Migrating Web Applications through Declarative Models

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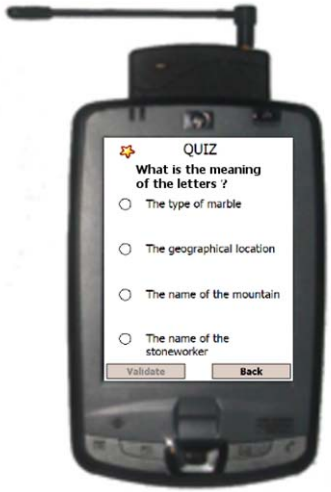
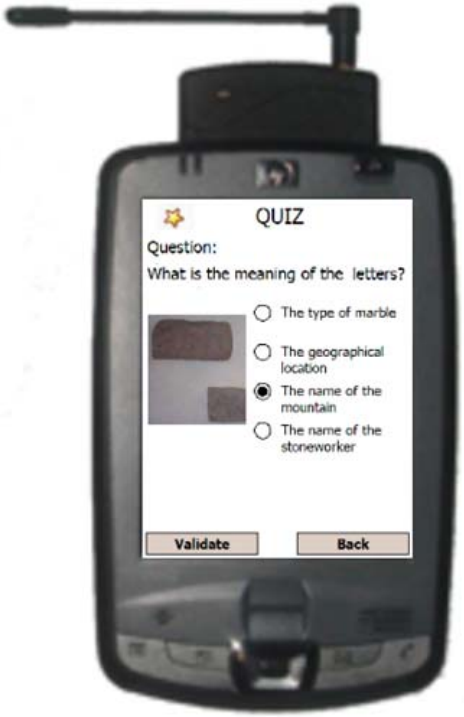
Why Migratory Interfaces?

- Our life is becoming a multi-device experience
- One of the main source of frustration is that we need to restart for each device change
- Need for continuous access to interactive services
- Application domains such as shopping, bids for online auctions, games, making reservations

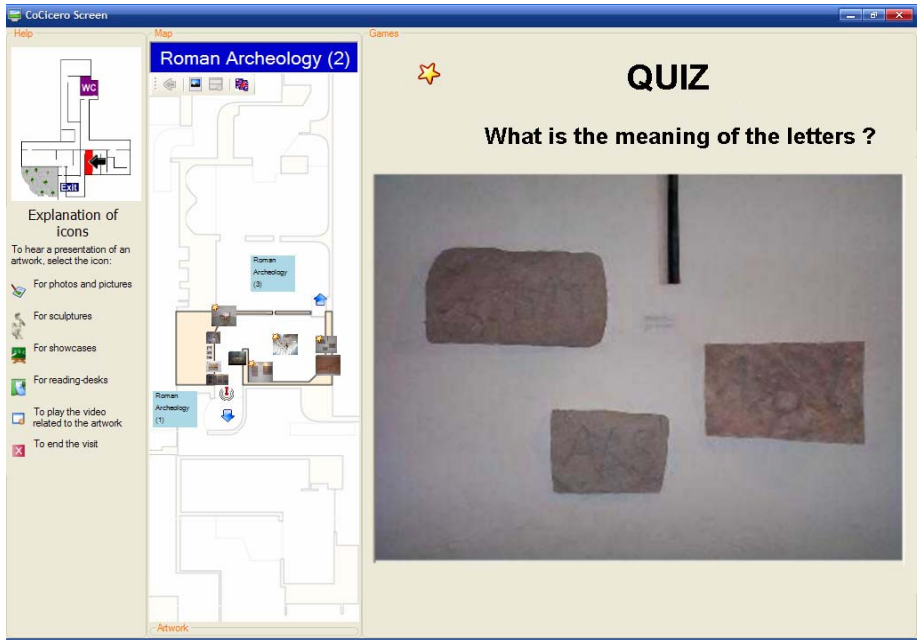
Migration Types

- Total, Partial, Distributing, Aggregating, Multiple



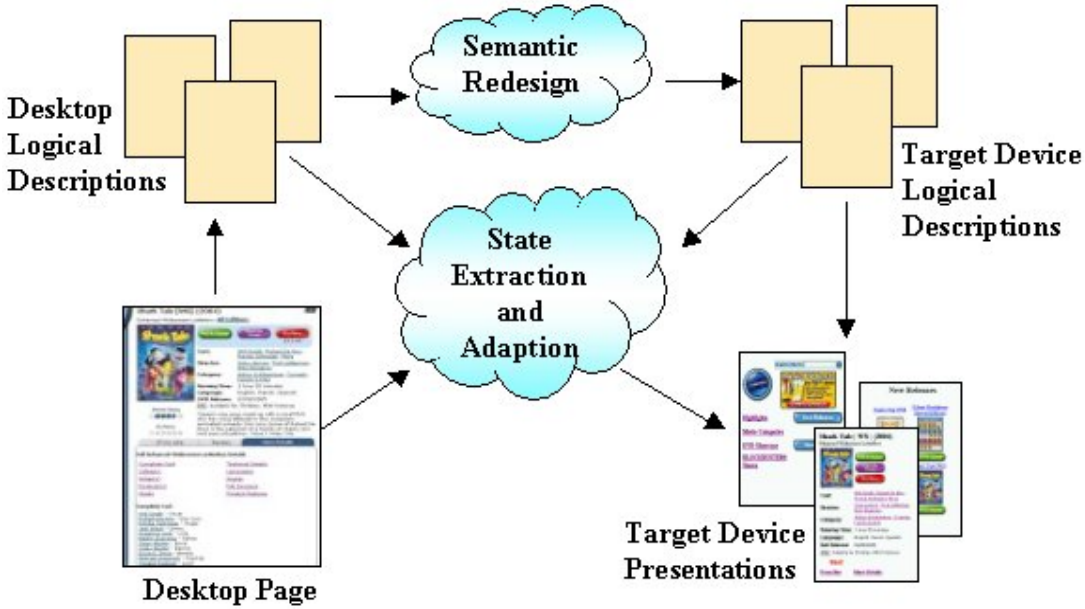


Migration



Our Approach to Migration

- Device Discovery (client application)
- Migration Trigger and Target Identification
- Reverse Engineering/Semantic Redesign
- State extraction, adaptation and association
- Run-time Interface Generation and Activation

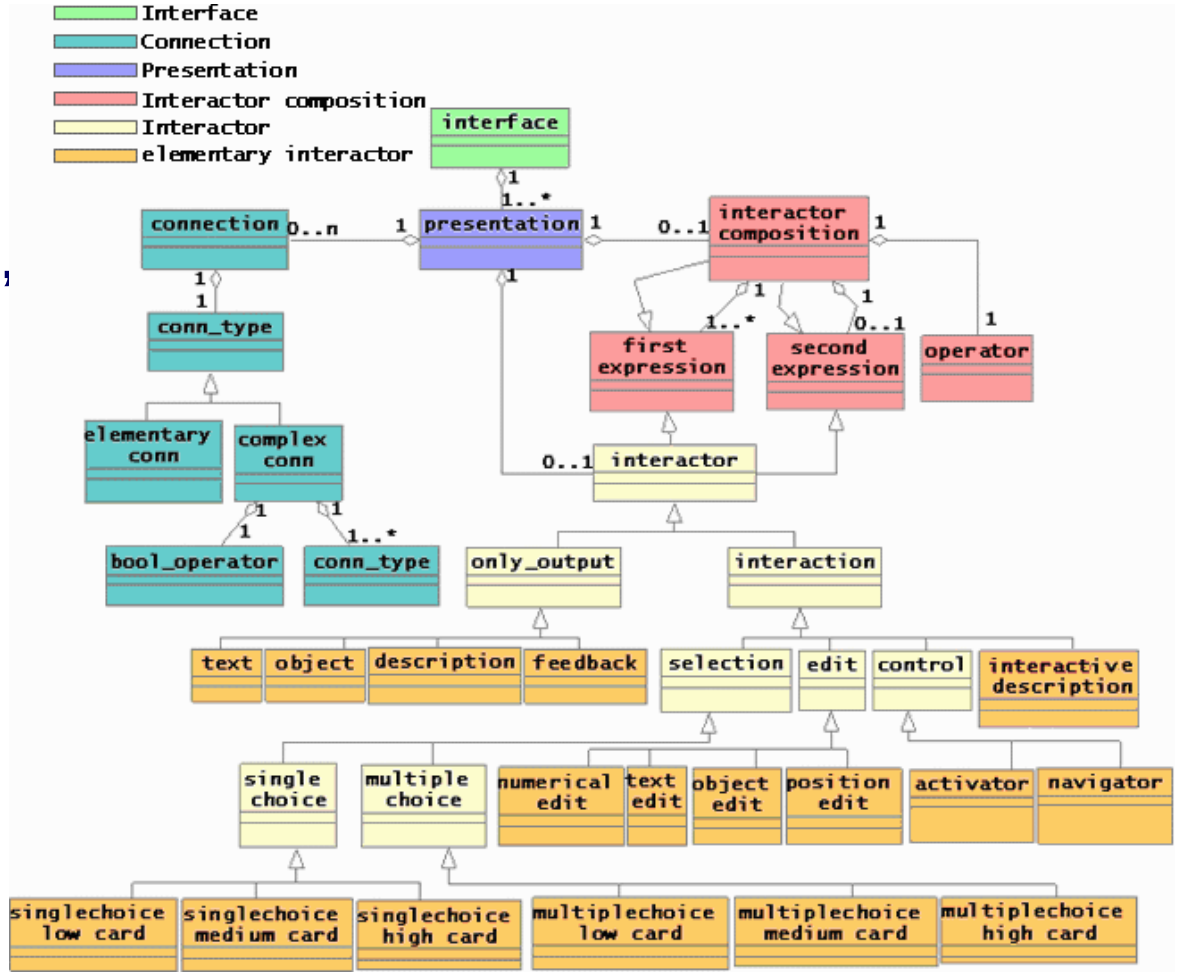


Semantic Descriptions for Interactive Systems

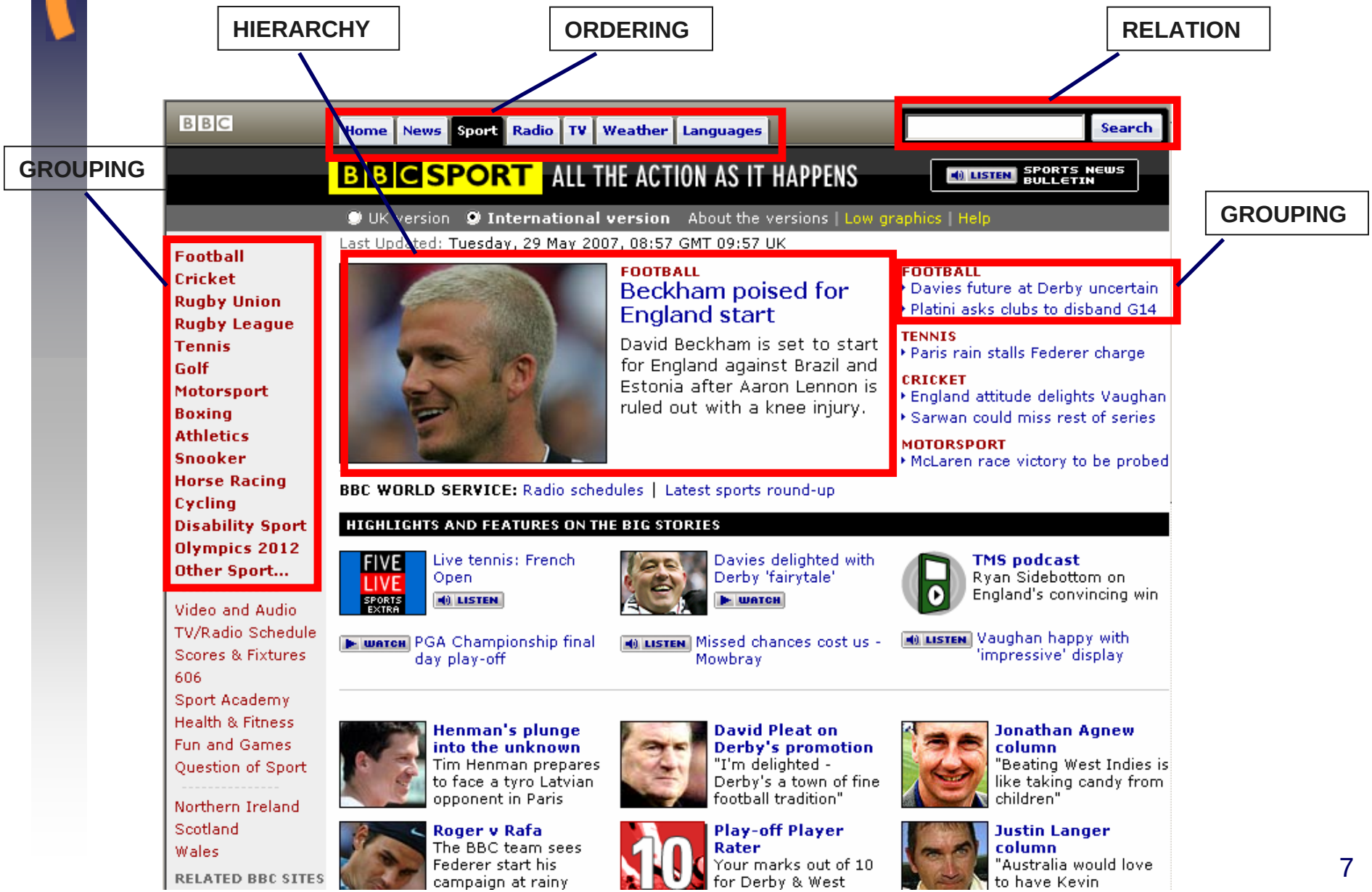
- Task and object
  - – *I want to select a work of art*
- Abstract Interface – platform independent
  - – *Single selection object with high cardinality*
- Concrete Interface – platform dependent
  - – *List Interaction object with X elements*
- Interface Implementation
  - – *List object in Java or XHTML or ….*
- *TERESA XML*

The Structure of the Abstract User Interface

- Language platform-independent
- Interactors (selection, navigator, activator, ...)
- Communication-oriented composition operators
- Connections among presentations



Composition operators

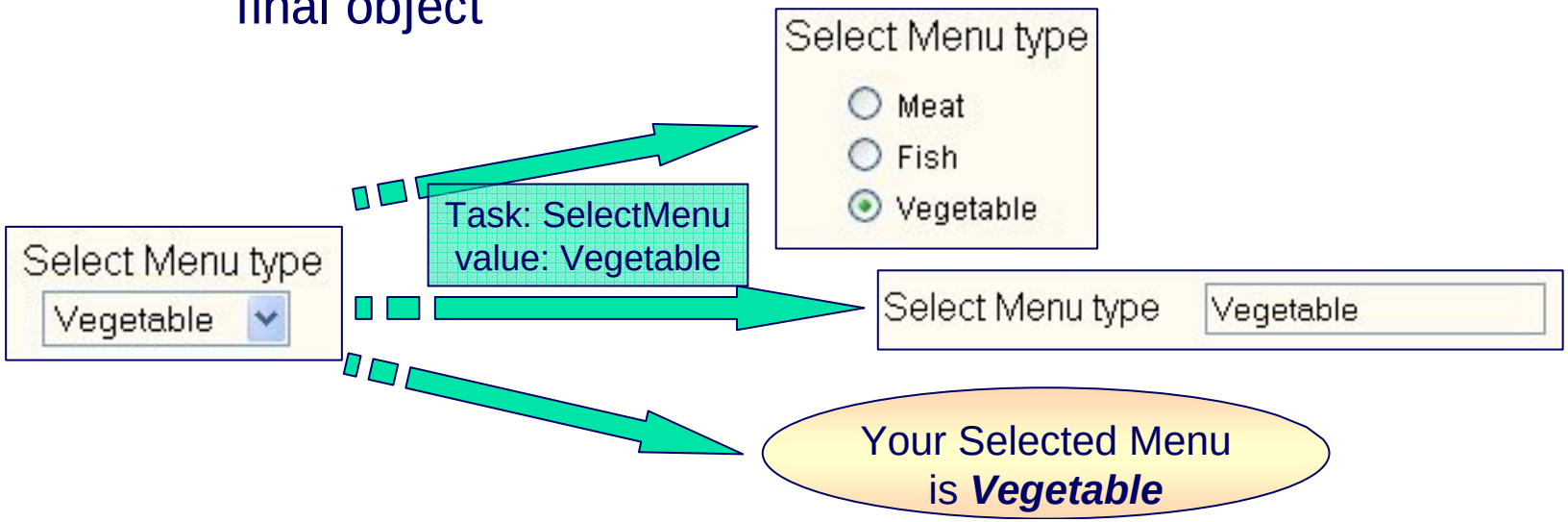


Reverse Engineering

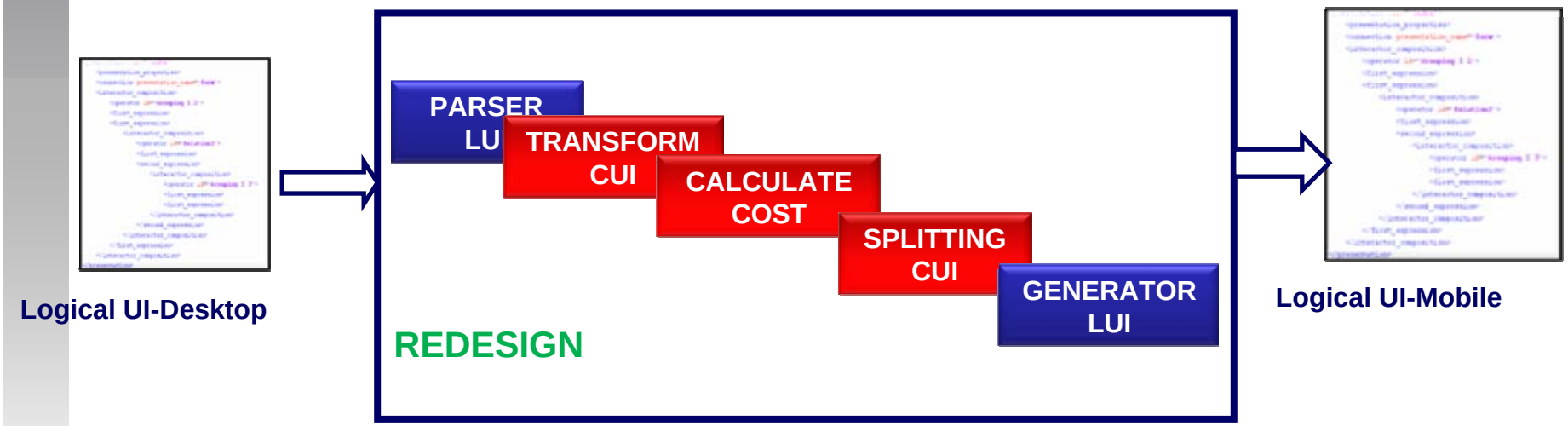
- Filtering out elements that cannot be reversed
- From XHTML/CSS to Concrete User Interface through recursive analysis of the DOM
- From Concrete to Abstract User Interface
- From Abstract User Interface to Task identifier

Support for task continuity

- Collection of the user interface state in the client side of source device through JavaScript inserted by the proxy server
- For each basic task also supported in the target device
  - Adapt and apply the state to the corresponding target final object



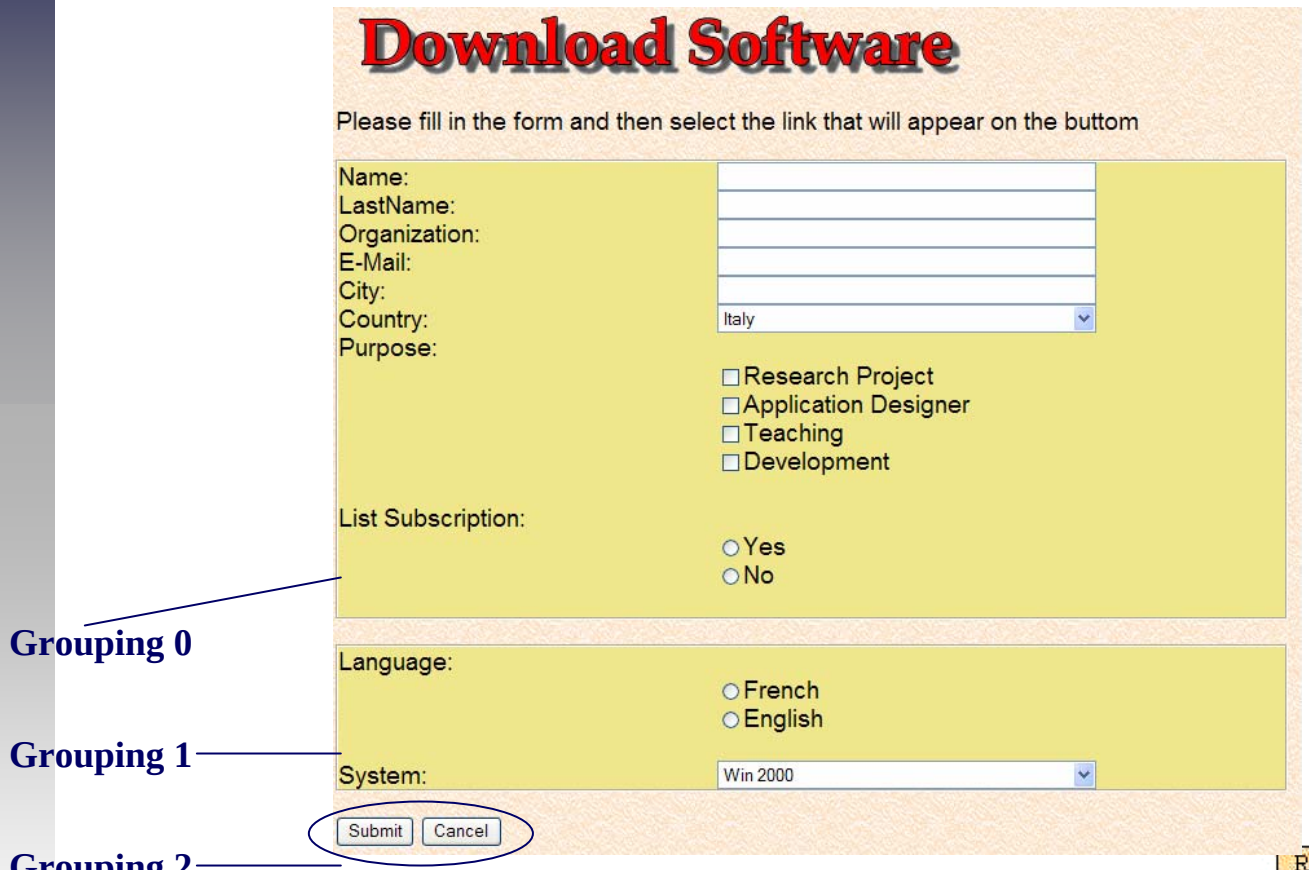
Semantic Redesign

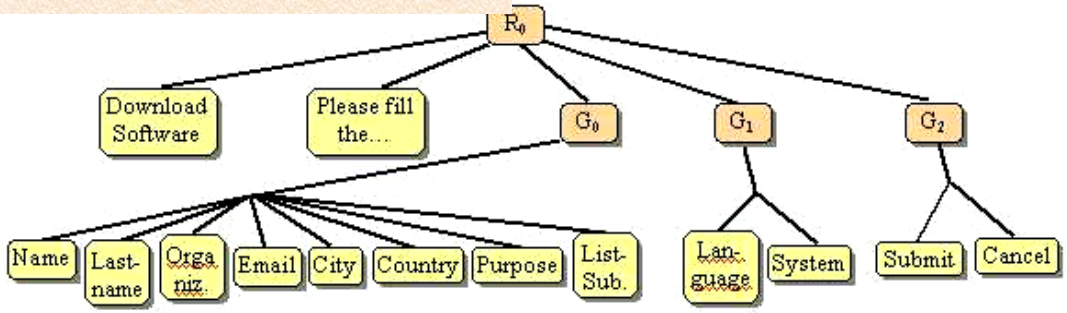


Support for Desktop-to-Mobile Redesign

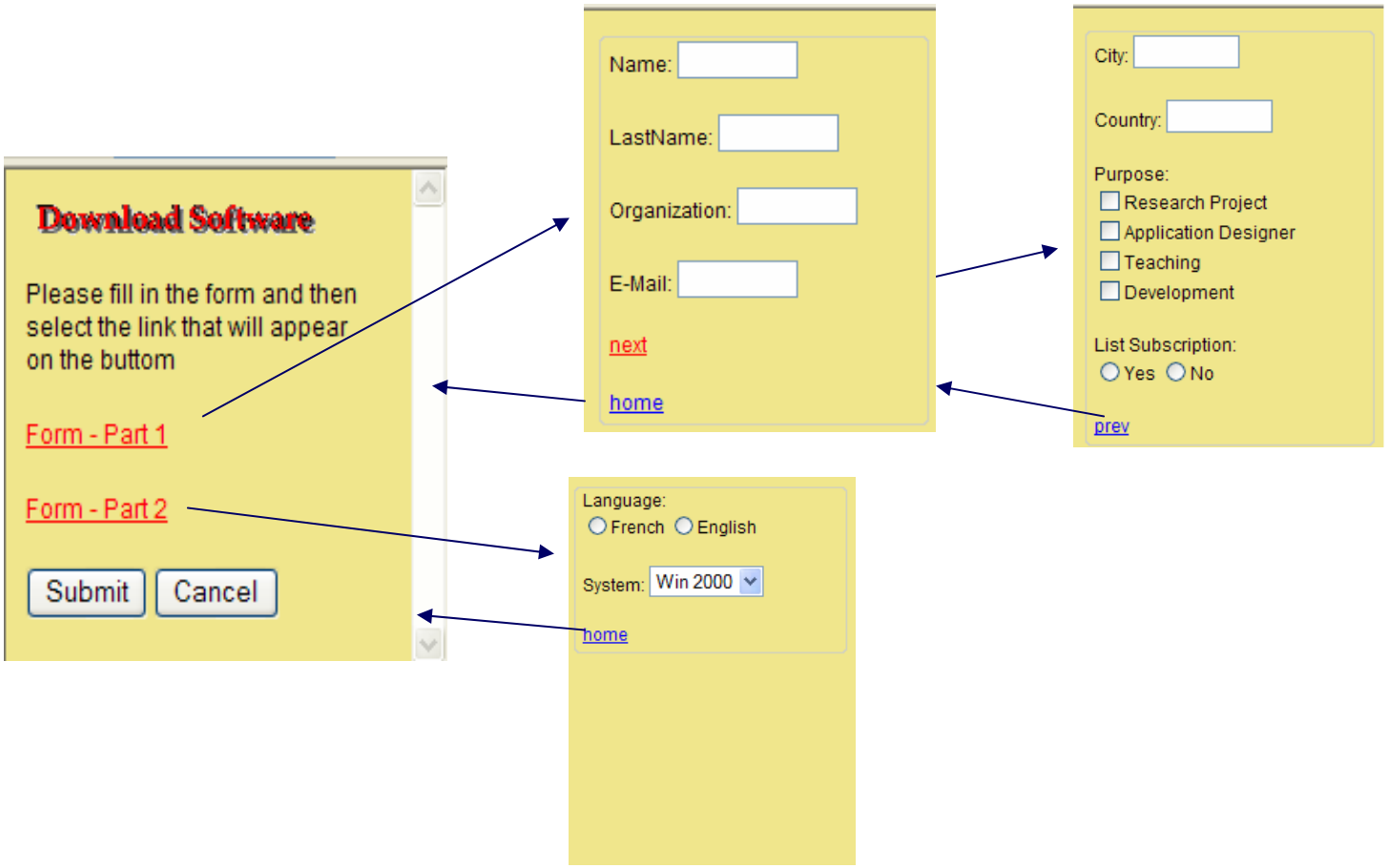
- Page splitting based on the cost of composition operators and interactors
- Connections: original ones + those derived from page splitting
- Images: resize depending on target device keeping the same aspect ratio
- Tables for converting terms and labels

From Desktop to Cell-phone

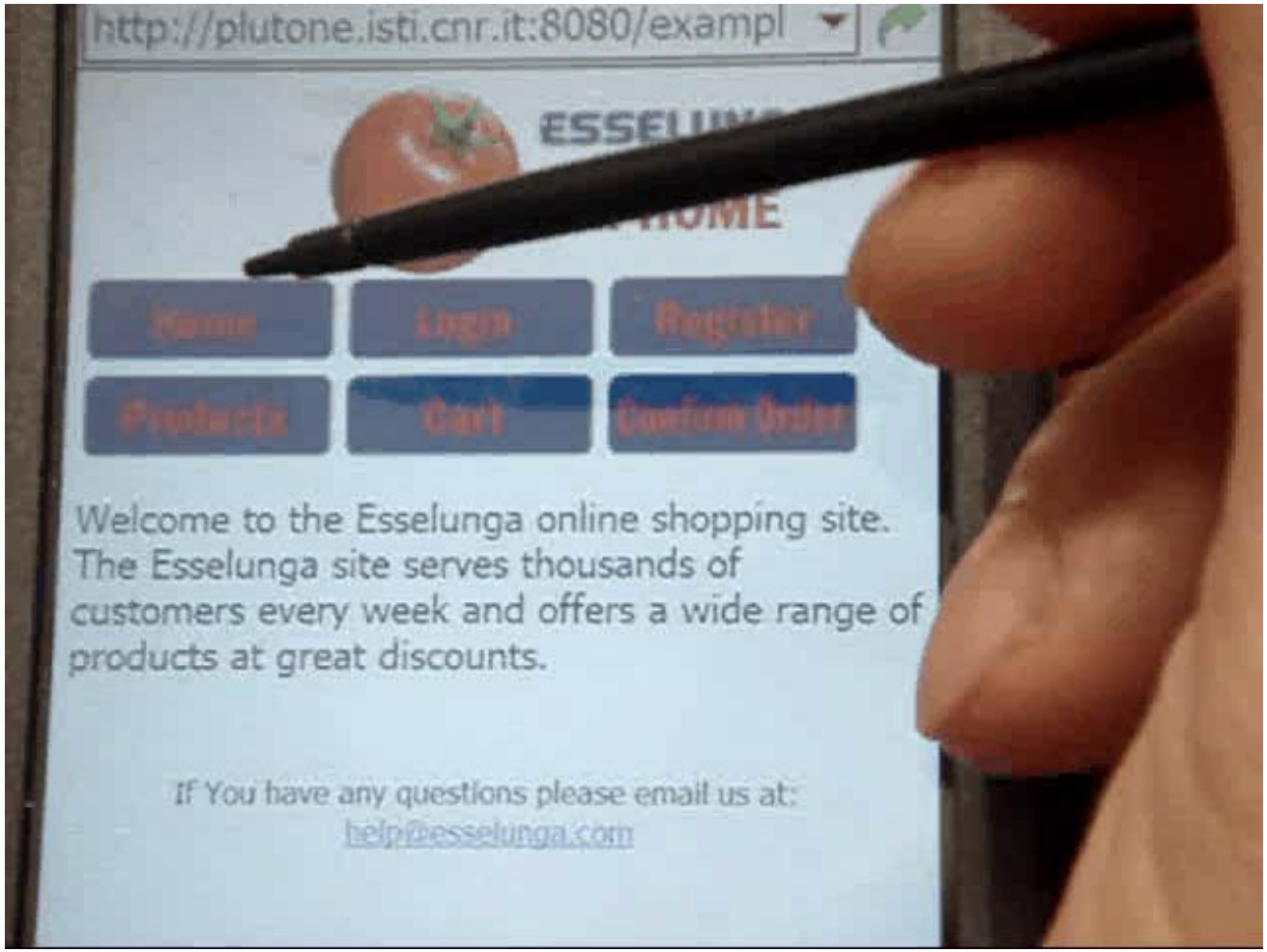




From Desktop to Cell-phone

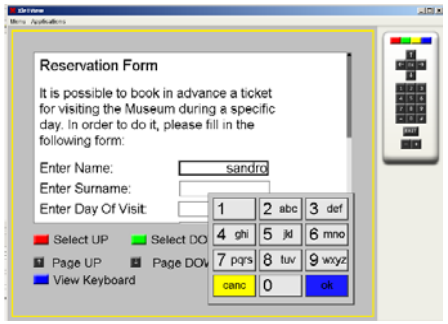


Example Migration (Video)

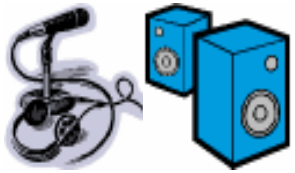


Transformations

http://giove.isti.cnr.it/teresa.html



Digital TV (Java)



Vocal interfaces (VoiceXML)

Direct Manipulation XHTML/SVG

Migration Platform

Mobile XHTML MP

Graphical+Gesture C#

Form-based XHTML

Graphical+Vocal X+V

Conclusions and Future Work

- Migration between multiple devices can improve user experience at home and on the move
- Support for generation of new implementation languages from TERESA XML such as XForms, SMIL
- Extension of the approach to distributing migration