Creating the future technology for lifelong learning, learning to collaborate and collaborating to learn

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Steering Committee, IEEE Trans on Learning Technologies
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Chair, Pervasive and Ubiquitous Computing Steering Committee

Computer human adapted interaction research group
Trac: Tool supporting long term group work

Used by team members, facilitators, teachers, some clients
TRAC

- open source tool for supporting software development projects

root / rcwu

<table>
<thead>
<tr>
<th>Name</th>
<th>Rev</th>
<th>Age</th>
<th>Last Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>BaseAdminPluginTest.js</td>
<td>46</td>
<td>4 months</td>
<td>rcwu</td>
</tr>
<tr>
<td>EditBlogEntriesPluginTest.js</td>
<td>47</td>
<td>4 months</td>
<td>rcwu</td>
</tr>
<tr>
<td>EditBlogPropertiesPluginTest.js</td>
<td>47</td>
<td>4 months</td>
<td>rcwu</td>
</tr>
<tr>
<td>journal</td>
<td>16</td>
<td>6 months</td>
<td>rcwu: Having problem with installation.</td>
</tr>
<tr>
<td>jsptest_r6.zip</td>
<td>49</td>
<td>4 months</td>
<td>rcwu</td>
</tr>
<tr>
<td>junit3.0.1.zip</td>
<td>49</td>
<td>4 months</td>
<td>rcwu</td>
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<tr>
<td>slog-logo-small.gif</td>
<td>55</td>
<td>4 months</td>
<td>rcwu</td>
</tr>
<tr>
<td>slog-logo-small.jpg</td>
<td>52</td>
<td>4 months</td>
<td>rcwu</td>
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<tr>
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<td>5 months</td>
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<td>4 months</td>
<td>rcwu</td>
</tr>
<tr>
<td>slog.jpg</td>
<td>52</td>
<td>4 months</td>
<td>rcwu</td>
</tr>
</tbody>
</table>

SVN source repository

- Not a learning system but used in a learning context.
Huge amounts of data about the group members and their interactions
Activity radar

- Each student has consistent colour, clock position
- Closer to centre is more work
- Logarithmic scale
• Each student has consistent colour, clock position
• Closer to centre is more work
• Logarithmic scale
Interaction diagram

- Same location of people as in activity diagram
- Black is source - blue is sink
Interaction graph - Medium wiki

Team Leader
Narcissus

Integrated of mirror tool

Narcissus tab
Time – activity on that day is shown for each user, on each medium
Click on cell ...

...to see details

Legend
- wiki
- svn
- ticket

Details
- 19:06 Changeset [77] by member 2
- 19:06 Changeset [78] by member 2
- 20:22 Changeset [79] by member 2
- 20:24 Changeset [80] by member 2
- 20:30 Changeset [81] by member 2

Score
The following activity was detected:
- svn add: 78 lines added
- svn add: 73 lines added
- svn edit: 3 lines added
The points for svn are calculated as follows:
- 1 point for up to 50 added lines
- 2 points for up to 150 added lines
- 3 points for up to 300 added lines
- 4 points for over 300 added lines
**Explains scoring**

The following activity was detected:
- svn add: 78 lines added
- svn add: 73 lines added
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The points for svn are calculated as follows:
- 1 point for **up to 50 added lines**
- 2 points for **up to 150 added lines**
- 3 points for **up to 300 added lines**
- 4 points for **over 300 added lines**
Group View - SOFT3300 Group x

Individual summary

Group average

Legend
- wiki
- svn
- ticket

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 chai:
Computer human adapted interaction research group
<table>
<thead>
<tr>
<th>Group</th>
<th>Managers</th>
<th>Developers</th>
<th>Loafers</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1</td>
<td>*1</td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Group 2</td>
<td>*1</td>
<td>0</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Group 3</td>
<td></td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Group 4</td>
<td>*1</td>
<td>3</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Group 5</td>
<td>3</td>
<td>*1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group 6</td>
<td>*1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group 7</td>
<td>*1</td>
<td>0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Group 1 – 1 person had sequences characteristic of managers. * That person had the manager role.

Group 1 – 3 members had developer activity sequences.

Group 3 – dysfunctional and here we might see why.

Group 5 – another way to be dysfunctional.
Pervasive technologies in real classrooms
Elements of collaboration (in learning)

P. Dillenbourg. What do you mean by 'collaborative learning'?

Two hands are better than one
The collaborative task
(concept mapping and problem solving)

• Concept mapping is:
  – A tool for externalising knowledge
  – Applied in many domains
  – Promotes meaningful learning
  – Has been used by organisations such as NASA, Navy, and universities around the world.

Our enriched interactive tabletop

Collaid

Identifies who does each touch

To help teachers determine whether groups or individual learners need attention.

Computer human adapted interaction.
Class level Dashboard

Group 1
- Collaborative

Group 2
- Collaborative

Group 3
- Collaborative

MTClassroom: sharing one tabletop on the wall
The teacher attends to a group
The Orchestra Dashboard

To help teachers control multiple classroom tutorial sessions.
Classroom study

8 tutes
32 small groups
140 students
from School of Business

Authentic classes, students, teacher
Within semester schedule as part of curriculum
Teacher designed both the activity and orchestration
MTDashboard – control and awareness dashboard
MTDashboard: functions and visualisations

Tabletops and script controls

Wall display controls

START
Next Phase SOLUTION
Block Tabletops
UnBlock Tabletops
FINISH
Reset All

You have 5 more minutes
Send Message

Awareness visualisations

Send to Wall
Send to Wall
Send to Wall
Send to Wall
Clean Wall Display
Emerging technologies

Lots of sensors making data capture really unobtrusive and effortless

Lots of displays

Storage and Middleware
Get Smart Shoe Phone
Sensors we wear – like Fitbit, Nike FuelBand,....
...and watches: Pebble, Moto 360 .......
An intelligent health and fitness companion.

Apple Watch gives you a more complete picture of your all-day physical activity because it measures more than just the quantity of your movement, such as the number of steps you take. It measures the quality and frequency as well. The three rings of the Activity app show your progress at a glance, and provide all the motivation you need to sit less, move more, and get some exercise. There’s also a separate Workout app for dedicated cardio sessions. Over time, Apple Watch can use what it learns about the way you move to suggest personalized daily fitness goals and encourage you to achieve them. So you can live a better day and a healthier life.
Metria ... activity, activity levels, calorie expenditure, sleep duration and quality, heart rate, and respiration rate. Medical grade. 7 days.
Brian Otis and Babak Parviz, Google[x]

Google contact lens ... levels of glucose in your tears ... working on embedding tiny LED lights for notifications.
Ralph Lauren Polo Tech ... ball boys at this year’s US Open ... monitor their respiration, heart rate and stress level ... machine-washable ... silver conductive thread woven into the fabric ... wick moisture
Sensoria's smart socks prototype ... sensor-equipped textile materials coupled + attachable activity tracker. ... track steps, speed, distance, data about your running form and technique... your weight distribution and the form of your foot during standing, walking and running.
Sensors in our home – like bathroom scales that store your data in the cloud
MediaWall

The MediaWall project transforms walls into interactive information displays that people control with gestures. This wall is used for in-the-wild studies on the IT building, as well as diverse commercial deployments in the creative industries, sales, marketing and police control room.
MediaWall
Delivering health information, messages........ And making that fun
Mneme
Managing Personal Lifelong Information.

This site takes its name from the Greek goddess of memory. Mneme remembers information you want kept.

- You can make Mneme collect information via sensors and applications.
- You can decide how this information will be kept.
- You can see that information and explore it to see long term trends.
- You can even direct Mneme to forget.

Login with Gmail

What you can keep in Mneme

You can setup plugins to extract data from different personal devices and apps and aggregate them in Mneme. Once you setup the plugin for a device/app (e.g., Fitbit), a model for that device/apps will be created in Mneme that will hold your data. The sensors and apps that are supported at present are:

- **Fitbit**
  A smart pedometer

- **Activity Cushion**
  A cushion that tracks inactivity

- **Avocado Fitness**
  An Android app that tracks activity.

- **Gmail**
  An application for managing emails.
Mneme
Managing Personal Lifelong Information

You are logged in as Alice and now in Goal View. What is Goal View?

Today is Thursday, February 14, 2013

Mneme is a research system. We welcome your feedback and comments.

Moderate activity goal: Do 150 minutes moderate activity/week, with at least 30 minutes/day in 10+ minutes bouts.

Progress so far today: 37 minutes total with 36 minutes in 10+ minutes bouts

Progress so far this week:

<table>
<thead>
<tr>
<th>Mon</th>
<th>Tues</th>
<th>Wed</th>
<th>Thurs</th>
<th>Fri</th>
<th>Sat</th>
<th>Sun</th>
<th>Mon</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>45</td>
<td>30</td>
<td></td>
<td>37</td>
<td>30</td>
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</tr>
<tr>
<td></td>
<td>30</td>
<td></td>
<td></td>
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</table>

Overall moderately active minutes: 37

Avoid long period of inactivity goal: Avoid more than 30 minutes of inactivity period every day.

Progress so far today:

8:00

13:00

18:00

Show overall progress

To add a comment (e.g., was feeling unwell) to help you review your information later, click the progress bar, e.g., click on the bar under Mon to add comments for Monday.
You are logged in as Alice and now in Long-term Dashboard. What is Long-term Dashboard?

Mneme is a research system. We welcome your feedback and comments.

Visualisation for Moderate Activity Goal. Showing data from January 22, 2013 to February 14, 2013

You met your goal 15 times during this period.
You were successful 65% of the times.

Total active minutes: 28 minutes
Active minutes in 10+ minutes bouts: 24 minutes
Daily goal: 30 minutes
Summary

• Life-long, life-wide, learning
• Pervasive technology
  – Sensors, devices, displays
  – Mobile, embedded, personal, shared
• Harnessing pervasive technology for learning
• Surface computing
  – as part of our digital ecosystem
  – And new digital footprints to harness
Acknowledgements
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