UI Patterns:
History, Status, Applications

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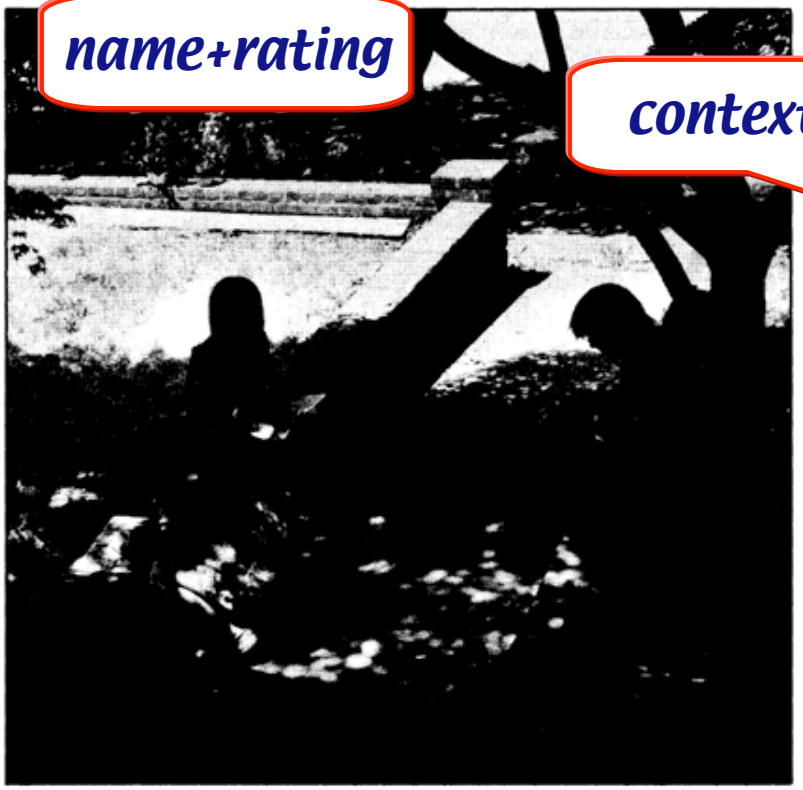
A Short History of UI Patterns

- Architect Christopher Alexander (1964)
- Pattern: successful solution to recurring problem in urban design
- Pattern language: layered network (scale)
- Goals: Improving quality of human life
  Capturing design philosophy
  Participatory Design (!)

243 SITTING WALL**



name+rating

context

picture

problem (forces)

. . . if all is well, the outdoor areas are largely made up of positive spaces—POSITIVE OUTDOOR SPACES (106); in some fashion you have marked boundaries between gardens and streets, between terraces and gardens, between outdoor rooms and terraces, between play areas and gardens—GREEN STREETS (51), PEDESTRIAN STREET (100), HALF-HIDDEN GARDEN (111), HIERARCHY OF OPEN SPACE (114), PATH SHAPE (121), ACTIVITY POCKETS (124), PRIVATE TERRACE ON THE STREET (140), OUTDOOR ROOM (163), OPENING TO THE STREET (165), GALLERY SURROUND (166), GARDEN GROWING WILD (172). With this pattern, you can help these natural boundaries take on their proper character, by building walls, just low enough to sit on, and high enough to mark the boundaries.

If you have also marked the places where it makes sense to build seats—SEAT SPOTS (241), FRONT DOOR BENCH (242)—you can kill two birds with one stone by using the walls as seats which help enclose the outdoor space wherever its positive character is weakest.

❖ ❖ ❖

In many places walls and fences between outdoor spaces are too high; but no boundary at all does injustice to the subtlety of the divisions between the spaces.

Consider, for example, a garden on a quiet street. At least somewhere along the edge between the two there is a need for a seam, a place which unites the two, but does so without breaking down the fact that they are separate places. If there is a high wall or a hedge, then the people in the garden have no way of being connected to the street; the people in the street have no way of being connected to the garden. But if there is no barrier at all—then the division between the two is hard to maintain. Stray dogs can wander in and out at will; it is even uncomfortable to sit in the garden, because it is essentially like sitting in the street.

The problem can only be solved by a kind of barrier which functions as a barrier which separates, and as a seam which joins, at the same time.

A low wall or balustrade, just at the right height for sitting, is perfect. It creates a barrier which separates. But because it invites people to sit on it—invites them to sit first with their legs on one side, then with their legs on top, then to swivel round still further to the other side, or to sit astride it—it also functions as a seam, which makes a positive connection between the two places.

Examples: A low wall with the children's sandbox on one side, circulation path on the other; low wall at the front of the garden, connecting the house to the public path; a sitting wall that is a retaining wall, with plants on one side, where people can sit close to the flowers and eat their lunch.

Ruskin describes a sitting wall he experienced:

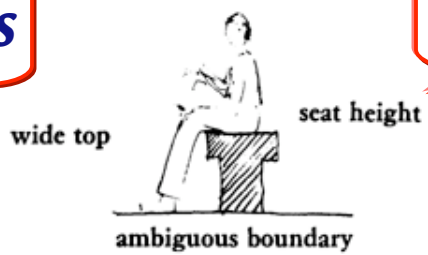
> Last summer I was lodging for a little while in a cottage in the country, and in front of my low window there were, first, some beds of daisies, then a row of gooseberry and currant bushes, and then a low wall about three feet above the ground, covered with stonecress. Outside, a corn-field, with its green ears glistening in the sun, and a field path through it, just past the garden gate. From my window I could see every peasant of the village who passed that way, with basket on arm for market, or spade on shoulder for field. When I was inclined for society, I could lean over my wall, and talk to anybody; when I was inclined for science, I could botanize all along the top of my wall—there were four species of stone-cress alone growing on it; and when I was inclined for exercise, I could jump over my wall, backwards and forwards. That's the sort of fence to have in a Christian country; not a thing which you can't walk inside of without making yourself look like a wild beast, nor look at out of your window in the morning without expecting to see somebody impaled upon it in the night. (John Ruskin, *The Two Paths*, New York: Everyman's Library, 1907, p. 203.)

Therefore:

Surround any natural outdoor area, and make minor boundaries between outdoor areas with low walls, about 16 inches high, and wide enough to sit on, at least 12 inches wide.

examples

diagram



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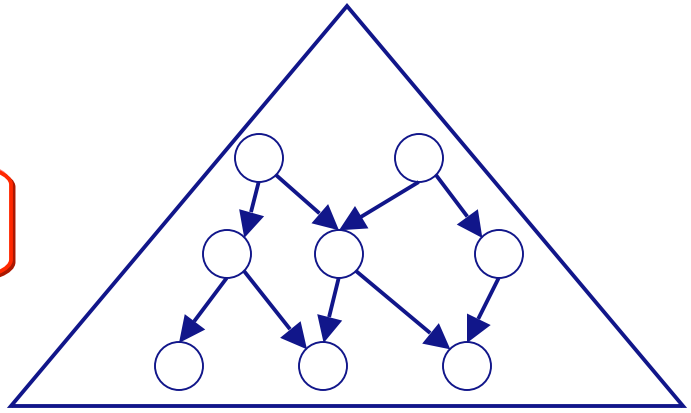
Place the walls to coincide with natural seat spots, so that extra benches are not necessary—SEAT SPOTS (241); make them of brick or tile, if possible—SOFT TILE AND BRICK (248); if they separate two areas of slightly different height, pierce them with holes to make them balustrades—ORNAMENT (249). Where they are in the sun, and can be large enough, plant flowers in them or against them—RAISED FLOWERS (245). . . .

references



solution

Design Patterns in Software Engineering

- Since 1994 (GoF, PLoP)
- Successful format for software engineering solutions, but missing some aspects
  - Interdisciplinary use
  - Linking
  - Quality Without A Name

Design Patterns in HCI

- Since 1986 (Norman), but now gaining momentum
  - Conferences, books, papers, panels, workshops, mailing lists, patterns... [http://www.hcipatterns.org/]
- ➡ Design patterns more appropriate for HCI than software engineering
- CHI 2000 [PAID]: "An HCI Design Pattern captures the essence of the solution to a recurring usability problem in interactive systems."
  - Name, ranking, sensitizing example
  - Context, problem statement, evidence
  - Solution, sketch, references
  - Synopsis, credits

Some Other UI Pattern Languages

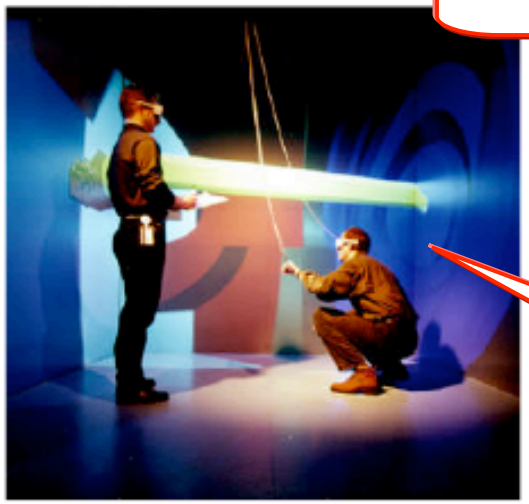
- Tidwell (1998): ~50 HCI design patterns, first widely known language, terse, (too?) broad applicability, recently refocused on web UIs
- van Duyne, Landay & Hong (2002): "The Design Of Sites", ~100 web design patterns, with process
- Many others, see http://www.hcipatterns.org/

My Background

- Used to capture UI design experience in multimedia exhibit projects
- Extended Patterns idea to three domains
  - user interface design
  - application domain
  - software architecture
- Workshops, panels,...
- Result: *A Pattern Approach To Interaction Design*
  - First book about UI patterns (“PAID”)
  - 3 languages, 32 Patterns, Alexandrian

H13 IMMERSIVE DISPLAY *

name+rating



picture

Figure 4.31: *CAVE* in the Ars Electronica Center Linz.

context

…you have decided to create an exhibit that several people can experience simultaneously—COOPERATIVE EXPERIENCE (H3). Now you need to find a way to design the visual output of such a system.

◇◇◇

problem (forces)

Typical usage scenarios of standard computer systems often involve only one human interacting with the computer at any time, and the system is only a small part of the real environment of the user. But exhibits are usually visited by groups of people, and when users interact with them, they are ready to immerse themselves into the world of the exhibit.

examples

CAVE: 3-D walls

The *CAVE* installation in the Ars Electronica Center in Linz uses wall-size projections all around the visitors to immerse them into a virtual reality. Special glasses synchronize with these displays to create a three-dimensional impression.

Virtual Vienna: panorama

Virtual Vienna uses a rear-projected display screen of about

1.6 m width, with the users standing at the same distance to the screen. This fills most of the optical viewing field when looking at the screen, and helps people to feel like they are actually standing at the place whose panorama is being displayed.

Personal Orchestra: large projection

Personal Orchestra uses an even bigger display area of about 2.5 m width, again with a corresponding viewing distance. This conveys the impression of actually standing in front of the Vienna Philharmonic in a far better way than it would on a small computer monitor.

solution

With these systems, this large display not only immerses the main user into the experience, it also allows several bystanders to at least observe the exhibit in action, which many may find already sufficient without becoming an active user.

Therefore:

Prefer a single exhibit with a large-scale display, with a minimum of 1.5 m in display width, over several similar stations with smaller displays, and over other output devices that shield a single user from his co-visitors, such as head-mounted displays. Design for a viewing distance that roughly equals the width of the display.

diagram

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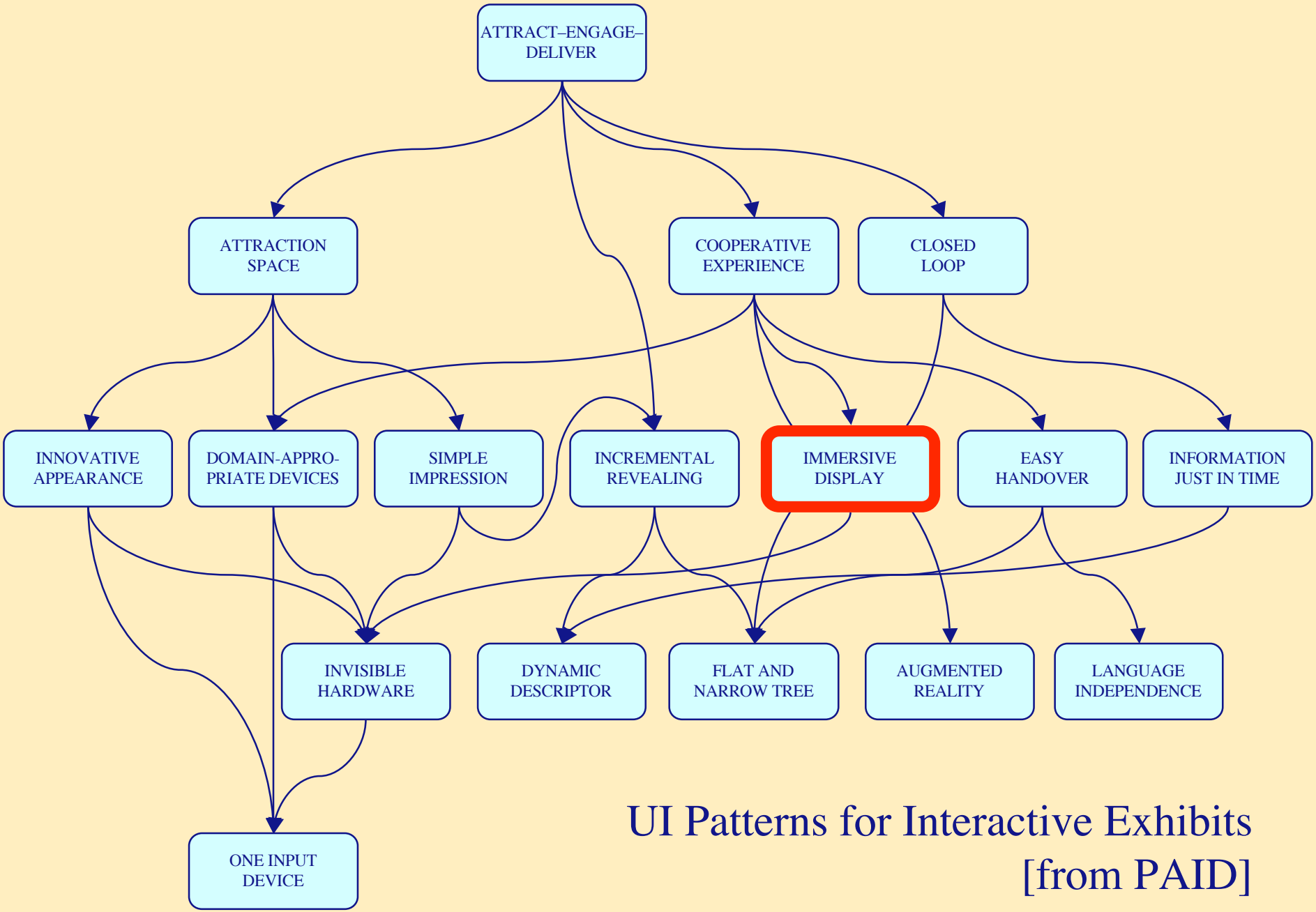
If you hide the display technology, it can become a "magic image"—INVISIBLE HARDWARE (H14). …

references



UI Patterns for Interactive Exhibits [from PAID]

Answers to Workshop Questions

- Success with current patterns? — Yes!
  - Training new team members
  - Talking to clients (reducing need for repeated arguing)
  - Educating students (experience from 2 classes)
  - Making design values explicit
  - Vocabulary function - “lingua franca”
- Wider adoption?
  - It’s happening; van Duyne’s book is great example
  - Many formats is not as bad as it sounds

Answers to Workshop Questions

- How to use patterns?
  - Browse Alexander first for the right spirit
  - Existing languages are good starting point
  - But: Writing patterns is important part of using them
- How to write patterns?
  - Focus on a specific UI design domain you care about
  - Aim for pattern language, not just for a pattern
  - Problem is harder than Solution
  - Find abstraction level between Style Guides & Golden Rules
  - Be verbose and interdisciplinary; patterns are literary style
  - Integrate pattern activities into software process

Patterns & Nielsen's Usability Engineering Life Cycle [from PAID]

Phase	Usability Engineering Life Cycle	Pattern use
1.	Know the user (characteristics, current & desired tasks, functional analysis, user & job evolution)	Extract application domain experience as pattern language
2.	Competitive analysis (examining existing products)	Generalize good UI solutions into HCI patterns
3.	Setting usability goals (financial impact analysis, prioritizing design goals)	Use competing goals as forces in abstract HCI patterns
4.	Parallel design (several initial designs by independent teams)	Use general HCI design patterns (maybe from book) as common design guidelines for the teams
5.	Participatory design (actively involving users in the design process)	Application domain expert (user) and HCI designer exchange their pattern languages for better mutual understanding
6.	Coordinated design of the total interface (Consistency within and across products)	Lower-level HCI design patterns, including project-relevant, concrete examples, communicate the common look and feel efficiently
7.	Apply guidelines and heuristic analysis (style guides, standards, and guidelines)	Patterns improve upon those formats because of their standard format, hierarchical networking, inclusion of examples, and discussion of problem context as well as solution
8.	Prototyping	Software design patterns express the standards, components, and specific project ideas of the development team in a way better understandable by the HCI experts
9.	Empirical testing (user tests)	Problems discovered can be related to applicable patterns to solve the problem (vocabulary function)
10.	Iterative design (improve prototypes, capture design rationale)	HCI and software patterns (constructive, unlike guidelines) inform designers about design options at each point, and help capturing the space of design options explored (structural design rationale) – possibly with anti-patterns for bad solutions.
11.	Collect feedback from field use	Use application domain pattern language again as common vocabulary between UI experts and users. Use feedback to strengthen successful HCI and software patterns, and to re-evaluate suboptimal ones.

For more information
(including these slides):
www.hcipatterns.org