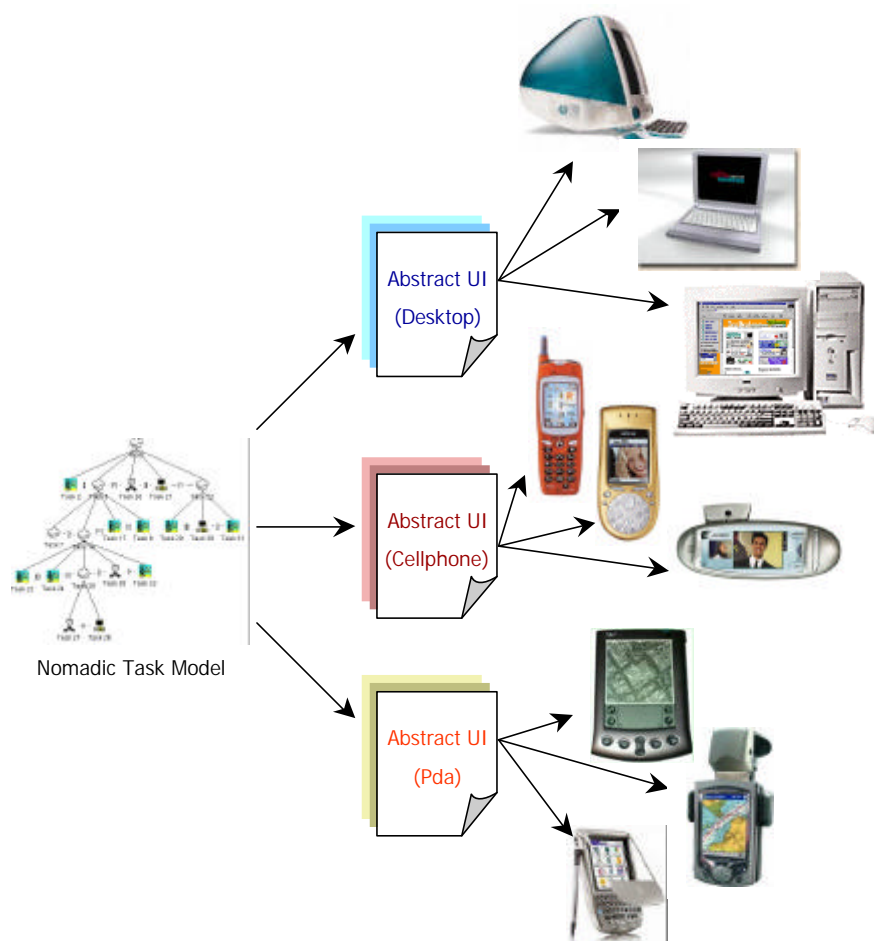


## One Model, Many Interfaces

The advent of the wireless Internet and the rapidly expanding market of smart devices, has made designing interactive applications supporting multiple platforms a thorny issue. On the one hand, the decreasing cost at which the devices are now offered has empowered an increasing variety of people to become potential users of features and services of novel generations of communication technology as never before. Moreover, the ever-spreading use of such devices in nearly every context has also stimulated a growing interest in exploring the unique opportunities offered by multi-modal applications with the aim of providing users with as much flexibility as possible and producing faster and more natural operations. On the other hand, the bad news is that rarely such a high number of flourishing range of opportunities have become effective, due to the low quality of user interfaces provided to the users.



**Figure 1: The main phases of the method underlying TERESA**

The main problem is that numerous assumptions that have been held up to now about classical stationary desktop systems are being challenged when moving towards applications that can be accessed by different users through multiple devices and from different locations. Consequently, one fundamental issue is how to support software designers and developers in building such applications, thereby the unarguable need for novel methods and tools able to support development of interactive software systems able to adapt to different targets while preserving usability has arisen.

The objective of the IST European CAMELEON Project (<http://giove.cnuce.cnr.it/cameleon.html>) is to build methods and environments supporting design and development of highly usable context-sensitive interactive software systems by providing the means to express context-dependent information and developing tools that support the use of the information contained in multiple abstract representations to drive the design and development of highly usable concrete interfaces for multi-context applications.

Under the aegis of this project, the HIIS lab (<http://www.isti.cnr.it/ResearchUnits/Labs/hiis-lab/>), which is the partner coordinator, has developed TERESA, a publicly available tool (<http://giove.cnuce.cnr.it/teresa.html>) supporting the design and development of nomadic applications, which are applications that can be accessed through heterogeneous platforms and from different locations. The method underlying TERESA tool is composed of a number of steps (see Figure 1) that allows designers to start with an envisioned overall task model of a nomadic application and then derive concrete and effective user interfaces for multiple devices through multiple levels of abstractions and related in-between transformations.

A number of main requirements have driven the design and development of TERESA:

- ? *Mixed initiative*: the tool able is to support different level of automations ranging from completely automatic solutions to highly interactive solutions where designers can customise or even radically change the solutions proposed by the tool. This is important for satisfying a variety of needs: situations when the time available is short, the application domain is rather narrow, or the designer has no expertise call for completely automatic solutions. When designers are expert or the application domain is either broad or has specific aspects, then more interactive environments are useful because they allow the designer to directly make important design decisions.
- ? *Model-based*, because the variety of platforms increasingly available can be better handled through multiple abstractions that allow designers to have a logical view of the activities to support.
- ? *XML-based*, XML-based languages have been proposed for every type of domain. In the field of interactive systems there have been a few proposals that partially capture the key aspects to be addressed.
- ? *Top-down*, this approach is an example of forward engineering. Various abstraction levels are considered, and we support cases when designers have to start from scratch. So, they first have to create more logical descriptions, and then move on to more concrete representations until they reach the final system.
- ? *Different entry-points*, our approach aims to be comprehensive and to support the entire task/platform taxonomy. However, there can be cases where only a part of it needs to be supported. For example, when only different devices (such as different brands of mobile phone) referring to the same type of platform are considered. In this case, there is no need for a nomadic task model, given that only one type of platform is involved.
- ? *Web-oriented*, due to the spreading use of the web, we decided that in order to be general Web applications had to be our first target.

This approach has been applied to the development of a number of nomadic applications and has emerged as a promising and effective solution for addressing the problem of generating UIs for heterogeneous devices, capable of providing usable multimedia interfaces for a broader set of mobile devices, including vocal interaction techniques.

