The universAAL UI Framework

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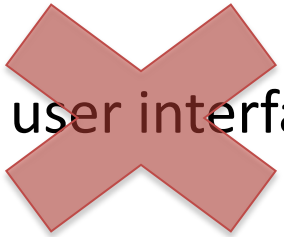
Note

the abbreviation “UI” throughout this presentation stands for

User Interaction



Outline

- Rationale behind the universAAL Approach
- The universAAL Approach
- Resources

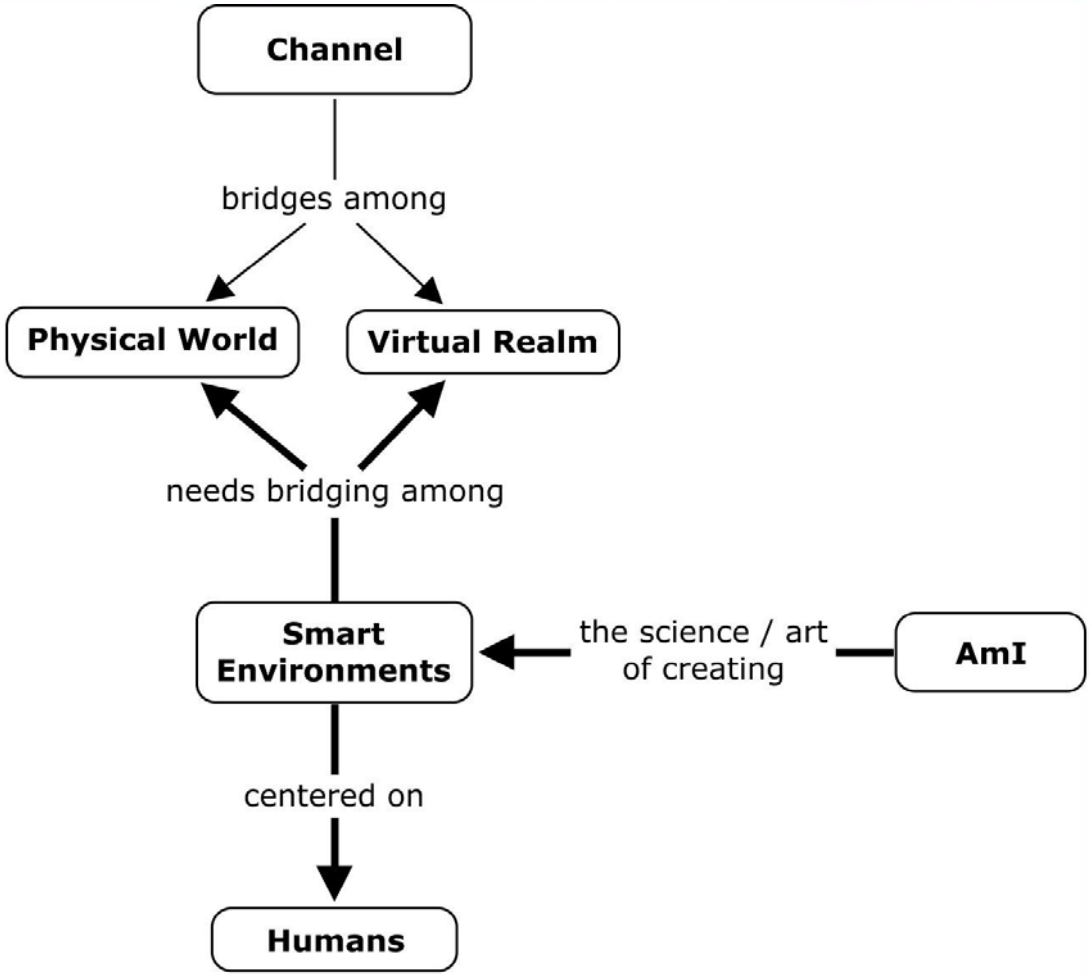
RATIONALE

From HCI to HEI!

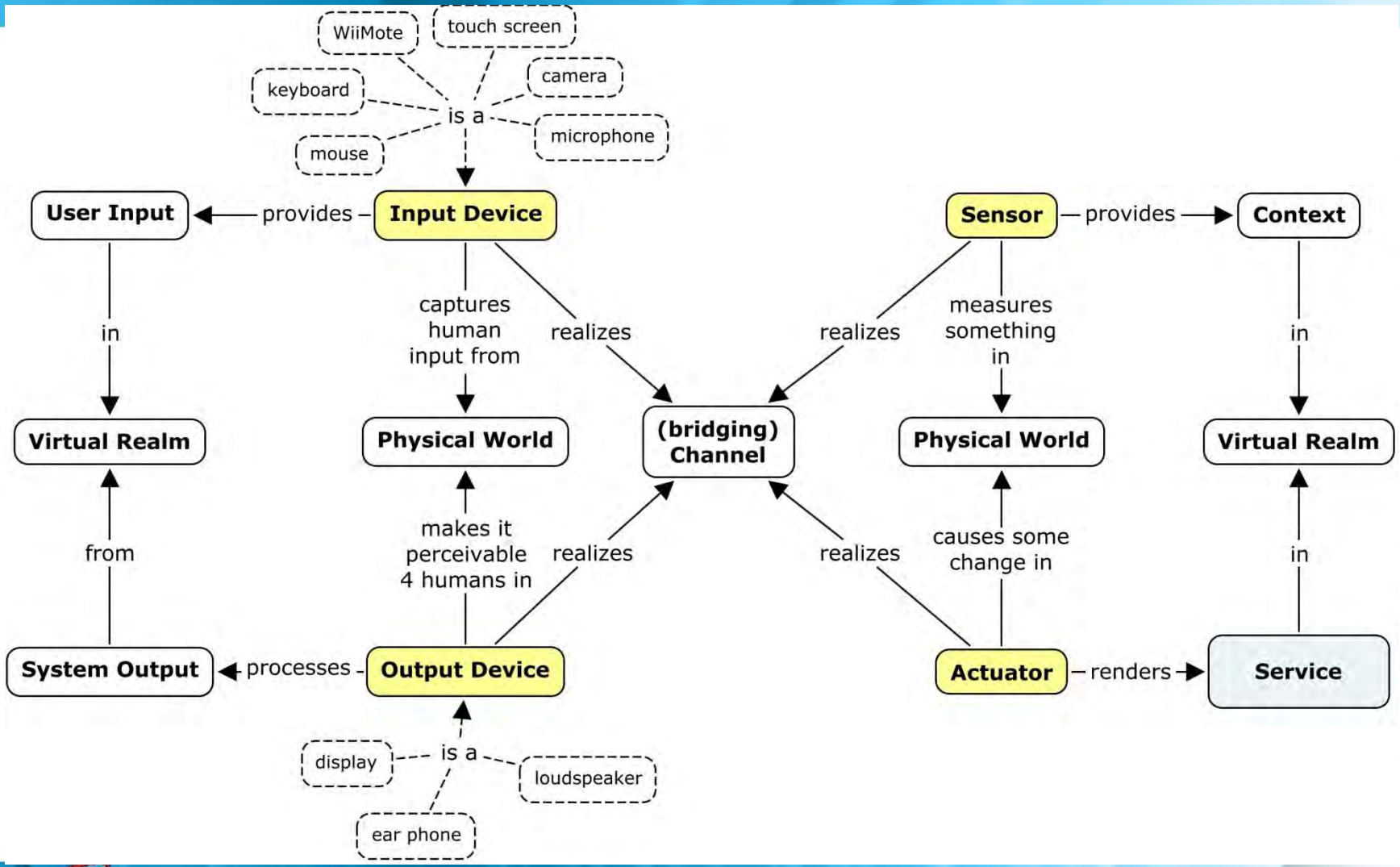
- HCI: the traditional Human-Computer Interaction
  - the interaction is usually assumed to be bound to one single computer and its peripherals.
- HEI: Human-Environment Interaction
  - Implicit interaction
  - Explicit interaction

Breaking out of the Virtual Realm into the Physical World

T. Berners-Lee, J. Hendler, O. Lassila: The Semantic Web

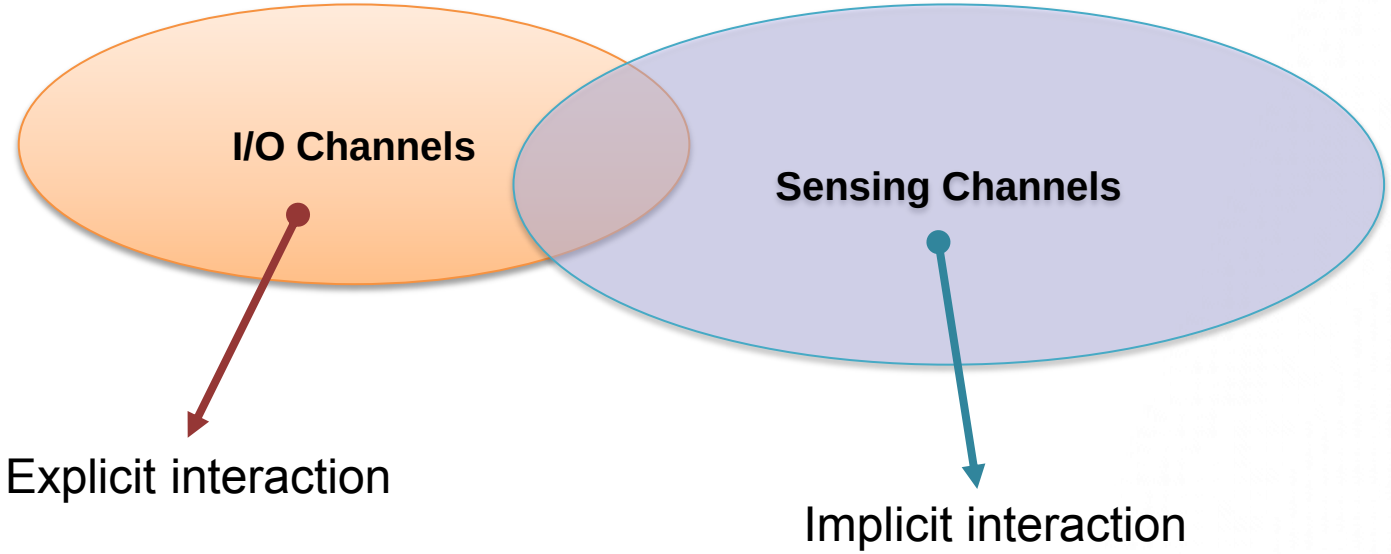


The Notion of Channel



The Importance of Explicit User Interaction (I)

- Explicit UI over I/O channels long enough in the shadow of "implicit interaction" over sensing channels in AmI



The Importance of Explicit User Interaction (II)

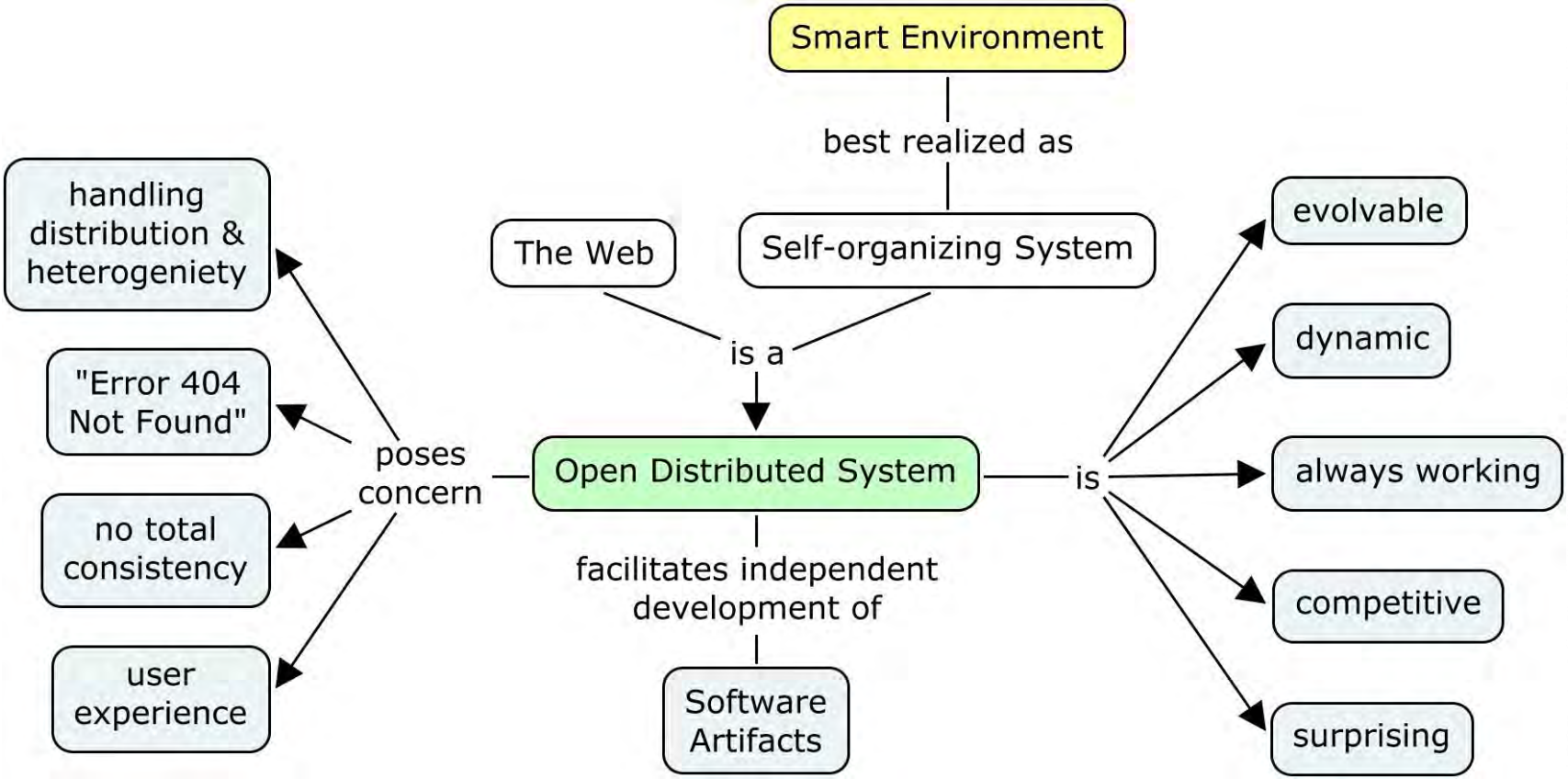
- Progresses that help explicit UI become more important
  - proliferation of (multi-)touch sensing, HD displays, & displays embedded in all possible devices
  - new interaction forms supported by special devices with specific sensors
  - qualitative progresses in
    - speech recognition
    - natural language processing
    - gesture recognition
  - socio-political pressure on “accessibility for all”

I/O Devices in emerging Smart Homes

- living room TV
- sleeping room TV
- a display in the entrance
- a display integrated in the fridge door
- mirrors capable of becoming displays
- microphone arrays installed in all rooms
- loudspeakers installed in all rooms
- phones providing displays, microphones, (loud)speakers
- hi-fi providing loudspeakers
- .
- .

➢ **An infrastructure of available I/O channels**

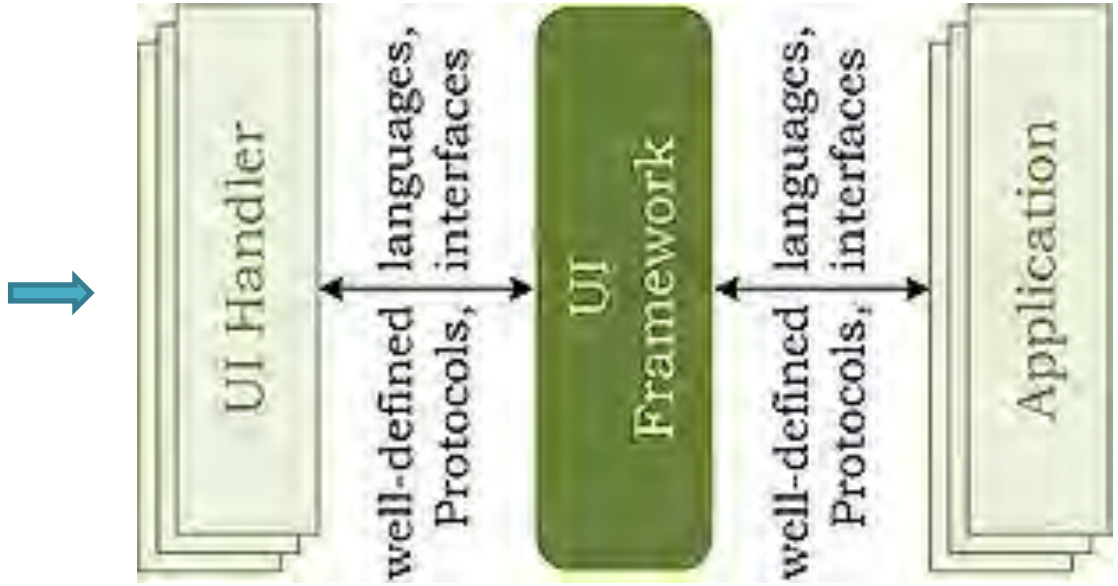
Smart Environments as Open Distributed Systems



The Consequence

I/O Infrastructure

Open Distributed System



Separating applications from the management of the I/O channels

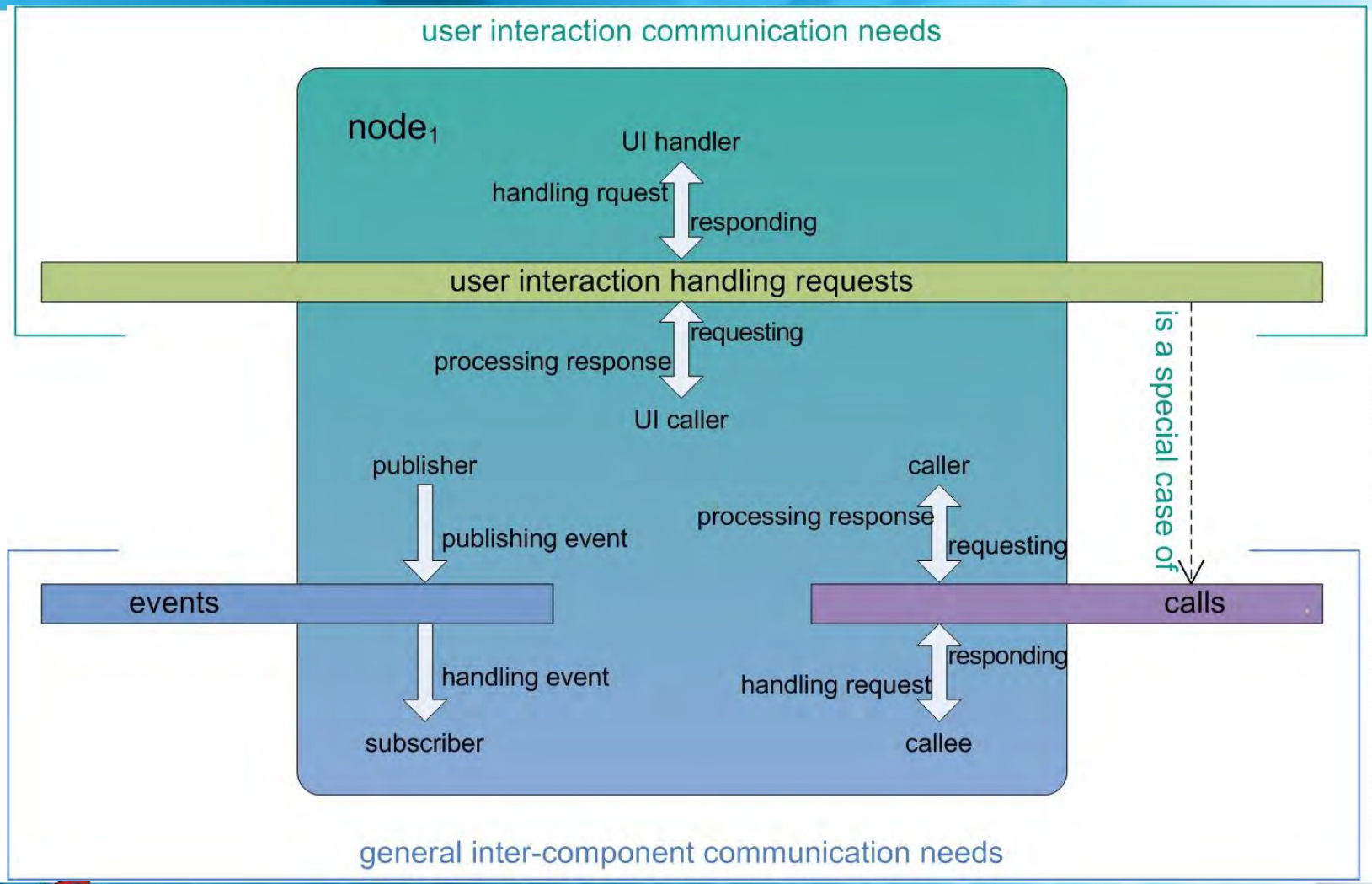
("UI Handler" is the term used for the managers of the I/O channels)

UIM Derived Goals

- We need to create a UI model for
  - describing user interfaces in a modality-neutral manner
  - performing personalized and context-aware adaptation
- Intelligent (personalized and context-aware) brokerage between applications and UI Handlers (I/O channel managers)
- Introduce a framework for
  - modality fusion when capturing user input from different input channels
  - modality fission when using different output channels for presenting system output to human users

APPROACH

UI Protocol


user interaction communication needs
node1
UI handler
handling rquest
responding
user interaction handling requests
requesting
processing response
UI caller
publisher
publishing event
caller
processing response
requesting
is a special case of
events
calls
handling event
responding
handling request
subscriber
callee
general inter-component communication needs

Approach

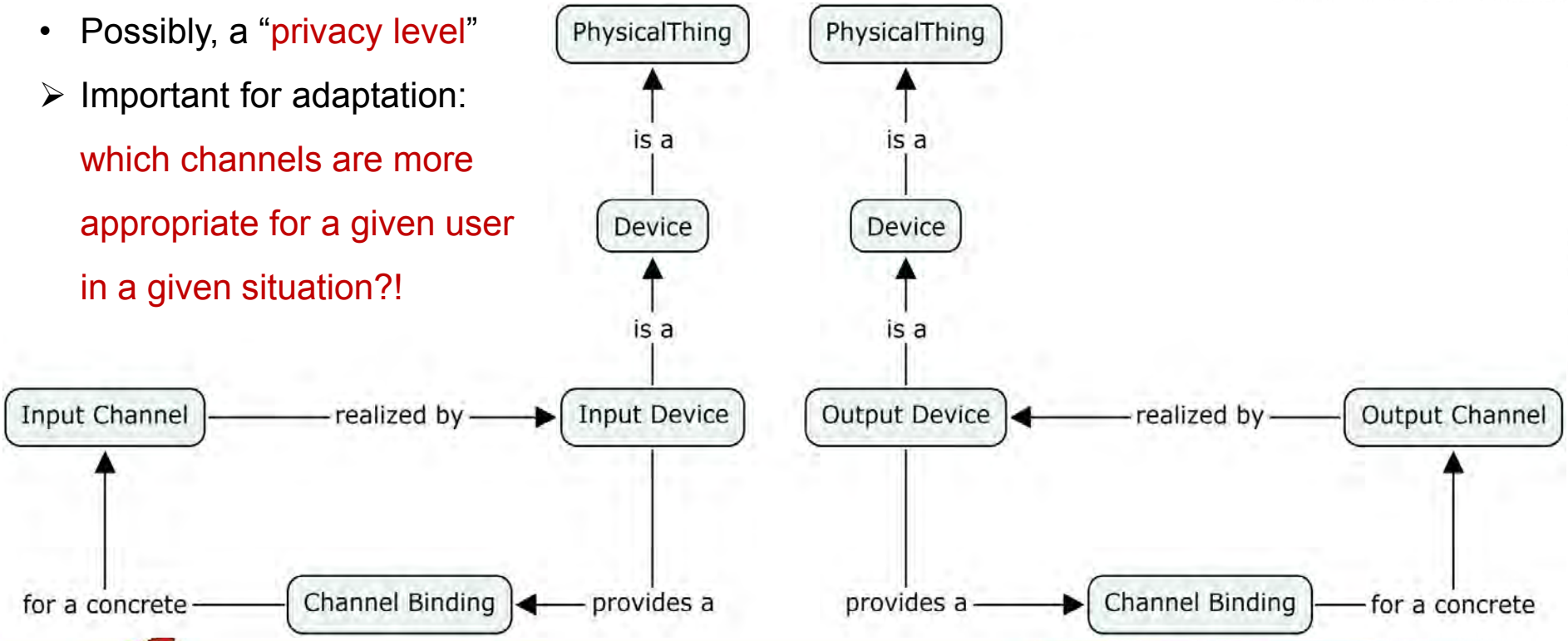
UI HANDLERS & THE MANAGEMENT OF I/O CHANNELS

Channel Binding

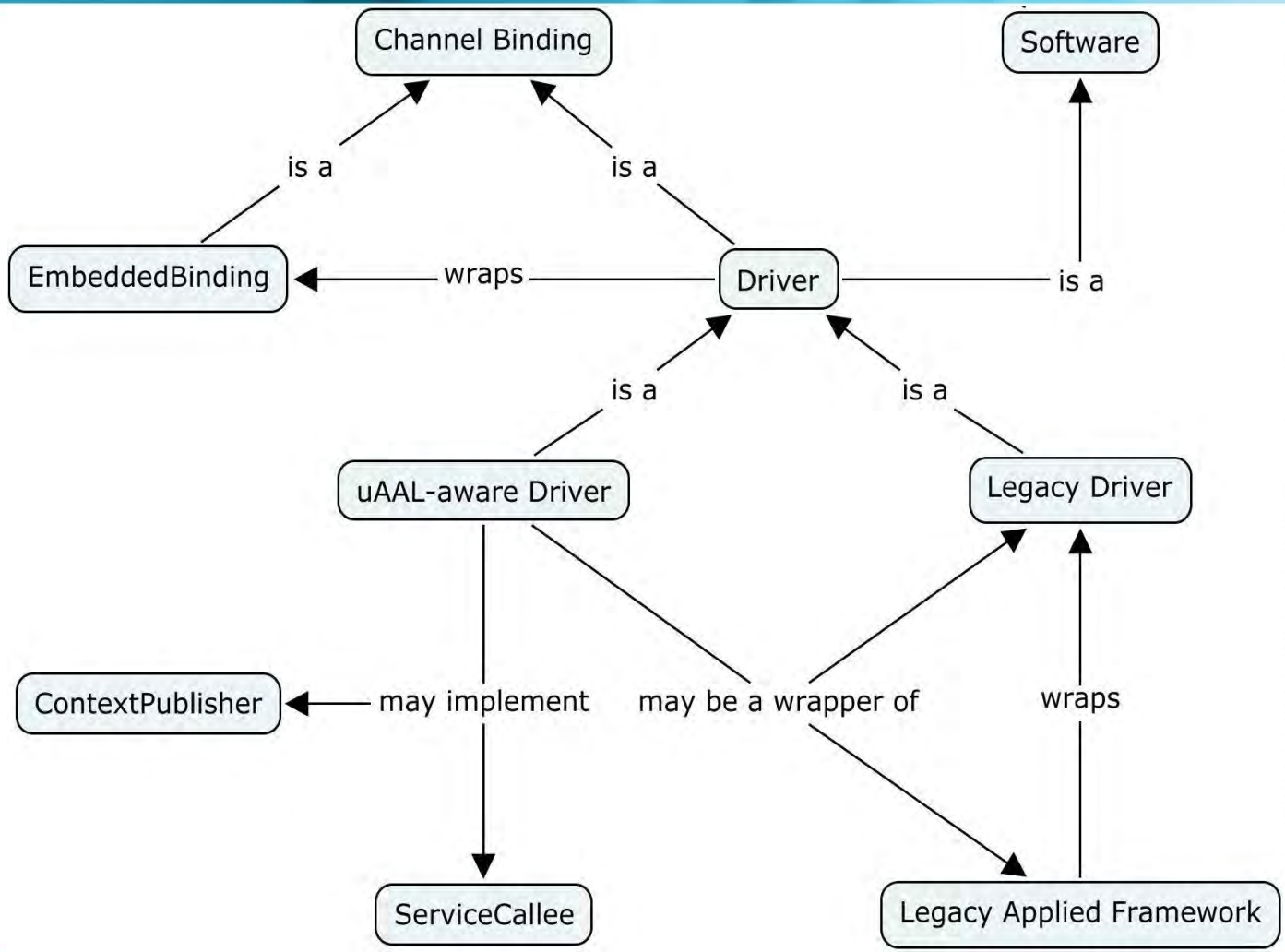
I/O Channels are bound to

- A certain location
- A certain modality
- Possibly, a "privacy level"

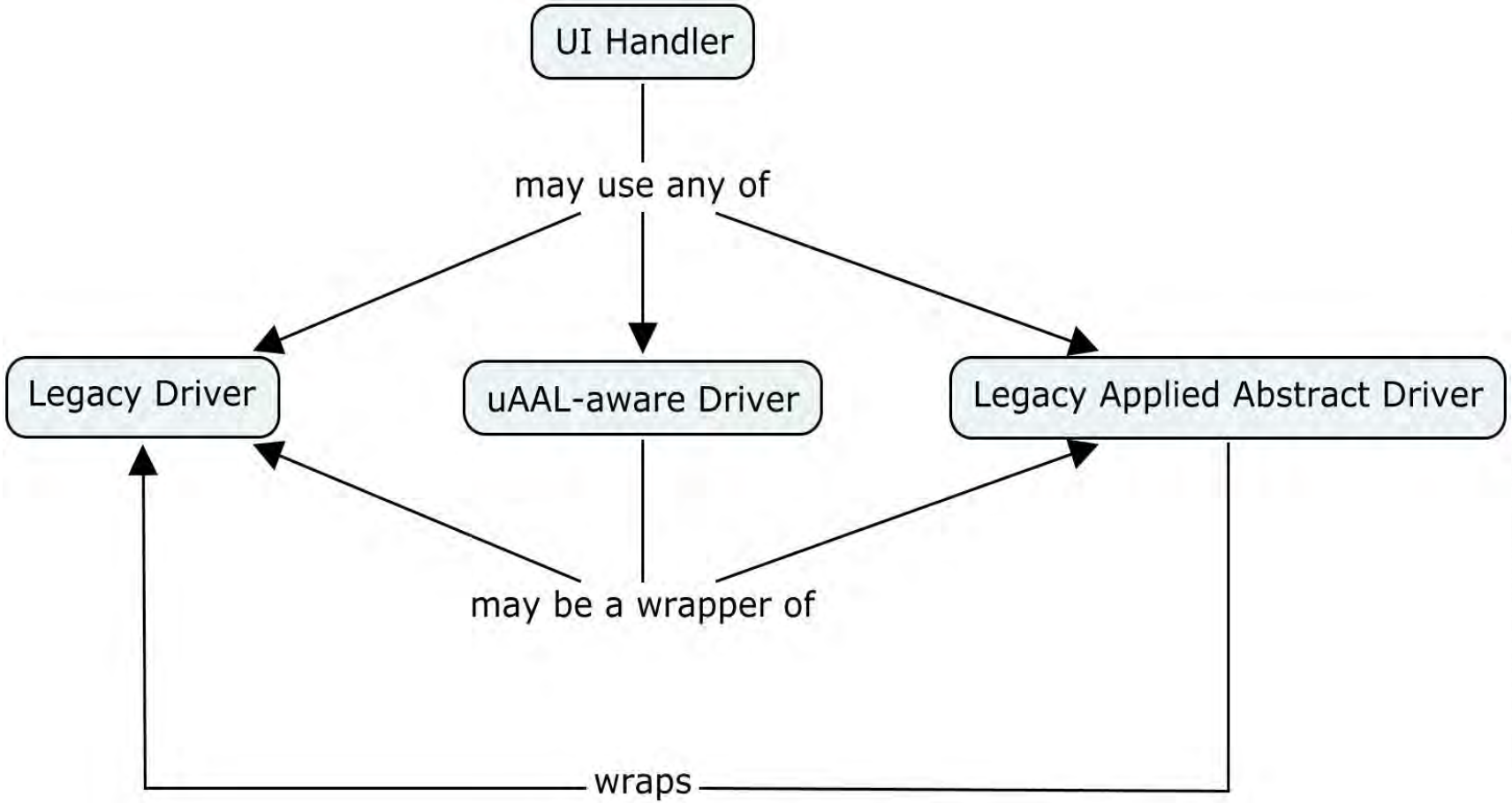
➢ Important for adaptation:
which channels are more appropriate for a given user in a given situation?!



Accessing Channels



Relationship to UI Handlers



Approach

ADAPTATION FAMEWORK

Context Awareness: using the rights channels

UI Bus

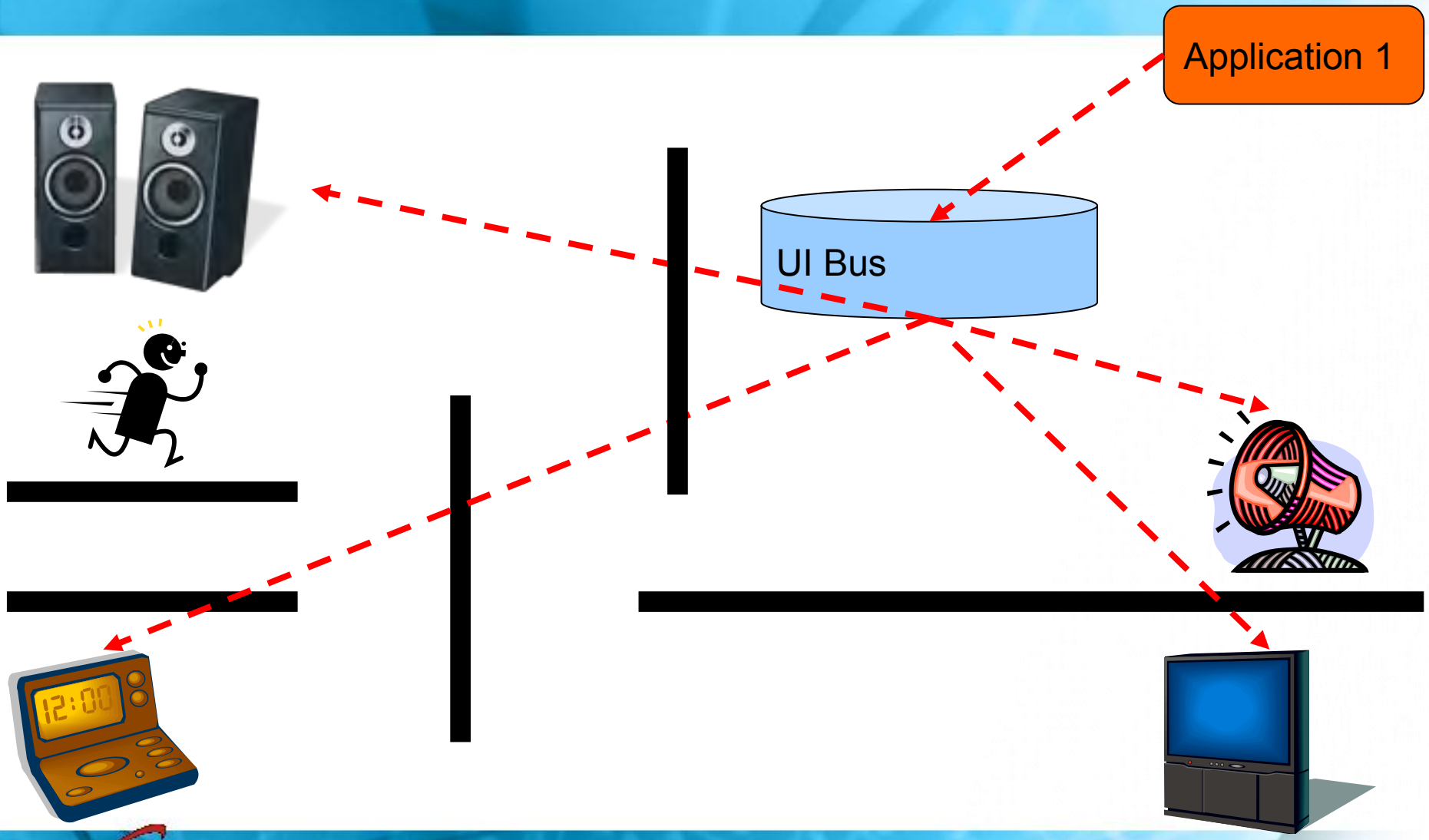
Application 1

Take your Prozac™ !

Privacy Awareness

Text 2 Speech

Context Awareness: Follow me without loss of data



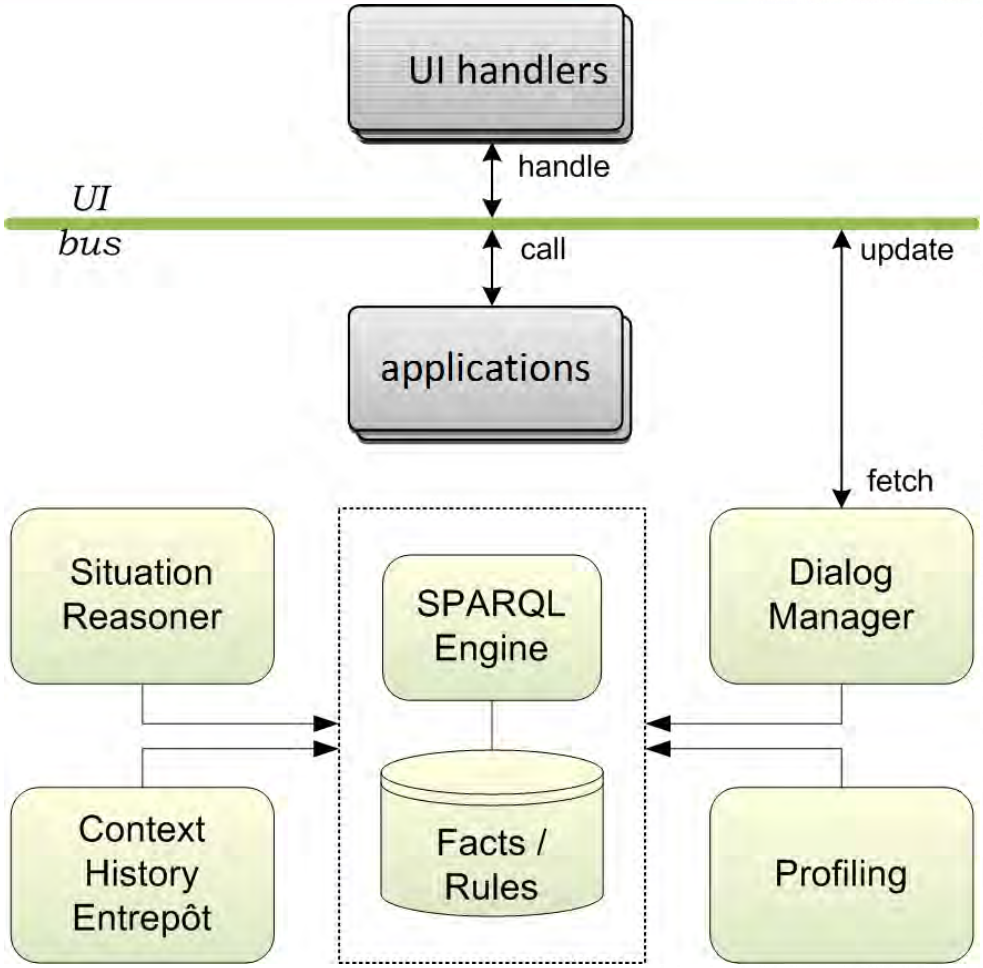
Supporting the UI Bus in Adaptation

Parameters provided by the app

- Addressed user
- Content language & privacy level
- Dialog priority

Parameters added by the UI Framework

- the presentation location and modality
- access impairments to be considered
- modality-specific recommendations



Capabilities of the UI Handlers

- appropriateness for certain access impairments
- supported languages, modalities & privacy levels
- locations where output can be presented
- modality-specific tuning capabilities

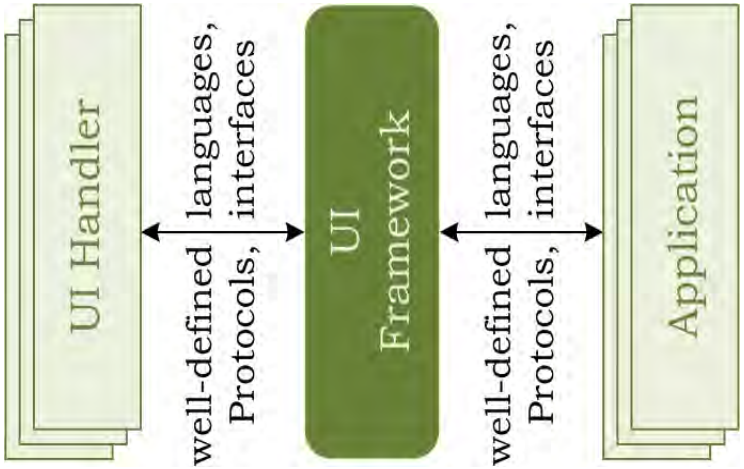
(recall that UI handlers are the managers of I/O channels & that channels are bound to specific modalities, privacy levels & locations)

Approach

DESCRIBING A DIALOG

Need for Declarative Languages

- A direct consequence of separating application layer from the presentation layer



analogy to the WWW

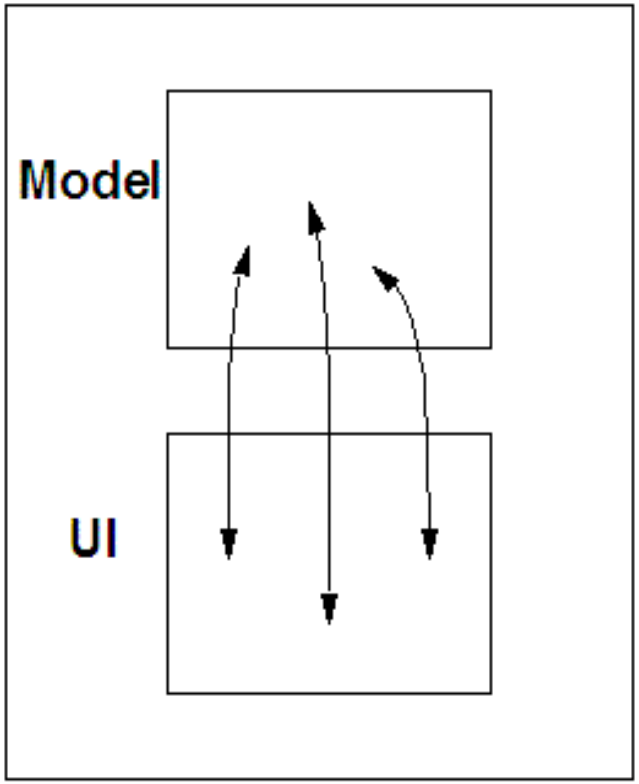
browsers	language = HTML protocol = HTTP	Web applications

The problem with HTML

- Not really modality-neutral
- Sometimes posing certain layout
- More abstract and neutral languages investigated since more than 10 years:
  - UIML
  - TERESA XML
  - UsiXML
  - SMIL
  - EMMA
  - XISL
  - XForms

XForms - Separation of Values from Controls

- XForms separates data and the underlying model from presentation:
  - The model specifies the values being collected (the instance), and their related logic
    - Types, restrictions
    - Initial values, Relations between values
  - Logical UI Controls with binding to the model



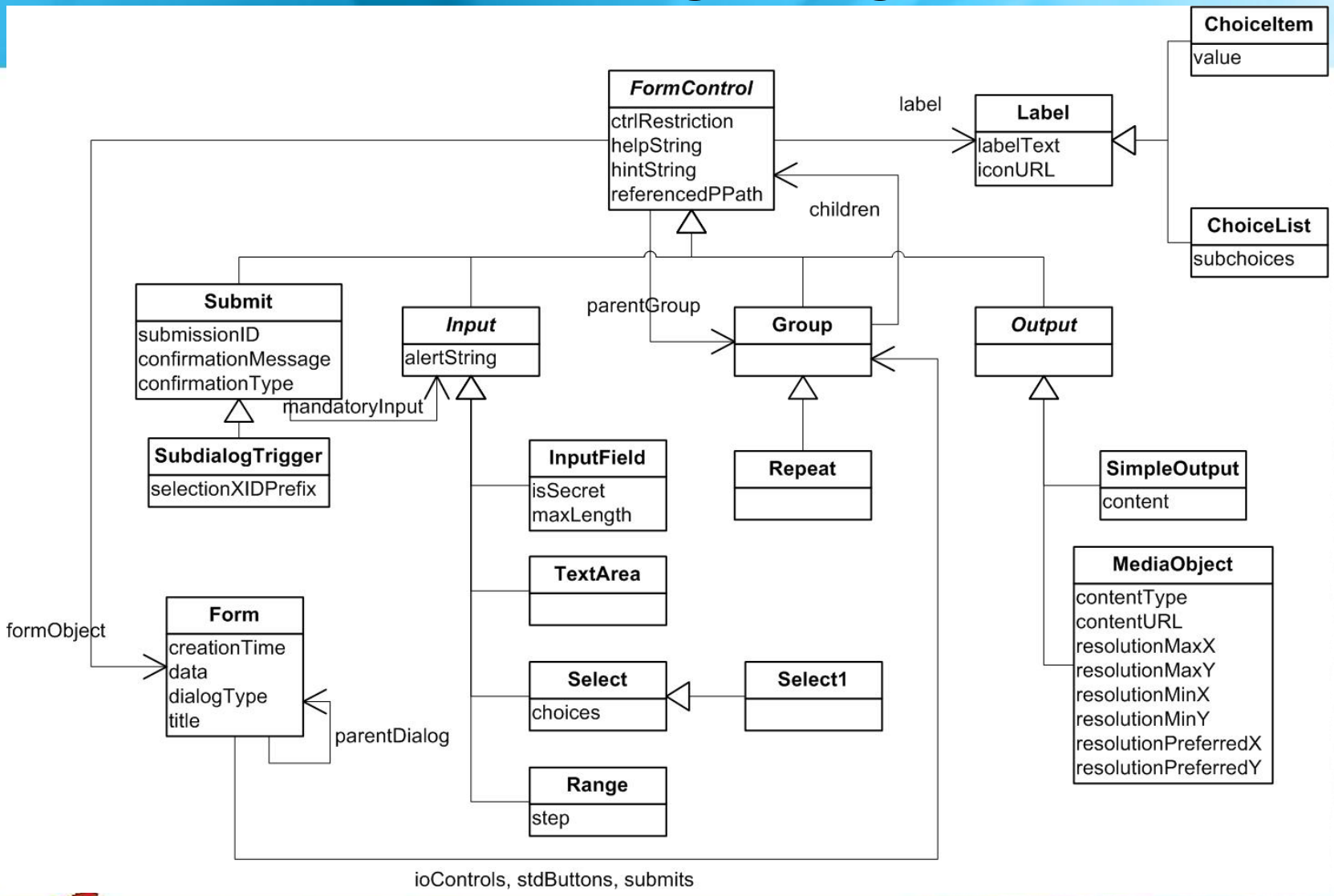
Source: www.w3.org/2006/Talks/05-26-steven-XForms/

universAAL Dialog Descriptions

- Current solution inspired by XForms
  - Apparently the most advanced form-based solution
  - Separating the form UI description from the form data

- Define a “dialog package” based on XForms UI controls
- Use own RDF-based data model instead of adding a new complexity

The Dialog Package



Approach

MISCELLANEOUS

More on the Dialog Manager

- Coherent representation of the whole system
  - Management of Dialogs
    - Per user & priority-based management of dialog queues
    - Suspending dialogs and continuing later
  - Providing the system main menu
  - Handling context-free input

Support for Multimodality

- Delegated to UI handles…

- An example developed within PERSONA
  - On the input side: fusion of speech & gesture
  - On the output side: speech synchronized with visual feedback

RESOURCES

Resources

- www.universaal.org, esp.
  - all deliverables immediately after release
  - Newsletters, publicity material, comic
- depot.universaal.org, the entry point for developers (reachable also through the home page)
  - Getting started developing AAL applications
  - Learning more about the platform & contributing to the development of the platform
- forge.universaal.org (reachable also through the Developer Depot) with
  - source codes, Javadocs, & Wiki Pages
  - forum discussions

THANK YOU FOR PAYING ATTENTION!

Questions?

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