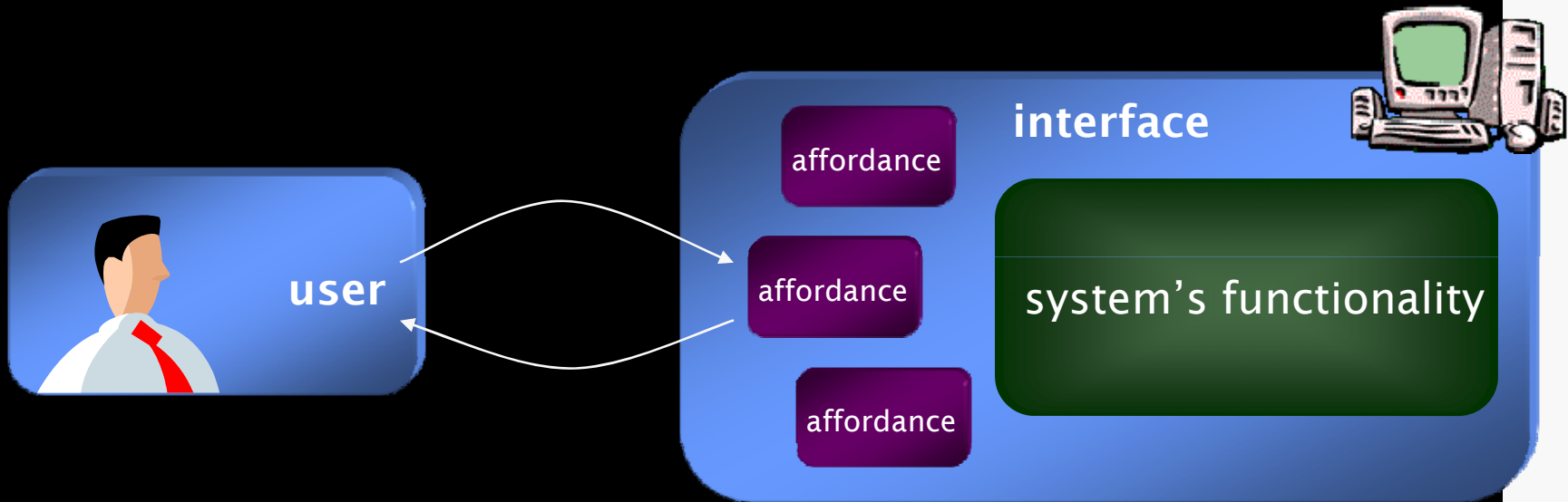


HCI Challenges and Opportunities in the SimParc Project

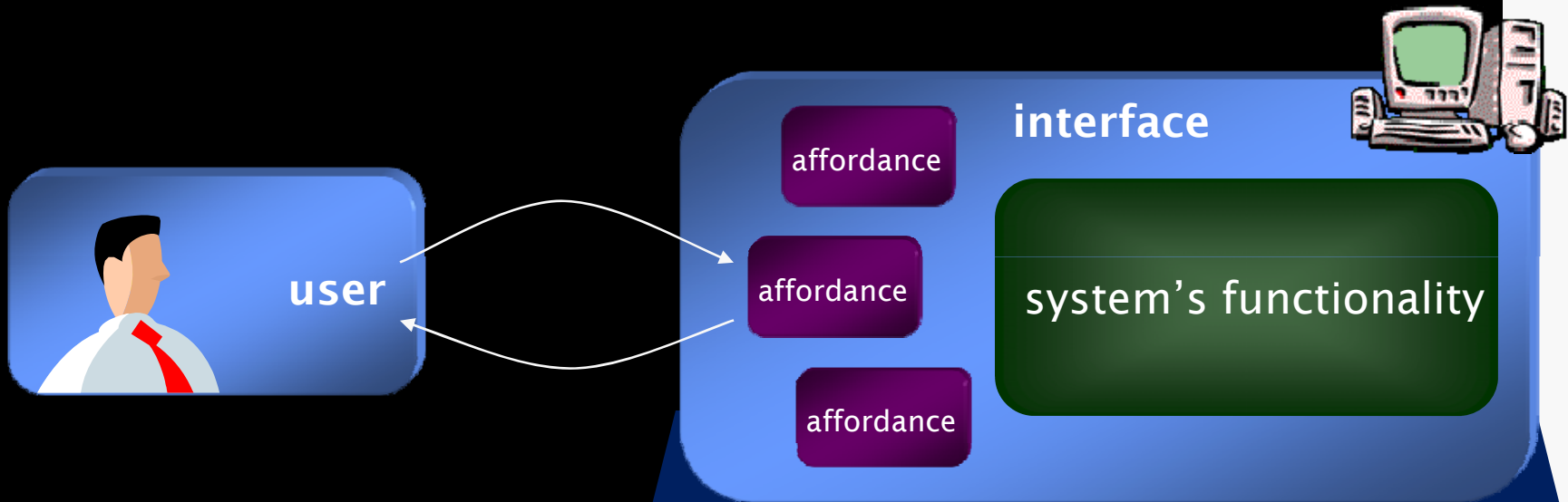
SimParc'07 Workshop

But first... what is HCI?

Human-Computer Interaction (HCI)

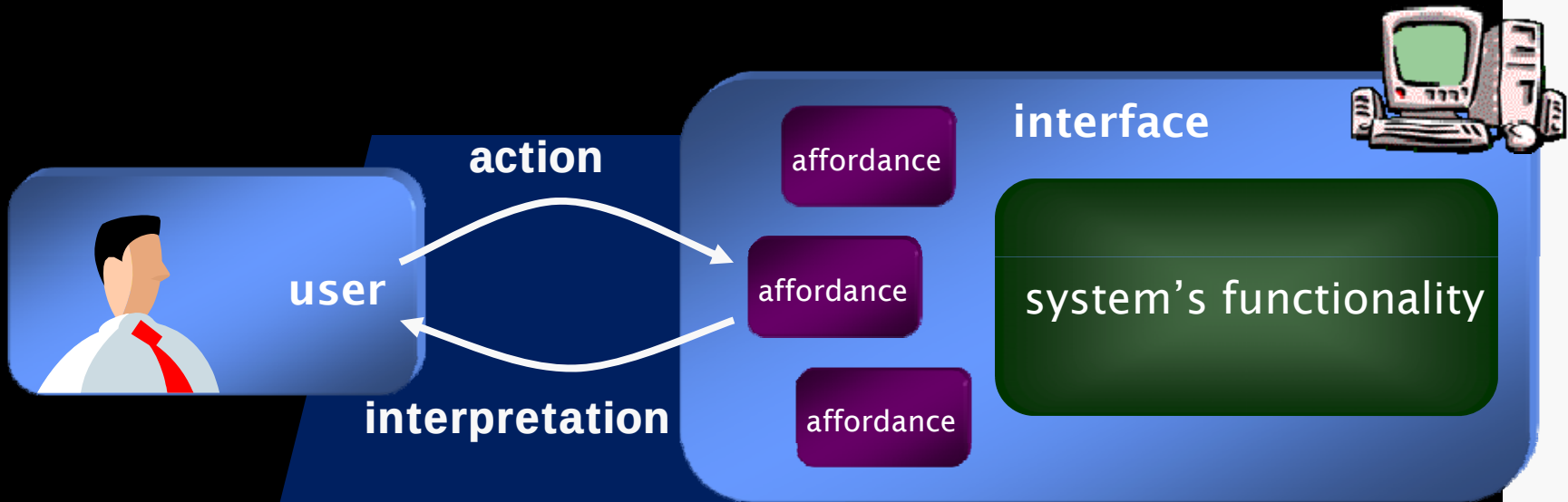


Human-Computer Interaction (HCI)



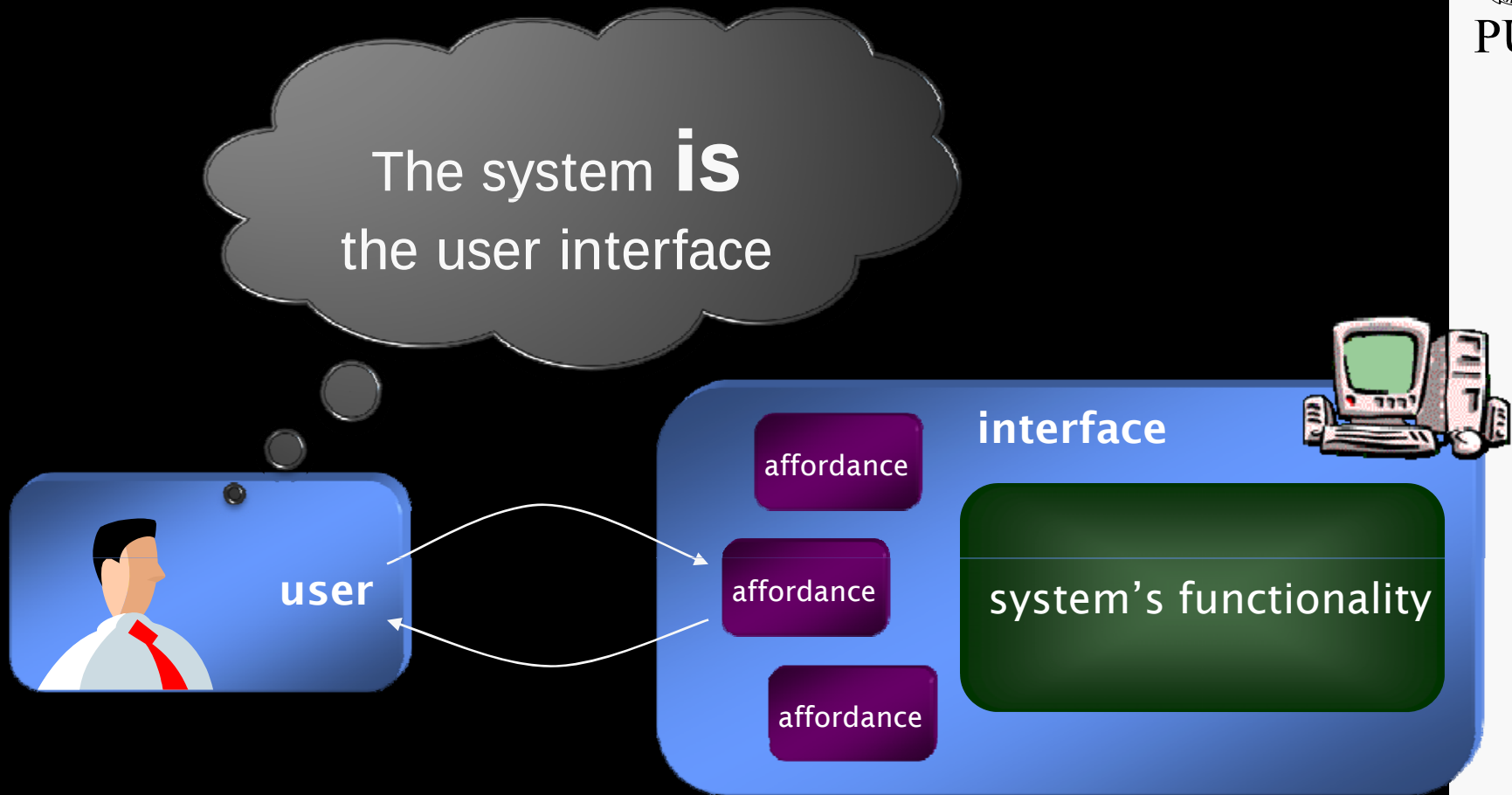
interface = part of the computational system with which the user is in contact (Moran 1981)

Human-Computer Interaction (HCI)



interaction =
user-system
communication
process
(Preece et al. 1994)

Human-Computer Interaction (HCI)



“prediction”

user centered

support people

elaborate alternatives

design

evaluation

evaluate alternatives

observe usage

measure return on investment

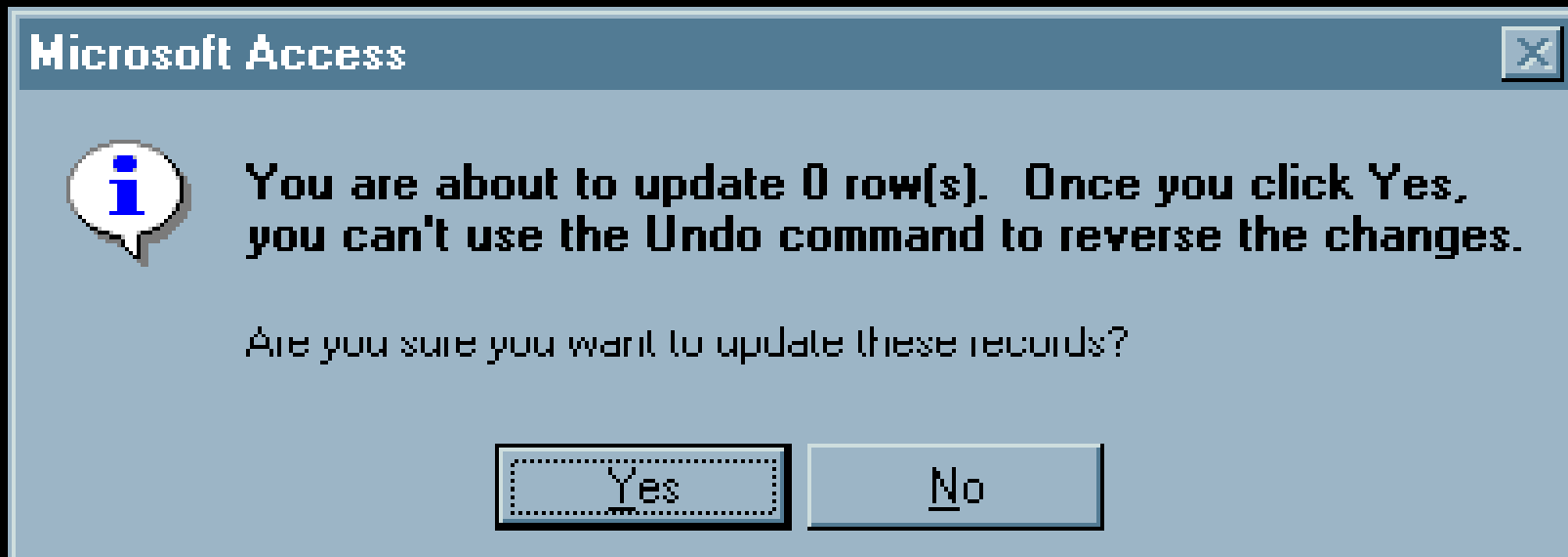
explanation

form
+
function



Low-quality user interfaces...

- ... are inefficient



Low-quality user interfaces...

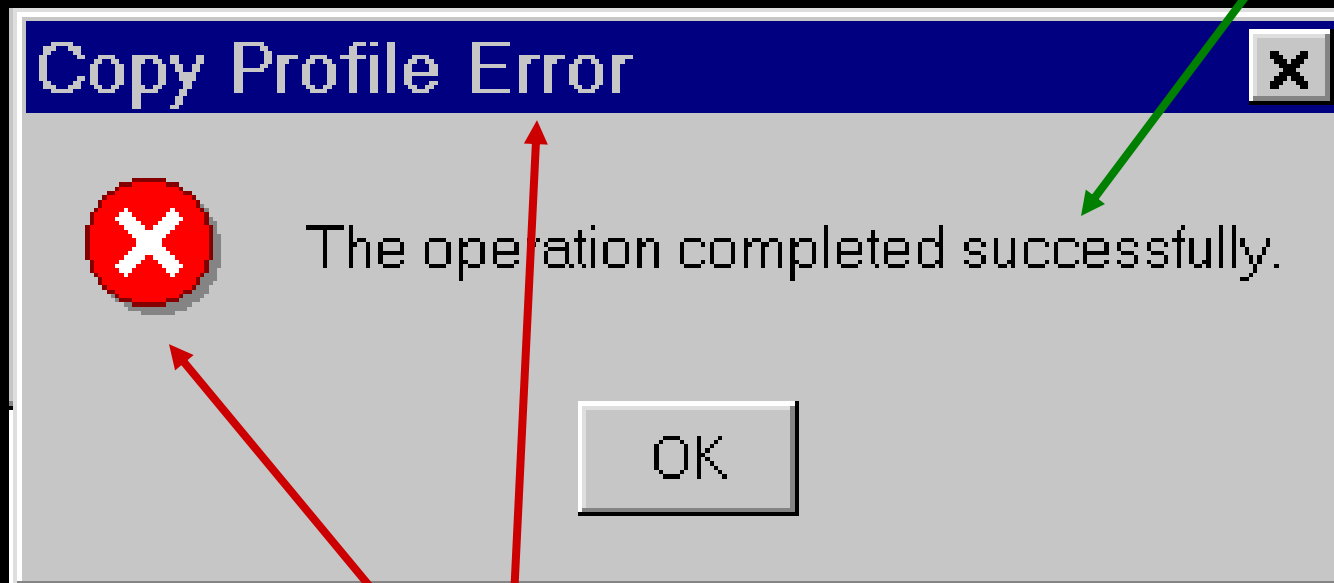
- ...are confusing



Low-quality user interfaces...

- ... are unreliable

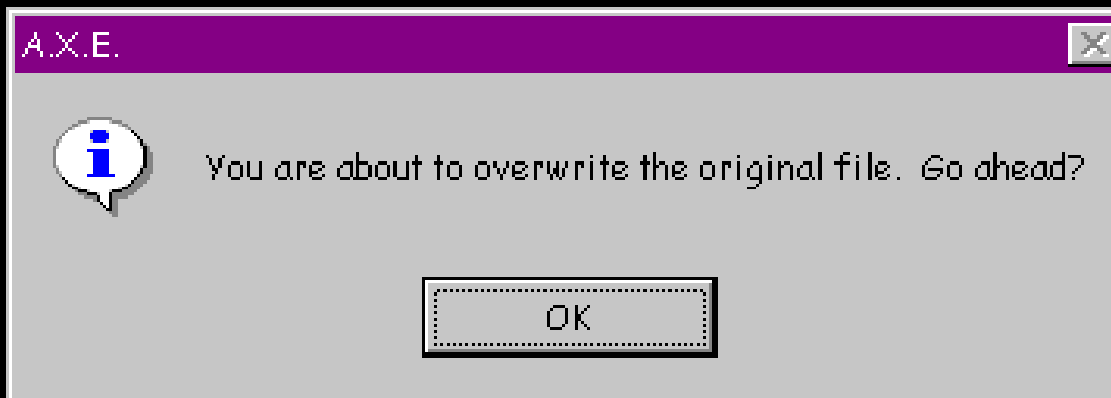
Is everything fine?



Or not?

Low-quality user interfaces...

- ... leave little or no control to the user



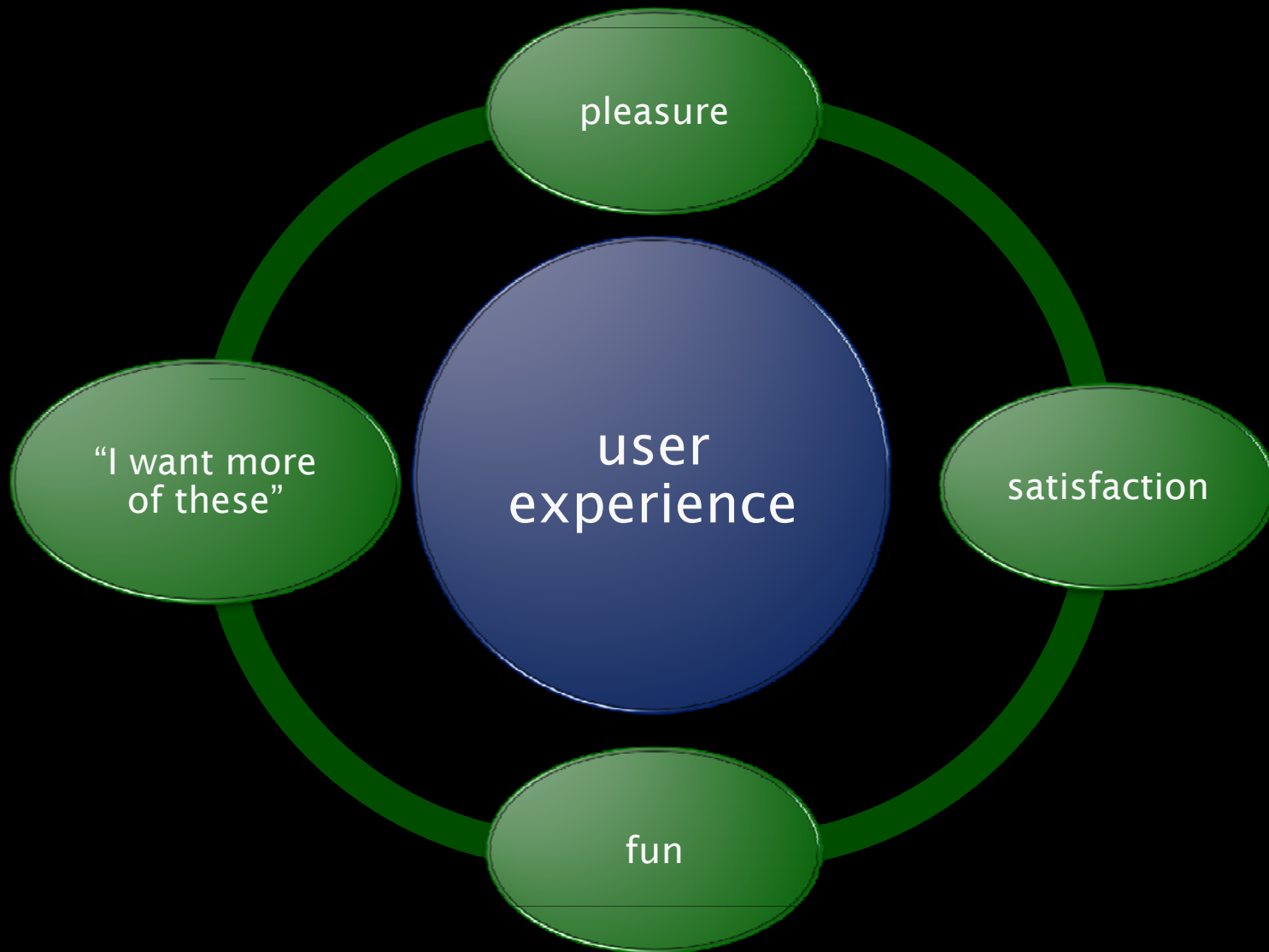
Quality in HCI: usability



Quality in HCI: accessibility



Quality in HCI: user experience



The concrete user interface isn't everything



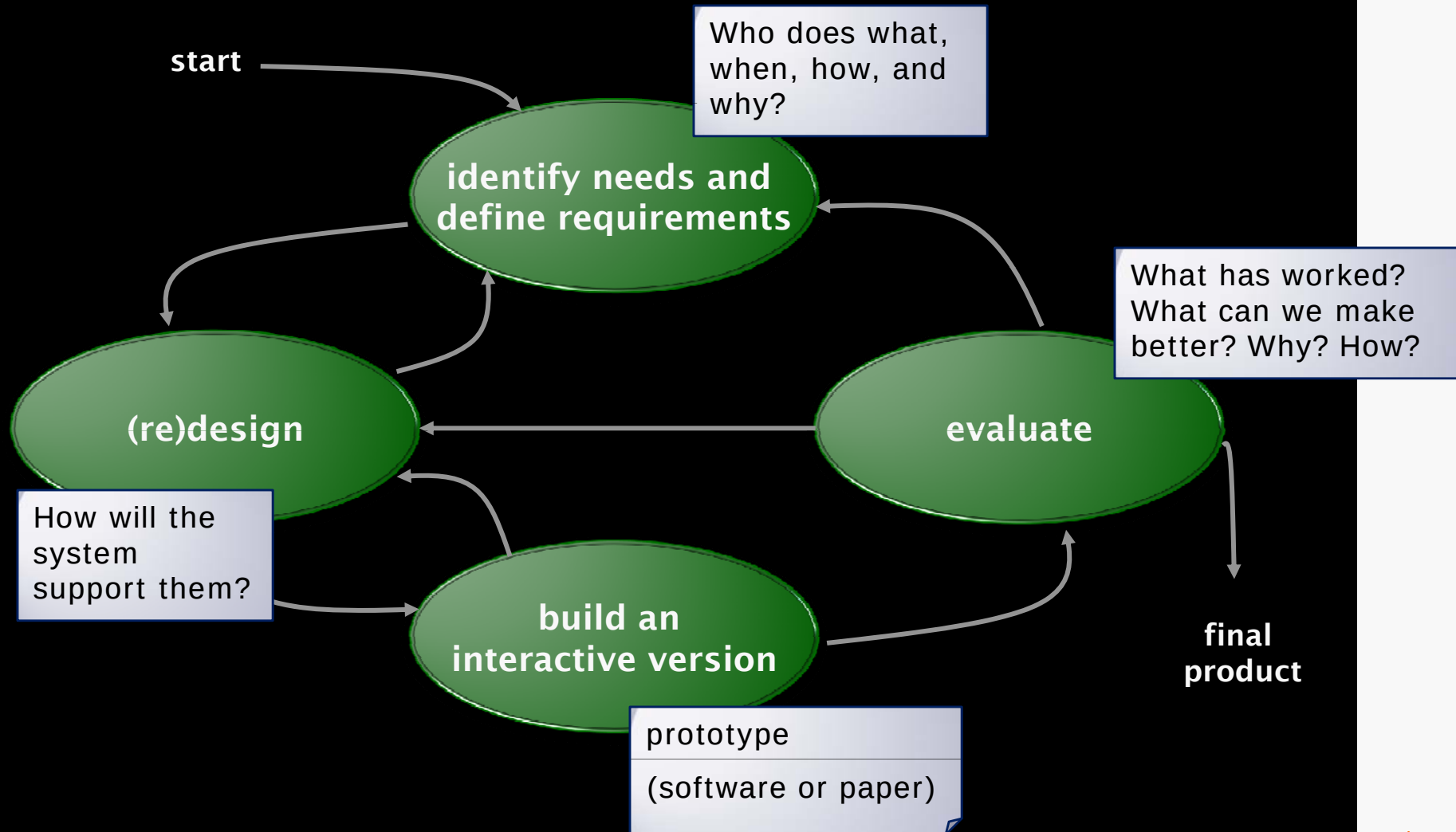
interface

interaction

conceptual
model



Simplified HCI design process



Identify user needs



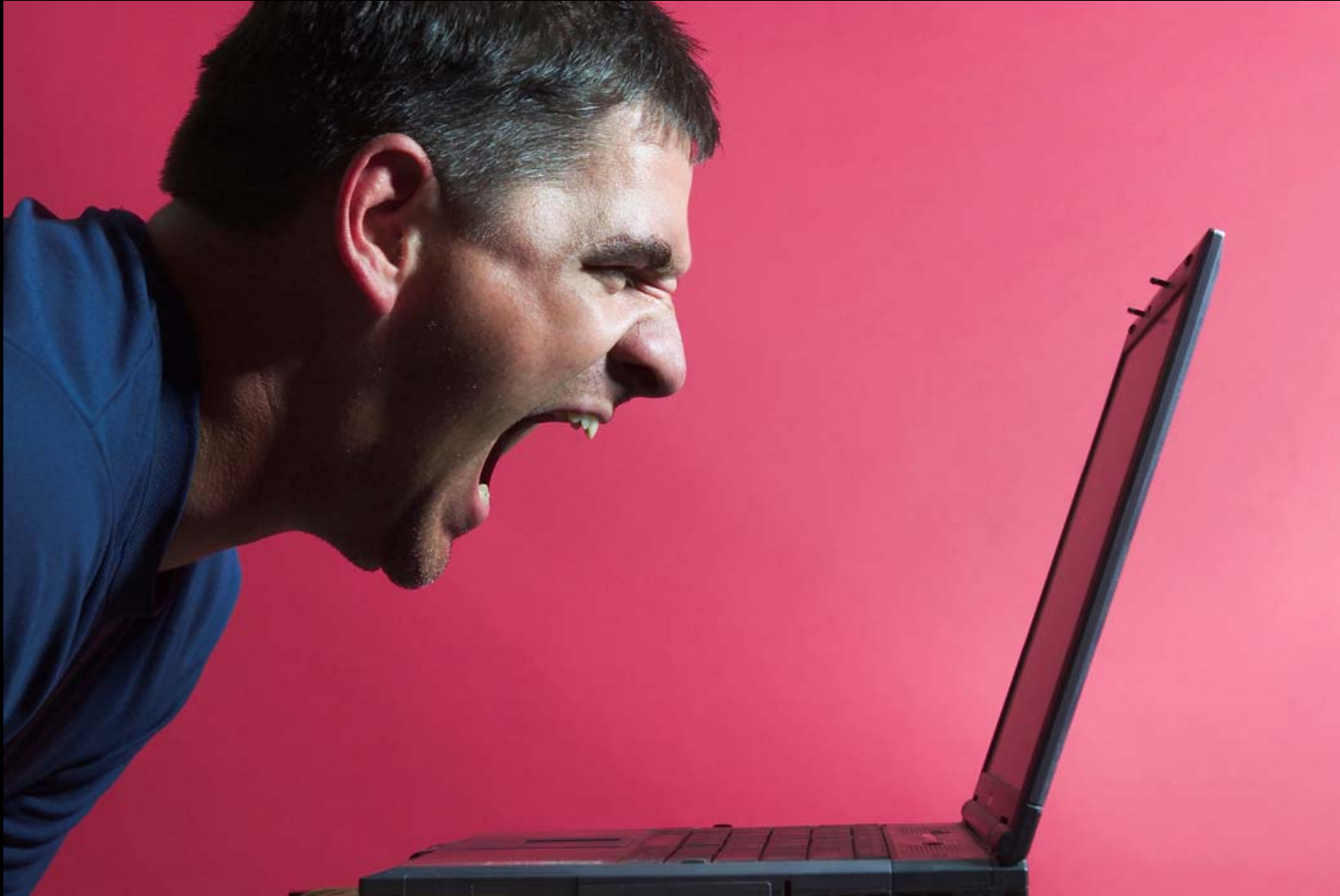
Design... NOT!



Build an interactive version



Evaluate



Cognitive vs. Non-cognitive Approaches to HCI Design

Cognitive

quantitative

fragmented, universal

alternative interface styles,
interactive design patterns,
other *generic* HCI solutions

Non-cognitive

qualitative

integrated, in-depth

analyzing users' needs and
context

User-Centered Design (UCD)

cognitive abilities as universal
within homogeneous groups

a proper “system image” will
make the user’s conceptual
model coincide with the
designer’s

Ethnographic approaches

question the “universal”
character of relevant aspects
of the users’ experience

Semiotic Engineering



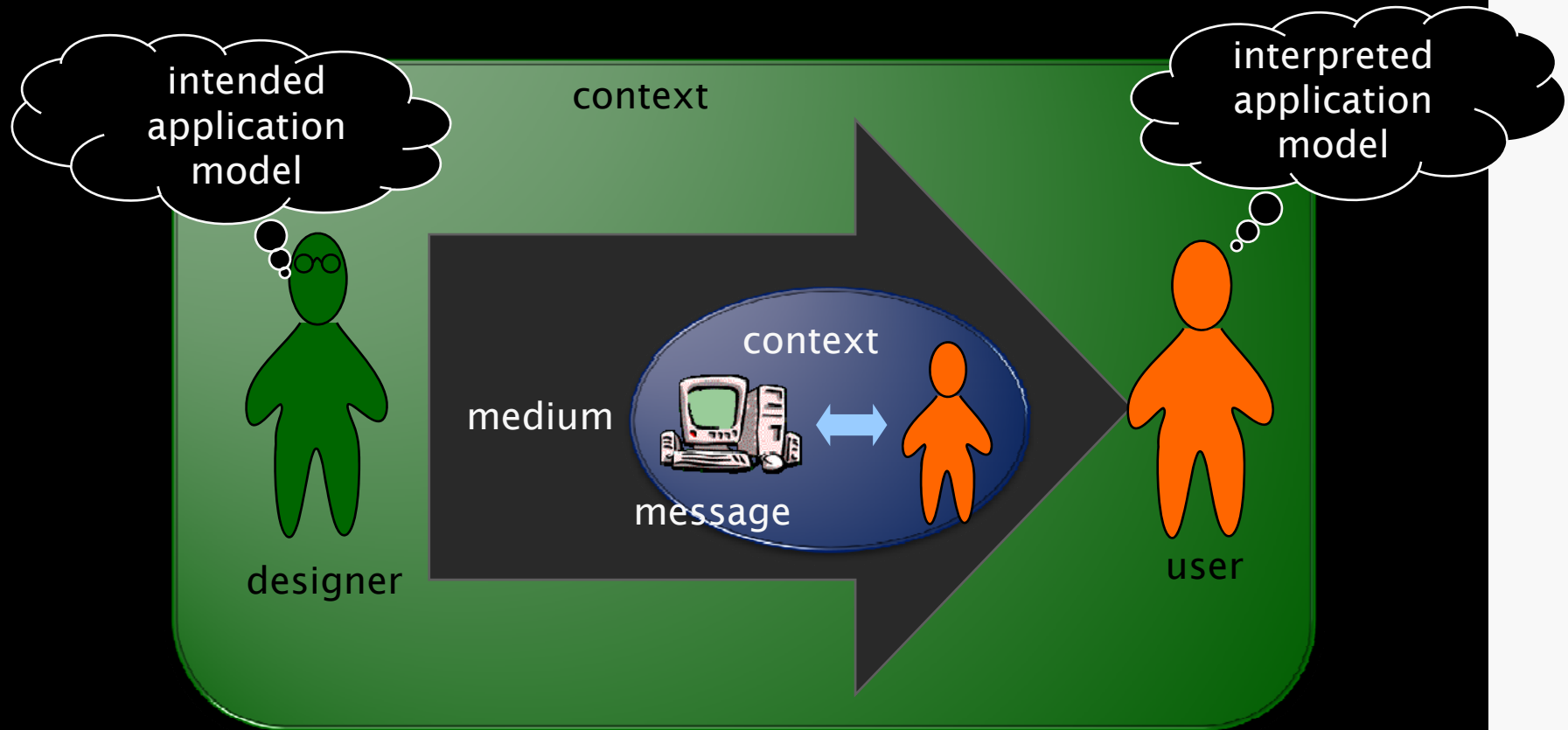
And what is Semiotic Engineering?

Semiotic Engineering

- a theory of HCI
- views the user interface as an intellectual (linguistic) artifact, which
 - encodes a particular understanding or interpretation of a **problem** situation;
 - encodes a particular **set of solutions** for the perceived problem; and
 - can only achieve its purpose if the users can formulate their goals **within the linguistic system** in which the artifact is encoded
 - (i.e. users must be able to understand and use a particular linguistic encoding system in order to explore and effect the solutions enabled through the artifact).



Semiotic Engineering



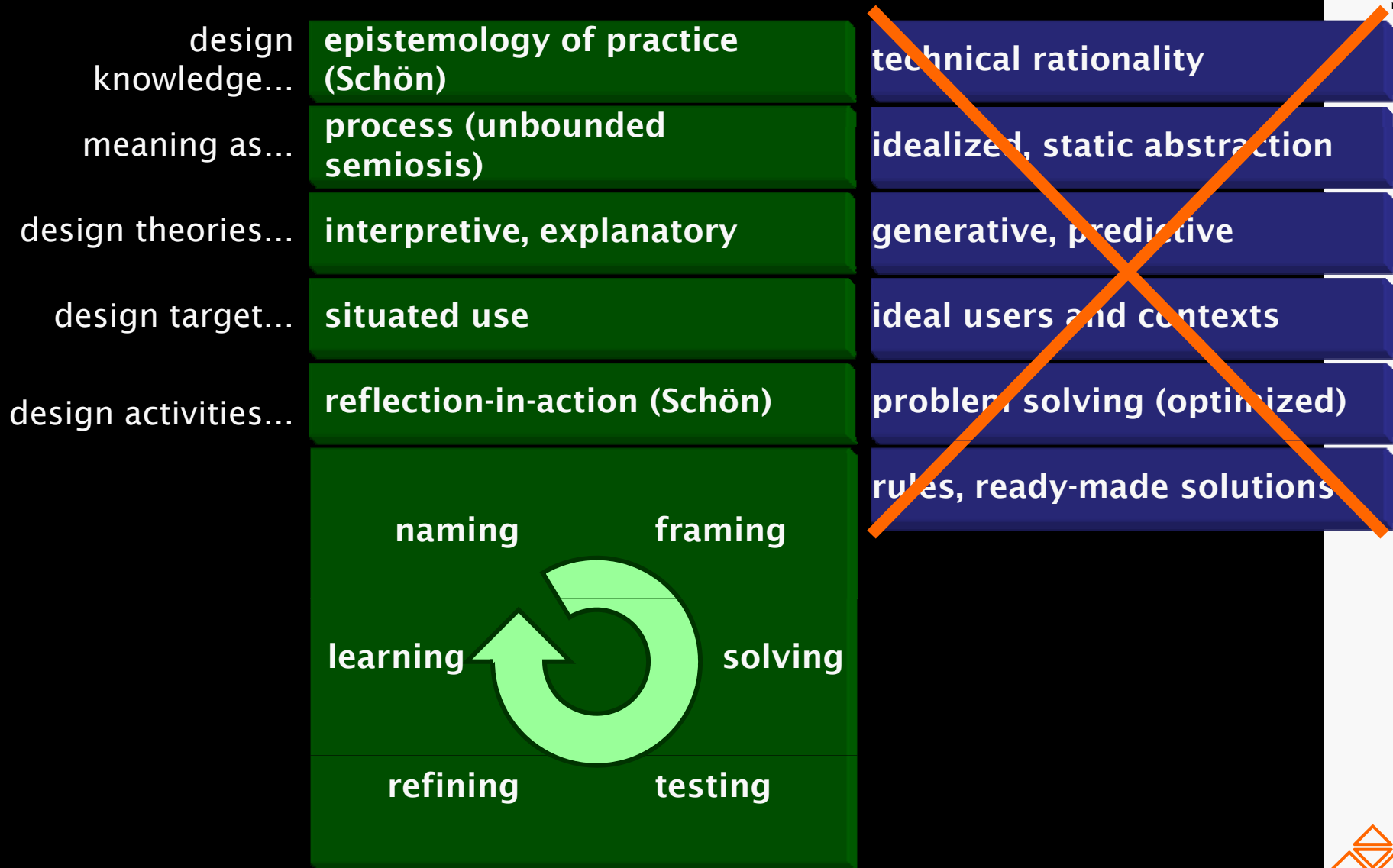
Designer-to-user message

- Here is my understanding of who you are, what I have learned you want or need to do, in which preferred ways, and why.
- This is the system that I have, therefore, designed for you, and this is the way you can or should use it in order to fulfill a range of purposes that fall within this vision.

analysis

design

Semiotic Engineering commits to a specific view of design



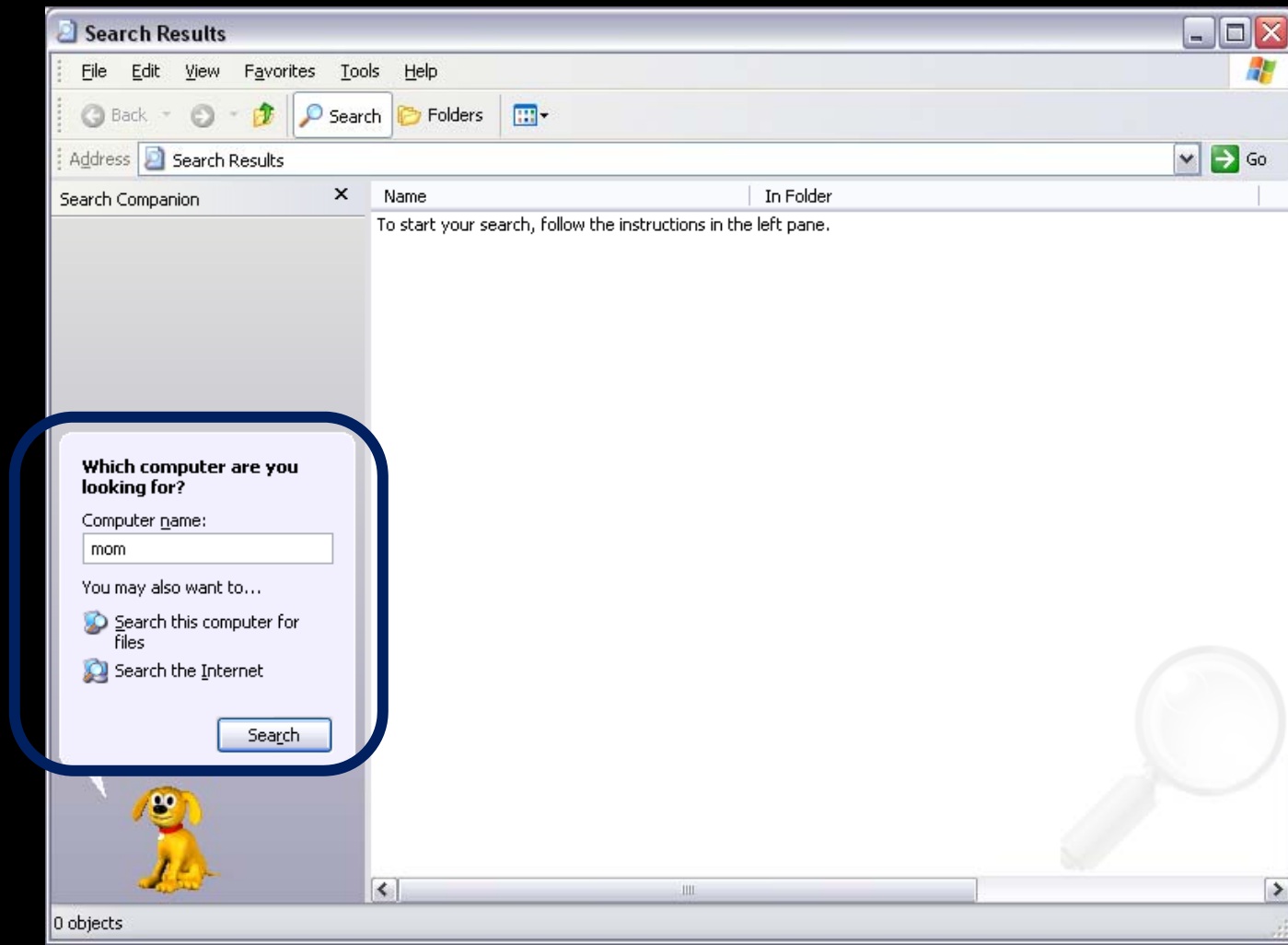
Quality in SemEng: communicability

- Can designers successfully get the *message* through to users?
 - If so, then:
 - users will input higher-quality information
 - users will interpret the system output better
 - ...
 - users will make better decisions
 - users will work better with the system
 - ...



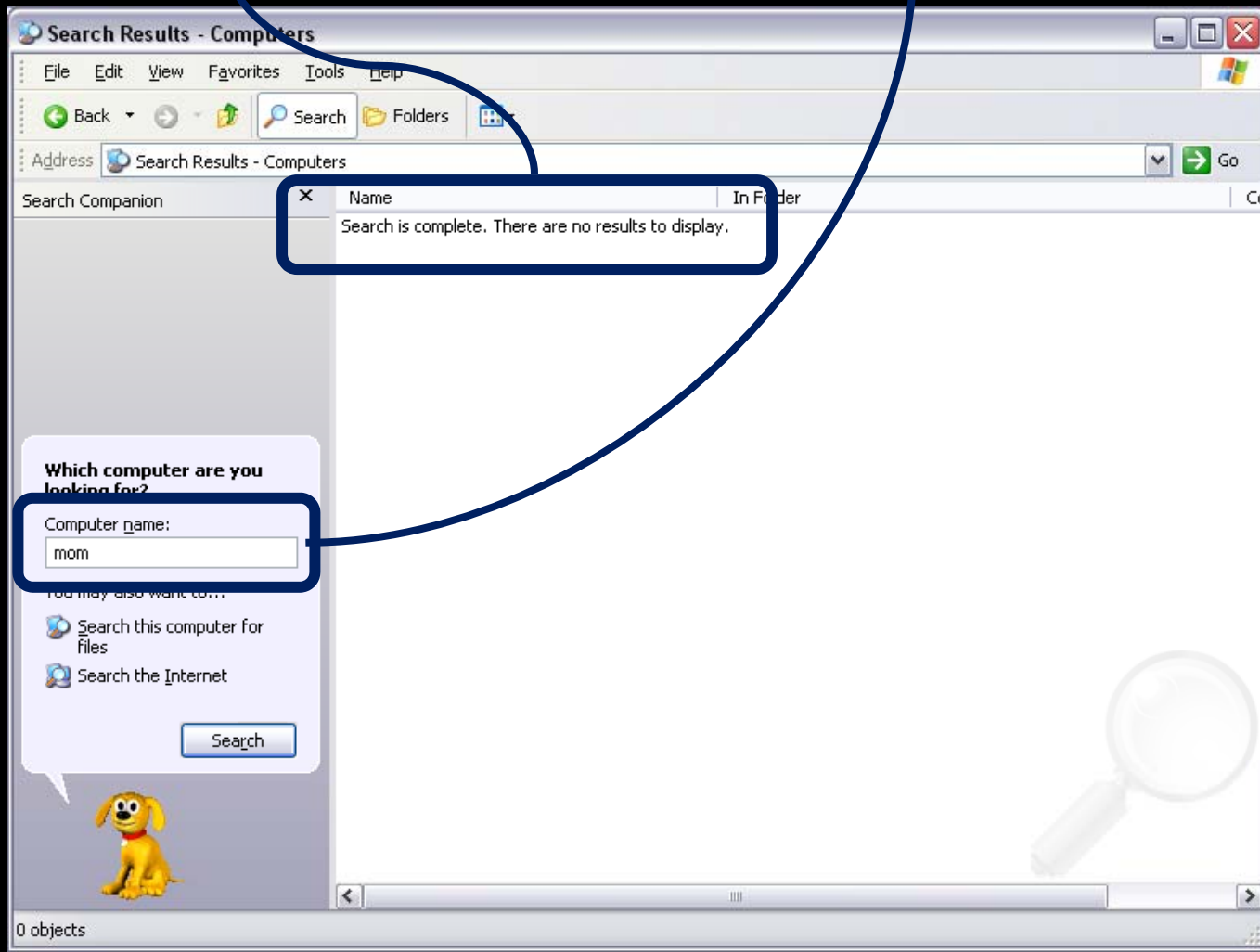
Example of low communicability

1. D: You can search for a computer here.



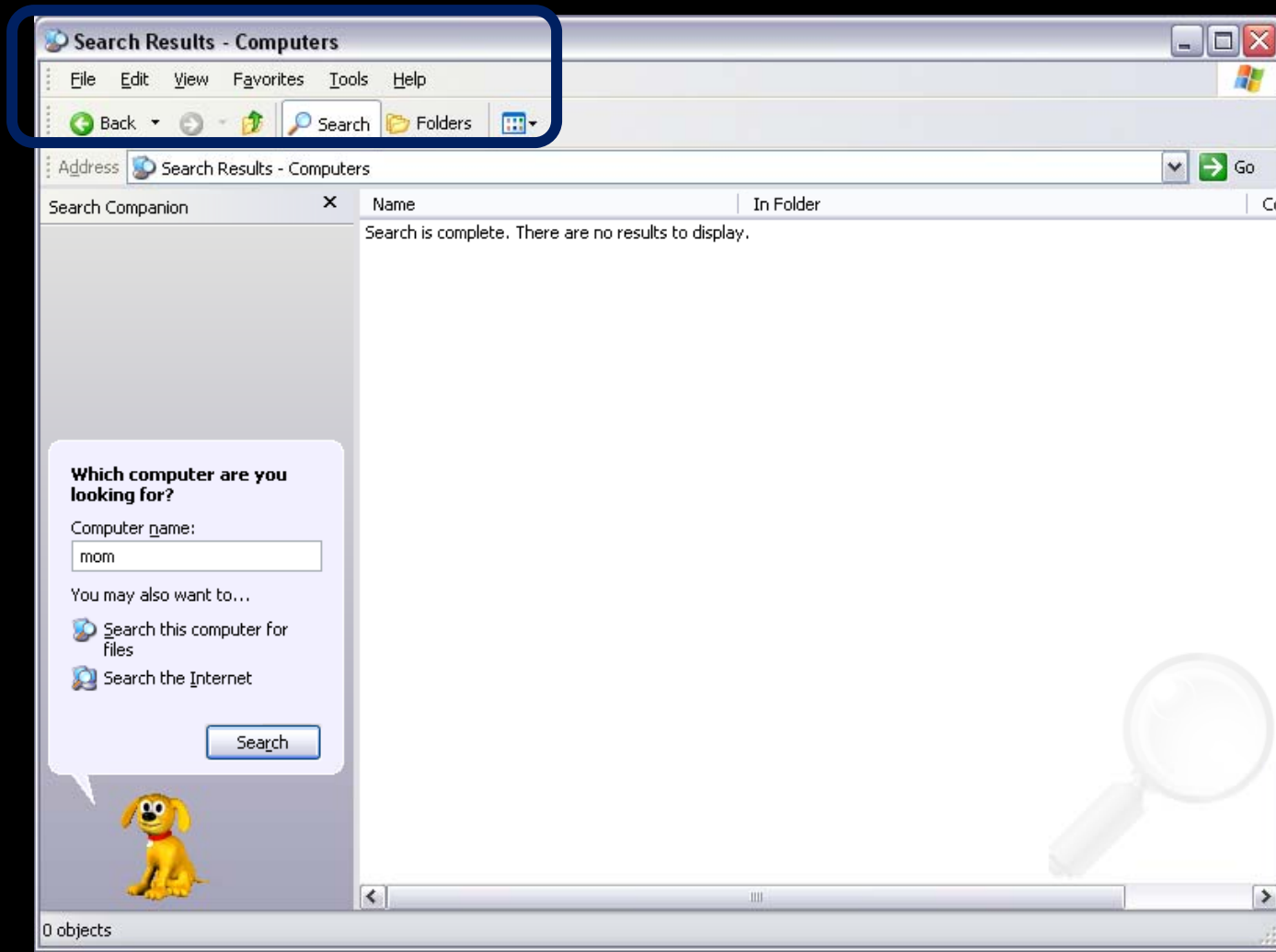
Example of low communicability (cont.)

2. D: I couldn't find the computer named "mom".



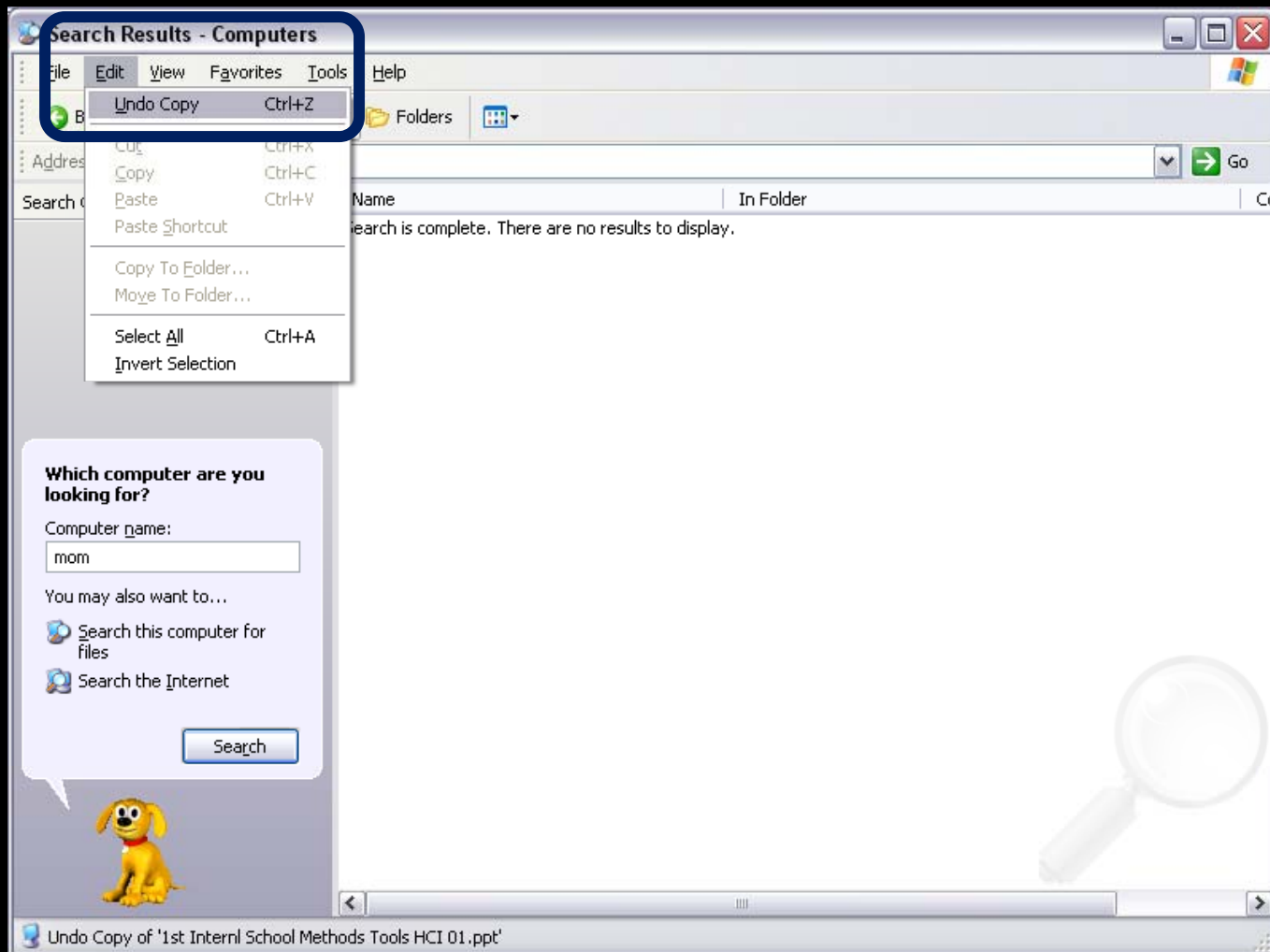
Example of low communicability (cont.)

3. D: Regarding search, there are other things you can do here...



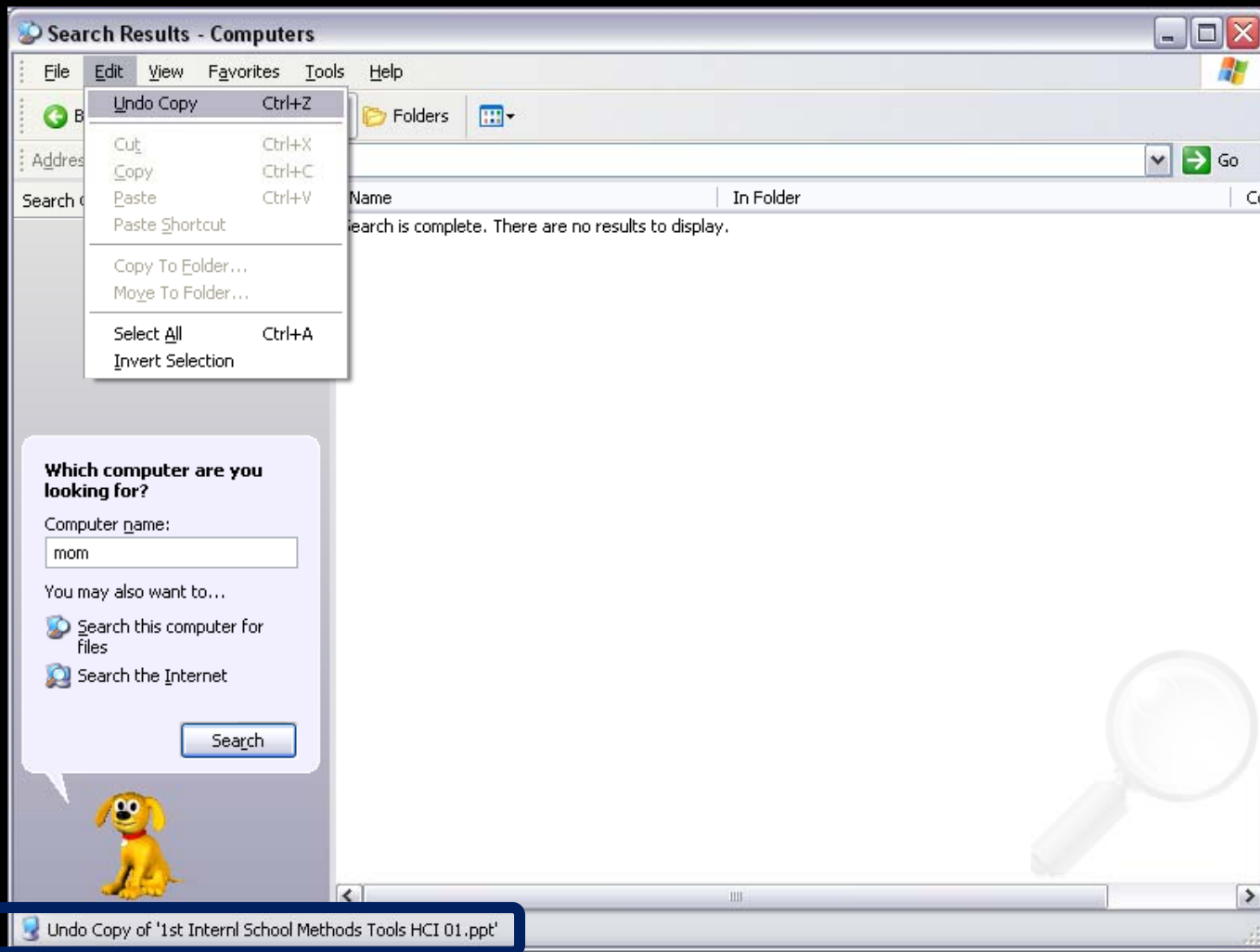
Example of low communicability (cont.)

4. D: You can Undo Copy (U: Copy? What copy?!?)

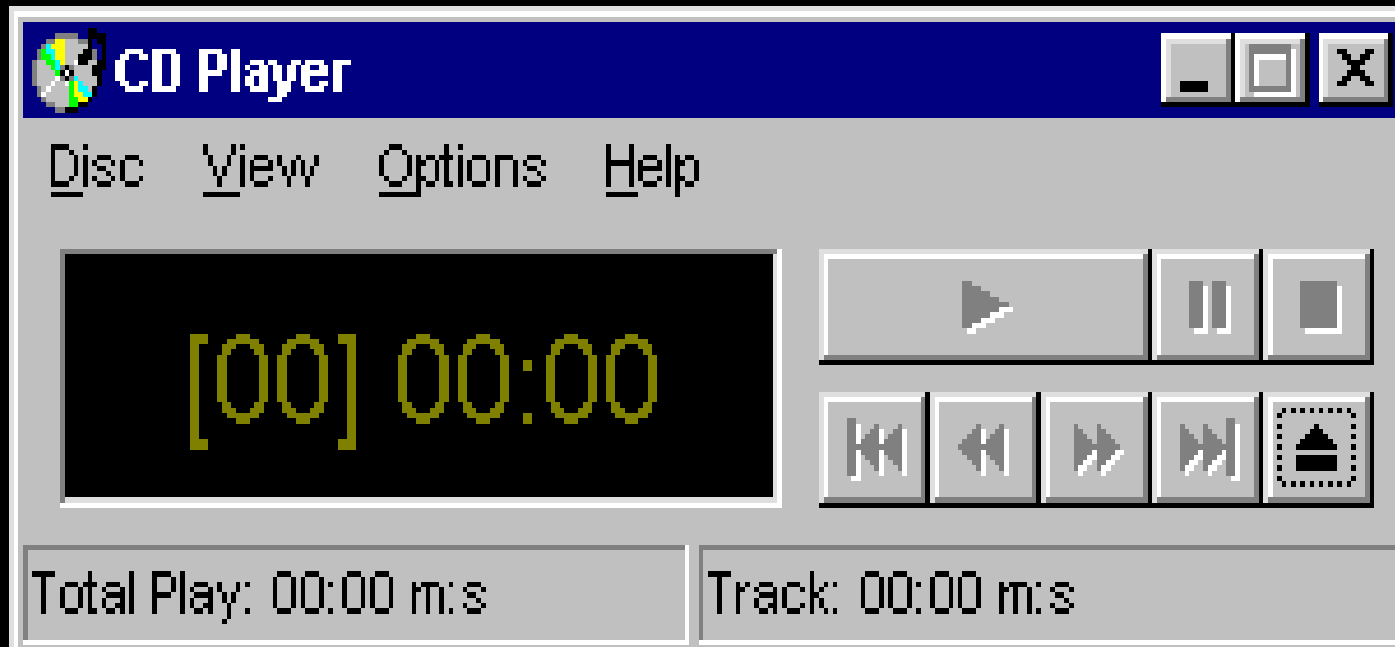


Example of low communicability (cont.)

5. D: Undo copy of the file '1st Internl...'



Example of high communicability



Design Process

Communication-centered design

Motivation

- communicability
 - avoid communicative breakdowns
- how?
 - anticipate users' need for support/help
 - design for that need
- in other words
 - design for communication
 - design for errors



Motivation: users' most frequent doubts

Question Types	Sample Questions
Informative	<i>What kinds of things can I do with this program?</i>
Descriptive	<i>What is this? What does this do?</i>
Procedural	<i>How do I do this?</i>
Interpretive	<i>What is happening now? Why did it happen? What does this mean?</i>
Navigational	<i>Where am I? Where have I come from? Where can I go to?</i>
Choice	<i>What can I do now?</i>
Guidance	<i>What should I do now?</i>
History	<i>What have I done?</i>
Motivational	<i>Why should I use this program? How will I benefit from using it?</i>
Investigative	<i>What else should I know? Did I miss anything?</i>

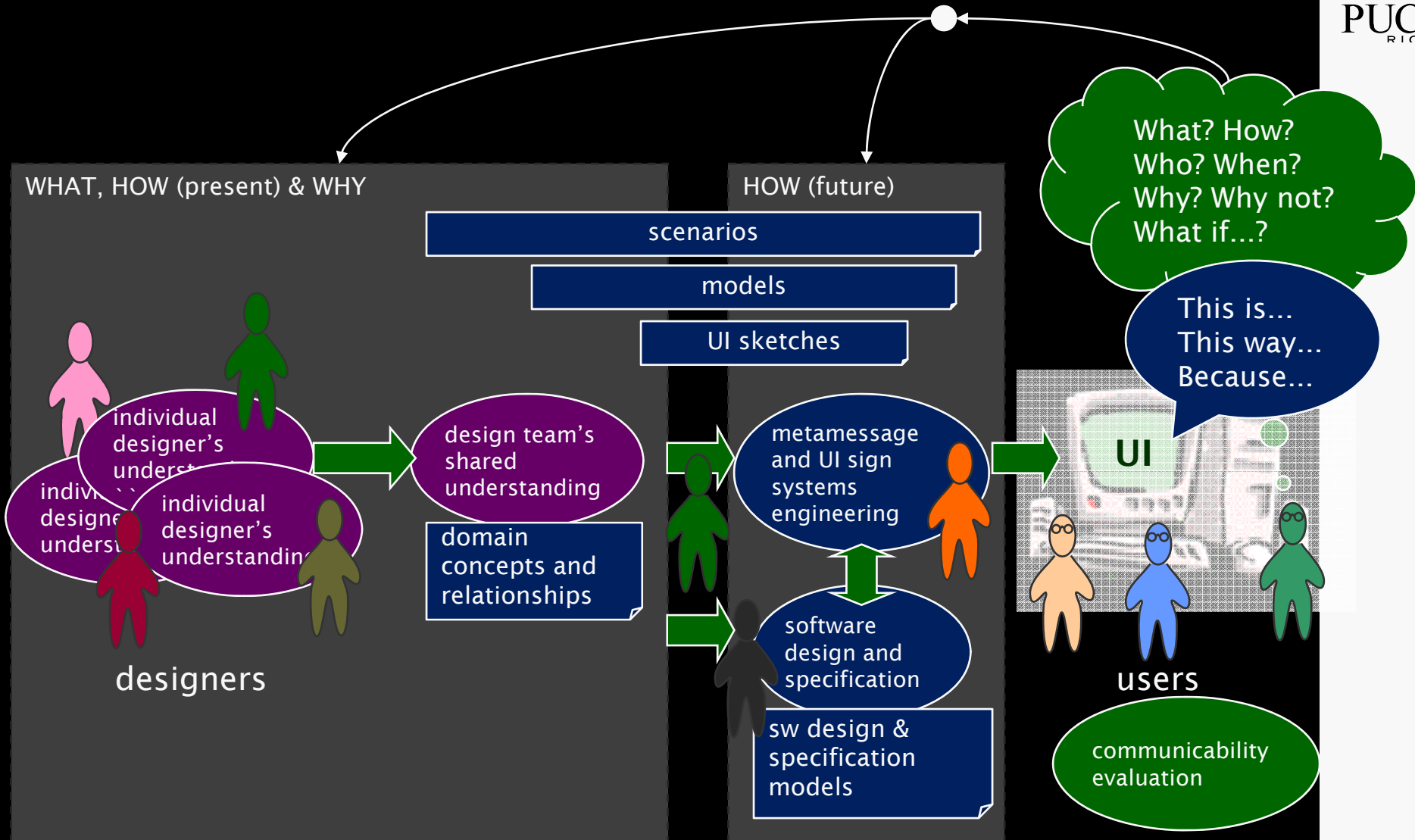


Questions to be addressed at design time

Original Communicability Utterances	(Additional) Help Utterances
What's this? What now? (What can I do? What should I do? Where can I go?) What happened? Why doesn't it (work)? Oops! Where is <i>it</i>? Where am I? I can't do it.	How do I do this? (Is there another way to do this?) What is this for? (Why should I do this?) Whom/What does this affect? On whom/what does this depend? Who can do this? Where was I?

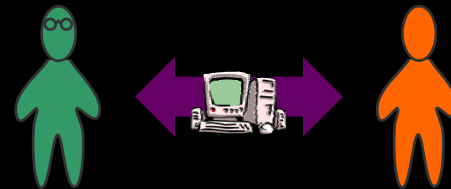


Communication-Centered Design

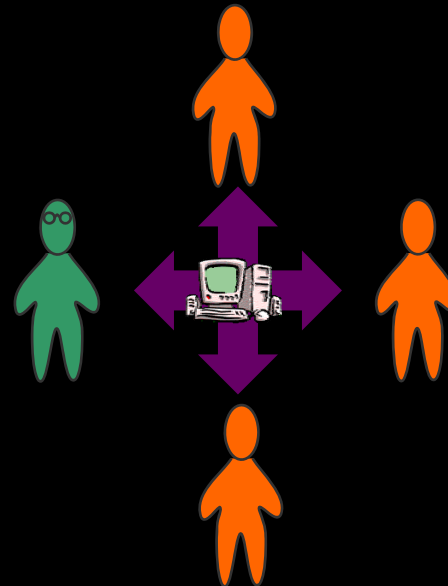


Designing conversations

- designer-user



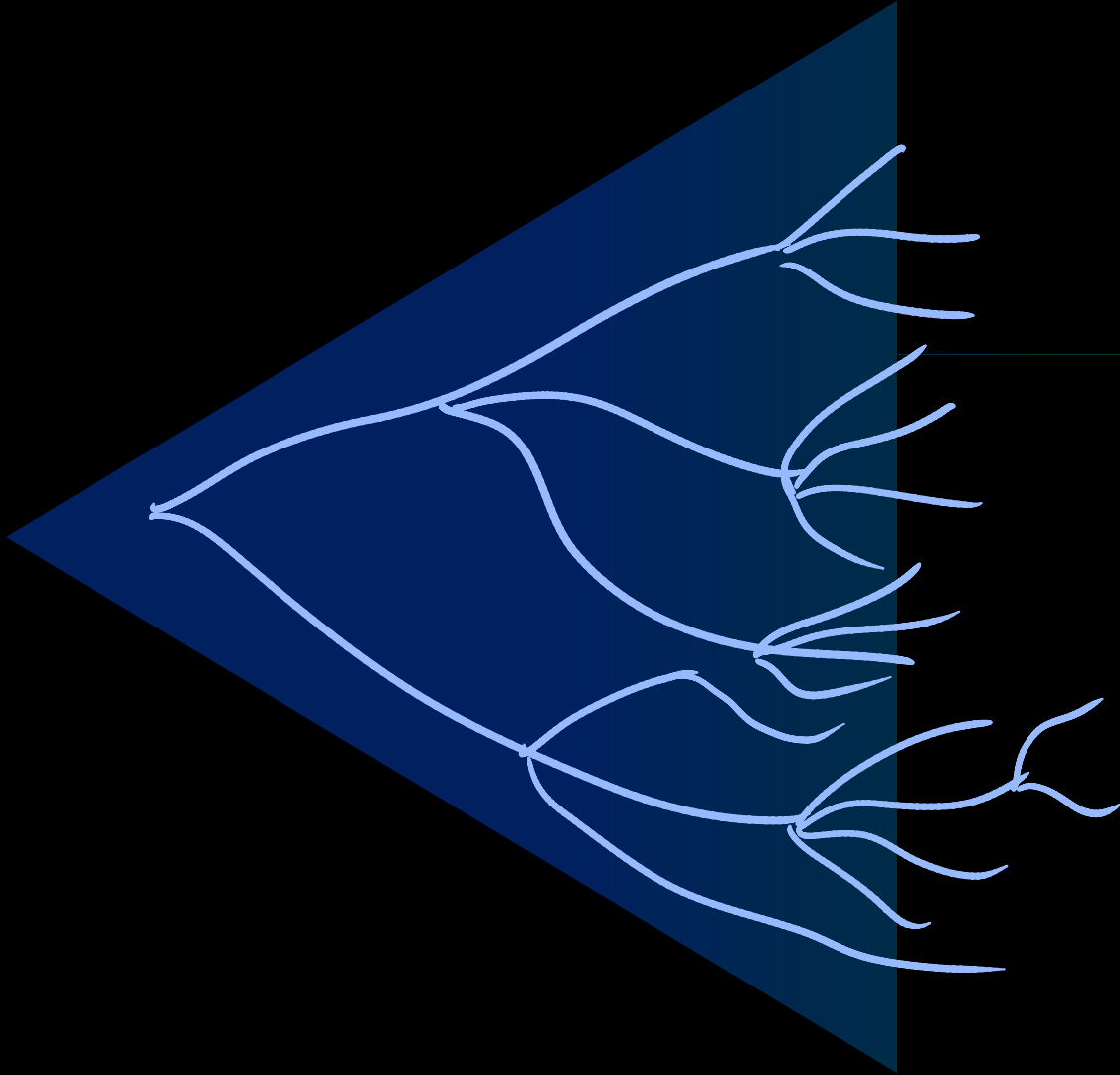
- user-user(s)
(CMC: computer-mediated communication)



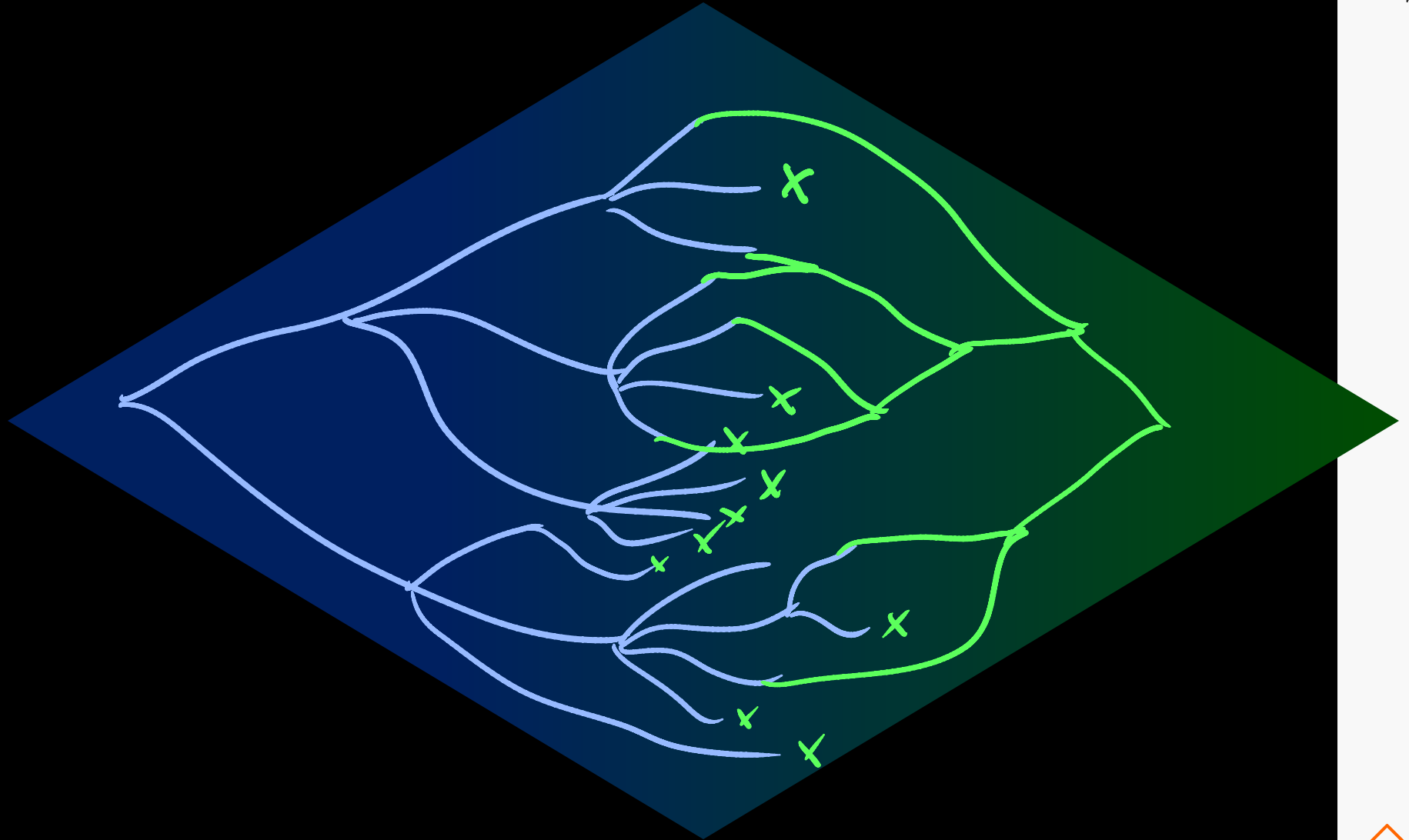
What's missing in that picture

analysis
+
design

What's missing in that picture



What's missing in that picture



What's missing in that picture

analysis
+
design

evaluation



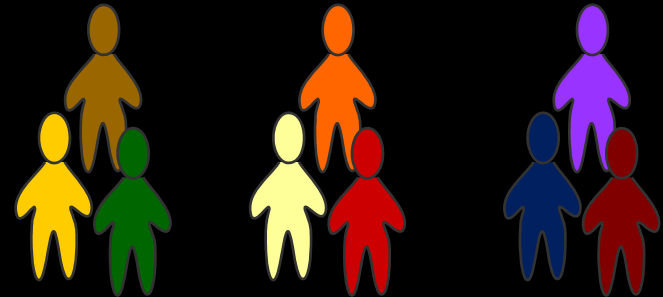


The need for “intelligent” user interfaces



users

are different



evolve

are different



contexts

evolve



HCI and SimParc

learning



knowledge transfer

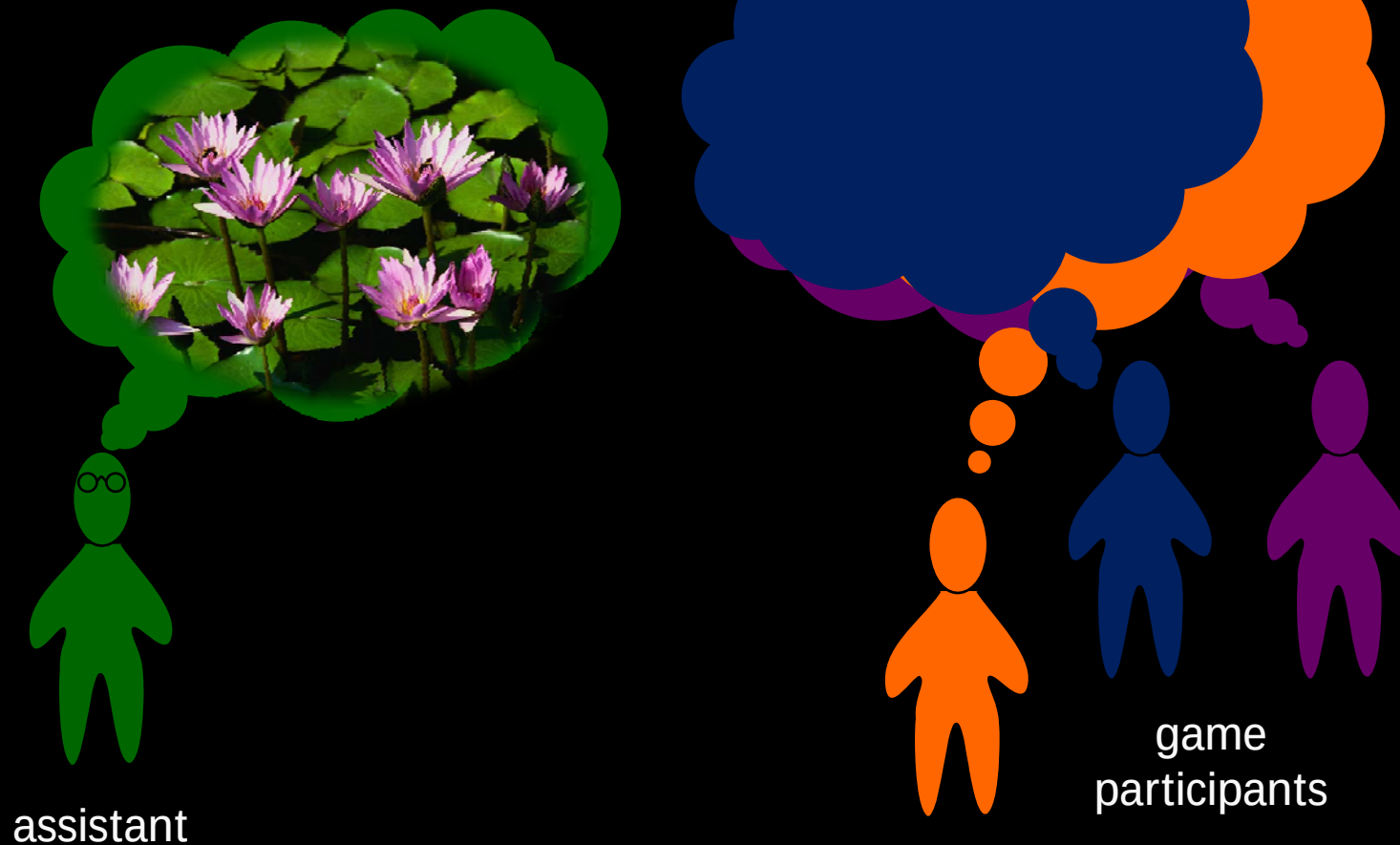
VS.

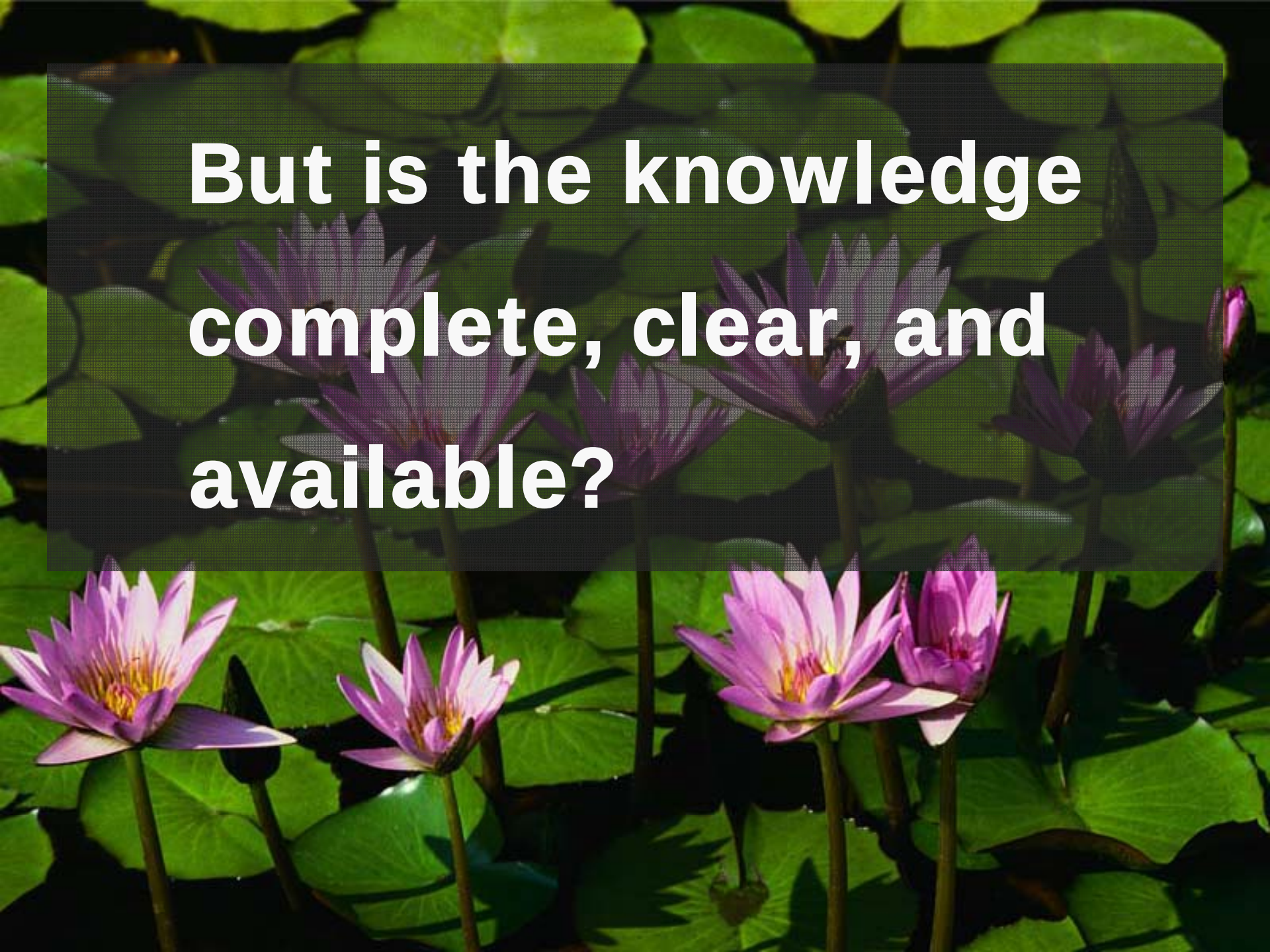
collective knowledge building



Challenge of SimParc: learning

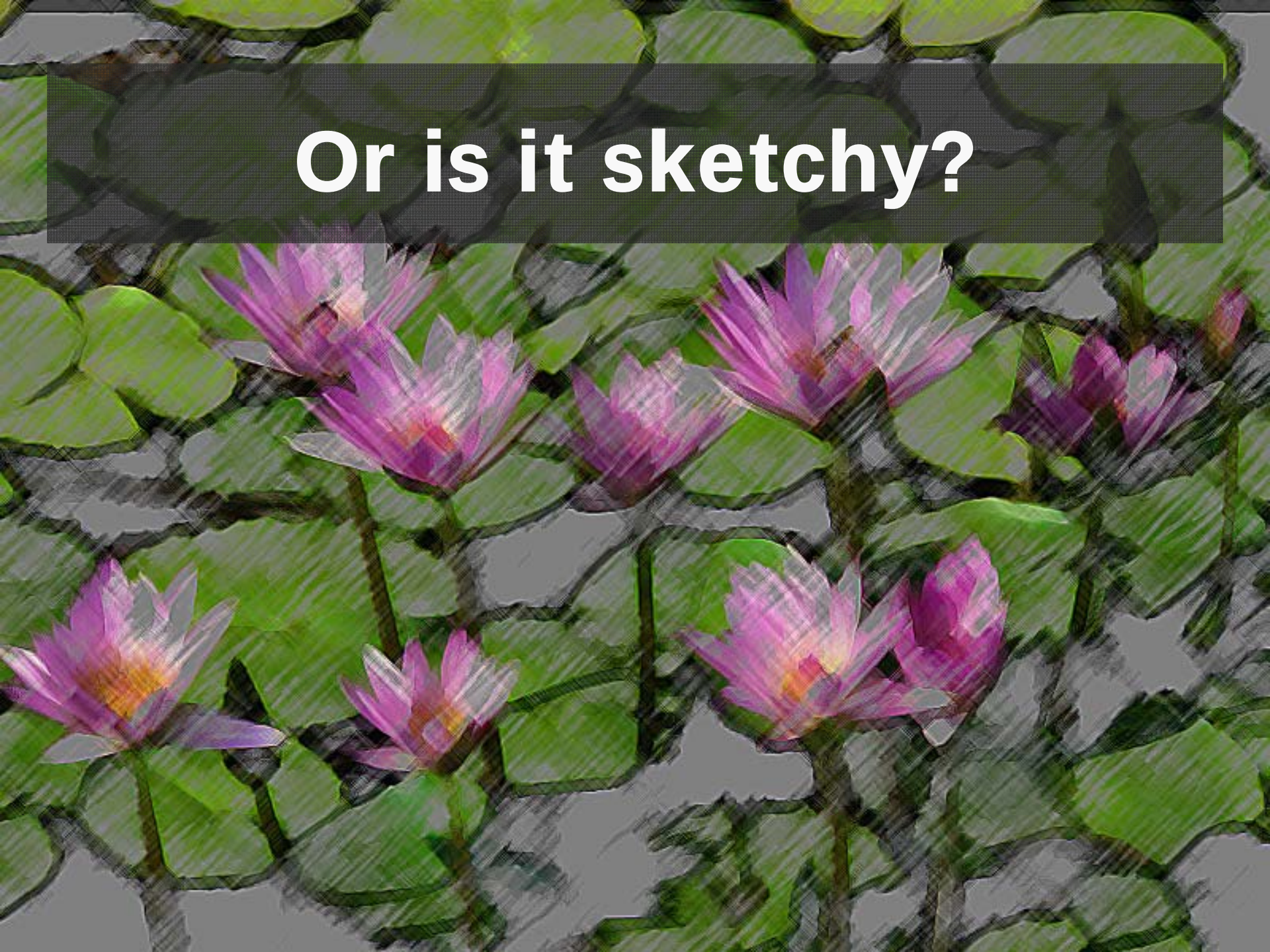
- transfer of existing knowledge from assistants



A photograph of a pond with several pink lotus flowers in bloom and many green lily pads. The flowers have yellow centers and delicate petals. The lily pads are large and round, floating on the water. The background is slightly blurred, focusing on the flowers in the foreground.

**But is the knowledge
complete, clear, and
available?**

Or is it sketchy?





Or incomplete?

Or fickle, changeable?



towards

collective
knowledge
building



discussions among participants

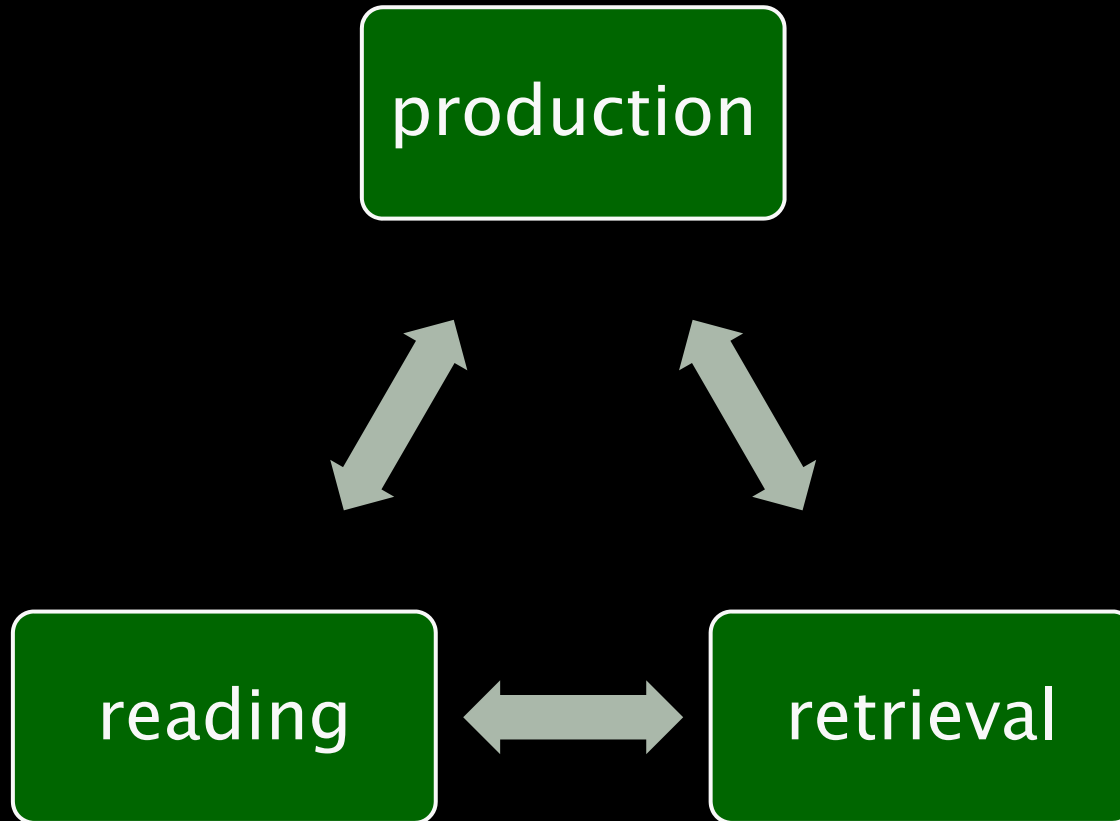


How will they learn? What? When?

- **before** the discussion
 - Who wants what, and why?
- **during** the discussion
 - How much is this worth to me?
 - Should I try to convince them of this or that? How?
 - What are the tradeoffs here and there?
 - What has happened until now?
 - ...
- **after** the discussion
 - What happened?
 - Why did this happen?
 - How can I do better next time?
 - ...



Discussion tasks



Discussion tasks – design tradeoff

users' expressiveness

production

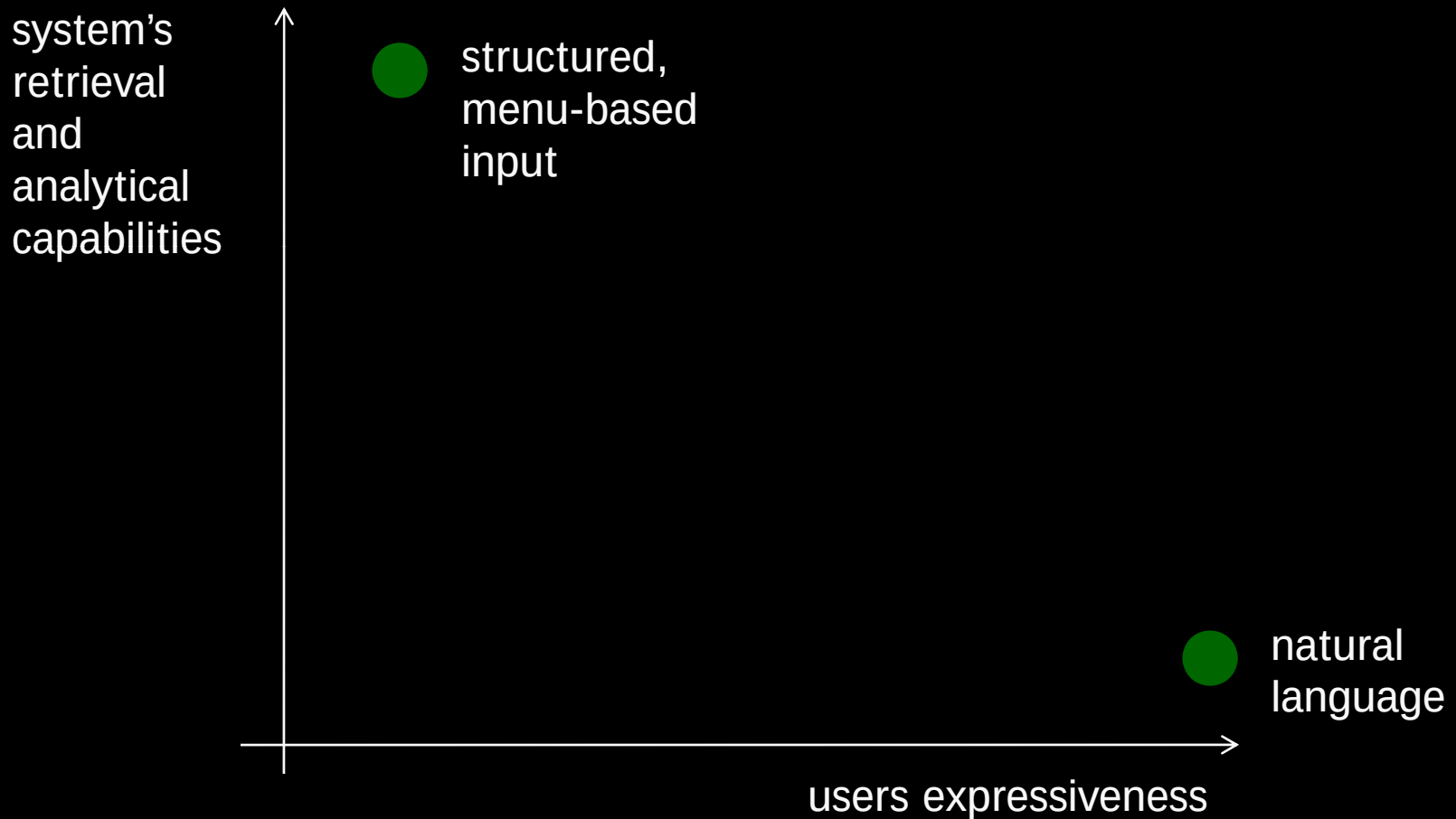
VS.

reading

retrieval

system's retrieval and analytical
capabilities

Discussion tasks – design tradeoff



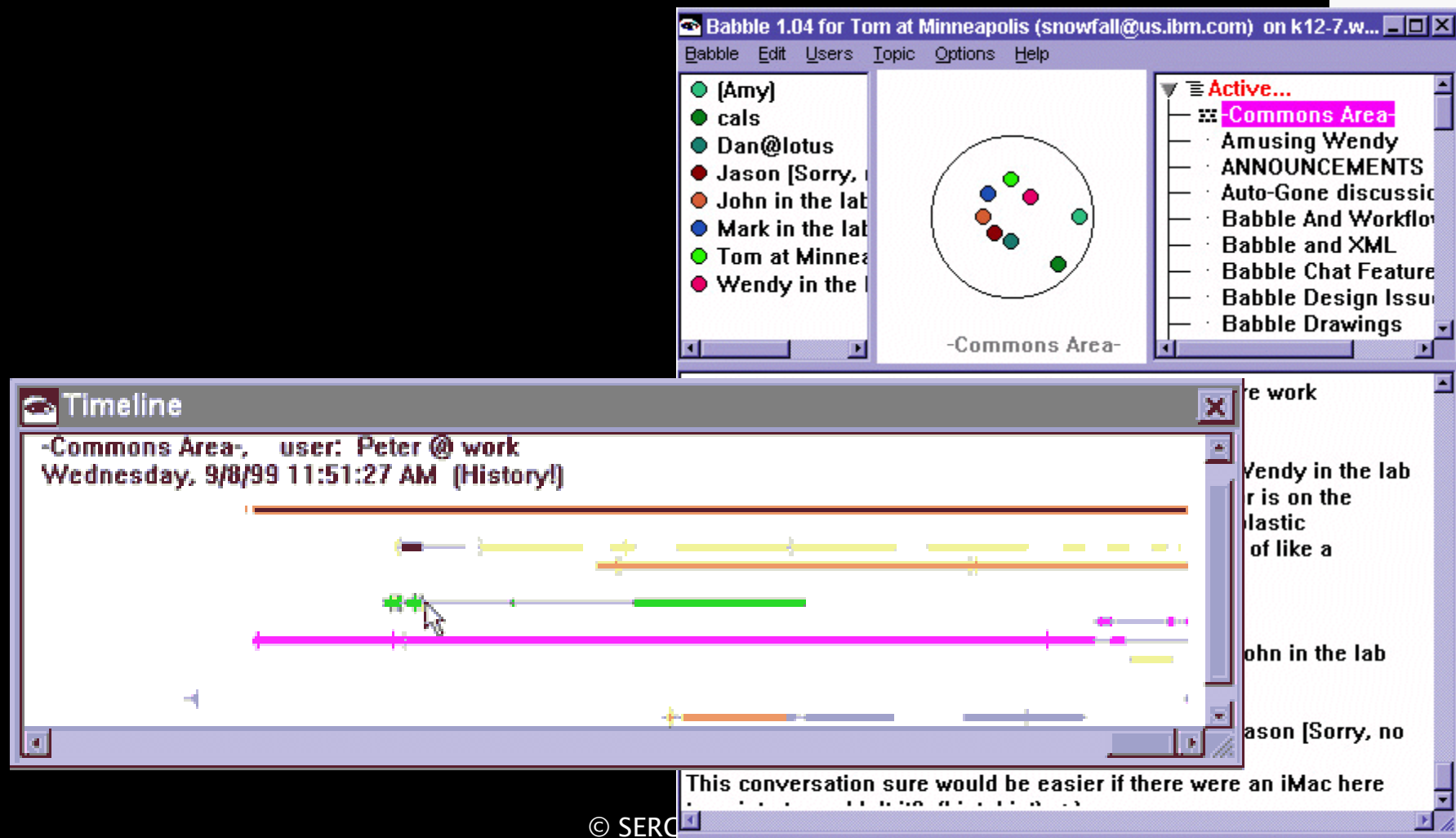
Conversation Analysis (CA)

- opening and closing patterns
- turn-taking
 - current speaker A selects next speaker B
 - next speaker B self-selects as next
 - current speaker A continues
- conversational sequences (adjacency pairs)
 - offer-acceptance/rejection
 - greeting-greeting
 - complaint-excuse/remedy
 - request-acceptance/denial
- topic / subtopic organization
- repair
- + discourse analysis + critical discourse analysis



Visualizing conversation

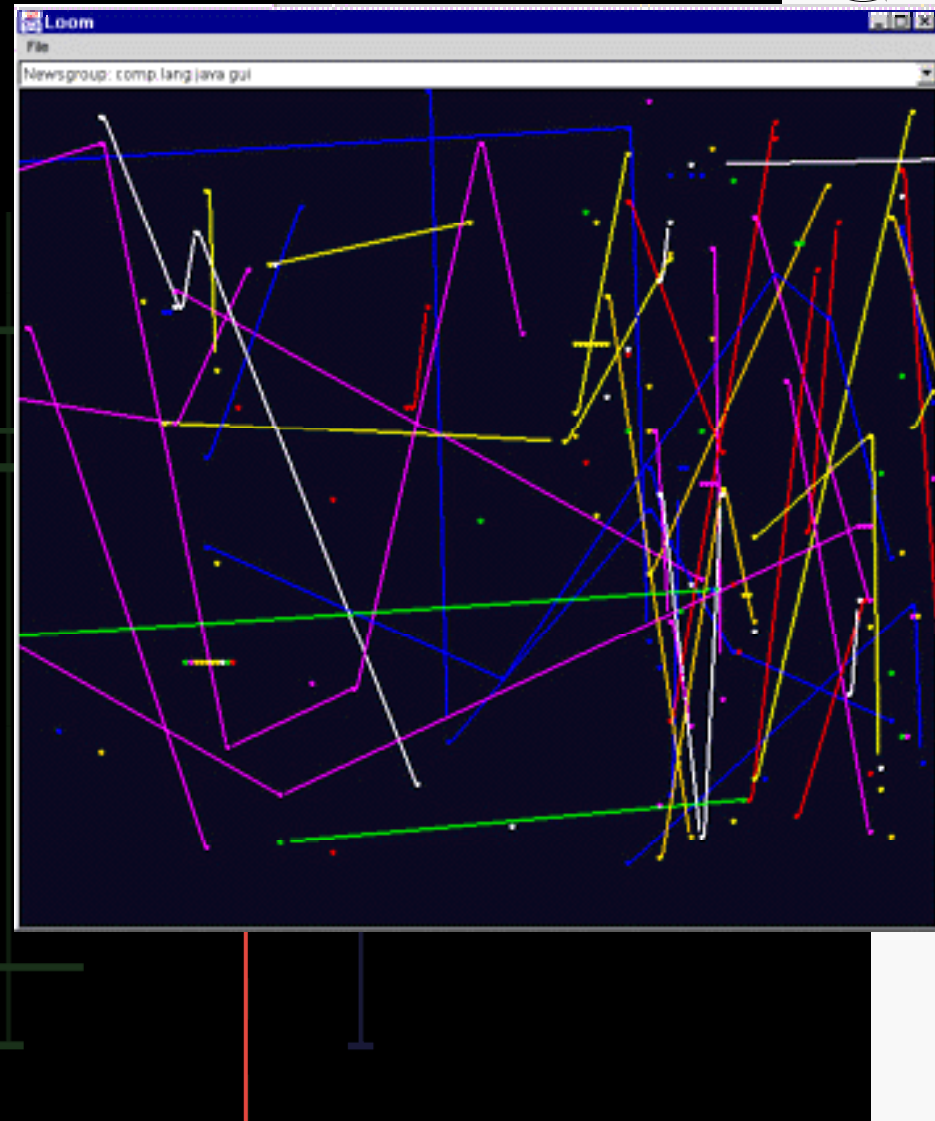
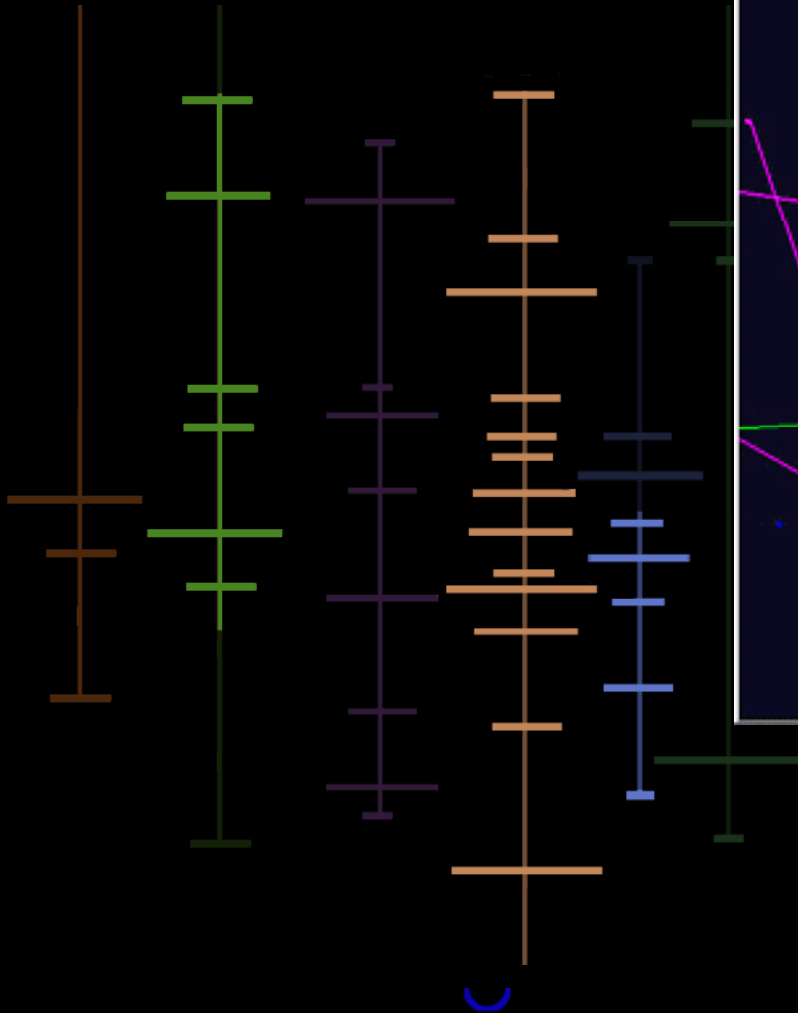
- social proxy @ Babble (Erickson 1999)



Visualizing conversation

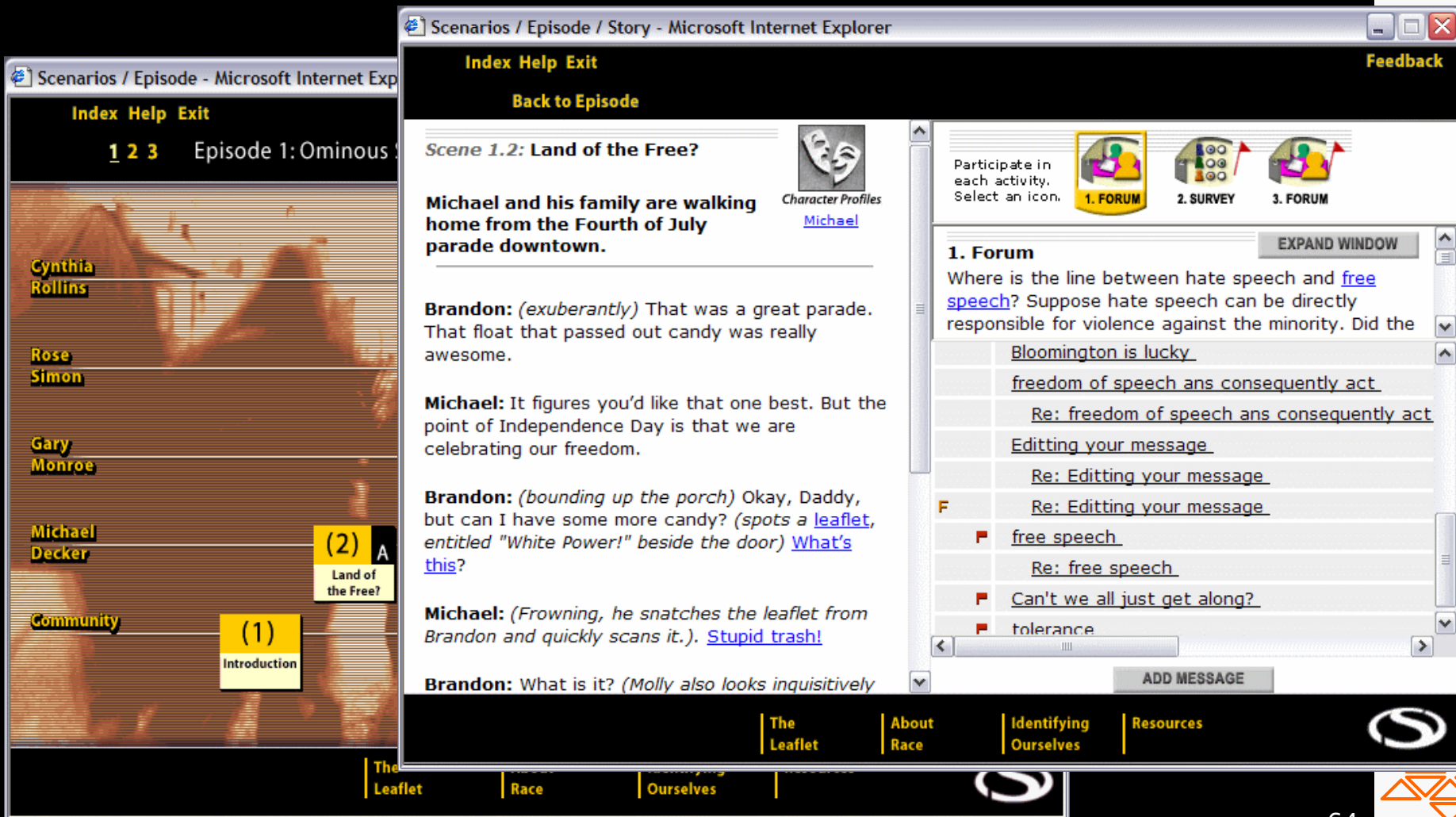


- Donath et al. 1999



Visualizing conversation

- Scenarios system (Siegel et al. 2004)



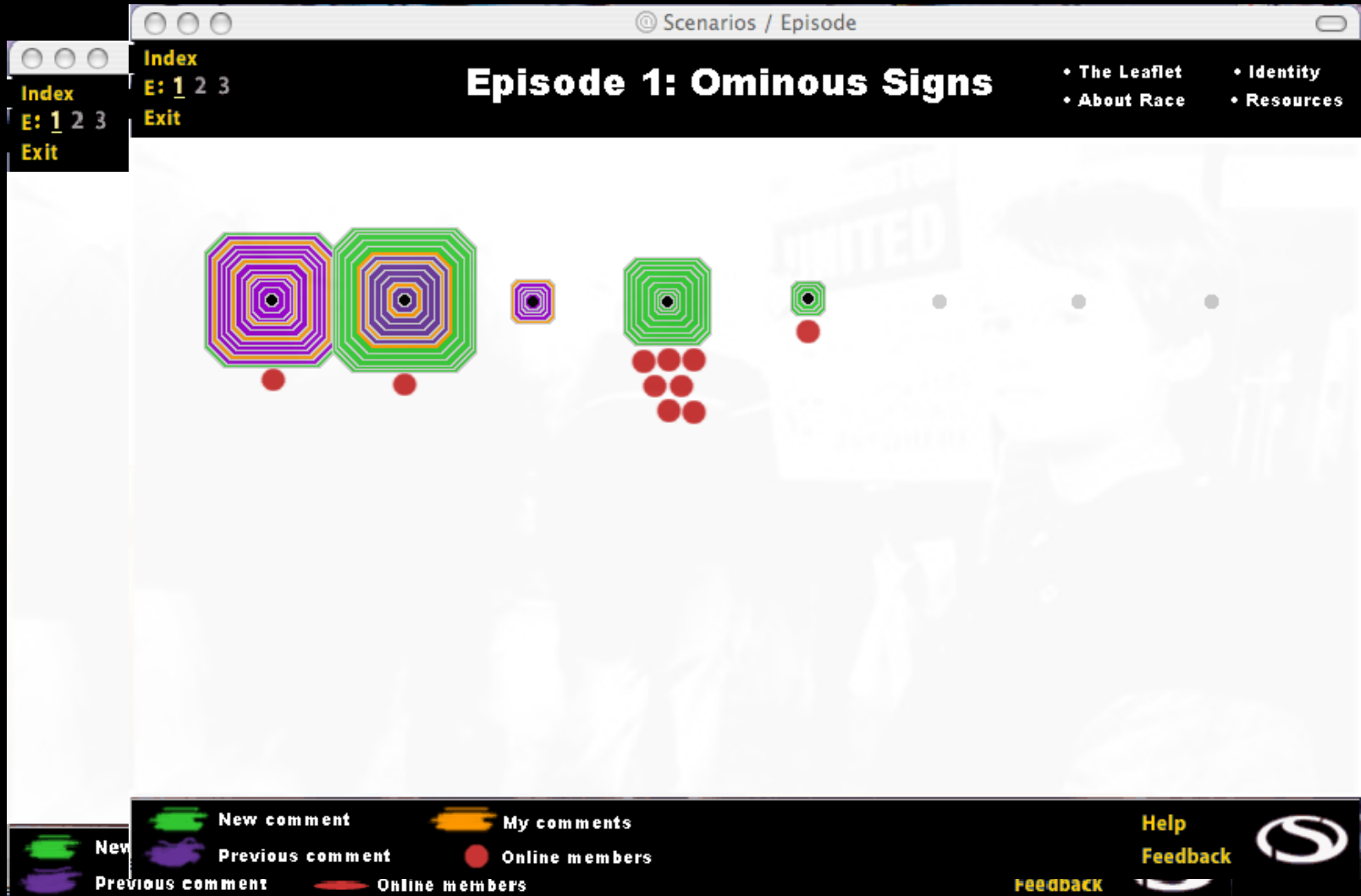
The screenshot displays the Scenarios system interface, which is a web-based environment for visualizing conversation. The interface is divided into several sections:

- Left Panel:** A sidebar with a list of characters and a navigation menu. The characters listed are Cynthia Rollins, Rose Simon, Gary Monroe, Michael Decker, and Community. The navigation menu includes a "Community" button and a "Land of the Free?" button, which is currently selected.
- Main Content Area:** The central part of the interface shows the story episode. It begins with the title "Scene 1.2: Land of the Free?" and a description: "Michael and his family are walking home from the Fourth of July parade downtown." Below this, there are dialogue blocks for Brandon, Michael, and Brandon again. Brandon's dialogue includes a reference to a "leaflet" and a link to "What's this?". Michael's dialogue includes a reference to a "leaflet" and a link to "Stupid trash!".
- Right Panel:** A forum section titled "1. Forum" with an "EXPAND WINDOW" button. It contains a list of messages, including "Bloomington is lucky", "freedom of speech ans consequently act", "Re: freedom of speech ans consequently act", "Editing your message", "Re: Editing your message", "Re: Editing your message", "free speech", "Re: free speech", "Can't we all just get along?", and "tolerance". There is an "ADD MESSAGE" button at the bottom of the forum.
- Bottom Panel:** A navigation bar with links to "The Leaflet", "About Race", "Identifying Ourselves", and "Resources".



Visualizing conversation

- Erickson 2004



- PostHistory (Viegas 2002)



Visualizing conversation – design issues

(Donath et al. 1999)

- Data choice:
 - What is the data to be visualized?
(What is the goal of the project? Word distribution, patterns of participation and response, thread development, the changing mood of messages, etc.)
- Data generation:
 - Where does the data come from? Can it be computationally derived from text itself or does it require input from the participants? If the latter, what motivates them to do so?
- Data mapping:
 - What are appropriate mappings of data to color, shape, and location? How does the resulting representation reflect the ambiance of the discussion?
- Impact:
 - How does the interface affect the dynamics of the conversational group? What does the visualization reveal about the social interactions?

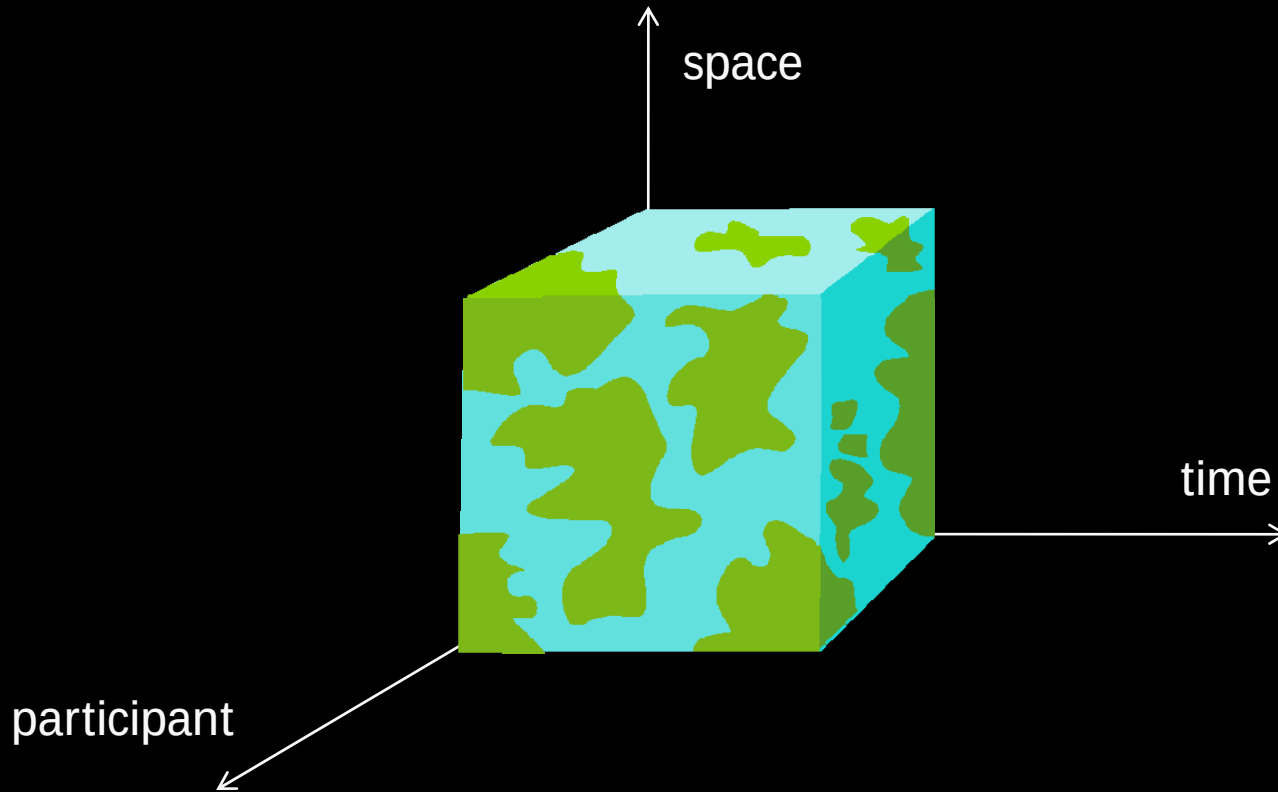


An additional design challenge: simulation

supporting
“What if...?”



What if...?

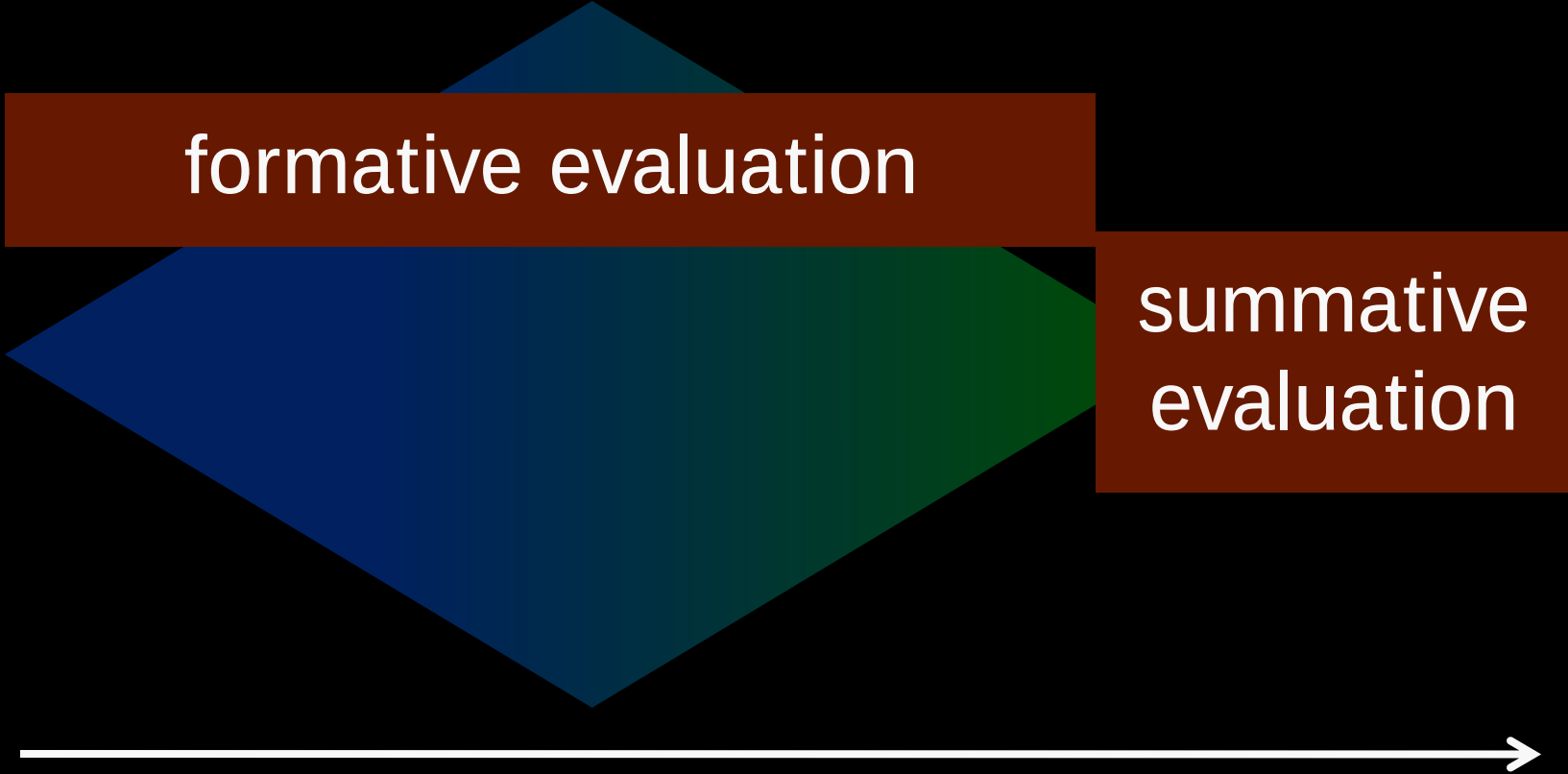


How to evaluate SimParc?

- First
 - What are the projects' goals?
- Different kinds of evaluations:
 - process x prototype
 - HCI (user interface) evaluation
 - learning assessment
 - HCI → learning



When to evaluate?



formative evaluation

summative
evaluation

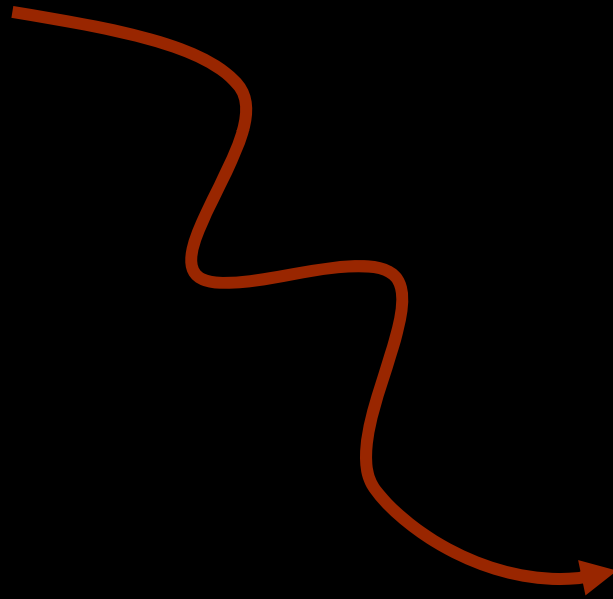
Evaluation must be systematic!

time



What to evaluate?

observation



inference



Evaluating HCI and the user interface

- quantitative x qualitative
- inspecting the user interface
 - e.g. semiotic inspection method, heuristics and design principles, model-based evaluation
- observing and talking to users
 - e.g. communicability evaluation, verbal protocol, cooperative evaluation
 - ethical issues
- challenges:
 - observing multiple users' interactions
 - multidisciplinary nature of evaluation (e.g. ecology, social scientists, educators)
 - HCI x learning / HCI → learning
 - different objects of investigation



The background of the slide features a close-up, slightly blurred image of a test paper. A yellow pencil is positioned diagonally across the lower half of the image, pointing towards a multiple-choice question. The question text is partially legible and includes phrases like "What is the story mostly about?", "boxes, Trying to save time, A", "Unpacking a crate", "Did Ellen and Bob put all the", "the crate? There was plenty", "They wanted to make", and "tested they put the toys". The multiple-choice options are labeled with letters in circles. The overall lighting is soft, and the colors are muted, with a greenish tint on the left side.

assessment

quantitative
measurable

qualitative
not-so-measurable



assessment

what? how?

participation in discussions

- measuring participation

- quality of argumentation

- collaboration / competition

- attitude

- usage of rhetorical structures

knowledge “acquisition”

- tests / exams

- analyzing discussions

observations, interviews & surveys

assessment

kinds of knowledge

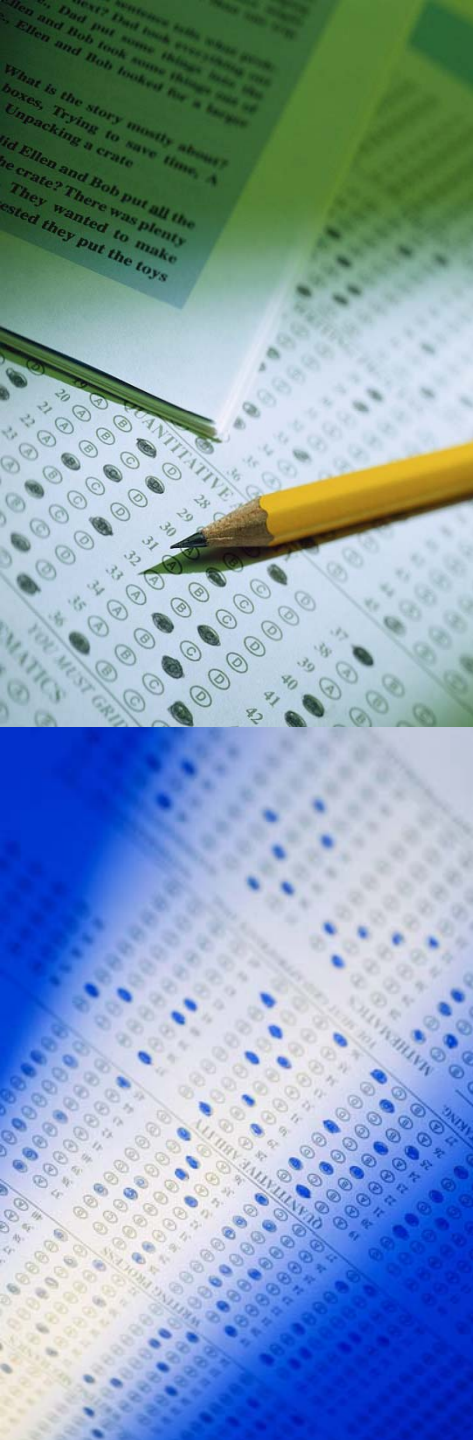
conceptual

what

why

applied

how to



comparison?

reliability & validity

different game designs

different game situations

different participants
or same participants in different moments

different roles

different materials

The Kirkpatrick Model (1996)

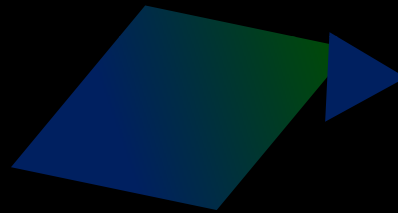
Evaluation level	Definition	Example
1 – Reaction	How students react to learning.	attitude surveys
2 – Learning	Whether students change attitudes, improve knowledge or increase skills.	knowledge tests
3 – Behavior	Whether students change their behavior as a result of the learning.	observation of skills
4 – Results	Whether students can apply learning in new domains.	performance in subsequent courses



assessment planning



Where is SimParc from an HCI design point-of-view?



Where is SimParc from a learning point-of-view?

Any educators here?



Thank you

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