



Towards a Universal Declarative User Interface Definition Language

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Relevant Active EU Projects

- **ServFace** (<http://www.servface.eu/>) aims to create a **model-driven service engineering methodology** for
 - the design of user interfaces for applications based on web services (primary goal); and
 - the composition and integration of user interfaces for applications based on web-services (secondary goal)
- **OPEN** (<http://www.ict-open.eu/>) aims to deliver seamless and transparent support to users in carrying out their tasks when changing services and/or devices, even in multi-user applications
 - **Migration = Device Change + Adaptation + Continuity**



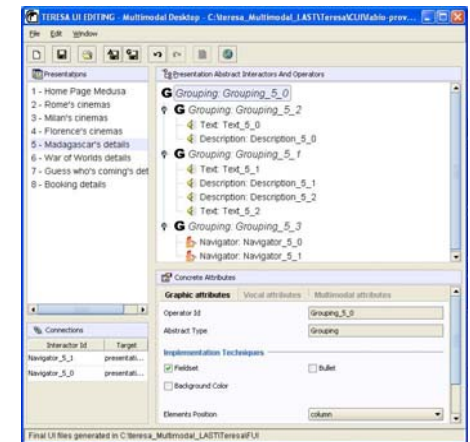
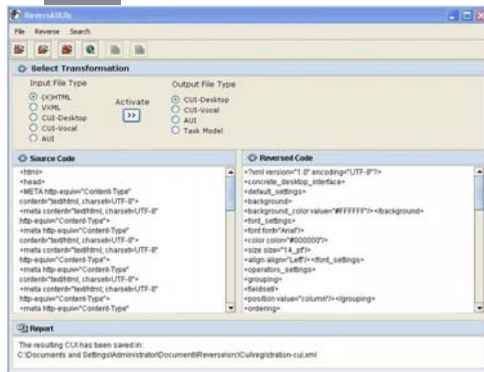
W3C Current Initiatives

- W3C Ubiquitous Web Applications
<http://www.w3.org/2007/uwa/>
- New W3C Group
<http://www.w3.org/2005/Incubator/model-based-ui/charter/>

Abstraction Levels and Transformations

Reverse

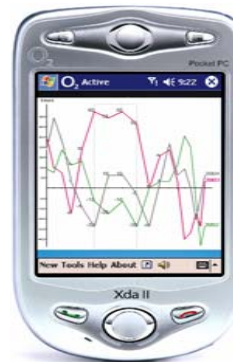
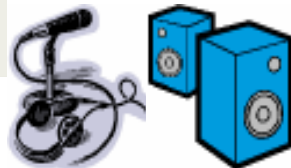
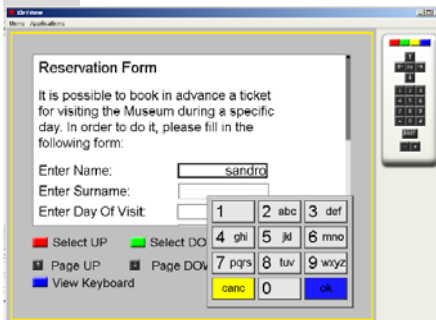
Forward



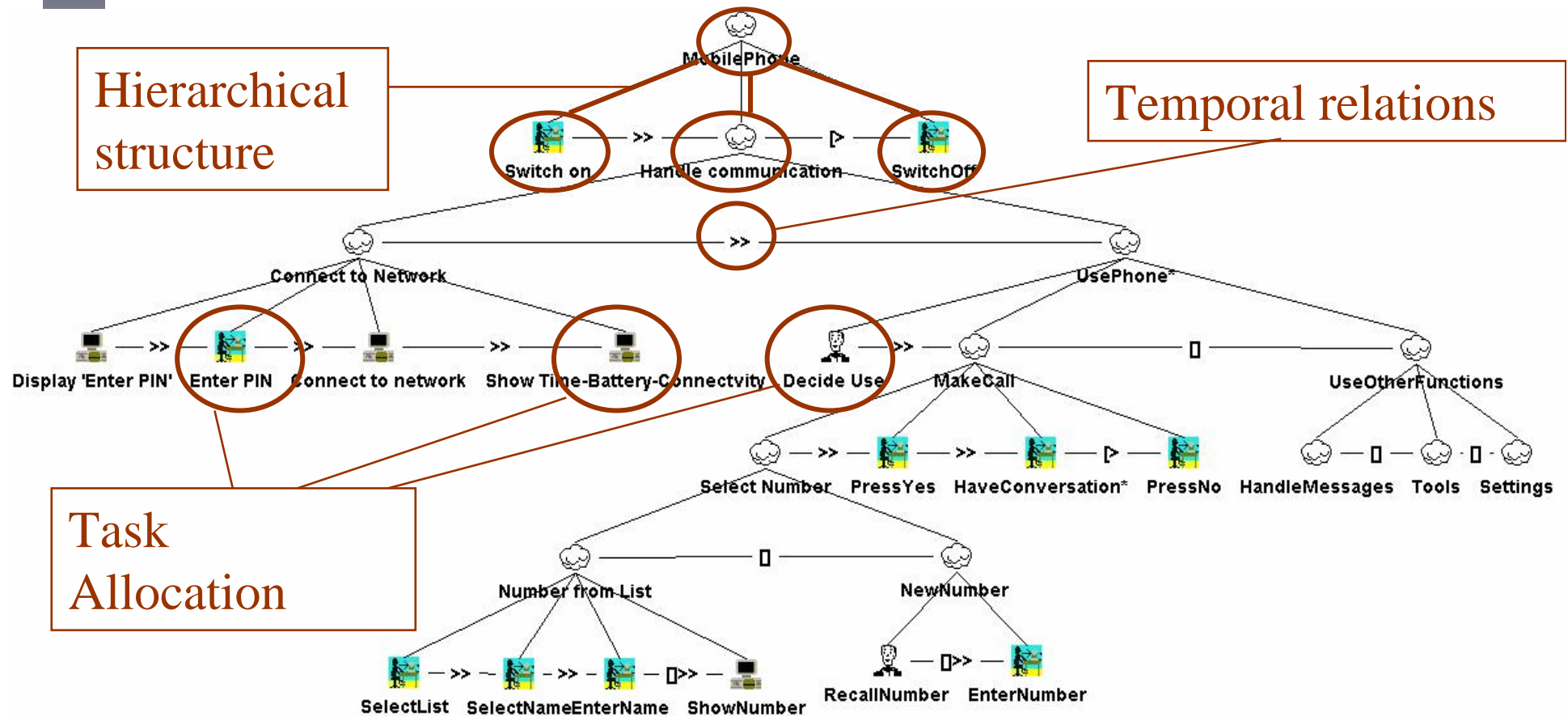
Task and Object

Abstract Interface

Concrete Interface



The ConcurTaskTrees Notation for Task Models





ConcurTaskTrees

- Publicly available tool at giove.isti.cnr.it/ctte.html (7000 downloads)
- CTT has become a defacto standard for task modelling, and has been widely used at the international level in various universities and companies
- We will propose to make it a W3C standard in the activities of the new W3C group of model-based userinterfaces



XForms

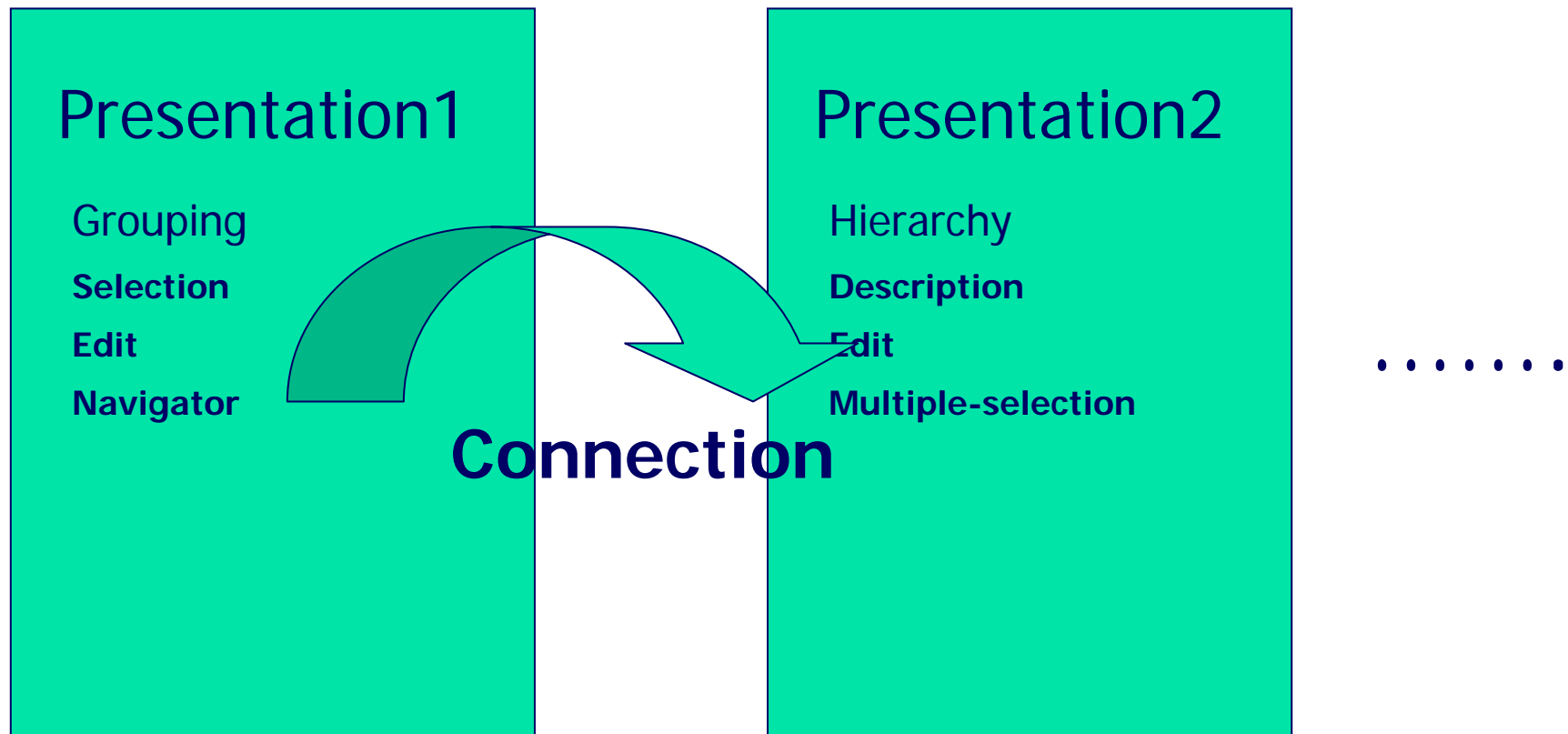
- XForms represents an example of how the research in model-based approaches has been incorporated into an industrial standard.
- In the same notation both abstract and concrete descriptions are included (vocabulary and constructs in abstract terms, and then presentation attributes and data types are described in concrete terms).
- However, (as its name indicates!) only the form-based interaction style for desktop and mobile devices are supported through the appearance attribute.
- This means that the notation is unsuitable to address other interaction modalities (such as vocal or gestural interaction).

TERESA XML

- Two platform-independent languages : task (CTT) and abstract interface
- One level (concrete interface) represented through a number of platform dependent languages
- Designers aware of the potential platforms (not devices) early on in the design process
- Method allows developers to avoid dealing with a plethora of low-level details (transformation from concrete description to implementation is automatic)
- Easy to add support for new implementation languages

The Structure of the Abstract User Interface

User Interface



The Authoring Environment

giove.isti.cnr.it/teresa.html

The screenshot shows the TERESA UI EDITING application window. The interface is divided into several panes:

- Presentations List:** A list on the left side containing 8 items: 1 - Home Page Medusa, 2 - Rome's cinemas, 3 - Milan's cinemas, 4 - Florence's cinemas, 5 - Madagascar's details, 6 - War of Worlds details, 7 - Guess who's coming's det, 8 - Booking details.
- Connections List:** A table at the bottom left showing interactor connections.
- Presentation Abstract Interactors And Operators:** A tree view on the right showing a hierarchy of groupings and their children (Text, Description, Navigator).
- Concrete Attributes:** A panel at the bottom right showing attributes for the selected element, including Operator Id, Abstract Type, Implementation Techniques, and Elements Position.

Annotations with arrows point to these specific areas:

- Presentations List:** A blue arrow points from the text "Presentations List" to the list of presentations.
- Connections List:** A red arrow points from the text "Connections List" to the table of interactor connections.
- Presentation Abstract Description:** A green arrow points from the text "Presentation Abstract Description" to the tree view of abstract interactors.
- Element Concrete Description:** A pink arrow points from the text "Element Concrete Description" to the concrete attributes panel.

Interactor Id	Target
Navigator_5_1	presentati...
Navigator_5_0	presentati...

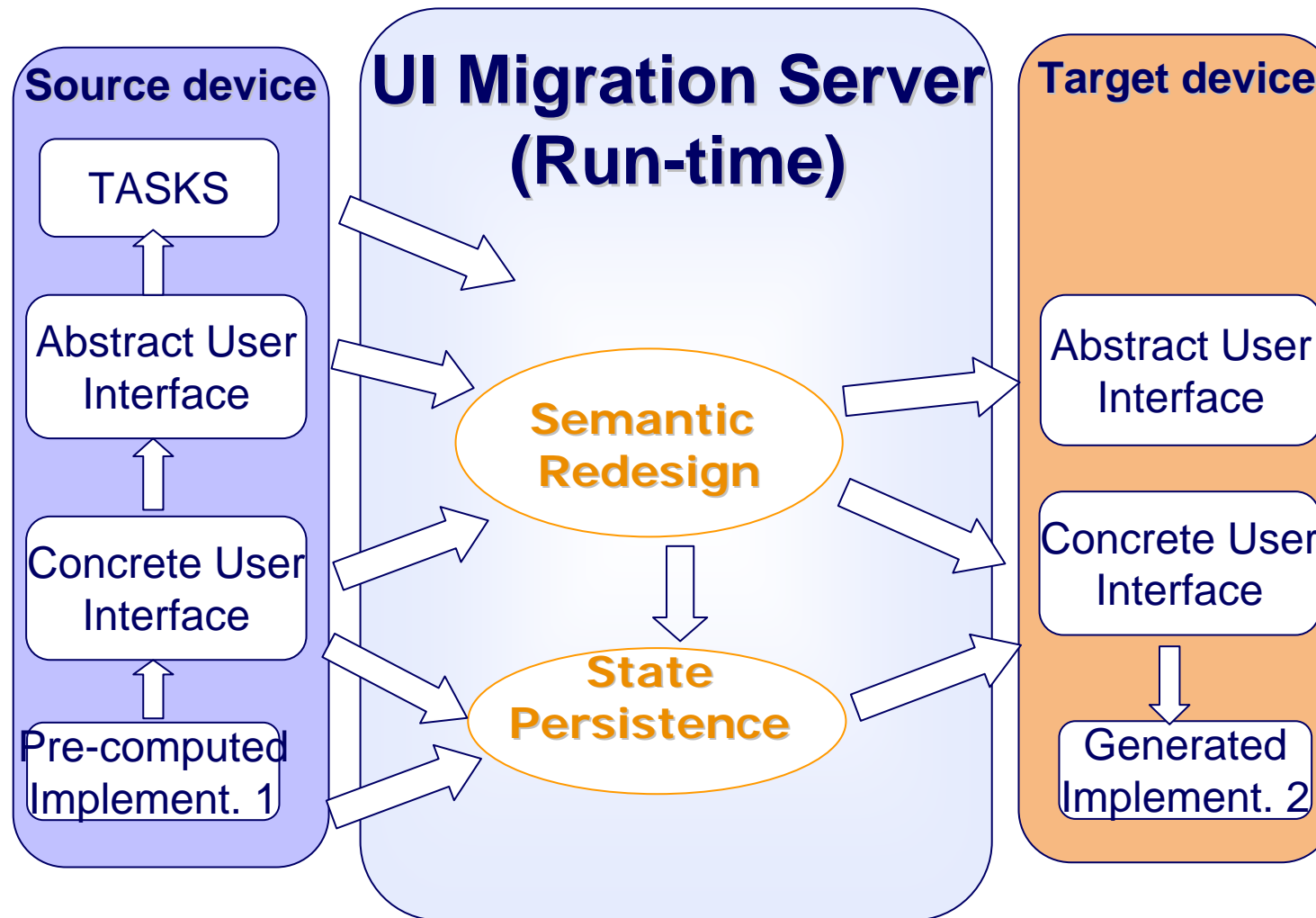


TERESA XML

- Support for various platforms:
 - Form-based desktop/mobile (XHTML/MP XHTML+Javascript)
 - Direct manipulation desktop/mobile (SVG/HTML javascript)
 - Digital TV (Java Xlets)
 - Vocal (VoiceXML)
 - Multimodal (X+V)
 - Tilt +Graphics (C# + tilt libraries)

OPEN Project

Migratory Interactive Services



Towards a Universal Declarative User Interface Definition Language



MARIA XML

- New language based on TERESA experience
- Support for Abstract Data Types
- Support for complex events processing
- Able to generate user interfaces including complex Javascripts and Ajax scripts
- More engineered and powerful language (for complex domains such as games and business applications)



MARIA Authoring Tool

- New Authoring Environment
 - Integrated Support for Web Services
 - Mappings WSDL/Logical user interfaces
 - Generation/Refinement
 - Not only traditional top-down approaches
 - Transformations not hard-coded but defined externally and performed with XSLT
 - Integration of BPMN/BPEL with Model-based UIs.



Research Agenda

- End-User Development
 - Web 2.0 mainly limited to user-generated content
 - The border between use, design and development is not rigid
 - People need to focus on the relevant concepts without being confused by low-level details
 - Trade-off between expressiveness and usability depending on the actual user
- Multi-User Interfaces and Social Aspects
 - Flexible Coordination Mechanisms
 - Applications able to exploit various personal sensors
- Natural Interaction
 - Incremental formalization, e.g. through sketching, programming-by-example, use of natural language (also with vocal or multimodal interfaces)
 - Application and extension of innovative interaction techniques (semantic feedback, two-hand interactions, tangible interfaces ...)