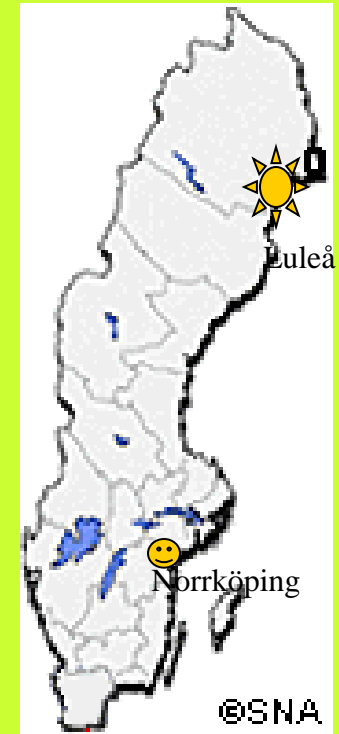


The Missing Paradigm Shifts:

- University Management
- Engineering Education



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(Luleå University of Technology)

My history

- Associate Professor in Software Engineering
- 1999-2002, 70%, Chairman CS&EE Dept. Luleå
- 1983-1990 Chairman CS Dept. Linköping Univ.
- Special interest for 15 years: *success factors in the Industrial Development of Complex Systems*

Complex: “so wide in scope that contributions from several persons with a wide range of experience, educational and professional backgrounds are needed, to solve problems and answer questions in the area”.

University Management

In the past, since the Middle Ages, the ability to resist pressure from external political and religious forces has been a strength; a survival factor for the universities.

As the accumulated amount of knowledge and information has grown, it has been divided into more and more narrow disciplines. For many generations the focusing on and delimitation to the own narrow subject have been promoted.

Each discipline has developed its own concepts, mental models and defined its own rules and behavior patterns in autonomous faculties.

University Management

Is the built-in robustness a strength or a weakness today?

Has academia the insight to understand by itself when things should be changed?

What should change?

University Management - What should change?

In education: the focus on *episteme*, the ability to remember and repeat declarative facts, is obsolete.

In research: the narrowing into thinner and thinner disciplines disables holistic understanding.

System organization: The idea, that you learn (from previous generations) when you are young and then use what you have learnt for the rest of your life, is also obsolete.

University Management

Has academia the insight to understand by itself when things should be changed?



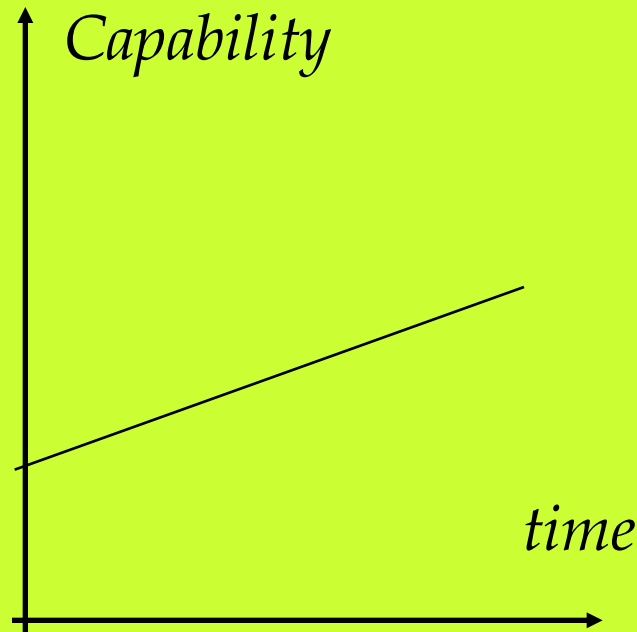
To change something at a university is like moving a graveyard

New Requirements on Development Engineers

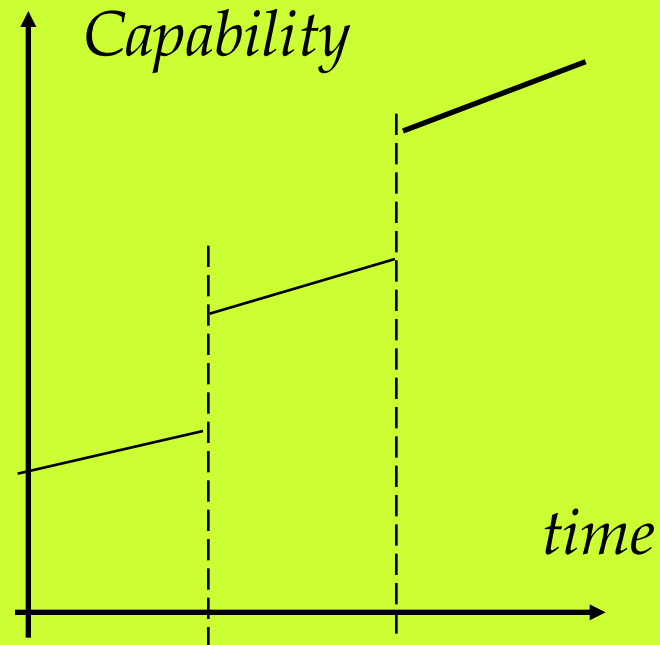
Bengt Lennartsson, Kristina Davidson (1996)

- **Ability to communicate and cooperate** more important than individual brilliance.
- **Ability to understand totality and inter-dependencies** more important than expertise in a narrow area.
- **Ability to learn new things** more important than ability to remember old facts.
- **Ability to question and to discover new trends** more important than ability to follow detailed instructions.

New Paradigm for capabilities and skills:



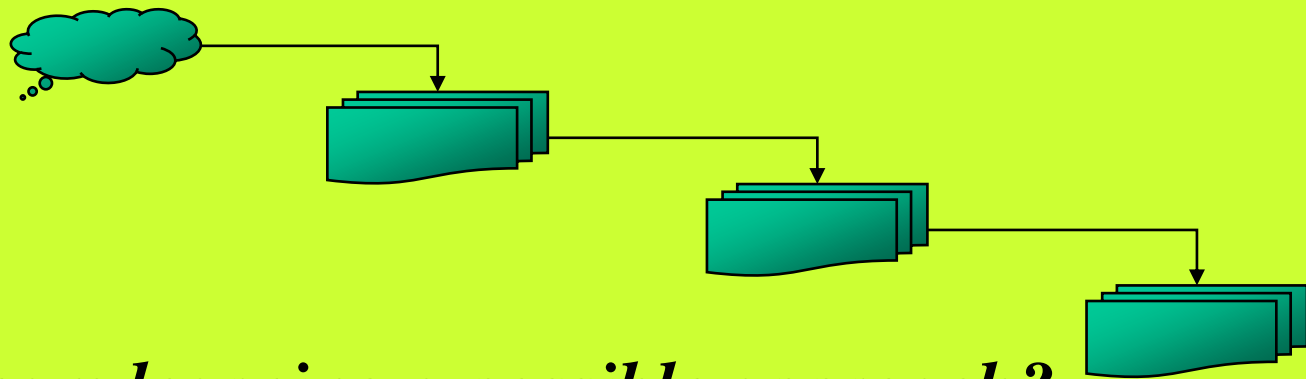
Learning within given structure (kaizen).



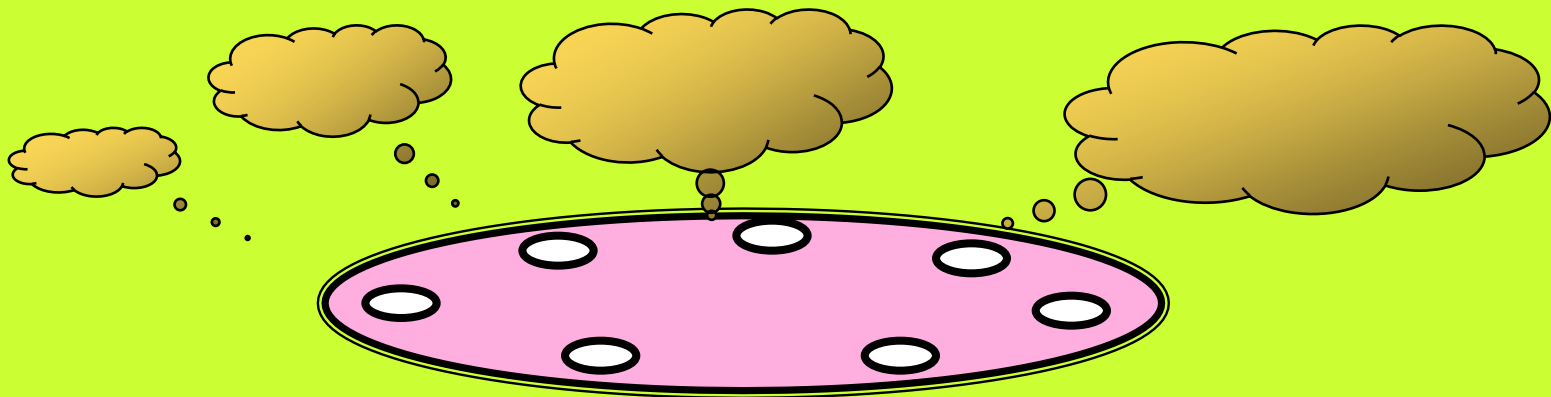
Learning by paradigm shift (kairyō).

*Conclusion from field studies in
Swedish Industry:*

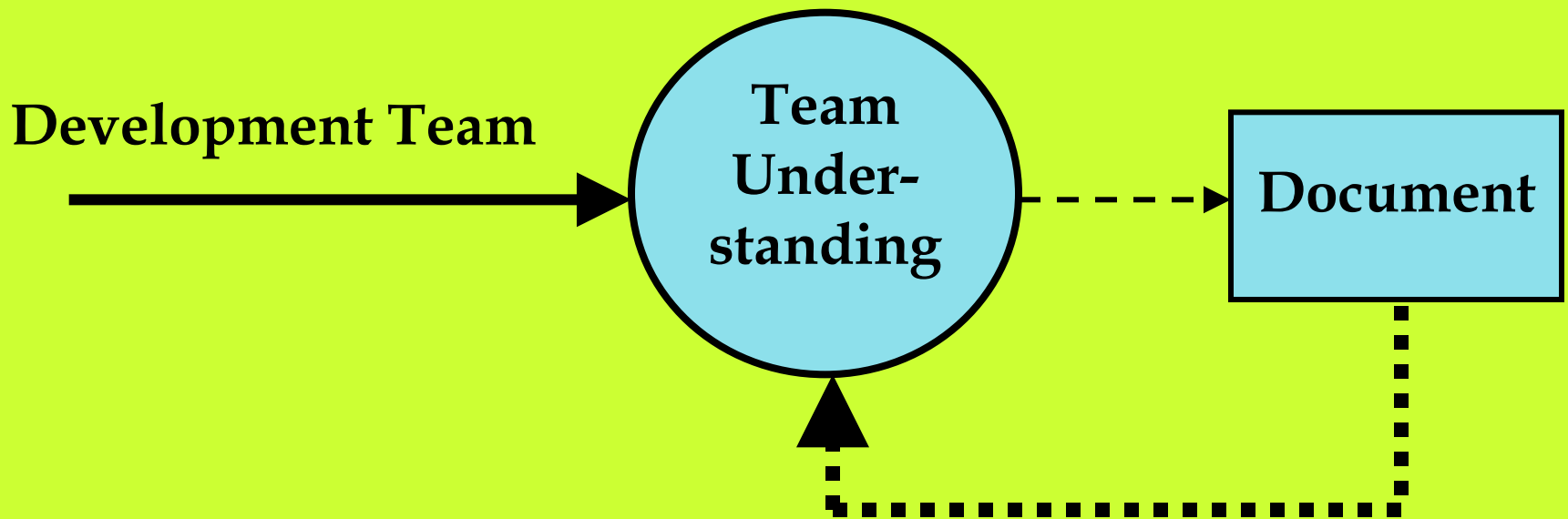
Document based models don't work



Team learning a possible approach?



Embryo of a new System Development Model based on the development, supply, and maintenance of shared visions and shared understanding.



Within the scope of my "own course" on Programming Distributed Systems, I have changed the contents and the organization. I have no lectures (except for the introduction), no marking of work assignments or lab reports, no project reports, no written exams.

Student comments:

"For the first time I have learned something"

"Before this course I was reluctant to try something where I was not sure about the outcome. Now I dare do such things. This has changed my life"