Mahdollisuuksia uudistumiseen - CDIO tekniikan koulutuksen kehittämisessä

Juha Kontio
KTT, koulutusjohtaja
Tietoliikenne ja sähköinen kauppa

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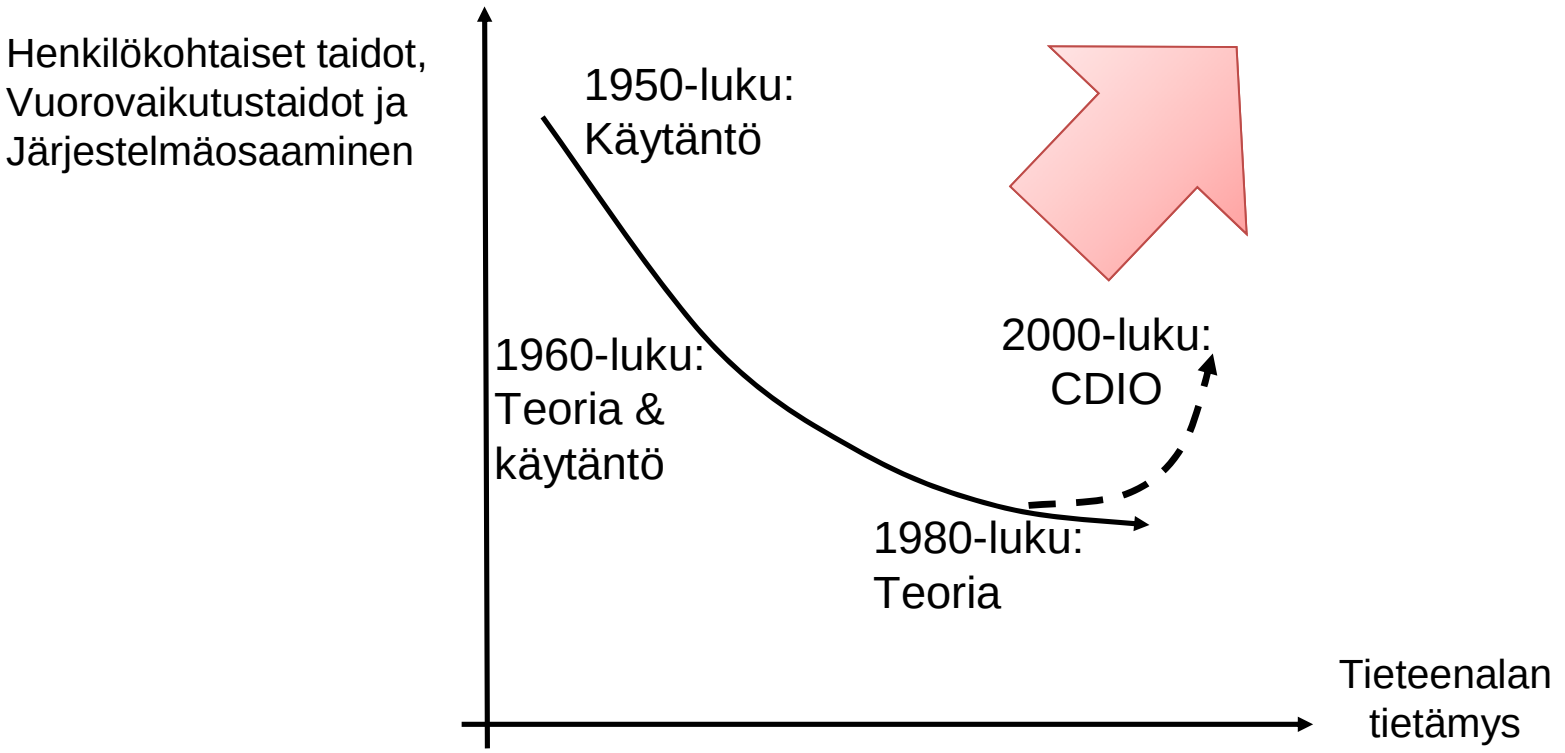
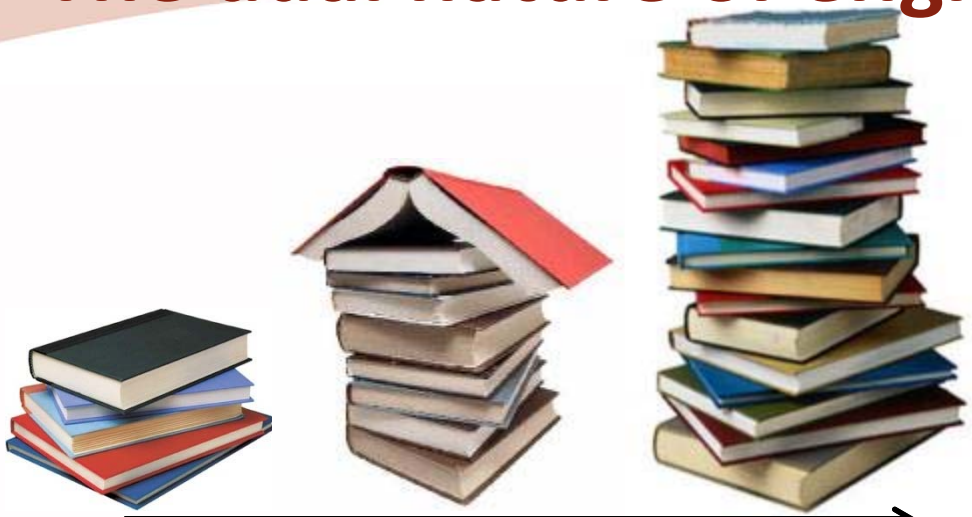
CDIO is an approach to improve (engineering) education

Teknisen koulutuksen painopisteen kehittyminen



The dual nature of engineering education



Acquisition of technical knowledge

Development of engineering skills

Integrated development of

technical knowledge

&

engineering skills

…in meaningful relationship!

CDIO was started

1997
- MIT plan identifies CDIO

1999
- Meeting with Wallenberg Foundation

2000
- MIT, Chalmers, KTH, Linköping proposal to Wallenberg

2001
- CDIO Syllabus adopted by 4 schools

2003
- CDIO standards adopted

2004
- CDIO council of first 10 schools

2005
- 1st conference & End of funding

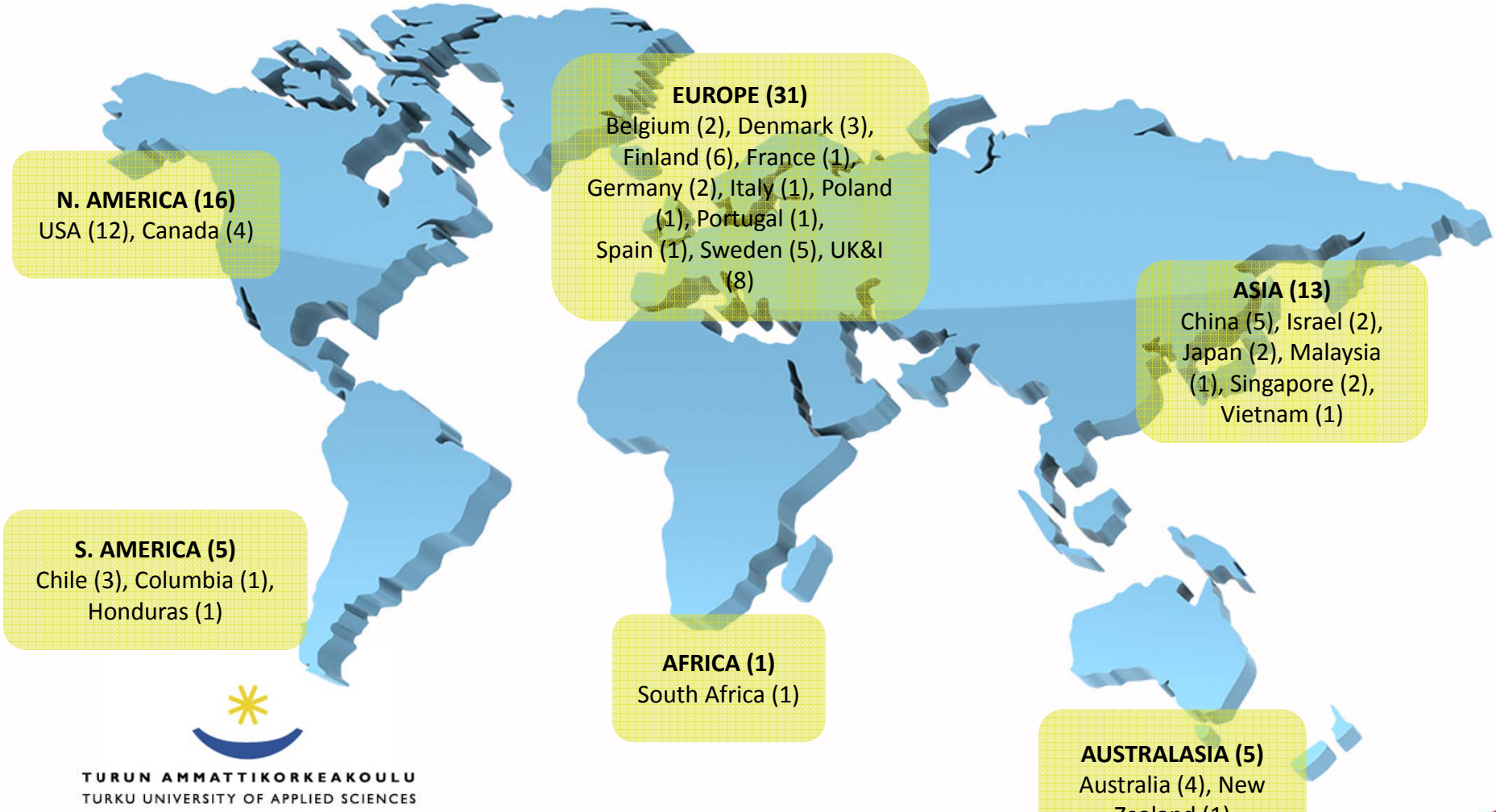
2007
- Books published

2009
- 5th conference

2010
- Revised syllabus and standards

2012
- almost 100 schools in CDIO

CDIO collaborators



N. AMERICA (16)
USA (12), Canada (4)

EUROPE (31)
Belgium (2), Denmark (3), Finland (6), France (1), Germany (2), Italy (1), Poland (1), Portugal (1), Spain (1), Sweden (5), UK&I (8)

ASIA (13)
China (5), Israel (2), Japan (2), Malaysia (1), Singapore (2), Vietnam (1)

S. AMERICA (5)
Chile (3), Columbia (1), Honduras (1)

AFRICA (1)
South Africa (1)

AUSTRALASIA (5)
Australia (4), New Zealand (1)

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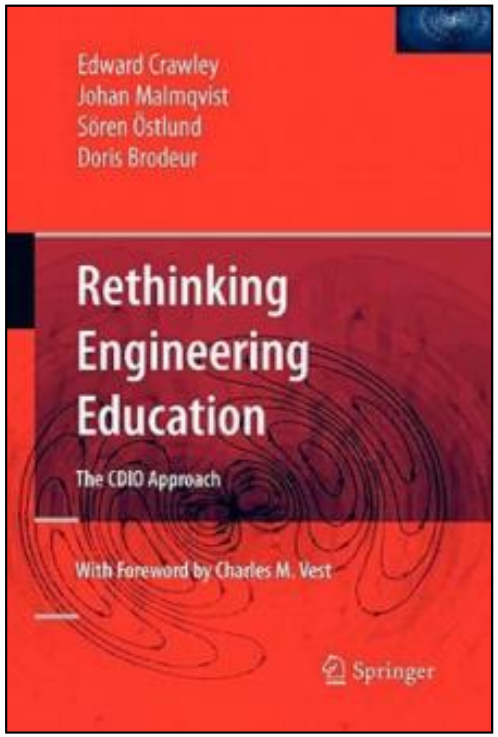
Katso kaikki CDIO kumppanit: www.cdio.org

Meet the CDIO community



- **Fall International CDIO meeting**
  October 22 – 26, 2012, Télécom Bretagne, Brest, France
- **European CDIO meeting**
  January 17-18, 2013, Aarhus School of Engineering, Denmark
- **9th International CDIO Conference**
  June 2013, MIT/Harvard, Cambridge, MA, USA
- **Fall International CDIO meeting**
  Oct 2013, Taylor's College, Malaysia
- **10th International CDIO Conference**
  June 2014, UPC, Barcelona, Spain

- Crawley et al. (2007) *Rethinking Engineering Education: The CDIO Approach,* Springer Verlag. ISBN 0387382879 (2nd edition coming soon)

CDIO is not a cookie cutter approach

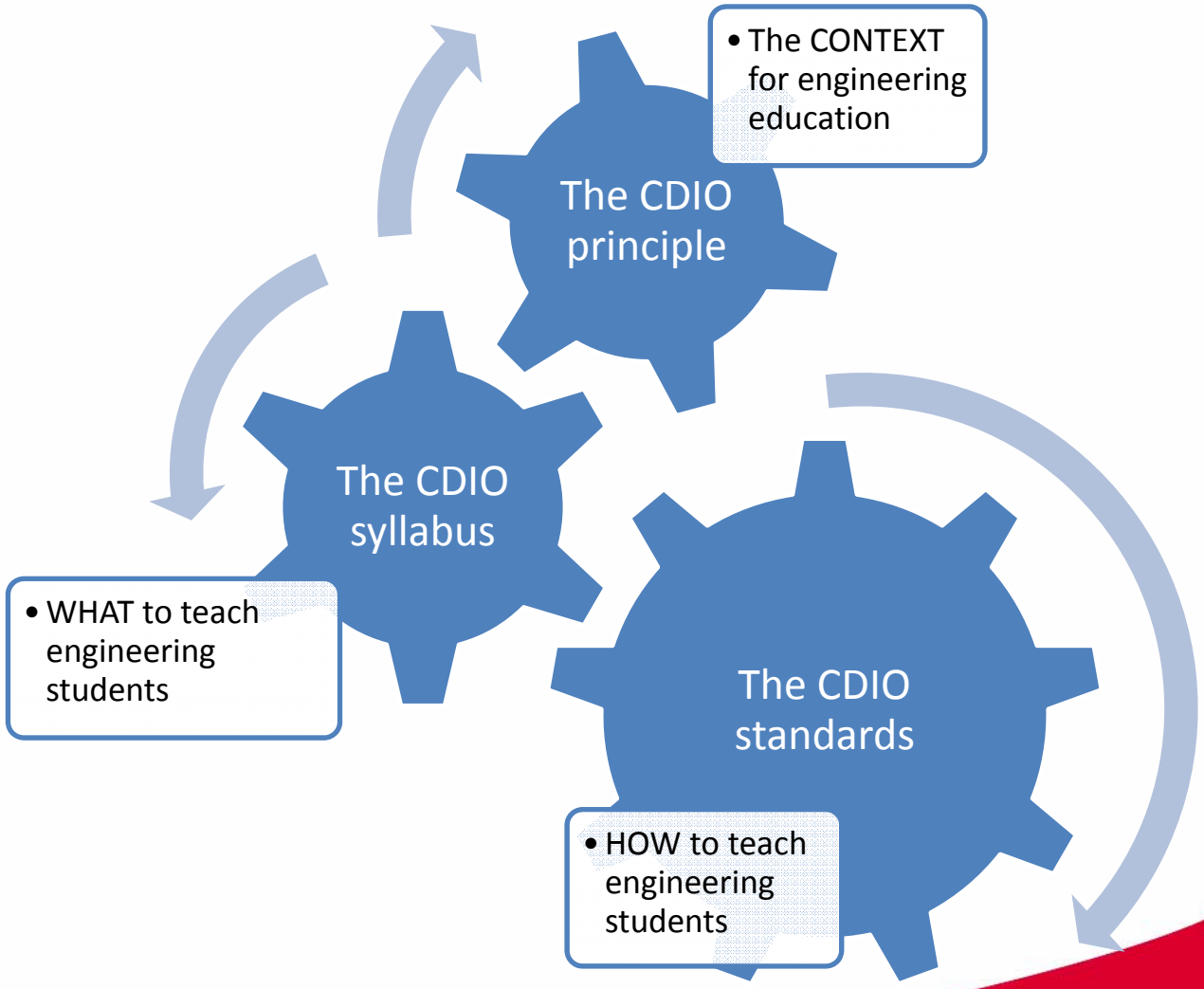
1. CDIO is a *reference model*
2. Everything has to be *translated-transformed* to fit the context and conditions of each university / program
3. Take what you want to use, transform it as you wish, give it a new name
4. CDIO provides a toolbox for working through the process
5. Local faculty ownership is key

How Can We Do Better?

Retask current assets and resources in:

- Curriculum
- Teaching and learning methods
- Design-implement experiences and engineering workspaces
- Learning assessment methods
- Faculty competence
- Program evaluation

Main elements of the CDIO approach



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CDIO standards – best practises

program philosophy

curriculum development

design-build experiences and workspaces

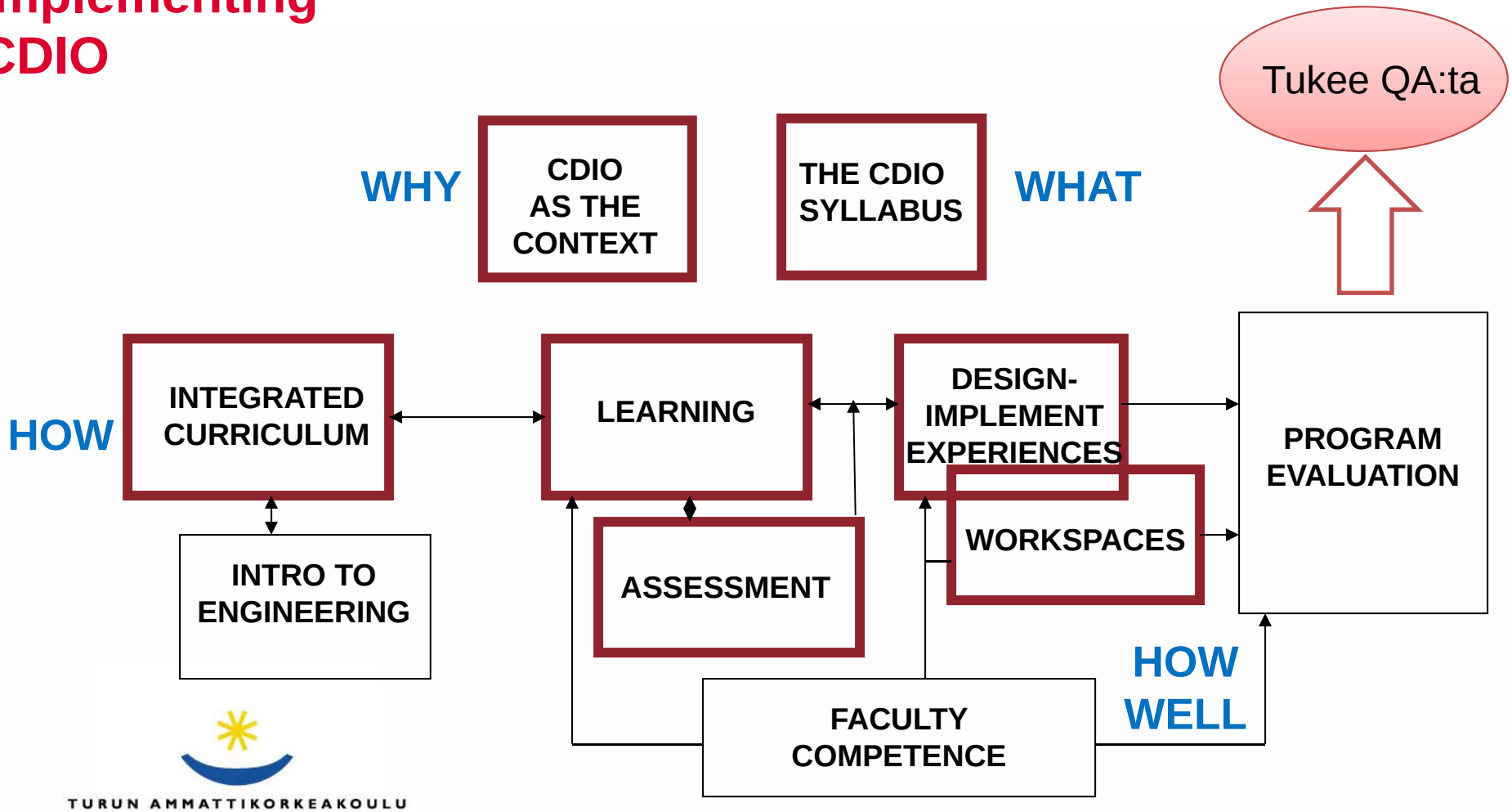
methods of teaching and learning

faculty development

assessment and evaluation

CDIO standardit on käännetty suomeksi – ota yhteyttä niin saat paluupostissa

Implementing CDIO



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Standard 12: Self-evaluate your program

1. Evaluate performance in each of the 12 standards
2. Provide evidence for the standard ratings
3. Document decisions made for continous improvement

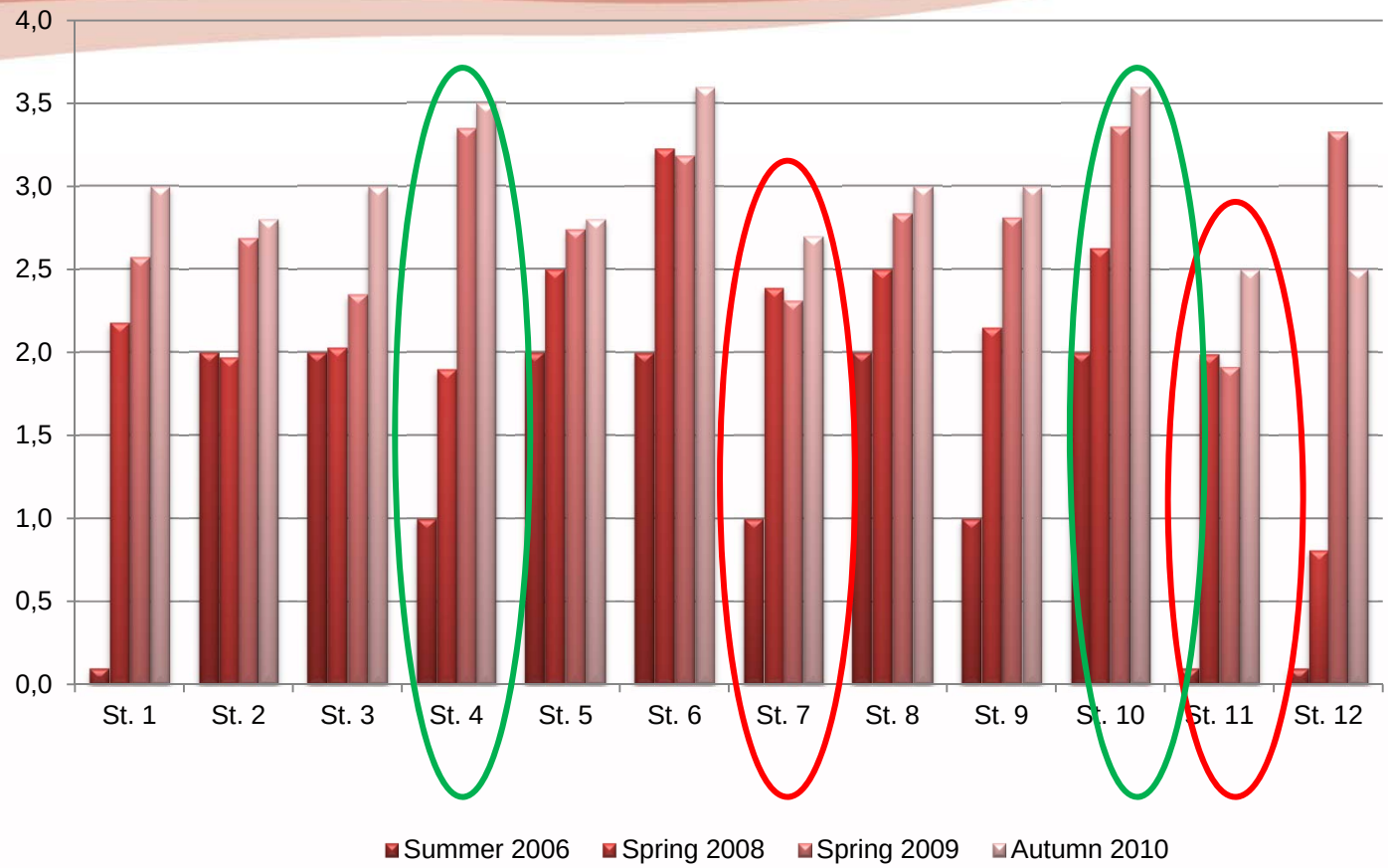
Scale	Criteria
5	Evidence related to the standard is **regularly reviewed** and used to make improvements
4	There is **documented evidence** of the full implementation and impact of the standard across program components and constituents.
3	**Implementation** of the plan to address the standard is **underway** across the program components and constituents.
2	**There is a plan** in place to address the standard.
1	There is an **awareness** of need to adopt the standard and a process is in place to address it.
0	There is **no documented plan** or activity related to the standard.

What we have done?

- Evaluation rounds
  - Sep-06
  - Jan-08
  - Apr-09
  - Sep-10
  - Oct-12 (in process)
- Lot of development based on evaluations

Std	Analysis
1	Management is committed; Work is still needed to assure all faculty members
2	**Competence definitions need improvements**
3	Curricula should have **clearer themes** for study modules
4	**Introductory courses** are lacking in all degree programs
5	Our project-based learning support this standard; weights now at the end of studies
6	Data has been collected in phase 3; further analysis is needed
7	Our project-based learning support this standard; weights now at the end of studies. In addition, mandatory work placement supports this standard.
8	Problem-based learning and laboratories are good examples of active learning. **Active learning should be promoted more**.
9	We have a project where teachers have the opportunity to be in the working life three months. Continuing these actions is seen essential.
10	Teacher qualification requires pedagogical studies; **Complementary education in active learning methods should be arranged**.
11	**A separate project to develop student assessment** has been started.
12	This workshop was first time we evaluated our operations in relation to CDIO initiative. In addition, internal quality assurance actions have been taken.

Something has happened (2006-2010)



- Can we say something from this?
- Where have we succeeded?
- Next focus areas for continuous improvement?

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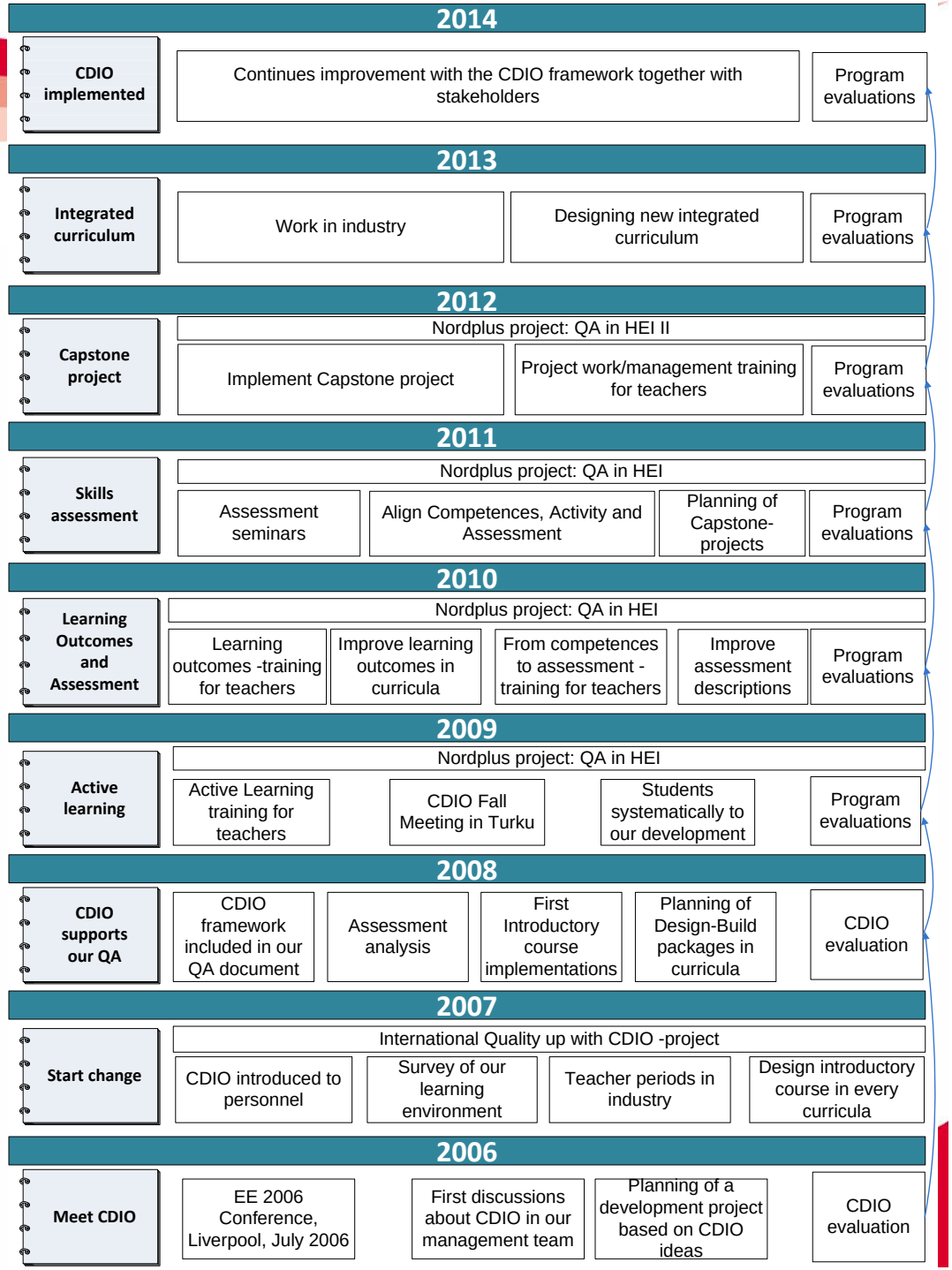
Pedagogical developments

- Problem Based Learning
  - PBL cycles integrated in engineering education since 2003.
- CDIO –based development since 2006



cdio
CONCEIVE DESIGN IMPLEMENT OPERATE™

Ajatuksia

1. CDIO on lähestymistapa koulutuksen järjestelmälliseen kehittämiseen – ohjaa katsomaan koulutusta useasta osa-alueelta
2. Standardit (Periaatteet) ovat selkeät ja niihin on helppo tarttua
3. Itsearviointimalli auttaa tunnistamaan toiminnan kehittämisen alueita ja vahvistaa jatkuvan parantamisen kulttuuria

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”Scientists investigate that which already is.
Engineers create that which has never been.
- Theodore von Karmann

Kysymyksiä, kommentteja,…

Kiitoksia!

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