FernUniversität in Hagen

Learning Analytics
Goals, Methods, Trends

February 3rd, 2012

Bernd Krämer

FernUniversität in Hagen, Germany

Our Panelists Today

Lynn Patterson, Kennesaw State University, USA
Denis Gillet, EPFL, Switzerland
Dirk Malzahn, OrgaTech GmbH, Germany
Andrew Sung, New Mexico Tech, USA
Stephen White, University of Huddersfield, UK

Analytics

Use of

- IT
- OR
- Statistics

To extract useful information from data

Google/ Web Analytics

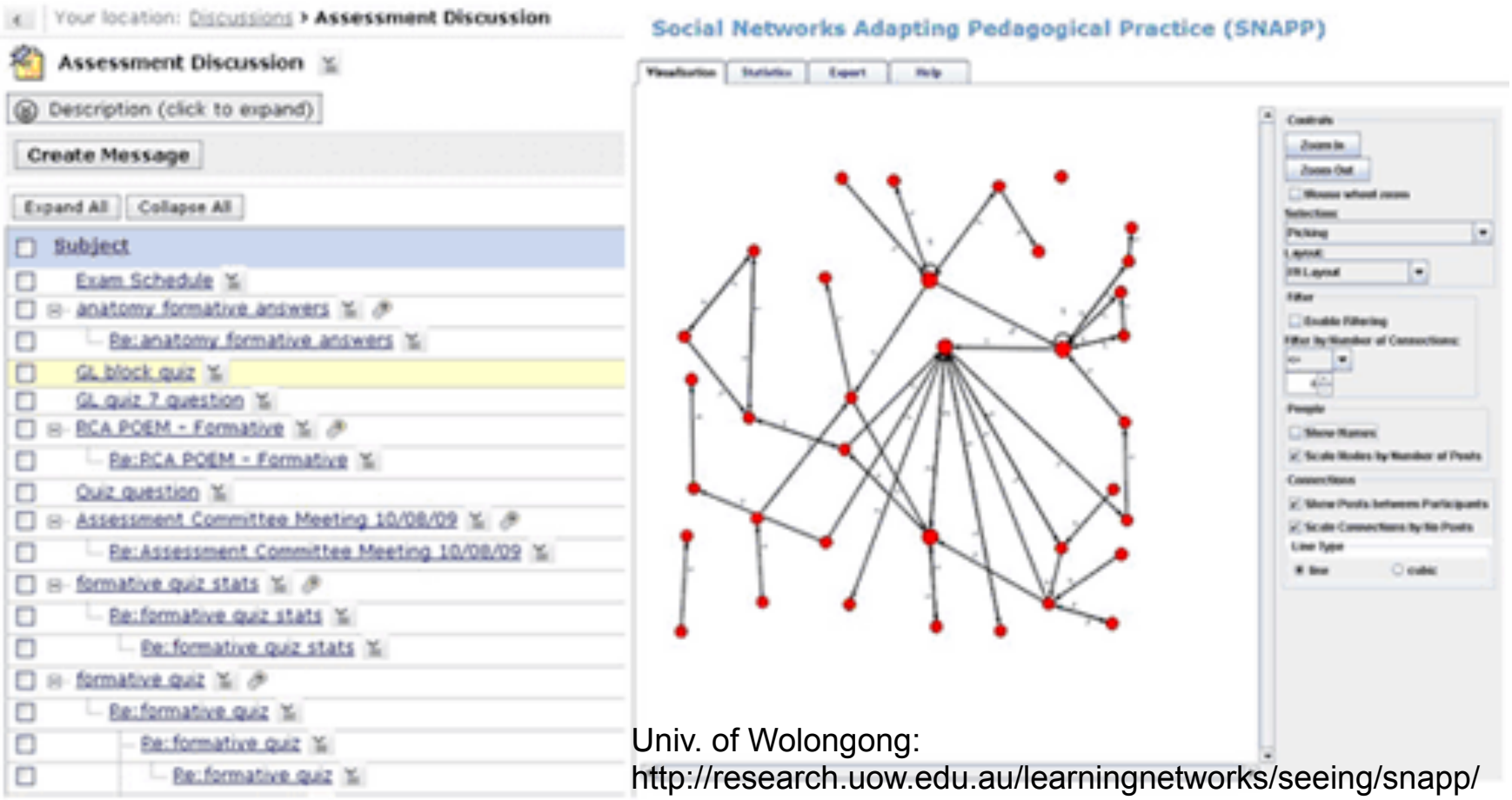
Business Analytics

Learning Analytics

…

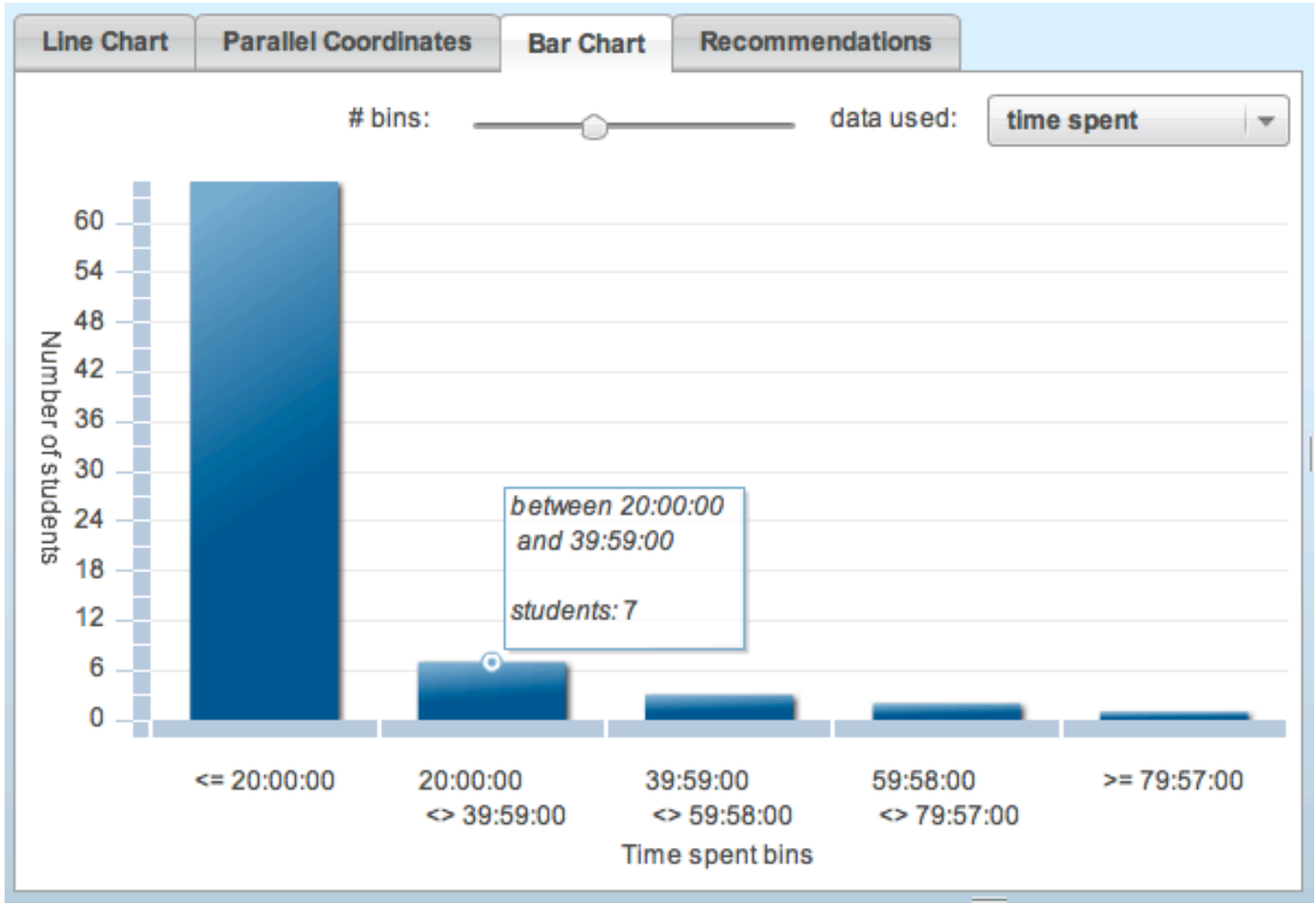
Learning Analytics?

Example: Network of Interactions (SNAPP)



Univ. of Wolongong:
http://research.uow.edu.au/learningnetworks/seeing/snapp/

Example: Student Activity Monitor (KU Leuven)



http://www.role-showcase.eu/role-tool/student-activity-monitor

Target Groups & Purposes

- Educators
  - Improve teaching support (IST guidance, learning design, content, ...)
  - Understand & predict student performance and behavior
  - …
- Individual learners
  - Personalize recommendations, learning environments options
  - Optimize learning process
  - …
- Groups of learners
  - Analyze & exploit social interaction structure
  - Enhance collaborative interaction
  - …
- Tool builders

Topics of Interest

- What can we observe and how?
- What is working best and worst?
- How can we increase the attention of students?
- Which methods and tools work well in which context?
- What are current research challenges?
- What about privacy?
- …

Learning Analytics

The Good, the Bad and the Ugly

Denis GILLET

Swiss Federal Institute of Technology in Lausanne - EPFL

ACHI, Valencia, Spain, February 3, 2012

Background

- **STELLAR** European Network of Excellence on Technology Enhanced Learning
  - **Project**: http://www.stellarnet.eu
  - **Portal**: http://www.teleurope.eu
- Activities and Instruments dedicated to **Research and Education 2.0**

Background

- **ROLE** European Integrated Research Project on Responsive Open Personal Learning Environments (**PLE**)
  - http://www.role-project.eu
  - http://www.role-widgetstore.eu
  - http://graasp.epfl.ch
- **Ecosystem** of services, platforms and actors supporting self-directed learning

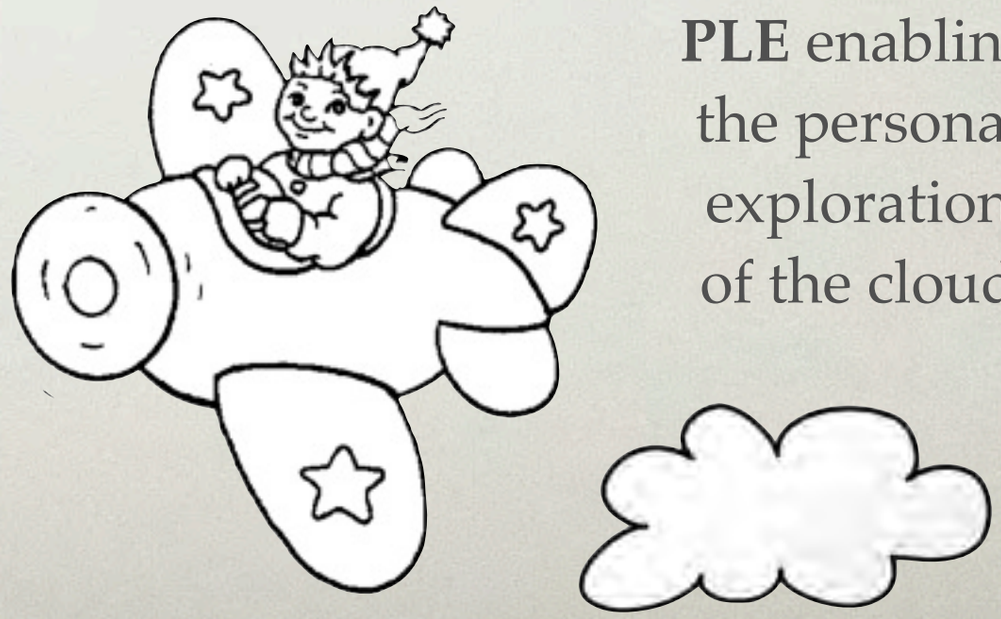
The Good

- **The Will**
  - Advanced Visualization
  - Informed Recommendation
    - Group, Personal and Ubiquitous Awareness (the augmented learner)
- **The Way**
  - Educational Data Mining
  - Federated Repositories

The Bad

- The **LMS** King is (almost) dead, Long live the new **PLE** King
- From controlled institutional settings to plastic cloud ecosystems

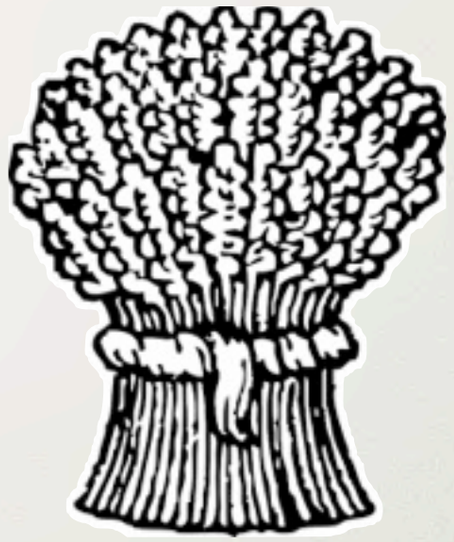
LMS bringing all passengers from A to B



PLE enabling the personal exploration of the cloud

The Bad

- Where can we find their data ?
  Federated repositories



Harvesting
By whom, where ?

- How do we deal with multiple identities ?
  e-Identity

Identity matching

The Ugly

- **Added value** (if any) for students or teachers ?
- **Privacy** Kid should not be tracked (traces and patterns anonymized thanks to group login)
- **Trust** Who host the data and their analytics ?
- **Context** Relevance with activities and modalities (most of the time lost in analytics)
- **Ubiquity** Blurring frontier between social activities, knowledge management and learning

Contact & Links

- denis.gillet@epfl.ch

- http://interaction.epfl.ch

- http://graaasp.epfl.ch

Digital World 2012

eKNOW 2012 The Fourth International Conference on Information, Process, and Knowledge Management

Panel eKNOW / eLmL

Improvement of Error Prediction in Custom Software Systems

Dirk Malzahn

OrgaTech GmbH, Germany

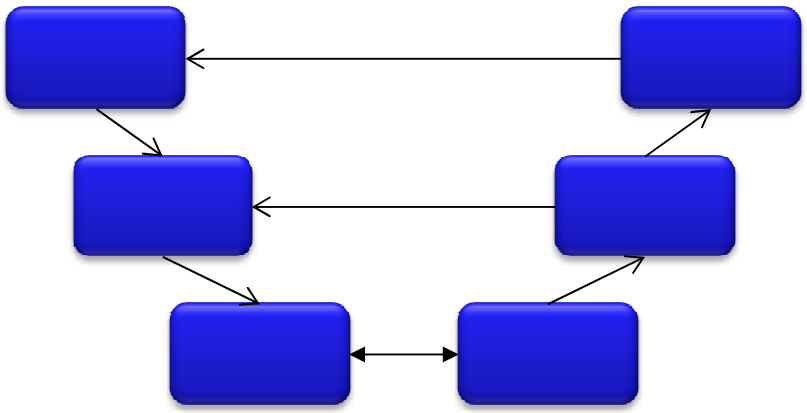
OrgaTech

Introduction

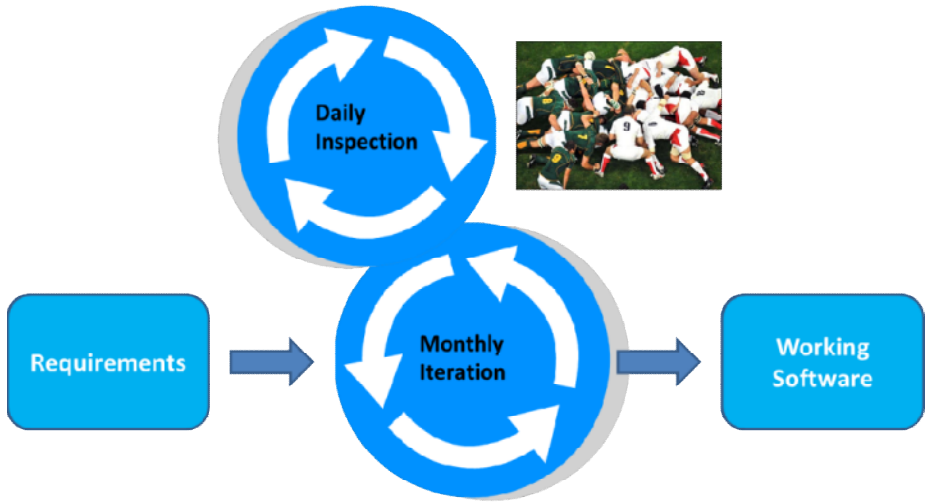
- The Quality of Custom Software is highly dependent on the qualification of software developers, using appropriate methods

- Dependent on qualification, experience and social and communication skills of the developers, the selected methodology has significant influence on the quality of the project and product

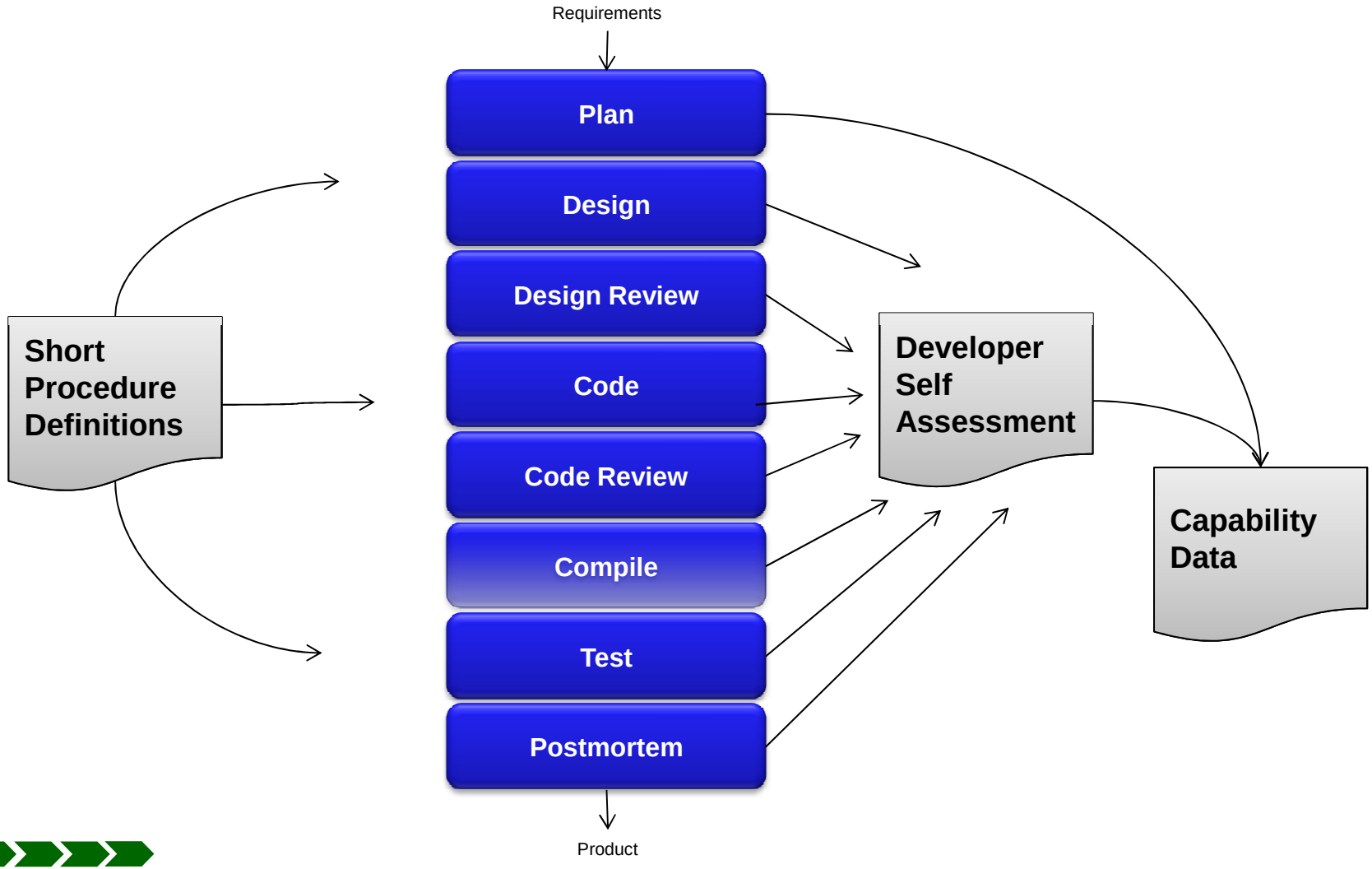
Formally



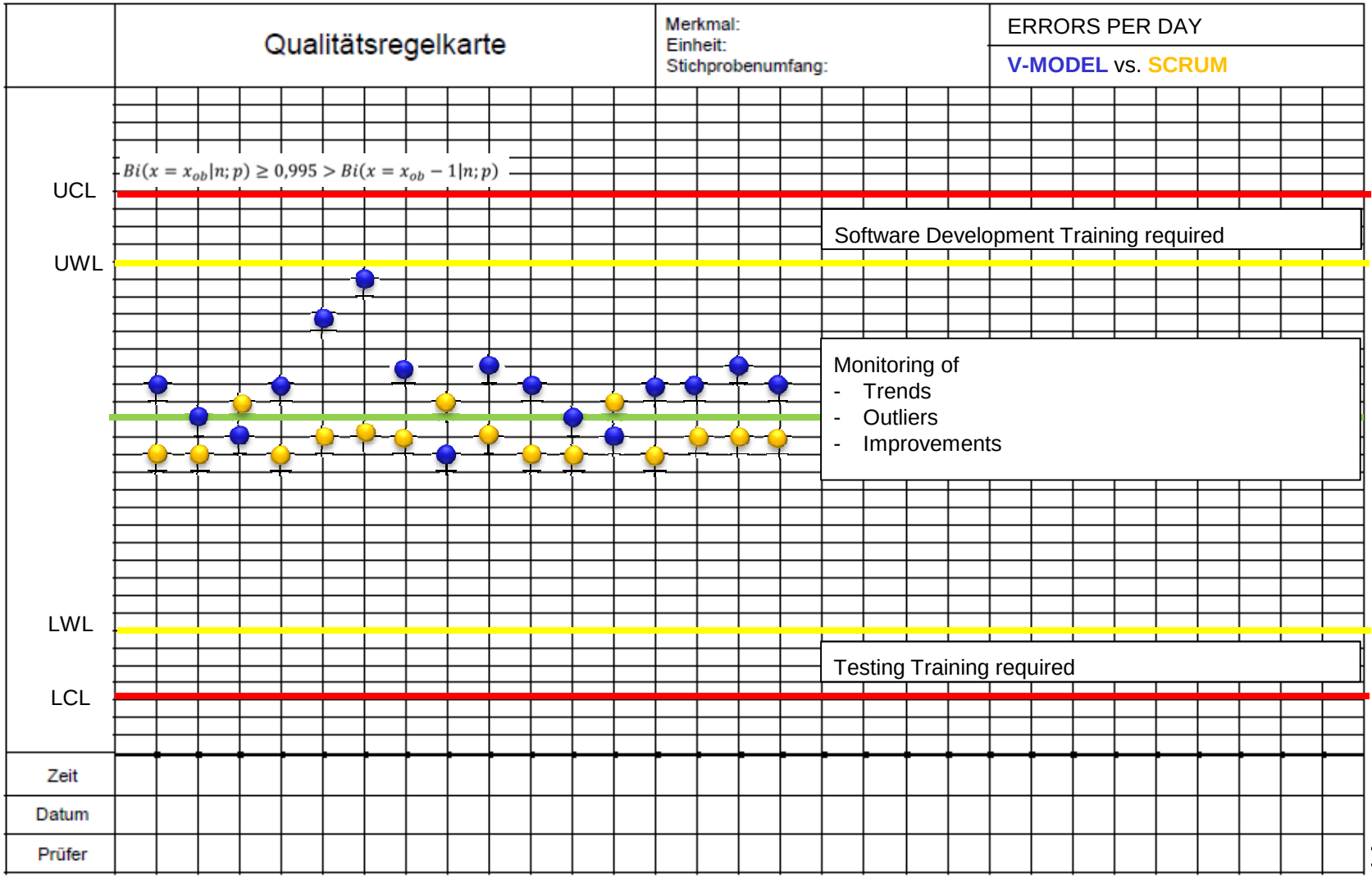
Communicative



SEI Personal Software Process



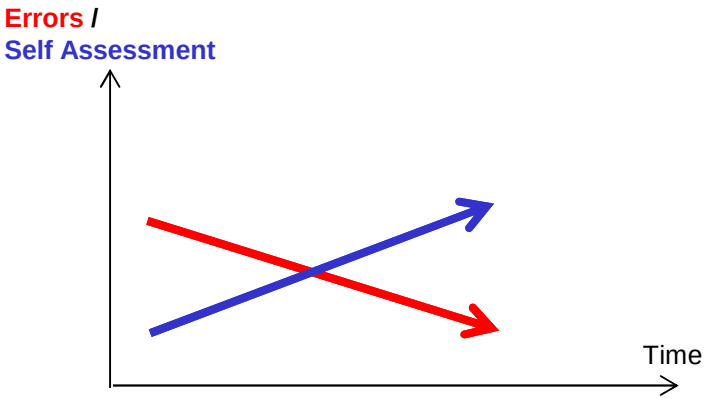
Error Tracking, Methodology Selection and Training Needs Analysis by Shewhart Control Charts



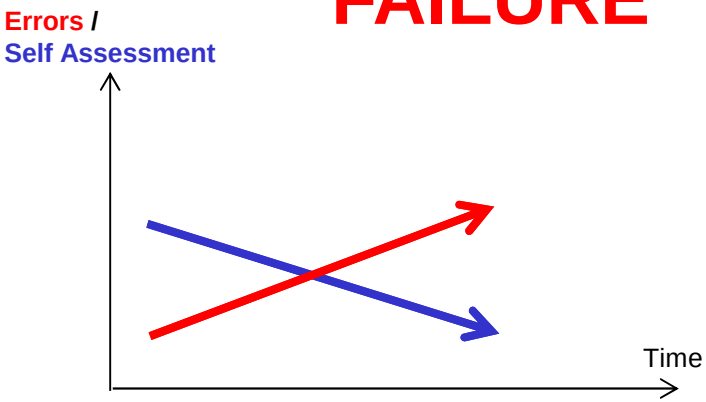
OrgaTech

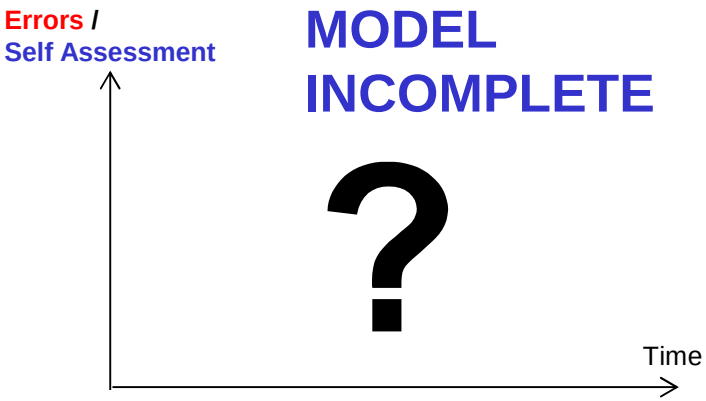
Compare Self Assessment and Error Tracking

SUCCESS



FAILURE





MODEL INCOMPLETE

?

ENHANCE APPROACH OR DATA BASIS

OrgaTech

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Learning Assessment

- Why?
- What to assess?
  - course objectives
  - learning outcomes
- Who to conduct assessment?
  - instructors
  - students
  - other stakeholders

Learning Assessment

- How to assess?
  - questionnaires, surveys
    (students, graduates, alumni, employers, etc.)
  - teaching evaluations
  - instructor / faculty self-study

Course Objectives and Program Outcomes

- Course objectives can be measured immediately at course completion
- Program outcomes require longer-term evaluation through a variety of mechanisms
- Formulate relevant, meaningful, and measurable objectives and outcomes
- Develop effective algorithms and tools for measurement
- Documentation is required

E-learning Assessment

- Course objectives
- Educational program outcomes
- Technology and delivery method
- Cost-effectiveness, etc.

Data Collection and Analysis

- Challenges in E-learning Assessment
  - diverse audience
  - geographical / temporal constraints
  - different tools, technologies, delivery modes
- E-learning provides many opportunities for data collection
- Evaluation of learning effectiveness can be assisted / enhanced through data analysis

Questions

- ⇨ To what extent can data analytics be used to
  - simplify the task of E-learning assessment?
  - produce reliable assessment of learning effectiveness?
- ⇨ Methods / guidelines / tools / algorithms?

Data Analysis Techniques

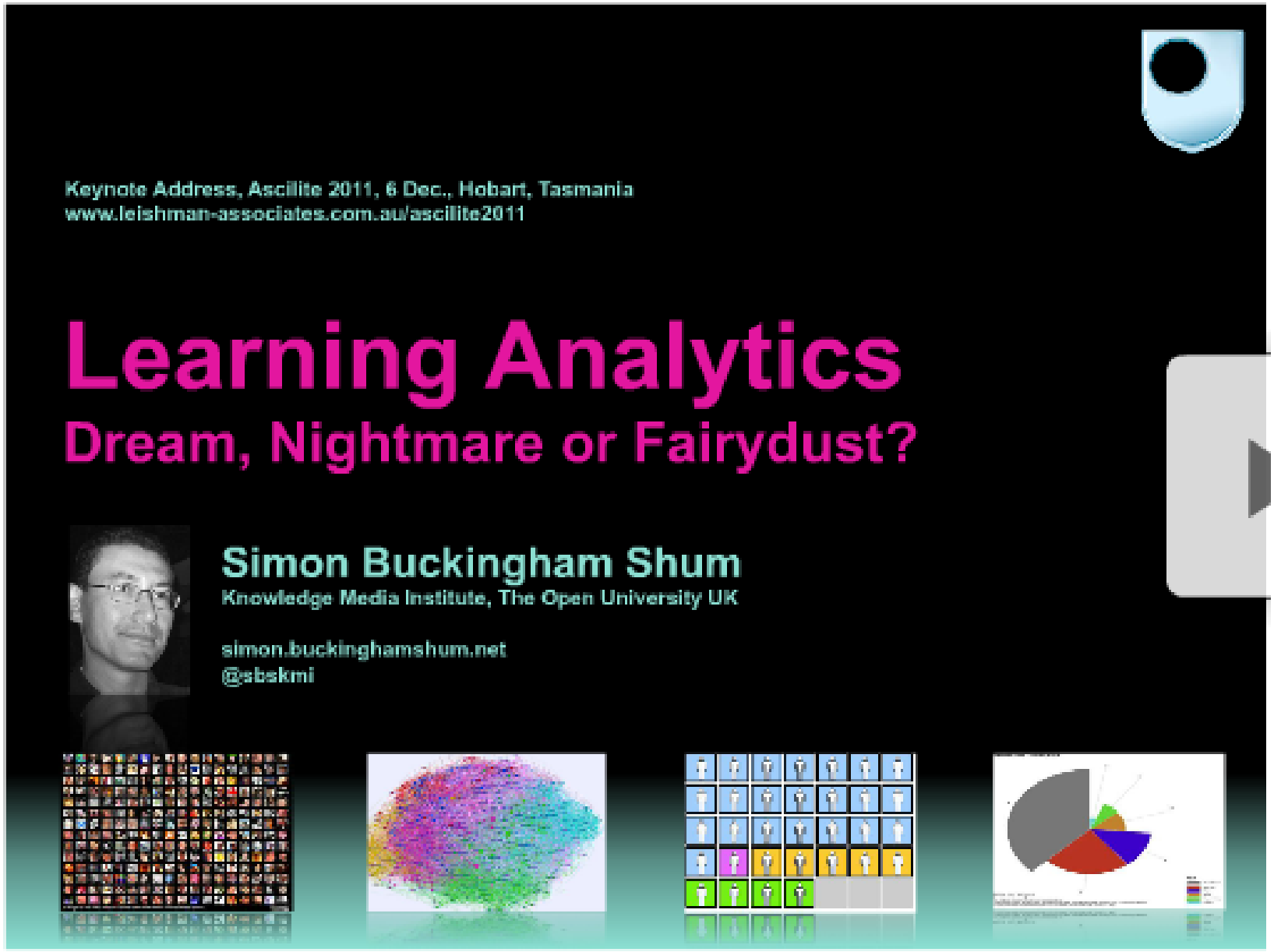
- Factor analysis
- Learning machine modeling, feature ranking and selection
- Important factors in e-learning effectiveness?
  - Motivation of students
  - Preparation and experience of teacher
  - Ease of use of technology
  - Delivery method

Learning Analytics: Goals, Methods, Trends

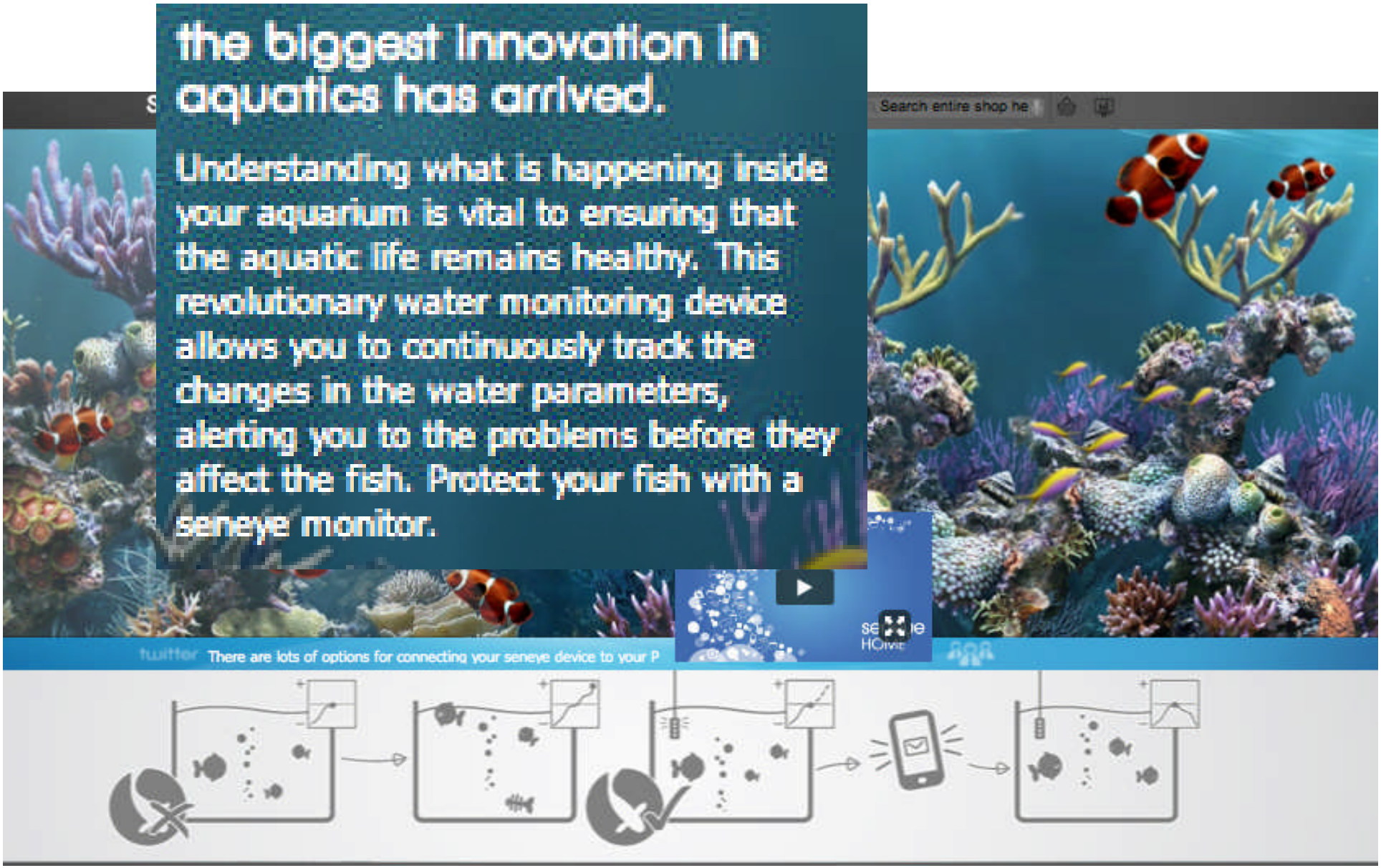
eKnow / eLmL Panel

Stephen White
IARIA Fellow

The analogy used by Simon really hit home to me…



http://people.kmi.open.ac.uk/sbs/2011/12/learning-analytics-ascilite2011-keynote/


the biggest innovation in aquatics has arrived.
Understanding what is happening inside your aquarium is vital to ensuring that the aquatic life remains healthy. This revolutionary water monitoring device allows you to continuously track the changes in the water parameters, alerting you to the problems before they affect the fish. Protect your fish with a seneye monitor.
Search entire shop he
There are lots of options for connecting your seneye device to your P

How is your aquatic ecosystem?

"This means that the keeper can be notified before water conditions directly harm the fish—an assured outcome of predictive software that lets you know if it looks like the pH is due to drop, or the temperature is on its way up.

This way, it's a real fish saver, as opposed to a forensic examiner, post-wipeout."

(From a review of *Seneye*, in a hobbyist magazine)

How is your learning ecosystem?

This means that the teacher can be notified before learning conditions directly harm the students — an assured outcome of predictive software that lets you know if it looks like engagement is due to drop, or attainment is on its way up.

This way, it's a real student saver, as opposed to a forensic examiner, post-wipeout.

7

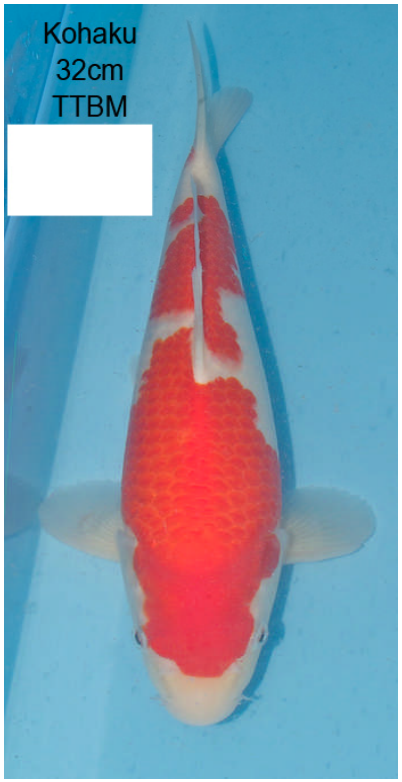
http://people.kmi.open.ac.uk/sbs/2011/12/learning-analytics-ascilite2011-keynote/

The pond version is something that I had been discussing recently…

Koi Sense

Discussion Forum

www.koisense.net



(my baby champion)

… because I keep koi for a hobby – actually…

I Keep Water, not Koi

Because an optimum environment is vital

These all contribute:
kH
pH
Nitrification
Ammonia
Nitrate

Water tests are available – used a lot by new koi keepers - but… how the koi behave is an indicator of something not being right – by monitoring them I am monitoring the environment

I would suggest…

Same with education

DANGER

An impressive use of technology – which may be needed by some.
But… will it result in loss of ability to park?
What happens the day it doesn't work?

A tutor, through observing and interacting with their students, can identify what is good or bad.

Potential for de-skilling tutors and adding to cognitive burden of students

So… not suggesting there is no need for learning analytics.
But… need to very carefully consider:

- When to apply?
- Who it is aimed at?
- Who will benefit?
- * What may we lose?