
User-centered support to localized activities in ubiquitous computing environments

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The motivation

- design of ubiquitous and pervasive computing systems must be user-centered, particularly on the user activity
- user-centered approaches imply personalization, context-awareness and non-obtrusiveness
- focus on localized activities (activities with a strong association with physical environment)



The motivation

- we thus need to:
 1. understand how humans naturally accomplish an activity (grounding on Activity Theory)
 2. find out how localized activities can be supported by the ubicomp environment
 3. find out how to achieve a user-centered support by integrating with personal environments

Activity and its environment

- some activities can be performed in many different places (e.g., editing a report)
- others – localized activities – are closely associated to some specific physical environment (e.g., visiting a relative at the hospital)
- particular interest in activities performed by occasional visitors
- these users may want to know which activities they can perform in that place



Generic requirements

- flexible structure of localized activities
- e.g., the structure of activity “visiting a museum” may depend on:
 - age
 - preferences
 - context
 - available resources
- support for social interaction and historical evolution of activity
- e.g., sharing, remembering or customizing experience



Supporting localized activities

- The role of personal and local environments
- Local environments have little or no knowledge about occasional visitors (anonymous users or different personalization mechanisms for each environment).
- Global personal environments are not able to fully explore resources available in the local environment
- Integrating both environments is thus fundamental



Supporting localized activities

- user-centered support requires profound knowledge:
 - about both local and personal environments
 - about the activity
- personal environments hardly own this knowledge, and even harder when it comes to deal with different local environments
- therefore, localized activities are expected to be supported mainly by local environments



Related work

- Mobile network operator location-based portals
- Ubiquitous computing infrastructures
- Project Aura
- Christensen and Bardram
- VADE project



Research foci

- Activity modelling
 - Identifying which localized activity the user may be interested in
 - Describing the activity plan
 - Interrupting and further resuming activity
 - Remembering or sharing activity experience
 - Customizing activity experience

Research foci

- Integration with personal environment
 - Detection of the personal environment and interaction with it
 - Advertising possible activities
 - Supporting activity unrolling
 - Always covering a wide range of environment types
 - Support to heterogeneous protocols, APIs, formats...
 - Device-independent interfaces



Proposed approach

- providing occasional visitors with the perception of how the local environment can assist them in performing localized activities
- heterogeneous personal environments:
 - web/MNO portals, ICQ, etc.
 - poorly equipped, richly equipped, etc.
- an architecture for supporting localized activities
- prototypes embodying different scenarios (the first is based on the previous work in the VADE project)

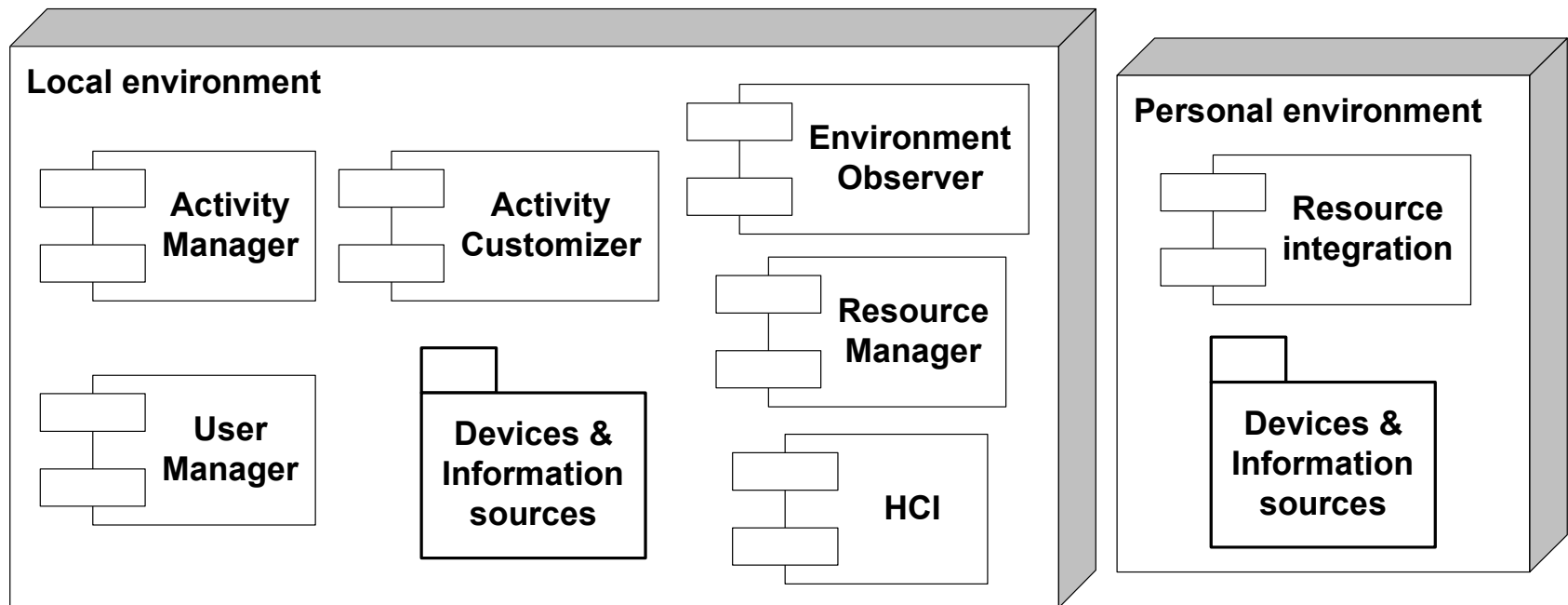


Initial validation scenario

- A computer scientist is invited for a talk in a seminar at the University of Minho
- The support to the localized activity includes a variable sequence of actions
- Different resources from the local and personal environments are required
- The scientist's personal environment corresponds to his mobile network operator portal
- The support to the localized activity is integrated into the personal environment



Proposed architecture



Further work

- More advanced scenarios supporting:
 - heterogeneous personal environments
 - activity perception/selection
 - activity interruption/resumption
 - experience remembering, sharing, and customization
- Develop:
 - activity modelling
 - integration between local and personal envs



Conclusions

- Supporting localized activities in a user-centered manner requires:
 - understanding of how the activity is carried out
 - modelling the support in order to allow:
 - a flexible structure of activity depending on the user and its context
 - historical evolution
 - social interaction
 - integrating local infrastructure with personal environment



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