

# Dynamic Distribution of User Interfaces for Flexible Multimodal Interaction

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## Motivation

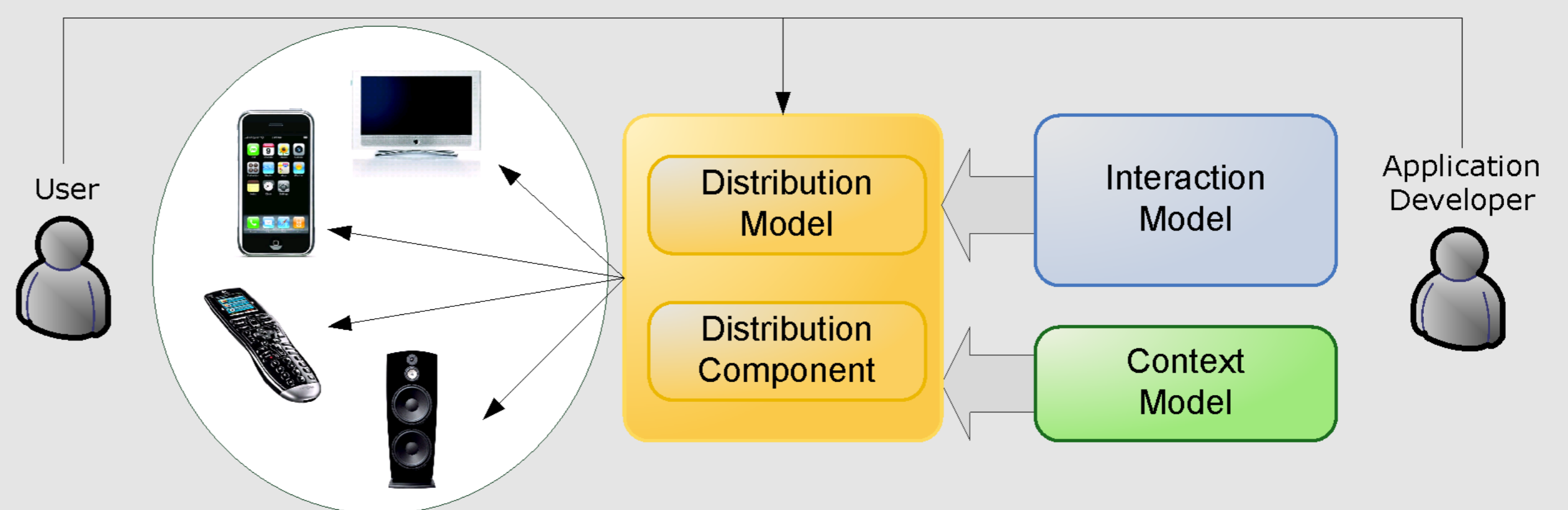
The availability of numerous networked interaction resources within smart environments makes the exploitation of these resources for innovative and more natural interaction possible. Combining the interaction capabilities of devices like TVs with remote controls, picture frames, mobile phones, touch screens, stereos and PCs would allow to achieve a more suitable interaction. For example, the mobile phone could be used to control the graphical user

interface on the TV and the stereo can also be included for voice output. Changing situations could then require the dynamic redistribution of the created interfaces and the alteration of the used modalities and devices to keep up the interaction. Currently, applications and its user interfaces can only be accessed from one device at a time making a combined and changing usage of combinations of devices impossible.



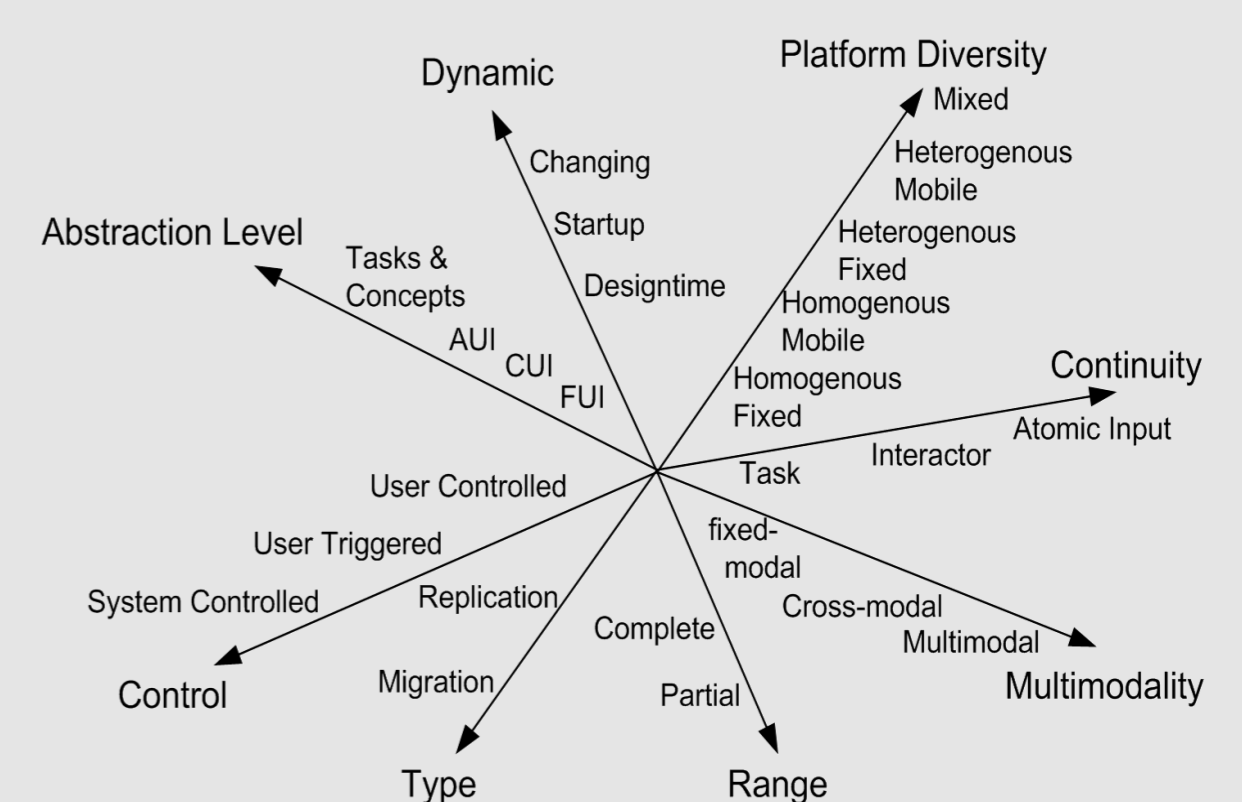
## Approach

A **distribution component** is responsible for determining the devices for the interaction based on the (changing) environment situation and the user interface requirements. A **context model** gathers information of the environment at runtime and an **interaction model** describes the interaction information. The component provides possibilities to the application developer and to the user to influence the distribution.



## First Results

Development of a distribution space (picture on the right). Implementation of a prototype for dynamically distributing user interfaces to different devices with different modalities at runtime. This includes an automatic distribution algorithm incorporating as much modalities as possible from the devices near the user (max. one device per modality) and a meta user interface allowing users to change the current distribution (picture on the left).



based on [Berti2005] and [Demeure2008]

## Open issues

There are three major issues that need to be solved. First, utilizing the specific device capabilities have to be supported like combined usage of modalities (e.g. complementary or redundant usage) and devices (e.g. multi-monitor usage). Second, the configuration possibilities for the user (meta-UI) have to be enhanced to suit the users needs. That includes among other things to allow users to store distributions to reapply them in the same situation

(which raises question like what is the same situation?) or to distribute all user interface elements relevant for one task to another device. Third, the needs of application developers have to be analyzed and corresponding possibilities have to be developed and implemented.

## References

- [Berti2005] Berti, S., Paternò, F. and Santoro, C.: A taxonomy for migratory user interfaces. *DSV-IS'2005*
- [Demeure2008] Demeure, A., Sottet, J.-S., G. Calvary, Coutaz, J., Ganneau, V. and Vanderdonck, J.: The 4C reference model for distributed user interfaces. *ICAS 2008*

## Links

MASP  
<http://masp.dai-labor.de>

**DAI-Labor**  
Distributed Artificial Intelligence Laboratory

