Michael Sonntag

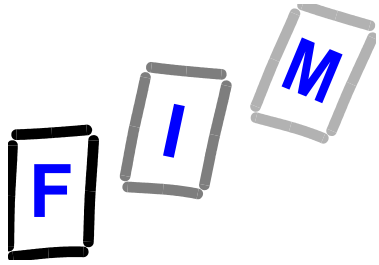# Cooperative Agent-Supported Learning with WeLearn

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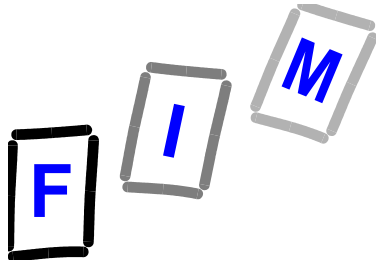http://www.fim.uni-linz.ac.at/Staff/sonntag.htm

Agenda

- **Introduction**
  - ➜ **Problems of distance education and how agents can help**
- **The WeLearn platform**
- **Supporting groupwork through agents:**
  - ➜ **Roadmaps and awareness, tracks, ...**
- **Agent-oriented design for learning platforms**
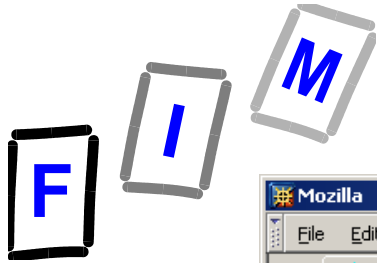- **Implementation & Evaluation**
- **Conclusions**

Introduction

- **Distance Education (DE) is in an intermediate stage: initial problems solved, first standards emerging, but yet no widespread adoption**

- **Problems:**
  - ➔ **Cost of creating/enhancing/extending material**
  - ➔ **Cooperation between learners is difficult to create**
  - ➔ **Changing role of the teacher**
    - » **From "content creator" to "content explainer" and "coach"**
    - » **Higher ratio learners : teachers**

- **Solution for some aspects:**
  - ➔ **Autonomous agents**
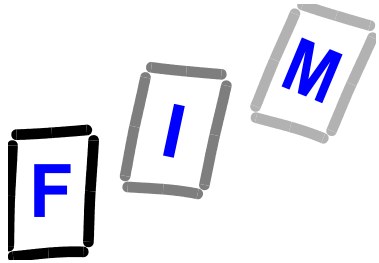
The WeLearn platform

- **An online learning platform developed at the FIM**
  - ➔ **In widespread use at several universities, higher and lower schools in Austria and Switzerland**
  - ➔ **Uses the IMS CPS specification for the content**
- **Main idea: Keep it simple to use**
  - ➔ **Therefore agents to enable more complex tasks!**
- **Important features:**
  - ➔ **Implemented in Java: Platform independence**
  - ➔ **System + templates for learning settings + example content + offline viewer for creating CDs**
- **Next version will support agents, workflow, etc.**
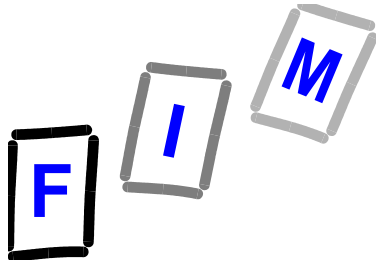
The WeLearn platform

Supporting groupwork through agents

- **Roadmaps and awareness**
  - ➔ Graphical representation of a course
  - ➔ High-level network structure instead of hierarchical tree
  - ➔ Allows adding more information:
    - » Physical distance as a measure of topical difference
    - » Size to show importance
    - » Already viewed elements
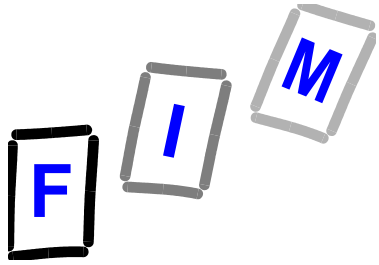   - » Progress compared to other learners
    - » Other learners in the "vicinity" for questions
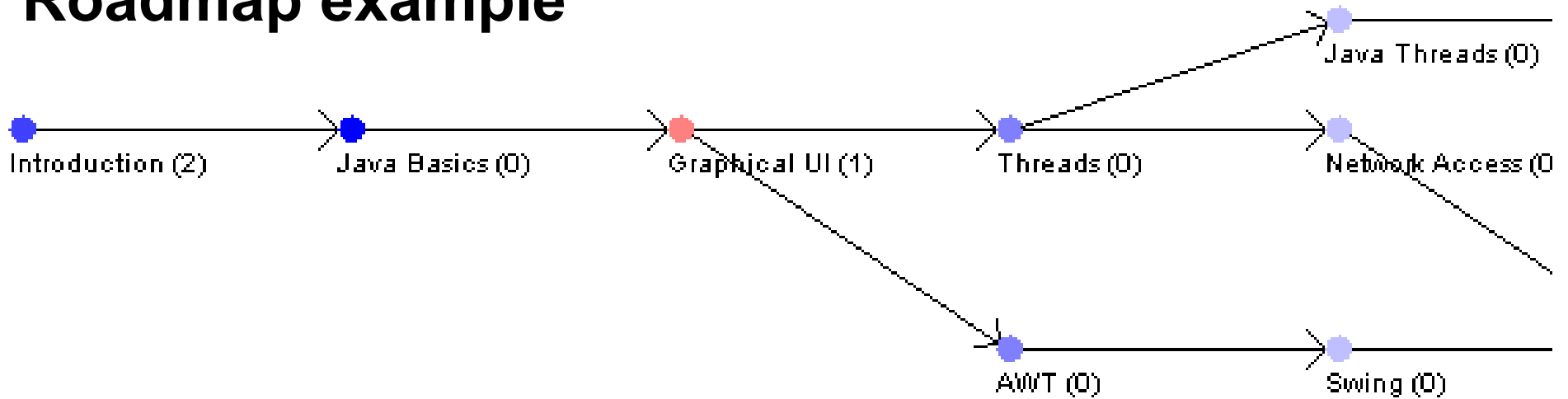   - » Coloring nodes and connections to show tracks, ...
    - » Three dimensional views are possible
  - ➔ Better awareness: One look is sufficient

Supporting groupwork through agents

Roadmap example

Introduction (2) → Java Basics (0) → Graphical UI (1) → Threads (0) → Java Threads (0)

Threads (0) → Network Access (0)

Graphical UI (1) → AWT (0) → Swing (0)

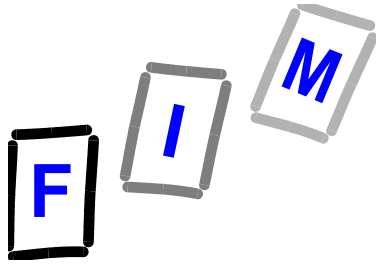Network Access (0)

➔ **3 users currently online**

➔ **This user is in the area "Graphical UI", two just at the start**

➔ **Several branches can be taken (see right part)**

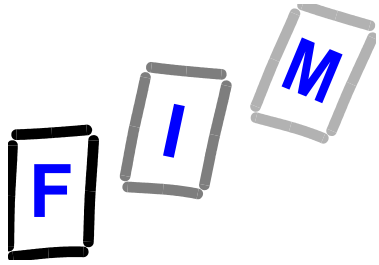➔ **Color intensity shows number of learners in vicinity**
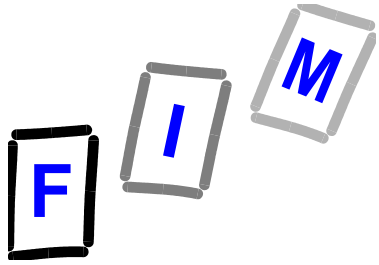
Supporting groupwork through agents

- **Tracks: Metaphor for different ways through content**
    - ➔ **Either created manually (e. g. designer of the course),**
    - ➔ **or automatically: Derived from the ways students take**
        - » **Observing the users behaviour and deducing new links between items from this**
        - » **Can also annotate them: Lookup (there and immediately back), sidetreck (list of visited items and back to start), etc.**
        - » **Size/color according to certainty of the agent**
- **Active Training: Agents as communication counterparts**
    - ➔ **E. g. When training call-center agents**
   - ➔ **Errors by agents are good here: Users will also err!**

Supporting groupwork through agents

- **Asynchronous support:**
  - ➜ **Remembering complicated visit history (with branches)**
  - ➜ **Notifications of changed/added items, other users, ...**
    - » **According to interest profile of learner**

- **Assembling results:**
  - ➜ **Integrating papers from students into a webpage and/or the learning system**
  - ➜ **Adding simple metadata (last changed, extracting abstracts and keywords, ...)**
 - ➜ **URL rewriting to match the page (relative links, images instead of E-Mail links, etc.)**

Supporting groupwork through agents

- **Simple personal coach:**
  - ➔ **Recommending areas to visit, other learners to ask**
  - ➔ **Based on tracks, metadata and user observation**

- **Community building:**
  - ➔ **Finding learners with similar problems for discussions**
    - » **Not necessarily in the same are, but working on related content**

- **Task automation:**
  - ➔ **From relatively simple to more complex tasks**
    - » **Setting up new courses or archiving old ones**
    - » **Notifying coaches of unanswered questions**
   - » **(Pre-) Checking answers for tests**
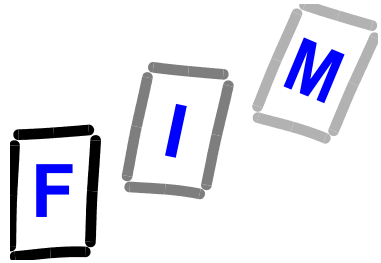
Agent-oriented design for learning platforms

- **Very high-level grouping of functionality in design**
  - ➔ **Tasks and entities instead of methods and objects**

- **Emphasis on coordination of dynamically interacting components**
  - ➔ **Similar to learning platforms: Many independent learners must be coordinated**
    - » **E. g. finishing the course, discussions, observing user behavior**
  - ➔ **No competition between learners/agents for resources**

- **Agent are also good for implementation:**
  - ➔ **Extending/changing functionality easier**
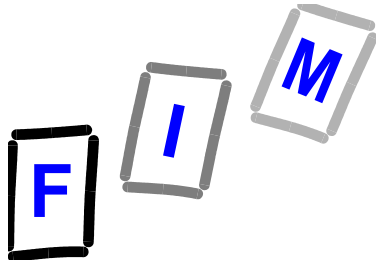 - ➔ **Easier modeling: 1 user $\equiv$ 1 agent (e. g. preferences)**
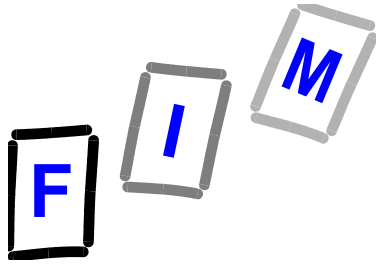
Implementation & Evaluation

- **Previous version of WeLearn is in practical use**

- **Next version is currently in prototype stage**
  - ➔ **First working version, not available for public test**
  - ➔ **Roadmaps and minor services (sending E-Mails; or SMS using public webpages) are already implemented, other agent support is in implementation or design phase**

- **Heavily relies on standards and frameworks:**
  - ➔ **SOAP, WebDAV, JAAS, JDBC, Avalon, Millstone, Axis, Apache, Tomcat, IMS CPS, etc.**

- **Connection learning-system ⇔ agent-system:**
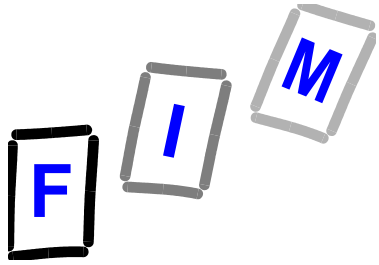 - ➔ **Uses SOAP; other clients/servers could be substituted!**
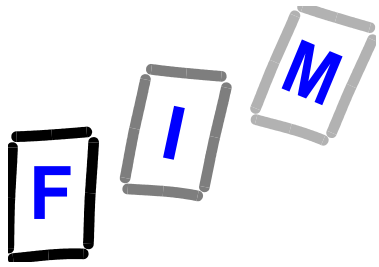
Connection
WeLearn - Agentsystem
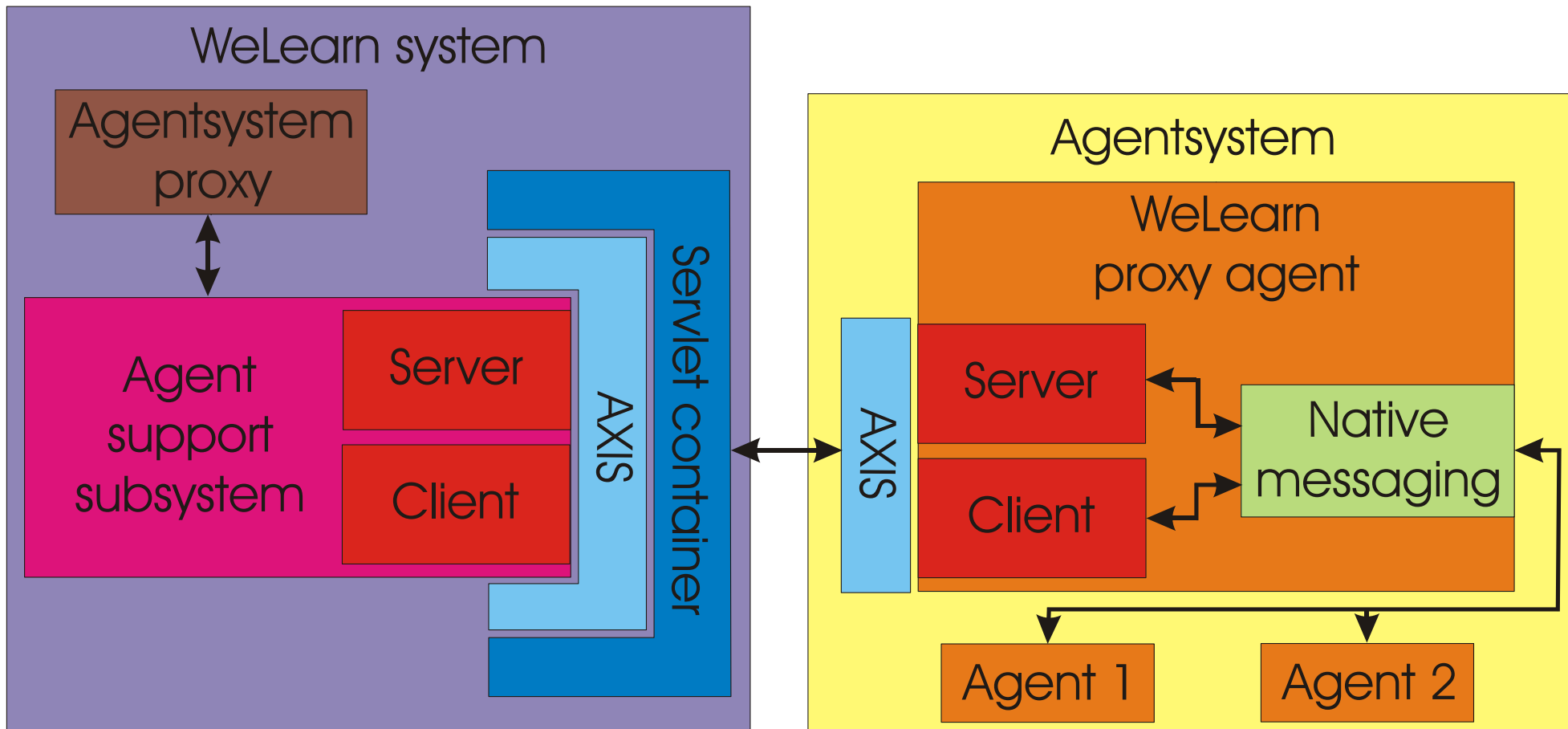
Conclusions

- **Agents can improve cooperation between learners as well as between learners and teachers in DE**
  - ➔ **Introducing bits of intelligence into learning platforms**
  - ➔ **Reducing problems arising from asynchronicity**
  - ➔ **Improving awareness and providing additional functions**
- **Automating standard tasks to free teachers for coaching their learners**
- **The concept of "agents" is useful both in design (identifying independent actors and tasks) and implementation (easier change of functionality)**

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Questions?
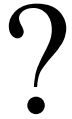
Thank you for your attention!

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http://www.fim.uni-linz.ac.at/Staff/sonntag.htm