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# **RESISTANCE TO CHANGE IN INSTITUTIONALIZING THE CDIO STANDARDS: from a Cascade to an Agile Improvement Model**

***8th International CDIO Conference,  
Queensland University of Technology,  
Brisbane, July 1 - 4, 2012***      11/07/2012





# Context

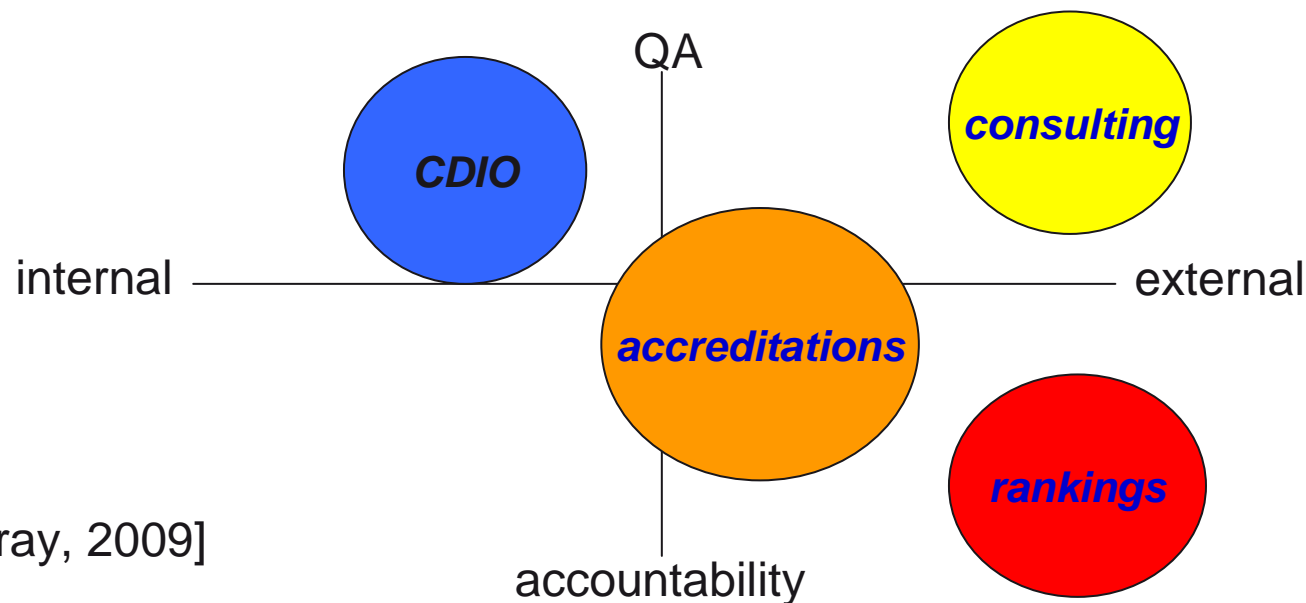
- **Telecom Bretagne: public French accredited “generalist” engineering school**
  - “*Grande Ecole*” system with preparatory schools (Maths in 2 years)
  - signal processing, optics, electronics, computer science, etc.
- **Two different programs at Master levels:**
  1. a **medium size full-time generalist program** (650 students) with a wide spectrum of knowledge, skills, and competences
    - 8 months of **internships mandatory** (6 months at the end of curriculum)
      - students can optionally integrate a 1 year internship in companies during the 2<sup>nd</sup> year (approx. 45% of sophomores)
  2. a **small size specialized apprenticeship program** (120 students)

# Accreditations and Quality Assurance ecosystem



## Labels or Quality Assurance?

- **CTI French accreditation every 6 years:**
  - Telecom Bretagne accredited since 1977
  - next process in 2013-14
- **2008: Telecom Bretagne joined the CDIO initiative (internal QA)**



[Peter Gray, 2009]

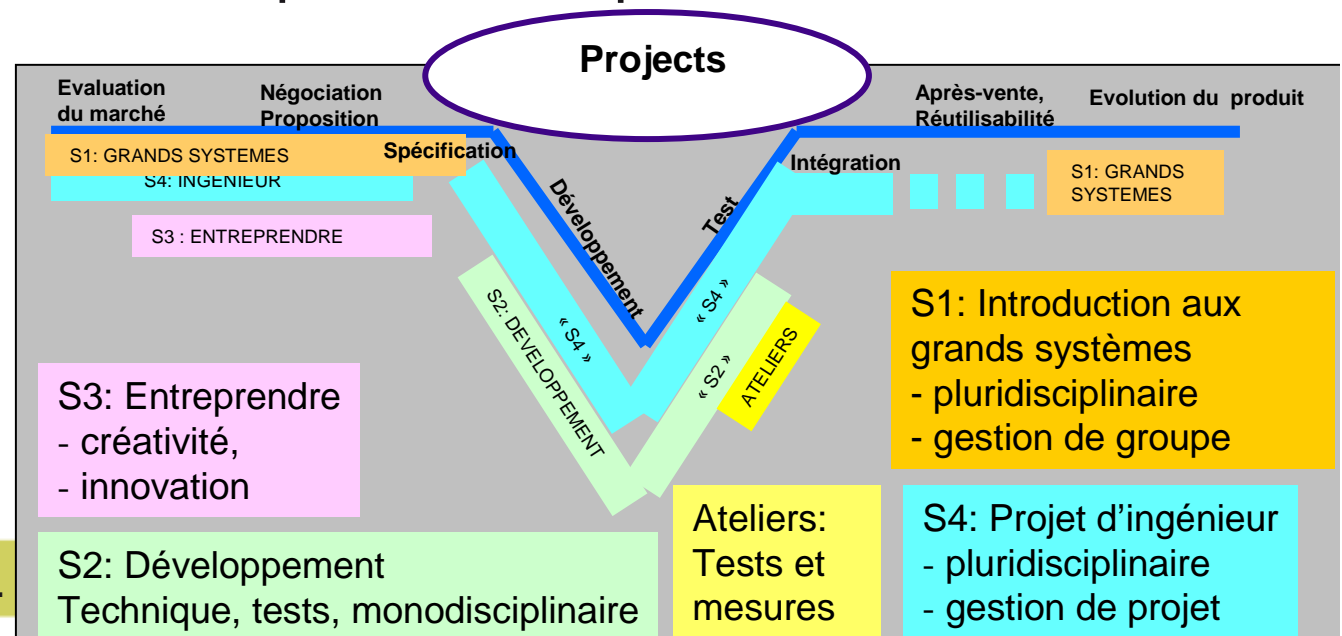


# The French “a-to-k” CTI outcomes

1. **Knowledge and understanding of a broad range of basic sciences**
2. **Aptitude to use the scientific and technical resources related to a specialty**
3. **Understanding of engineering methods and tools:**  
identification and resolution of problems, possibly using experimentation, innovation and research, the collection and interpretation of data, the use of computing tools, the analysis and design of systems,
4. **Capacity to join an organisation, to lead it and drive it forward:**  
self-awareness, team spirit, commitment and leadership, project management, project coordination, communication with specialists and non-specialists alike,
5. **Aptitude to take on board professional issues:**  
corporate spirit, competitiveness and productivity, innovation, intellectual and industrial property, respect for quality procedures, security, health and safety
6. **Aptitude to work in an international context:**  
command of **one or more foreign languages**, **cultural** open-mindedness, **international experience**, business intelligence,
7. **Aptitude to put sustainable development principles into practice:**  
environment, economy, labour and corporate governance,
8. **Aptitude to consider and foster societal values:**  
endorsing social values, responsibility, ethics, health and safety,
9. **Capacity to follow through on their professional choices**  
and fit into a professional context.

## 2003 reform: 1st Phase

- 1st casptone project in 1985 (teamwork)
- 1994 & 1998: even more focus on team work, interpersonal skills, and project management:
  - development and entrepreneurship **quarter projects**
- **2003: an integrated curriculum with semester projects**
  - PBL, approx. 120 hours per student per semester, in teams





## But...

- **In 2003, we were faced with the problem of defining an internal exhaustive syllabus (LO) for all the curricula**
  - the spectrum covered by the generalist program is wide
  - newly graduated students from the *Grande Ecole* system tend to work under various job titles and sectors
  - some faculty tend to desperately rely on core disciplinary knowledge exclusively
  - after several iterations, it appeared that the level of granularity was not shared, the completeness was regularly controversial
  - endure debates on terminology, non convergence, disagreement, loss of energy, coherency and alignment of LO with existing program
- **An educational reform is a tricky strategic and engineering issue:**
  - complex management challenge, conflicting and restraining forces
  - public institutions where leadership is rather low
- **Finally done only for projects and formalize in 2006**



## Facing resistance to changes

- To be **continuously prepared for national or international formal accreditations:**
  - Telecom Bretagne has chosen in 2008 to use the **CDIO standards as a dynamic tool**
- We decided to take **CDIO standards one step at a time, at a slow pace:**
  - to support peace among educational managers, program developers and teaching staff,
  - industrial partners and students used as strong **change agents**



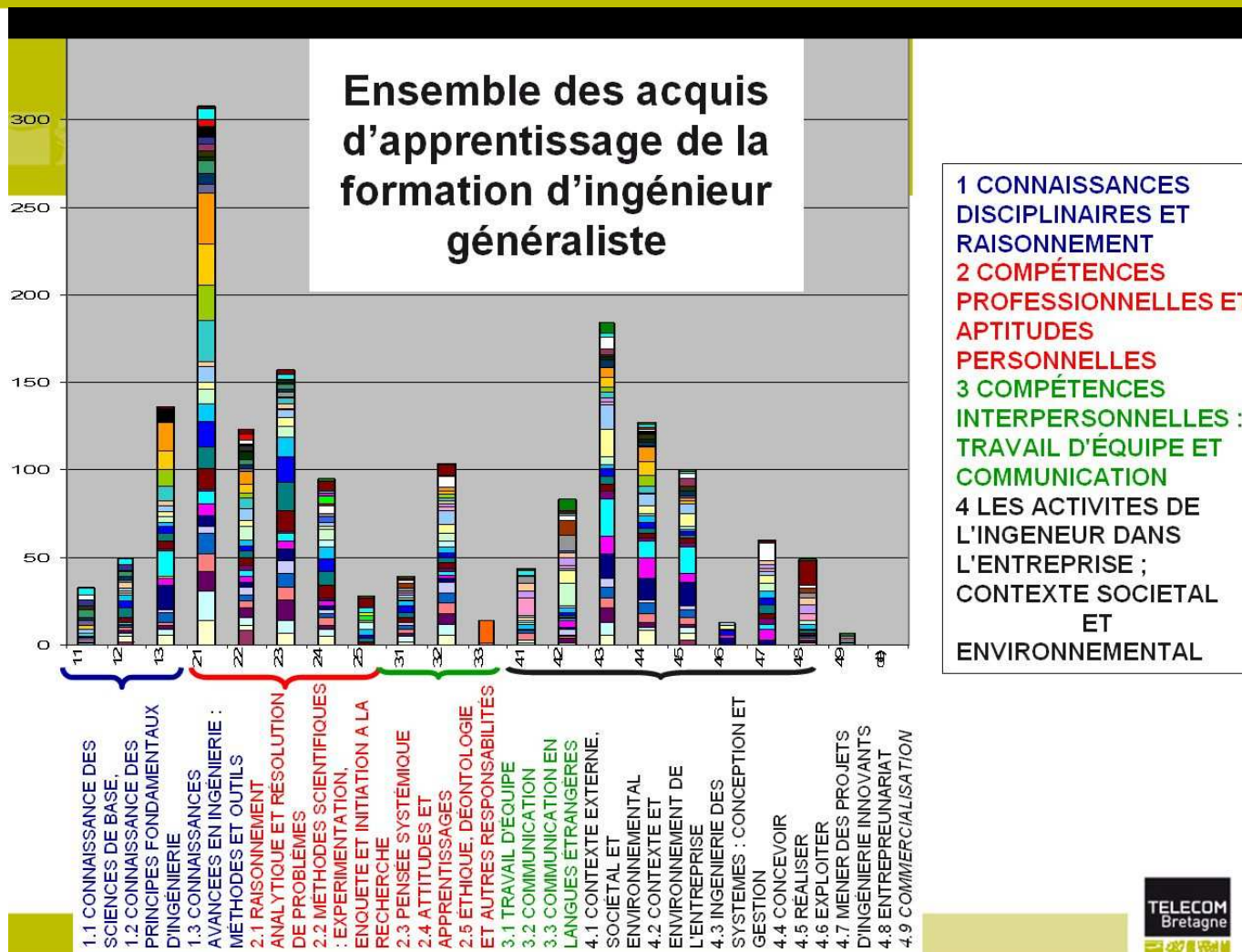


## Then 2<sup>nd</sup> phase (2008)

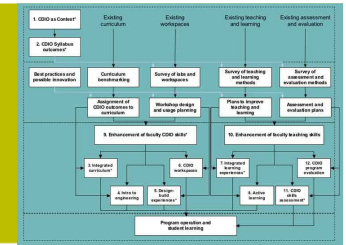
- For both programs, the CDIO standard #1 (CDIO as a context) has first been elected by the board of directors as a driver of our educational strategy
- The **CDIO syllabus standard #2 has been gently and progressively disclosed to key program designers and ultimately teaching members** (levels 2 & 3)
- Nevertheless, at the beginning, detailed **CDIO standards were not communicated to most of the teaching staff** considering the large scope and alarming complexity of the former



# Discussive quantitative LO photographies



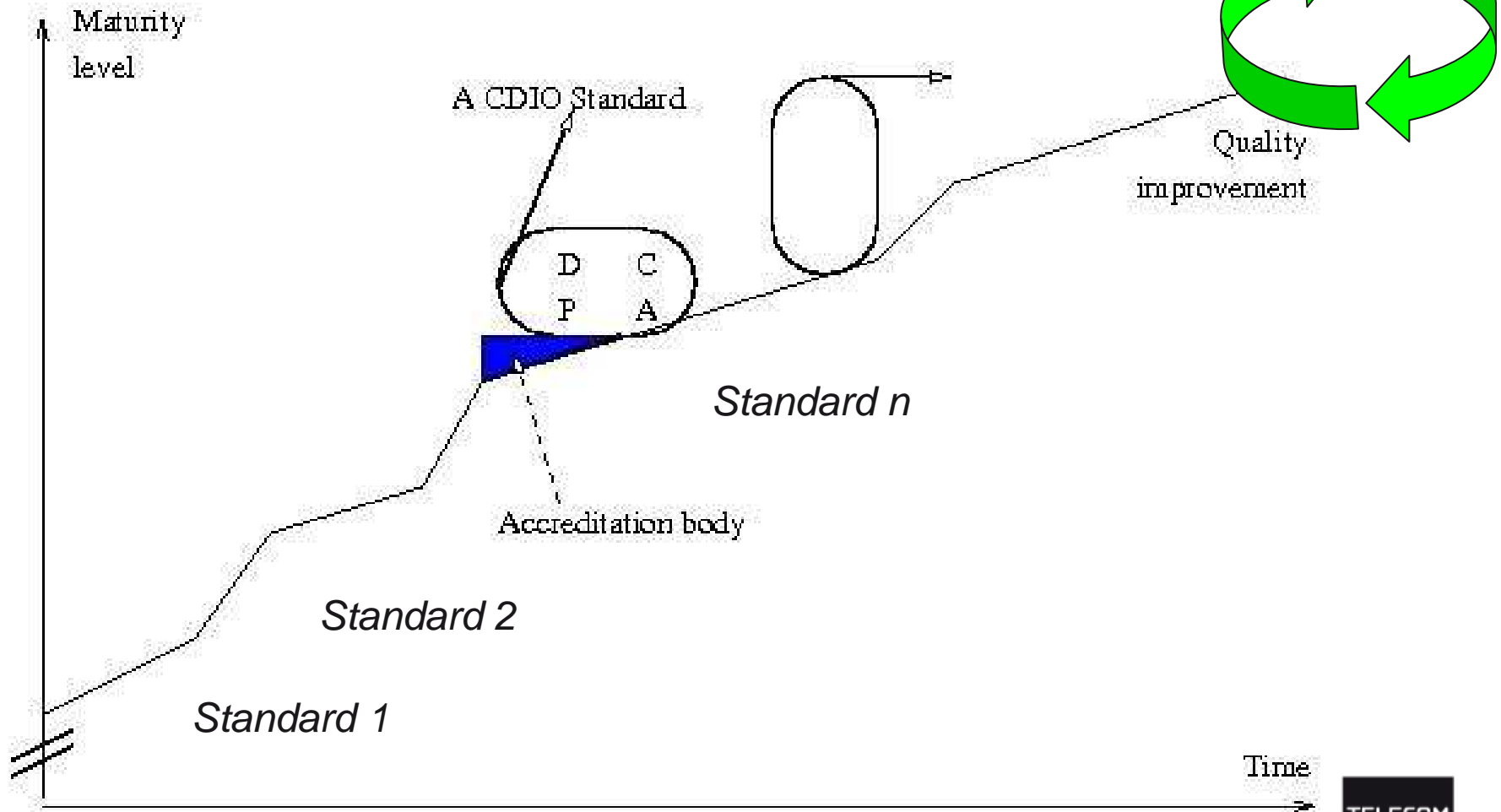
## Then 3rd phase (2010-)



- From that point, standards #3, 4, 5, 7 and 8 relating to educational contents and pedagogical methods were investigated for other courses (done for projects)
- Today, the focus is on standards #6, 9 and 10 (i.e. workspaces and faculty skills),
  - Approximately 15% of the teaching staff is confident with all the CDIO standards and details
  - 40% are aware on the broad lines, mainly standard #2
    - all stakeholders in the CDIO evaluation standard #12?
- Before further exploring standard #11 (i.e. skills assessment, proficiency matrixes)

# Conceptualization attempt

## ■ A first cascade cycle with a Deming Ellipse

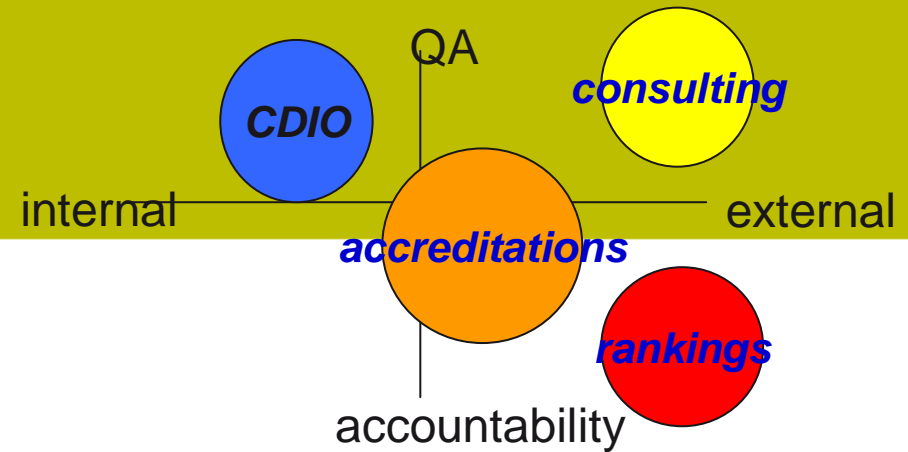




# Conclusion

- **Difficulties of educational system transformation and improvement:**
  - French faculty prefer to **navigate in a flexible manner**... keep the pace
  - there is a **comfort zone** of “business as usual in education”
    - keep energy for scientific research, contracts, and **quest of excellence for research evaluation of laboratories and individuals**
    - the **recognition of educational involvement** just starts, to date, to be also taken into account for the promotion of A/Professors to Professor status
  
- **CTI largely recognized by faculty (9 rubrics for outcomes)**
  
- **Harder to institutionalize the CDIO standards**
  - **progressive introduction** of some of the CDIO standards
  - **now prepare for a more agile model** for continuous improvement
    - managing several standards at a time

## Future directions



- **The peer voice: cross-evaluations with other HEIs as a complement to accreditations**
  - perhaps a better **acceptance** from teaching staff
- **The student voice: student-evaluations as a **strategic crowbar****
  - a semester project has been initiated in Spring 2012 (5 students, approx. 120h working time each)
  - to evaluate our generalist program thanks to the 12 CDIO standards
  - students do the audit