Université Grenoble Alpes

Engineering Human Computer Interaction: focus on design

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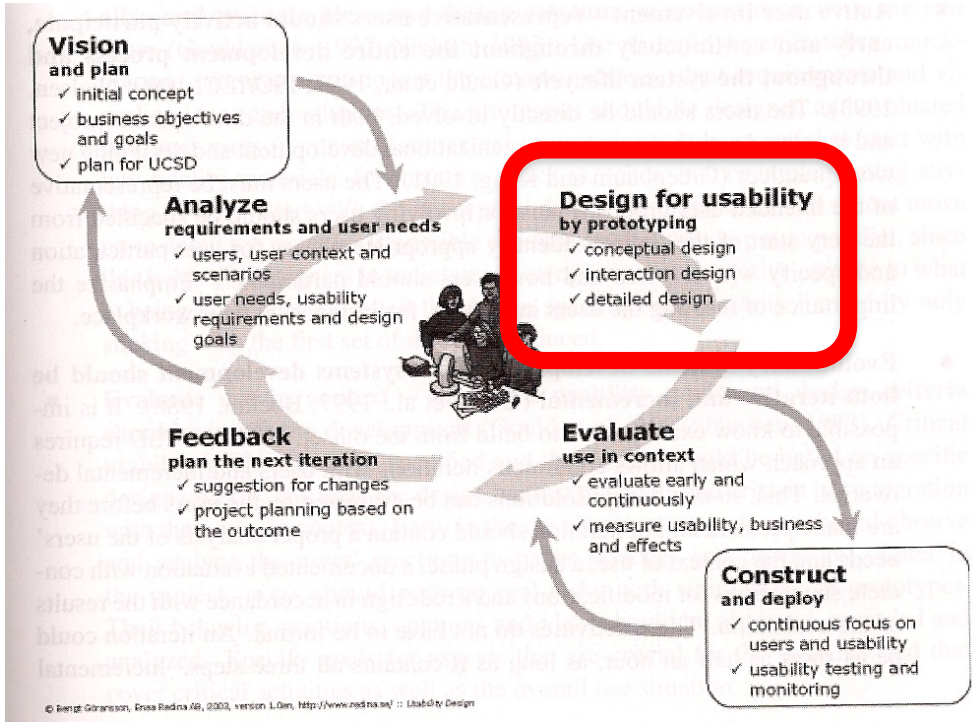
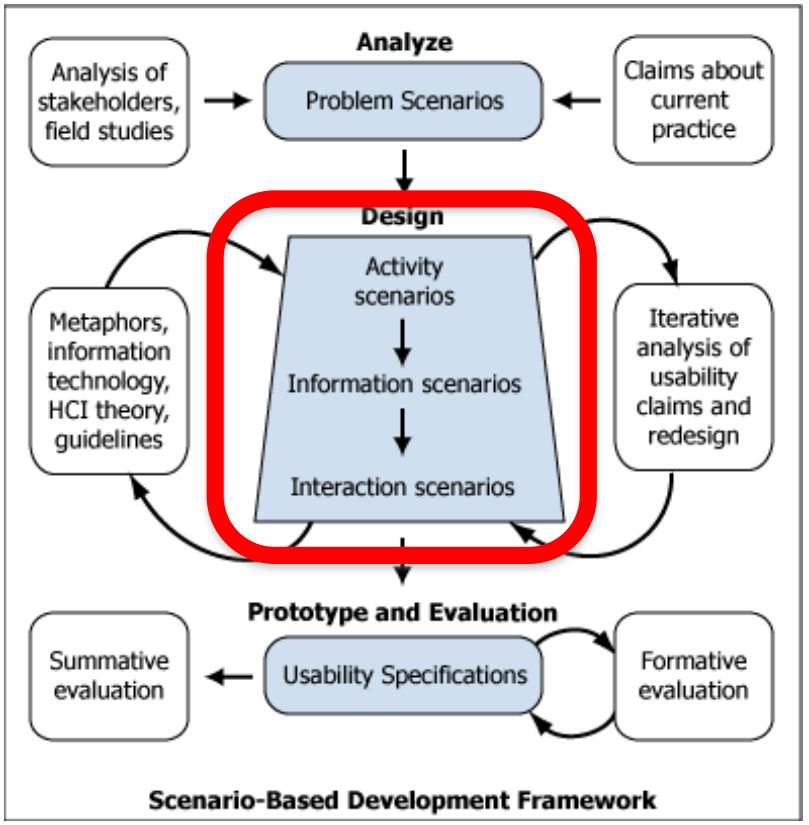
Introduction

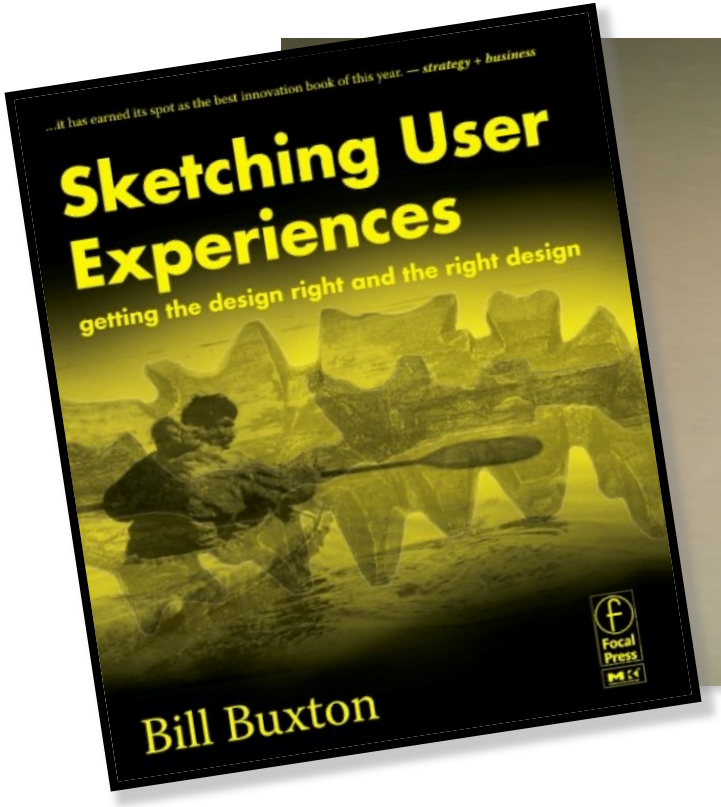
- Focus of the lecture

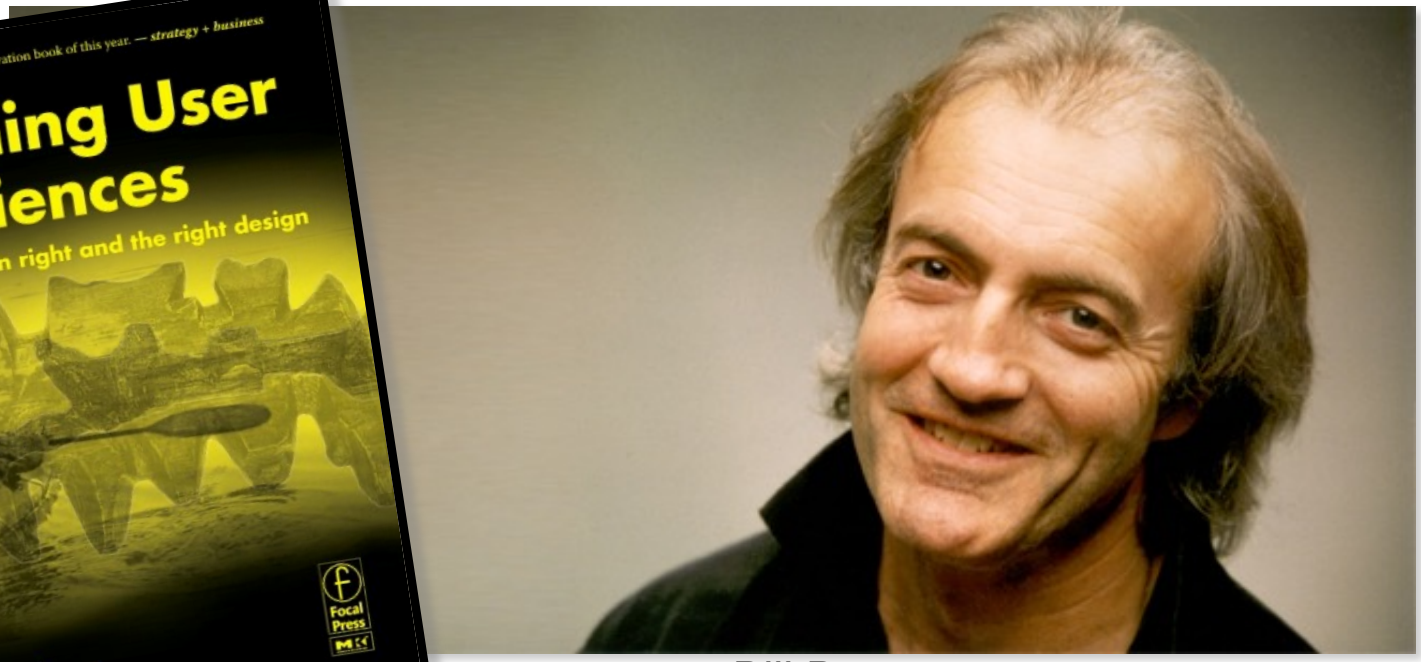




Principles of creativity

- Reference book





Bill Buxton

Principles of creativity

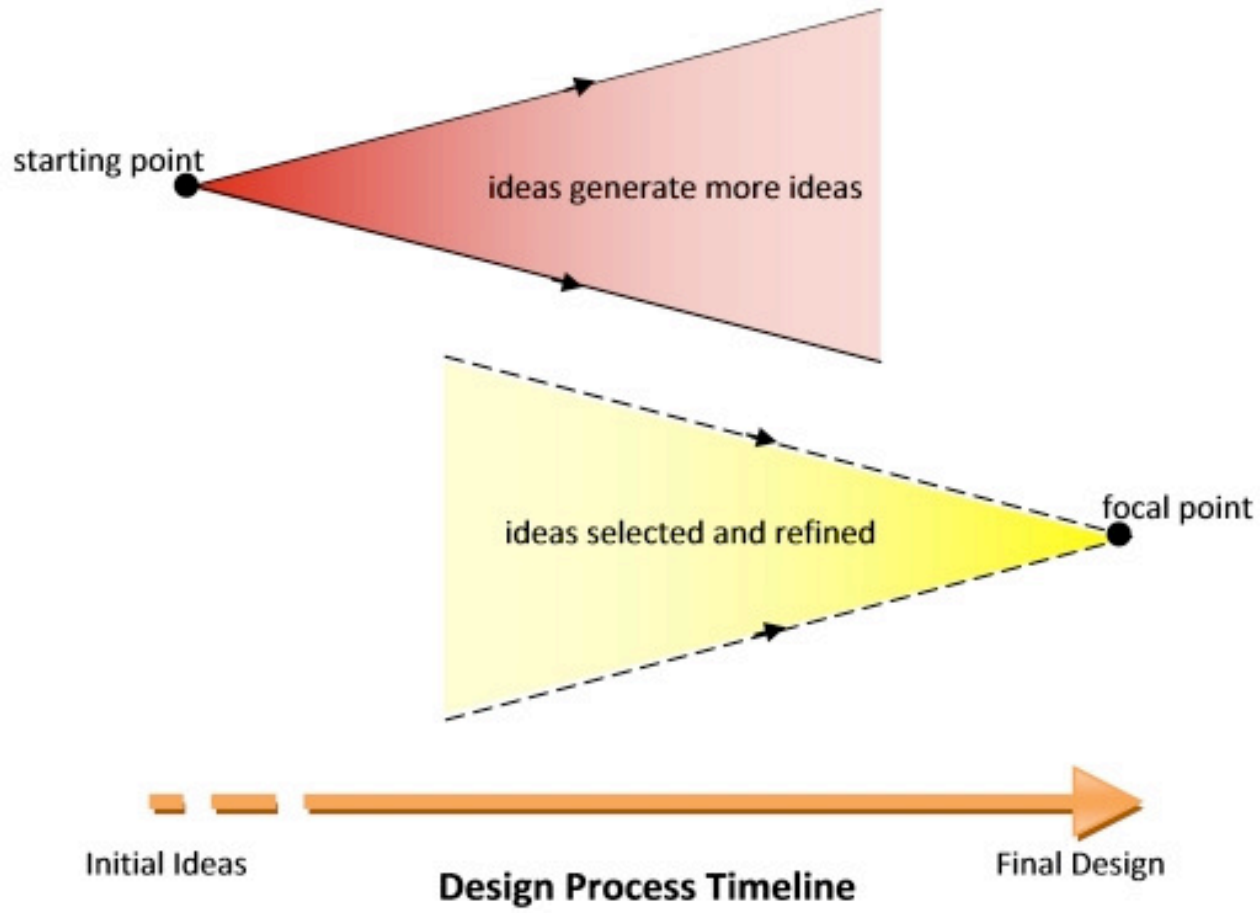
- **#1. Quality is a side-effect of quantity! Explore the design space as much as possible**
  - The ceramics teacher announced on opening day that he was dividing the class into two groups. All those on the left side of the studio, he said, would be graded solely on the **quantity** of work they produced, all those on the right solely on its **quality**. His procedure was simple: on the final day of class he would bring in his bathroom scales and weigh the work of the "quantity" group: fifty pounds of pots rated an "A", forty pounds a "B", and so on. Those being graded on "quality," however, needed to produce only one pot—albeit a perfect one—to get an "A."
  - Well, came grading time and a curious fact emerged: **the works of highest quality were all produced by the group being graded for quantity**. It seems that while the "quantity" group was busily churning out piles of work—and learning from their mistakes—the "quality" group had sat theorizing about perfection, and in the end had little more to show for their efforts than grandiose theories and a pile of dead clay. (Bayles & Orland 2001; p. 29)

Principles of creativity

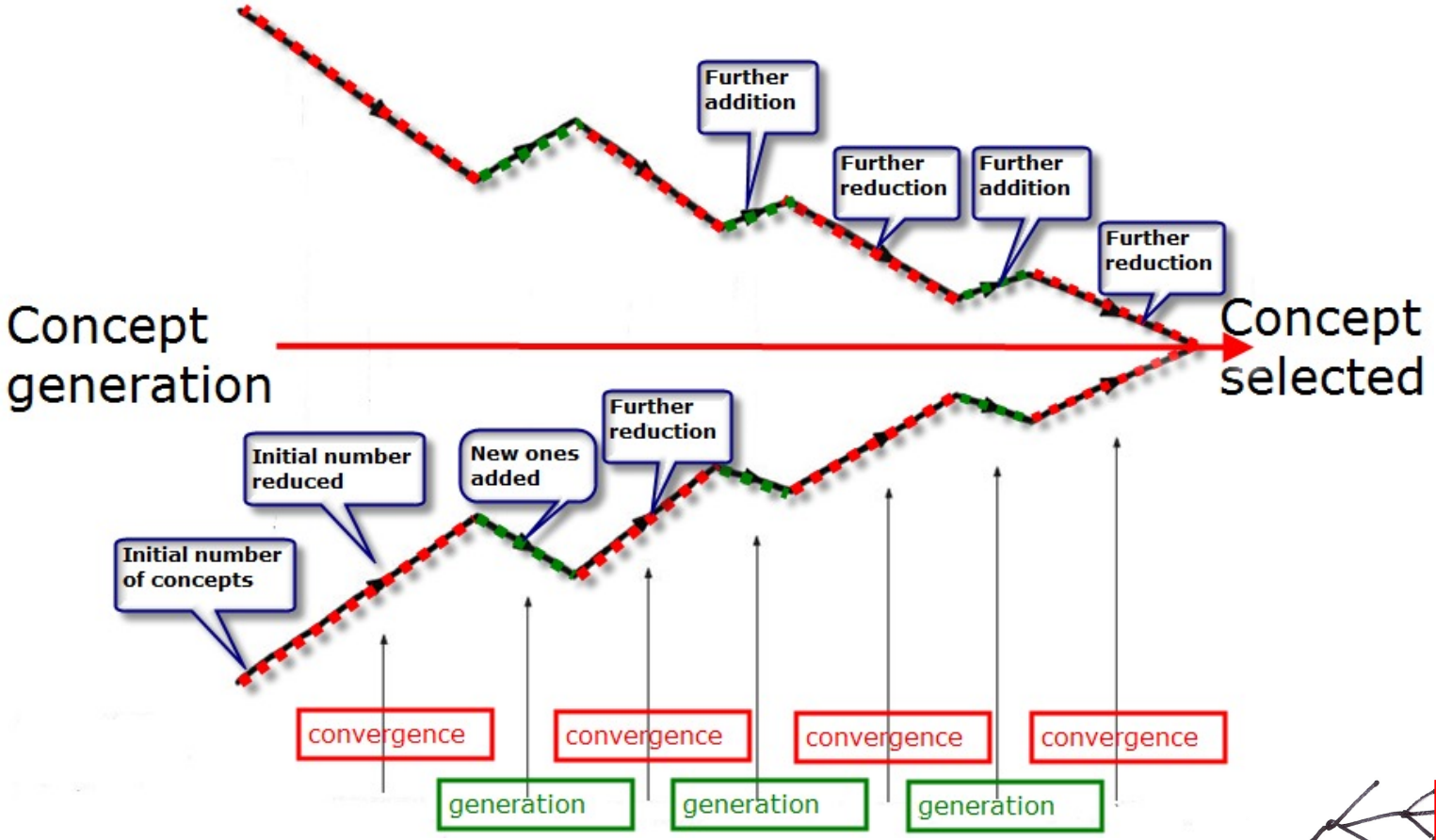
- **#2. "You must get the right design as well as the design right"**
  - **First Getting the right design**
    - Generate many ideas, e.g. inspired by brainstorming, discussions, lateral thinking, client discussions, observations, etc.
    - Reflect on all your ideas
    - Choose the ones that look promising
  - **Then Getting the design right**
    - Iterate and develop your choices
    - Continually refine your choices as the better solutions become apparent
    - Of course, add in new ideas as they come up

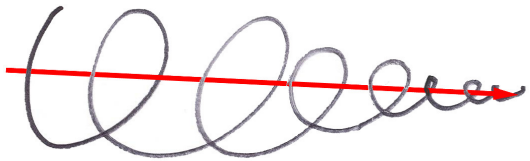
  - **"The role of design is to get the right design. The role of usability engineering is to get the design right"**

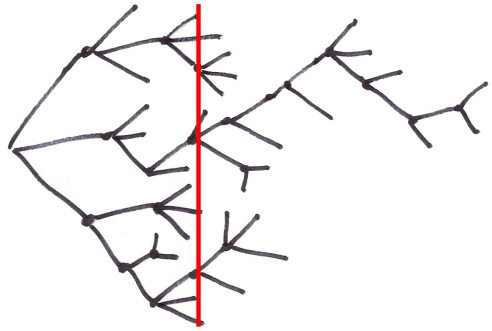
Principles of creativity



Principles of creativity

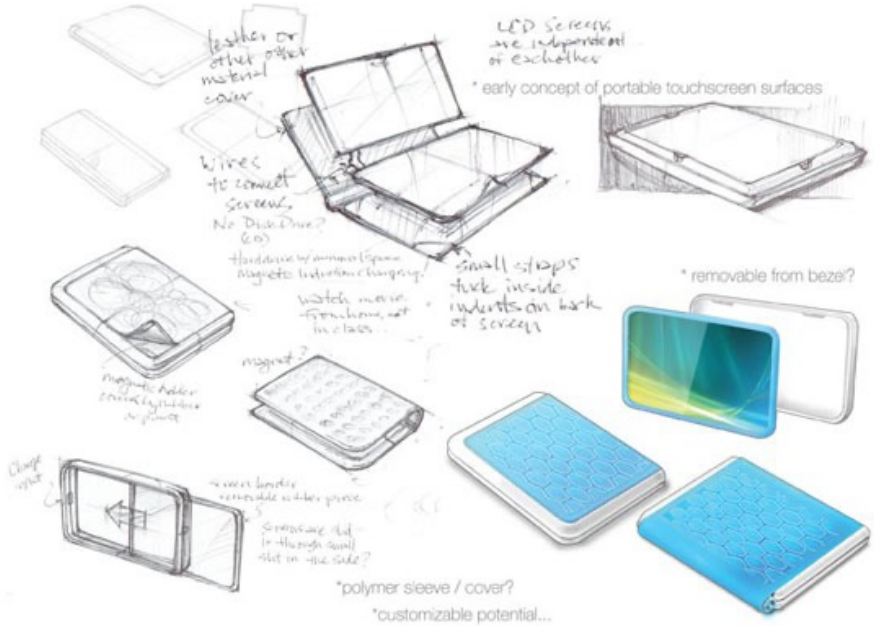






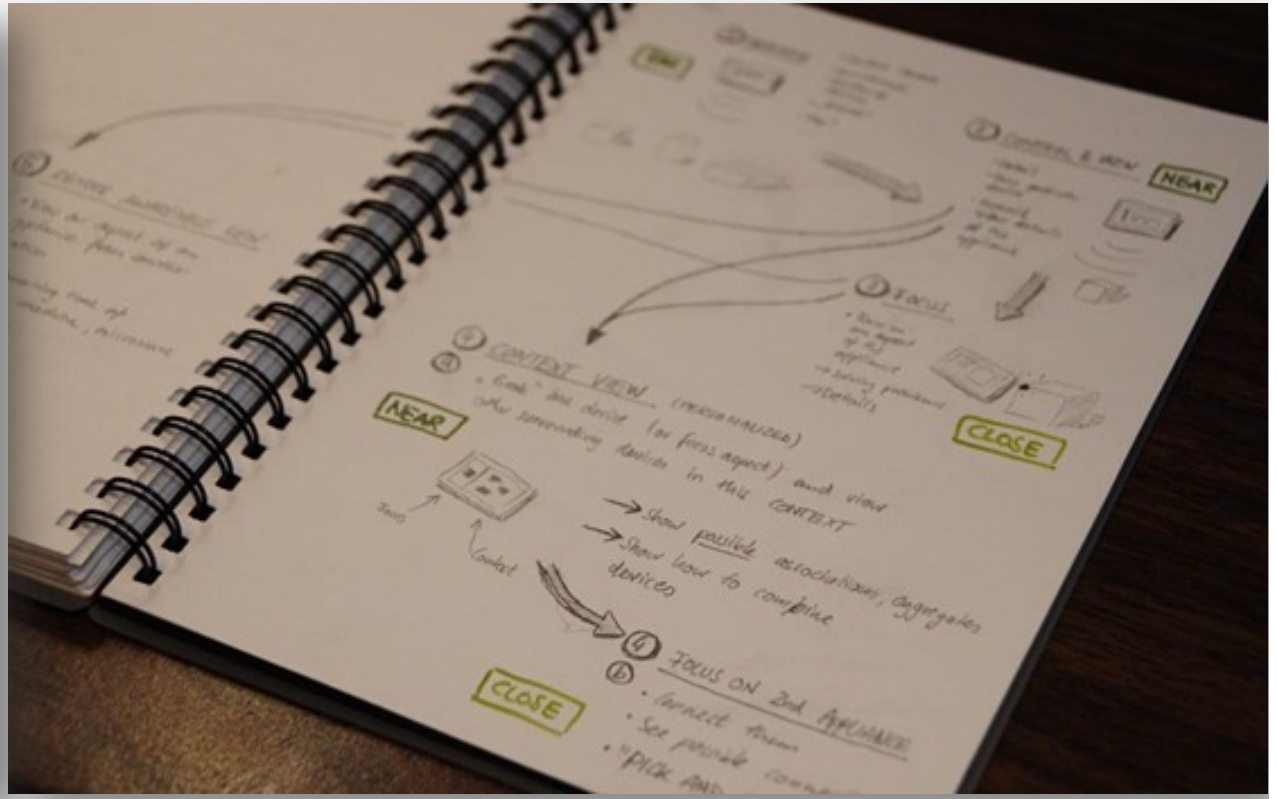
Principles of creativity

- #3. Sketch
  - Producing *full* solutions is time consuming => Favor sketches
  - A sketch is not a means for depicting an idea. It is a means for exploring the design space.
  - **A sketch is not a sordid drawing**



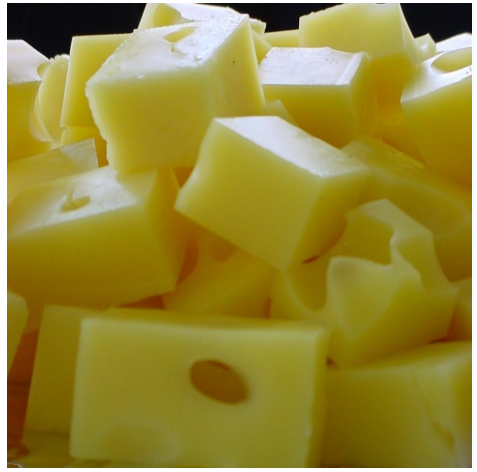
Principles of creativity

- Sketchbook



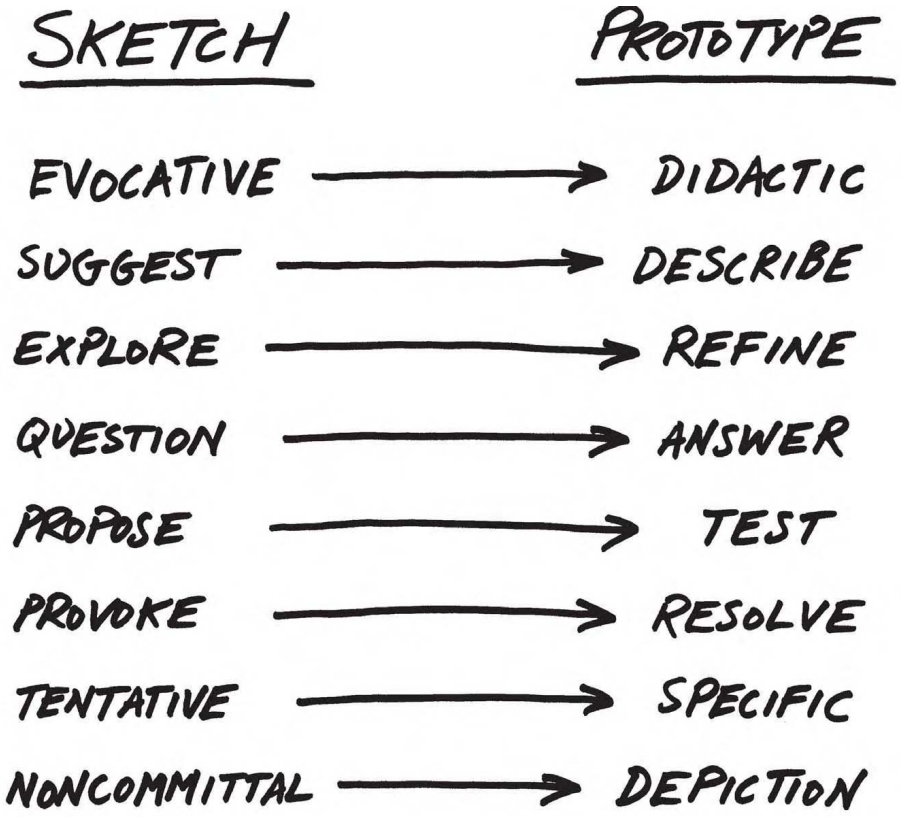
Principles of creativity

- Few properties for being a good sketch [Buxton 2007]
  - Quick / Timely
  - Inexpensive / Disposable
  - Plentiful
  - Clear vocabulary
  - No higher resolution than required to communicate the intended purpose/concept
  - Resolution of the rendering does not suggest a degree of refinement of the concept exceeds its actual state
  - **Ambiguous**
- **Make understand it is a sketch!**
  Do not do too much!
  Keep place for imagination!

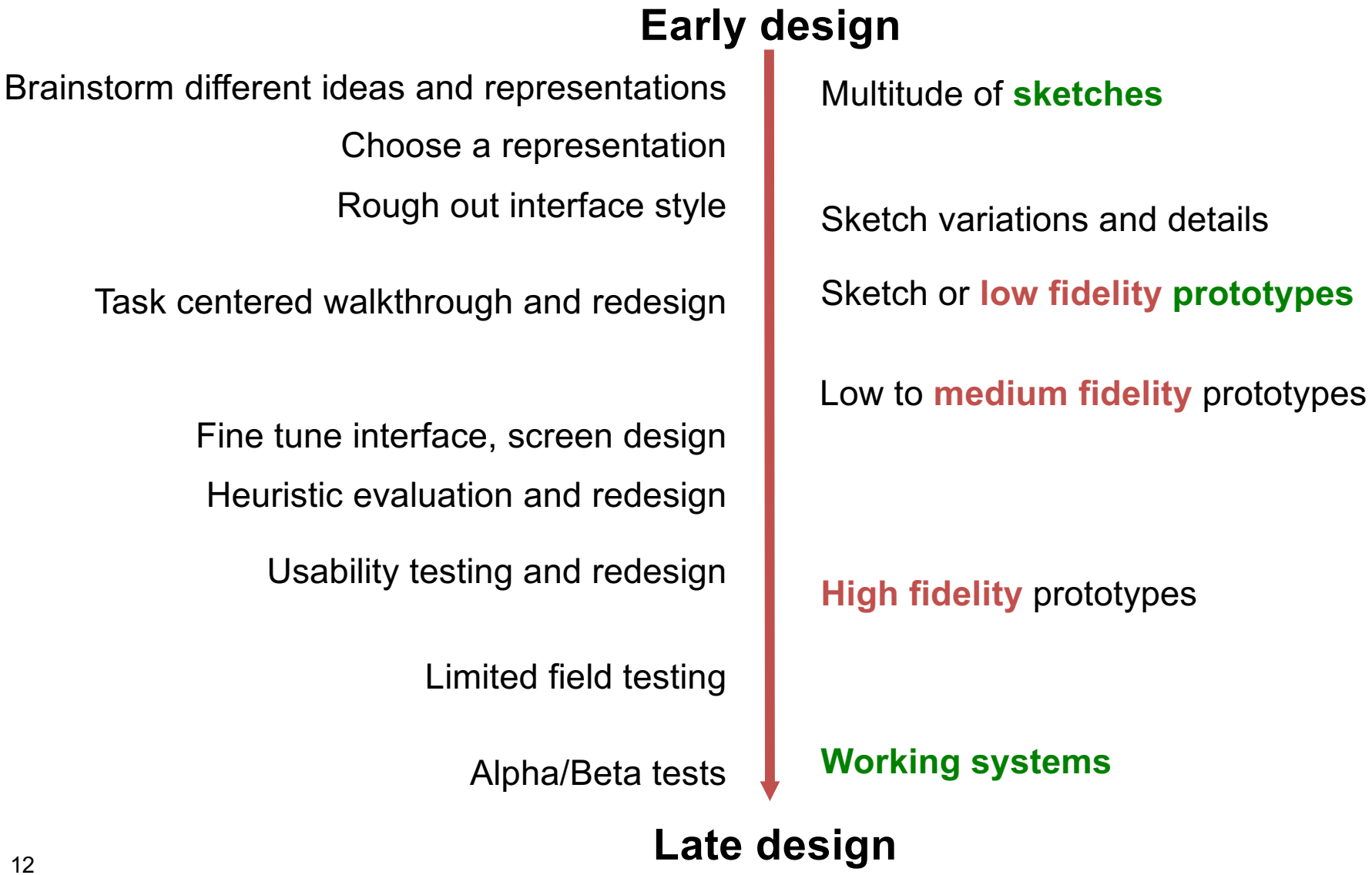


Principles of creativity

- **A sketch is not a low fidelity prototype!**

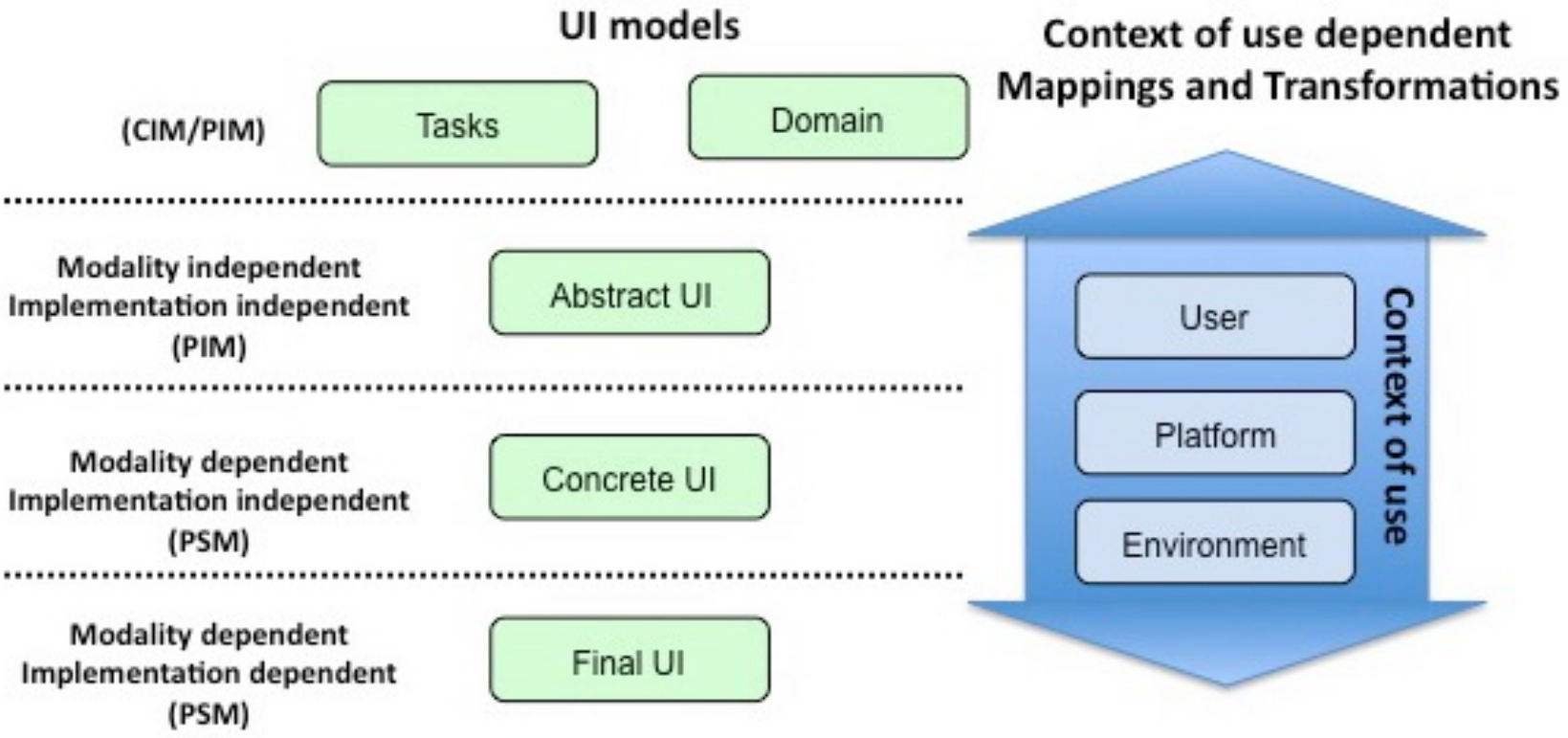


Principles of creativity



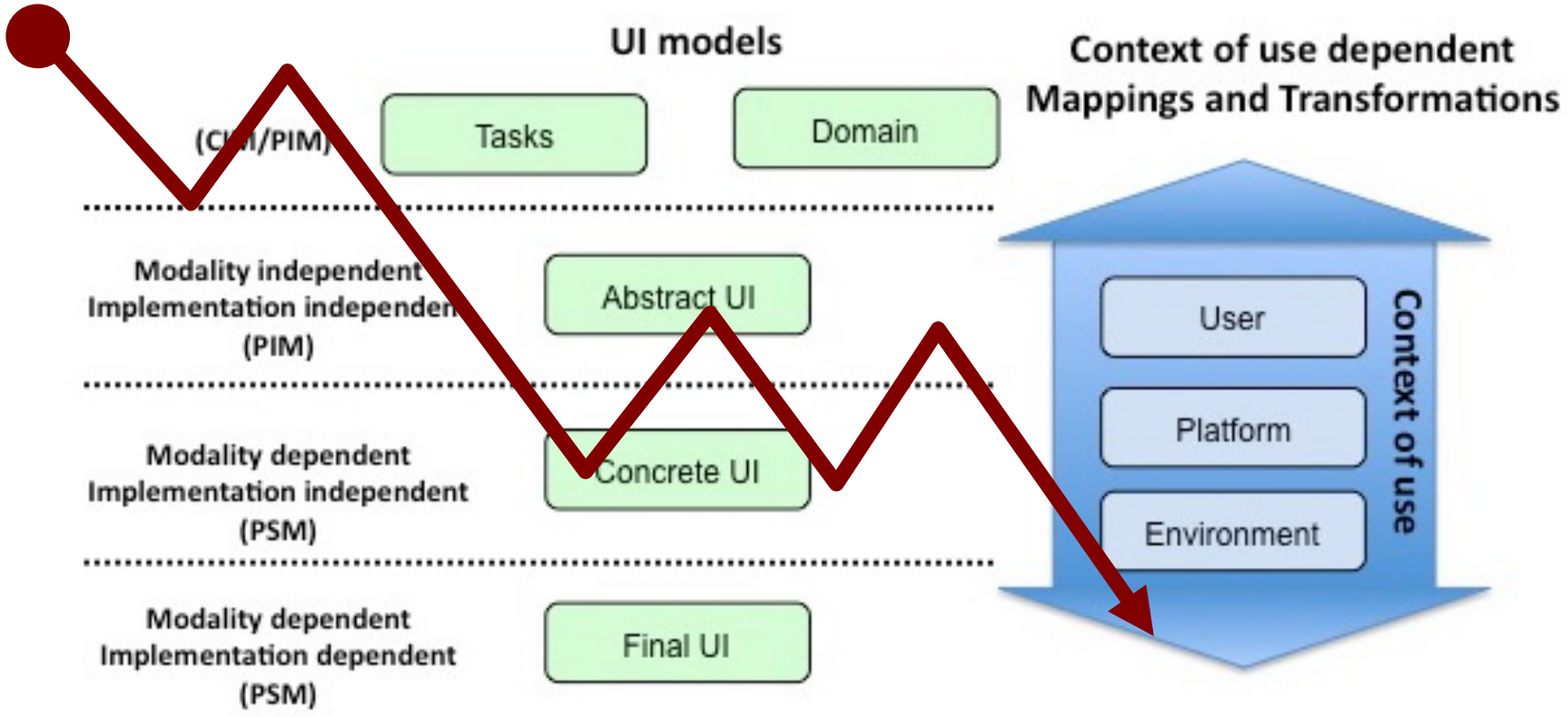
Quick convergence

- Several levels of abstraction



Quick convergence

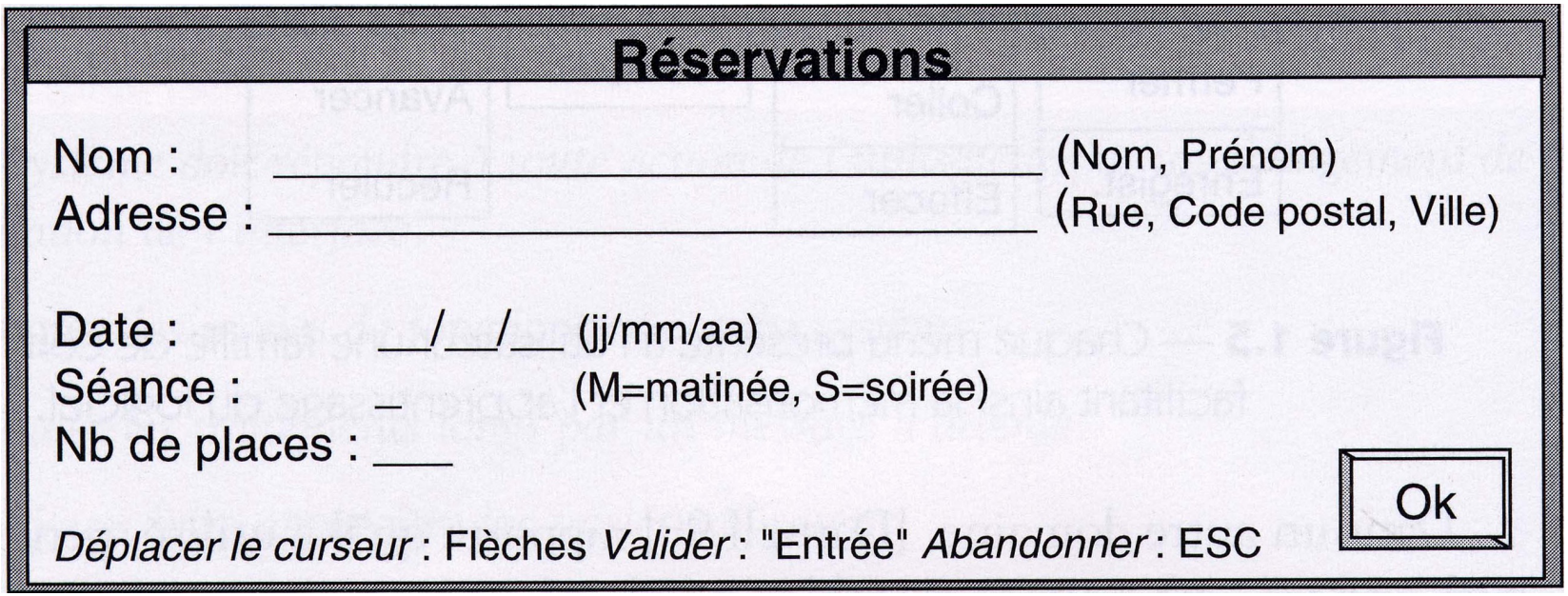
- Several entry points and design paths



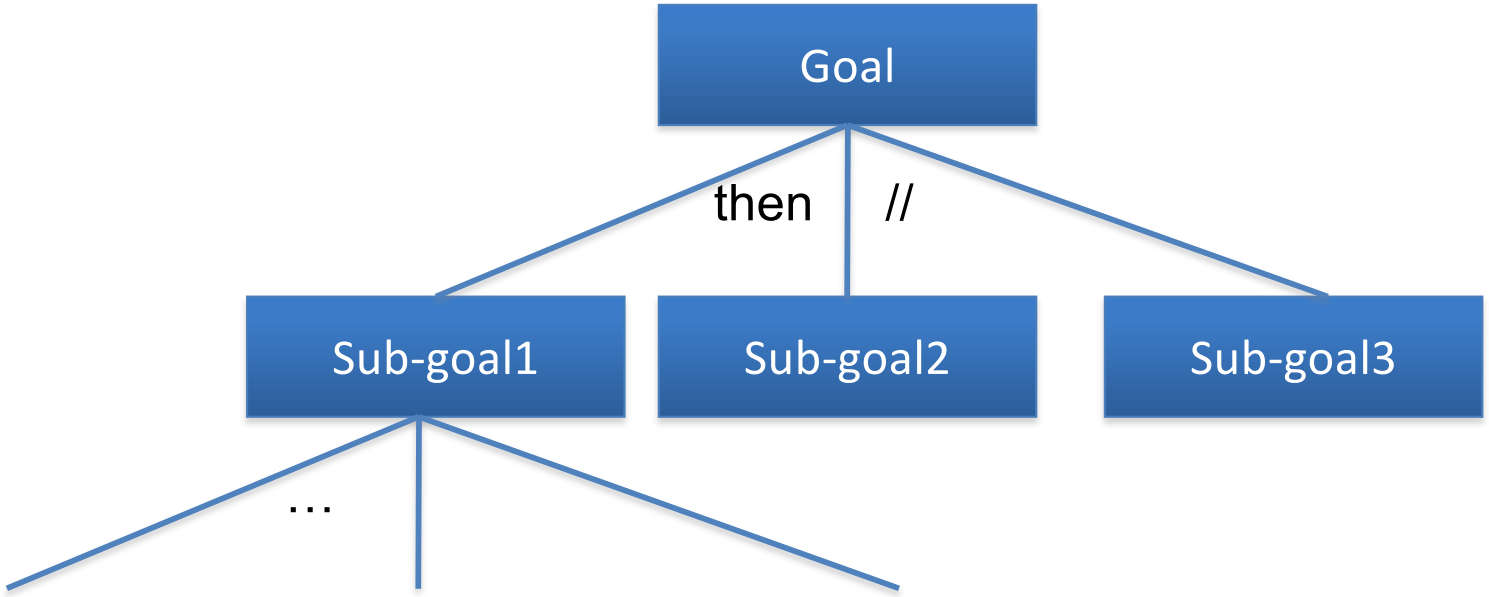
Focus on the Task model

Task model

- Exercice: reverse engineering



Task model



Task model

- Terminology
  - Task
    - A user goal
    - A procedure to achieve the goal
  - Procedure: a set of subtasks linked together by the way of logical and/or temporal relationships
  - Elementary tasks: tasks that would be decomposable into physical actions => not to be further decomposed = leafs of the tree
  - Physical action: atomic operation performed on an input or output device => not to be mentionned in the tree

Task model

- How to elaborate the model
  - Collect data in the field
  - Identify domain concepts (psychological variables)
  - Elicit the operations that are appliable to the concepts
  - Elaborate the hierarchy of (sub)tasks
  - Decorate each task
  - Think to exceptions (interruptions, system/user errors)
  - Evaluate the decomposition
    - Multiple decomposition of a same task, too many subtasks, …
    - Evaluate with users (if accessible)

Task model

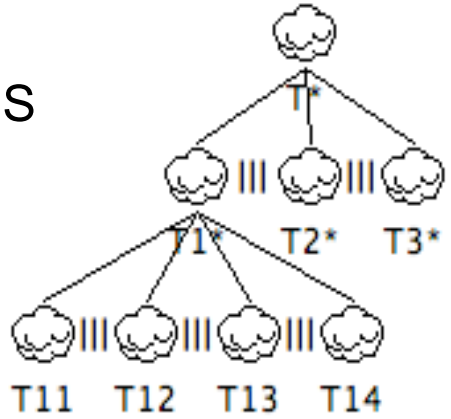
- Core principles
  - Top-down: refinement
    - Intermediary tasks: abstract tasks (at least two subtasks)
    - Leafs: elementary tasks
  - Left-right: time if relevent
  - One operator between 2 subtasks
    - Temporal: sequence, interleaving
    - Logical : or, and
  - Be careful with priorities between operators

Task model

- Decorations
  - Domain concepts
  - Preconditions
  - Postconditions
  - Frequency
  - Optionality
  - Complexity
  - Criticity
  - Temporal constraints (maximal duration)
  - Actor in charge of the task (user and/or system)
  - Platform
  - Others (depend on the domain)

Task model

- Formalisms and notations
  - CTT (University of Pisa) : based on LOTOS
  - UAN
  - KMAD



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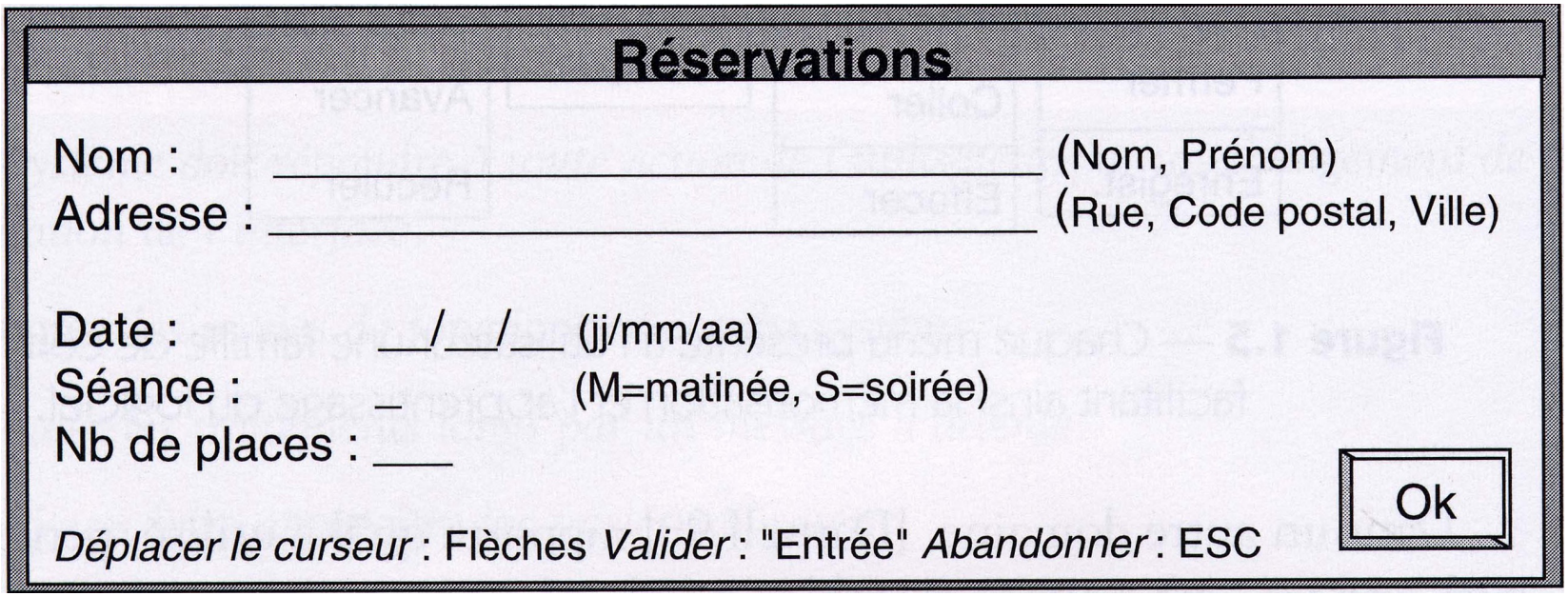
Focus on the domain model

Domain model

- Exercice: reverse engineering



Domain model

- Entities/Information useful for performing the task
  - = Psychological variables (e.g., the concept of document)
  - Will give rise to digital objects (e.g., the file object)
- Knowledge comes from the analysis phase
- How to elaborate the model
  - Scenario analysis
  - Elicit the objects and operations (e.g., create, delete, modify…)
- = an UML class diagramme classically
- Are decorations of the task model

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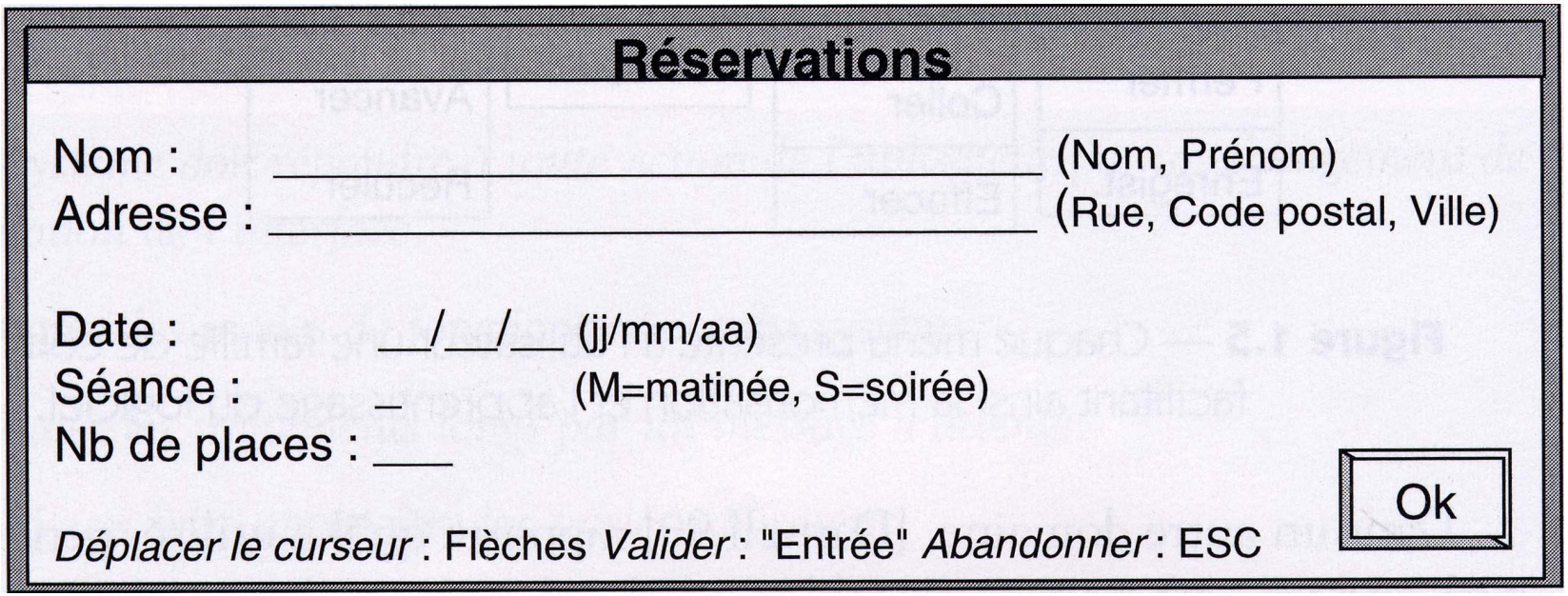
Focus on the abstract user interface

Abstract UI

- Exercice: reverse engineering



Abstract UI

- Three thinks to be modeled
  - Structuration of the UI in terms of dialog spaces
  - Navigation among spaces
  - Conceptual content

- Rationale = Ergonomic criteria

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Focus on the concrete user interface

Concrete UI

- Exercice: reverse engineering

Réservations

Nom : _____ (Nom, Prénom)
Adresse : _____ (Rue, Code postal, Ville)

Date : __/__/__ (jj/mm/aa)
Séance : _ (M=matinée, S=soirée)
Nb de places : ___

Déplacer le curseur : Flèches *Valider* : "Entrée" *Abandonner* : ESC

Ok

Concrete UI

- Specification of the rendering
  - Dialog spaces: windows, panels, sentences?
  - Navigation: « Next buttons », tabbed panes, separators?
  - Content: images, films, sounds, radio buttons, labels?

- Rationale = Ergonomic criteria

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Focus on the final user interface

Final UI

- Specification of the environments
  - development
  - execution

Conclusion

Know (how), explore, explicit, revise and argue!

Conclusion

- User Interface = a trade-off

- QOC (Question, Option, Criteria) (McLean)
  - Tracability, maintenance
  - Decision support