AIM 2012 Conference
Budapest, Hungary, 21 September 2012

"Experimental Learning in Industrial Management"

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Experimental Learning in Industrial Management
Discussion Points

(1)   What are the future challenges to industry?

(2)   What role do experiments play in that game?

(3)   What is the desired competence profile of our graduates?

(4)   What is the background at our universities?

(5)   How should an experimental learning-based framework look like?

- Learning syles
- Examples for Experimental Learning

(6)   What then for AIM?

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Experimental Learning in Industrial Management
Future Challenges to Industry

- From resource-based to knowledge-based production

- From linearity to complexity

- From individual competition to systematic competition

- From mono-disciplinarity to trans-disciplinarity

- From top-down to bottom-up production   [Manufuture - A Vision for 2020]

- From stable to dynamic and unpredictable environment

- From foreseeable cyclical fluctuations with effects on single industries to more powerful fluctuations effecting sensitive global networks

Experimental Learning in Industrial Management
The Role of Experiments

[http://www.youtube.com/watch?v=H0_yKBitO8M]

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- From resource-based to knowledge-based production

- From linearity to complexity

- From individual competition to systematic competition

- From mono-disciplinarity to trans-disciplinarity

- From top-down to bottom-up production

"Experimenting is the best way for industrial organisations to enhance quick innovation and adaptability in our unpredictable world!"
[Manufuture - A Vision for 2020]

- From stable to dynamic and unpredictable environment

- From foreseeable cyclical fluctuations with effects on single industries to more powerful fluctuations effecting sensitive global networks

Experimental Learning in Industrial Management
The Desired Competence Profile of our Graduates
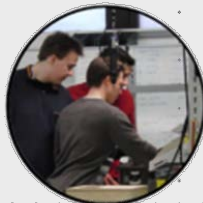
Professional / methodological competence
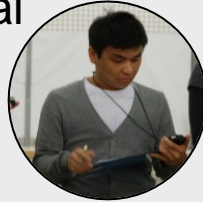
- Methodological competence
- System competence
- Problem-solving competence

Activity / implementation competence

- Being a "hands-on doer"

Social / communication competence

- Being a team player,
  able to motivate employees and to lead
  change processes

Personal Competence

- Ability to reflect, act
  self-directed and develop own
  competences

[according to J. Erpenbeck, V. Heyse]

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Professional / methodological competence

- Methodological competence
- System competence
- Problem-solving competence

Activity / implementation competence

- Being a "hands-on doer"

"We are currently teaching important professional knowledge but do not empower the development of holistic competence profiles!"

Social / communication competence

- Being a team player,
  able to motivate employees and to lead
  change processes

Personal competence

- Ability to reflect, act
  self-directed and develop own
  competences

[according to J. Erpenbeck V. Heyse]

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Experimental Learning in Industrial Management
The Background at our Universities

Professors

- Academic vs. industrial career path depending on European region
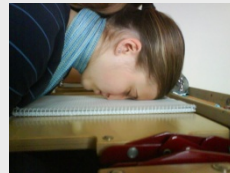- Changes in the appointment procedure of professors at European Universities

PhD Candidates

- Development of different competence profiles based on different models, e.g. research fellows vs. graduate school

Students

- Missing link from theory to practice
- Students are not used to student-centred, experimental learning and have to learn to participate actively

Bologna Process

- Strives for outcome-oriented teaching but leads to:
- "School-like regimentation" of curricula
- "Paternalism" and less self-responsibility
- Less time for practical experiences, internships etc.

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Professors

- Scientific career vs. industrial experiences depending on European region
- Changes in the appointment process of professors at European Universities

PhDs

- Development of different PhD competence profiles based on different frameworks of engineering doctorates

"RESEARCH"

"Transfer of knowledge and talents between academia and industry must not be a one way street!"

Students

- Missing relation of theory and practice in teaching
- Students are not used to student-centered, experimental learning and have to learn to participate actively
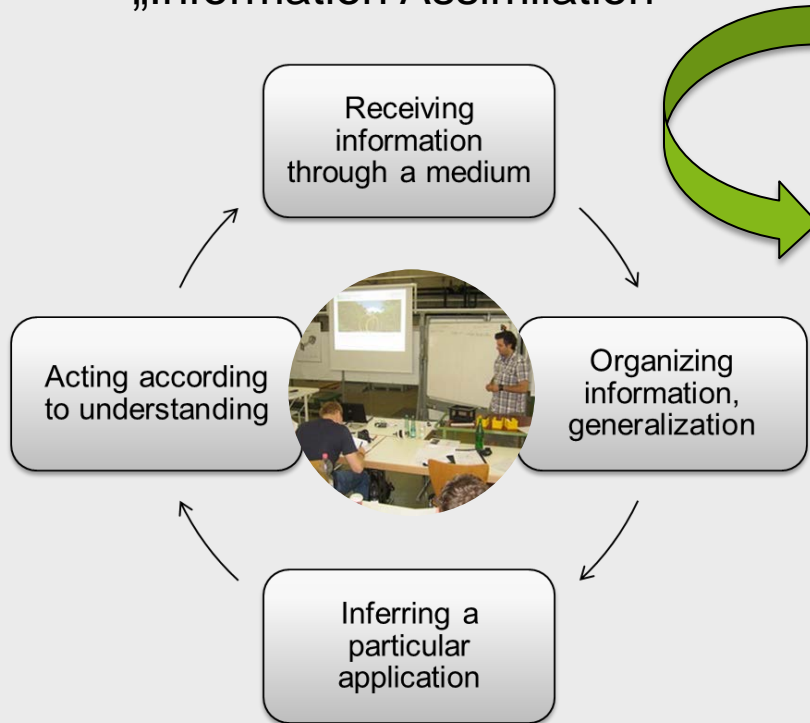
Bologna process

strives for outcome-oriented teaching

but leads to:

- "school-like regimentation" of curricula
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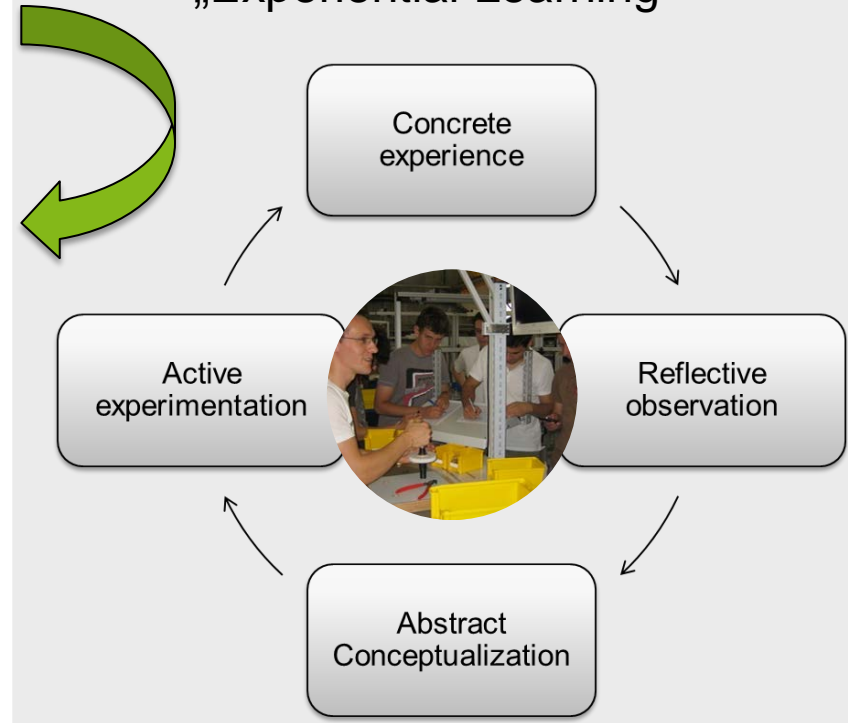Lehrstuhl für Arbeits- und Produktionssysteme
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„Information Assimilation "

- Less time consuming
- Easy to give knowledge a structure
- Low taxonomy level
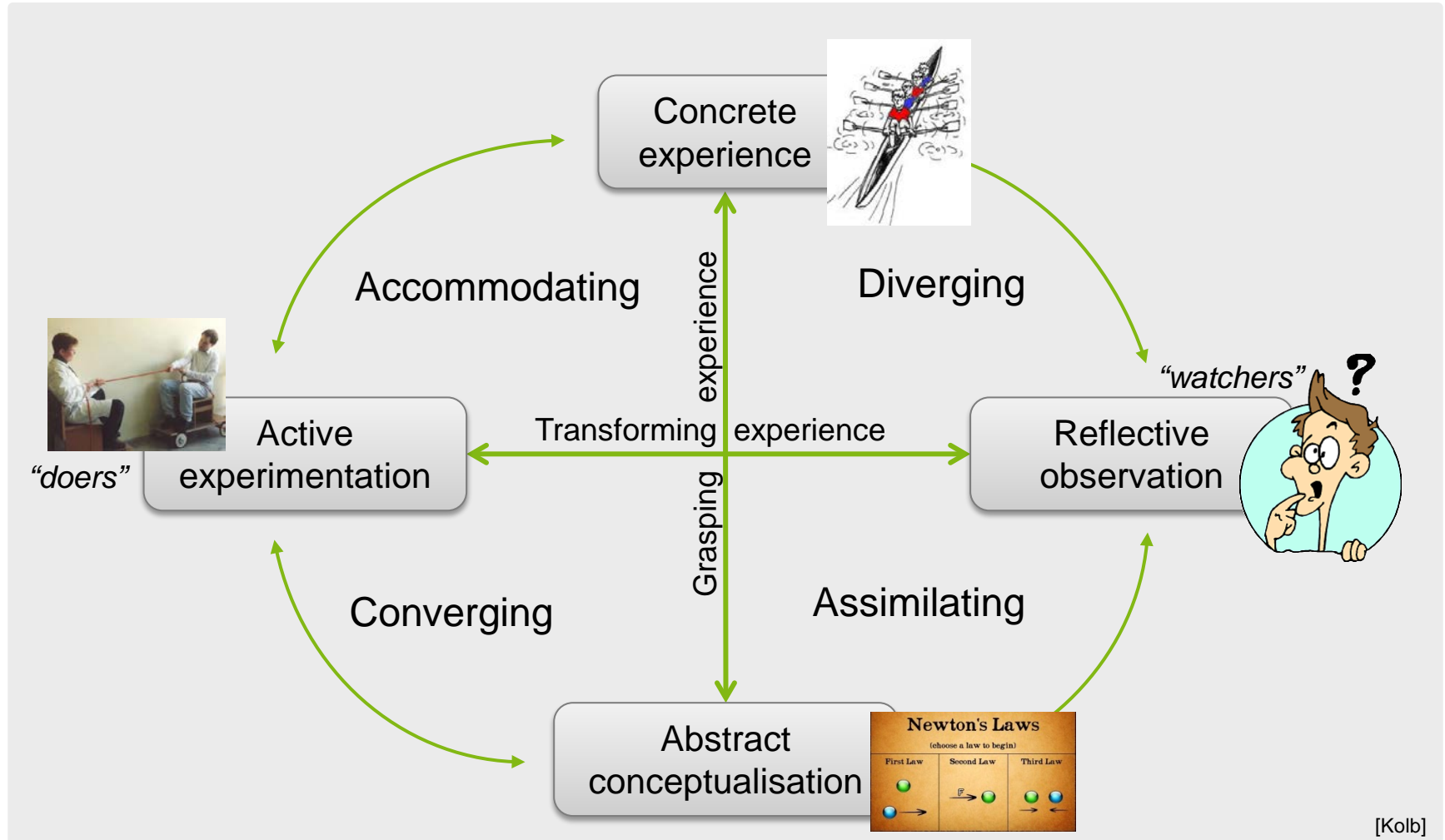- Low learning retention

[Coleman]

„Experiential Learning"

- High taxonomy level
- High learning retention
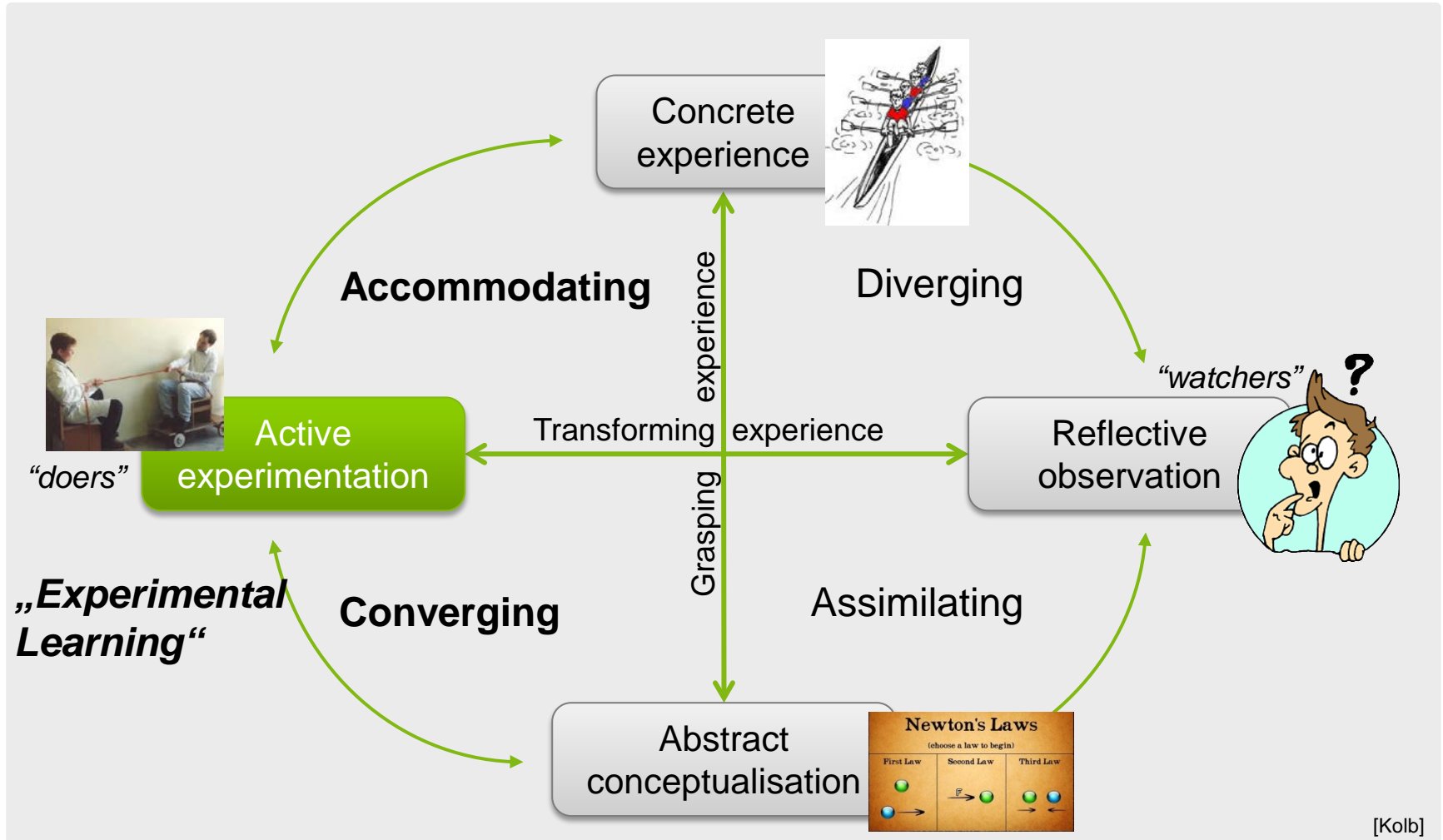- Time consuming
- Knowledge needs a structure

[Kolb]

J. Deuse, M. Steffen, J. Riis, J. Johansen | Budapest 21/09/2012

Concrete experience

Accommodating

Diverging

Grasping experience

Transforming experience

"doers"

Active experimentation

"watchers"

Reflective observation

„Experimental Learning"

Converging

Assimilating

Abstract conceptualisation

[Kolb]

"Compared to the competence profile we have to focus on western learning styles, i.e. Experimental Learning!"
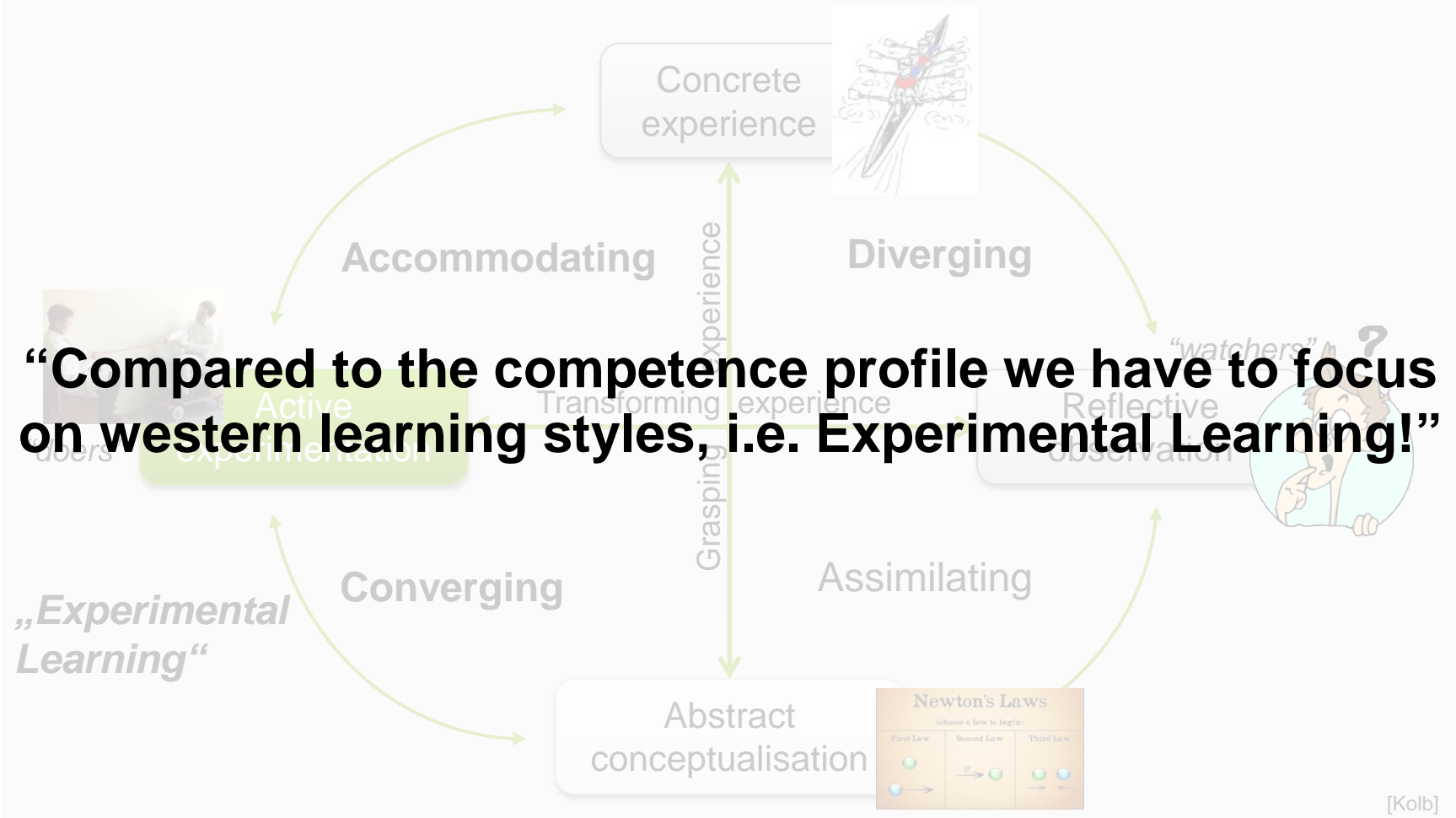
Experimental Learning in Industrial Management
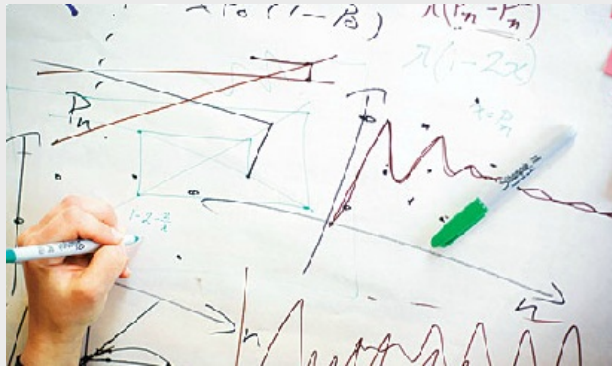# EL based Educational Program - The Olin Experiment

Hands-on starting on day 1

Professors and students

Classroom work

Lab time

[http://spectrum.ieee.org/at-work/education/the-olin-experiment]

Experimental Learning in Industrial Management
Examples for Experimental Learning

SimLab, Aalto University

[http://simlab.aalto.fi]

Gaming, Steel Industry

[DEW]

Solution Lab, Aalborg University

IE Training Centre, TU Dortmund

Experimental Learning in Industrial Management
Accomodating Learning – Cuddling in an Ass'y Line

"We have some excellent examples of Experimental Learning within AIM that we should promote and develop further!"

Experimental Learning in Industrial Management
What then for AIM?

Step 1: Get overview at first glance

Ongoing Activities on Experimental Learning (EL) in Europe

(Literature, Conferences*, Research**, Networks/Communities***, Working Groups, Surveys****, Industry*****)

Target:

- Get an overview to define a starting point and specify open questions

To do:

- Collect and sort information ...

Potential starting point to apply for possible EU Funding

Step 2: Analysis – Best practice for EL in IM

Target:

- Identify and share best practice
- Analyse EL in theory and practice

To do:

- Attend conferences
- Set up further surveys
- Organise benchmark trips ...

*e.g.: 2nd conference on learning factories; IEEE EDUCON; Dortmunder IE-Fachtagung
**e.g.: Project TeachING.LearnING EU; Project Elli
*** e.g.: SAGE: Simulation and Advanced Gaming Environments for Learning
****e.g.: Survey on Learaning factories by Prof. ElMaraghy, survey on Curricuulum of Master of Advanced Industrial Management by Prof. Dombrowski
***** e.g.: Simulation Work Environment by GM

Experimental Learning in Industrial Management
What then for AIM?

Step 3: Common understanding and Benefit of EL

Target:

- Create a common understanding of EL
- Prove why EL is an appropriate concept for IM higher education

To do:

- Define IM tasks, necessary asset of competences, learning targets
- Develop a way how to evaluate competence development respectively benefit of EL
- Set up surveys, expert interviews ...

Step 4: Define Framework for Educational Program based on EL

Target:

- create a framework with recommendations how to integrate EL

To do:

- Define an core work group/ an advisory board, organise workshops (e.g. in combination w/ benchmark trips)
- Analyse different cultural, organisational and social background at European universities ...

Experimental Learning in Industrial Management
What then for AIM?

Step 5: Evaluation ("Summerschool") (mid-term vision)

Target:
- Evaluate framework and benefit of EL by a prototype (e.g. summerschool)
- Enable exchange of students,
- Support development of holistic competence profile, including intercultural competence
  Maybe integrate Industry by forming mixed groups w/ employees and students

To do:
- Develop and organise summerschool according to the EL framework …

Step 6: Consolidation (long-term vision)

Target:
- Establish „IM Summerschool" as a yearly event (rotating locations within Europe)
- Create European curriculum of IM based on EL framework
- Sustainable discussion about EL within AIM, support AIM fellows w/ EL

To do:
- Create structure to organise, finance, schedule summerschool,
- Integrate EL at each AIM conference
- Further development of AIM homepage to exchange information …

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Step 5: Evaluation ex. Summerschool

- Organise „IM Summerschool"
- Targets: improve quality of IE Education and thus students employability. Encourage European exchange and international experience of students, support development of intercultural competence. Maybe integrate Industry by forming groups w/ engineers/workers and students

- To do: choose participants, organise summerschool, develop or adapt existing EL course to defined requirements

Step 6: Consolidation/ Sustainability

- Establish „IM Summerschool" as a yearly event (rotating locations within Europe)
- sustainable discussion about EL
- Targets: support further improvements of IM higher Education. Encourage exchange on EL at least within AIM, support AIM fellows implementing EL
- To do: define sustainable structure to organize, finance, schedule summercamp integrate topic EL on AIM conference, further development of AIM homepage to exchange information

"Now it's time to act and AIM is in charge!"

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