

Toolkits for Building Ubiquitous Computing Applications

The topic thus far ...

Motivating Ubicomp, capture applications

Today: Context-Awareness

Recall Mark Weiser

- Chief Technologist
Xerox PARC
- Began Ubiquitous
Computing Project in
1988
- Paradigm shift



Ubiquitous Computing

Weiser motivation

"The most profound technologies are those that disappear."

"The whole purpose for ubicomp are, of course, the applications."

Ubiquitous Computing

Ubicomp application features

- Scalable interfaces
- Three C's
 - Correction
 - Context
 - Capture (last wed.)

Ubiquitous Computing

Context-Aware Computing

Effective use of context is the key to a ubicomp environment that does the right thing.

Supporting the right abstractions and services for handling context makes it easier to design, build and evolve context-aware applications.

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Defining Context

- Information used to characterize the situation of an entity
- Entity - person, place or object relevant to the interaction between a human and some computational service

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Implicit input

- Lots of ways to provide context
 - explicit
 - implicit
- We emphasize implicit context, that applications do not have easy access to

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Context types

- Who, Where, When, What
- Identity, Location, Time, Activity

Ubiquitous Computing

Categories of C-A applications

Presenting information and services

location-aware reminders

Automatically executing a service

nearest printer

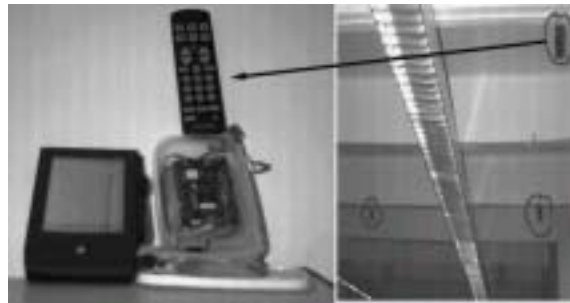
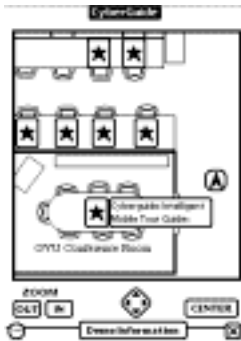
Attaching context to information

stick e-Notes

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C-A Applications hard to build

- Cyberguide case study: no separation of concerns



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Separation of Concerns

- Acquisition
- Representation
- Storage
- Distribution
- Reaction <- this is the application (finally)

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Inspiration

- Analogy to *GUI* toolkits
- What is the context equivalent to the *GUI* widget or interactor?

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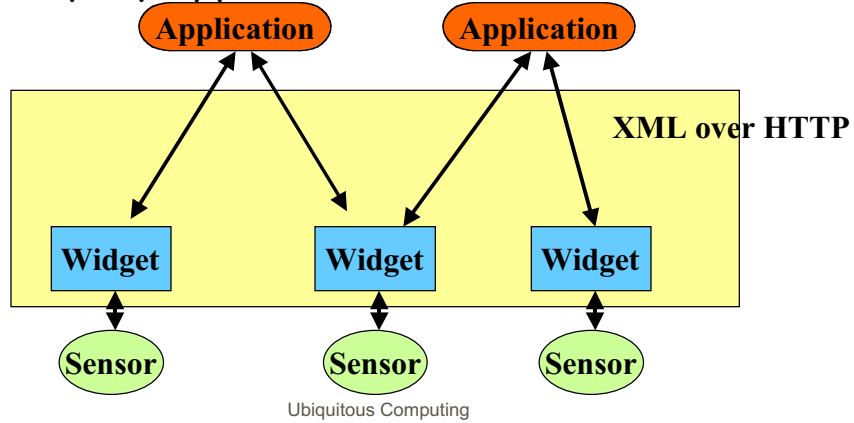
Eg. The Context Toolkit

- Anind Dey, Daniel Salber, Gregory Abowd
- <http://www.cc.gatech.edu/fce/ctk>
- 3 abstractions
 - widgets, interpreters & aggregators

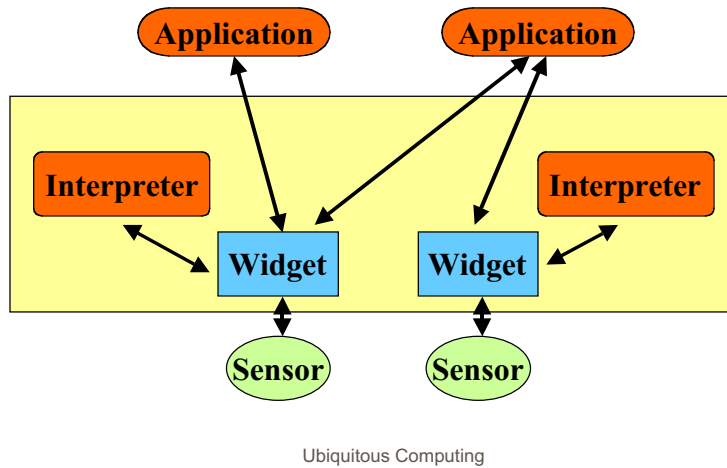
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Context Widgets

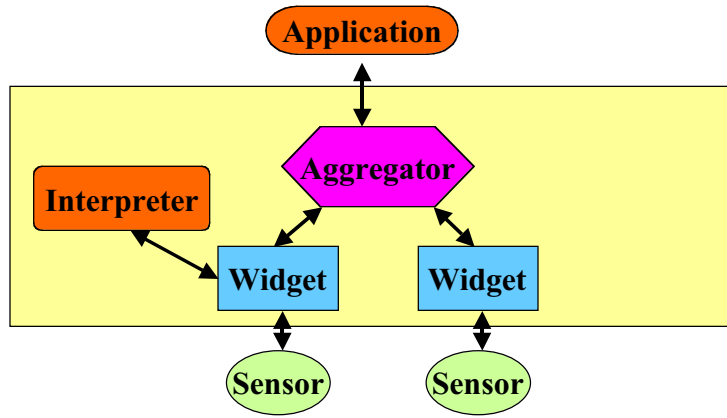
- Simplify application's view of world



Flexible Representation

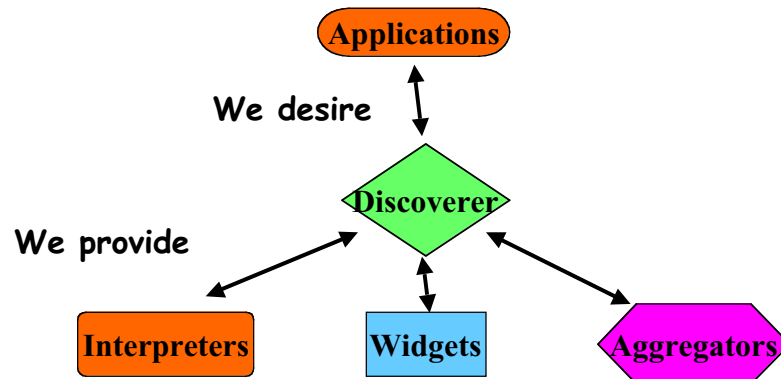


Focus on Entities



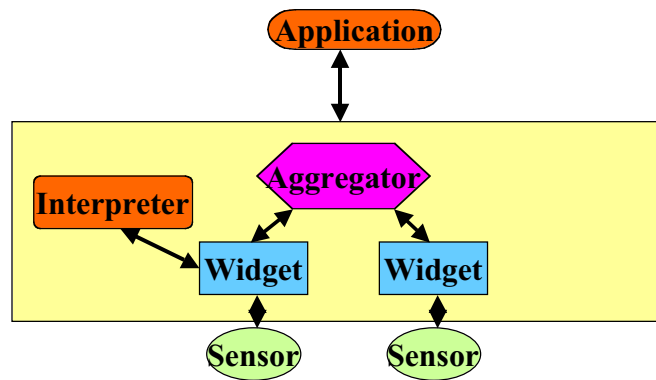
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Focus on Context, not Source



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Results in ...



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Context Challenges

- Finding compelling applications
- Higher-level programming abstractions
- What are standard context types?
- Handling privacy
- Dealing with imperfect context

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Compelling Applications

- The Aware Home: creating **new capabilities** by making a home **aware** of its occupants.
 - Aging in Place
 - Early Childhood Development
 - Domestic Communication

Ubiquitous Computing