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The SCY project

Learning by creating

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SEVENTH FRAMEWORK PROGRAMME

Information Society Technologies

Centre for Advanced Learning

University of Twente
Enschede - The Netherlands

SCY basic principles

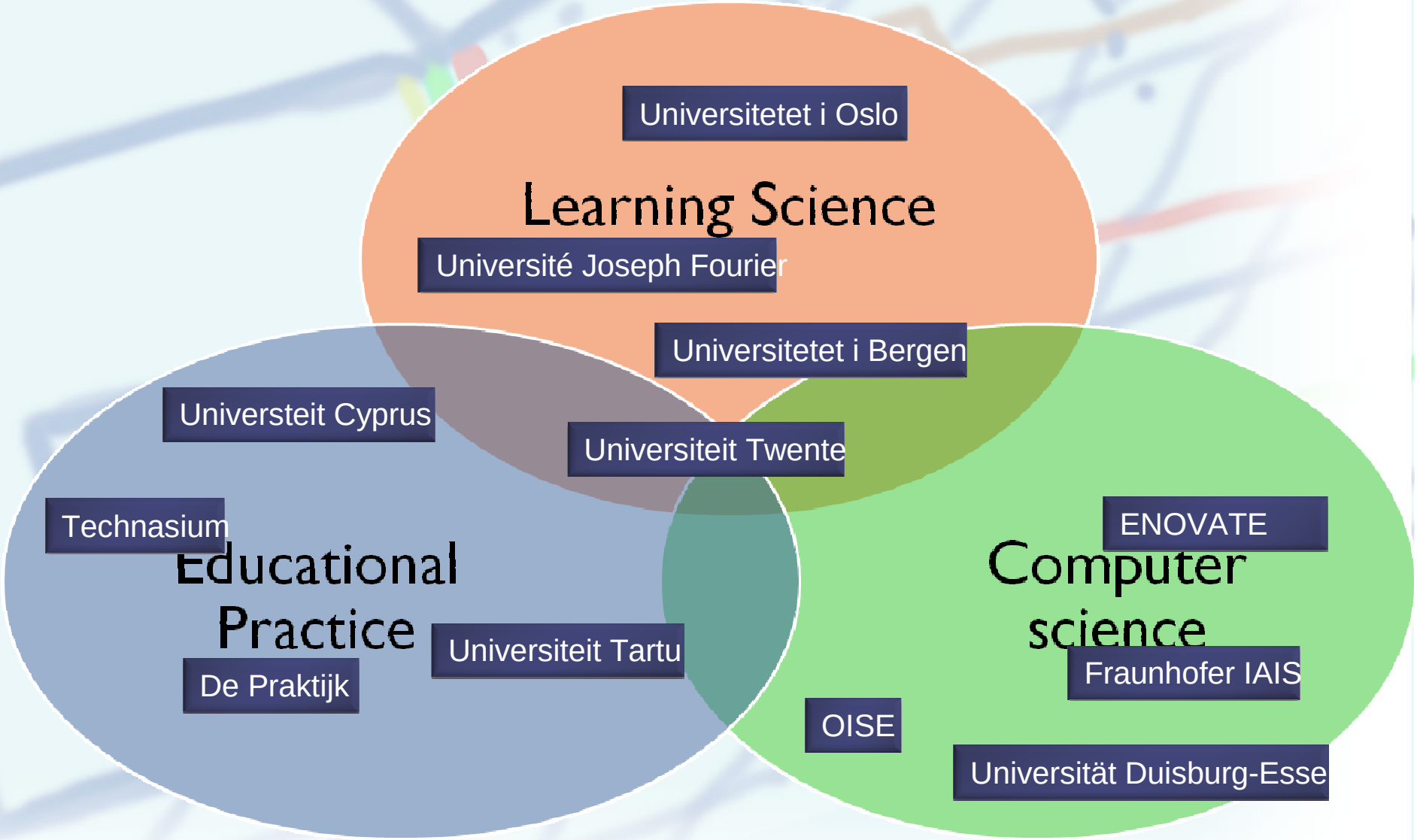
Science is all about creating knowledge:

- Scientific theories
- Evidence to support those theories
- Material to convince others
- Data to inspire new ideas
- New ideas

Learning science is best done by doing science

- Design realistic scientific tasks that learners can handle
- Creating artefacts and knowledge is central
- Adaptively support the learner where needed

Who is SCY


Universitetet i Oslo
Learning Science
Université Joseph Fourier
Universitetet i Bergen
Universteit Cyprus
Universiteit Twente
Technasium
Educational Practice
Universiteit Tartu
De Praktijk
ENOVATE
Computer science
Fraunhofer IAIS
OISE
Universität Duisburg-Esse

Who is SCY

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The project

- 12 partners
- € 8.000.000 budget
- € 6.000.000 subsidie

- Integrated Project
- Chosen first out of 255 applications

- Interdisciplinary project!
  - At least we try…

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Strong relation to educational practice

- Teacher training institutes in Cyprus and Estonia
- Technasium
  - 27 schools in the Netherlandssters
  - Research and Design as topic for students
  - Strong relation with educational field.
- De Praktijk
  - Mission: increase public interest in Science
  - Free material for teachers and students
  - Open content

Technasium

Jacob-Roelandslyceum gymnasium atheneum havo

VARENDONCK COLLEGE

pleincollege Eckart

Basis Science Quiz

Next Level Science Quiz

Expert Science Quiz

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Educational Practice

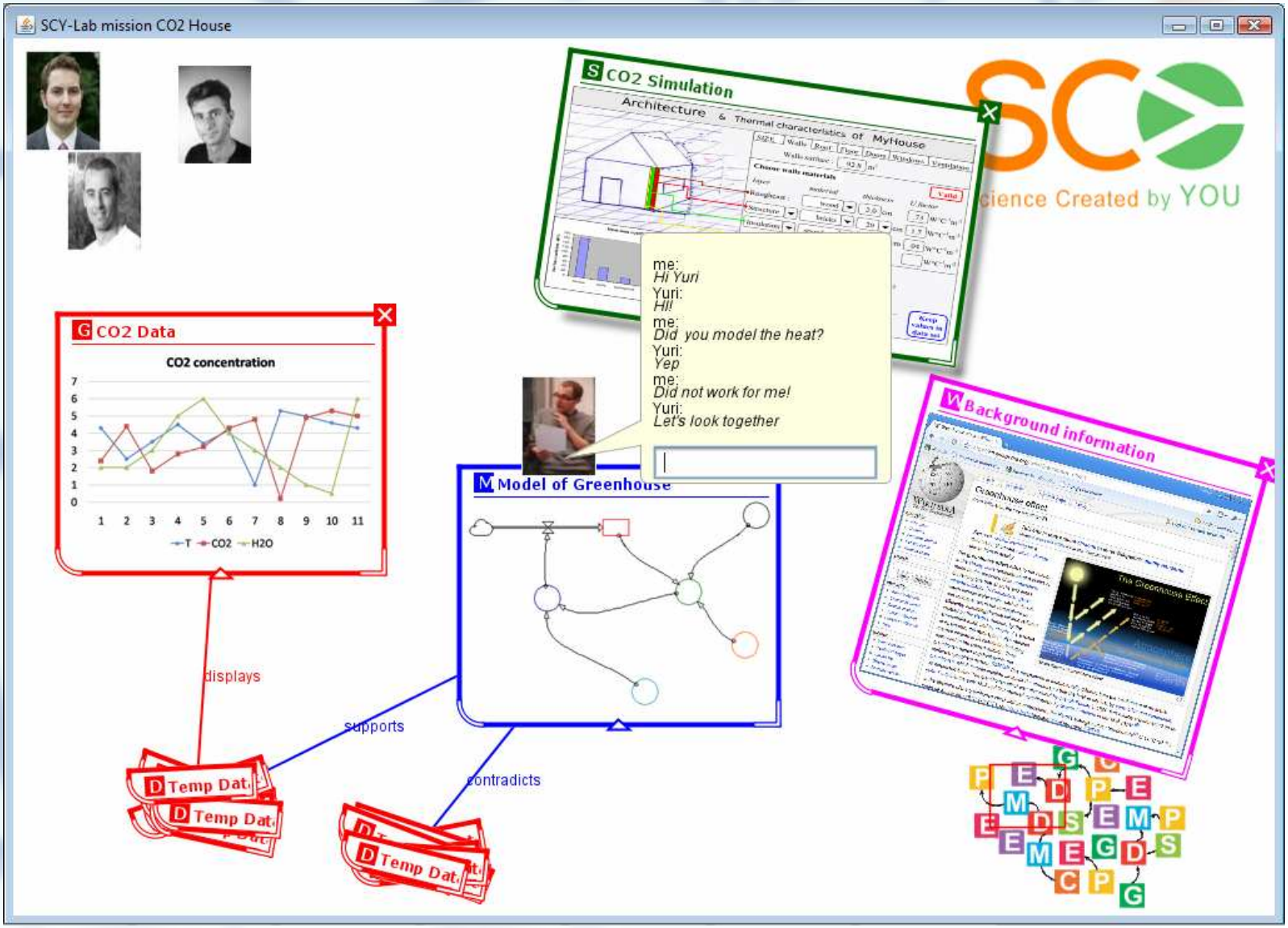
- Technasium, De Praktijk and Teacher trainers ensure realistic image of schools and science education
  - Curricular integration
  - Realistic school scenarios
  - Approach the learner at the right level
  - And – often ignored – the role of the teacher
    - **The goal is not to replace but to support the teacher.**
- Realize an online teacher community
  - SCYCOM

SCY innovation

- New interpretation of “Learning Objects”
  - Are made mainly by learners
  - Represent growing knowledge
  - Form the basis for a community of learners

  Emerging Learning Objects
- Intelligent support by Pedagogical Agents
  - Dynamic, ad-hoc collaboration
  - Providing just in time information and scaffolding
- Advanced pedagogical scenarios
  - Design, inquiry, …
  - Smart tools for knowledge construction

SCY for the learner



Missions

- Realistic project for learners.
- Typically 4-6 weeks, 20-40 lesson hours.
- Examples:
  - Investigate how cows can produce helathier milk
  - Design a bridge meeting technical an environmental requirements
  - Design a climate friendly house

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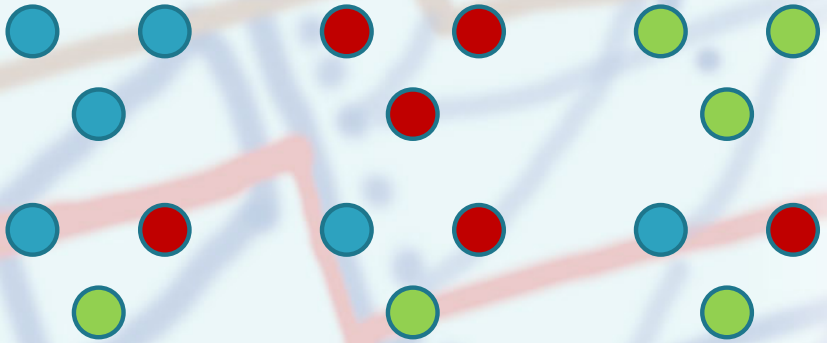
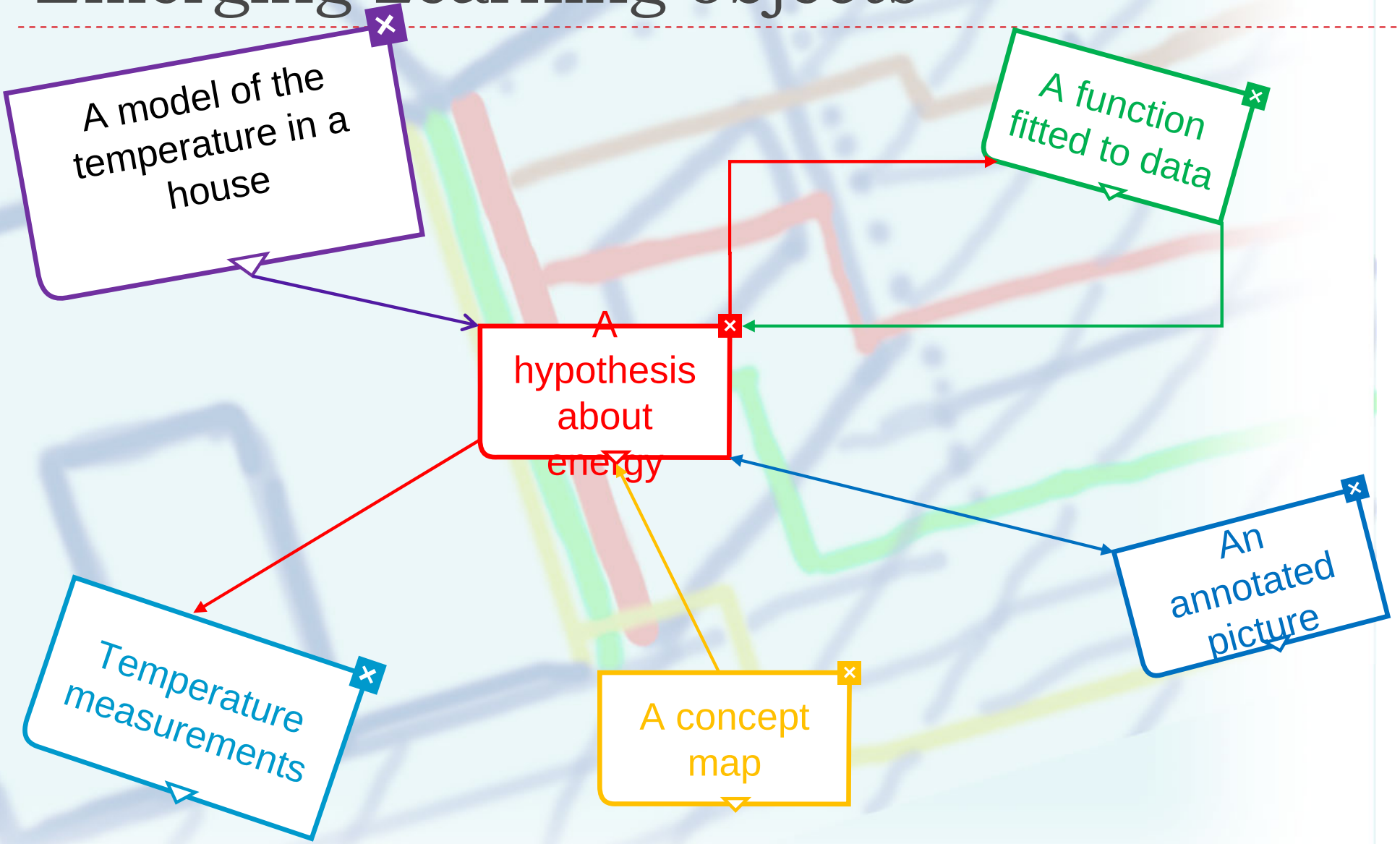
SCY Mission 1: Design a climate friendly house

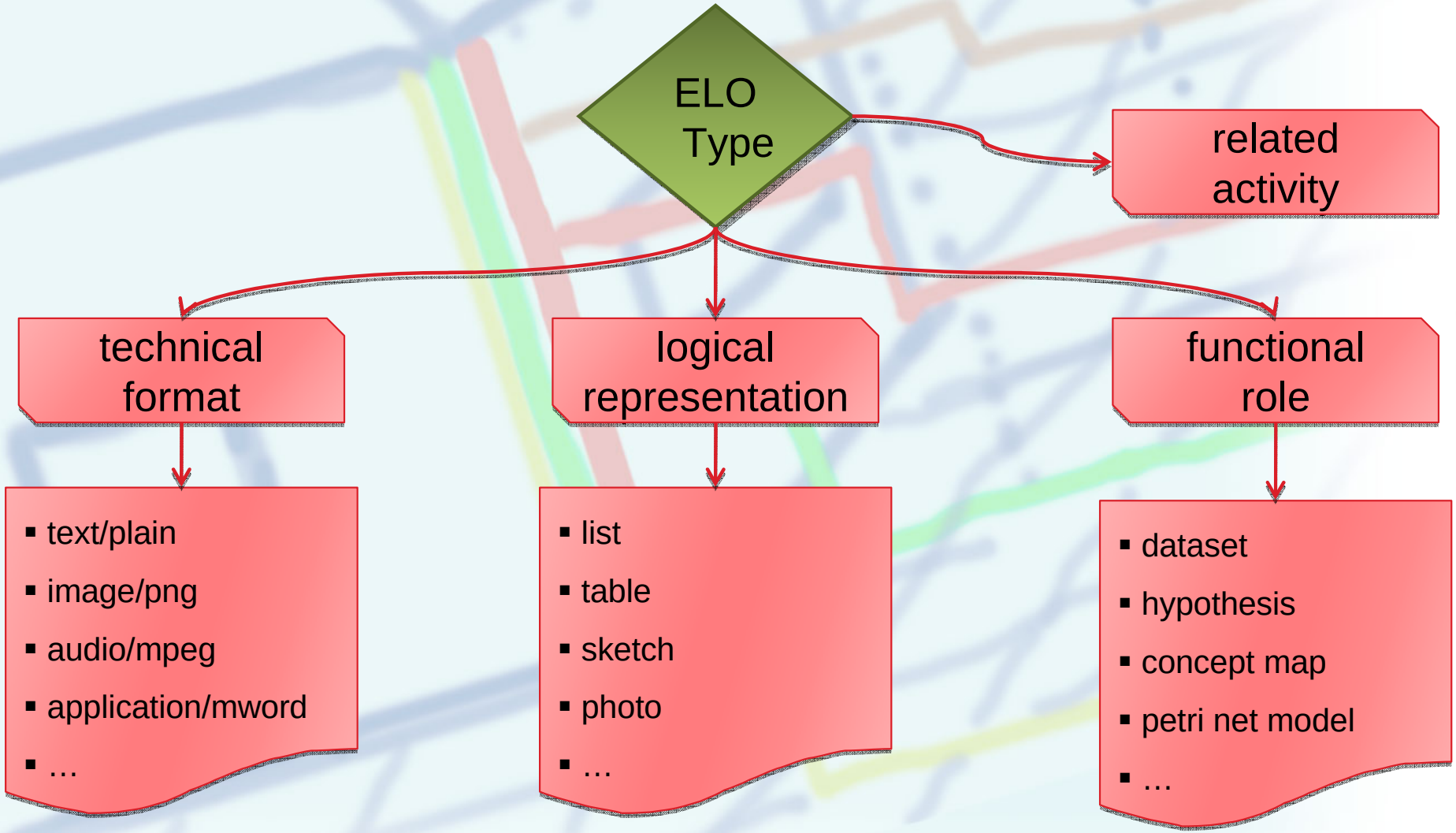
- Dynamic groups:
  - Expert group
  - Design group
- Simulations
- Field measurements
  - On their own house
- Design
- Competition
- Design-based scenario



Emerging Learning objects



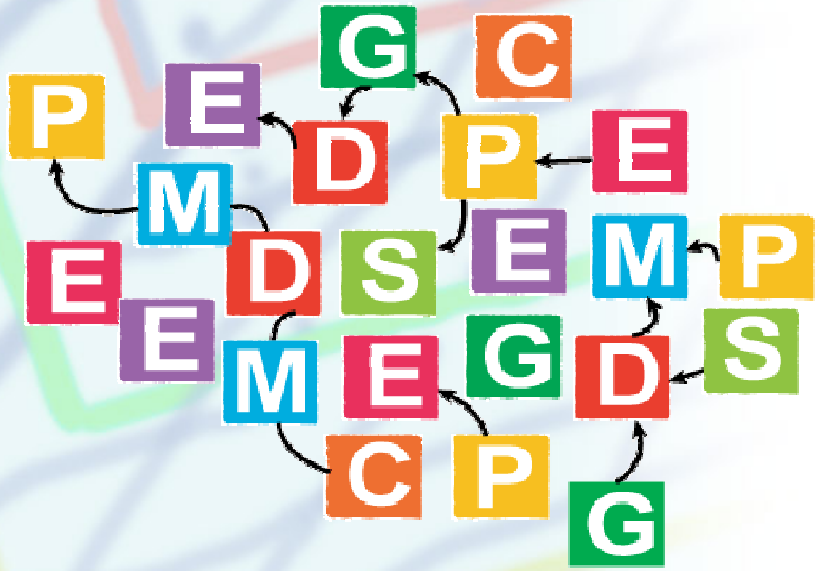
ELO Typology and Ontology



ELOS

ELOs …

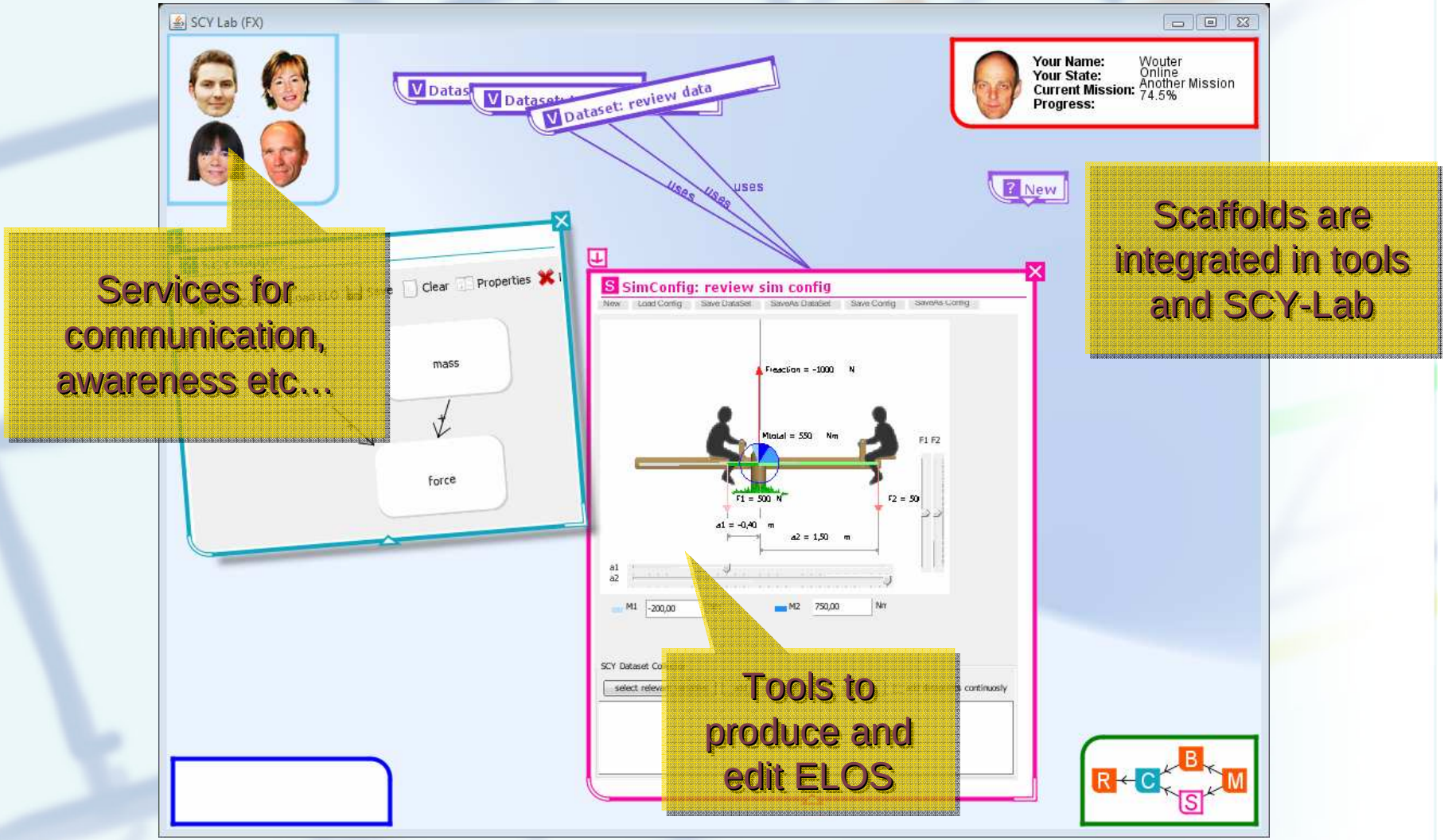
- form the starting point
- define intermediate steps
- and are the goal of the missions



Mission map

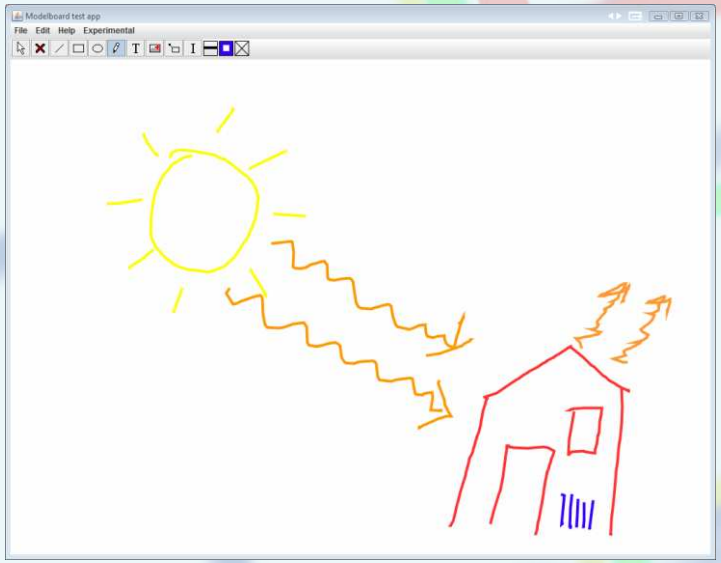
- Provides regulative support

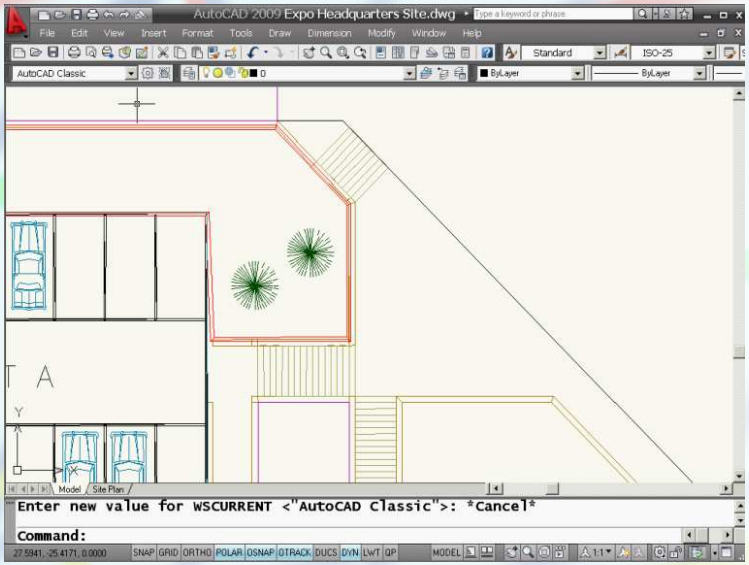
Supporting learners in producing ELOs



SCY Tools to create ELOs

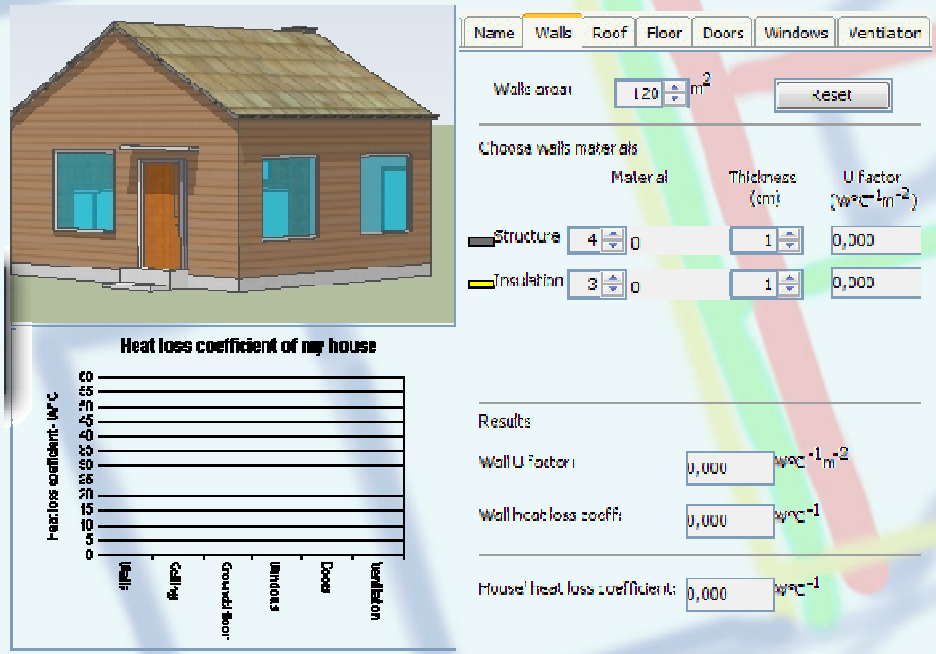
- Specialized cognitive tools
  - Drawing-based modeling
  - Visualization tools





- "Tools of the trade"
  - Tools that are used in real practice

Simulations to gather data



- Producing “Dataset” ELOs
- Specifically designed for learning purposes
- ELOs can be taken up in other tools
  - Data processing
  - Data visualization
  - Modeling

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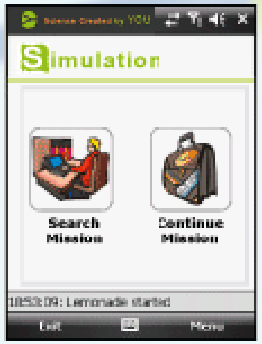
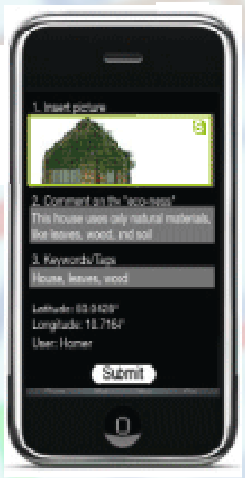
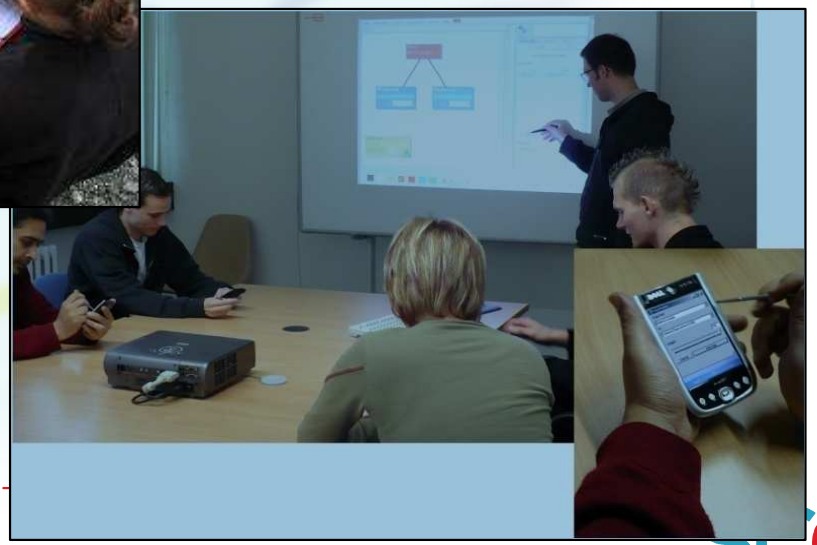
Mobile tools





- Field work
  - Measuring
  - Geolocation
  - Pictures
- Group discussion
  - Moderation
  - Individual contributions



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The SCY approach to Tools

- SCY-*fi* – standards for tools
  - Conceptual
  - Technical
- Tool broker interface
  - Client side uniform access to server components
  - Will be a smart component (caching, load balancing etc.)

SCY-*fi*

Conceptual

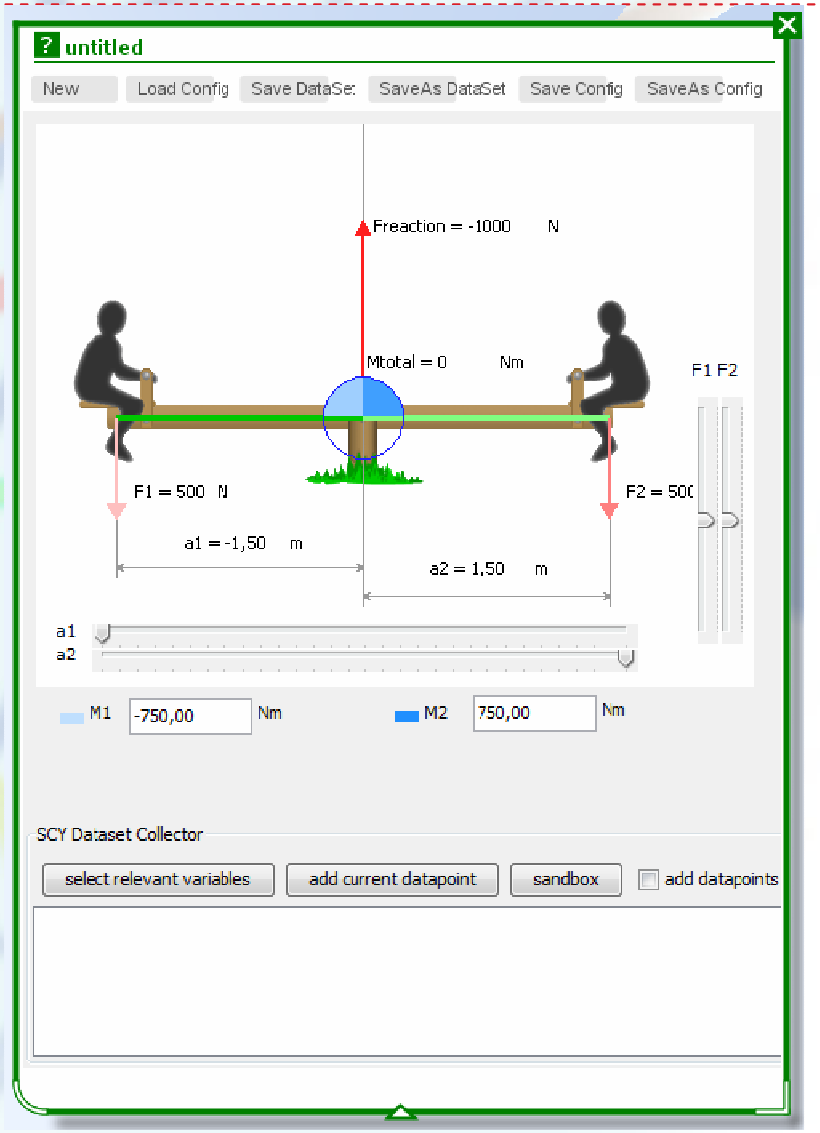
- Levels of integration
  - 3rd party tool
  - Standalone SCY tool
  - Mobile tool
  - Integrated tool (or service)
- User interface guidelines
  - SCY Style book
- Create an integrated SCY experience

Technical

- Storing and retrieving ELOs
- Remote control interface
- Collaboration and synchronization
- Tool-Broker Interface

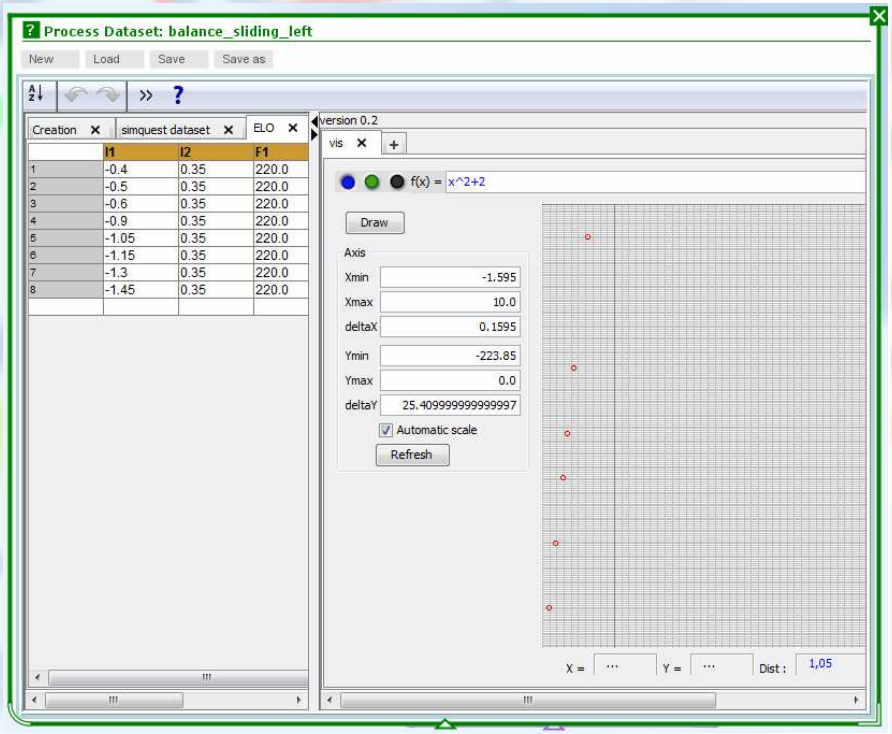
Tools and services

- Simulator



Tools and services

- Simulator
- Data processing and viewing



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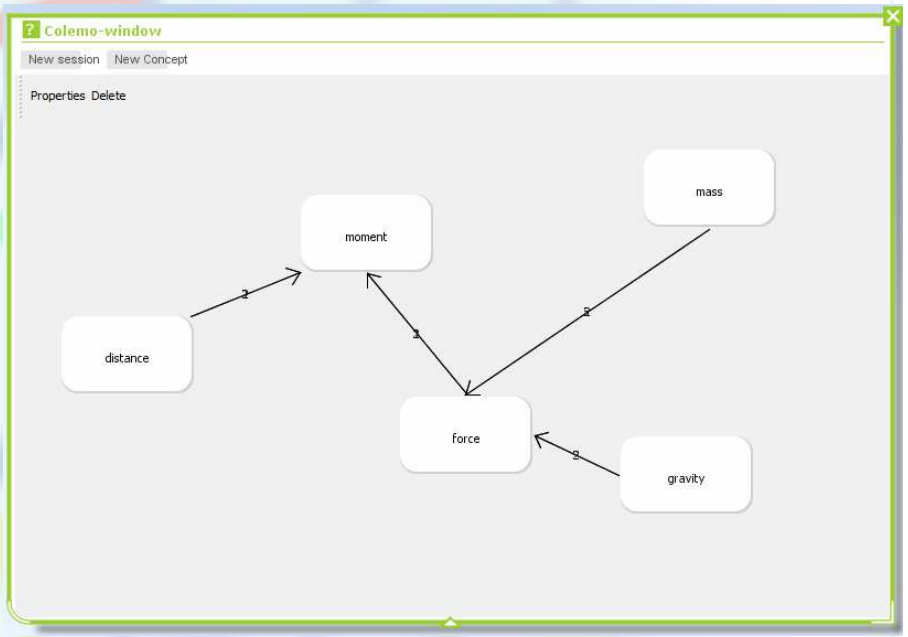
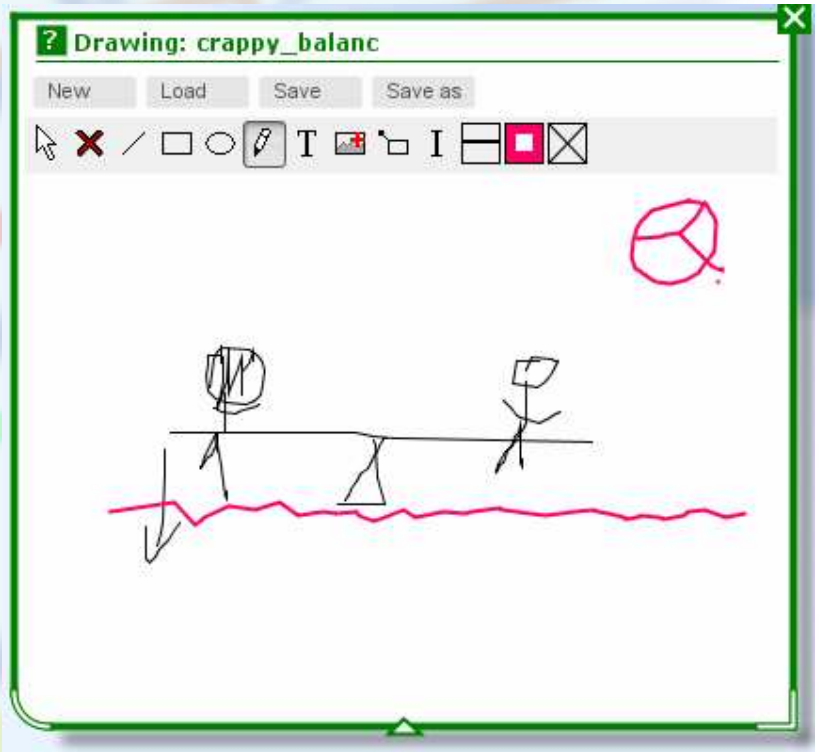
Tools and services

- Simulator
- Data processing and viewing
- Concept mapping



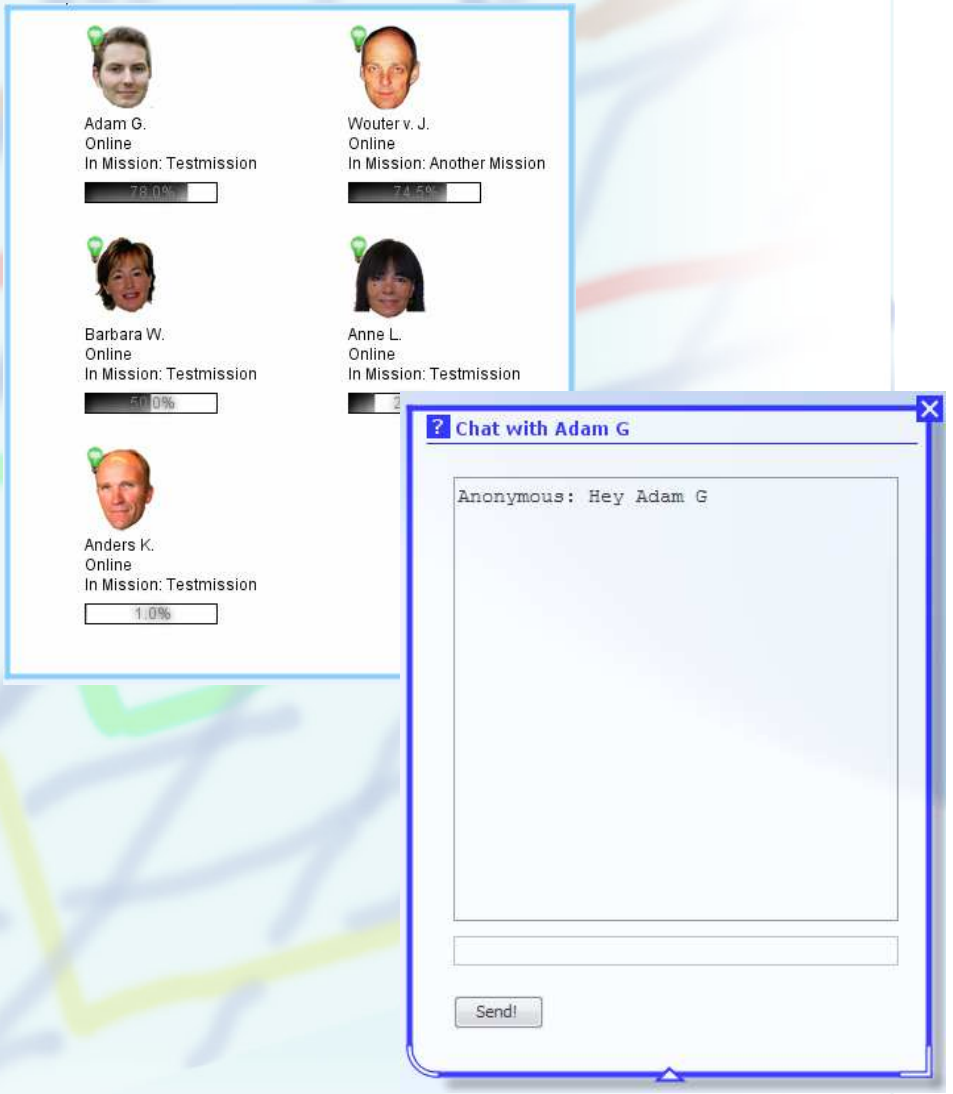
Tools and services

- Simulator
- Data processing and viewing
- Concept mapping
- Drawing



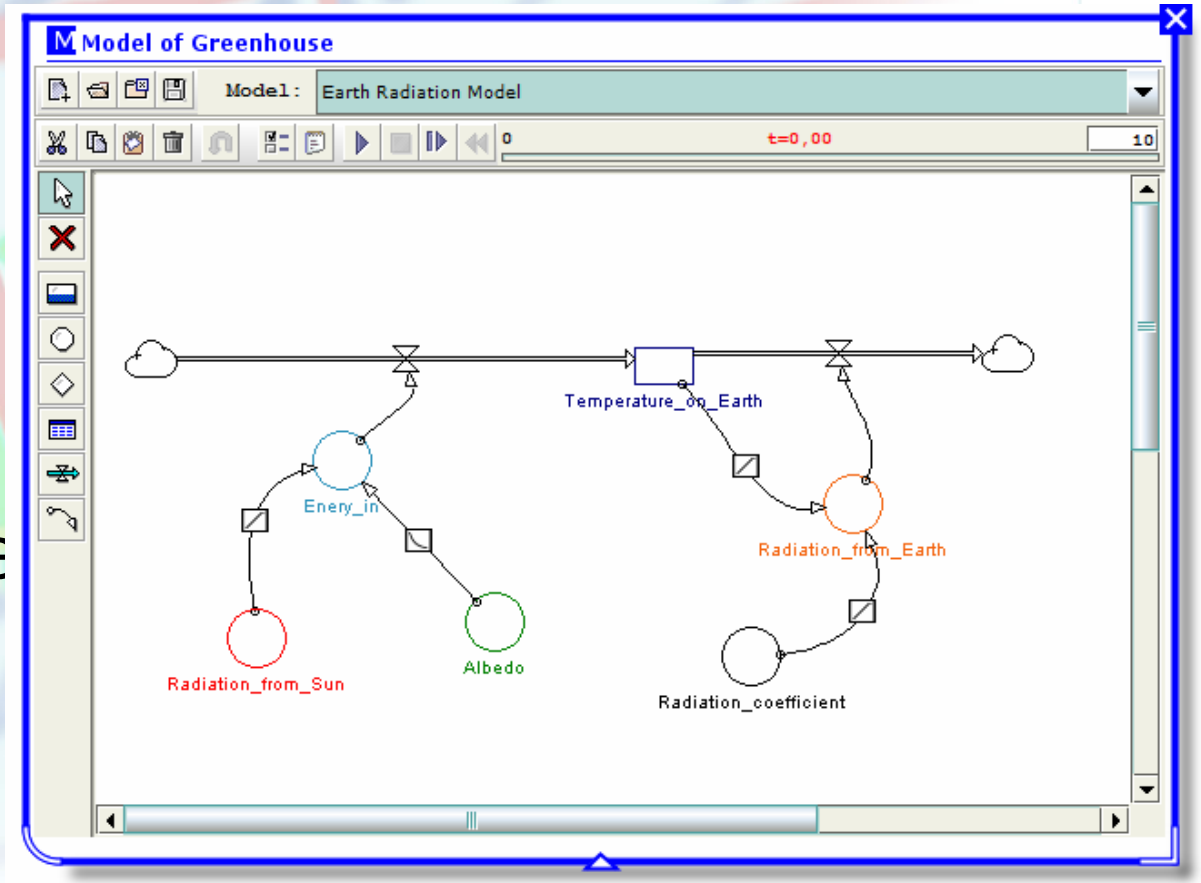
Tools and services

- Simulator
- Data processing and viewing
- Concept mapping
- Drawing
- Awareness and communication services



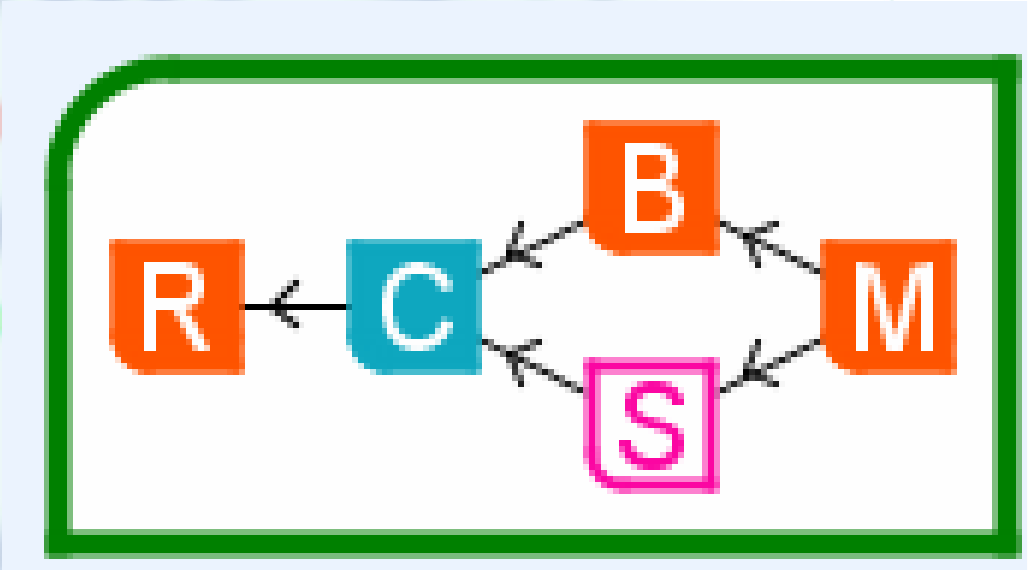
Tools and services

- Simulator
- Data processing and viewing
- Concept mapping
- Drawing
- Awareness and communication service
- Modeling tool



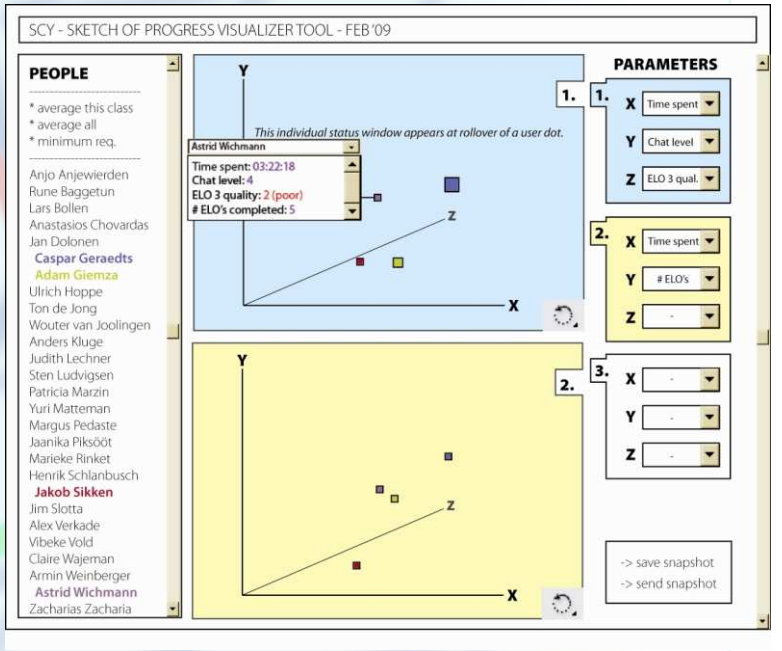
More to come

- Progress visualization
  - i.c.w. the mission map



More to come

- Progress visualization
  - i.c.w. the mission map
- Cockpit view
  - For teachers (with WP VII)



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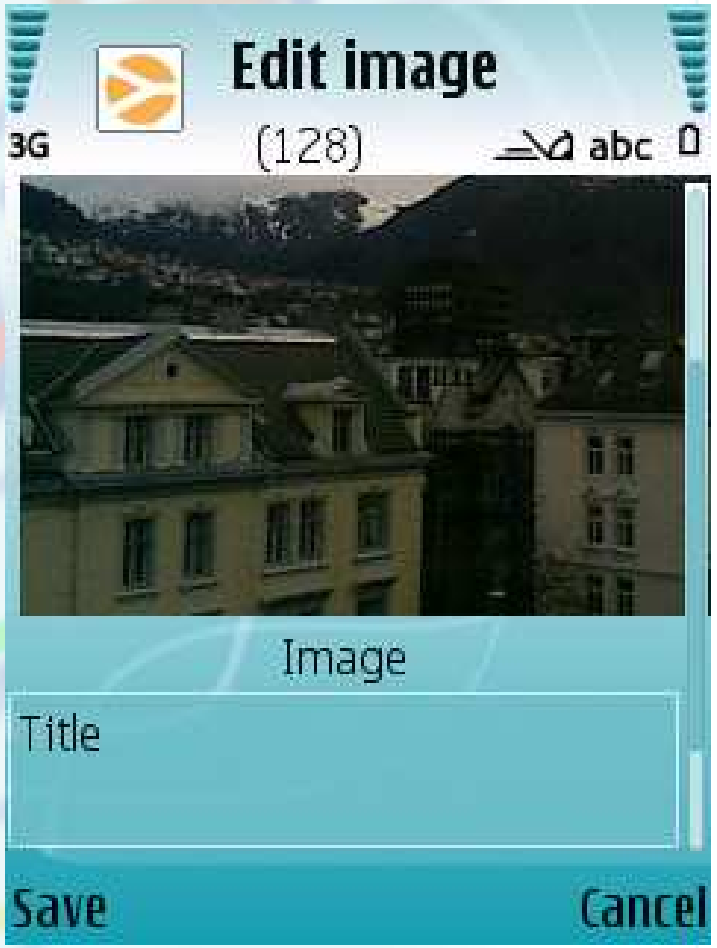
- Mobile tools



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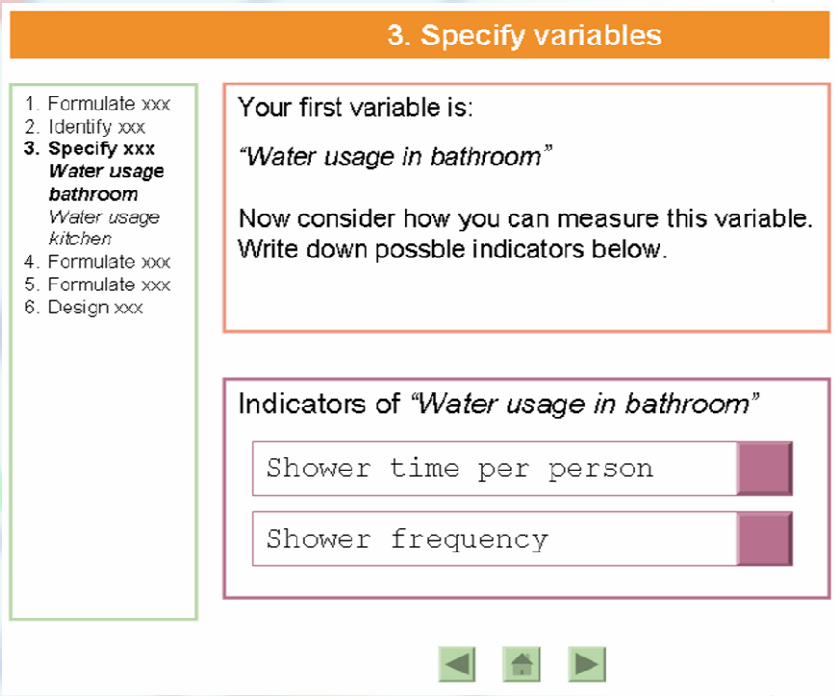
More to come

- Progress visualization
  - i.c.w. the mission map
- Cockpit view
  - For teachers (with WP VII)
- Mobile tools
- Interviewing



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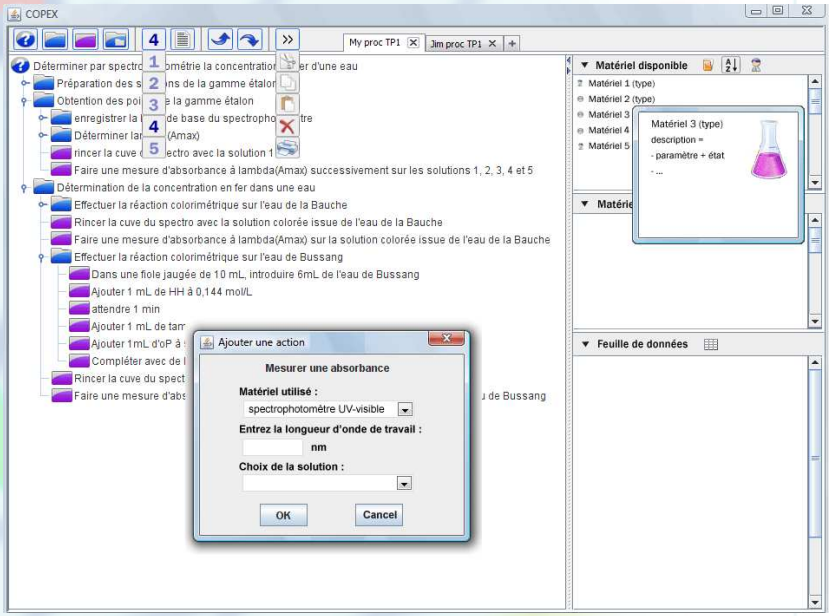
More to come

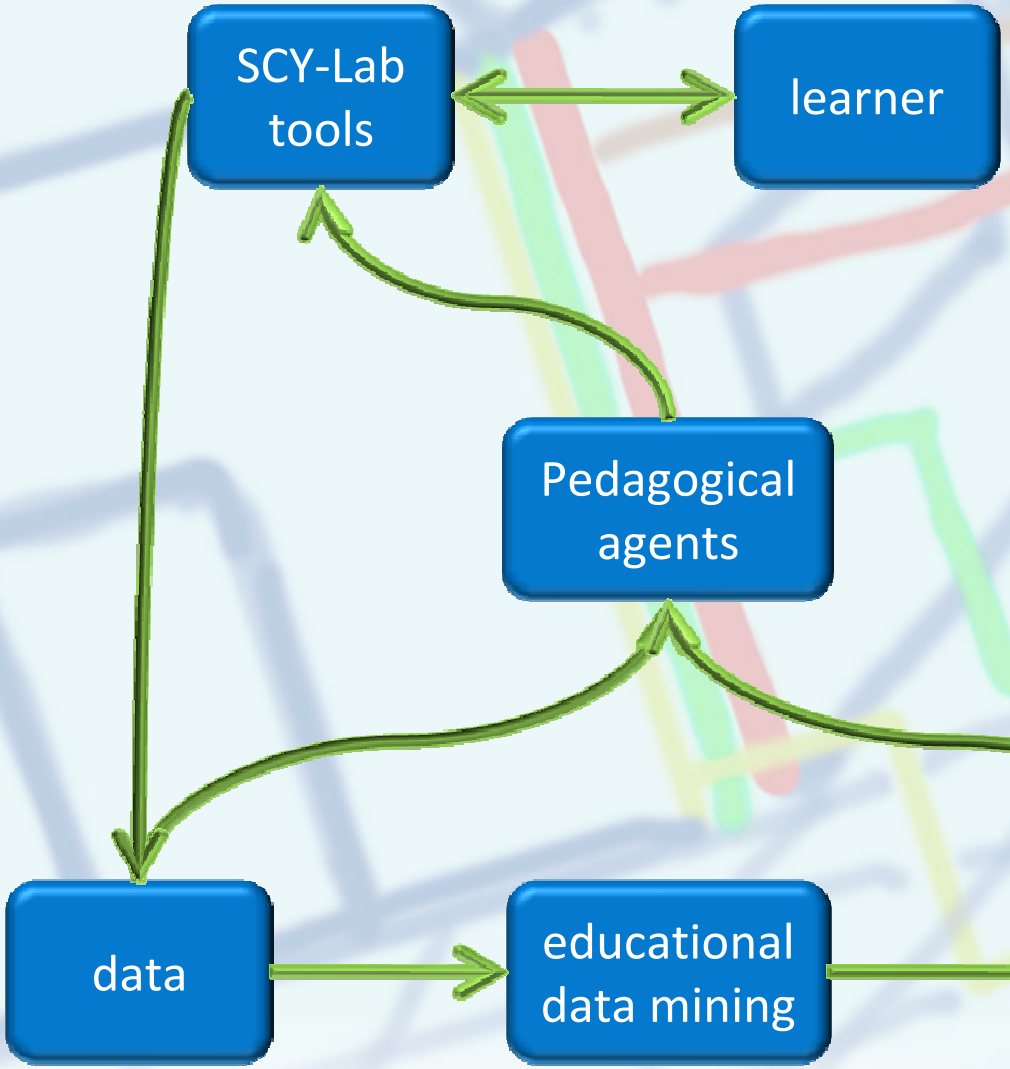
- Progress visualization
  - i.c.w. the mission map
- Cockpit view
  - For teachers (with WP VII)
- Mobile tools
- Interviewing
- Experimental design
- …. And more



Pedagogical Agents

- Small software agents
- Monitoring
  - Products (ELOs)
  - Process (Actions)
- Signal need for intervention
  - Scaffolds
  - Offering information and tools
- Technology
  - Data mining
  - Pattern matching

Pedagogical agents - concepts

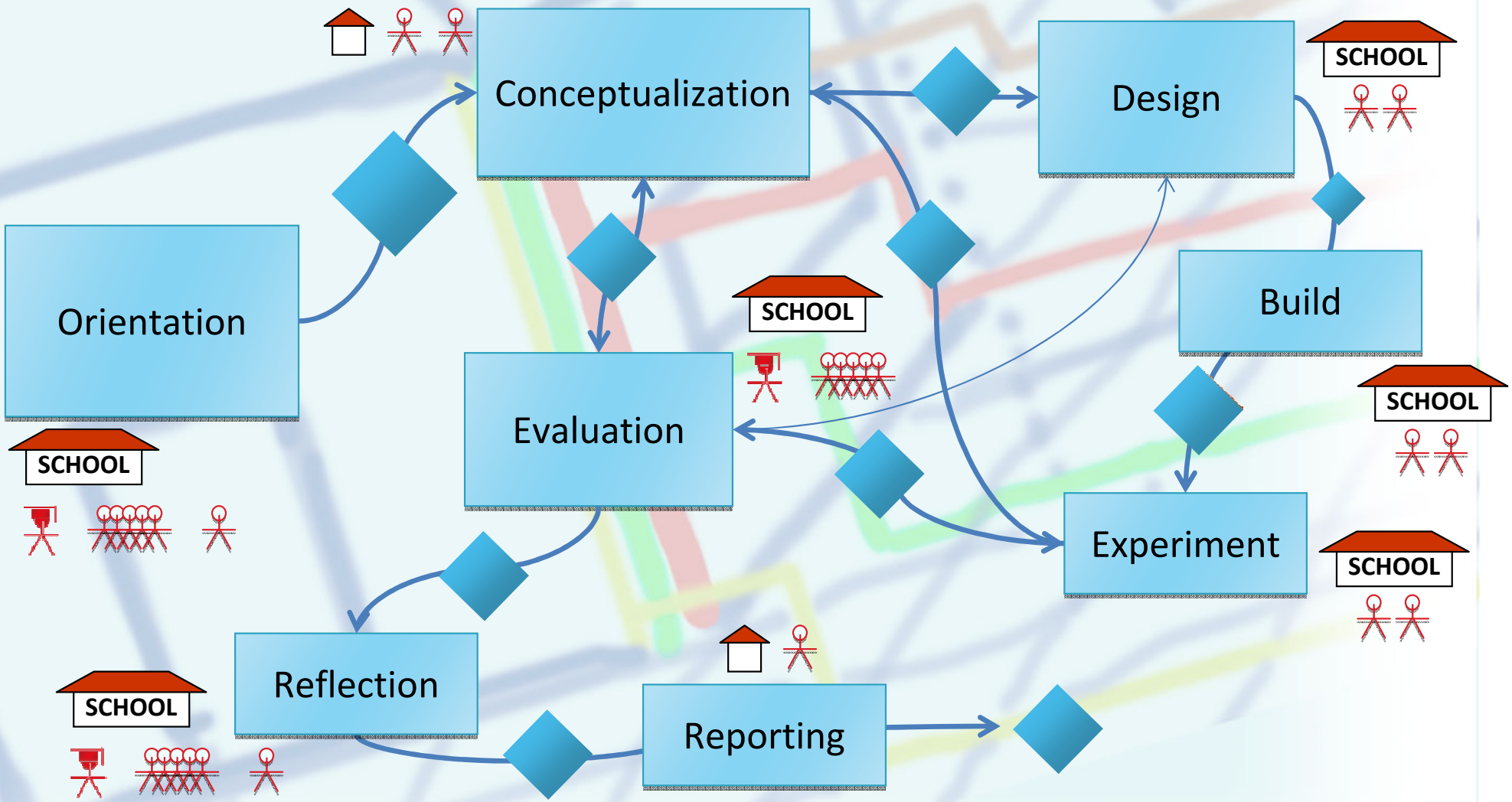


- Learners produce data
- Educational data mining extracts patterns
- Agents (are trained to) detect patterns
- Agents give feedback to learners

Advanced Pedagigical Approaches

- based on learners' activities
- collaborative and self-regulated
- anchored in authentic contexts and tasks
- learners using tools for creating sharable and usable products (ELOs)
- scaffolding, i.e. support adaptive to learners' advancing skills and knowledge

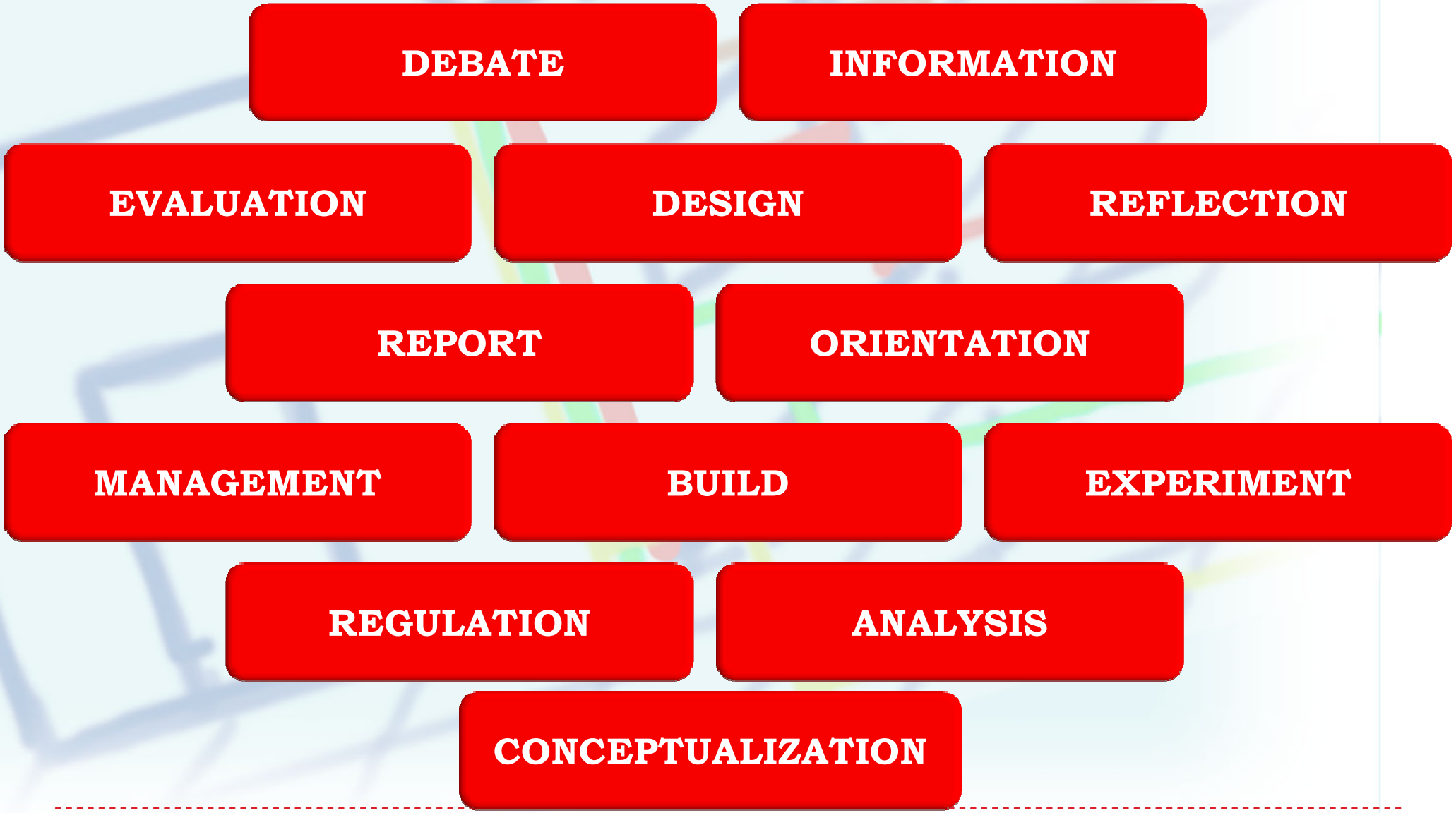
The Design Challenge



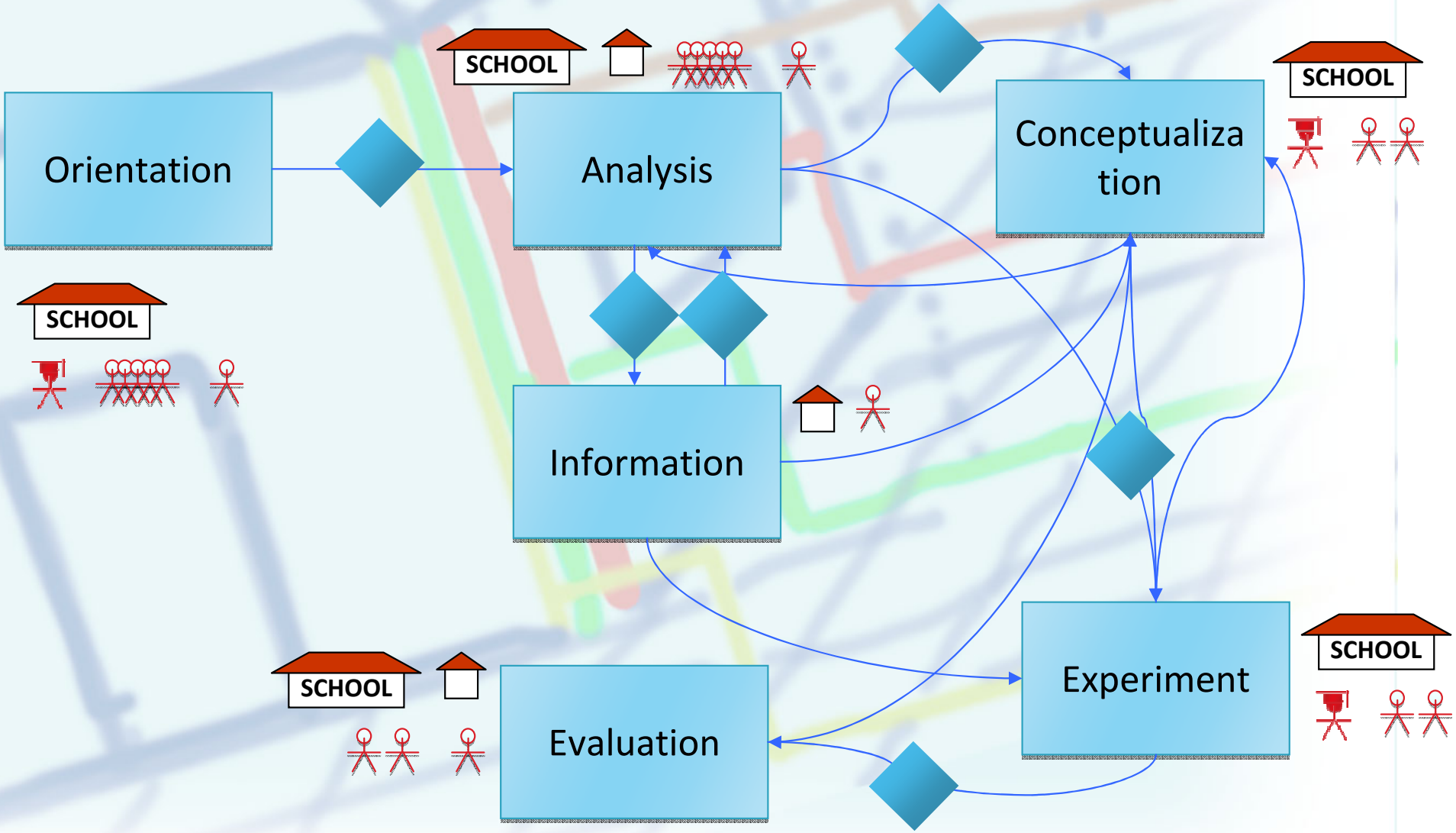
LAS – Learning Activity Spaces

- LASs are the building blocks for scenario design
- A LAS is a set of activities, scaffolds, tools and services
- A LAS defines anchor ELOs that represent required milestones in a pedagogical scenario
- LASs cluster thematically related learning activities in a coherent and intuitively conceivable way
- The thematically related activities inside a LAS can be freely exchanged to provide flexibility

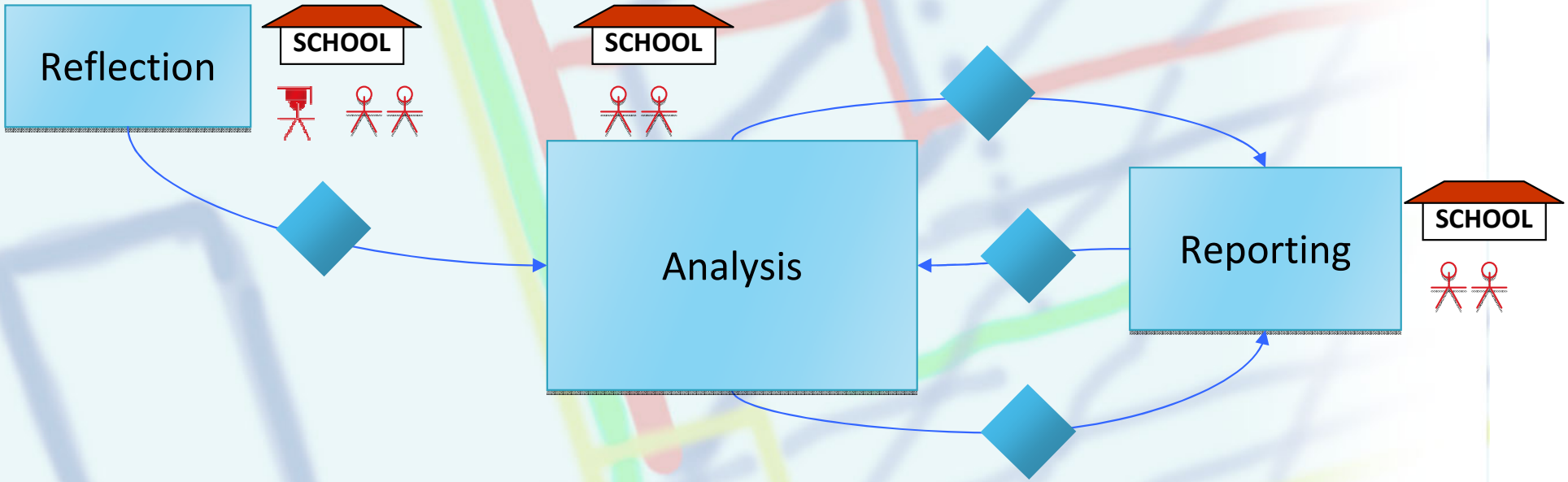
Advanced Pedagogical Scenarios



Inquiry Learning



Decision console



LASs for the learner

LASs

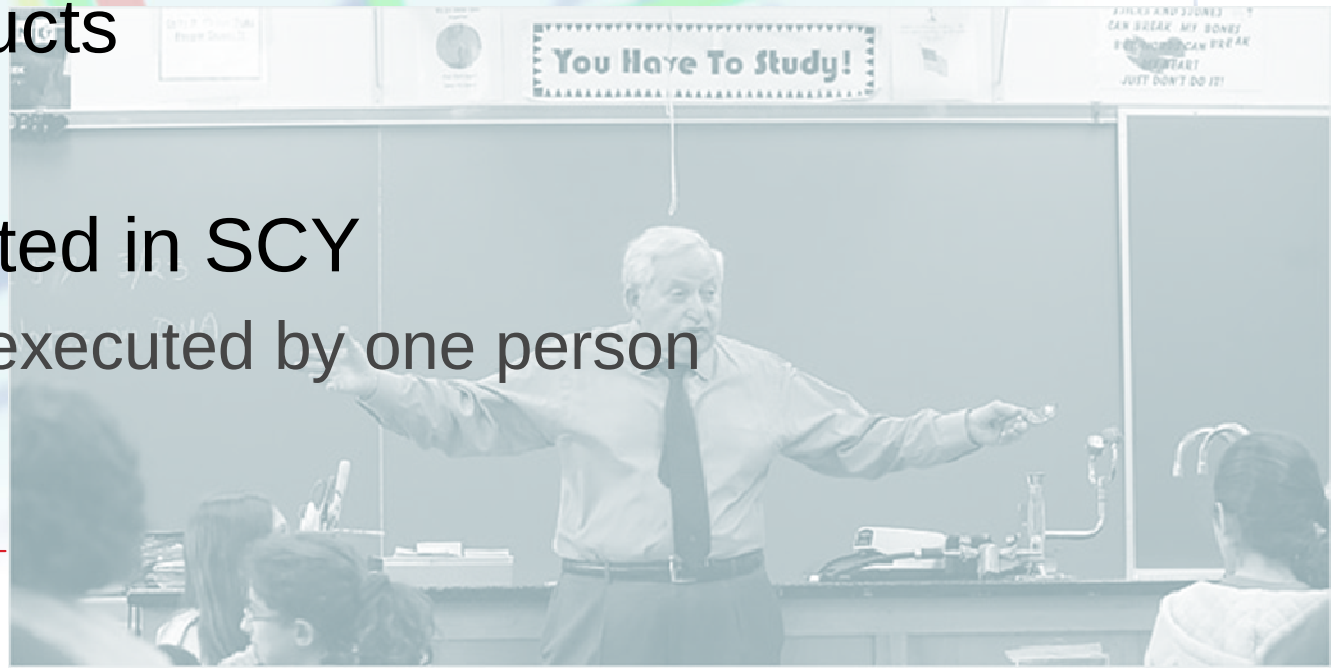
- MAY
  - Represent phases of learning
  - Represent logically grouped activities
  - Structure the learning process

- But definitvely do not represent an enforced structure

- Gentle ride along the instructional guidance wave.
- Offer support without destroying the exploratory nature of the environment

Roles for the teacher in SCY

- Designer: tuning the learning environment for learners
- Source of knowledge during classroom discussion and work
- Coach/supervisor: providing hints and support for learners.
- Assessor of products



- Tasks are separated in SCY
  - And need not be executed by one person

SCY and the teacher - survey

- Teachers
  - … want to keep the fun in teaching
  - … want to be supported in routine tasks
  - … want support for differentiation
  - … need more time
  - … want to exchange data and documents

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More SCY!

Assessment

- Portfolio-based assessment
  - Building ELO-based portfolio
  - Assessing portfolio
- Playful peer assessment
  - Learners assess each other's work

Authoring

- Building
- Editing
- Filling
- Pedagogical plans
  - Based on scenario
  - Tailored to a mission

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