

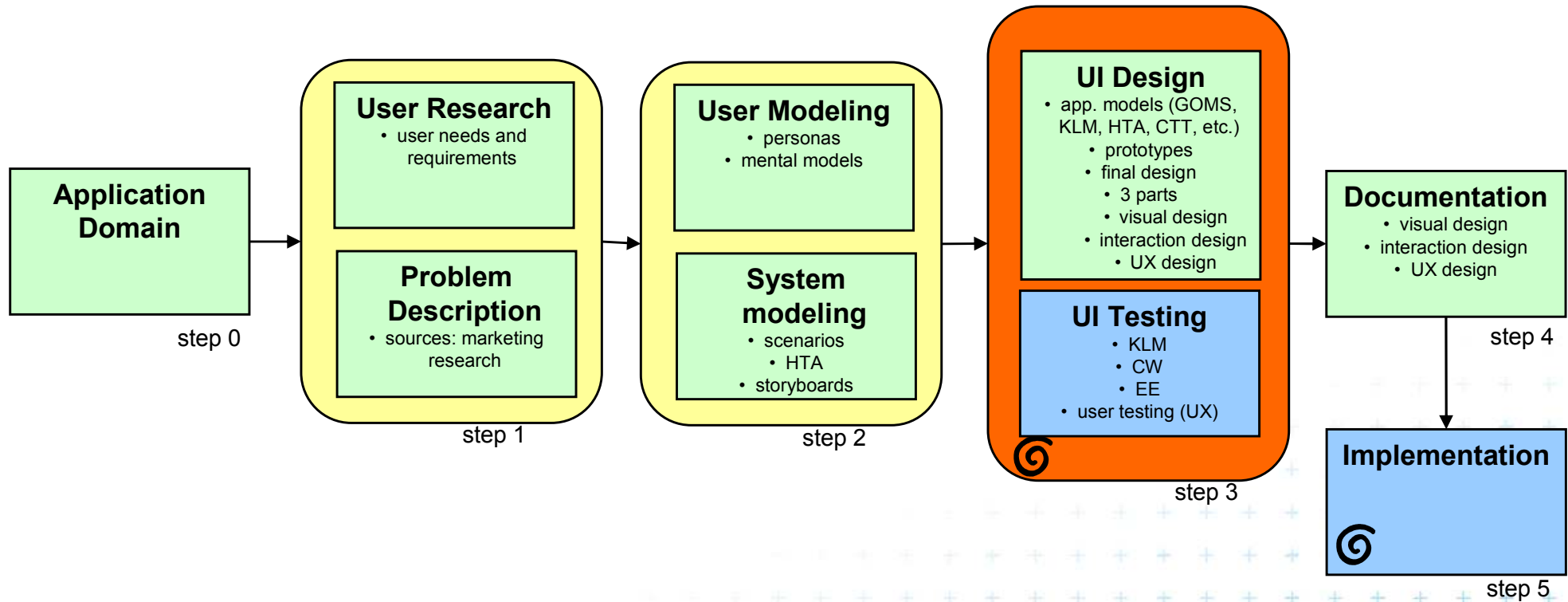
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DEPARTMENT OF COMPUTER GRAPHICS AND INTERACTION

NUR - Prototyping & Evaluation

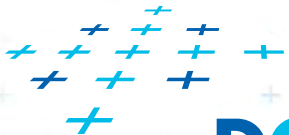
High Fidelity Prototyping, Usability evaluation

User interface design - big picture



Prototyping

High fidelity prototyping



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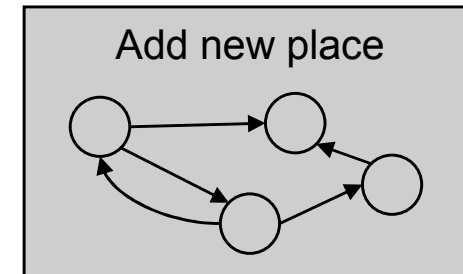
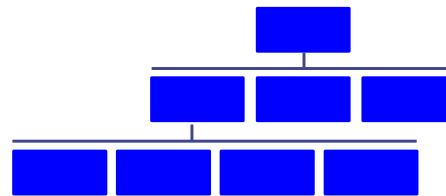
High fidelity prototype

- Illusion of final visual and interaction design
 - look&feel should follow the basic GUI guidelines
 - e.g., MS Windows, iPhone, Mac OS, Android
 - usage of target devices
 - e.g., iPhone NOT web app. on desktop PC
 - interaction realized in the same way as final implementation
 - e.g., gestures and virtual keyboard for iPhone NOT mouse and PC keyboard
- Application logic not necessarily implemented
 - Wizard of Oz, usage of illustrative data, simulation of the application logic
- Main parts of the application UI application implemented
 - not all parts/details of the applications are prototyped
 - horizontal vs. vertical prototype

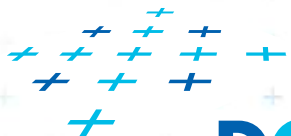


What must be done before

- User research (D1)
- Task analysis, UI modelling (D2)
 - HTA, STN

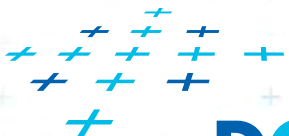


- Low fidelity prototype (D3)
 - not necessary, but recommended
 - e.g., small upgrade of existing system



Catch&Run

GPS based multi-user mobile game

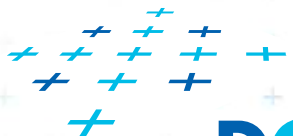


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- GPS game in real environment
- Players are catching each other

- Defined game area
- Three states
 - idler ... waiting for the chase
 - catcher ... catching runner
 - runner ... run out of catcher



Mid-fidelity prototype

- Web applet
 - GPS simulator
 - Static data
 - Simulation of collaboration
-
- Remote testing
 - 99 participants



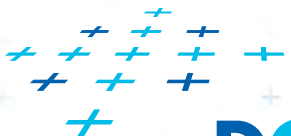
High-fidelity prototype

- Application running on the mobile device
- Usage of target framework
- Collaboration server implemented
- Field test
- 6 participants
- <http://www.youtube.com/watch?v=zZesDMB7eqs>



BTour Guide

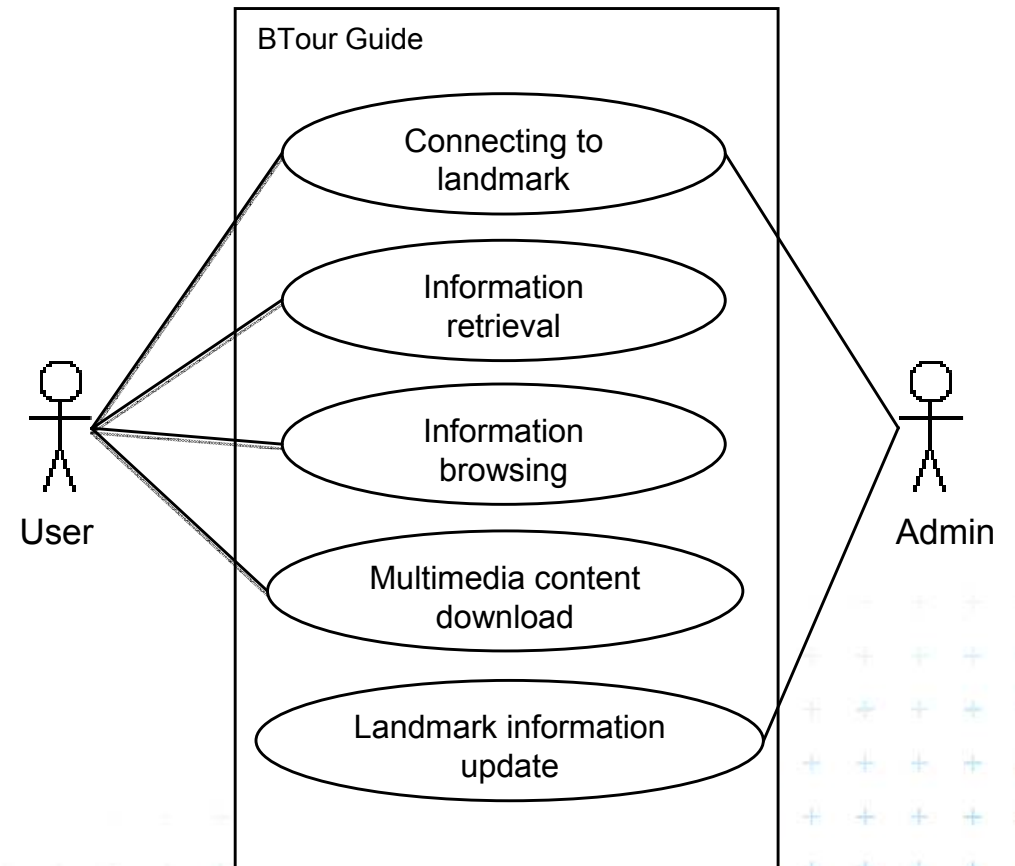
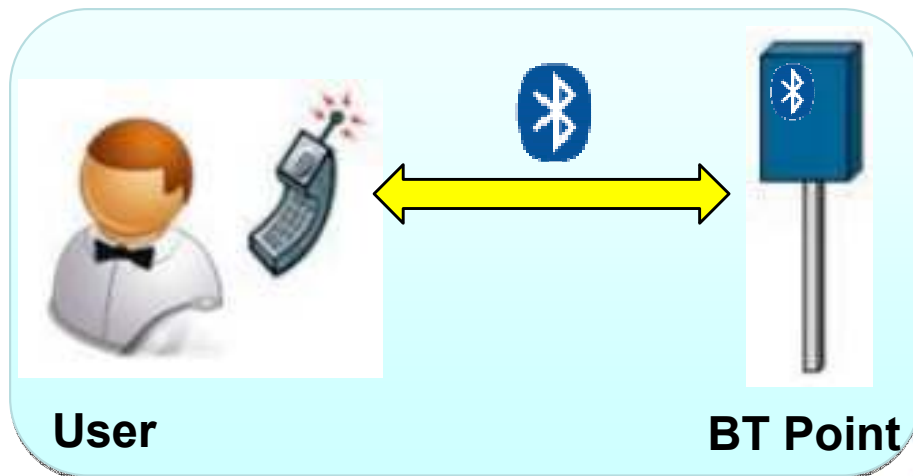
Mobile City Tourist Guide



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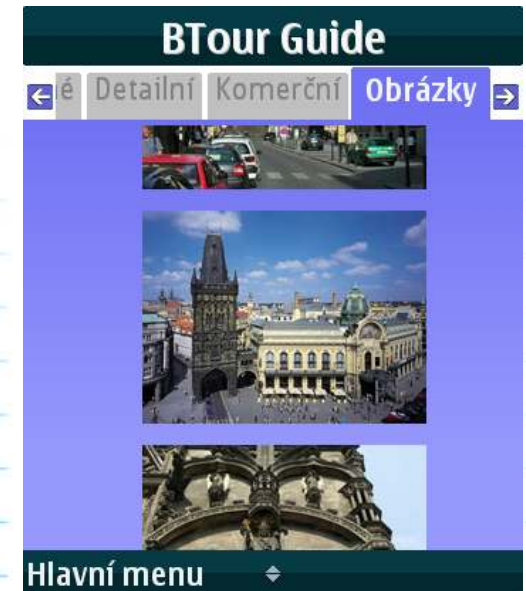
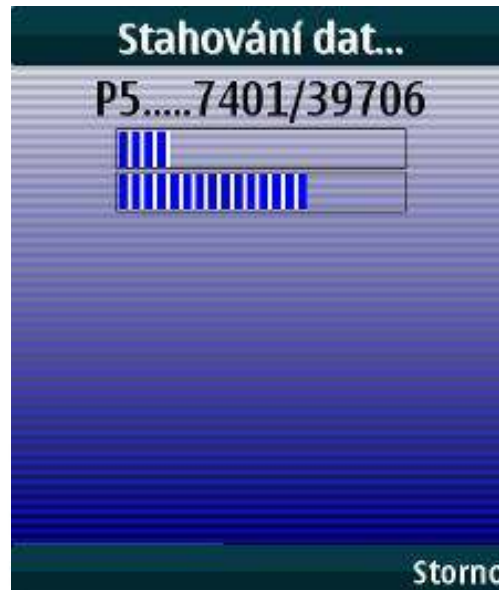


Btour Guide – description

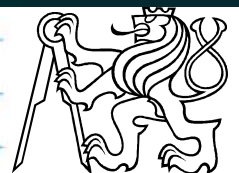


High-fidelity prototype

- Application running on the mobile device
- Target framework used
- BT points implemented (HW+SW)
- No implementation of solutions of "trouble" scenarios

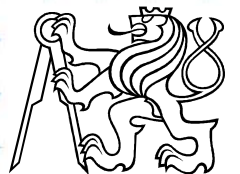
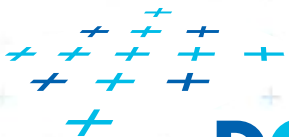


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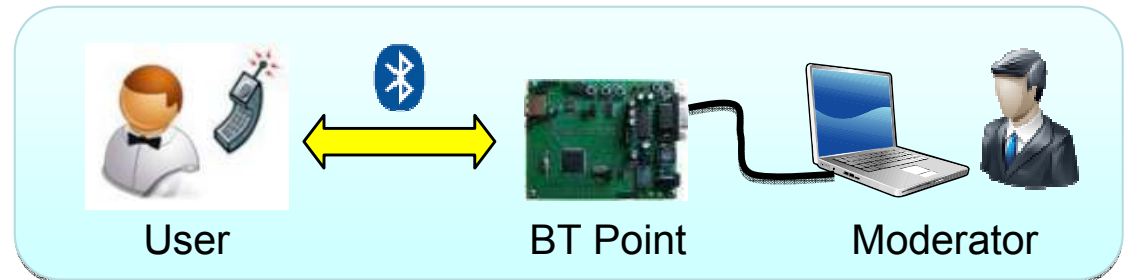
"Trouble" scenarios

- Scenario 1
 - slow and background download
 - necessity for repeat browsing
- Scenario 2
 - problems with BT point connection – signal strength is low, necessity to locate BT point
 - waiting for complete download
- Scenario 3
 - problems with BT point connection – connection refusal, BT point is busy
 - transparent download, no info to the user
- Scenario 4
 - download on demand
 - problems with BT point connection – connection interrupted



"Trouble" scenarios implementation

- Simulation of trouble situations
- Special client and server implemented
- Wizard of Oz technique

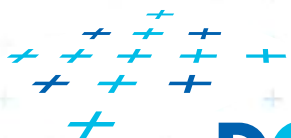




BEEPER MOBILE

Mobilní systém pro podporu včelařské práce

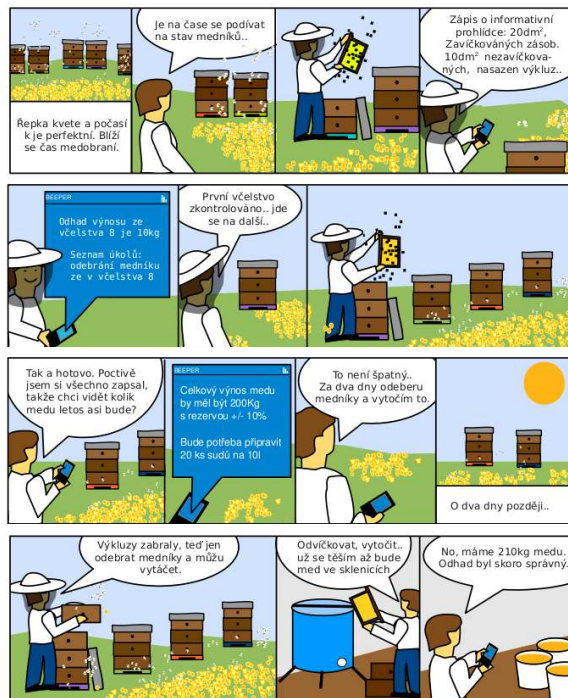
<http://benman.ondramandik.com/beeper-pro-mobilni-zarizeni>



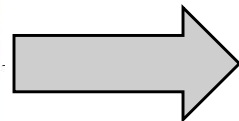
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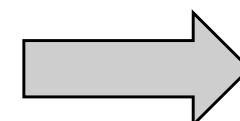
From Storyboard to HiFi Prototype



Storyboard



LoFi Prototype

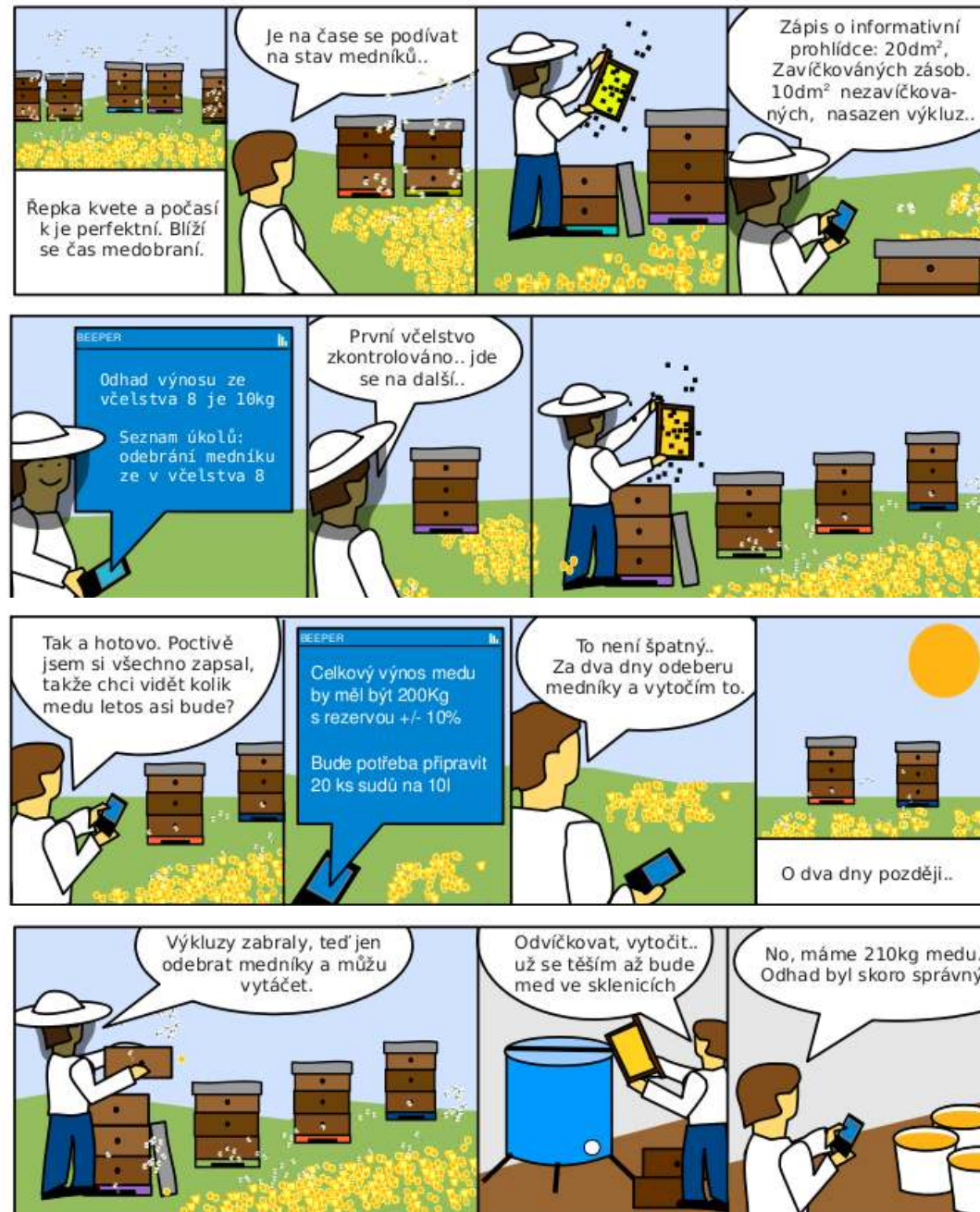


HiFi Prototype

- Rozdělení na akce a zobrazování informací, je nutné přepracovat nebo úplně vypustit.
- Je třeba rozšířit storyboard o tvoření nových včel, tak aby nedošlo k záměně termínu oddělek a smetenec.
- Je nutné znovu navrhnout uživatelské rozhraní pro správu včelařského inventáře.
 - Pracovat pouze s nastavkovým systémem, rámky a polorámky. Odstranit složitý systém nastavování rozměrů.
- Do oblasti léčení včelstev vůbec nevstupovat.
- Produkce medu musí evidovat všechny včelařské produkty.



Storyboards: 11 storyboards



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LoFi -> HiFi Prototype

Medobraní

Včelstvo: 25

Typ medu: Lesní

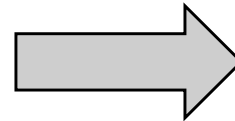
Výnos: 10 kg

Uložit

Uložit a další

Zpět

Menu



MicroEmulator

Medobraní

Typ snůšky

Typ: - vybrat -

Výnosy včelstev

- vybrat - kg

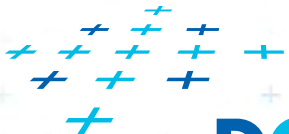
- vybrat - kg

+ Přidat včelstvo

Celkem vytočeno: 0 kg

Potvrdit Zrušit

38 screens



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LoFi -> HiFi Prototype

 **Objednávka medu**

Jméno:

Kontakt:

Objednávka medu:

kg

kg

Přidat typ medu

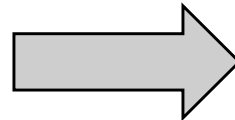
Uložit

Realizovat prodej

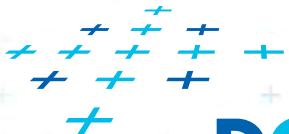
Smazat

← Zpět

≡ Menu



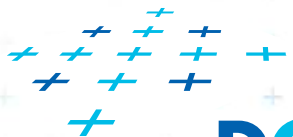
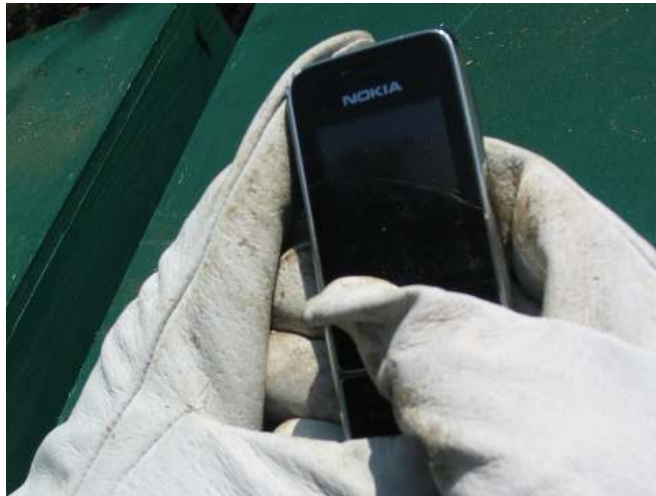
38 screens



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Field tests



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NUR - Prototyping (high fidelity) & Evaluation

(20)

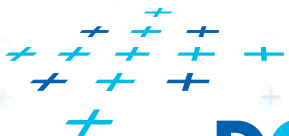




Intelligent household (i2home)

Intelligent household for elderly

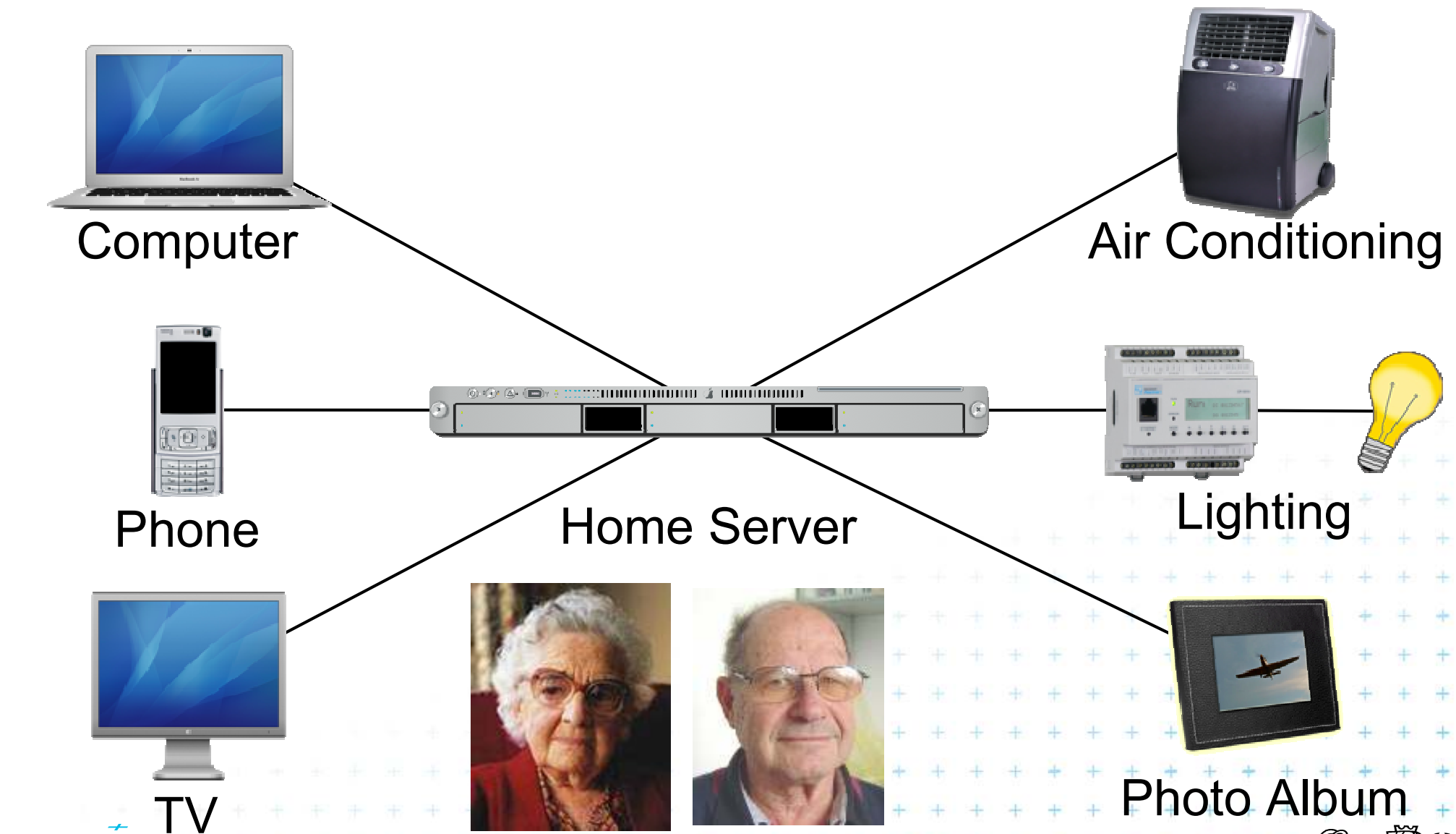
<http://www.i2home.org>



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Intelligent household - description



Intelligent household - description

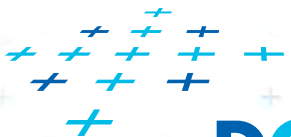
- Bringing technology closer to elderly people
 - help them to stay in touch with relatives
 - make them less dependent on others
- Make technology easier to use
 - evaluating new interaction methods
- Rapid UI development with UIProtocol
 - from prototype to final application



High-fidelity prototype of TV and household

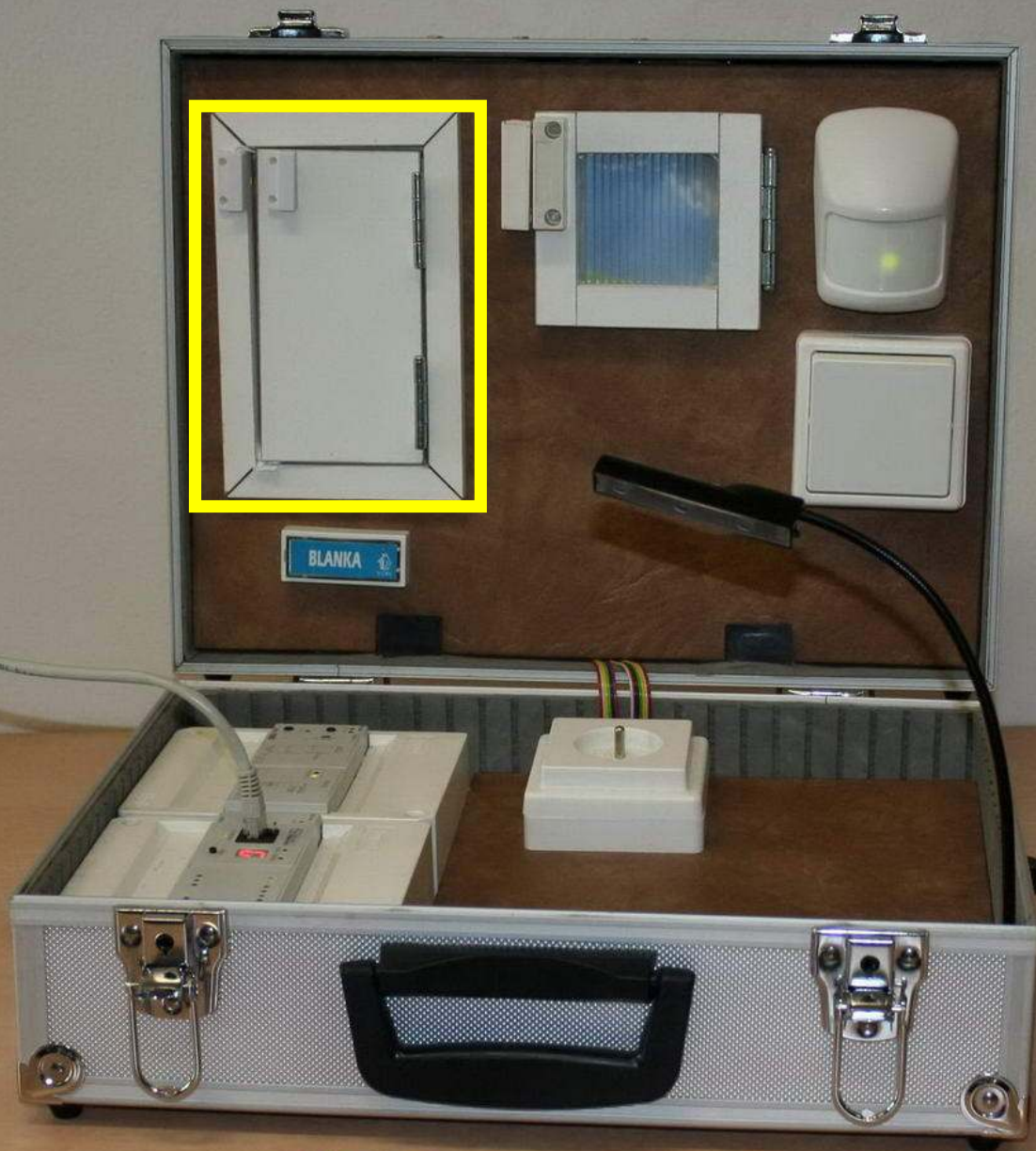


TV remote control



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Somebody is ringing the bell



I'm not Blanka

Talk

Reject



Now you can talk



Low vs. High fidelity prototype

■ LOW FIDELITY

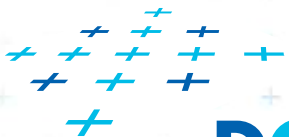
- hours/days to develop
- many alternatives
- no final interaction techniques
- not necessary on target devices
- sketchy look&feel
 - paper/electronic paper

■ HIGH FIDELITY

- days/months to develop
- few alternatives (if any)
- final interaction techniques
- on target devices
- final visual and interaction look&feel
 - target framework or testing environment running on target platform with final look&feel

■ lab tests

■ lab or field tests



Problems with prototypes

- Skipping deep user requirements analysis (D1)
 - especially low-fid prototypes (very fast and funny)
- User confusion: prototype vs. final project
 - especially high-fid prototypes
- Expensive and time consuming
 - especially high-fid prototypes
 - highly interactive systems
 - real-time response to highly changing environment

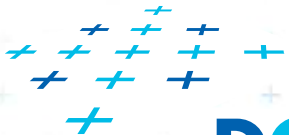


Types of prototyping

- Throw away prototyping
 - light-weight
 - short-time usage
- Evolutionary prototyping
 - very robust
 - constantly refined



Product development process



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NUR - Prototyping (high fidelity) & Evaluation

(32)



Product development process phases

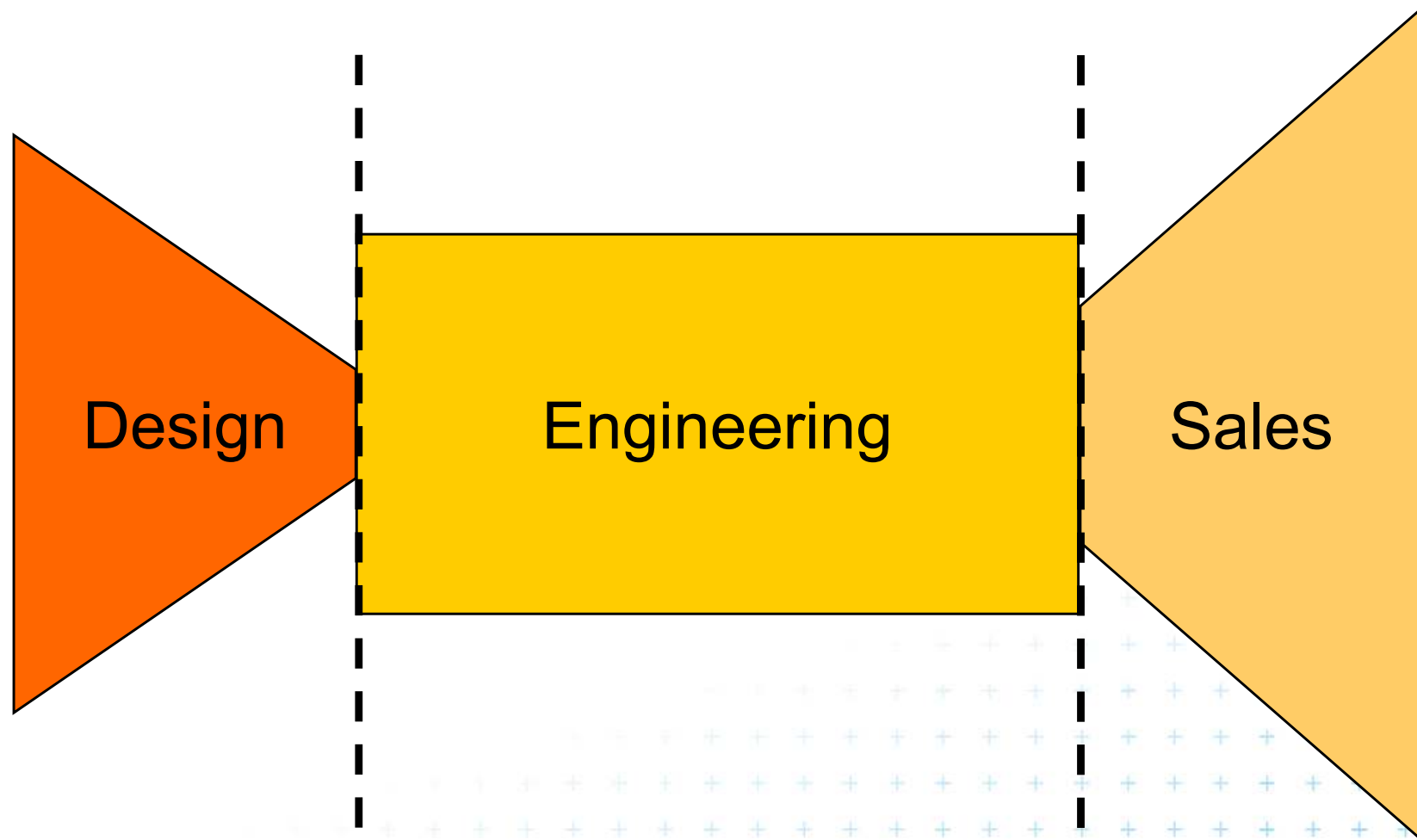
- Application domain: Personal Weather Forecast

- Development process phases

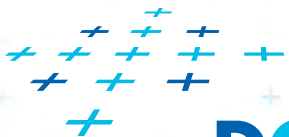
- problem analysis
 - user research (ethnography study)
 - user modeling (persona)
- design
 - sketching
 - prototyping (low-fid, high-fid)
- engineering
 - programming, manufacturing, assembling
 - testing & evaluation
- sales



Strictly distinguish design and engineering



Source: Buxton 2007



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NUR - Prototyping (high fidelity) & Evaluation





Prototyping as a part of SW dev. process

■ Waterfall

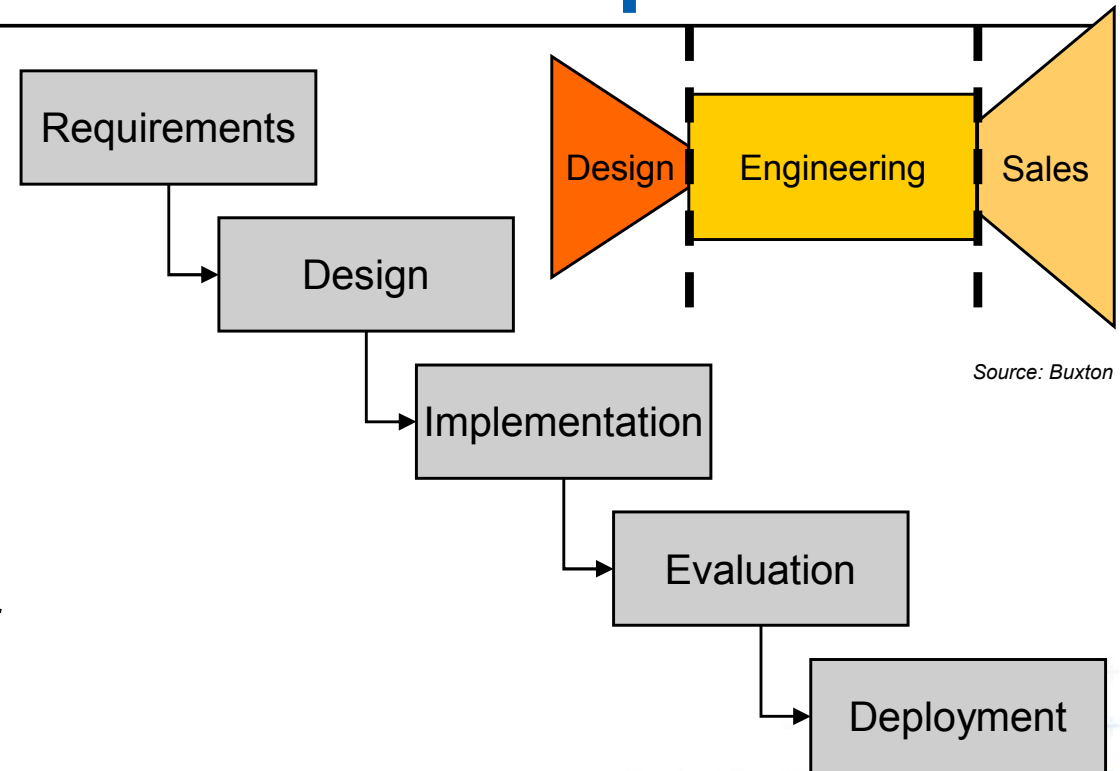
- in design phase
- not evaluated
- serves as specification
 - rather than text description

■ Iterative

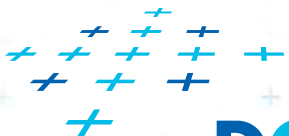
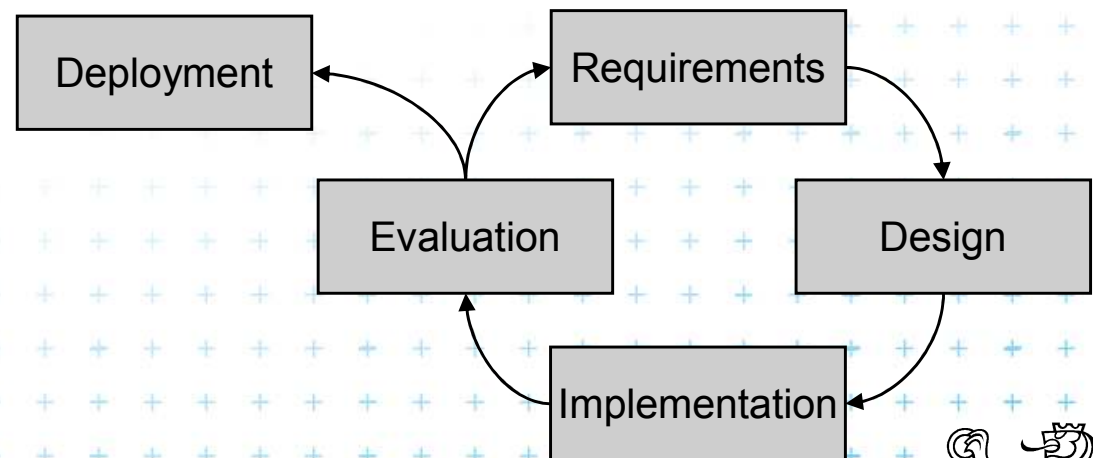
- in implementation phase
- can be evaluated
- design perceived as a part of implementation

■ In fact we can/should do prototyping in every stage continuously

■ HOW? The role of evaluation must be revised?

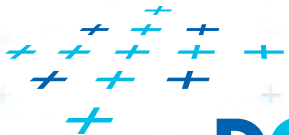


Source: Buxton 2007



Evaluation

Formative usability evaluation



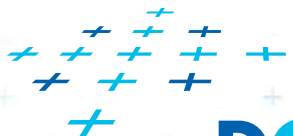
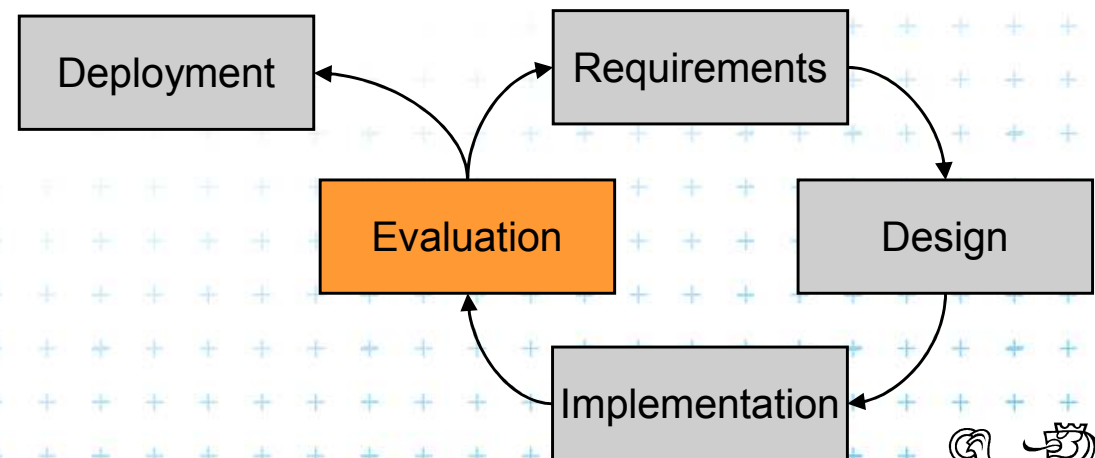
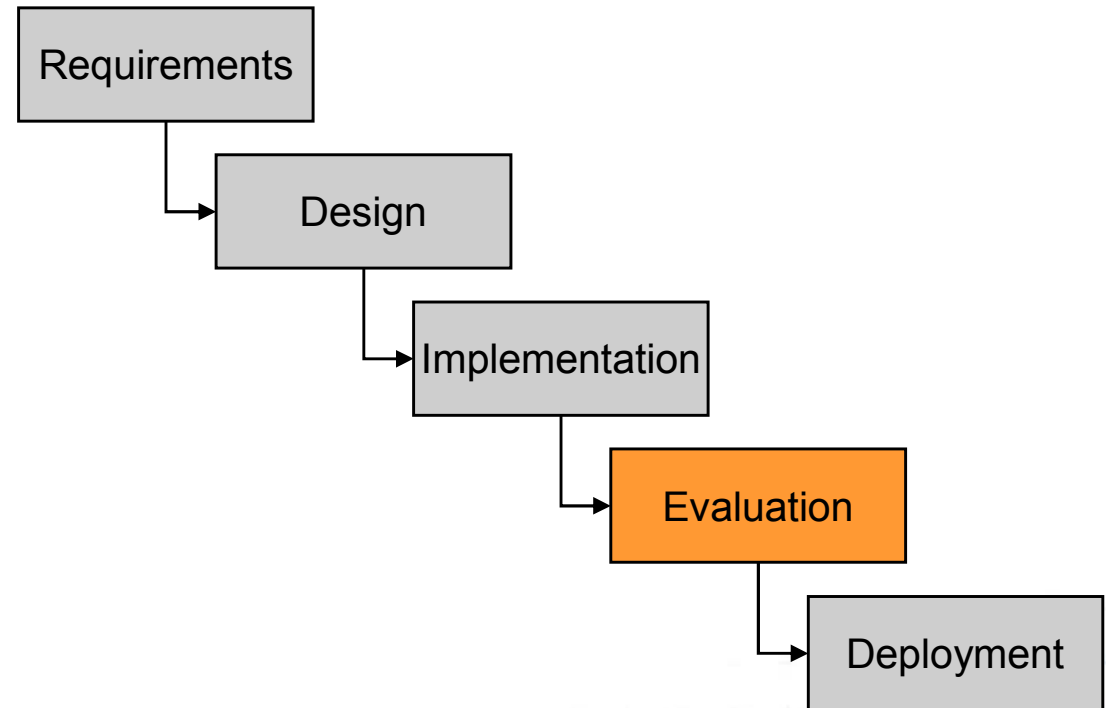
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Evaluation supporting the design process

■ Summative

- at the end of SW design process



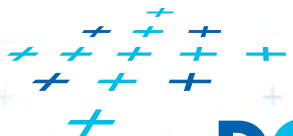
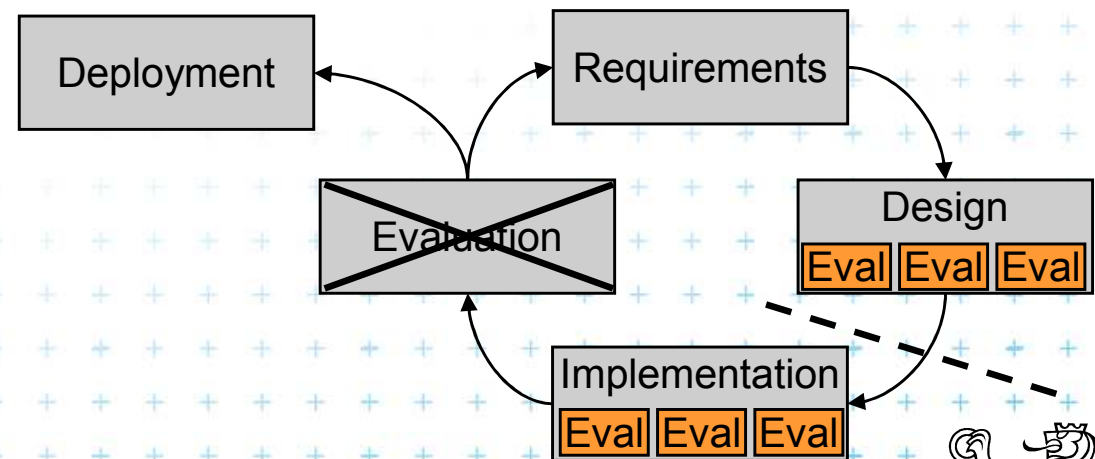
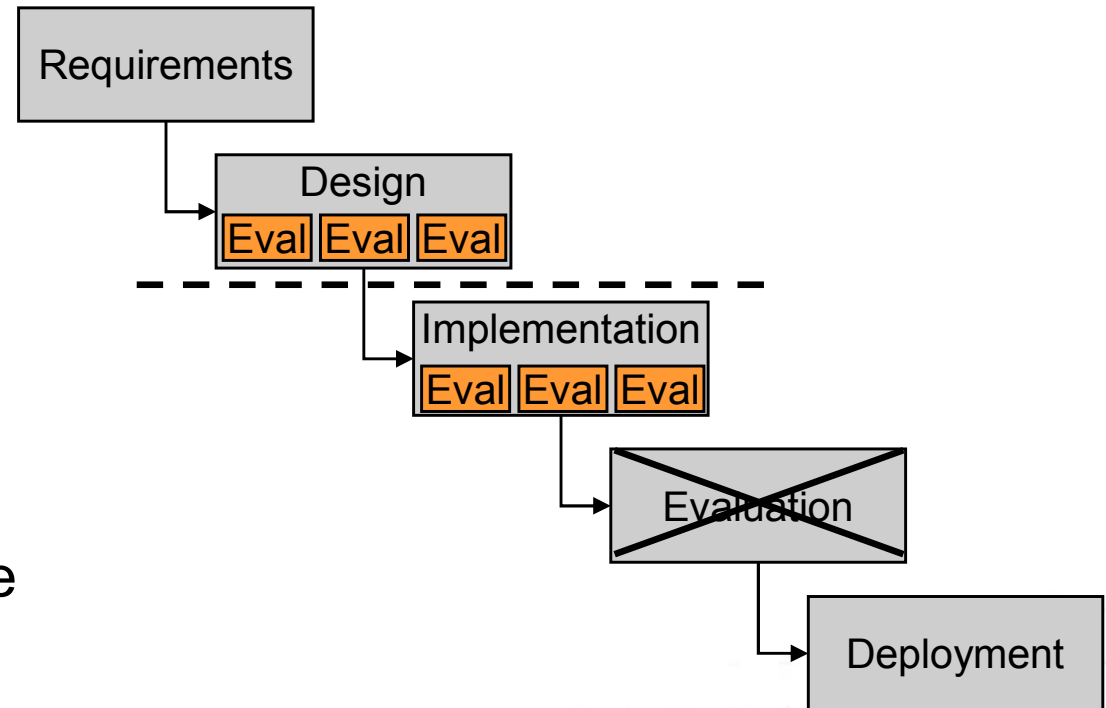
Evaluation supporting the design process

■ Summative

- at the end of SW design process

■ Formative [Hix and Hartson, 1993]

- supports the overall SW design process
- helps to form solutions to the design problems
- continuous evaluation
- strict distinction of Design and Engineering



Usage of prototypes for evaluation

- Analytical evaluation
 - based on simulation
 - GOMS, KLM, CW, HE
- Empirical evaluation
 - user tests
 - prototypes needed



Formative evaluation methods

- Learning from designing prototypes
- Informal user tests of low-fid prototypes
- Laboratory user tests
 - all kinds of prototypes
 - controlled conditions
 - statistical evaluation possible
- Field tests with users
 - high fidelity prototypes
 - some tests can be done only here
 - collaboration
 - intensive interaction with the dynamically changing environment



Performing evaluation

- Focus the evaluation on few specific requirements
 - performance requirements are easy to evaluate
- 1. Usability properties identification (specific requirements)
- 2. Prototype creation
- 3. Experiment design
- 4. Test run and data collection
- 5. Data analysis
- 6. Conclusions and recommendations statement



Performing evaluation - problems

■ 3. Experiment design

- poor choice of task mix => indistinguishable results
- wrong choice of participants => misleading results
 - unaware mixing novice and expert users can seem like design improvement
- accidental changes in the test conditions => insignificant or misleading results
 - large spread of measured values => insignificant results
 - shift of measured values => misleading results

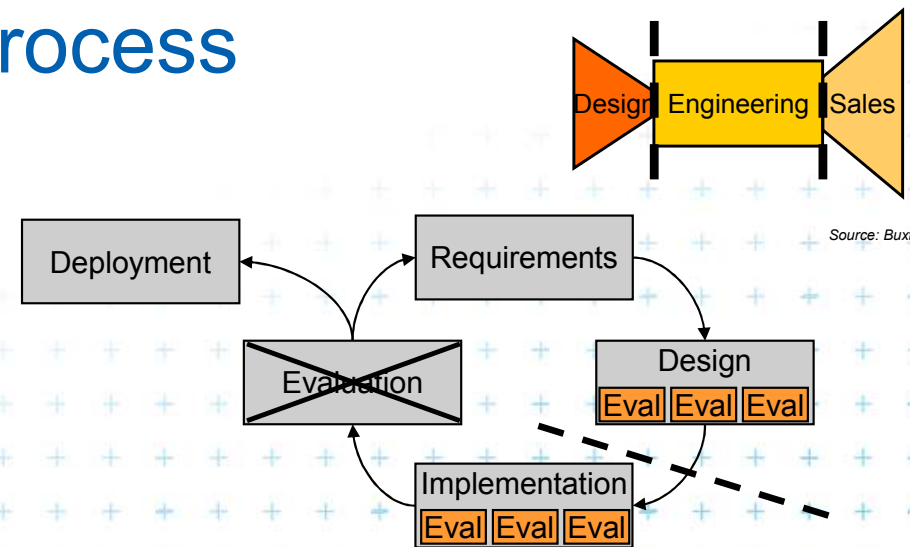
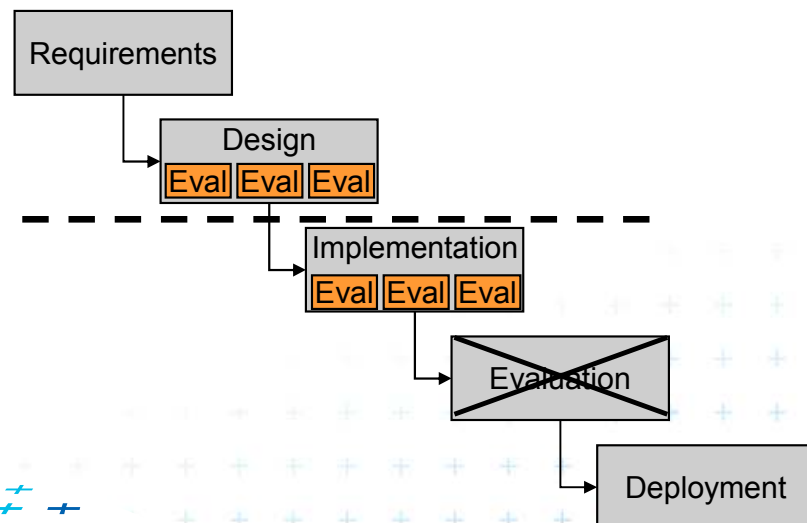
■ 5. Data analysis

- analysis of influence of test conditions on the data measured
- evaluator bias => analysis performed by more evaluators

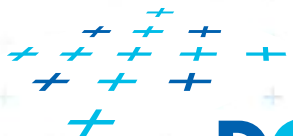


Evaluation of interactive system

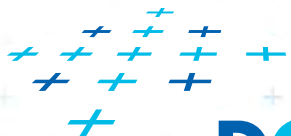
- Do we need prototypes for evaluation?
- YES. Why?
 - user testing needed (empirical evaluation)
 - without prototypes it is impossible
- => Formative evaluation involves prototyping in all stages of the SW design process



Source: Buxton 2007



Thank for your attention



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