WE COULD DESIGN THE PRODUCT WITH A SIMPLE POINT-AND-CLICK INTERFACE...

OR WE COULD REQUIRE THE USER TO CHOOSE AMONG THOUSANDS OF POORLY DOCUMENTED COMMANDS, EACH OF WHICH MUST BE TYPED EXACTLY RIGHT ON THE FIRST TRY.

BEAR IN MIND, WE'LL NEVER MEET A CUSTOMER OURSELVES.

MAKE IT SO THEY HAVE TO REBOOT AFTER EVERY TYPO.
Software Prototyping

Prototypes as Assets not Toys
Why and How to Extract Knowledge from prototype
Kurt Schneider, May 1996
Agenda

- Definition of Prototype
- History of Prototyping
- Uses of System Prototypes
- Taxonomy of Prototypes
- Prototyping languages
- Pros & Cons
- Prototyping, to use or not?
- Designing a prototype
What can be a prototype?

• Sketches
• Diagrams & Frameworks
• Machined construction
• Virtual models
• Graphics
• Role play, Experiences
• Video
• And more ...
Definition

• Article – A tool to explore the introduction of computer into new domains

• Wikipedia – An activity during certain software development, is the creation of prototypes, i.e., incomplete versions of the software program being developed
• Reference 1 – Animating and demonstrating system requirements

Reference 2 – A representation of a design before the final artifacts exist
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Sketching

Paper mock-up of the interface look, feel, functionality
- Quick and cheap to prepare and modify
- Initial representation/user reaction
- Elicit user modifications / suggestions

Invite
Suggest
Explore
Question
Propose
Provoke
From Sketching Low Fidelity Prototypes
And the story continues...

- From Sketches and low fidelity prototypes to medium / high fidelity prototypes
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The user is just like me
Golden rule of interface design:

Know The User
Uses of System Prototypes

- The principal use is to help customers and developers understand the requirements for the system
- The prototype may be used for user training before a final system is delivered

- The prototype may be used for back-to-back testing
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Description and characteristics:

- Early project phase, supports acquisition of project, attracts customers

- Will be abandoned

- Covers only very limited part of the target system (mostly user-interface)
Role of prototype: Prototype proper

Description and characteristics:

- Parallel to modeling the application domain, a temporary, executable system is developed.

- Covering several functions and the user-interface.

- The prototype lacks important properties of the target system (e.g., error handling).
Role of prototype: Breadboard

Description and characteristics:

- Derived from a domain model or specification to allow study of alternative solutions
- Also to foster creativity of developers
Role of prototype: Pilot System

Description and characteristics:

- No distinction between prototype and target system
- Prototype is actually used in the application domain as kernel of the full target system, evolves gradually
## Purpose of prototype

<table>
<thead>
<tr>
<th>Approach</th>
<th>Purpose</th>
<th>Investigating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explorative</td>
<td>Elicit requirements, determine scope and different alternatives of the computer support</td>
<td>Requirements</td>
</tr>
<tr>
<td>Experimental</td>
<td>Try out technical Solutions to meet requirements</td>
<td>Particular solutions</td>
</tr>
<tr>
<td>Evolutionary</td>
<td>Continually adapt a system to a rapidly changing environment</td>
<td>Evolving requirements and solutions</td>
</tr>
</tbody>
</table>
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## Prototyping languages

<table>
<thead>
<tr>
<th>Language</th>
<th>Type</th>
<th>Application domain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smalltalk</td>
<td>Object-Oriented</td>
<td>Interactive systems</td>
</tr>
<tr>
<td>Java</td>
<td>Object-Oriented</td>
<td>Interactive systems</td>
</tr>
<tr>
<td>Prolog</td>
<td>Logic</td>
<td>Symbolic processing</td>
</tr>
<tr>
<td>Lisp</td>
<td>List-based</td>
<td>Symbolic processing</td>
</tr>
<tr>
<td>Miranda</td>
<td>Functional</td>
<td>Symbolic processing</td>
</tr>
<tr>
<td>APL</td>
<td>Mathematical</td>
<td>Scientific systems</td>
</tr>
<tr>
<td>4GLs</td>
<td>Database</td>
<td>Business DP</td>
</tr>
</tbody>
</table>
Choice of prototyping language

- What is the application domain of the problem?
- What user interaction is required?
- What support environment comes with the language?

- Different parts of the system may be programmed in different languages. However, there may be problems with language communications.
Database programming languages

- Domain specific languages for business systems based around a database management system

- Normally include a database query language, a screen generator, a report generator and a spreadsheet.

- The language + environment is sometimes known as a fourth-generation language (4GL)
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Pros & Cons

Pros:

- Misunderstandings between software users and developers are exposed
- Missing services may be detected
- Confusing services may be identified
- A working system is available early in the process
Pros & Cons

Pros:

- The prototype may serve as a basis for deriving a system specification
- Reduced time and costs
- Improved and increased user involvement
Pros & Cons

Cons:

- Insufficient analysis
- User confusion of prototype and finished system
- Developer misunderstanding of user objectives
- Developer attachment to prototype
- Excessive development time of the prototype
- Expense of implementing prototyping
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Prototyping, to use or not?

There is no constant rule but ...

- Design and analysis of on-line systems (e.g. transactions processing)

- In general, application that need a lot of interaction with the user
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Designing a prototype

Open mind and ideas first !!!

- Quality is a function of the number of iterations and refinements a design undergoes before it hits the street

- To get a good idea, get lots of ideas.
Designing a prototype

3 stages of prototyping

![Graph showing three stages of prototyping: Inspire, Evolve, Validate. The number of ideas decreases over project time.](image)

Prototype driven specs → Spec driven prototypes
Designing a prototype

- Choose what aspects to prototype for relevance to your project goals

- Identify measurable design goals

- Good enough to provide feedback but flexible enough for significant changes to be made down the line
Thank you for listening