guidelines recommend using a menu in vertical for convenient way and due to the small of the screen of the iOS device. On the iPad, that could be more possible than on the iPhone.

In addition to aspect, standard available actions such as file, window and help respect their meaning.

- 3) Standard buttons only have their own function. On iPhone, these standard tasks are replaced in the navigation. Reducing the window make the previous content appear. By default, the application is already displayed in full format and it is not possible to manage in a smaller aspect.

- [Web view](#)

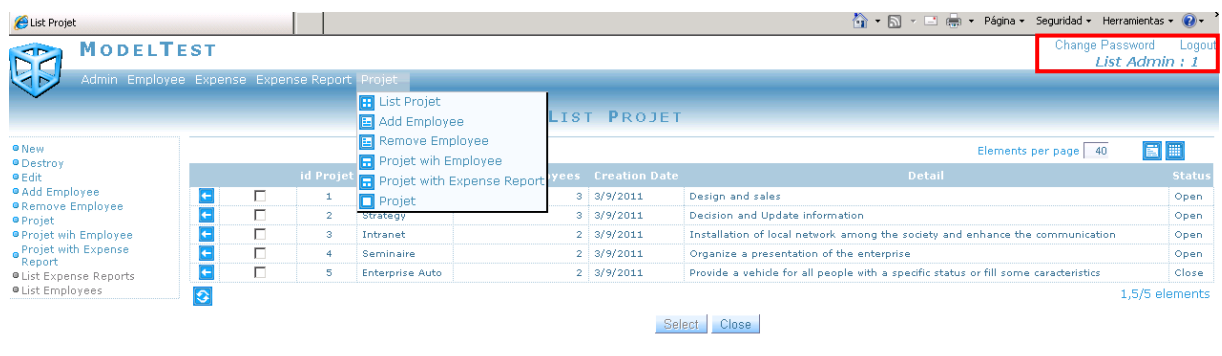


Figure 84 : Hat web view

As in the office view, we will only focus on the general elements. The content will be analyzed in the following sections. The title, menu and standard buttons have the same characteristics as described in the previous section.

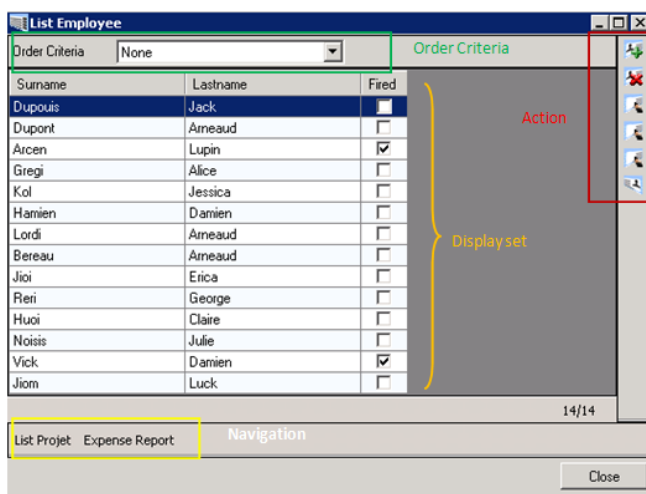
The particularity of this part is the display of the user state and the possibility to modify its profile (in red colour). On the iPhone, the small screen does not always enable us to see to show these characteristics. Therefore, usually, the action to change the password is not shown in such a way but appears in a configuration in the menu. It is the same way for the logout action which is placed on the right in menu bar.

In addition to the log display, the represented logo of the application has to link toward the home page and then be "clickable" (tappable in iOS language).

4.2.2 Population Interaction unit

This element displays a list of information from a specific class. A set of functions can be employed in this list. Its representation and function will be compared with the information of iOS UI and the model representation.

1) The title and the general buttons as reduced, enlarged and closed are already defined in the previous section. The title is usually inserted in the middle navigation bar and the standard buttons are also inserted but in another format. The navigation bar introduced in this presentation has to be positioned at the top of the display and correctly presented in another view without coming back to the menu, thus displaying more information in a direct manner..

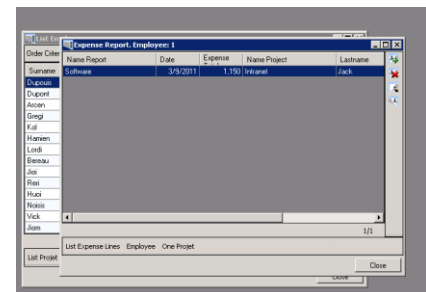


2) The main pieces of information are firstly presented by the name, last name and if the employee is currently working in the enterprise.

3) The possibility to view in another aspect, order criteria, can be provided through a control which can be inserted in the toolbar as an icon at the first time. Using a select button is

a good choice and helps the user in their choice of display.

4) The action button are usually put in the toolbar of the iOS display (below the display set) or in the tab bar, which present other available tasks. The inconvenient of the tab bar is the limitation to only three possible actions. But, in using the tab bar, the action button is through a clarity word or verb. When the action button is observed, not standard task are represented by the same icon. Avoiding the confusing elements is the main purpose of the UI guidelines. The toolbar requests different icons for each task without changing the standard icons and their functions. It can be difficult to understand a task represented by an unknown icon. Therefore, for unusual action, it is recommended in our case to use the tab bar in the iOS device. Moreover, the action button has to be able to be displayed in a 180° rotation.



5) Navigation shows a cascade window in order to let the user come back into the previous window and to show that it is a new display. Moreover, this window is correctly placed in front of the regard user. On the iPhone, users can only display one window of the application and take full format.

6) Any advice about Order Criteria and Filter are related to UI iOS.

• Web view

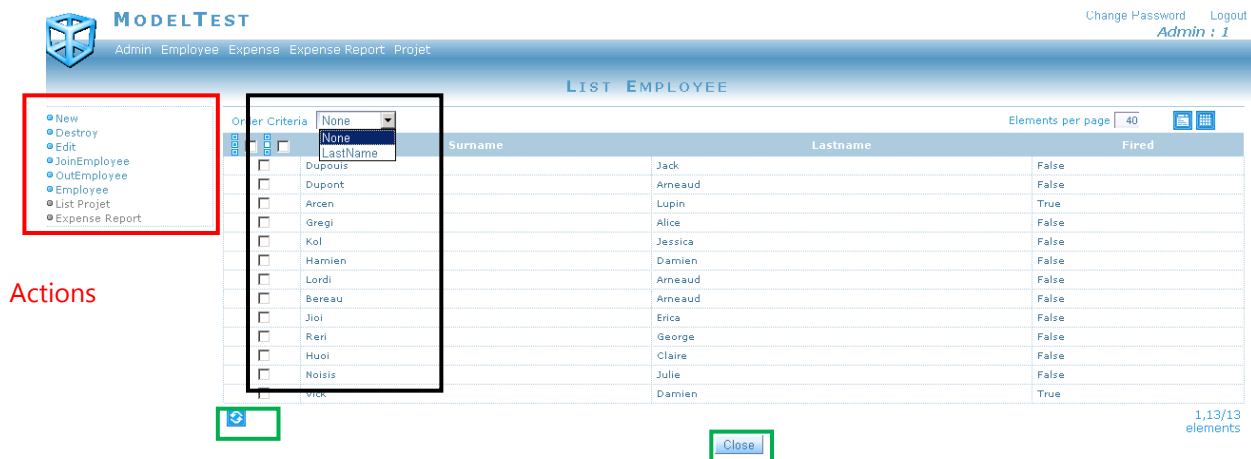


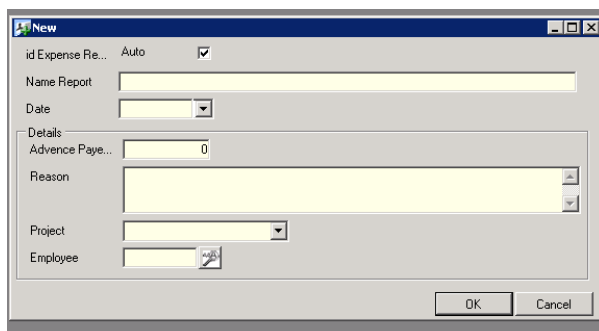
Figure 85: Web view for population interaction unit

- 1) In addition to characteristics in office view, this part shows actions pattern on the left of the display set. That can join the idea to have a kind of submenu which another view will be display. But in general case, on the left, it is a menu as menu bar and only one is display. On the top, the navigation, the path is showed. As said before, Actions buttons have to be in navigation or other elements.
- 2) An inconvenient format is the list of fired people. The office view looks better than the web part for this one.
- 3) The green rectangle shows other available action. Usually, this task are put in toolbar and not scattered like this. But these actions represent correctly their function. Usually, close function a display remains the traditional icon.

4.2.3 Service Interaction unit

In this part, the users require a set of information. The guidelines on form, information-text will be applied and observed in the different representations.

• Office view



- 1) An order to request information is correctly defined. That begins by the most important data.
- 2) The title of this new view is ambiguous. "New" can also be related to other functions.

- 3) A selected date is in calendar format to make the selection easier. (Show into web view)
- 4) "Advanced payment" is by default zero but that attract the regard of user because the field is full.
- 5) The particularity is the length of the field. For large requested information, the size of the field must be correctly be adapted.
- 6) The guideline which recommends to make the entering of the data by the user is applied correctly. For instance, in the project data, the user can choose among a selection of data and then a list of employees has been adapted into the selected project.

- [web view](#)

Figure 86: Web view for SIU

In addition to office view, the confirm button is inactive. A dialog message to confirm users of an action is not showed but it is represented by the inactive or active state of button.

The creation is requested to entry more data but in the part delete task, the user has just the choice in a list.

4.2.4 Instance of Interaction unit

In this part, only a single element is displayed with information related to this one.

The most inconvenience in addition to other explained points, it is the large space between the name of attributes and the values related to them.

The screenshot shows a window titled "One Expense Line". At the top, there is a field "List Expense Li..." with the value "2". Below this is a table with two columns: "Name" and "Value". The table contains the following rows:

Name	Value
id Expense Line	2
Date	3/9/2011
Type	software
Unit	1
Price	250
Description	Buy antivirus
Total Expense	250

At the bottom of the window, there is a section labeled "One Expense Report" and a "Close" button.

The web view offers to users a table of all information that makes it easier to correspond each value from its attributes.

The screenshot shows the MODELTEST web application interface. The top navigation bar includes links for "Admin", "Employee", "Expense", "Expense Report", and "Projet". The user is logged in as "Admin : 1". The main section is titled "LIST PROJET". On the left, there is a sidebar with a list of actions: New, Destroy, Edit, JoinEmployee, OutEmployee, One Project, Projects with Expense Report, Expense Report, and Filter. The main content area displays a table with the following columns: "id", "Projet", "Name Project", "Number Employees", "Creation Date", "Detail", and "Status". The table contains four rows of data:

	id	Projet	Name Project	Number Employees	Creation Date	Detail	Status
<input type="checkbox"/>	1		Marketing Product abc	4	3/9/2011	Define the price, manage the sales and advices	Open
<input type="checkbox"/>	2		Strategy product abc	4	3/6/2011	Decide the product requirement, establish the design, take majeure decision as where and when the product should be made	Open
<input type="checkbox"/>	3		Seminaire	2	3/1/2011	create a conference in the enterprise and share the knowledges on product abc	Open
<input type="checkbox"/>	4		Intranet	3	2/24/2011	Installation of a network communication on all computers	Open

At the bottom of the table, there is a "Select" button and a "Close" button. The text "1,4/4 elements" is displayed at the bottom right of the table.

Figure 87 : Web view for IIU

4.2.5 Master/Detail Interaction unit

This interaction unit offers more information in the display set. The problem is that a set of actions is required to display everything in iOS devices, by the small format, the user have to scroll down and enter all inputs before having a result. But with this element, the information is already related to others and avoids to come back in the menu or to the requested supplementary action.

• Office view

Projets with Employee

Project: 2

Name	Value
Name Project	Strategy product abc
Creation Date	3/6/2011
Status	Open
Detail	Decide the product requirement, establish the design, take ...

Research Employee

Lastname: Search

Surname	Lastname	Fred
Dupouis	Jack	<input type="checkbox"/>
Gregi	Alice	<input type="checkbox"/>
Lordi	Ameaud	<input type="checkbox"/>
Bereau	Ameaud	<input type="checkbox"/>

4/4

Employee

Close

- [web view](#)

MODELTEST Change Password Logou
Admin Employee Expense Expense Report Projet **Admin : 1**

PROJETS WITH EXPENSE REPORT

ONE PROJET

Project: 4

Name Project: Intranet
Creation Date: 2/24/2011
Status: Open
Detail: Installation of a network communication on all computers

EXPENSE REPORT

Elements per page: 40

Name Report	Date	Expense Total	Name Project	Lastname	Surname
Software	3/9/2011	1,150.00	Intranet	Jack	Dupouis

1,1/1 elements

Close

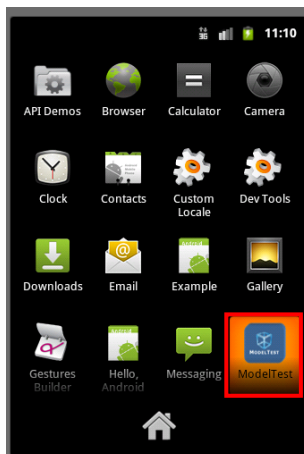
Figure 88 : web view for MIU

4.3 New Designs

This chapter reach the purpose about the application of the ergonomic guide on a specific platform built in the section 2. In our case, we have chosen the Android system to perform this task. This selection is motivated by the incredible increase of the popularity and the sales in the world of Android. Its Software Development Kit is easy to obtain. Moreover, Android is compatible on all operating system of all computers while the iOS system requires using a Mac computer to develop an application for iPhone. Furthermore, Android environment is more flexible on its specific usability guidelines and in using of patterns. Indeed, iOS requires using its own graphic elements. The tool and the Application Programming Interface (API) of Android can be integrated in the famous Eclipse software development. Eclipse is a free integrated development environment, universal and polyvalent to create projects implementing any programming language. Android uses the Java programming language in its applications and provides a set of specific libraries with a complete description and some tutorials on the official website. The mobile views were created in this operating system related with the ergonomic guide and the different views done in OLIVANOVA software.

See Appendix for design codes of the mobile application views.

4.3.1 Identification



Here is a typical main menu of a smartphone. The application has its own icon which is different of the others (bottom right). The colours of the icon are blue and white; this is in consistency with the colours used in the application.

Figure 89 : Typical smartphones menu

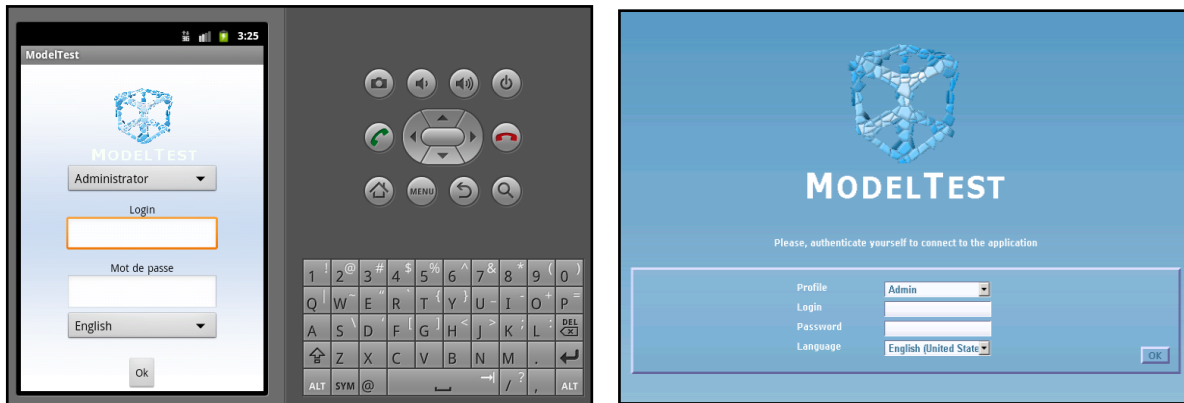


Figure 90 : : Identification on application (left) and login page of the web view (right)

For this application, the logo and the selection box match between the program and the application. The button “OK” is more appropriate in the application, just in front of the user after the last selection box.

All Guidelines on some element display categories have been respected:

- Window frame :guidelines 1,2,3,4,6,8
- Not horizontal scroll :guidelines 51
- Content:
 - Short and not ambiguous title : guideline 53
 - Action text : guideline 77
 - Graphic: guidelines 91,96,98
 - Button: guidelines 87,88
 - No sound: guideline 108
 - Log on: guideline 115
 - Tab key: guideline 128
 - Selection: guideline 144
- Specific guidelines:
 - Content: guideline 169
 - Graphic : guideline 222
 - Icon : guidelines 184,196,220,216,217

For this application, the logo and the selection box match between the program and the application. The button “OK” is more appropriate in the application, just in front of the user after the last selection box.

4.3.2 Level 1-The Hierarchical Action Tree (HAT)

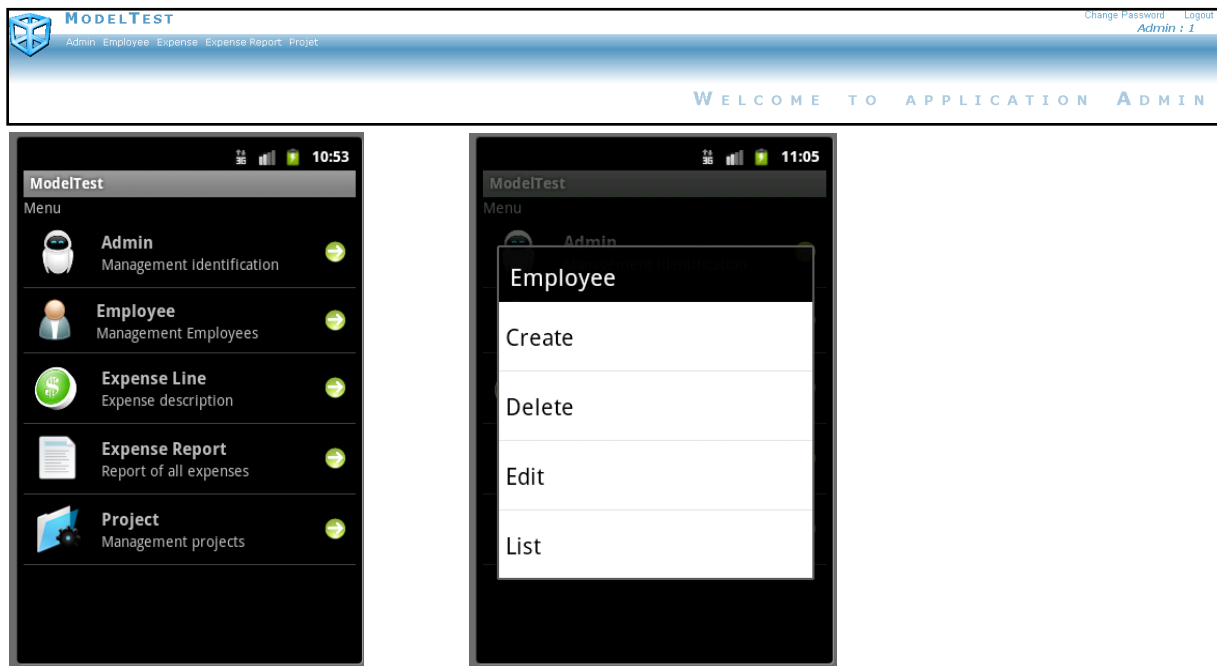


Figure 91 : Menu example and sub-menu (application)

The particularity on mobile view is its interactive aspect. As we have seen in the second section, Smartphone owns specific pattern and guidelines. A menu in horizontal on its device is not correct from a visual point of view. Moreover, that would be in contradiction with the guideline 51 related to avoiding a horizontal scroll. In consequence, Cascading menu is not possible. Then, a context menu is displayed to distinguish itself with the main menu. The button “previous” on the device allows coming back to the main menu. Another possibility is to integrate a “context menu” as an option for this way. Smartphone offers the possibility to have a list view in which user can scroll in vertical. Icon, title and short description of content help the user to find correctly and to have a direct access to its objectives. By its small size, the mobile view cannot show information about the user profile on each window.

All Guidelines on some element display categories have been respected:

- Window frame :guidelines 1,2,3,4,6,8
- Navigation: guidelines 40,43,48
- No horizontal scroll :guidelines 51
- Content:
 - Short and not ambiguous title : guideline 53
 - Text : guidelines 53,55,62,66,67,69,79,81
 - Action text : guideline 77

- Buttons : guidelines 87, 88
- Graphic: guideline 96
- No sound: guideline 108
- Specific guidelines:
 - Content: guideline 169
 - Text-field: guideline 211
 - Graphic : guideline 222
 - Icon : guidelines 184,196,220,216,217

4.3.3 Level 2- Interaction Units

4.3.3.1 Service interaction unit (SIU)

◇Create an employee

Figure 92 : New data entry on application (left) and on web view (right)

We want to create an application for which the guideline 130 “Minimize the demand of data” and the guideline 154: “Prevent an issue to interrupt processes” will be respected.

In this objective, we display essential information firstly and a solution to save the profile of the user if an interrupt process occurs.

By the next button, the user can continue to fill mandatory information or save the data and continue later.

On each window, a navigation bar is shown. Moreover, the user can see the action buttons on the bottom menu. In the web application, a condition on the entry is given and users have to put his age. We can imagine another issue such as the user put the date of birth and automatically his age is put in the field with additional information close to it. That looks like the supplementary information pattern.

→ **Improve the user requirement**

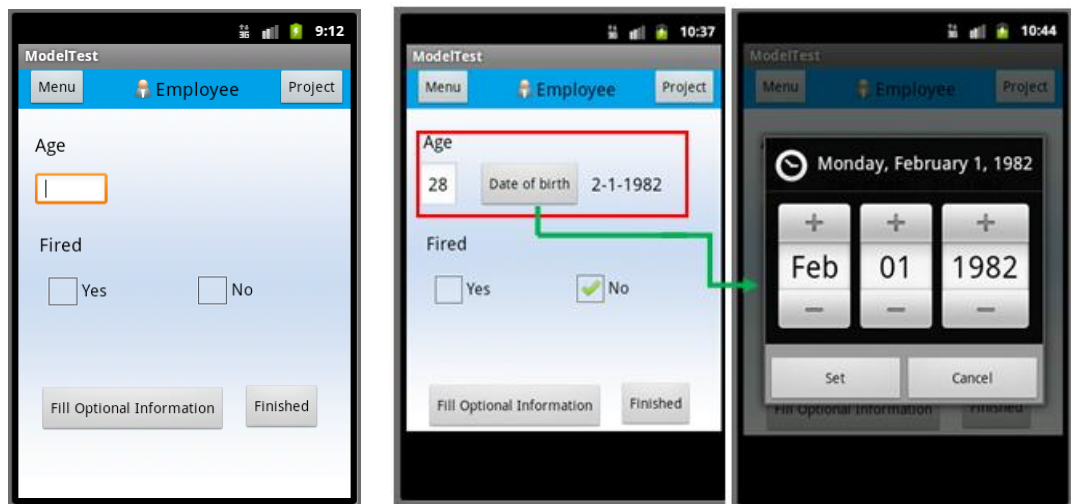


Figure 93 : improvement about automatic deduction of the age

In this scenario the user can finish the entry of data or continue and fill optional information. Generally, the address, the country, the telephone number and email address are mandatory but in our example, we can consider that it is virtually optional.

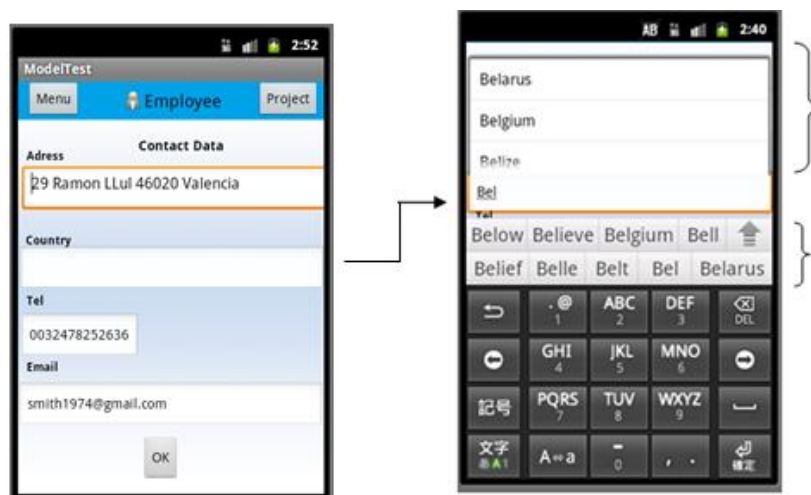


Figure 94 : optional information and auto-complete field (country)

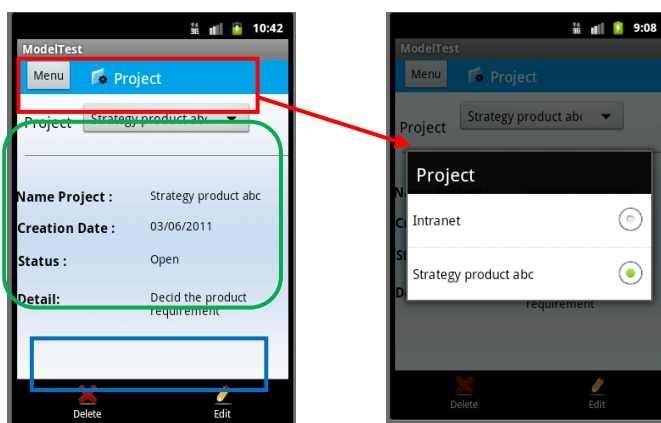
All Guidelines on some element display categories have been respected:

- Window frame :guidelines 1,2,3,4,6,8

- Menu bar: guidelines 20,21,22
- Menu icon : guidelines 23,24,25,26
- Navigation: guidelines 40,43,48
- Not horizontal scroll :guideline 51
- Content:
 - Short and not ambiguous title : guideline 53
 - Text :guidelines 53,55,62,66,67,69,79,81
 - Action text :guideline 77
 - Buttons : guidelines 87, 88
 - Graphic: guideline 96
 - No sound: guideline 108
 - Checkbox: guidelines 135, 137
 - Selection: guideline 144
- Form: Guidelines 125,126,128,129,130,131,132,,134,136,137,140,143,144
- Specific guidelines:
 - Content: guideline 169
 - Toolbar: guidelines 185,190
 - Navigation: guidelines 187,179,191,196, 197,229,233
 - Button : guideline 210
 - Text-field: guideline 211
 - Graphic : guideline 222
 - Icon : guidelines 184,196,220,216,217

4.3.3.2 Interface Interaction Unit (IIU)

In this scenario, only one scenario is possible. In our instance, one project is displayed in mobile view with its owned characteristics.



Legend:

- Blue square: Action
- Red square: Population Preload
- Green square: Display Set
- Yellow Square: Hat

Figure 95 : Interface Interaction Unit in Mobile View

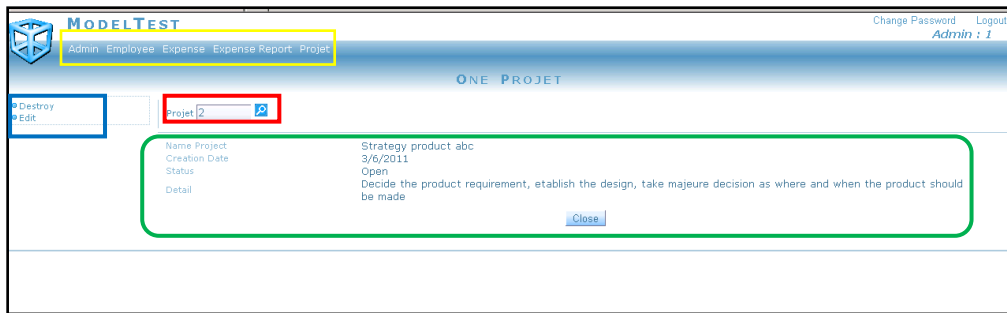


Figure 96 : Web View of Interface Interaction Unit

On Smartphones, the information has to be short and clear. The details of one project have to be readable and are shorter than a web view or a desktop view.

The action bar in the desktop view is called toolbar in iOS . This is not the same meaning than in Android which uses the same name. Indeed, the action bar in Android is the navigation bar in iOS at the top of the window.

The action button corresponds to iOS control. This bar is in bottom of the window in mobile view. To show this bar, you have to push on a menu key.

All Guidelines on some element display categories have been respected:

- Window frame :guidelines 1,2,3,4,6,8
- Menu bar: guidelines 20,21,22
- Menu icon : guidelines 23,24,25,26
- Navigation: guidelines 40,43,48
- Not horizontal scroll :guidelines 51
- Content:
 - Short and not ambiguous title : guideline 53
 - Text :guidelines 53,55,62,66,67,69,79,81
 - Action text :guideline 77
 - Buttons : guidelines 87, 88
 - Graphic: guideline 96
 - No sound: guideline 108
 - Selection: guideline 144
- Specific guidelines:
 - Content: guideline 169
 - Toolbar: guidelines 185,190

- Navigation: guidelines 187,179,191,196, 197,229,233
- Button : guideline 210
- Text-field: guideline 211
- Graphic : guideline 222
- Icon : guidelines 184,196,220,216,217

4.3.3.3 Population Interaction Unit (PIU)

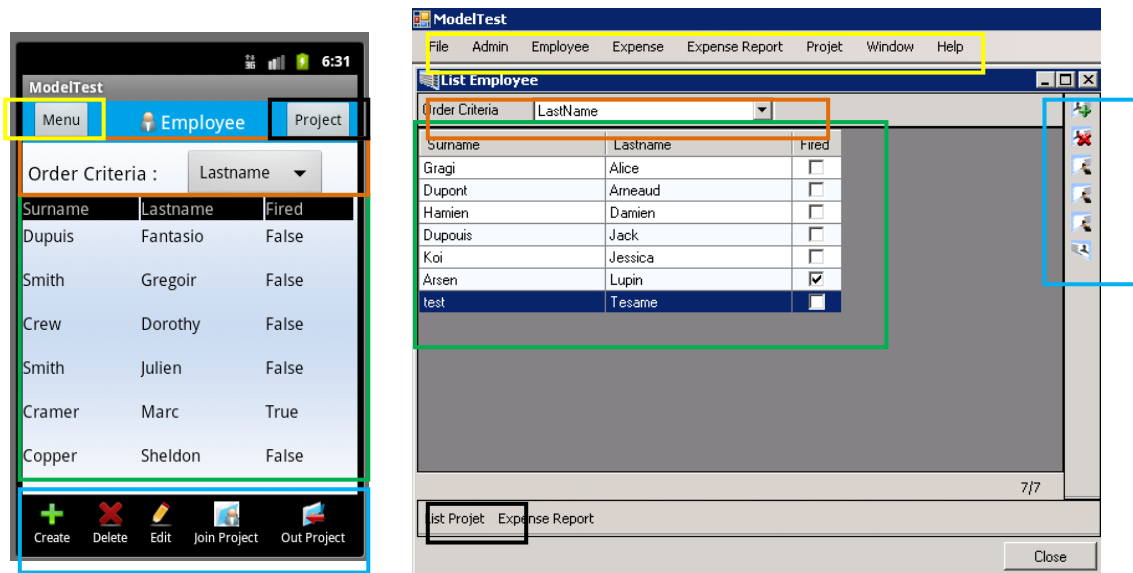
This interaction unit is focused on a representation of a list of information from a specific class.

A list of all employees is provided by the Employee class.

In opposite of the Service Interaction Unit, the interface interaction unit presents a second navigation bar on the left in web view and at the bottom in desktop view when the user press on menu key.

Therefore, in the mobile view, a second navigation bar was necessary in order to respect the representation. This scenario remains in line with the guideline on multiple menus-navigations (guideline 43). The Hat is shown by the button “menu” on the navigation bar.

On the desktop view, the fired column presents a set of checkboxes to validate options in opposite with the web view which it is an indication by the string value “False” or “True”. It is possible to integrate the checkbox presentation in the mobile view as in the Figure 99.



Legend: Blue square: Action
Black square: navigation pattern

Red square: Population Preload
Orange square: Order Criteria

Green square: Display Set

Figure 97: Population Interaction Unit on Mobile View and Desktop View

Population Interaction Unit can show more information such as in the Figure 98. On mobile phone, it is difficult due to the small size of its screen. Therefore, an available option is that user can click on the line of the employee for who he wants to have more information. The figure 99 shows the next window when the user has clicked on one information.

ModelTest - [List Employee]							
File Admin Employee Expense Expense Report Projet Window Help							
Order Criteria		None					
Surname	Lastname	Fired	Gender	Age	Adresse	Tel	Email
Dupouis	Jack	<input type="checkbox"/>	M	36	Street Timon 22	032000000000	Jack0212@hotmail.com
Dupont	Arneaud	<input type="checkbox"/>	M	45			
Arsen	Lupin	<input checked="" type="checkbox"/>	M	32			
Gragi	Alice	<input type="checkbox"/>	F	26			
Koi	Jessica	<input type="checkbox"/>	F	28			
Hamien	Damien	<input type="checkbox"/>	M	26			

Figure 98 : Population Interaction Unit on Desktop View with more information

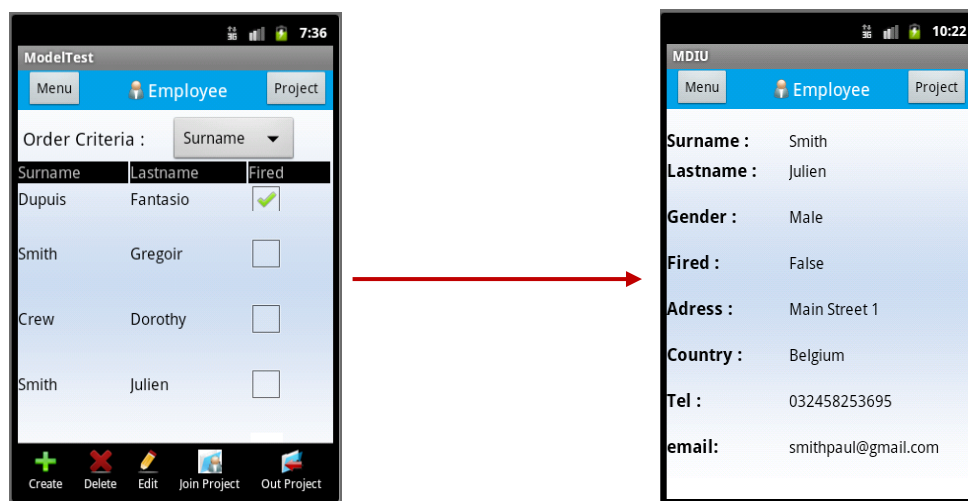


Figure 99 : PIU on Mobile View with checkbox (left) and IU of Employee on Mobile view (right)

All Guidelines on some element display categories have been respected:

- Window frame :guidelines 1,2,3,4,6,8
- Menu bar: guidelines 20,21,22
- Menu icon : guidelines 23,24,25,26
- Navigation: guidelines 40,43,48
- Not horizontal scroll :guidelines 51
- Content:
 - Short and not ambiguous title : guideline 53

- Text :guidelines 53,55,62,66,67,69,79,81
- Action text :guideline 77
- Buttons : guidelines 87, 88
- Graphic: guideline 96
- No sound: guideline 108
- Checkbox :guideline 137
- Selection: guideline 144
- Graphic use in correct context, no sound :guidelines 96,108
- Specific guidelines:
 - Content: guideline 169
 - Toolbar: guideline 185,190
 - Navigation: guidelines 187,179,191,196, 197,229,233
 - Button : guidelines 210
 - Text-field: guideline 211
 - Graphic : guideline 222
 - Icon : guidelines 184,196,220,216,217

4.3.3.4 Master Detail Interaction Unit (MDIU)

The combination of the two interactions units is shown in two tabs on the mobile view.

In our instance, we have in the master role: the interface interaction unit of project class. In the Detail role is the population interaction unit of employee class.

The detail role means to show only employee from the selected project in the master part.

It is the same with the mobile view, the second tab show all employees from the project in the first tab.

Therefore, we can say that a dependence part is defined.

A navigation bar on the top is not visually correct because the title is reproduced twice as we can observe on the right of the Figure 100 and that is not in line with the specific guideline 197. Without a navigation bar, the user can not come back to the menu. The solution can be to integrate in the bottom menu bar which defines the action patterns. The problem with this solution is that it reduces the options of action.



Figure 100 : Master Detail Interaction Unit on Mobile View

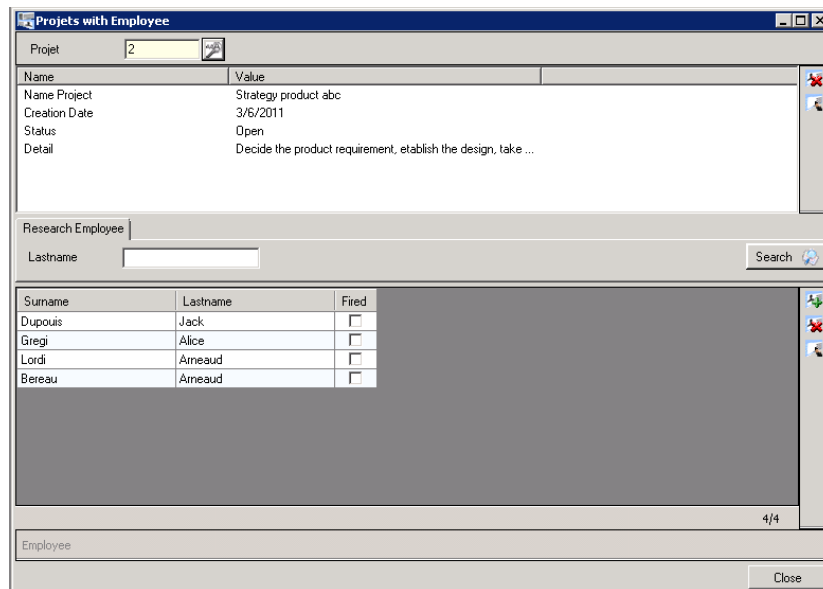


Figure 101 : Master Detail Interaction Unit on Desktop View

All Guidelines on some element display categories have been respected:

- Window frame :guidelines 1,2,3,4,6,8
- Window Tab: guidelines 15,16
- Menu bar: guidelines 20,21,22
- Menu icon : guidelines 23,24,25,26
- Navigation: guidelines 40,43,48
- Not horizontal scroll :guidelines 51
- Content:

- Short and not ambiguous title : guidelines 53
- Text :guidelines 53,55,62,66,67,69,79,81
- Action text :guidelines 77
- Buttons : guidelines 87, 88
- Graphic: guideline 96
- No sound: guideline 108
- Checkbox : guideline 137
- Selection: guideline 144
- Graphic use in correct context, no sound : guidelines 96,108
- Specific guidelines:
 - Content: guideline 169
 - Toolbar: guidelines 185,190
 - Navigation: guidelines 187,179,191,196, 197,229,233
 - Button : guideline 210
 - Text-field: guideline 211
 - Graphic : guideline 222
 - Icon : guidelines 184,196,220,216,217

4.3.4 Level3-Elementary Patterns

-Introduction: the calendar defined for the birth, the auto complete for an attribute such as country can be inserted in this category.

-Defined Selection: a list of country

-Argument grouping: The personal data group in service interaction unit instance (web view) is composed of important information such as the surname, the last name, the age and fired question. The other group is more focused on data which allows contacting the employee: Address, country, telephone, email.

-Conditional Navigation: as iOS, the application shows us a navigation bar which the left button gives the opportunity to return back to the previous content in IIU and PIU instances

-Supplementary information: in the improve issue for Employee SIU, the age is defined by a calculation with a determined date. By consequence, the age is displayed with a extra information which is the date of the user's birth.

-Dependency: see the example in Master Detail Interaction Unit Section.

-Population preload : see the example in Instance Interaction Unit.

-Order criterion: see the example in Population Interaction Unit.

-**Filter:** we can imagine an action button on the bottom menu in Population Interaction Unit view , into the place of the navigation as we can see the figure 102

-**Display Set:** see the example in Population Interaction Unit, Instance Interaction Unit and Master Detail Interaction Unit Section.

-**Navigation:** that is defined by a navigation bar in the top of the display set in Population Interaction Unit, Instance Interaction Unit instances. In the Master Detail Interaction Unit instance, the navigation is included in the bottom menu bar with the action buttons in order to not have the repeated title. Moreover, the home option is also included.

-**Action:** is defined in the bottom menu bar. The user has to press menu key before having all the action options because this bar is defined as additional option from Navigation.

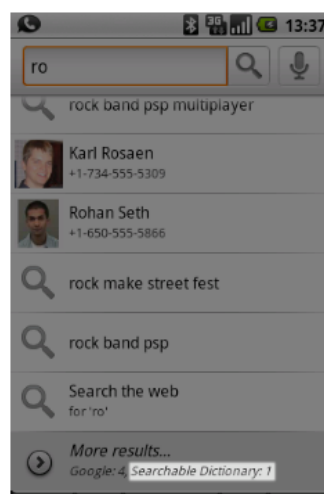


Figure 102 : Filter in mobile application

5 CONCLUSIONS

This thesis was written with a specific methodology based on the Design Research. The first developed topic is the awareness of the problem. The emergence of new devices and services, such as social networks, brings new needs for new guidelines to Help developers facilitate the actions of users on multi-platform applications. Currently, several studies suggest a list of guidelines which may be incomplete due to a lack of illustrations, definitions, simplicity, structure or because the guidelines are not adapted to the current situation of the new devices.

The main purpose of the ergonomic guide is to avoid these scenarios and to provide a support to make easier the development of multi-platform interfaces. To realize that, it is necessary to understand the context and the environment in which these guidelines can be applied. Therefore, a set of categories has to be set to obtain a good structure of the guide. That means to define the categories of users, tasks, environments, domains, etc... A variety of references dealing with these elements have been selected to build the ergonomic guide. Then, the guidelines have been selected to be the most compatible with these defined categories. The complexity in the realization of the guide was to extract all guidelines and to review all the references in order to demonstrate their importance and their credibility. Two types of guidelines are presented: general guidelines which are applied for all platforms, all applications and all operating systems, which is the main part of the guide. The second type of guidelines is applied for only one platform or one operating system, Typically for the platform "smartphones" and the operating systems "iOS".

In order to apply this ergonomic guide, it was necessary to understand how currently available technologies dealing with usability guidelines work. The collaboration with PROS, the « Centro de Investigación en Métodos de Producción Software » associated with the « Universidad Politécnica de Valencia (UPV) » and « CARE Technologies » gave me the opportunity to acquire the necessary knowledge in human-machine interactions and user interfaces domain. The technology developed by the team has produced the OLIVANOVA software. OLIVANOVA is a tool for automatic generation and fast implementations on a platform and is based on the OO-Method theory. For a specific example, two representations have been defined with the program OLIVANOVA: "web" and "desktop view". These views were compared with the guide presenting the objective to establish a design of user interface for Smartphones. Specific guidelines and general guidelines were applied. We noted that Android has more flexible rules on ergonomics than its competitor iOS.

Another motivation of this work was to provide an open software summarizing the ergonomic guide for developers. With the collaboration of *Defimedia Society* in Belgium, the software *Destine* now contains all guidelines from this guide with a short description and their validation in the defined categories.

Despite these achievements, the guide has some limits. One of them is that the selected references do not cover all defined categories. Indeed, it is difficult to find guidelines which could satisfy all types of users. By example, a teenager prefers to have more graphical and sounds to attract him. In opposite, senior people prefer simple websites for an easy reading. Also, guidelines for all platforms are complex to develop due to the differences of the performance and of the size of devices. Moreover, a specific platform can develop its own pattern and imposes its use in order to have a better impact on the user memory.

Another limit is that there is no evidence that all developers will follow this ergonomic guide. Consequently, the real impact of the work is limited due to a lack of experimentation. A future work could be carried out to validate the ergonomic guide with programmers, to extend the guide to other platforms or operating systems on Smartphones such as Symbian. We can imagine submitting a survey to users in order to check the importance and the relevance of each guideline.

On a more personal note, I must say that writing this thesis and the work involved has been very rewarding. The part made in connection with an internship at the research center of Valencia (PROS) within a specialized team has been for me a real experience of what may be the work-life in my field of study. This aspect is necessarily a benefit for a future professional career.

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Appendix A : Worldwide Mobile Terminal Sales and Smartphone Sales to end users between 2009-2010

Worldwide Mobile Terminal Sales to End Users in 3Q10 (Thousands of Units)

Company	3Q10 Units	3Q10 Market Share (%)	3Q09 Units	3Q09 Market Share (%)
Nokia	117,461.0	28.2	113,466.2	36.7
Samsung	71,671.8	17.2	60,627.7	19.6
LG	27,478.7	6.6	31,901.4	10.3
Apple	13,484.4	3.2	7,040.4	2.3
Research In Motion	11,908.3	2.9	8,522.7	2.8
Sony Ericsson	10,346.5	2.5	13,409.5	4.3
Motorola	8,961.4	2.1	13,912.8	4.5
HTC	6,494.3	1.6	2,659.5	0.9
ZTE	6,003.6	1.4	4,143.7	1.3
Huawei Technologies	5,478.1	1.3	3,339.7	1.1
Others	137,797.6	33.0	49,871.1	16.1
Total	417,085.7	100.0	308,894.7	100.0

Source: Gartner (November 2010)

Worldwide Smartphone Sales to End Users by Operating System in 3Q10 (Thousands of Units)

Company	3Q10 Units	3Q10 Market Share (%)	3Q09 Units	3Q09 Market Share (%)
Symbian	29,480.1	36.6	18,314.8	44.6
Android	20,500.0	25.5	1,424.5	3.5
iOS	13,484.4	16.7	7,040.4	17.1
Research In Motion	11,908.3	14.8	8,522.7	20.7
Microsoft Windows Mobile	2,247.9	2.8	3,259.9	7.9
Linux	1,697.1	2.1	1,918.5	4.7
Other OS	1,214.8	1.5	612.5	1.5
Total	80,532.6	100.0	41,093.3	100.0

Source: Gartner (November 2010)

Appendix B : Destine Screenshot

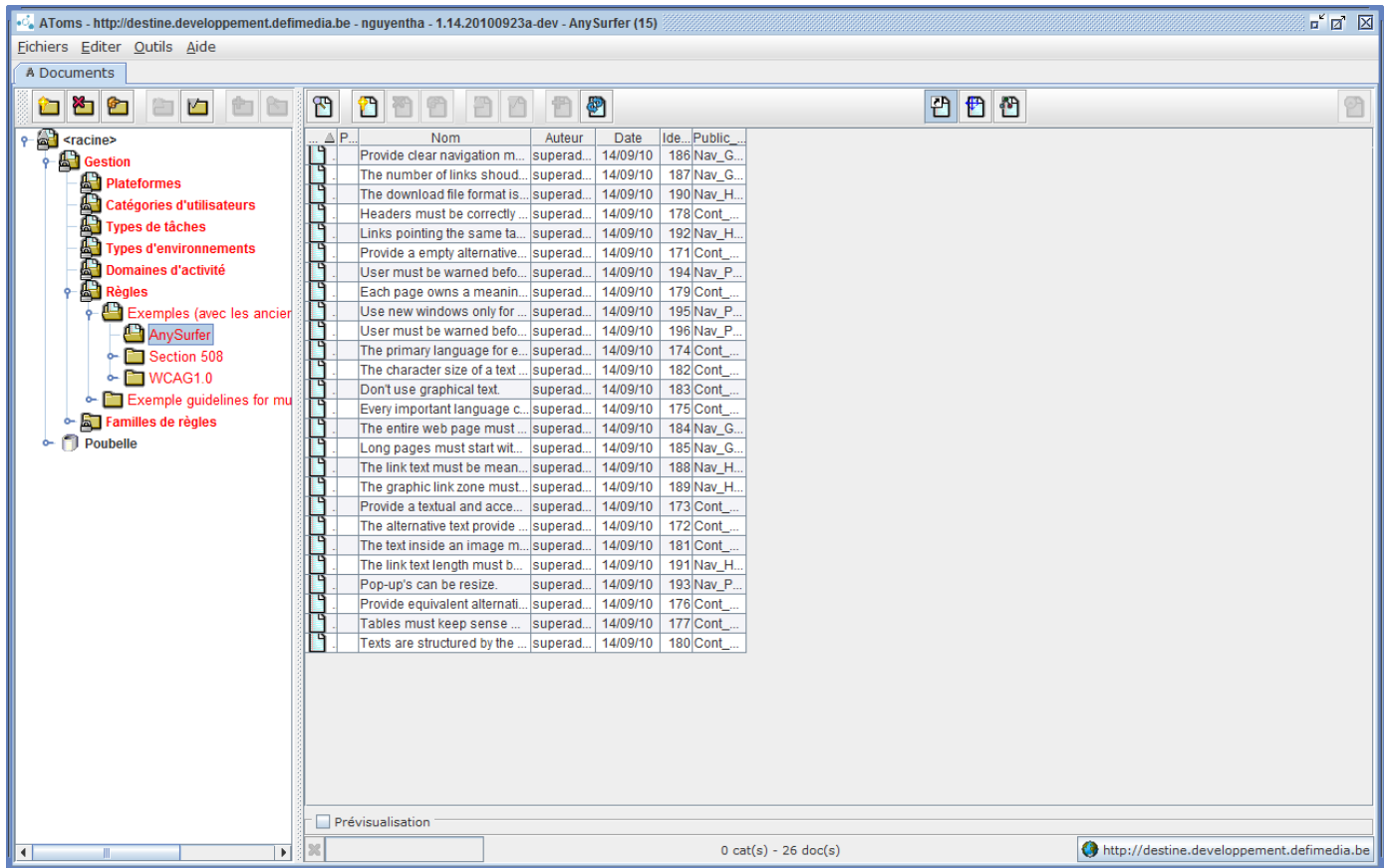


Figure A: the ergonomic guide in Destine Software

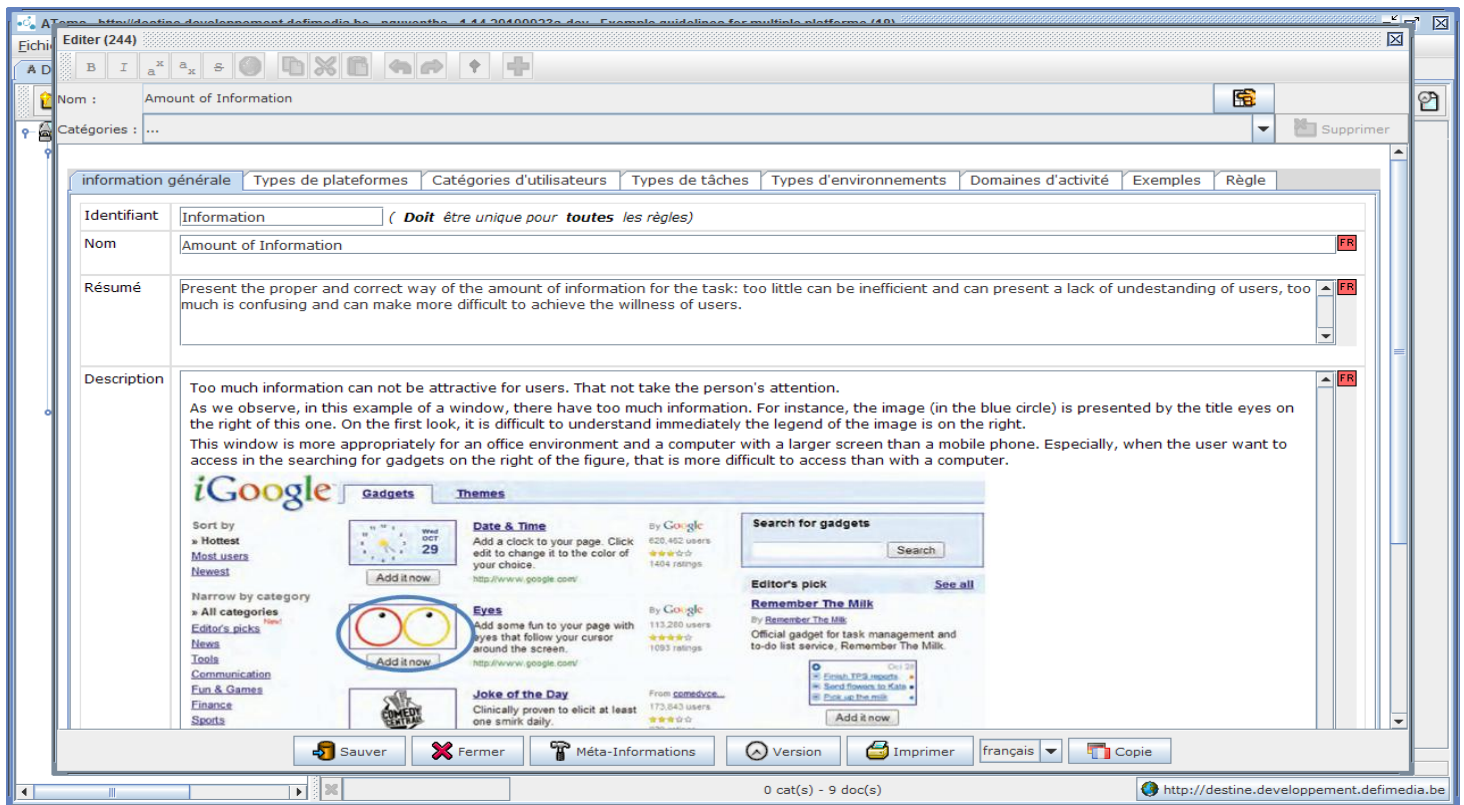


Figure B: A representation of one guideline

Appendix C : Guidelines and types of platforms

enter in contact with an agent of the enterprise									
Guideline 162 : Frequently Asked Questions (FAQ) with answer should be provided	V	V	V	V	V	V	V	V	
Guideline 163 : When submitting the form and a lack of information occurs, the site should position the user at this location.	V	V	V	V	V	V	V	V	
Guideline 164 : Show that the help centre had received the question by a message	V	V	V	V	V	V	V	V	
Guideline 165 : The Answer to the question is given in a short time	V	V	V	V	V	V	V	V	
Guideline 166 : Suggest an automatically set of word when user is writing a beginning word	V	V	V	V	V	V	V	V	
Guideline 167 : User experience is also able to return to the site and perform the same tasks	V	V	V	V	V	V	V	V	
Guideline 168 : Make a possible report to the website when a problem occurs	V	V	V	V	V	V	V	V	
Guideline 169 : Only one column for a content	X	X	X	X	X	V	X	X	
Guideline 170 : The interface shall be adapted for both touchscreen and no touchscreen use.	X	X	X	X	X	V	X	X	
Guideline 171 : Adapt all elements in portrait or landscape aspect	X	X	X	X	X	V	X	X	
Guideline 172 : If your application or websites need only one orientation, keep all elements in this format (Then the user knows the appropriate format and keeps view on it)	X	X	X	X	X	V	X	X	
Guideline 173 : Respond to 180 rotation if only use in landscape case	X	X	X	X	X	V	X	X	
Guideline 174 : Users should not be asked to rotate their device.	V	V	V	V	V	V	V	V	
Guideline 175 : Rearrange the layout of the user interface to	X	X	X	X	X	V	X	X	

Guideline 191 : Text in the Navigation Bar is understandable and easy to read	V	V	V	V	V	V	V	V	
Guideline 192 : Replace the Navigation Bar by segmented control at the top level to make the navigation or view easier and make sure to have the back button	V	V	V	V	V	V	V	V	
Guideline 193 : Segmented controls do not have a title	X	X	X	X	X	V	X	X	
Guideline 194 : The Navigation Bar contains only the title of the current content, a back button and one control that act on the current content.	X	X	X	X	X	V	X	X	
Guideline 195 : Specify a custom colour to look well with the application or translucency fashion to extend the view.	X	X	X	X	X	V	X	X	
Guideline 196 : Icon size navigation bar should be 20 x 20 pixels or 40 x 40 pixels in high definition.	X	X	X	X	X	V	X	X	
Guideline 197 : Indicate the position of the user only once .	X	X	X	X	X	V	X	X	
Guideline 198 : Allows user to interrupt a modal task.	V	V	V	V	V	V	V	V	
Guideline 199 : Balance any request for input by users with what you offer users in return.	V	V	V	V	V	V	V	V	
Guideline 200 : Use detail button to bring additional information.	V	V	V	V	V	V	V	V	
Guideline 201 : Use info button to show more details of the application and position it on the back of the screen display and not on the current interface.	X	X	X	X	X	V	X	X	
Guideline 202 : Use a rounded rectangle button for action button	X	X	X	X	X	V	X	X	

Guideline 203 : Use a switch to let user chose a state, such as active or inactive, of list items.	X	X	X	X	X	V	X	X	
Guideline 204 : The switch have got a coherent and diametrically opposed pair.	X	X	X	X	X	V	X	X	
Guideline 205 : Undo and Redo Buttons are inserted only in the fundamental case.	X	X	X	X	X	V	X	X	
Guideline 206 : The label has to be understandable, in great font and in legible colour	V	V	V	V	V	V	V	V	
Guideline 207 : Only one line of user entry in a field.	X	X	X	X	X	V	X	X	
Guideline 208 : Put the objective on left of the text field.	X	X	X	X	X	V	X	X	
Guideline 209 : Put additional feature on right of the text field.	X	X	X	X	X	V	X	X	
Guideline 210 : Clear button is in the right of the text field.	X	X	X	X	X	V	X	X	
Guideline 211 : Show a text in the field to help user to enter information.	V	V	V	V	V	V	V	V	
Guideline 212 : Help user with different keyboard types provided from the iOS system.	X	X	X	X	X	V	X	X	
Guideline 213 : Do not offer a demo feature without it being in “store’s perspective”	X	X	X	X	X	V	X	X	
Guideline 214 : Implies complicated framesets related to scroll ability	X	X	X	X	X	V	X	X	
Guideline 215 : Menu icons have to be drawn in a flat-front perspective and in greyscale.	X	X	X	X	X	V	X	X	
Guideline 216 : Avoid inserting 3D icon.	X	X	X	X	X	V	X	X	

Guideline 217 : Create icon sets for different aspect of the screen (low, medium, high-density screens).	X	X	X	X	X	V	X	X	
Guideline 218 : Menu icons have rounded corner in appropriate cases.	X	X	X	X	X	V	X	X	
Guideline 219 : All menu icons have to be used in the same colour palette and effects	V	V	V	V	V	V	V	V	
Guideline 220 : Menu icons have to be created at 48 x 48 pixels and as a transparent PNG file	X	X	X	X	X	V	X	X	
Guideline 221 : The default format for loaded page is in zoomed-out perspective.	V	V	V	V	V	V	V	V	
Guideline 222 : Graphic elements have to be adapted to different densities.	V	V	V	V	V	V	V	V	
Guideline 223 : If necessary, bring alternative graphics for different screen densities.	V	V	V	V	V	V	V	V	
Guideline 224 : Use Viewport Metadata on the web page to control the best visual representation on screen densities (resize correctly the web page).	V	V	V	V	V	V	V	V	
Guideline 225 : Use the tool like Minify to compress files to increase the speed of the page load.	V	V	V	V	V	V	V	V	
Guideline 226 : Make the navigation with a scroll up and down, and avoid scrolling left and right.	V	V	V	V	V	V	V	V	
Guideline 227 : Use for this effect, a vertical linear layout.	V	V	V	V	V	V	V	V	
Guideline 228 : Not use general units, such as pixels, but relative measurement such as "density-independent pixel units (dp)".	X	X	X	X	X	V	X	X	
Guideline 229 : Action bar have to be at the top of the screen.	X	X	X	X	X	V	X	X	

Appendix D : Guidelines and types of users

Guidelines	Children	Teenagers	Adults	Seniors	Disabilities	Description
Guideline 1 : Elements of a window have to be align	V	V	V	V	V	
Guideline 2 : Create a screen balanced by distributing the weight of the items displayed between the parts right, left, top and bottom	V	V	V	V	V	
Guideline 3 : Insert regularity and harmony in the way of a set ordered elements from a central point	V	V	V	V	V	
Guideline 4 : Assembling objects consistently provides better overview.	V	V	V	V	V	
Guideline 5 : A conventional order or plan allows predicting the rest of the unlooked content.	V	V	V	V	V	
Guideline 6 : for clarity and comprehending aspect, an optimal number of elements on a screen are inserted.	V	V	V	V	V	
Guideline 7 : Present the components in order of use (Next, Modify, Cancel)	V	V	V	V	V	
Guideline 8 : For each consolidated information in a frame, insert a document title	V	V	V	V	V	
Guideline 9 : The window title have to be short and not ambiguous	V	V	V	V	V	
Guideline 10 : User has to find quickly the open and close action of an application	V	V	V	V	V	
Guideline 11 : Allow to move away the window from initial place	V	V	V	V	X	
Guideline 12 : Dimensions of the window do not affect the content and graphic disposition	V	V	V	V	V	
Guideline 13: For a frequent use, the user can reduce the window	V	V	V	V	V	

Guideline 14: Use a centred layout	V	V	V	V	V	
Guideline 15 : Each window tab is easy to recognize	V	V	V	V	V	
Guideline 16 : Prefer a tab window or replace the content than using a pop-up window	V	V	V	V	V	
Guideline 17 : The home page remains a traditional home page	V	V	V	V	V	
Guideline 18 : A brief and real content is shown in the home page	V	V	V	V	V	
Guideline 19 : The logo must also be a reference to the homepage	V	V	V	V	V	
Guideline 20 : The content is presented with a defined sequence	V	V	V	V	V	
Guideline 21 : A button for the connection to entry in the inbox on the right	V	V	V	V	V	
Guideline 22 : A button registering for new user	V	V	V	V	V	
Guideline 23 : A link to condition using this service	V	V	V	V	V	
Guideline 24 : Make possible to stay connected by a checked button	V	V	V	V	V	
Guideline 25 : Menu bar must have only one explicit word-title as description of content	V	V	V	V	V	
Guideline 26 : Menu bar must be visible on each page of website	V	V	V	V	V	
Guideline 27 : Items, which are most frequent, are shown in the Menu	V	V	V	V	V	
Guideline 28 : Menu bar should be interactive with a representation and helpful icons	V	V	V	V	V	
Guideline 29 : For a specific and relevant task, an icon with a short word describe the task	V	V	V	V	V	
Guideline 30: The icon must reference directly to the link itself	V	V	V	V	V	
Guideline 31 : Limit the number of icons in a appropriate way	V	V	V	V	V	
Guideline 32 : Use Hierarchical menus under cascading form and toward the down screen	V	V	V	V	V	
Guideline 33 : Two cascade menus (represented by three menu levels) is preferred.	V	V	V	V	V	

Guideline 34 : The title of the cascading menu is not useful.	V	V	V	V	V	
Guideline 35 : Use shortcut commands that are accessed frequently.	V	V	V	V	V	
Guideline 36 : Each menu item should be assigned to a keyboard equivalent mnemonic to facilitate keyboard selection	V	V	V	V	V	
Guideline 37 : Pressing two keys simultaneously is preferred as shortcut	V	V	V	V	X	
Guideline 38 : Navigation guide have to be displayed on left-top	V	V	V	V	V	
Guideline 39 : Use this symbol ">" or "/"to show the path of the current page from home page	V	V	V	V	V	
Guideline 40 : Small size on the titles of the navigation	V	V	V	V	V	
Guideline 41: The title of the navigation is clear and is the same that the linked page	V	V	V	V	V	
Guideline 42 : Repeat the navigation issue at the end of the page if the content is large	V	V	V	V	V	
Guideline 43 : Limit the number of navigation area	V	V	V	V	V	
Guideline 44 : The navigation between two pages has not exceeded more 2 till 6 seconds.	V	V	V	V	V	
Guideline 45 : A long waiting of one charged page have a notice message about it or an icon on the mousse	V	V	V	V	V	
Guideline 46 : Use a strategic location to put a link in order to come back to the top	V	V	V	V	V	
Guideline 47: Indicate the page already visited	V	V	V	V	V	
Guideline 48 : Indicate the position of the user in each page	V	V	V	V	V	
Guideline 49 : Show clearly what the user is pointing to on the menu or an item	V	V	V	V	V	
Guideline 50 : Minimize scrolling	V	V	V	V	V	
Guideline 51 : Eliminate horizontal scrolling	V	V	V	V	V	
Guideline 52 : The logo must be visibly on every page and not only on the	V	V	V	V	V	

home page						
Guideline 53: Each title of a page should be short and not ambiguous	V	V	V	V	V	
Guideline 54 : Use a brief description about the content	V	V	V	V	V	
Guideline 55 : A visual consistency of frequently application should be the same on all platforms	V	V	V	V	V	
Guideline 56 : In order to recognize the same site, each page must have the same brand or title and colour	V	V	V	V	V	
Guideline 57 : Not let blank page on website	V	V	V	V	V	
Guideline 58 : The content of each category is logical and not too heavy	V	V	V	V	V	
Guideline 59 : Give a title for each object group	V	V	V	V	V	
Guideline 60 : Avoid the most possible to have the same word for each title	V	V	V	V	V	
Guideline 61 : Do not center a text in a bad location	V	V	V	V	V	
Guideline 62: Amount of information should be correct, proper, relevant and appropriate.	V	V	V	V	V	
Guideline 63 : The content must avoid having out of date information	V	V	V	V	V	
Guideline 64 : All available resources should be use to know and understand the user's requirement	V	V	V	V	V	
Guideline 65: A text should not be written entirely in capital letters	V	V	V	V	V	
Guideline 66 : Use dark letters on a light background and inversely	V	V	V	V	V	
Guideline 67 : The first letter of a sentence should be capitalized	V	V	V	V	V	
Guideline 68 : Using a familiar straight police in a general text (if not a quote) with normal size	V	V	V	V	V	
Guideline 69 : Allow the user to change the letter policy	V	V	V	V	V	
Guideline 70 : Put symbol (puce) for a better structure and visibility	V	V	V	V	V	
Guideline 71 : Do not insert symbol (puce) for decorative	V	V	V	V	V	
Guideline 72: Use less negation and avoid double negation in a section	V	V	V	V	V	

Guideline 73: Do not use the right justification in an inappropriate way	V	V	V	V	V	
Guideline 74: Information has to be present in a correct order	V	V	V	V	V	
Guideline 75: First order is the Objective	V	V	V	V	V	
Guideline 76: Secondly a short conclusion, action to realise this goal are shown and details will follow above	V	V	V	V	V	
Guideline 77: Action text should not use the future sentence	V	V	V	V	V	
Guideline 78: Help user when the content have some difficult words to understand	V	V	V	V	V	
Guideline 79: Use formal language and user	V	V	V	V	V	
Guideline 80: Avoid abbreviations without a given definition	V	V	V	V	V	
Guideline 81: Gathering the information of the same activity in the same window	V	V	V	V	V	
Guideline 82: Short memory is preferable and by this way the website provides easy word	V	V	V	V	V	
Guideline 83: Mental calculation has to be minimized or tools have to be provided for this usage	V	V	V	V	V	
Guideline 84: Highlight only key words	V	V	V	V	V	
Guideline 85: Avoid repeating the same useless information more than once	V	V	V	V	V	
Guideline 86 : A tiny centred text appears to describe the application before the user clicks on the link or button	V	V	V	V	V	
Guideline 87 : Avoid link not clickable	V	V	V	V	V	
Guideline 88 : Avoid "click here" as button or a link without define the following content	V	V	V	V	V	
Guideline 89 : Avoid link don't look like link	V	V	V	V	V	
Guideline 90 : The passage of user on a website by clicking on a link must be displayed by another colour.	V	V	V	V	V	
Guideline 91: No multiple links to refer to the same address on one page	V	V	V	V	V	

Guideline 92 : One verb as label on button should define the action when the user click on	V	V	V	V	V	
Guideline 93 : Small size on verbs of each button	V	V	V	V	V	
Guideline 94 : Button without possible action on it should not be active	V	V	V	V	V	
Guideline 95 : Warn users that the page will request important download of components	V	V	V	V	V	
Guideline 96 : Use decorate graphics in a useful way such as showing the real content	V	V	V	V	V	
Guideline 97 : Minimize the weight of the image	V	V	V	V	V	
Guideline 98 : Prioritize on the quality of the picture than the size	V	V	V	V	V	
Guideline 99 : The key "alt" allows to show a short description of the picture	V	V	V	V	V	
Guideline 100 : The picture can also be a link to another page	V	V	V	V	V	
Guideline 101 : A representation on different tools (Video, graphic ...) is sometimes preferable than a large text (because users can quickly catch the meaning.)	V	V	V	V	V	
Guideline 102 : Do not launch directly the animation when the page is charged	V	V	V	V	V	
Guideline 103 : Do not launch directly a sound with the animation when the page is charge	V	V	V	V	V	
Guideline 104 : The user is able to stop the animation whenever he wants	V	V	V	V	V	
Guideline 105 : Commercial web sites have to use animation to complete a product (tutorial or marketing issue)	V	V	V	V	V	
Guideline 106 : Present a correct convention for each chart and graph	V	V	V	V	V	
Guideline 107 : Use of audible alarms in a correct situation	V	V	V	V	V	
Guideline 108 : Do not annoy the user with unnecessary noise	V	V	V	V	V	
Guideline 109 : The website or application should propose the target links in a direct way	V	V	V	V	V	

Guideline 110 : Provide a fully spelled-out description of the action	V	V	V	V	V	
Guideline 111 : Avoid repeating the same action more than once	V	V	V	V	V	
Guideline 112 : The functionality of new device controls is explicit	V	V	V	V	V	
Guideline 113 : When the time is out, the web site must log off the user	V	V	V	V	V	
Guideline 114 : The content will be print in correct format	V	V	V	V	V	
Guideline 115 : Login and password will be entry by a justified field on the right	V	V	V	V	V	
Guideline 116 : Make sure the private information	V	V	V	V	V	
Guideline 117 : Allow users to chose their own password	V	V	V	V	V	
Guideline 118 : Allow user to change password	V	V	V	V	V	
Guideline 119 : Limit the number of unsuccessful log on	V	V	V	V	V	
Guideline 120 : A message with the login and password has been sent to users in unsuccessful log on case	V	V	V	V	V	
Guideline 121 : Not automatically tab action by the computer	V	V	V	V	V	
Guideline 122 : Avoid unnecessary registration	V	V	V	V	V	
Guideline 123 : Use a "web-safe"tool to choose the colour	V	V	V	V	V	
Guideline 124 : Radio button is preferable than a long selection list	V	V	V	V	V	
Guideline 125 : Leave one space between the longest caption and the data field column	V	V	V	V	V	
Guideline 126 : Left justify data fields and right-justify captions to data fields	V	V	V	V	V	
Guideline 127 : Label and field should be align and not so far to make the correspondence view	V	V	V	V	V	
Guideline 128 : A single field is preferred than multiple boxes	V	V	V	V	V	
Guideline 129 : Ask most useful information on the first time	V	V	V	V	V	
Guideline 130 : Minimize the demand of data	V	V	V	V	V	

Guideline 131 : Entries must be automatically justified and not aligned in right position	V	V	V	V	V	
Guideline 132 : Required and optional data fields are clearly displayed	V	V	V	V	V	
Guideline 133 : Visible length of a field of the data requirement or present a mask as indication	V	V	V	V	V	
Guideline 134 : Notice data form (data, symbol, space, unit of measurement)	V	V	V	V	V	
Guideline 135 : Use default value in possible case	V	V	V	V	V	
Guideline 136 : Radiobutton is preferred for choosing one of several options	V	V	V	V	V	
Guideline 137 : Checkbox is used for validating one choice (Yes or Not)	V	V	V	V	V	
Guideline 138 : A validation request occurs before the form is definitely submitted	V	V	V	V	V	
Guideline 139 : To fill a form, either let the user choose the unit, either the websites have to define and explain at users	V	V	V	V	V	
Guideline 140 : Precise the format for the entry data	V	V	V	V	V	
Guideline 141 : Allow to select all data if users have to select items	V	V	V	V	V	
Guideline 142 : If an error occurs, the input is easy corrected	V	V	V	V	V	
Guideline 143 : Suggest an automatically set of word when user is writing a beginning word	V	V	V	V	V	
Guideline 144 : Use alphabetic order for selection tool	V	V	V	V	V	
Guideline 145 : options not available in a tool (radiobutton, selection, checkboxes) are missed or in light colour and cannot be chosen .	V	V	V	V	V	
Guideline 146 : Make the possibility to search a specific content on the website, in each page	V	V	V	V	V	
Guideline 147 : the length for a research in search boxes is optimal	V	V	V	V	V	
Guideline 148 : indicate the possibility to have different kinds of search functionality.	V	V	V	V	V	
Guideline 149 : Make the possibility to search in a sub group	V	V	V	V	V	

Guideline 150 : Show the results in relevant order	V	V	V	V	V	
Guideline 151 : Do not multiply the search tool in a window if the search function is the same.	V	V	V	V	V	
Guideline 152 : Message to prevent the user of the irreversible action have to be displayed and confirmation of a relevant action	V	V	V	V	V	
Guideline 153 : A message alert-error should be short and make the understanding easy (not search requirement)	V	V	V	V	V	
Guideline 154 : Prevent an issue to interrupt processes due to a long waiting of charging with a profile copy	V	V	V	V	V	
Guideline 155 : Error Message allow the user to access in direct fashion at the problem or how to solve it.	V	V	V	V	V	
Guideline 156 : Do not use the message as "error fatal" that can stress the users	V	V	V	V	V	
Guideline 157 : The alert-error message should use an understandable and formal language	V	V	V	V	V	
Guideline 158 : The alert-error message has to appear directly in front of the user view where the action had taken	V	V	V	V	V	
Guideline 159 : Error message has to describe the solution to solve the problem or explain the situation not require any additional action to understand it.	V	V	V	V	V	
Guideline 160 : Give an issue when a message system appears "404-page not found"	V	V	V	V	V	
Guideline 161 : Show that the web site offers the possibility to enter in contact with an agent of the enterprise	V	V	V	V	V	
Guideline 162 : Frequently Asked Questions (FAQ) with answer should be provided	V	V	V	V	V	
Guideline 163 : When submitting the form and a lack of information occurs, the site should position the user at this location.	V	V	V	V	V	

Guideline 164 : Show that the help centre had received the question by a message	V	V	V	V	V	
Guideline 165 : The Answer to the question is given in a short time	V	V	V	V	V	
Guideline 166 : Suggest an automatically set of word when user is writing a beginning word	V	V	V	V	V	
Guideline 167 : User experience is also able to return to the site and perform the same tasks	V	V	V	V	V	
Guideline 168 : Make a possible report to the website when a problem occurs	V	V	V	V	V	
Guideline 169 : Only one column for a content	V	V	V	V	V	
Guideline 170 : The interface shall be is adapted for both touchscreen and no touchscreen use.	V	V	V	V	V	
Guideline 171 : Adapt all elements in portrait or landscape aspect	V	V	V	V	V	
Guideline 172 : If your application or websites need only one orientation, keep all elements in this format (Then the user knows the appropriate format and keeps view on it)	V	V	V	V	V	
Guideline 173 : Respond to 180 rotation if only use in landscape case	V	V	V	V	X	
Guideline 174 : Users should not be asked to rotate their device.	V	V	V	V	V	
Guideline 175 : Rearrange the layout of the user interface to content more information on the screen	V	V	V	V	V	
Guideline 176 : Keep a similar format of elements in rotation	V	V	V	V	X	
Guideline 177 : Each orientation should have a unique launch image	V	V	V	V	V	
Guideline 178 : Tappable elements could be in an area of about 44 x 44 points	V	V	V	V	X	
Guideline 179 : Do not change the meaning of standard known gesture	V	V	V	V	X	
Guideline 180 : Complex gesture should also have another issue to perform this task	V	V	V	V	X	
Guideline 181 : The new gesture owns a logical meaning	V	V	V	V	X	

Guideline 182 : Avoid new gesture if possible	V	V	V	V	X	
Guideline 183 : Avoid coded value that identify screen dimension automatically (ref q)	V	V	V	V	V	
Guideline 184 : Never use standard icon for other use - That can confuse the user (ref q)	V	V	V	V	V	
Guideline 185 : This element is compatible with guidelines of toolbar, and segmented control for the cascading menu.	V	V	V	V	V	
Guideline 186 : Make the path in logical order	V	V	V	V	V	
Guideline 187 : Navigation bar have to be shown just below status bar	V	V	V	V	V	
Guideline 188 : The title in the current page is the same that in the Navigation bar	V	V	V	V	V	
Guideline 189 : A previous button is shown on the left of Navigation bar and labeled with the title of the previous page.	V	V	V	V	V	
Guideline 190 : For more additional action, toolbar is preferred to extend Navigation Bar.	V	V	V	V	V	
Guideline 191 : Text in the Navigation Bar is understandable and easy to read	V	V	V	V	V	
Guideline 192 : Replace the Navigation Bar by segmented control at the top level to make the navigation or view easier and make sure to have the back button	V	V	V	V	V	
Guideline 193 : Segmented controls do not have a title	V	V	V	V	V	
Guideline 194 : The Navigation Bar contains only the title of the current content, a back button and one control that act on the current content.	V	V	V	V	V	
Guideline 195 : Specify a custom colour to look well with the application or translucency fashion to extend the view.	V	V	V	V	V	
Guideline 196 : Icon size navigation bar should be 20 x 20 pixels or 40 x 40 pixels in high definition.	V	V	V	V	V	
Guideline 197 : Indicate the position of the user only once .	V	V	V	V	V	

Guideline 198 : Allows user to interrupt a modal task.	V	V	V	V	V	
Guideline 199 : Balance any request for input by users with what you offer users in return.	V	V	V	V	V	
Guideline 200 : Use detail button to bring additional information.	V	V	V	V	V	
Guideline 201 : Use info button to show more details of the application and position it on the back of the screen display and not on the current interface.	V	V	V	V	V	
Guideline 202 : Use a rounded rectangle button for action button	V	V	V	V	V	
Guideline 203 : Use a switch to let user chose a state, such as active or inactive, of list items.	V	V	V	V	V	
Guideline 204 : The switch have got a coherent and diametrically opposed pair.	V	V	V	V	V	
Guideline 205 : Undo and Redo Buttons are inserted only in the fundamental case.	V	V	V	V	V	
Guideline 206 : The label has to be understandable, in great font and in legible colour	V	V	V	V	V	
Guideline 207 : Only one line of user entry in a field.	V	V	V	V	V	
Guideline 208 : Put the objective on left of the text field.	V	V	V	V	V	
Guideline 209 : Put additional feature on right of the text field.	V	V	V	V	V	
Guideline 210 : Clear button is in the right of the text field.	V	V	V	V	V	
Guideline 211 : Show a text in the field to help user to enter information.	V	V	V	V	V	
Guideline 212 : Help user with different keyboard types provided from the iOS system.	V	V	V	V	V	
Guideline 213 : Do not offer a demo feature without it being in “store’s perspective”	V	V	V	V	V	
Guideline 214 : Implies complicated framesets related to scroll ability	V	V	V	V	V	
Guideline 215 : Menu icons have to be drawn in a flat-front perspective and in greyscale.	V	V	V	V	V	

Guideline 216 : Avoid inserting 3D icon.	V	V	V	V	V	
Guideline 217 : Create icon sets for different aspect of the screen (low, medium, high-density screens).	V	V	V	V	V	
Guideline 218 : Menu icons have rounded corner in appropriate cases.	V	V	V	V	V	
Guideline 219 : All menu icons have to be used in the same colour palette and effects	V	V	V	V	V	
Guideline 220 : Menu icons have to be created at 48 x 48 pixels and as a transparent PNG file	V	V	V	V	V	
Guideline 221 : The default format for loaded page is in zoomed-out perspective.	V	V	V	V	V	
Guideline 222 : Graphic elements have to be adapted to different densities.	V	V	V	V	V	
Guideline 223 : If necessary, bring alternative graphics for different screen densities.	V	V	V	V	V	
Guideline 224 : Use Viewport Metadata on the web page to control the best visual representation on screen densities (resize correctly the web page).	V	V	V	V	V	
Guideline 225 : Use the tool like Minify to compress files to increase the speed of the page load.	V	V	V	V	V	
Guideline 226 : Make the navigation with a scroll up and down, and avoid scrolling left and right.	V	V	V	V	V	
Guideline 227 : Use for this effect, a vertical linear layout.	V	V	V	V	V	
Guideline 228 : Not use general units, such as pixels, but relative measurement such as "density-independent pixel units (dp)".	V	V	V	V	V	
Guideline 229 : Action bar have to be at the top of the screen.	V	V	V	V	V	
Guideline 230 : Application logo is positioned on the left of the Action Bar.	V	V	V	V	V	
Guideline 231 : Activity title and available elements on the right of the Action Bar.	V	V	V	V	V	
Guideline 232 : Search box can be inserted in the Action Bar.	V	V	V	V	V	

[illegible]

checkboxes or radio button.

Appendix E : XML Code of the Figure 89

To insert a specific icon on the main menu of Android device before launching the application, a specific code is already written in the AndroidManifest.xml in "res" directory. In the square, it is the code for the specific icon.

Developer has to change the standard icon in "drawable" sub-directory.

```
<?xml version="1.0" encoding="utf-8"?>
<manifest xmlns:android="http://schemas.android.com/apk/res/android"
    package="com.test02.texview"
    android:versionCode="1"
    android:versionName="1.0">

    <application android:icon="@drawable/icon" android:label="@string/app_name">
        <activity android:name="TextView"
            android:label="@string/app_name">
            <intent-filter>
                <action android:name="android.intent.action.MAIN" />
                <category android:name="android.intent.category.LAUNCHER"/>
            </intent-filter>
        </activity>
    </application>
</manifest>
```

Appendix F: Java-XML Code of the Figure 90

- **Java code**

```
package com.modelTest;

import android.app.Activity;
import android.content.Intent;
import android.os.Bundle;
import android.view.View;
import android.view.View.OnClickListener;
import android.widget.AdapterView;
import android.widget.AdapterView.OnItemClickListener;
import android.widget.ArrayAdapter;
import android.widget.Button;
import android.widget.Spinner;

public class ModelTest extends Activity {
    /** Called when the activity is first created. */
    @Override
    public void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);

        setContentView(R.layout.first);
        //combobox profile
        Spinner spinner = (Spinner) findViewById(R.id.acountcreation.connectspinner);
        ArrayAdapter<CharSequence> adapter = ArrayAdapter.createFromResource(
            this, R.array.connect_array, android.R.layout.simple_spinner_item);
        adapter.setDropDownViewResource(android.R.layout.simple_spinner_dropdown_item);
        spinner.setAdapter(adapter);
        //combobox language
        Spinner spin = (Spinner) findViewById(R.id.acountcreation.langagespinner);
        ArrayAdapter<CharSequence> adapter02 = ArrayAdapter.createFromResource(
            this, R.array.language_array, android.R.layout.simple_spinner_item);
        adapter.setDropDownViewResource(android.R.layout.simple_spinner_dropdown_item);
        spin.setAdapter(adapter02);

        OnClickListener connection = new OnClickListener()
        {
            public void onClick(View actuelView)
            {
                //create one notification
                //Toast.makeText(getBaseContext(), "Vous avez cliquez sur le bouton
s\'enregistrer", Toast.LENGTH_SHORT).show();
                Intent intent = new Intent(ModelTest.this, MainMenu.class);
                startActivity(intent);
            }
        };
        Button bouton = (Button) findViewById(R.id.acountcreation.connect);
        bouton.setOnClickListener(connection);
    }
}
```

- **XML code**

-In AndroidManifest.xml, insert the following code to launch an activity (new window):

```
<activity android:name=".MenuModelTest" />
```

-In res/layout directory:

```
<?xml version="1.0" encoding="utf-8"?>
<LinearLayout
    xmlns:android="http://schemas.android.com/apk/res/android"
    android:layout_width="fill_parent"    android:orientation="vertical"
    android:layout_height="fill_parent"  android:background="@drawable/background">

    <ImageView android:layout_width="fill_parent" android:id="@+accountcreation/title"
        android:layout_height="wrap_content"
        android:src="@drawable/logo02" android:layout_marginTop="10px" />

    <Spinner
        android:id="@+accountcreation/connectspinner"
        android:layout_width="200px"
        android:layout_height="40px"
        android:prompt="@string/connect_prompt"
        android:layout_gravity="center"/>

    <TextView android:layout_height="wrap_content" android:layout_width="wrap_content"
        android:text="Login" android:paddingTop="10px"
        android:textColor="#000000" android:layout_gravity="center_horizontal" />

    <EditText android:id="@+accountcreation/login" android:layout_width="200px"
        android:layout_height="wrap_content" android:layout_gravity="center"/>

    <TextView android:layout_width="wrap_content" android:layout_height="wrap_content"
        android:text="Mot de passe" android:textColor="#000000"
        android:paddingTop="10px" android:layout_gravity="center_horizontal" />

    <EditText android:id="@+accountcreation/password" android:layout_width="200px"
        android:layout_height="wrap_content" android:password="true"
        android:layout_gravity="center"/>

    <Spinner
        android:id="@+accountcreation/langagespinner"
        android:layout_width="200px"
        android:layout_height="40px"
        android:prompt="@string/connect_prompt"
        android:layout_x="100px"
            android:layout_y="332px"
        android:layout_gravity="center" />

    <Button android:layout_width="wrap_content" android:id="@+accountcreation/connect"
        android:layout_height="wrap_content"
        android:text="Ok" android:layout_marginTop="20px"
        android:layout_gravity="center"/>

</LinearLayout>
```

-In res/value directory: (to insert value in the spinners-Selection tool)

```
<?xml version="1.0" encoding="utf-8"?>
<resources>
    <string name="hello"></string>
    <string name="app_name">ModelTest</string>
    <string name="connect_prompt">Profile</string>
    <string-array name="connect_array">
        <item>Administrator</item>
    </string-array>
    <string name="langage_prompt">Language</string>
    <string-array name="language_array">
        <item>English</item>
    </string-array>
    <string name="country_prompt">Country</string>
    <string-array name="country_array">
        <item></item>
    </string-array>
</resources>
```

Appendix G: Java-XML Code of the Figure 91

- Java code for the creation of the list view and sub-menu

```
package com.test02.texview;

import java.util.ArrayList;
import java.util.HashMap;
import com.test02.texview.R;
import android.app.Activity;
import android.os.Bundle;
import android.view.ContextMenu;
import android.view.MenuInflater;
import android.view.MenuItem;
import android.view.View;
import android.widget.ListView;
import android.widget.SimpleAdapter;
import android.widget.Toast;

public class TextView extends Activity {

    private ListView maListViewPerso;

    /** Called when the activity is first created. */
    @Override
    public void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.main);

        maListViewPerso = (ListView) findViewById(R.id.listviewperso);

        ArrayList<HashMap<String, String>> listItem = new ArrayList<HashMap<String,
String>>();

        HashMap<String, String> map;
        map = new HashMap<String, String>();
        map.put("titre", "Admin");
        map.put("description", "Management identification");
        map.put("img", String.valueOf(R.drawable.admin));
        map.put("symbol", String.valueOf(R.drawable.fleche));
        listItem.add(map);

        map = new HashMap<String, String>();
        map.put("titre", "Employee");
        map.put("description", "Management Employees");
        map.put("img", String.valueOf(R.drawable.employee));
        map.put("symbol", String.valueOf(R.drawable.fleche));
        listItem.add(map);

        map = new HashMap<String, String>();
        map.put("titre", "Expense Line");
        map.put("description", "Expense description");
        map.put("img", String.valueOf(R.drawable.line));
        map.put("symbol", String.valueOf(R.drawable.fleche));
        listItem.add(map);

        map = new HashMap<String, String>();
        map.put("titre", "Expense Report");
        map.put("description", "Report of all expenses");
        map.put("img", String.valueOf(R.drawable.expensereport));
        map.put("symbol", String.valueOf(R.drawable.fleche));
        listItem.add(map);

        map = new HashMap<String, String>();
        map.put("titre", "Project");
        map.put("description", "Management projects");
        map.put("img", String.valueOf(R.drawable.project));
        map.put("symbol", String.valueOf(R.drawable.fleche));
        listItem.add(map);

        SimpleAdapter mSchedule = new SimpleAdapter (this.getContext(), listItem,
R.layout.displayitem,
```

```

        new String[] {"img", "titre", "description", "symbol"}, new int[] {R.id.img,
R.id.titre, R.id.description, R.id.symbol});
        maListViewPerso.setAdapter(mSchedule);

        maListViewPerso.setOnCreateContextMenuListener(new View.OnCreateContextMenuListener() {
            public void onCreateContextMenu(ContextMenu menu, View v, ContextMenu.ContextMenuInfo
menuInfo) {
                //HashMap map = (HashMap) maListViewPerso.getItemAtPosition(position);

                menu.setHeaderTitle("Employee SubMenu");
                MenuInflater inflater = getMenuInflater();
                inflater.inflate(R.layout.menu, menu);

            }
        });
    }

    public boolean onOptionsItemSelected(MenuItem item){

        switch (item.getItemId()) {
            case R.id.employee:
                Toast.makeText(Textview.this, "Delete", Toast.LENGTH_SHORT).show();
                return true;
            case R.id.create01:
                Toast.makeText(Textview.this, "Create", Toast.LENGTH_SHORT).show();
                //setContentview(R.layout.addemployee);
                return true;
            case R.id.delete01:
                Toast.makeText(Textview.this, "Delete", Toast.LENGTH_SHORT).show();
                return true;
            case R.id.edit01:
                Toast.makeText(Textview.this, "Edit", Toast.LENGTH_SHORT).show();
                return true;
            case R.id.list01:
                Toast.makeText(Textview.this, "List", Toast.LENGTH_SHORT).show();
                return true;
            case R.id.project:
                Toast.makeText(Textview.this, "Delete", Toast.LENGTH_SHORT).show();
                return true;
            case R.id.create02:
                Toast.makeText(Textview.this, "Create", Toast.LENGTH_SHORT).show();
                //setContentview(R.layout.addemployee);
                return true;
            case R.id.delete02:
                Toast.makeText(Textview.this, "Delete", Toast.LENGTH_SHORT).show();
                return true;
            case R.id.edit02:
                Toast.makeText(Textview.this, "Edit", Toast.LENGTH_SHORT).show();
                return true;
            case R.id.list02:
                Toast.makeText(Textview.this, "List", Toast.LENGTH_SHORT).show();
                return true;
            case R.id.joinproject02:
                Toast.makeText(Textview.this, "List", Toast.LENGTH_SHORT).show();
                return true;
            case R.id.removeproject02:
                Toast.makeText(Textview.this, "List", Toast.LENGTH_SHORT).show();
                return true;
        }
        return (super.onOptionsItemSelected(item));
    }
}

```

- **XML code of the list view** (In res/layout directory)


```
<?xml version="1.0" encoding="utf-8"?>
<LinearLayout xmlns:android="http://schemas.android.com/apk/res/android"
    android:orientation="vertical"
    android:layout_width="fill_parent"
    android:layout_height="fill_parent"
    >
<TextView
    android:id="@+id/monTextView"
    android:layout_width="fill_parent"
    android:layout_height="wrap_content"
    android:text="@string/hello"
    />

<ListView
    android:id="@+id/listviewperso"
    android:layout_width="fill_parent"
    android:layout_height="fill_parent"
    />

</LinearLayout>
```

- **XML code of the sub-menu** (In res/layout directory)

```
<menu xmlns:android="http://schemas.android.com/apk/res/android">

<item android:id="@+id/employee"
    android:title="Employee">

    <menu android:id="@+id/sousmenu01">

        <item android:id="@+id/create01"
            android:title="Create"/>

        <item android:id="@+id/delete01"
            android:title="Delete"/>

        <item android:id="@+id/edit01"
            android:title="Edit"/>

        <item android:id="@+id/list01"
            android:title="List"/>

    </menu>

</item>

<item android:id="@+id/project"
    android:title="Project">

    <menu android:id="@+id/sousmenu02">
        <item android:id="@+id/create02"
            android:title="Create"/>
        <item android:id="@+id/delete02"
            android:title="Delete"/>
        <item android:id="@+id/edit02"
            android:title="Edit"/>
        <item android:id="@+id/list02"
            android:title="List"/>
        <item android:id="@+id/joinproject02"
            android:title="List"/>
        <item android:id="@+id/removeproject02"
            android:title="List"/>

    </menu>

</item>

</menu>
```

Appendix H: Java-XML Code of the Figure 92

- **Java Code**

```
package com.employee.list;

import android.app.Activity;
import android.os.Bundle;

public class Employee extends Activity {
    /** Called when the activity is first created. */
    @Override
    public void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.createemployee);
    }
}
```

- **XML Code** (In res/layout directory)

```
<?xml version="1.0" encoding="utf-8"?>
<AbsoluteLayout
xmlns:android="http://schemas.android.com/apk/res/android"
android:layout_width="fill_parent"
android:layout_height="fill_parent"
android:background="@drawable/background">
>
<!-- Navigation -->
    <AbsoluteLayout android:layout_height="40px"
android:id="@+id/absoluteLayout1" android:layout_width="fill_parent"
android:background="@drawable/barnavigation">
        <Button android:layout_width="wrap_content" android:layout_x="8dip"
android:id="@+id/button01" android:text="Menu" android:layout_y="0dip"
android:layout_height="40px"></Button>
        <ImageView android:layout_height="wrap_content"
android:src="@drawable/employee" android:layout_width="wrap_content"
android:id="@+id/img" android:padding="10px"
android:layout_x="90dip"></ImageView>
        <TextView android:layout_width="wrap_content"
android:layout_x="132dip" android:textColor="#ff000000"
android:id="@+id/titrenavigation" android:textSize="18sp"
android:layout_y="8dip" android:text="Employee"
android:layout_height="wrap_content"></TextView>
        <Button android:layout_width="wrap_content"
android:layout_x="249dip" android:id="@+id/button02" android:text="Project"
android:layout_y="0dip" android:layout_height="40px"></Button>

    </AbsoluteLayout>
<!-- The content -->
<TextView android:layout_width="wrap_content" android:textSize="18sp"
android:textColor="#ff000000" android:id="@+id/textView1"
android:paddingTop="10px" android:text="Surname"
android:layout_height="wrap_content" android:layout_x="12dip"
android:layout_y="70dip"></TextView>
<EditText android:id="@+id/editText1" android:textSize="18sp"
android:layout_width="match_parent" android:text="Smith"
android:layout_height="wrap_content" android:layout_x="4dip"
android:layout_y="112dip"></EditText>
<TextView android:layout_width="wrap_content"
android:textColor="#ff000000" android:textSize="18sp"
```

```

android:layout_x="12dip" android:id="@+id/textView2"
android:text="Lastname" android:layout_height="wrap_content"
android:layout_y="169dip"></TextView>
<EditText android:id="@+id/editText2" android:layout_x="6dip"
android:text="Andrew" android:layout_height="wrap_content"
android:layout_y="197dip" android:layout_width="match_parent"></EditText>
<TextView android:layout_width="wrap_content" android:textColor="#ff000000"
android:textSize="18sp" android:layout_x="13dip"
android:id="@+id/textView3" android:text="Gender"
android:layout_height="wrap_content" android:layout_y="256dip"></TextView>
<TextView android:layout_width="wrap_content" android:textColor="#ff000000"
android:id="@+id/textView4" android:textSize="18sp" android:text="M"
android:layout_height="wrap_content" android:layout_x="16dip"
android:layout_y="310dip"></TextView>
<CheckBox android:layout_width="wrap_content" android:id="@+id/checkbox2"
android:layout_height="wrap_content" android:layout_x="204dip"
android:layout_y="298dip"></CheckBox>
<CheckBox android:layout_width="wrap_content" android:id="@+id/checkbox1"
android:layout_height="wrap_content" android:layout_x="52dip"
android:layout_y="298dip"></CheckBox>
<TextView android:layout_width="wrap_content" android:textColor="#ff000000"
android:id="@+id/textView5" android:textSize="18sp" android:text="F"
android:layout_height="wrap_content" android:layout_x="185dip"
android:layout_y="312dip"></TextView>
<Button android:text="next" android:layout_width="wrap_content"
android:id="@+id/next" android:layout_height="wrap_content"
android:layout_x="190dip" android:layout_y="354dip"></Button>
<Button android:text="save" android:layout_width="wrap_content"
android:id="@+id/save" android:layout_height="wrap_content"
android:layout_x="49dip" android:layout_y="352dip"></Button>

</AbsoluteLayout>

```

Appendix I : Java-XML Code of the Figure 93

- The Java code presents the improved figure 5

```

package com.employee.list;

import java.util.Calendar;
import android.app.Activity;
import android.app.DatePickerDialog;
import android.app.Dialog;
import android.os.Bundle;
import android.view.View;
import android.widget.Button;
import android.widget.DatePicker;
import android.widget.TextView;

public class Employee extends Activity {
    private TextView mDateDisplay;
    private Button mPickDate;
    private int mYear;
    private int mMonth;
    private int mDay;

    static final int DATE_DIALOG_ID = 0;
    /** Called when the activity is first created. */
    @Override
    public void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.createemployee01bis);
        // capture our View elements
    }
}

```

```

mDateDisplay = (TextView) findViewById(R.id.dateDisplay);
mPickDate = (Button) findViewById(R.id.pickDate);

// add a click listener to the button
mPickDate.setOnClickListener(new View.OnClickListener() {
    public void onClick(View v) {
        showDialog(DATE_DIALOG_ID);
    }
});

// get the current date
final Calendar c = Calendar.getInstance();
mYear = c.get(Calendar.YEAR);
mMonth = c.get(Calendar.MONTH);
mDay = c.get(Calendar.DAY_OF_MONTH);

// display the current date (this method is below)
updateDisplay();
}
// updates the date in the TextView
private void updateDisplay() {
    mDateDisplay.setText(
        new StringBuilder()
            // Month is 0 based so add 1
            .append(mMonth + 1).append("-")
            .append(mDay).append("-")
            .append(mYear).append(" ");
    }
// the callback received when the user "sets" the date in the dialog
private DatePickerDialog.OnDateSetListener mDateSetListener =
    new DatePickerDialog.OnDateSetListener() {

        public void onDateSet(DatePicker view, int year,
                               int monthOfYear, int dayOfMonth) {
            mYear = year;
            mMonth = monthOfYear;
            mDay = dayOfMonth;
            updateDisplay();
        }
    };
@Override
protected Dialog onCreateDialog(int id) {
    switch (id) {
        case DATE_DIALOG_ID:
            return new DatePickerDialog(this,
                                         mDateSetListener,
                                         mYear, mMonth, mDay);
    }
    return null;
}
}

```

- **XML Code** (In res/layout directory)

```

<?xml version="1.0" encoding="utf-8"?>
<AbsoluteLayout xmlns:android="http://schemas.android.com/apk/res/android"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:orientation="vertical"
    android:background="@drawable/background">

    <!-- Navigation -->
    <AbsoluteLayout android:layout_height="40px"
        android:id="@+id/absoluteLayout1" android:layout_width="fill_parent"
        android:background="@drawable/barnavigation">
        <Button android:layout_width="wrap_content" android:layout_x="8dip"
            android:id="@+id/button01" android:text="Menu" android:layout_y="0dip"
            android:layout_height="40px"></Button>
    </AbsoluteLayout>
</AbsoluteLayout>

```

```

        <ImageView android:layout_height="wrap_content"
android:src="@drawable/employee" android:layout_width="wrap_content"
android:id="@+id/img" android:padding="10px"
android:layout_x="90dip"></ImageView>
        <TextView android:layout_width="wrap_content"
android:layout_x="132dip" android:textColor="#ff000000"
android:id="@+id/titreavigation" android:textSize="18sp"
android:layout_y="8dip" android:text="Employee"
android:layout_height="wrap_content"></TextView>
        <Button android:layout_width="wrap_content"
android:layout_x="249dip" android:id="@+id/button02" android:text="Project"
android:layout_y="0dip" android:layout_height="40px"></Button>

</AbsoluteLayout>
<!-- The content -->
<!-- date picker-Age -->
<TextView android:id="@+id/textView1"
android:layout_width="wrap_content" android:text="Age"
android:textSize="18sp" android:textColor="#ff000000"
android:layout_x="17dip" android:layout_height="wrap_content"
android:layout_y="61dip"></TextView>
        <TextView android:id="@+id/dateDisplay" android:textSize="18sp"
android:layout_width="wrap_content" android:text=""
android:layout_height="wrap_content" android:textColor="#ff000000"
android:layout_x="188dip" android:layout_y="104dip"></TextView>
        <EditText android:id="@+id/editText1" android:textSize="18sp"
android:textColor="#ff000000" android:text="28"
android:layout_width="wrap_content" android:layout_x="12dip"
android:layout_height="wrap_content" android:layout_y="94dip"></EditText>
        <Button android:id="@+id/pickDate" android:text="Date of birth"
android:layout_width="wrap_content" android:layout_height="wrap_content"
android:layout_x="73dip" android:layout_y="94dip"></Button>
        <!-- Fired -->
        <CheckBox android:id="@+id/checkbox1" android:textColor="#ff000000"
android:layout_height="wrap_content" android:layout_width="wrap_content"
android:text="Yes" android:layout_x="24dip"
android:layout_y="198dip"></CheckBox>
        <CheckBox android:id="@+id/checkbox2" android:textColor="#ff000000"
android:layout_height="wrap_content" android:layout_width="wrap_content"
android:text="No" android:layout_x="168dip"
android:layout_y="197dip"></CheckBox>
        <TextView android:id="@+id/textView2"
android:layout_height="wrap_content" android:textSize="18sp"
android:textColor="#ff000000" android:layout_width="wrap_content"
android:text="Fired" android:layout_x="20dip"
android:layout_y="164dip"></TextView>
        <!-- Button for next scenario -->
        <Button android:id="@+id/button1" android:text="Fill Optional
Information" android:layout_width="wrap_content"
android:layout_height="wrap_content" android:layout_x="20dip"
android:layout_y="318dip"></Button>
        <Button android:id="@+id/button2" android:text="Finished"
android:layout_width="wrap_content" android:layout_height="wrap_content"
android:layout_x="216dip" android:layout_y="316dip"></Button>

</AbsoluteLayout>

```

Appendix J: Java-XML Code of the Figure 94

- **Java Code**

```
package com.employee.list;

import android.app.Activity;
import android.os.Bundle;
import android.widget.AdapterView;
import android.widget.AdapterView.OnItemClickListener;
import android.widget.AutoCompleteTextView;

public class Employee extends Activity {
    static final String[] COUNTRIES = new String[] {
        "Afghanistan", "Albania", "Algeria", "American Samoa", "Andorra",
        "Angola", "Anguilla", "Antarctica", "Antigua and Barbuda", "Argentina",
        "Armenia", "Aruba", "Australia", "Austria", "Azerbaijan",
        "Bahrain", "Bangladesh", "Barbados", "Belarus", "Belgium",
        "Belize", "Benin", "Bermuda", "Bhutan", "Bolivia",
        "Bosnia and Herzegovina", "Botswana", "Bouvet Island", "Brazil", "British Indian Ocean Territory",
        "British Virgin Islands", "Brunei", "Bulgaria", "Burkina Faso", "Burundi",
        "Cote d'Ivoire", "Cambodia", "Cameroon", "Canada", "Cape Verde",
        "Cayman Islands", "Central African Republic", "Chad", "Chile", "China",
        "Christmas Island", "Cocos (Keeling) Islands", "Colombia", "Comoros", "Congo",
        "Cook Islands", "Costa Rica", "Croatia", "Cuba", "Cyprus", "Czech Republic",
        "Democratic Republic of the Congo", "Denmark", "Djibouti", "Dominica", "Dominican Republic",
        "East Timor", "Ecuador", "Egypt", "El Salvador", "Equatorial Guinea", "Eritrea",
        "Estonia", "Ethiopia", "Faeroe Islands", "Falkland Islands", "Fiji", "Finland",
        "Former Yugoslav Republic of Macedonia", "France", "French Guiana", "French Polynesia",
        "French Southern Territories", "Gabon", "Georgia", "Germany", "Ghana", "Gibraltar",
        "Greece", "Greenland", "Grenada", "Guadeloupe", "Guam", "Guatemala", "Guinea", "Guinea-Bissau",
        "Guyana", "Haiti", "Heard Island and McDonald Islands", "Honduras", "Hong Kong", "Hungary",
        "Iceland", "India", "Indonesia", "Iran", "Iraq", "Ireland", "Israel", "Italy", "Jamaica",
        "Japan", "Jordan", "Kazakhstan", "Kenya", "Kiribati", "Kuwait", "Kyrgyzstan", "Laos",
        "Latvia", "Lebanon", "Lesotho", "Liberia", "Libya", "Liechtenstein", "Lithuania", "Luxembourg",
        "Macau", "Madagascar", "Malawi", "Malaysia", "Maldives", "Mali", "Malta", "Marshall Islands",
        "Martinique", "Mauritania", "Mauritius", "Mayotte", "Mexico", "Micronesia", "Moldova",
        "Monaco", "Mongolia", "Montserrat", "Morocco", "Mozambique", "Myanmar", "Namibia",
        "Nauru", "Nepal", "Netherlands", "Netherlands Antilles", "New Caledonia", "New Zealand",
        "Nicaragua", "Niger", "Nigeria", "Niue", "Norfolk Island", "North Korea", "Northern Marianas",
        "Norway", "Oman", "Pakistan", "Palau", "Panama", "Papua New Guinea", "Paraguay", "Peru",
        "Philippines", "Pitcairn Islands", "Poland", "Portugal", "Puerto Rico", "Qatar",
        "Reunion", "Romania", "Russia", "Rwanda", "Sao Tome and Principe", "Saint Helena",
        "Saint Kitts and Nevis", "Saint Lucia", "Saint Pierre and Miquelon",
        "Saint Vincent and the Grenadines", "Samoa", "San Marino", "Saudi Arabia", "Senegal",
        "Seychelles", "Sierra Leone", "Singapore", "Slovakia", "Slovenia", "Solomon Islands",
        "Somalia", "South Africa", "South Georgia and the South Sandwich Islands", "South Korea",
        "Spain", "Sri Lanka", "Sudan", "Suriname", "Svalbard and Jan Mayen", "Swaziland", "Sweden",
        "Switzerland", "Syria", "Taiwan", "Tajikistan", "Tanzania", "Thailand", "The Bahamas",
        "The Gambia", "Togo", "Tokelau", "Tonga", "Trinidad and Tobago", "Tunisia", "Turkey",
        "Turkmenistan", "Turks and Caicos Islands", "Tuvalu", "Virgin Islands", "Uganda",
        "Ukraine", "United Arab Emirates", "United Kingdom",
        "United States", "United States Minor Outlying Islands", "Uruguay", "Uzbekistan",
        "Vanuatu", "Vatican City", "Venezuela", "Vietnam", "Wallis and Futuna", "Western Sahara",
        "Yemen", "Yugoslavia", "Zambia", "Zimbabwe"
    };

    /** Called when the activity is first created. */

    @Override
    public void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.createemployee02);

        AutoCompleteTextView textView = (AutoCompleteTextView) findViewById(R.id.autocomplete_country);
        ArrayAdapter<String> adapter = new ArrayAdapter<String>(this, R.layout.listcountry, COUNTRIES);
        textView.setAdapter(adapter);
    }
}
```

- **Code XML** (In res/layout directory)

```

<?xml version="1.0" encoding="utf-8"?>
<AbsoluteLayout
xmlns:android="http://schemas.android.com/apk/res/android"
android:layout_width="fill_parent"
android:layout_height="fill_parent"
android:background="@drawable/background">
>

<!-- Navigation -->
    <AbsoluteLayout android:layout_height="40px"
android:id="@+id/absoluteLayout1" android:layout_width="fill_parent"
android:background="@drawable/barnavigation">
        <Button android:layout_width="wrap_content" android:layout_x="8dip"
android:id="@+id/button01" android:text="Menu" android:layout_y="0dip"
android:layout_height="40px"></Button>
        <ImageView android:layout_height="wrap_content"
android:src="@drawable/employee" android:layout_width="wrap_content"
android:id="@+id/img" android:padding="10px"
android:layout_x="90dip"></ImageView>
        <TextView android:layout_width="wrap_content"
android:layout_x="132dip" android:textColor="#ff000000"
android:id="@+id/titrenavigation" android:textSize="18sp"
android:layout_y="8dip" android:text="Employee"
android:layout_height="wrap_content"></TextView>
        <Button android:layout_width="wrap_content"
android:layout_x="249dip" android:id="@+id/button02" android:text="Project"
android:layout_y="0dip" android:layout_height="40px"></Button>

    </AbsoluteLayout>

<!-- The content -->
    <TextView android:textStyle="bold" android:id="@+id/contactdata"
android:textSize="14sp" android:layout_width="wrap_content"
android:text="Contact Data" android:layout_height="wrap_content"
android:textColor="#ff000000" android:layout_x="126dip"
android:layout_y="57dip"></TextView>
    <EditText android:layout_width="fill_parent" android:textSize="16sp"
android:text="29 Ramon LLul 46020 Valencia" android:layout_height="50px"
android:gravity="top" android:id="@+id/adresstext" android:layout_x="4dip"
android:layout_y="88dip"></EditText>
    <TextView android:text="Adress" android:layout_width="wrap_content"
android:textSize="12sp" android:textStyle="bold" android:id="@+id/adress"
android:layout_height="wrap_content" android:textColor="#ff000000"
android:layout_x="9dip" android:layout_y="69dip"></TextView>
    <TextView android:text="Country" android:layout_width="wrap_content"
android:textSize="12sp" android:textStyle="bold" android:id="@+id/country"
android:layout_height="wrap_content" android:textColor="#ff000000"
android:layout_x="8dip" android:layout_y="157dip"></TextView>
    <AutoCompleteTextView android:layout_width="fill_parent"
android:id="@+id/autocomplete_country" android:textSize="14sp"
android:layout_height="wrap_content" android:text=""
android:layout_x="1dip" android:layout_y="172dip"></AutoCompleteTextView>
    <Button android:layout_width="wrap_content" android:id="@+id/button1"
android:layout_height="wrap_content" android:text="OK"
android:layout_x="129dip" android:layout_y="370dip"></Button>
    <EditText android:layout_width="fill_parent" android:textSize="14sp"
android:text="smith1974@gmail.com" android:layout_height="wrap_content"
android:id="@+id/emailtext2" android:layout_x="0dip"
android:layout_y="314dip"></EditText>
    <EditText android:layout_width="125px" android:textSize="14sp"
android:text="0032478252636" android:layout_height="wrap_content"

```

```
android:id="@+id/telText1" android:layout_x="2dip"
android:layout_y="242dip"></EditText>
    <TextView android:text="Tel" android:layout_width="wrap_content"
android:textSize="12sp" android:textStyle="bold" android:id="@+id/tel"
android:layout_height="wrap_content" android:textColor="#ff000000"
android:layout_x="9dip" android:layout_y="220dip"></TextView>
    <TextView android:text="Email" android:layout_width="wrap_content"
android:textSize="12sp" android:textStyle="bold" android:id="@+id/email"
android:layout_height="wrap_content" android:textColor="#ff000000"
android:layout_x="9dip" android:layout_y="289dip"></TextView>

</AbsoluteLayout>
```



```

        return super.onKeyDown(keyCode, event);
    }

    /**
     * Load up our menu.
     */
    private void loadMenuItems() {
        //This is kind of a tedious way to load up the menu items.
        //Am sure there is room for improvement.
        ArrayList<CustomMenuItem> menuItems = new ArrayList<CustomMenuItem>();
        CustomMenuItem cmi = new CustomMenuItem();
        cmi.setCaption("Delete");
        cmi.setImageResourceId(R.drawable.icon2);
        cmi.setId(MENU_ITEM_1);
        menuItems.add(cmi);
        cmi = new CustomMenuItem();
        cmi.setCaption("Edit");
        cmi.setImageResourceId(R.drawable.icon3);
        cmi.setId(MENU_ITEM_2);
        menuItems.add(cmi);
        if (!mMenu.isShowing())
            try {
                mMenu.setMenuItems(menuItems);
            } catch (Exception e) {
                AlertDialog.Builder alert = new AlertDialog.Builder(this);
                alert.setTitle("Egads!");
                alert.setMessage(e.getMessage());
                alert.show();
            }
    }

    /**
     * Toggle our menu on user pressing the menu key.
     */
    private void doMenu() {
        if (mMenu.isShowing()) {
            //mMenu.hide();
        } else {
            //Note it doesn't matter what widget you send the menu as long as it
            //gets view.
            mMenu.show(findViewById(R.id.any_old_widget));
        }
    }

    /**
     * For the demo just toast the item selected.
     */
    @Override
    public void MenuItemSelectedEvent(CustomMenuItem selection) {
        Toast t = Toast.makeText(this, "You selected item
        #" + Integer.toString(selection.getId()), Toast.LENGTH_SHORT);
        t.setGravity(Gravity.CENTER, 0, 0);
        t.show();
    }

    public void onClick(View v) {
        switch (v.getId()) {
            case R.id.line01:

                Intent intent = new Intent(ProjectIUI.this, ProjectUI01.class);
                startActivity(intent);
            }
    }
}

```

⇒The **bar action** uses this code and is the same for all views

- **Java code**²⁶:

```
package com.MDIU;

public class CustomMenuItem {

    /**
     * Some global variables.
     */
    private String mCaption = null;
    private int mImageResourceId = -1;
    private int mId = -1;

    /**
     * Use this method to set the caption displayed under the icon for a menu item.
     * @param String caption
     * @return void
     */
    public void setCaption(String caption) { mCaption =caption; }

    /**
     * Use this method to get the caption displayed under the icon for a menu item.
     * @return String caption
     */
    public String getCaption() { return mCaption; }

    /**
     * Use this method to set the resource ID for the drawable displayed for a menu item.
     * @param int imageResourceId
     * @return void
     */
    public void setImageResourceId(int imageResourceId) { mImageResourceId =
imageResourceId; }

    /**
     * Use this method to get the resource ID for the drawable displayed for a menu item.
     * @return int imageResourceId
     */
    public int getImageResourceId() { return mImageResourceId; }

    /**
     * Use this method to set an ID to be returned when this menu item is clicked.
     * This is really for convenience only and optional.
     * @param int id
     * @return void
     */
    public void setId(int id) { mId = id; }

    /**
     * Use this method to get an ID assigned to a menu item.
     * This is really for convenience only and optional.
     * @return int id
     */
    public int getId() { return mId; }

}
```

- **Java code**²⁷: (Interaction with the action bar)

²⁶ The bar menu at bottom is written with the help of M.William J Francis

```

package com.MDIU;

import java.util.ArrayList;
import android.content.Context;
import android.view.Display;
import android.view.Gravity;
import android.view.LayoutInflater;
import android.view.View;
import android.view.WindowManager;
import android.view.View.OnClickListener;
import android.view.WindowManager.LayoutParams;
import android.widget.ImageView;
import android.widget.PopupWindow;
import android.widget.TableLayout;
import android.widget.TableRow;
import android.widget.TextView;

public class CustomMenu {

    /**
     * Some global variables.
     */
    private ArrayList<CustomMenuItem> mMenuItems;
    private OnMenuItemSelectedListener mListener = null;
    private Context mContext = null;
    private LayoutInflater mLayoutInflater = null;
    private PopupWindow mPopupWindow = null;
    private boolean mIsShowing = false;
    private boolean mHideOnSelect = true;
    private int mRows = 0;
    private int mItemsPerLineInPortraitOrientation = 1;
    private int mItemsPerLineInLandscapeOrientation = 5;

    /**
     * The interface for returning the item clicked.
     */
    public interface OnMenuItemSelectedListener {
        public void MenuItemSelectedEvent(CustomMenuItem selection);
    }

    /**
     * Use this method to determine if the menu is currently displayed to the user.
     * @return boolean isShowing
     */
    public boolean isShowing() { return mIsShowing; }

    /**
     * This setting controls whether or not the menu closes after an item is selected.
     * @param boolean doHideOnSelect
     * @return void
     */
    public void setHideOnSelect(boolean doHideOnSelect) { mHideOnSelect = doHideOnSelect; }

    /**
     * Use this method to decide how many of your menu items you'd like one a single line.
     * This setting in particular applied to portrait orientation.
     * @param int count
     * @return void
     */
    public void setItemsPerLineInPortraitOrientation(int count) {
mItemsPerLineInPortraitOrientation = count; }

    /**
     * Use this method to decide how many of your menu items you'd like one a single line.
     * This setting in particular applied to landscape orientation.
     * @param int count
     * @return void
     */
    public void setItemsPerLineInLandscapeOrientation(int count) {
mItemsPerLineInLandscapeOrientation = count; }

    /**

```

```

        * Use this method to assign your menu items. You can only call this when the menu is
hidden.
        * @param ArrayList<CustomMenuItem> items
        * @return void
        * @throws Exception "Menu list may not be modified while menu is displayed."
        */
        public synchronized void setMenuItems(ArrayList<CustomMenuItem> items) throws Exception
        {
            if (mIsShowing) {
                throw new Exception("Menu list may not be modified while menu is
displayed.");
            }
            mMenuItems = items;
        }

        /**
        * This is our constructor. Note we require a layout inflater. There is probably a
way to
        * grab one of these from the local context but I failed to find it.
        * @param Context context
        * @param OnMenuItemSelectedListener listener
        * @param LayoutInflater lo
        * @return void
        */
        public CustomMenu(Context context, OnMenuItemSelectedListener listener, LayoutInflater
lo) {
            mListener = listener;
            mMenuItems = new ArrayList<CustomMenuItem>();
            mContext = context;
            mLayoutInflater = lo;
        }

        /**
        * Display your menu. Note we require a view from the parent. This is so we can get
        * a window token. It doesn't matter which view on the parent is passed in.
        * @param View v
        * @return void
        */
        public synchronized void show(View v) {
            mIsShowing = true;
            boolean isLandscape = false;
            int itemCount = mMenuItems.size();
            if (itemCount < 1) return; //no menu items to show
            if (mPopupWindow != null) return; //already showing
            Display display = ((WindowManager)
mContext.getSystemService(Context.WINDOW_SERVICE)).getDefaultDisplay();
            if (display.getWidth() > display.getHeight()) isLandscape = true;
            View mView = mLayoutInflater.inflate(R.layout.custom_menu, null);
            mPopupWindow = new
PopupWindow(mView, LayoutParams.FILL_PARENT, LayoutParams.WRAP_CONTENT, false);
            mPopupWindow.setAnimationStyle(android.R.style.Animation_Dialog);
            mPopupWindow.setWidth(display.getWidth());
            mPopupWindow.showAtLocation(v, Gravity.BOTTOM, 0, 0);

            int divisor = mItemsPerLineInPortraitOrientation;
            if (isLandscape) divisor = mItemsPerLineInLandscapeOrientation;
            int remainder = 0;
            if (itemCount < divisor) {
                mRows = 1;
                remainder = itemCount;
            } else {
                mRows = (itemCount / divisor);
                remainder = itemCount % divisor;
                if (remainder != 0) mRows++;
            }
            TableLayout table = (TableLayout)mView.findViewById(R.id.custom_menu_table);
            table.removeAllViews();
            for (int i=0; i < mRows; i++) {
                TableRow row = null;
                TextView tv = null;
                ImageView iv = null;
                //create headers
                row = new TableRow(mContext);
                row.setLayoutParams(new LayoutParams(LayoutParams.FILL_PARENT,
LayoutParams.WRAP_CONTENT));
                for (int j=0; j< divisor; j++) {
                    if (i*divisor+j >= itemCount) break;

```

```

        final CustomMenuItem cmi = mMenuItems.get(i*divisor+j);
        View itemLayout = mLayoutInflater.inflate(R.layout.custom_menu_item,
null);

        tv = (TextView)itemLayout.findViewById(R.id.custom_menu_item_caption);
        tv.setText(cmi.getCaption());
        iv = (ImageView)itemLayout.findViewById(R.id.custom_menu_item_icon);
        iv.setImageResource(cmi.getImageResourceId());
        itemLayout.setOnClickListener( new OnClickListener() {
            @Override
            public void onClick(View v) {
                mListener.MenuItemSelectedEvent(cmi);
                //if (mHideOnSelect) hide();
            }
        });
        row.addView(itemLayout);
    }
    table.addView(row);
}
}
}
}

```

- **XML Code** (In res/layout directory)

```

<?xml version="1.0" encoding="utf-8"?>
<AbsoluteLayout
xmlns:android="http://schemas.android.com/apk/res/android"
android:layout_width="fill_parent"
android:layout_height="fill_parent" android:background="@drawable/background">
>
<!-- Menu Bottom -->
<TextView
    android:layout_width="fill_parent"
    android:layout_height="wrap_content"
    android:textColor="#ffffff"
    android:textSize="16sp"
    android:textStyle="bold"
    android:padding="8dip"
    android:text="@string/hello"
    android:id="@+id/any_old_widget"/>
<!-- Navigation -->
    <AbsoluteLayout android:layout_height="40px" android:id="@+id/absoluteLayout1"
android:layout_width="fill_parent" android:background="@drawable/barnavigation">

        <Button android:layout_width="wrap_content" android:layout_x="8dip"
android:id="@+id/buttonmenu" android:text="Menu" android:layout_y="0dip"
android:layout_height="40px"></Button>

        <TextView android:layout_height="wrap_content" android:layout_width="wrap_content"
android:id="@+id/titrenavigation" android:textSize="18sp" android:textColor="#ffffff"
android:text="Project" android:layout_x="114dip" android:layout_y="9dip"></TextView>

        <ImageView android:padding="10px" android:src="@drawable/project"
android:layout_height="wrap_content" android:layout_width="wrap_content" android:id="@+id/img"
android:layout_x="64dip" android:layout_y="-1dip"></ImageView>

    </AbsoluteLayout>

    <ImageView android:src="@drawable/bottombar" android:layout_height="wrap_content"
android:layout_width="wrap_content" android:id="@+id/imageView1" android:layout_x="9dip"
android:layout_y="112dip"></ImageView>

    <TableRow android:id="@+id/tableRow1" android:layout_x="-2dip"
android:layout_height="wrap_content" android:layout_width="wrap_content"
android:layout_y="149dip">

        <TextView android:layout_width="wrap_content" android:layout_height="wrap_content"
android:id="@+id/textView2" android:textStyle="bold" android:textSize="16sp"
android:gravity="left" android:textColor="#ff000000" android:text="Name Project :"></TextView>

    </TableRow>

```

```

        <TextView android:layout_height="wrap_content" android:layout_width="wrap_content"
android:id="@+id/textView3" android:text="Strategy product abc" android:textColor="#000000"
android:layout_x="157dip" android:textSize="14sp" android:layout_y="150dip"></TextView>

        <TextView android:layout_height="wrap_content" android:layout_width="wrap_content"
android:id="@+id/TextView01" android:textStyle="bold" android:textSize="16sp"
android:gravity="left" android:textColor="#ff000000" android:text="Creation Date : "
android:layout_x="0dip" android:layout_y="186dip"></TextView>

        <TextView android:layout_height="wrap_content" android:layout_width="wrap_content"
android:id="@+id/textView4" android:text="03/06/2011" android:textColor="#000000"
android:layout_x="157dip" android:layout_y="186dip"></TextView>

        <TextView android:layout_height="wrap_content" android:layout_width="wrap_content"
android:id="@+id/textView01" android:textStyle="bold" android:textSize="16sp"
android:gravity="left" android:textColor="#ff000000" android:text="Status : "
android:layout_x="1dip" android:layout_y="225dip"></TextView>

        <TextView android:layout_height="wrap_content" android:layout_width="wrap_content"
android:id="@+id/TextView01" android:textStyle="bold" android:textSize="16sp"
android:gravity="left" android:textColor="#ff000000" android:text="Detail:"
android:layout_x="0dip" android:layout_y="270dip"></TextView>

        <TextView android:layout_x="157dip" android:id="@+id/textView6" android:text="Decid
the product requirement" android:textColor="#000000" android:singleLine="false"
android:layout_height="wrap_content" android:layout_width="120px"
android:layout_y="270dip"></TextView>

        <Spinner android:prompt="@string/project_prompt"
android:id="@+id/accountcreation/connectspinner" android:layout_height="40px"
android:layout_width="200px" android:layout_x="76dip" android:layout_y="50dip"></Spinner>

        <TextView android:layout_width="wrap_content" android:text="Open"
android:id="@+id/textView5" android:layout_height="wrap_content" android:textColor="#000000"
android:layout_x="157dip" android:layout_y="225dip"></TextView>

        <TextView android:layout_width="wrap_content" android:text="Project"
android:id="@+id/textView1" android:layout_height="wrap_content" android:textSize="18sp"
android:textColor="#ff000000" android:layout_x="8dip" android:layout_y="61dip"></TextView>

</AbsoluteLayout>

```

Appendix L: Java-XML Code of the Figure 97

- **Java code** (for the bar action see the appendix G) :

```
package com.test;

import java.util.ArrayList;
import com.test.CustomMenu.OnMenuItemSelectedListener;
import android.app.Activity;
import android.app.AlertDialog;
import android.content.Intent;
import android.os.Bundle;
import android.view.Gravity;
import android.view.KeyEvent;
import android.view.View;
import android.widget.AdapterView;
import android.widget.AdapterView.OnItemClickListener;
import android.widget.AdapterView.OnItemSelectedListener;
import android.widget.ArrayAdapter;
import android.widget.Spinner;
import android.widget.Toast;

public class ProjectIUI extends Activity implements OnMenuItemSelectedListener {

    /**
     * Some global variables.
     */
    private CustomMenu mMenu;
    public static final int MENU_ITEM_1 = 1;
    public static final int MENU_ITEM_2 = 2;
    public static final int MENU_ITEM_3 = 3;
    public static final int MENU_ITEM_4 = 4;
    public static final int MENU_ITEM_5 = 5;

    /**
     * Always called when an Android activity launches.
     */
    @Override
    public void onCreate(Bundle savedInstanceState) {
        //create the view
        super.onCreate(savedInstanceState);
        setContentView(R.layout.piu01);

        //initialize the menu
        mMenu = new CustomMenu(this, this, getLayoutInflater());
        mMenu.setHideOnSelect(true);
        //define the number of item on horizontal
        mMenu.setItemsPerLineInPortraitOrientation(5);
        mMenu.setItemsPerLineInLandscapeOrientation(8);
        //load the menu items
        loadMenuItems();

        //initialize the spinner
        Spinner spinner = (Spinner) findViewById(R.id.connectspinner);
        ArrayAdapter<CharSequence> adapter = ArrayAdapter.createFromResource(
            this, R.array.ordercriteria_array, android.R.layout.simple_spinner_item);
        adapter.setDropDownViewResource(android.R.layout.simple_spinner_dropdown_item);
        spinner.setAdapter(adapter);
    }

    /**
     * Snarf the menu key.
     */
    public boolean onKeyDown(int keyCode, KeyEvent event) {
        if (keyCode == KeyEvent.KEYCODE_MENU) {
            doMenu();
            return true; //always eat it!
        }
        return super.onKeyDown(keyCode, event);
    }

    /**
     * Load up our menu.
     */
}
```



```

private void loadMenuItems() {
    //This is kind of a tedious way to load up the menu items.
    //Am sure there is room for improvement.
    ArrayList<CustomMenuItem> menuItems = new ArrayList<CustomMenuItem>();
    CustomMenuItem cmi = new CustomMenuItem();

    cmi = new CustomMenuItem();
    cmi.setCaption("Create");
    cmi.setImageResourceId(R.drawable.icon1);
    cmi.setId(MENU_ITEM_1);
    menuItems.add(cmi);
    cmi = new CustomMenuItem();
    cmi.setCaption("Delete");
    cmi.setImageResourceId(R.drawable.icon2);
    cmi.setId(MENU_ITEM_2);
    menuItems.add(cmi);
    cmi = new CustomMenuItem();
    cmi.setCaption("Edit");
    cmi.setImageResourceId(R.drawable.icon3);
    cmi.setId(MENU_ITEM_3);
    menuItems.add(cmi);
    cmi = new CustomMenuItem();
    cmi.setCaption("Join Project");
    cmi.setImageResourceId(R.drawable.icon4);
    cmi.setId(MENU_ITEM_4);
    menuItems.add(cmi);
    cmi = new CustomMenuItem();
    cmi.setCaption("Out Project");
    cmi.setImageResourceId(R.drawable.icon5);
    cmi.setId(MENU_ITEM_5);
    menuItems.add(cmi);
    if (!mMenu.isShowing())
    try {
        mMenu.setMenuItems(menuItems);
    } catch (Exception e) {
        AlertDialog.Builder alert = new AlertDialog.Builder(this);
        alert.setTitle("Egads!");
        alert.setMessage(e.getMessage());
        alert.show();
    }
}

/**
 * Toggle our menu on user pressing the menu key.
 */
private void doMenu() {
    if (mMenu.isShowing()) {
        //mMenu.hide();
    } else {
        //Note it doesn't matter what widget you send the menu as long as it
gets view.
        mMenu.show(findViewById(R.id.any_old_widget));
    }
}

/**
 * For the demo just toast the item selected.
 */
@Override
public void MenuItemSelectedEvent(CustomMenuItem selection) {
    Toast t = Toast.makeText(this, "You selected item
#" + Integer.toString(selection.getId()), Toast.LENGTH_SHORT);
    t.setGravity(Gravity.CENTER, 0, 0);
    t.show();
}

public void onClick(View v) {
    switch (v.getId()) {
    case R.id.line01:

        Intent intent = new Intent(ProjectIUI.this, ProjectUI01.class);
        startActivity(intent);
    }
}

```

- **XML Code** (In res/layout directory)

```
<?xml version="1.0" encoding="utf-8"?>
<AbsoluteLayout
xmlns:android="http://schemas.android.com/apk/res/android"
android:layout_width="fill_parent"
android:layout_height="fill_parent" android:background="@drawable/background">

<!-- Menu Bottom -->
<TextView
    android:layout_width="fill_parent"
    android:layout_height="wrap_content"
    android:textColor="#ffffff"
    android:textSize="16sp"
    android:textStyle="bold"
    android:padding="8dip"
    android:text="@string/hello"
    android:id="@+id/any_old_widget"/>

<AbsoluteLayout android:layout_height="40px" android:id="@+id/absoluteLayout1"
android:layout_width="fill_parent" android:background="@drawable/barnavigation">
    <Button android:layout_width="wrap_content" android:layout_x="8dip"
android:id="@+id/button01" android:text="Menu" android:layout_y="0dip"
android:layout_height="40px"></Button>
    <ImageView android:layout_height="wrap_content" android:src="@drawable/employee"
android:layout_width="wrap_content" android:id="@+id/img" android:padding="10px"
android:layout_x="90dip"></ImageView>
    <TextView android:layout_width="wrap_content" android:layout_x="132dip"
android:textColor="#ffffff" android:id="@+id/titrenavigation" android:textSize="18sp"
android:layout_y="8dip" android:text="Employee"
android:layout_height="wrap_content"></TextView>
    <Button android:layout_width="wrap_content" android:layout_x="249dip"
android:id="@+id/button02" android:text="Project" android:layout_y="0dip"
android:layout_height="40px"></Button>

</AbsoluteLayout>
<TableLayout android:layout_height="wrap_content" android:stretchColumns="*"
android:layout_width="wrap_content" android:id="@+id/tableLayout1" android:layout_y="90dip"
android:layout_x="-2dip">
    <TableRow android:layout_margin="1dp" >
        <TextView android:text="Surname" android:background="#000000"
            android:layout_margin="1dp" android:textSize="16sp" />
        <TextView android:text="Lastname" android:background="#000000"
            android:layout_margin="1dp" android:textSize="16sp"/>
        <TextView android:text="Fired" android:background="#000000"
            android:layout_margin="1dp" android:textSize="16sp" />
    </TableRow>
    <TableRow android:id="@+id/line01" android:layout_margin="1dp"
android:onClick="onClick" android:clickable="true">
        <TextView android:text="Dupuis" android:textColor="#000000"
android:textSize="16sp"
            android:layout_margin="1dp" />
        <TextView android:text="Fantasio" android:textColor="#000000"
android:textSize="16sp"
            android:layout_margin="1dp" />
        <TextView android:text="False" android:textColor="#000000"
android:textSize="16sp"
            android:layout_margin="1dp" />
    </TableRow>
<!-- A space between line -->
    <TableRow android:layout_margin="1dp">
        <TextView android:text="" android:textColor="#000000" android:textSize="8sp"
            android:layout_margin="1dp" />
        <TextView android:text="" android:textColor="#000000" android:textSize="8sp"
            android:layout_margin="1dp" />
        <TextView android:text="" android:textColor="#000000" android:textSize="8sp"
            android:layout_margin="1dp" />
    </TableRow>
<!-- End space between line -->

    <TableRow android:layout_margin="1dp">
        <TextView android:text="Smith" android:textColor="#000000"
android:textSize="16sp"
            android:layout_margin="1dp" />
        <TextView android:text="Gregoir" android:textColor="#000000"
android:textSize="16sp"
            android:layout_margin="1dp" />
    </TableRow>
</TableLayout>
```



```

        <!-- A space between line -->
        <TableRow android:layout_margin="1dp">
            <TextView android:text="" android:textColor="#000000" android:textSize="8sp"
                android:layout_margin="1dp" />
            <TextView android:text="" android:textColor="#000000" android:textSize="8sp"
                android:layout_margin="1dp" />
            <TextView android:text="" android:textColor="#000000" android:textSize="8sp"
                android:layout_margin="1dp" />
        </TableRow>
        <!-- End space between line -->

        <TableRow android:layout_margin="1dp">
            <TextView android:text="Copper" android:textColor="#000000"
android:textSize="16sp"
                android:layout_margin="1dp" />
            <TextView android:text="Sheldon" android:textColor="#000000"
android:textSize="16sp"
                android:layout_margin="1dp" />
            <TextView android:text="False" android:textColor="#000000"
android:textSize="16sp"
                android:layout_margin="1dp" />
        </TableRow>

    </TableLayout>
    <Spinner android:layout_width="wrap_content" android:prompt="@string/ordercriteria_prompt"
        android:id="@+accountcreation/connectspinner" android:layout_x="156dip"
        android:layout_height="wrap_content" android:layout_y="46dip"></Spinner>
    <TextView android:layout_width="wrap_content" android:text="Order Criteria :"
        android:id="@+id/textView1" android:layout_height="wrap_content" android:textSize="18sp"
        android:textColor="#000000" android:layout_x="55dip" android:layout_y="57dip"></TextView>

</AbsoluteLayout>

```

Appendix M: XML Code of the Figure 99

- XML Code for Figure 11a: PIU on Mobile View with checkbox

```
<?xml version="1.0" encoding="utf-8"?>
<AbsoluteLayout
xmlns:android="http://schemas.android.com/apk/res/android"
android:layout_width="fill_parent"
android:layout_height="fill_parent" android:background="@drawable/background">

<!-- Menu Bottom -->
<TextView
    android:layout_width="fill_parent"
    android:layout_height="wrap_content"
    android:textColor="#ffffff"
    android:textSize="16sp"
    android:textStyle="bold"
    android:padding="8dip"
    android:text="@string/hello"
    android:id="@+id/any_old_widget"/>

<AbsoluteLayout android:layout_height="40px" android:id="@+id/absoluteLayout1"
android:layout_width="fill_parent" android:background="@drawable/barnavigation">
    <Button android:layout_width="wrap_content" android:layout_x="8dip"
android:id="@+id/button01" android:text="Menu" android:layout_y="0dip"
android:layout_height="40px"></Button>
    <ImageView android:layout_height="wrap_content" android:src="@drawable/employee"
android:layout_width="wrap_content" android:id="@+id/img" android:padding="10px"
android:layout_x="90dip"></ImageView>
    <TextView android:layout_width="wrap_content" android:layout_x="132dip"
android:textColor="#ffffffff" android:id="@+id/titrenavigation" android:textSize="18sp"
android:layout_y="8dip" android:text="Employee"
android:layout_height="wrap_content"></TextView>
    <Button android:layout_width="wrap_content" android:layout_x="249dip"
android:id="@+id/button02" android:text="Project" android:layout_y="0dip"
android:layout_height="40px"></Button>

</AbsoluteLayout>
<TableLayout android:layout_height="wrap_content" android:stretchColumns="*"
android:layout_width="wrap_content" android:id="@+id/tableLayout1" android:layout_y="90dip"
android:layout_x="-2dip">
    <TableRow android:layout_margin="1dp" >
        <TextView android:text="Surname" android:background="#000000"
            android:layout_margin="1dp" android:textSize="16sp" />
        <TextView android:text="Lastname" android:background="#000000"
            android:layout_margin="1dp" android:textSize="16sp"/>
        <TextView android:text="Fired" android:background="#000000"
            android:layout_margin="1dp" android:textSize="16sp" />
    </TableRow>
    <TableRow android:id="@+id/line01" android:layout_margin="1dp"
android:onClick="onClick" android:clickable="true">
        <TextView android:text="Dupuis" android:textColor="#000000"
android:textSize="16sp"
            android:layout_margin="1dp" />
        <TextView android:text="Fantasio" android:textColor="#000000"
android:textSize="16sp"
            android:layout_margin="1dp" />
        <CheckBox android:text="" android:id="@+id/checkbox01"
android:layout_width="25dip" android:layout_height="25dip"></CheckBox>
    </TableRow>
<!-- A space between line -->
    <TableRow android:layout_margin="1dp">
        <TextView android:text="" android:textColor="#000000" android:textSize="8sp"
            android:layout_margin="1dp" />
        <TextView android:text="" android:textColor="#000000" android:textSize="8sp"
            android:layout_margin="1dp" />
        <TextView android:text="" android:textColor="#000000" android:textSize="8sp"
            android:layout_margin="1dp" />
    </TableRow>
<!-- End space between line -->

    <TableRow android:layout_margin="1dp">
```

```

        <TextView android:text="Smith" android:textColor="#000000"
android:textSize="16sp"
        android:layout_margin="1dp" />
        <TextView android:text="Gregoir" android:textColor="#000000"
android:textSize="16sp"
        android:layout_margin="1dp" />
        <CheckBox android:text="" android:id="@+id/checkBox2"
android:layout_width="wrap_content" android:layout_height="wrap_content" ></CheckBox>
    </TableRow>

    <!-- A space between line -->
    <TableRow android:layout_margin="1dp">
        <TextView android:text="" android:textColor="#000000" android:textSize="8sp"
        android:layout_margin="1dp" />
        <TextView android:text="" android:textColor="#000000" android:textSize="8sp"
        android:layout_margin="1dp" />
        <TextView android:text="" android:textColor="#000000" android:textSize="8sp"
        android:layout_margin="1dp" />
    </TableRow>
    <!-- End space between line -->

    <TableRow android:layout_margin="1dp">
        <TextView android:text="Crew" android:textColor="#000000"
android:textSize="16sp"
        android:layout_margin="1dp" />
        <TextView android:text="Dorothy" android:textColor="#000000"
android:textSize="16sp"
        android:layout_margin="1dp" />
        <CheckBox android:text="" android:id="@+id/checkBox3"
android:layout_width="wrap_content" android:layout_height="wrap_content"></CheckBox>
    </TableRow>

    <!-- A space between line -->
    <TableRow android:layout_margin="1dp">
        <TextView android:text="" android:textColor="#000000" android:textSize="8sp"
        android:layout_margin="1dp" />
        <TextView android:text="" android:textColor="#000000" android:textSize="8sp"
        android:layout_margin="1dp" />
        <TextView android:text="" android:textColor="#000000" android:textSize="8sp"
        android:layout_margin="1dp" />
    </TableRow>
    <!-- End space between line -->

    <TableRow android:layout_margin="1dp">
        <TextView android:text="Smith" android:textColor="#000000"
android:textSize="16sp"
        android:layout_margin="1dp" />
        <TextView android:text="Julien" android:textColor="#000000"
android:textSize="16sp"
        android:layout_margin="1dp" />
        <CheckBox android:text="" android:id="@+id/checkBox3"
android:layout_width="wrap_content" android:layout_height="wrap_content"></CheckBox>
    </TableRow>

    <!-- A space between line -->
    <TableRow android:layout_margin="1dp">
        <TextView android:text="" android:textColor="#000000" android:textSize="8sp"
        android:layout_margin="1dp" />
        <TextView android:text="" android:textColor="#000000" android:textSize="8sp"
        android:layout_margin="1dp" />
    </TableRow>
    <!-- End space between line -->

    <TableRow android:layout_margin="1dp">
        <TextView android:text="Cramer" android:textColor="#000000"
android:textSize="16sp"
        android:layout_margin="1dp" />
        <TextView android:text="Marc" android:textColor="#000000"
android:textSize="16sp"
        android:layout_margin="1dp" />
        <CheckBox android:text="" android:id="@+id/checkBox3"
android:layout_width="wrap_content" android:layout_height="wrap_content"
android:checked="true"></CheckBox>
    </TableRow>

```

```

<!-- A space between line -->
<TableRow android:layout_margin="1dp">
<TextView android:text="" android:textColor="#000000" android:textSize="8sp"
    android:layout_margin="1dp" />
<TextView android:text="" android:textColor="#000000" android:textSize="8sp"
    android:layout_margin="1dp" />
<TextView android:text="" android:textColor="#000000" android:textSize="8sp"
    android:layout_margin="1dp" />
</TableRow>
<!-- End space between line -->

<TableRow android:layout_margin="1dp">
<TextView android:text="Copper" android:textColor="#000000"
android:textSize="16sp"
    android:layout_margin="1dp" />
<TextView android:text="Sheldon" android:textColor="#000000"
android:textSize="16sp"
    android:layout_margin="1dp" />
<CheckBox android:text="" android:id="@+id/checkbox3"
android:layout_width="wrap_content" android:layout_height="wrap_content" ></CheckBox>
</TableRow>

</TableLayout>
<Spinner android:layout_width="wrap_content" android:prompt="@string/ordercriteria_prompt"
android:id="@+id/accountcreation/connectspinner" android:layout_x="156dip"
android:layout_height="wrap_content" android:layout_y="46dip"></Spinner>
<TextView android:layout_width="wrap_content" android:text="Order Criteria :"
android:id="@+id/textView1" android:layout_height="wrap_content" android:textSize="18sp"
android:textColor="#000000" android:layout_x="55dip" android:layout_y="57dip"></TextView>

</AbsoluteLayout>

```

• XML Code for Figure 11b: IU of Employee on Mobile view

```

<AbsoluteLayout
xmlns:android="http://schemas.android.com/apk/res/android"
android:layout_width="fill_parent"
android:layout_height="fill_parent"
android:background="@drawable/background">

<!-- Menu Bottom -->
<TextView
    android:layout_width="fill_parent"
    android:layout_height="wrap_content"
    android:textColor="#ffffff"
    android:textSize="16sp"
    android:textStyle="bold"
    android:padding="8dip"
    android:text="@string/hello"
    android:id="@+id/any_old_widget"/>

<AbsoluteLayout android:layout_height="40px"
android:id="@+id/absoluteLayout1" android:layout_width="fill_parent"
android:background="@drawable/barnavigation">
    <Button android:layout_width="wrap_content" android:layout_x="8dip"
android:id="@+id/button01" android:text="Menu" android:layout_y="0dip"
android:layout_height="40px"></Button>
    <ImageView android:layout_height="wrap_content"
android:src="@drawable/employee" android:layout_width="wrap_content"
android:id="@+id/img" android:padding="10px"
android:layout_x="90dip"></ImageView>

```

```

        <TextView android:layout_width="wrap_content"
android:layout_x="132dip" android:textColor="#ffffffff"
android:id="@+id/titrenavigation" android:textSize="18sp"
android:layout_y="8dip" android:text="Employee"
android:layout_height="wrap_content"></TextView>
        <Button android:layout_width="wrap_content"
android:layout_x="249dip" android:id="@+id/button02" android:text="Project"
android:layout_y="0dip" android:layout_height="40px"></Button>

    </AbsoluteLayout>

    <TableLayout android:layout_height="wrap_content"
android:stretchColumns="*" android:layout_width="wrap_content"
android:id="@+id/tableLayout1" android:layout_y="40dip" android:layout_x="-
2dip">
        <!-- A space between line -->
        <TableRow android:layout_margin="1dp">
            <TextView android:text="" android:textColor="#000000"
android:textSize="8sp"
                android:layout_margin="1dp" />
            <TextView android:text="" android:textColor="#000000"
android:textSize="8sp"
                android:layout_margin="1dp" />
        </TableRow>
        <!-- End space between line -->

        <TableRow android:layout_margin="1dp">
            <TextView android:text="Surname :" android:textColor="#000000"
android:textSize="18sp" android:textStyle="bold"
                android:layout_margin="1dp" />
            <TextView android:text="Smith" android:textColor="#000000"
android:textSize="16sp"
                android:layout_margin="1dp" />
        </TableRow>
        <TableRow android:layout_margin="1dp">
            <TextView android:text="Lastname :"
android:textColor="#000000" android:textSize="18sp"
android:textStyle="bold"
                android:layout_margin="1dp" />
            <TextView android:text="Julien" android:textColor="#000000"
android:textSize="16sp"
                android:layout_margin="1dp" />
        </TableRow>
        <!-- A space between line -->
        <TableRow android:layout_margin="1dp">
            <TextView android:text="" android:textColor="#000000"
android:textSize="8sp"
                android:layout_margin="1dp" />
            <TextView android:text="" android:textColor="#000000"
android:textSize="8sp"
                android:layout_margin="1dp" />
        </TableRow>
        <!-- End space between line -->
        <TableRow android:layout_margin="1dp">
            <TextView android:text="Gender :" android:textColor="#000000"
android:textSize="18sp" android:textStyle="bold"
                android:layout_margin="1dp" />
            <TextView android:text="Male" android:textColor="#000000"
android:textSize="16sp"

```



```

        android:layout_margin="1dp" />
    </TableRow>
    <!-- A space between line -->
    <TableRow android:layout_margin="1dp">
        <TextView android:text="" android:textColor="#000000"
android:textSize="8sp"
        android:layout_margin="1dp" />
        <TextView android:text="" android:textColor="#000000"
android:textSize="8sp"
        android:layout_margin="1dp" />

    </TableRow>
    <!-- End space between line -->
        <TableRow android:layout_margin="1dp">
            <TextView android:text="Fired :" android:textColor="#000000"
android:textSize="18sp" android:textStyle="bold"
            android:layout_margin="1dp" />
            <TextView android:text="False" android:textColor="#000000"
android:textSize="16sp"
            android:layout_margin="1dp" />
        </TableRow>
        <!-- A space between line -->
        <TableRow android:layout_margin="1dp">
            <TextView android:text="" android:textColor="#000000"
android:textSize="8sp"
            android:layout_margin="1dp" />
            <TextView android:text="" android:textColor="#000000"
android:textSize="8sp"
            android:layout_margin="1dp" />

    </TableRow>
    <!-- End space between line -->
        <TableRow android:layout_margin="1dp">
            <TextView android:text="Adress :" android:textColor="#000000"
android:textSize="18sp" android:textStyle="bold"
            android:layout_margin="1dp" />
            <TextView android:text="Main Street 1"
android:textColor="#000000" android:textSize="16sp"
            android:layout_margin="1dp" />
        </TableRow>
        <!-- A space between line -->
        <TableRow android:layout_margin="1dp">
            <TextView android:text="" android:textColor="#000000"
android:textSize="8sp"
            android:layout_margin="1dp" />
            <TextView android:text="" android:textColor="#000000"
android:textSize="8sp"
            android:layout_margin="1dp" />

    </TableRow>
    <!-- End space between line -->
        <TableRow android:layout_margin="1dp">
            <TextView android:text="Country :" android:textColor="#000000"
android:textSize="18sp" android:textStyle="bold"
            android:layout_margin="1dp" />
            <TextView android:text="Belgium" android:textColor="#000000"
android:textSize="16sp"
            android:layout_margin="1dp" />
        </TableRow>
        <!-- A space between line -->
        <TableRow android:layout_margin="1dp">

```

```

        <TextView android:text="" android:textColor="#000000"
android:textSize="8sp"
            android:layout_margin="1dp" />
        <TextView android:text="" android:textColor="#000000"
android:textSize="8sp"
            android:layout_margin="1dp" />

    </TableRow>
    <!-- End space between line -->
    <TableRow android:layout_margin="1dp">
        <TextView android:text="Tel : "
android:textColor="#000000" android:textSize="18sp"
android:textStyle="bold"
            android:layout_margin="1dp" />
        <TextView android:text="032458253695"
android:textColor="#000000" android:textSize="16sp"
            android:layout_margin="1dp" />
    </TableRow>
    <!-- A space between line -->
    <TableRow android:layout_margin="1dp">
        <TextView android:text="" android:textColor="#000000"
android:textSize="8sp"
            android:layout_margin="1dp" />
        <TextView android:text="" android:textColor="#000000"
android:textSize="8sp"
            android:layout_margin="1dp" />

    </TableRow>
    <!-- End space between line -->
    <TableRow android:layout_margin="1dp">
        <TextView android:text="email:" android:textColor="#000000"
android:textSize="18sp" android:textStyle="bold"
            android:layout_margin="1dp" />
        <TextView android:text="smithpaul@gmail.com"
android:textColor="#000000" android:textSize="16sp"
            android:layout_margin="1dp" />
    </TableRow>
</TableLayout>
</AbsoluteLayout>

```

Appendix N : Java-XML Code of the Figure 100

- **Java Code**

```
package com.MDIU;

import android.app.Activity;
import android.app.TabActivity;
import android.content.Intent;
import android.content.res.Resources;
import android.os.Bundle;
import android.widget.TabHost;
import android.widget.TextView;

public class MDIU extends TabActivity {
    /** Called when the activity is first created. */

    public void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.main);

        Resources res = getResources(); // Resource object to get Drawables
        TabHost tabHost = getTabHost(); // The activity TabHost
        TabHost.TabSpec spec; // Reusable TabSpec for each tab
        Intent intent; // Reusable Intent for each tab

        // Create an Intent to launch an Activity for the tab (to be reused)
        intent = new Intent().setClass(this, Project.class);

        // Initialize a TabSpec for each tab and add it to the TabHost
        spec = tabHost.newTabSpec("project").setIndicator("Project",
            res.getDrawable(R.layout.tab_project))
            .setContent(intent);
        tabHost.addTab(spec);

        // Do the same for the other tabs
        intent = new Intent().setClass(this, Employee.class);
        spec = tabHost.newTabSpec("employee").setIndicator("Employee",
            res.getDrawable(R.layout.tab_employee))
            .setContent(intent);
        tabHost.addTab(spec);

        tabHost.setCurrentTab(1);
    }
}
```

- **Java Code of Project Tab:**

```
package com.MDIU;

import java.util.ArrayList;
import com.MDIU.CustomMenu.OnMenuItemSelectedListener;
import android.app.Activity;
import android.app.AlertDialog;
import android.os.Bundle;
import android.view.Gravity;
import android.view.KeyEvent;
import android.widget.ArrayAdapter;
import android.widget.Spinner;
import android.widget.Toast;

public class Project extends Activity implements OnMenuItemSelectedListener {

    /**
     * Some global variables.
     */
    private CustomMenu mMenu;
    public static final int MENU_ITEM_1 = 1;
    public static final int MENU_ITEM_2 = 2;
    public static final int MENU_ITEM_3 = 3;

    public void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);

        setContentView(R.layout.project01);
        Spinner spinner = (Spinner) findViewById(R.id.acountcreation.connectspinner);
        ArrayAdapter<CharSequence> adapter = ArrayAdapter.createFromResource(
            this, R.array.project_array, android.R.layout.simple_spinner_item);
        adapter.setDropDownViewResource(android.R.layout.simple_spinner_dropdown_item);
        spinner.setAdapter(adapter);

        //initialize the menu
        mMenu = new CustomMenu(this, this, getLayoutInflater());
        mMenu.setHideOnSelect(true);
        //define the number of item on horizontal
        mMenu.setItemsPerLineInPortraitOrientation(5);
        mMenu.setItemsPerLineInLandscapeOrientation(8);
        //load the menu items
        loadMenuItems();
    }

    /**
     * Snarf the menu key.
     */
    public boolean onKeyDown(int keyCode, KeyEvent event) {
        if (keyCode == KeyEvent.KEYCODE_MENU) {
            doMenu();
            return true; //always eat it!
        }
        return super.onKeyDown(keyCode, event);
    }

    /**
     * Load up our menu.
     */
    private void loadMenuItems() {
        //This is kind of a tedious way to load up the menu items.
        //Am sure there is room for improvement.
        ArrayList<CustomMenuItem> menuItems = new ArrayList<CustomMenuItem>();
        CustomMenuItem cmi = new CustomMenuItem();
        cmi = new CustomMenuItem();
        cmi.setCaption("Home");
        cmi.setImageResourceId(R.drawable.home);
        cmi.setId(MENU_ITEM_1);
        menuItems.add(cmi);

        cmi = new CustomMenuItem();
    }
}
```

```

        cmi.setCaption("Delete");
        cmi.setImageResource(R.drawable.icon2);
        cmi.setId(MENU_ITEM_2);
        menuItems.add(cmi);

        cmi = new CustomMenuItem();
        cmi.setCaption("Edit");
        cmi.setImageResource(R.drawable.icon3);
        cmi.setId(MENU_ITEM_3);
        menuItems.add(cmi);

        if (!mMenu.isShowing())
        try {
            mMenu.setMenuItems(menuItems);
        } catch (Exception e) {
            AlertDialog.Builder alert = new AlertDialog.Builder(this);
            alert.setTitle("Egads!");
            alert.setMessage(e.getMessage());
            alert.show();
        }
    }

    /**
     * Toggle our menu on user pressing the menu key.
     */
    private void doMenu() {
        if (mMenu.isShowing()) {
            //mMenu.hide();
        } else {
            //Note it doesn't matter what widget you send the menu as long as it
            gets view.
            mMenu.show(findViewById(R.id.any_old_widget));
        }
    }
}

```

- **XML code of Project tab:**
- **XML for the tab**

```

<?xml version="1.0" encoding="utf-8"?>
<selector xmlns:android="http://schemas.android.com/apk/res/android">
    <!-- When selected, use grey -->
    <item android:drawable="@drawable/grey_project"
          android:state_selected="true" />
    <!-- When not selected, use white-->
    <item android:drawable="@drawable/project" />
</selector>

```

-XML of the Project content

```

<?xml version="1.0" encoding="utf-8"?>
<AbsoluteLayout
    xmlns:android="http://schemas.android.com/apk/res/android"
    android:layout_width="fill_parent"
    android:layout_height="fill_parent"
    android:background="@drawable/background">
    <TextView
        android:layout_width="fill_parent"
        android:layout_height="wrap_content"
        android:textColor="#ffffff"
        android:textSize="16sp"
        android:textStyle="bold"
        android:padding="8dip"
        android:text="@string/hello"
        android:id="@+id/any_old_widget"/>

```

```

        <TextView android:layout_height="wrap_content"
android:layout_width="wrap_content" android:id="@+id/textView1"
android:textSize="18sp" android:text="Project:" android:layout_x="5dip"
android:layout_y="5dip" android:textColor="#ff000000"></TextView>
        <ImageView android:src="@drawable/bottombar"
android:layout_height="wrap_content" android:layout_width="wrap_content"
android:id="@+id/imageView1" android:layout_x="9dip"
android:layout_y="45dip"></ImageView>
        <TableRow android:id="@+id/tableRow1" android:layout_x="-2dip"
android:layout_height="wrap_content" android:layout_width="wrap_content"
android:layout_y="149dip">

        </TableRow>
        <TextView android:layout_height="wrap_content"
android:layout_width="wrap_content" android:id="@+id/textView3"
android:text="Strategy product abc" android:textColor="#000000"
android:layout_x="157dip" android:textSize="14sp"
android:layout_y="60dip"></TextView>
        <Spinner android:prompt="@string/project_prompt"
android:id="@+id/acountcreation/connectspinner" android:layout_height="40px"
android:layout_width="200px" android:layout_x="76dip"
android:layout_y="6dip"></Spinner>
        <TextView android:id="@+id/textView4" android:text="03/06/2011"
android:textColor="#000000" android:layout_height="wrap_content"
android:layout_width="wrap_content" android:layout_x="160dip"
android:layout_y="98dip"></TextView>
        <TextView android:id="@+id/textView5" android:text="Open"
android:textColor="#000000" android:layout_height="wrap_content"
android:layout_width="wrap_content" android:layout_x="162dip"
android:layout_y="133dip"></TextView>
        <TextView android:id="@+id/textView6" android:lines="5"
android:gravity="top" android:text="Decid the product requirement"
android:textColor="#000000" android:singleLine="false"
android:layout_height="wrap_content" android:layout_width="120px"
android:layout_x="161dip" android:layout_y="176dip"></TextView>
        <TextView android:id="@+id/textView2" android:textSize="16sp"
android:gravity="left" android:text="Name Project :"
android:textStyle="bold" android:layout_height="wrap_content"
android:layout_width="wrap_content" android:textColor="#ff000000"
android:layout_x="6dip" android:layout_y="61dip"></TextView>
        <TextView android:id="@+id/TextView01" android:textSize="16sp"
android:gravity="left" android:text="Creation Date :"
android:textStyle="bold" android:layout_height="wrap_content"
android:layout_width="wrap_content" android:textColor="#ff000000"
android:layout_x="6dip" android:layout_y="100dip"></TextView>
        <TextView android:id="@+id/TextView01" android:textSize="16sp"
android:gravity="left" android:text="Status :" android:textStyle="bold"
android:layout_height="wrap_content" android:layout_width="wrap_content"
android:textColor="#ff000000" android:layout_x="6dip"
android:layout_y="137dip"></TextView>
        <TextView android:id="@+id/TextView01" android:textSize="16sp"
android:gravity="left" android:text="Detail:" android:textStyle="bold"
android:layout_height="wrap_content" android:layout_width="wrap_content"
android:textColor="#ff000000" android:layout_x="6dip"
android:layout_y="177dip"></TextView>

</AbsoluteLayout>

```

- **Java Code of Employee Tab:**

```
package com.MDIU;

import java.util.ArrayList;
import com.MDIU.CustomMenu.OnMenuItemSelectedListener;
import android.app.Activity;
import android.app.AlertDialog;
import android.content.Intent;
import android.os.Bundle;
import android.view.Gravity;
import android.view.KeyEvent;
import android.view.View;
import android.widget.Toast;

public class Employee extends Activity implements OnMenuItemSelectedListener{

    /**
     * Some global variables.
     */
    private CustomMenu mMenu;
    public static final int MENU_ITEM_1 = 1;
    public static final int MENU_ITEM_2 = 2;
    public static final int MENU_ITEM_3 = 3;
    public static final int MENU_ITEM_4 = 4;
    //public static final int MENU_ITEM_5 = 5;

    /**
     * Always called when an Android activity launches.
     */
    @Override
    public void onCreate(Bundle savedInstanceState) {
        //create the view
        super.onCreate(savedInstanceState);
        setContentView(R.layout.employee01);

        //initialize the menu
        mMenu = new CustomMenu(this, this, getLayoutInflater());
        mMenu.setHideOnSelect(true);
        //define the number of item on horizontal
        mMenu.setItemsPerLineInPortraitOrientation(5);
        mMenu.setItemsPerLineInLandscapeOrientation(8);
        //load the menu items
        loadMenuItems();
    }

    /**
     * Snarf the menu key.
     */
    public boolean onKeyDown(int keyCode, KeyEvent event) {
        if (keyCode == KeyEvent.KEYCODE_MENU) {
            doMenu();
            return true; //always eat it!
        }
        return super.onKeyDown(keyCode, event);
    }

    /**
     * Load up our menu.
     */
    private void loadMenuItems() {
        //This is kind of a tedious way to load up the menu items.
        //Am sure there is room for improvement.
        ArrayList<CustomMenuItem> menuItems = new ArrayList<CustomMenuItem>();
        CustomMenuItem cmi = new CustomMenuItem();

        cmi = new CustomMenuItem();
        cmi.setCaption("Home");
    }
}
```

```

        cmi.setImageResourceId(R.drawable.home);
        cmi.setId(MENU_ITEM_1);
        menuItems.add(cmi);

        cmi = new CustomMenuItem();
        cmi.setCaption("Create");
        cmi.setImageResourceId(R.drawable.icon1);
        cmi.setId(MENU_ITEM_2);
        menuItems.add(cmi);

        cmi = new CustomMenuItem();
        cmi.setCaption("Delete");
        cmi.setImageResourceId(R.drawable.icon2);
        cmi.setId(MENU_ITEM_3);
        menuItems.add(cmi);

        cmi = new CustomMenuItem();
        cmi.setCaption("Edit");
        cmi.setImageResourceId(R.drawable.icon3);
        cmi.setId(MENU_ITEM_4);
        menuItems.add(cmi);

        if (!mMenu.isShowing())
        try {
            mMenu.setMenuItems(menuItems);
        } catch (Exception e) {
            AlertDialog.Builder alert = new AlertDialog.Builder(this);
            alert.setTitle("Egads!");
            alert.setMessage(e.getMessage());
            alert.show();
        }
    }

    /**
     * Toggle our menu on user pressing the menu key.
     */
    private void doMenu() {
        if (mMenu.isShowing()) {
            //mMenu.hide();
        } else {
            //Note it doesn't matter what widget you send the menu as long as it gets view.
            mMenu.show(findViewById(R.id.any_old_widget));
        }
    }

    /**
     * For the demo just toast the item selected.
     */
    @Override
    public void MenuItemSelectedEvent(CustomMenuItem selection) {
        Toast t = Toast.makeText(this, "You selected item
        #" + Integer.toString(selection.getId()), Toast.LENGTH_SHORT);
        t.setGravity(Gravity.CENTER, 0, 0);
        t.show();
    }

    public void onClick(View v) {
        switch (v.getId()) {
            case R.id.line01:

                Intent intent = new Intent(Employee.this, Employee02.class);
                startActivity(intent);
            }
        }
    }
}

```


- **XML Code of Employee Tab**

- XML for the tab

```
<?xml version="1.0" encoding="utf-8"?>
<selector xmlns:android="http://schemas.android.com/apk/res/android">
    <!-- When selected, use grey -->
    <item android:drawable="@drawable/grey_employee"
        android:state_selected="true" />
    <!-- When not selected, use white-->
    <item android:drawable="@drawable/employee" />
</selector>
```

- XML for the content Employee

```
<?xml version="1.0" encoding="utf-8"?>
<AbsoluteLayout
xmlns:android="http://schemas.android.com/apk/res/android"
android:layout_width="fill_parent"
android:layout_height="fill_parent" android:background="@drawable/background">
<TextView
    android:layout_width="fill_parent"
    android:layout_height="wrap_content"
    android:textColor="#ffffff"
    android:textSize="16sp"
    android:textStyle="bold"
    android:padding="8dip"
    android:text="@string/hello"
    android:id="@+id/any_old_widget"/>

<TableLayout android:layout_height="wrap_content" android:stretchColumns="*"
android:layout_width="wrap_content" android:id="@+id/tableLayout1" android:layout_y="2dip"
android:layout_x="-2dip">
    <TableRow android:layout_margin="1dp" >
        <TextView android:text="Surname" android:background="#000000"
            android:layout_margin="1dp" android:textSize="16sp" />
        <TextView android:text="Lastname" android:background="#000000"
            android:layout_margin="1dp" android:textSize="16sp"/>
        <TextView android:text="Fired" android:background="#000000"
            android:layout_margin="1dp" android:textSize="16sp" />
    </TableRow>
    <TableRow android:id="@+id/line01" android:layout_margin="1dp"
android:onClick="onClick" android:clickable="true">
        <TextView android:text="Dupuis" android:textColor="#000000"
android:textSize="16sp"
            android:layout_margin="1dp" />
        <TextView android:text="Fantasio" android:textColor="#000000"
android:textSize="16sp"
            android:layout_margin="1dp" />
        <TextView android:text="False" android:textColor="#000000"
android:textSize="16sp"
            android:layout_margin="1dp" />
    </TableRow>
    <!-- A space between line -->
    <TableRow android:layout_margin="1dp">
        <TextView android:text="" android:textColor="#000000" android:textSize="8sp"
            android:layout_margin="1dp" />
        <TextView android:text="" android:textColor="#000000" android:textSize="8sp"
            android:layout_margin="1dp" />
        <TextView android:text="" android:textColor="#000000" android:textSize="8sp"
            android:layout_margin="1dp" />
    </TableRow>
    <!-- End space between line -->
    <TableRow android:layout_margin="1dp">
        <TextView android:text="Smith" android:textColor="#000000"
android:textSize="16sp"
            android:layout_margin="1dp" />
```

[illegible]

```

<!-- A space between line -->
<TableRow android:layout_margin="1dp">
<TextView android:text="" android:textColor="#000000" android:textSize="8sp"
    android:layout_margin="1dp" />
<TextView android:text="" android:textColor="#000000" android:textSize="8sp"
    android:layout_margin="1dp" />
<TextView android:text="" android:textColor="#000000" android:textSize="8sp"
    android:layout_margin="1dp" />
</TableRow>
<!-- End space between line -->

<TableRow android:layout_margin="1dp">
<TextView android:text="Crum" android:textColor="#000000"
android:textSize="16sp"
    android:layout_margin="1dp" />
<TextView android:text="Leonard" android:textColor="#000000"
android:textSize="16sp"
    android:layout_margin="1dp" />
<TextView android:text="False" android:textColor="#000000"
android:textSize="16sp"
    android:layout_margin="1dp" />
</TableRow>

<!-- A space between line -->
<TableRow android:layout_margin="1dp">
<TextView android:text="" android:textColor="#000000" android:textSize="8sp"
    android:layout_margin="1dp" />
<TextView android:text="" android:textColor="#000000" android:textSize="8sp"
    android:layout_margin="1dp" />
<TextView android:text="" android:textColor="#000000" android:textSize="8sp"
    android:layout_margin="1dp" />
</TableRow>
<!-- End space between line -->

<TableRow android:layout_margin="1dp">
<TextView android:text="Smith" android:textColor="#000000"
android:textSize="16sp"
    android:layout_margin="1dp" />
<TextView android:text="Paul" android:textColor="#000000"
android:textSize="16sp"
    android:layout_margin="1dp" />
<TextView android:text="False" android:textColor="#000000"
android:textSize="16sp"
    android:layout_margin="1dp" />
</TableRow>

<!-- A space between line -->
<TableRow android:layout_margin="1dp">
<TextView android:text="" android:textColor="#000000" android:textSize="8sp"
    android:layout_margin="1dp" />
<TextView android:text="" android:textColor="#000000" android:textSize="8sp"
    android:layout_margin="1dp" />
<TextView android:text="" android:textColor="#000000" android:textSize="8sp"
    android:layout_margin="1dp" />
</TableRow>
<!-- End space between line -->

<TableRow android:layout_margin="1dp">
<TextView android:text="Massy" android:textColor="#000000"
android:textSize="16sp"
    android:layout_margin="1dp" />
<TextView android:text="Vincent" android:textColor="#000000"
android:textSize="16sp"
    android:layout_margin="1dp" />
<TextView android:text="False" android:textColor="#000000"
android:textSize="16sp"
    android:layout_margin="1dp" />
</TableRow>

</TableLayout>
</AbsoluteLayout>

```

