Constructive misunderstandings

a computer scientist's report on the design of collaborative technologies for children on the autism spectrum

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COSPATIAL

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a 3-year project: 2009-2012

collaborative technologies for teaching social competence to children on the autism spectrum (HFASD)

Collaborative Virtual Environments and Shared Active Surfaces

Fondazione Bruno Kessler (FBK)

University of Haifa

University of Bar-Ilan

University of Nottingham

University of Birmingham
(now Univ. of Southampton)

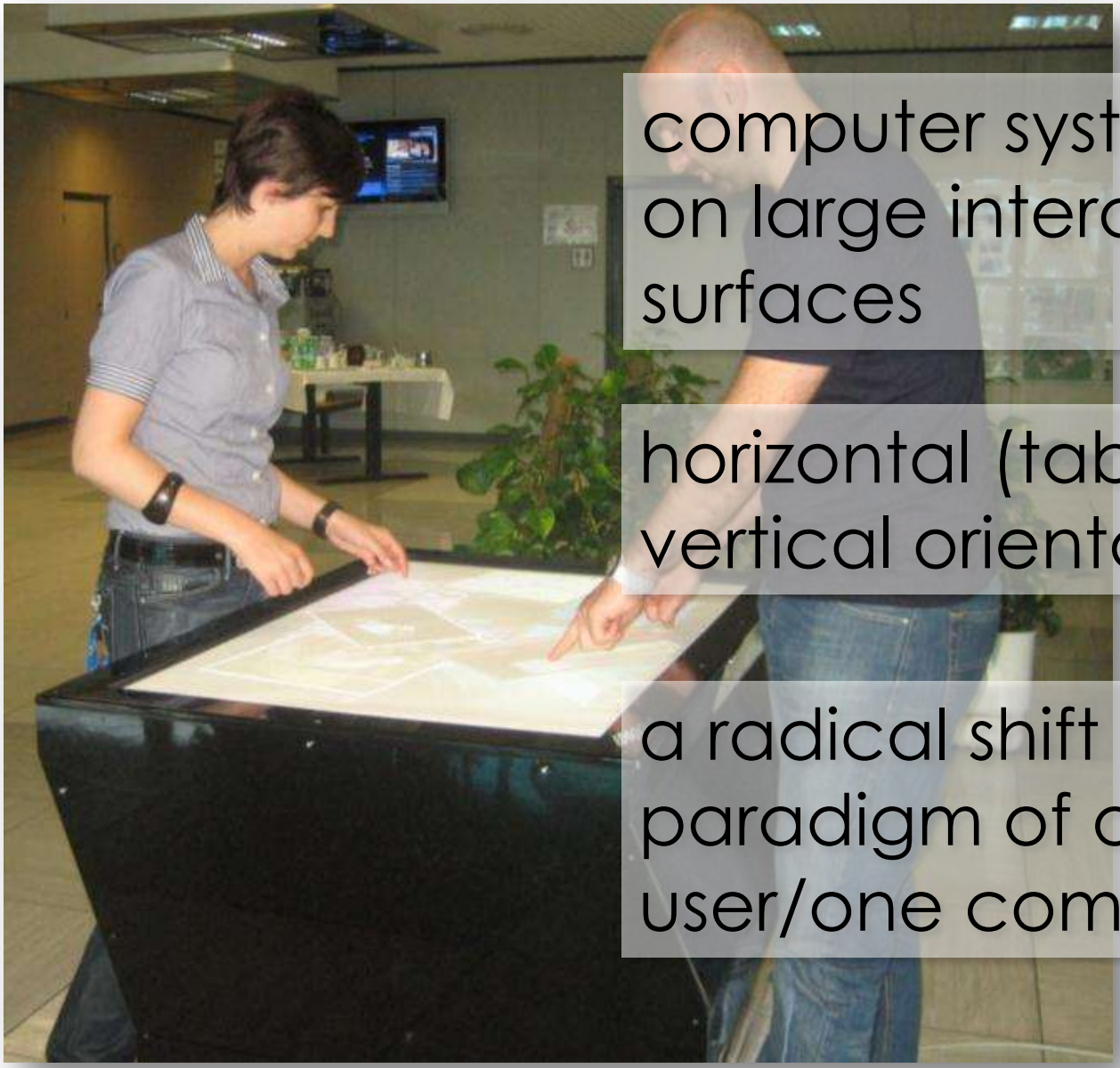
Cognitive Behavioral Therapy

a reference framework
to exploit the affordances
of technologies and to pursue
educational strategies

a CBT session is usually composed of two distinct but possibly interleaved parts: Learning and Experience

technology provides support to both

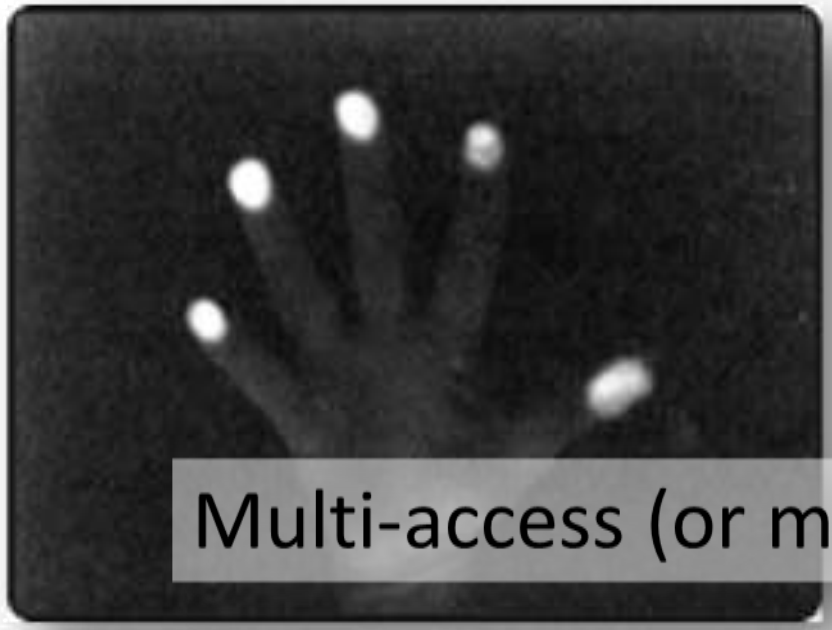
Shared Active Surfaces



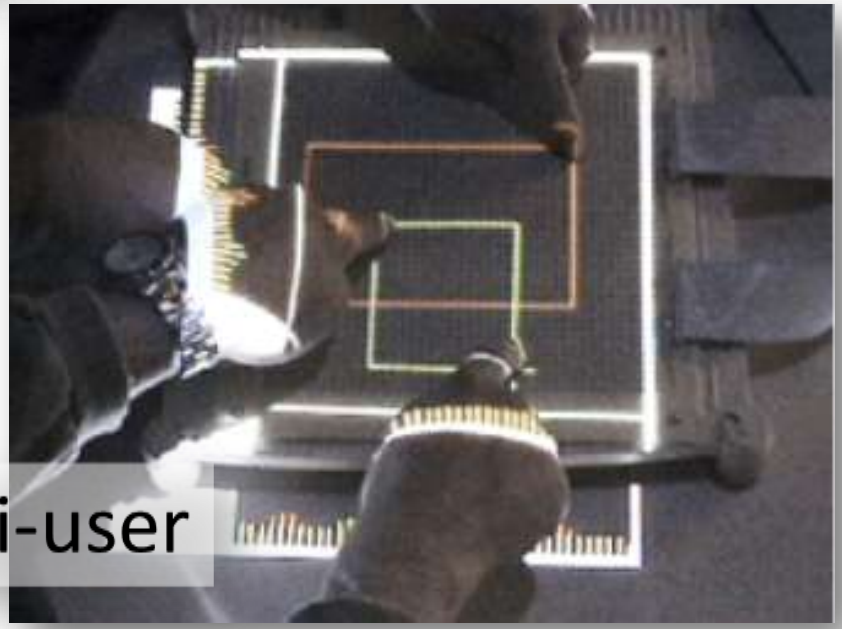
computer systems based on large interactive surfaces

horizontal (tabletops) or vertical orientation

a radical shift from the paradigm of one user/one computer

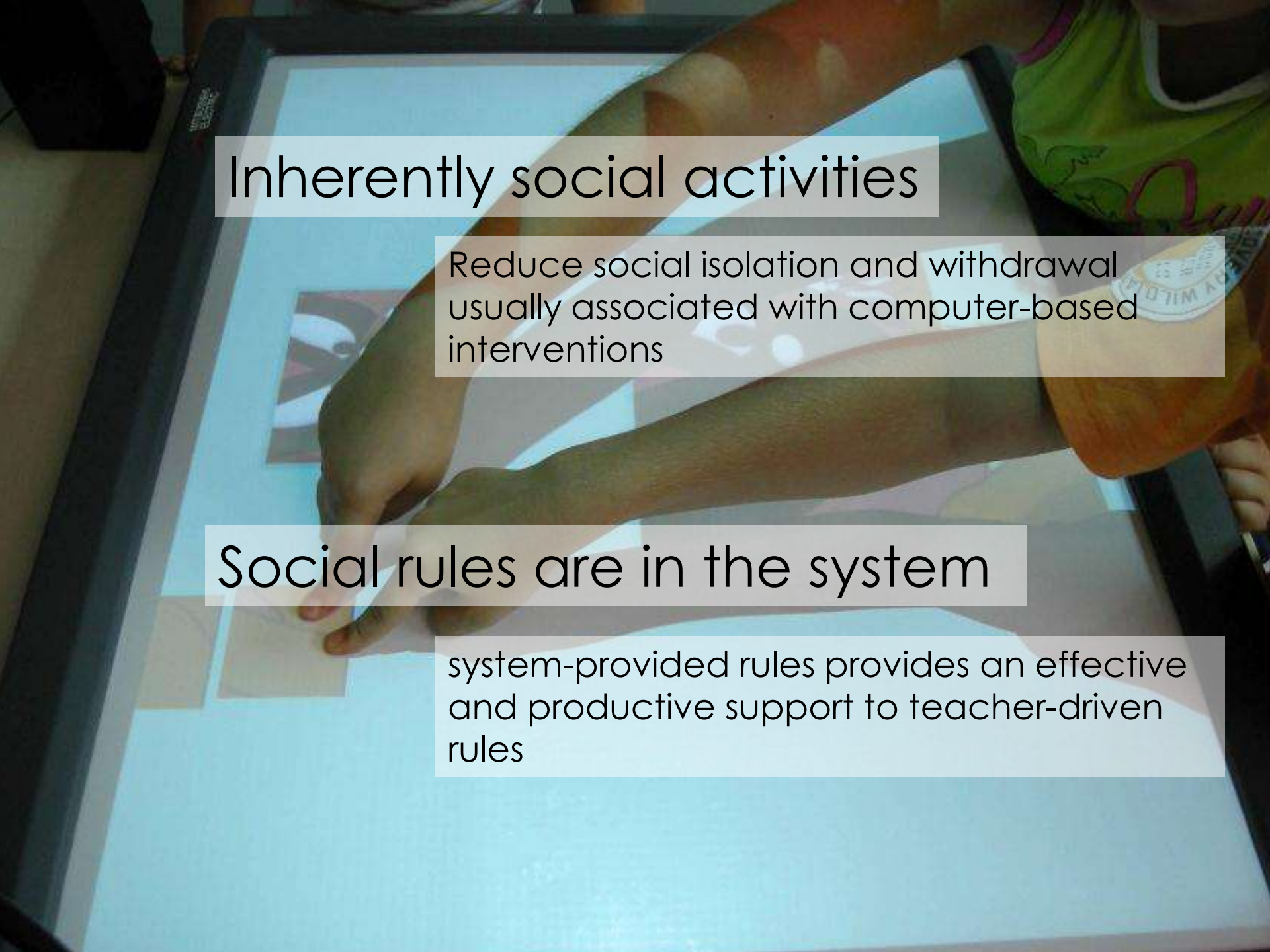


Multi-access (or multi-touching)



Multi-user

CircleTwelve, Boston (http://www.circletwelve.com/)



Inherently social activities

Reduce social isolation and withdrawal usually associated with computer-based interventions

Social rules are in the system

system-provided rules provides an effective and productive support to teacher-driven rules

Core team (6/8 people)

- Researchers in computer science/designers (FBK)
- Software developers (FBK)
- Researchers in new technologies for occupational therapy (Haifa)
- Researchers in education (Bar-Ilan)

Extended team (10/20 people)

- Teachers and practitioners
- Children on the autism spectrum

10 envisioning scenarios

5 initial prototypes

assessed in formative studies

2 robust applications

currently under evaluation in controlled interventions

Join-In Suite

1. Support varied types of social tasks (acting together, negotiation, mutual planning)

2. Embed specific interaction mechanisms to foster collaboration *(doing things together, sharing resources, playing different roles)*

3. Support an activity flow based on the main principles of CBT (*problem solving, concept clarification, rehearsal*)

4. Allow the therapist to control the activity flow and shape the collaboration experience

Initially concerned with "doing things together"

After focus groups, identified different ways to collaborate: sharing resources and playing different roles

After a formative study, added more emphasis on the role of the teacher as a mediator

How did it really go?

Issues in designing Join-In Suite

- Hesitant use of narrative scenarios slowed down the discussion on possibilities and challenges of technologies and a clear understanding of user context
- Lack of clarity on roles hampered the design requirements that were never really finalized
- The technical team focused on their baby while the domain experts and the users requested new "pony" functionalities
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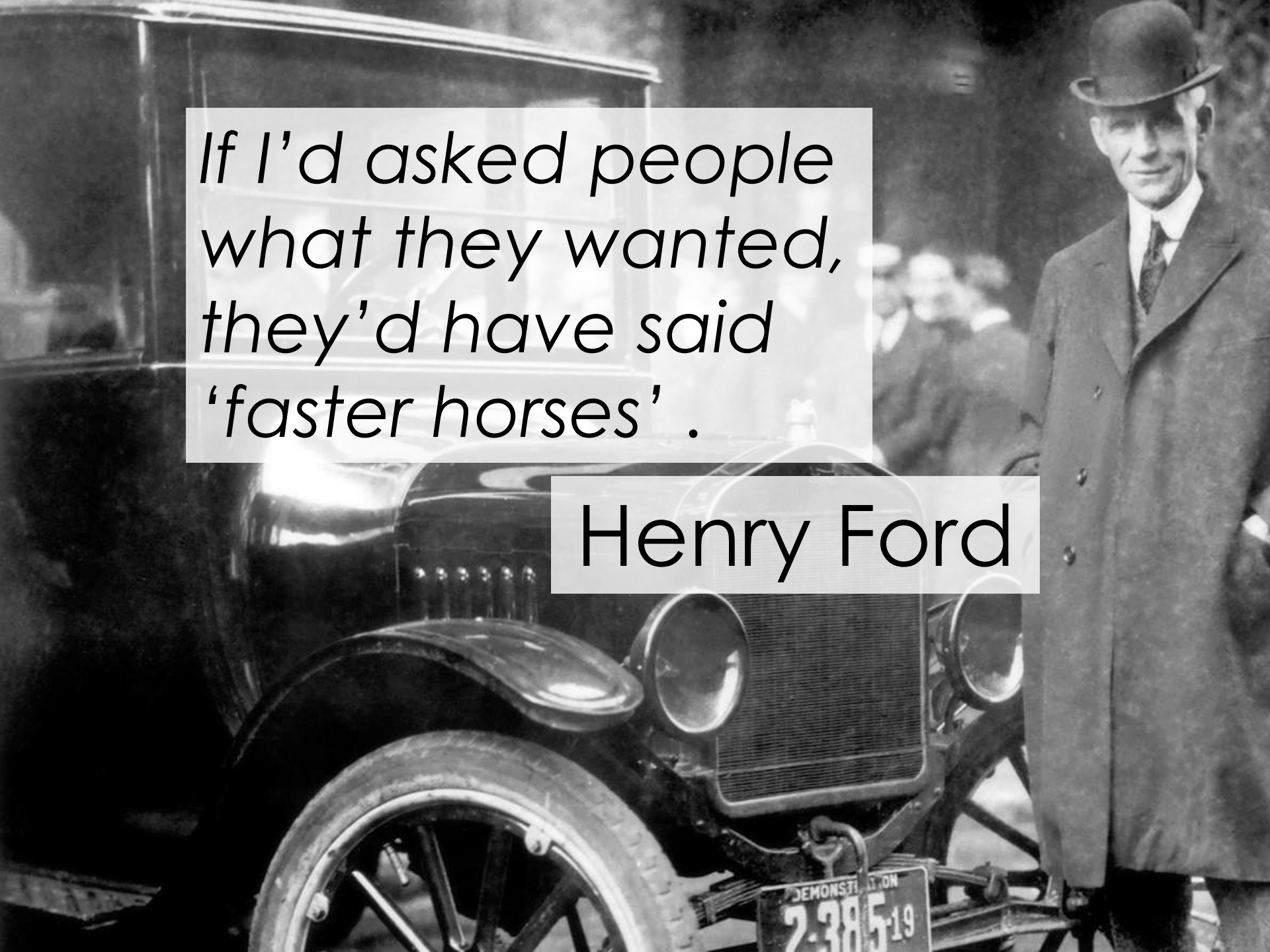
A lesson from Henry Ford



If I'd asked people what they wanted, they'd have said 'faster horses'.

Henry Ford

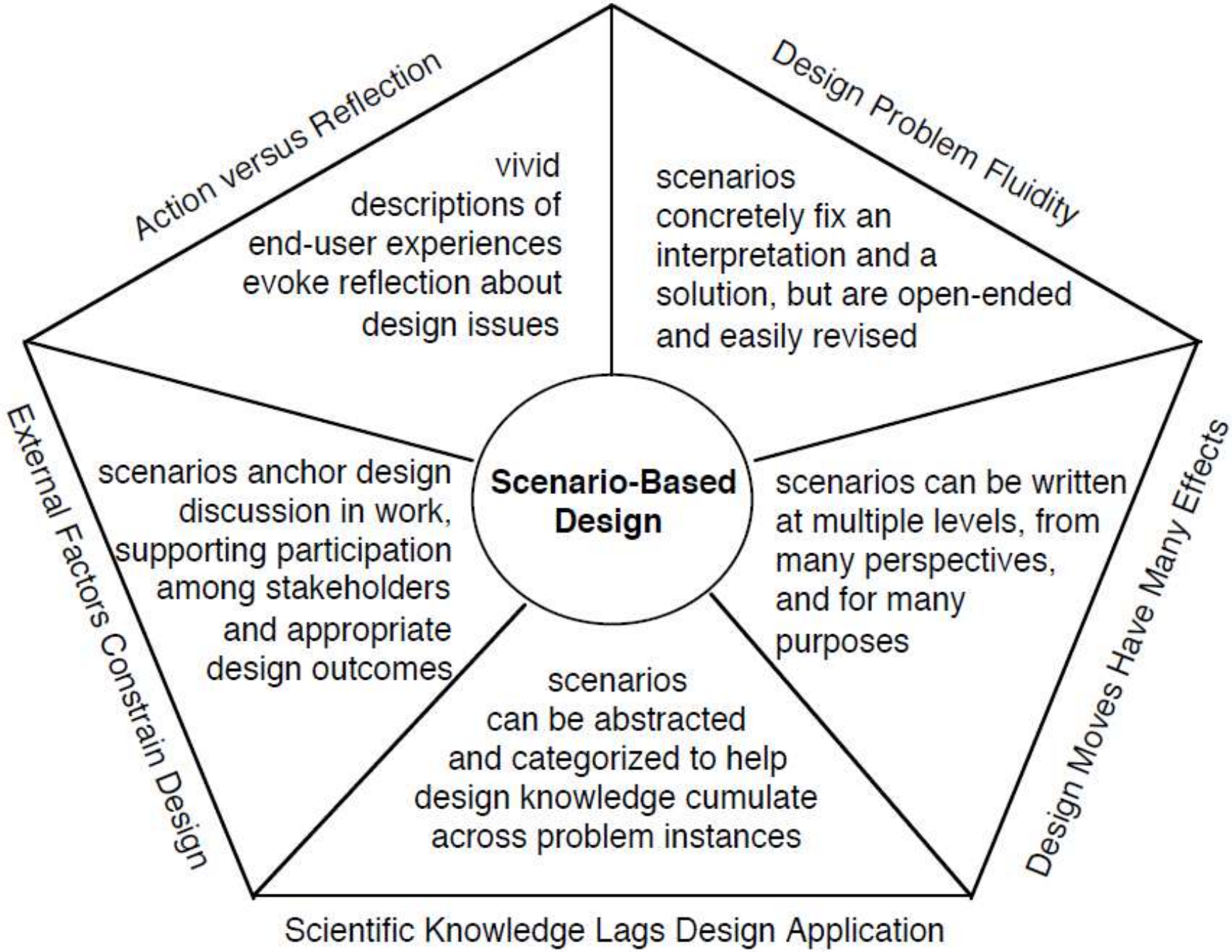
Co-participation in

design is indeed fundamental but a naïve approach may not work

understanding the context of the users

accepting the challenging of technology

narration is a powerful tool to make things understandable (e.g. Hollywood)



John M. Carroll. Five Reasons for Scenario-Based Design. Proceedings of the 32nd Hawaii International Conference on System Sciences - 1999

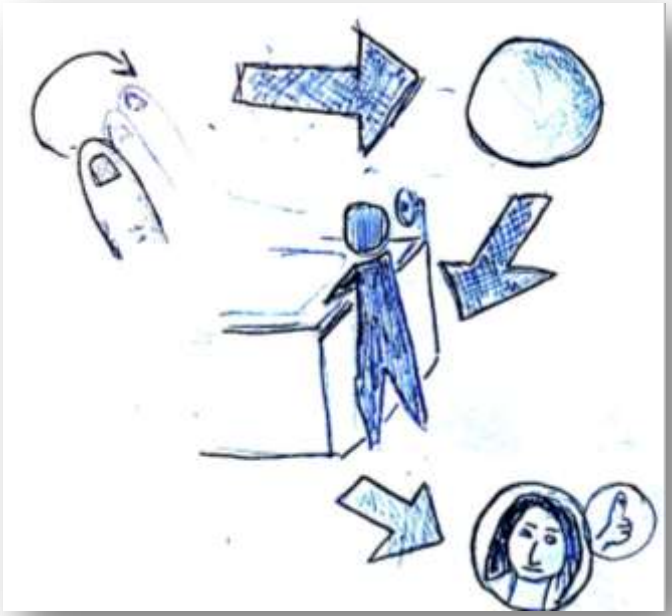
Scenarios in COSPATIAL

10 draft descriptions of systems were created: yet not always in narrative terms

Example: Narrative scenario

Maria, Luca and Martina meet around the table. As they approach it, the system starts playing a video, on the external monitor.

Martina draws a circular gesture on the table and a ball appears while the webcam turns on. Martina records a 20 s video expressing her support for the coolness of the girl in the video. She place a “thumbs up” icon to make this apparent. The track is activated and the arrow train speeds up until it stops in front of Luca.



Example: Non-narrative scenario

Examples of tasks that can be resolved by collaboration in terms of joint actions are presented on screen as “cartoon like” little stories.

The story can be enriched with sounds and voice-over

Alternative solutions for solving the task can be provided , and children can choose, with the help of the therapist, the more appropriate one

CBT

Concept clarification
Problem solving

Practice
Behavioural rehearsals
Feedback reinforcement

Learning

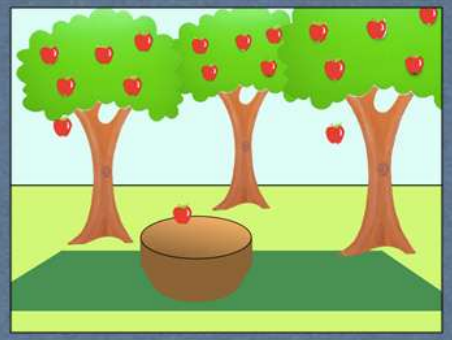
Simple interface and really basic task: apples falling from the trees have to be collected in the basket below

The basket can be dragged horizontally only by the joint touch of two children

Throughout the game, difficulty increases: more apples will fall more quickly, requiring a better level of coordination

Experience

Children can directly experiment the same kind of interaction presented in the stories through joint actions on the interface.



Useful to categorize the proposals in terms of CBT but less useful to give the «gist of technology» and prompt discussions about its added value

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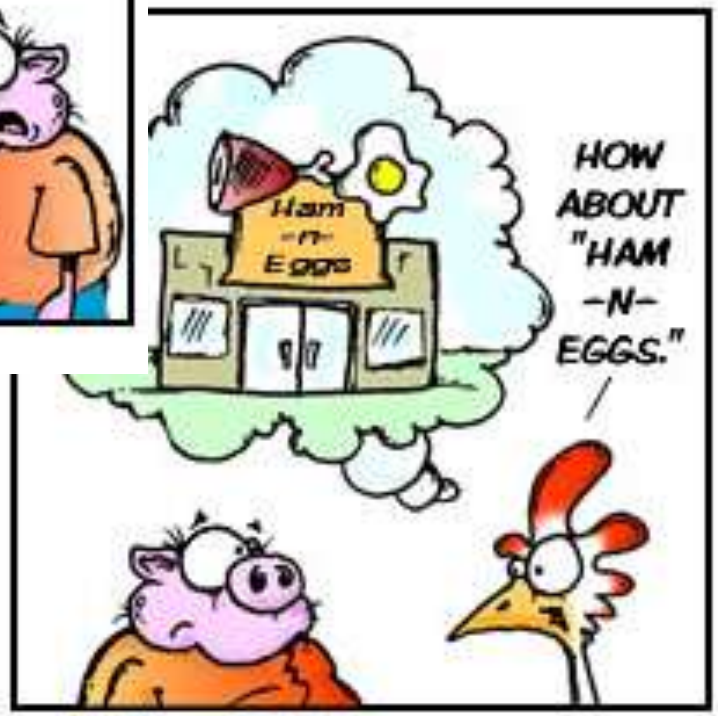
Chicken & Pigs

By Clark & Vizdos



http://www.implementingscrum.com/

Pigs

are totally committed to the project and accountable for its outcome

Chickens

consult on the project and are informed of its progress

In a design team is important to clarify these roles:

Pigs are required to stay tuned, act and take responsibility

Chickens express opinions but can't delay the team

The situation in COSPATIAL

Chickens for the design may be Pigs for the evaluation (and theoretical background)

Because of the lack of clarity (who's who and when), the design requirements were never really finalized

From: **X**

Sent: Tuesday, 24 May 2010

To: ***all***

Subject: Join-In – content preparation

Hi all,

we are going on with the implementation of the three games for the Join-In suite. From a software point of view, we have almost finalized all the three games. The next week we would like starting to integrate the contents. Here what we need from your side

a) ..

b) ...

From: Y

Sent: Tuesday, 24 May 2010

To: ***all***

Subject: Re: Join-In – content preparation

Hi all,

I'm not sure I understand how can we define the problem when we do not have the scenarios. Do I miss something?

From: **X**

Sent: Tuesday, 25 May 2010

To: ***all***

Subject: Join-In – content preparation

Actually, the scenarios were circulated several weeks ago!

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Babies & Ponies

Babies

the “great” ideas that the designers try to push forward even if the users are not really convinced

Ponies

the naïve or unrealistic ideas that the users have and want to insert into the process

Babies and ponies are the two main reasons of failure of a design process

difficult to recognize

difficult to deal with

Scenarios and early prototypes may help

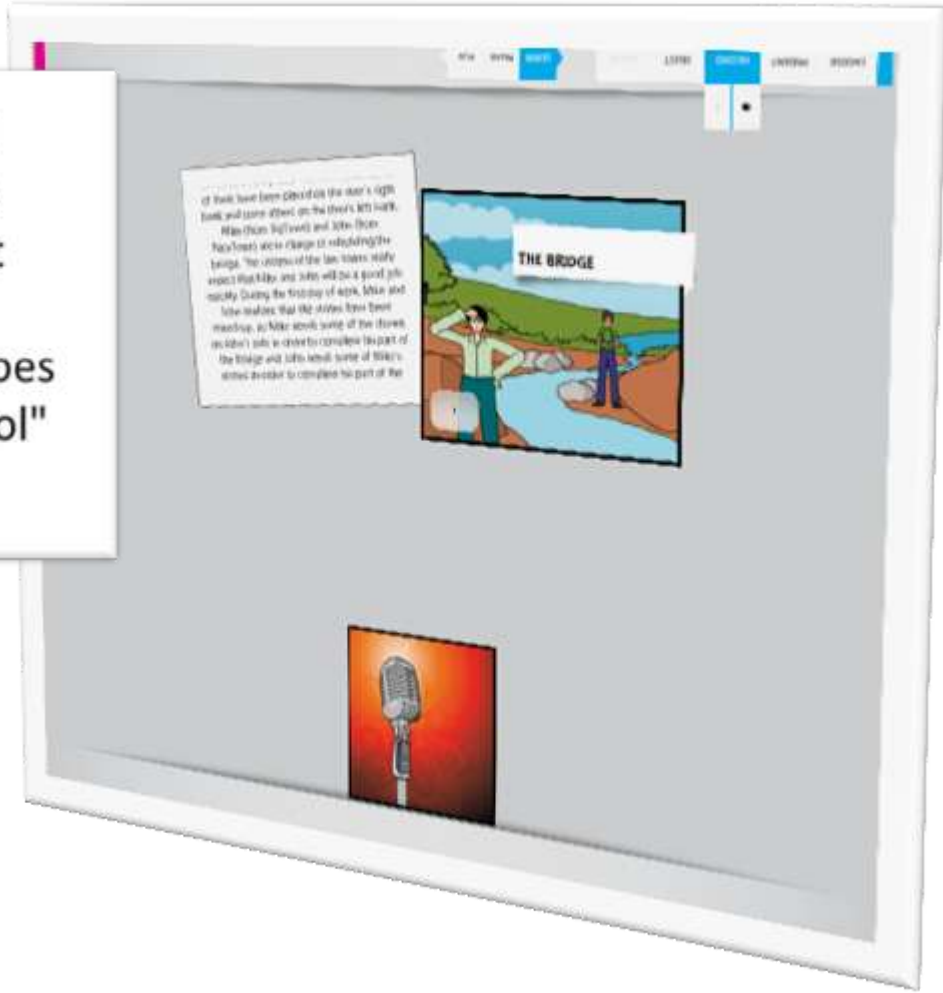
ideas are presented in draft form and likely too rough to become babies

ponies can be anticipated because the users are presented with several alternative ideas

A COSPATIAL's baby

A COSPATIAL's pony

"In the children's solutions it will be a taped voice only, unless we provide them with the option to create a picture (drugging relevant objects like in story table) in the relevant square. Do you guys think it is important? Does it add a lot of work? It will sure be more "cool" "involving" and creative."



In this design, it would be cumbersome and complicated.

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Dandy horses for mountain bikes

Early adopters may find **difficult** to appreciate the potentialities of a product

"[…] what the designer is trying to do is to envision things for users that the users can't yet envision. The hard part is not fixing little problems, but designing things that are both innovative and that work […]"

T. Winograd

prototypes help
in the process of
envisioning …

… but it is important to
recognize when the dandy
horse stands for the
mountain bike

What do prototypes prototype?

Role

- How do the users use the product? In which ways they can use it?
- You have to understand the context of use it!

Implementation

- How the system works? Which are its main components?
- You have to build a working system!

Look and Feel

- What's the sensory experience? What do the users see and feel in using the product?
- You have to create or simulate the experience that the user may have with the system!

Houde, S., and Hill, C., What Do Prototypes Prototype?, in Handbook of Human-Computer Interaction (2nd Ed.), M. Helander, T.Ê Landauer, and P. Prabhu (eds.): Elsevier Science B. V: Amsterdam, 1997.

http://en.wikipedia.org/wiki/Palm_(PDA)

a prototype is never a complete product

a prototype should have precise goal: it assess/demonstrate something

The *Barely Good Enough* Principle

make the **simplest** prototype that can do what you want to assess/demonstrate

The COSPATIAL BGE

The interactive process helped in keeping the initial mockups and the prototypes as BGE

Yet the prototypes were kept BGE by denying new functionalities and this caused misunderstandings in the team

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Prioritize or die

if everything is a top priority, then nothing is

Low hanging fruits: easy to accomplish

Dependencies: first things first

Urgent vs. Important: urgency based on time; importance based on values

The most important thing is to target the BGE

COSPATIAL 04/08/2010 i3

REDESIGN ISSUES

In what follows, a synthetic list of the redesign issues that have been discussed during the Barllan meeting (28/07/2010)

Technical difficulty/convenience: Difficult/unconvient Requires some effort Relatively easy

TEACHER'S CONTROL PANEL

XX The control panel should disappear in order to avoid children to be distracted (sometimes they tried to operate on this).

XX The therapist should have the possibility to pause the activity.

XX A double-tap (both children) should be required to start the audio description.

XX The therapist should be enabled to move forward and backward across the different activity phases.

XX In the Experience part, the teacher should be able to control in real-time: levels of sociality, levels of difficulty, and the duration of the game (sometimes, the therapist feels that it is important that children succeed).

Save the Alien

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The appetite comes with eating

In software industry, programs are delivered by versions

- Alpha, Beta, 1.0, 1.1, …, 2.0 …

Once enough bugs are collected, a new sub-version is released (x.1,x.2, …)

- Bugs are prioritized (importance/dependencies) before being fixed

Once enough consensus on new functionalities is reached a new major version is released (x.0)

- New functionalities are prioritized according to BGE

The worst mistake is to fix bugs on the run

The second worst mistake is to add functionalities during the debugging

Therapist's comments:

She thinks there is a need for a "done" button at the end of learning stage.

Teacher's mouse color is very light. Sometimes hard to see. Please change to a darker color

Would prefer to have access to the rules in the "select" stage.

Re the experience phase- she thinks it was better to use the computer for the first stages (chosing a setting and chosing topics) but that once the children started to converse, it was better to use the cards.

Please consider including setting and topics in the DT. I'll send you the ppt presentation.

Children's comments while plavi

I agree and understand, but we did usability study in order to assess if there are problems.
I identified minor problems.
It is now time to prioritise what is important to do NOW
What is important to do at a later stage
and
What is not important to do at all.

Other wise- what is a usability study for?

Possibly you didn't read my previous e-mail carefully- I'm saying that there is a need to chai
represents the mediator, other wise sometimes the mediator can't operate her mouse. I don't

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7 things I should do next time

1. Don’t ask “what” but “how” (narration may not be enough)
2. Make the roles clear
3. Acknowledge the different goals (beyond the common vision)
4. Do make priority lists (and keep them)
5. Beware of babies and ponies
6. Set the level of barely good enough
7. Make clearly separate debugging and designing

Nevertheless …

5 things I must do again next time

1. Encourage the exploration of new technological approaches (using more adequate means)
2. Clarify misunderstanding and quarrels as soon as possible
3. Apologize (sometime, when needed)
4. Say thank you and acknowledge effort (more often)
5. Visit the "real" sites and meet therapists and children (and bring programmers too)

http://cospatial.fbk.eu

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