



CTC



Workshop - Systems, Product Development and Innovation

Undergraduate, Master's and Doctorate Students Involved
on Academic and Industrial Projects

Federal University of Santa Catarina
Technological Centre
Mechanical Engineering Department
Laboratory of Hydraulic and Pneumatic Systems

Prof. Victor Juliano De Negri
Santo André, November 13, 2015

- Founded in 1962
 - Built area: 16,000 m²
 - Expansion: 4,000 + 8,000 m²
- People (March 2014):
 - 69 full time faculty
 - 7 visiting faculty
 - 1,438 students (undergraduate and graduate)
- Research:
 - 25 Research Groups



Building B



Buildings A1 and A2



Building A3

- Undergraduate programs:

- Mechanical engineering (1962)



- Materials engineering (1999)



- Master's and Doctorate Programs:

- Mechanical Engineering (1969)



- Materials Science and Engineering (1994)

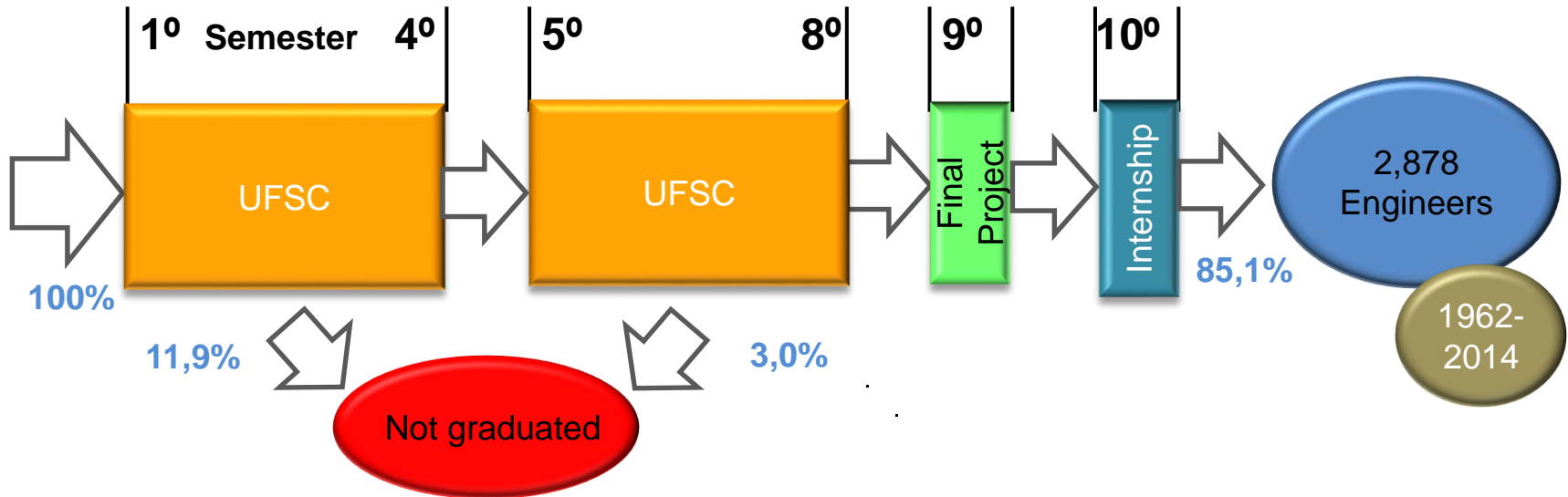


**INPetro –
SAPIENS Park**



Building C

- 5 years course (4,320 hours)



Internships:

~40 students/semester
30% abroad
90% in industry
70% in Brazil
90% in industry

Students:

Admission: 110 /year
Evasion: 14.9 % (~16/year)

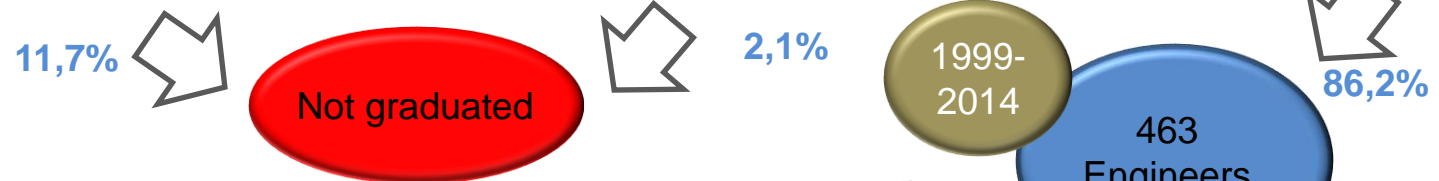
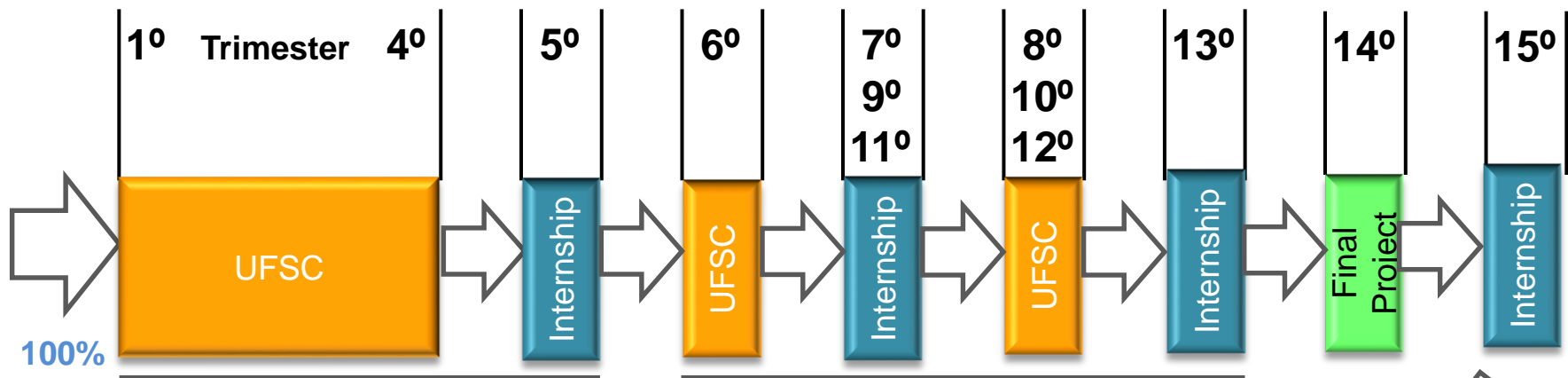
March 2014:

Registered: 596
Alumni: 2,878



Undergraduate Program in Materials Engineering

- 5-year course (4,202 hours)



Internships:

~95 students/year
60% abroad
30% in industry
30% in Brazil
90% in industry

Students:

Admission: 70 /year
Evasion: 13.8 % (~10/year)



March 2014:

Registered: 355
Alumni: 463

Following some CDIO Directives

- Standard 4 - Introduction to Engineering:
- 1st semester course: Introduction to engineering

- Standard 5 - Design-Build Experiences:
- 6th semester course: Integrated project in mechanical engineering
 - Academic problem
 - Design following the four design phases; requirement analysis; conceptual design; embodiment design; and detailed design

- Standard 6 - CDIO Workspaces:
- Hands-on courses:
 - 5th semester: Laboratory on mechanical properties
 - 5th semester: Laboratory on thermal sciences
 - 6th semester: Laboratory on manufacturing and metrology

ST&I Extra-Curricular Programs



Scientific & Technological
Training

Industrial and
Academic Projects

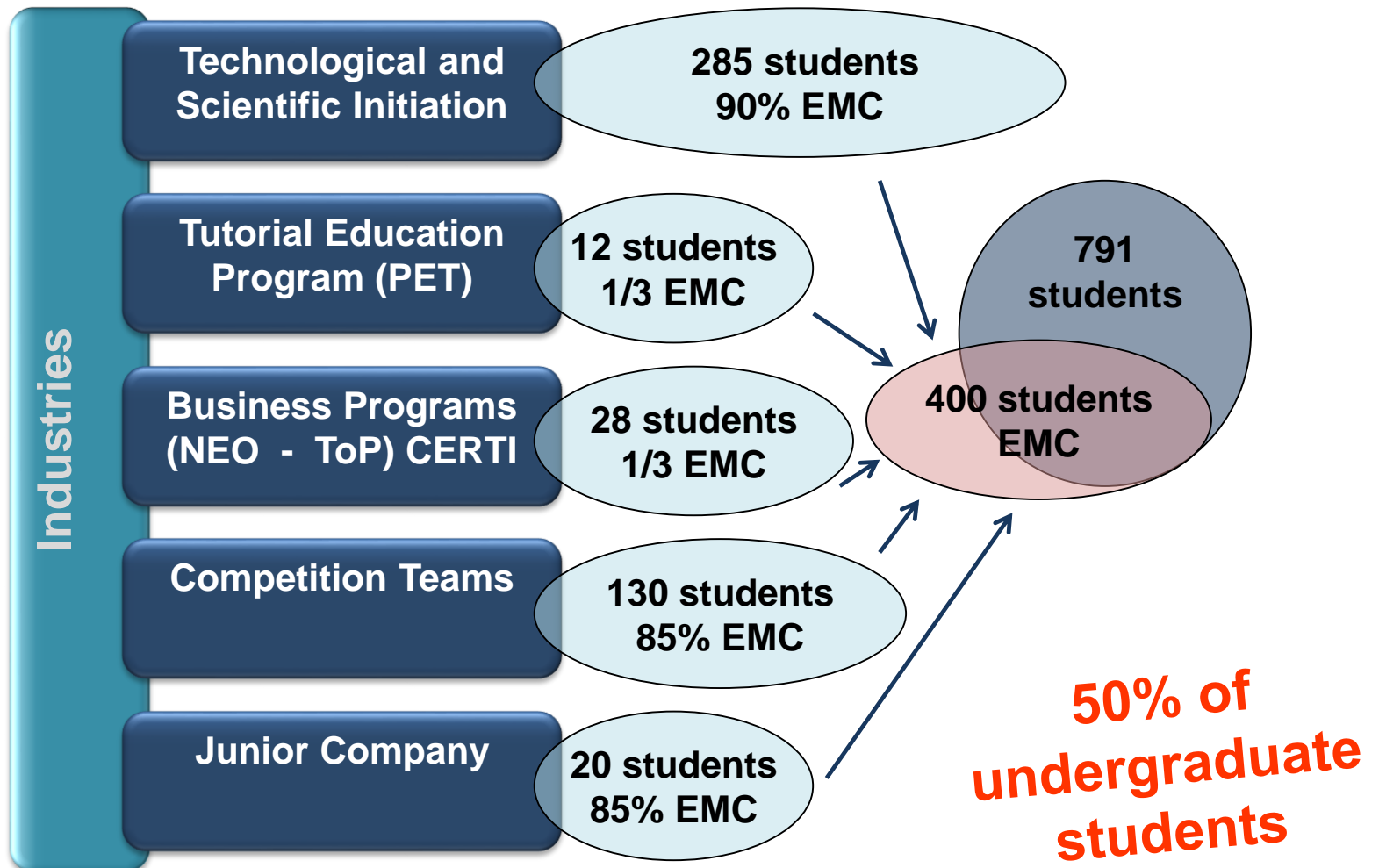
Competition Teams




15 horas	Alocadas em atividades técnicas de projetos ou gestão nos CRs/CRITs
3 horas	Projetos Institucionais
1 hora	Seminário / Palestra
1 hora	Reunião

Business Programs by CERTI

ST&I Extra-Curricular Programs



Curricular Activities

Final Term Project

- 20 hours/week – 3 or 4 months
- At the research groups/labs



Laboratórios de Pesquisa em Refrigeração e Termodinâmica
Research Laboratories for Emerging Technologies in Cooling and Thermofluidics



Laboratório de Robótica



GRANTE
Grupo de Análise e
Projeto Mecânico



Full time internships at Industry:

Mechanical Course:

- 1 internship of 5-6 months
- 30% abroad (Europe, USA), being 90% in industry
- 70% in Brazil, being 90% in industry

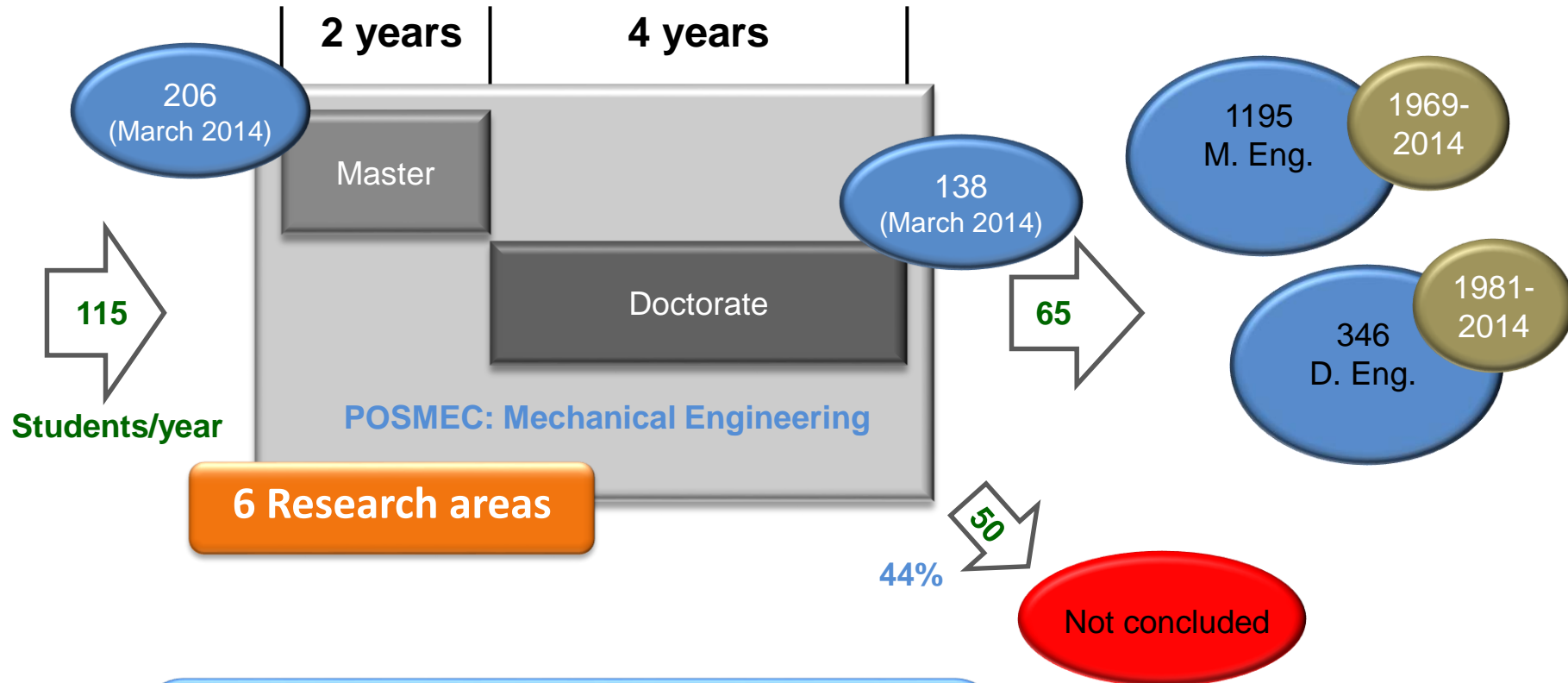
Materials Course:

- 6 internships of 3 months
- 60% abroad (Europe, USA), being 30% in industry
- 30% in Brazil, being 90% in industry



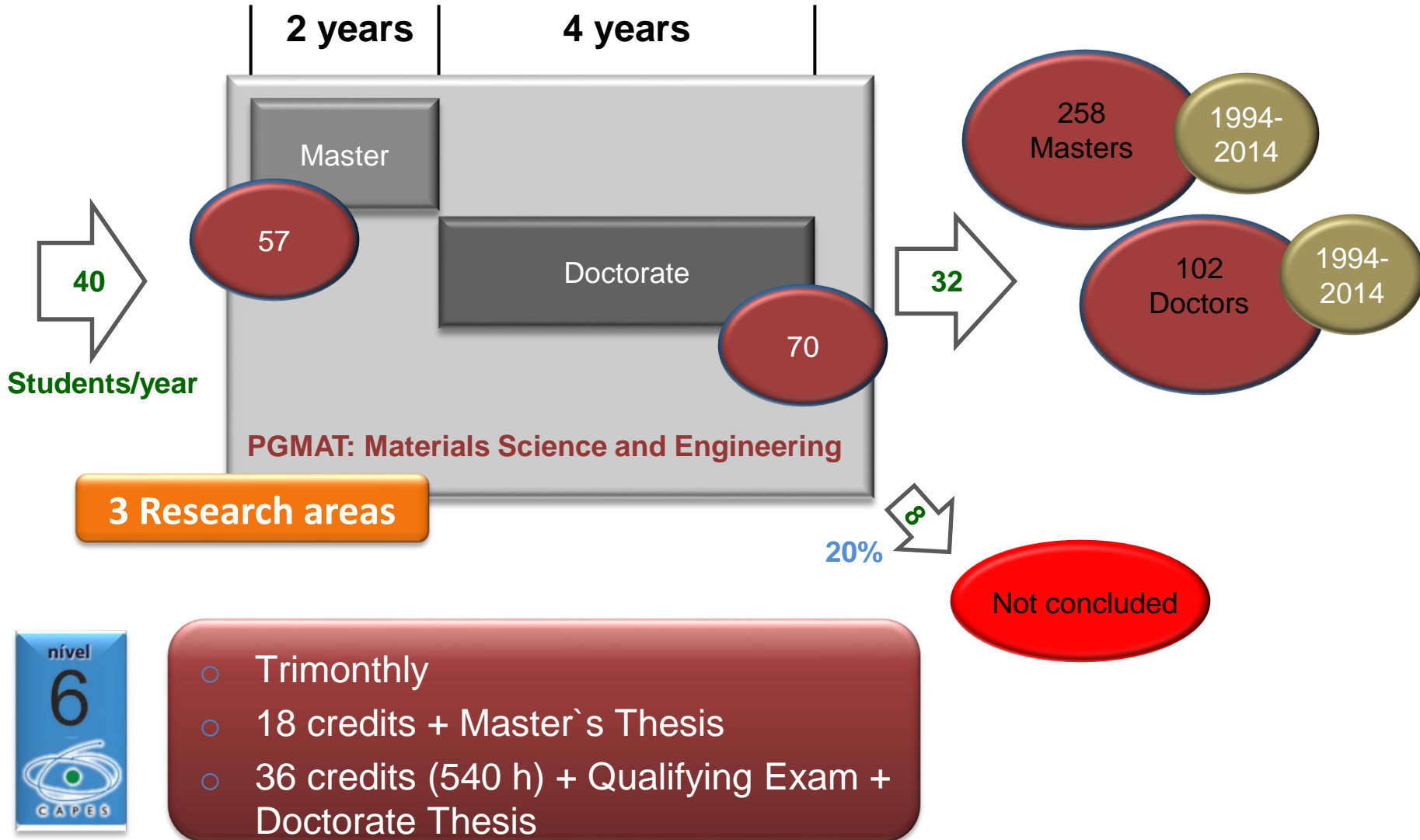
100% of students
170 students/year

Graduate Program in Mechanical Engineering

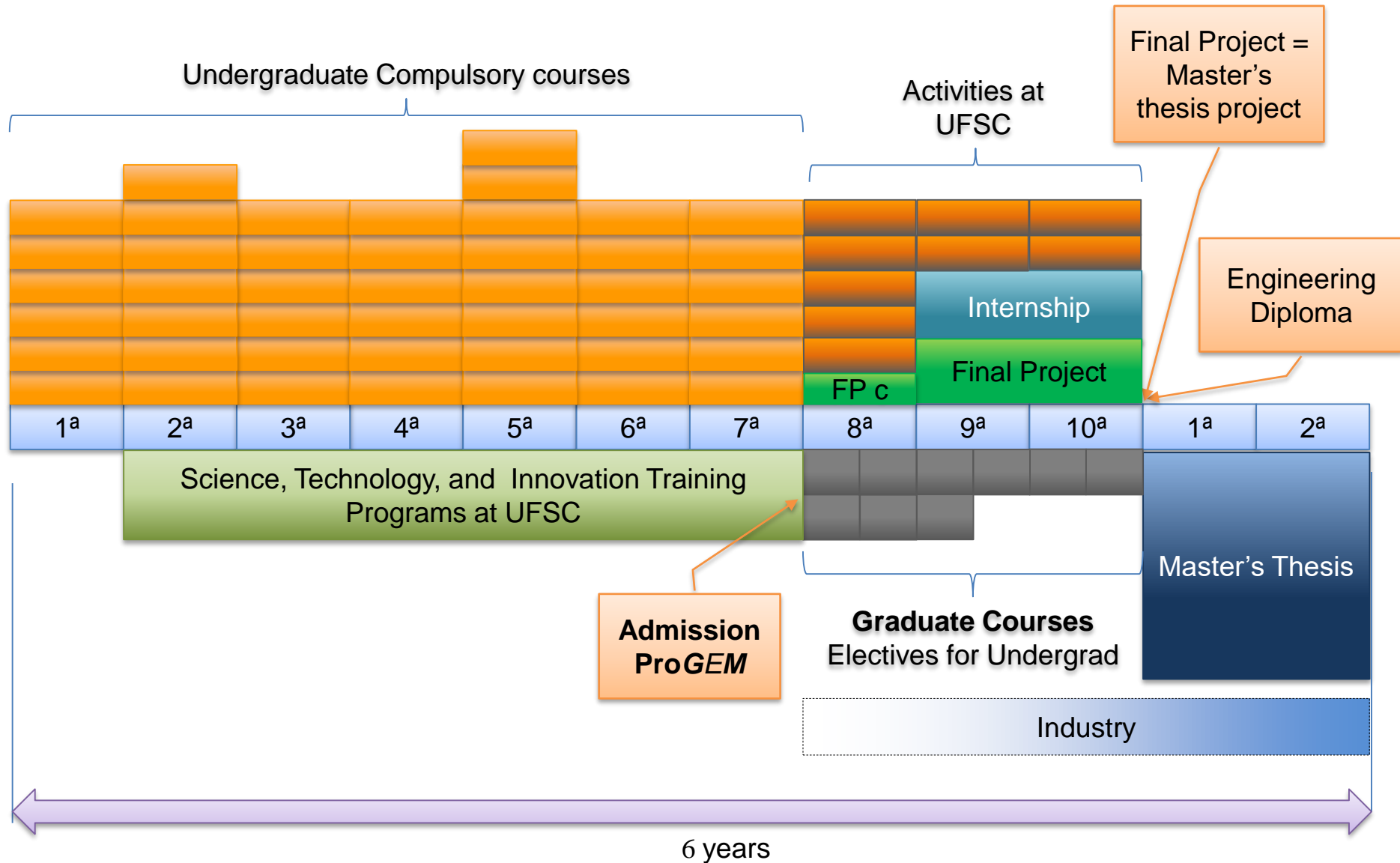


- Bimonthly (from 2014)
- Master's: 18 credits + Master's Thesis
- Doctorate: 36 credits + Qualifying Exam + Doctorate Thesis

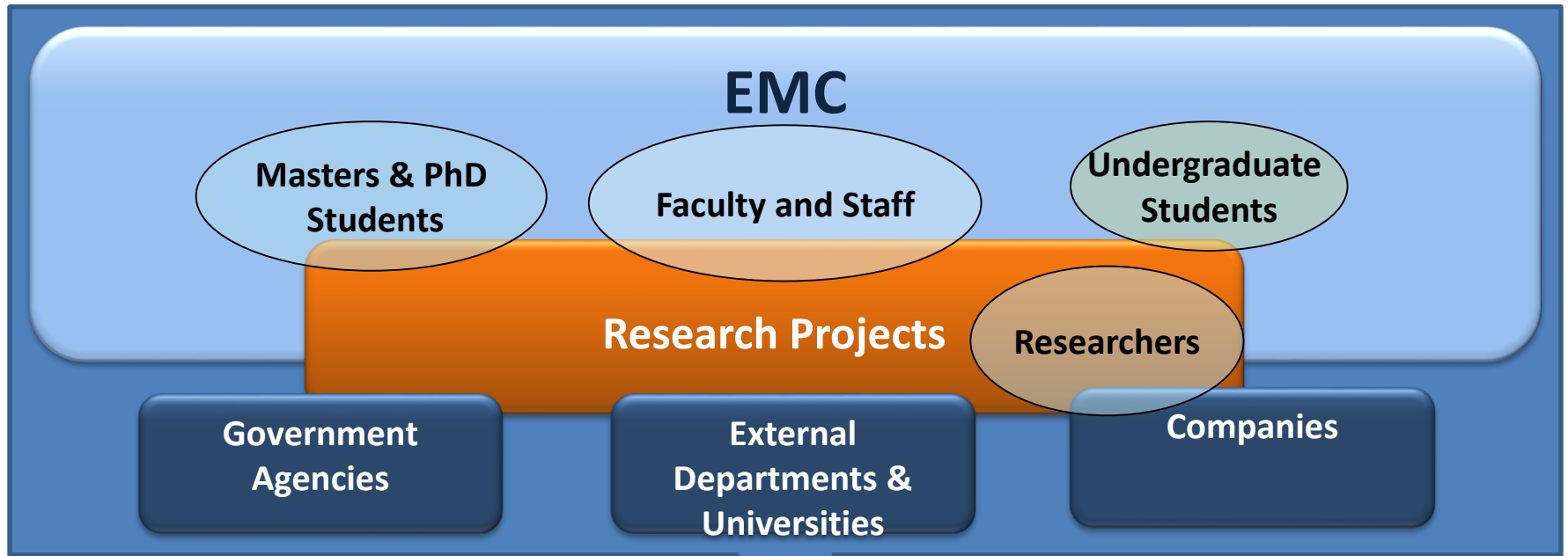
Graduate Program in Materials Engineering



Integrated Program in Undergraduate and Master in Mechanical Engineering (ProGEM)



Research as an Integrative Activity



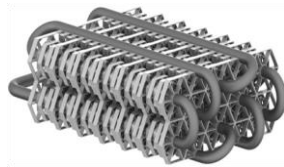
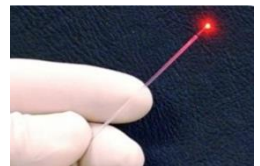
Prototypes,
Technologies

Publication

Patent,
Innovation

Technology-Based
Spin-offs

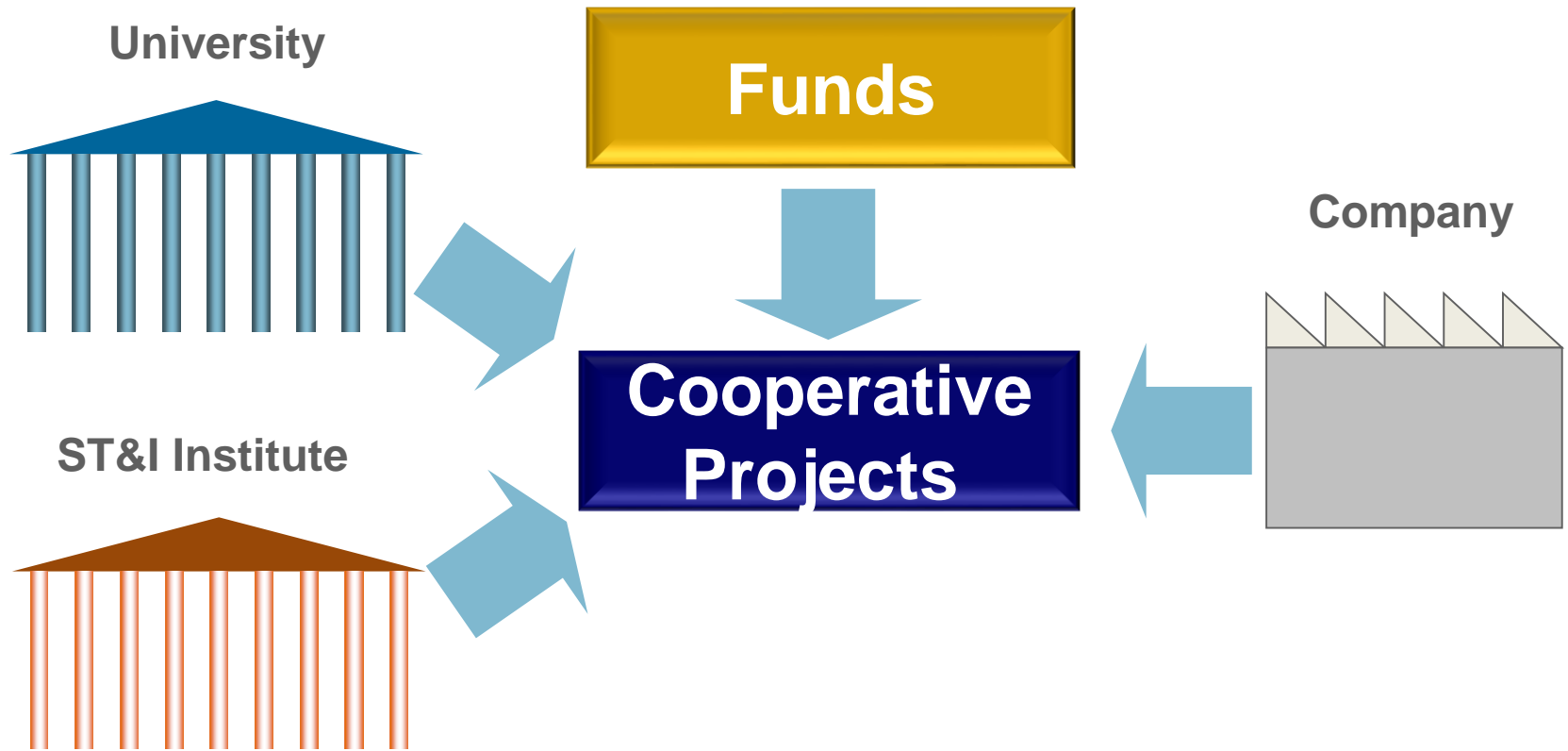
New frontiers



Engineers, Masters
& Doctors

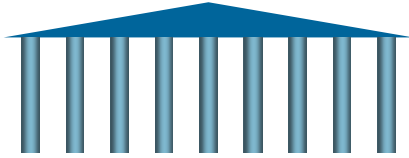


Interaction University/ST&I Institute - Company

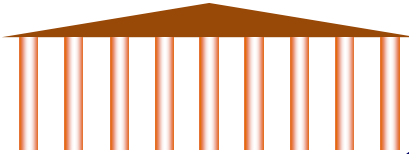


Interaction University/ST&I Institute - Company

University



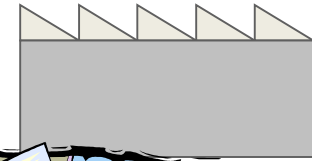
ST&I Institutes



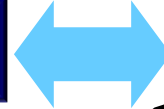
Funds



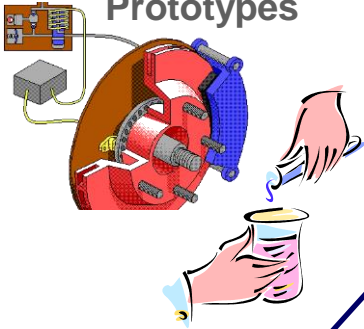
Company



Cooperative Projects



Prototypes



Royalties



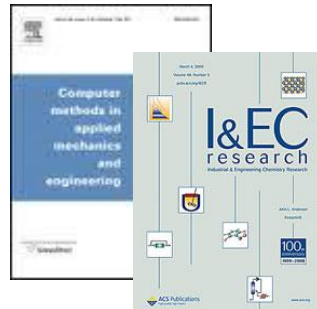
R&D Departments at
Companies



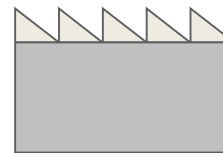
Patents



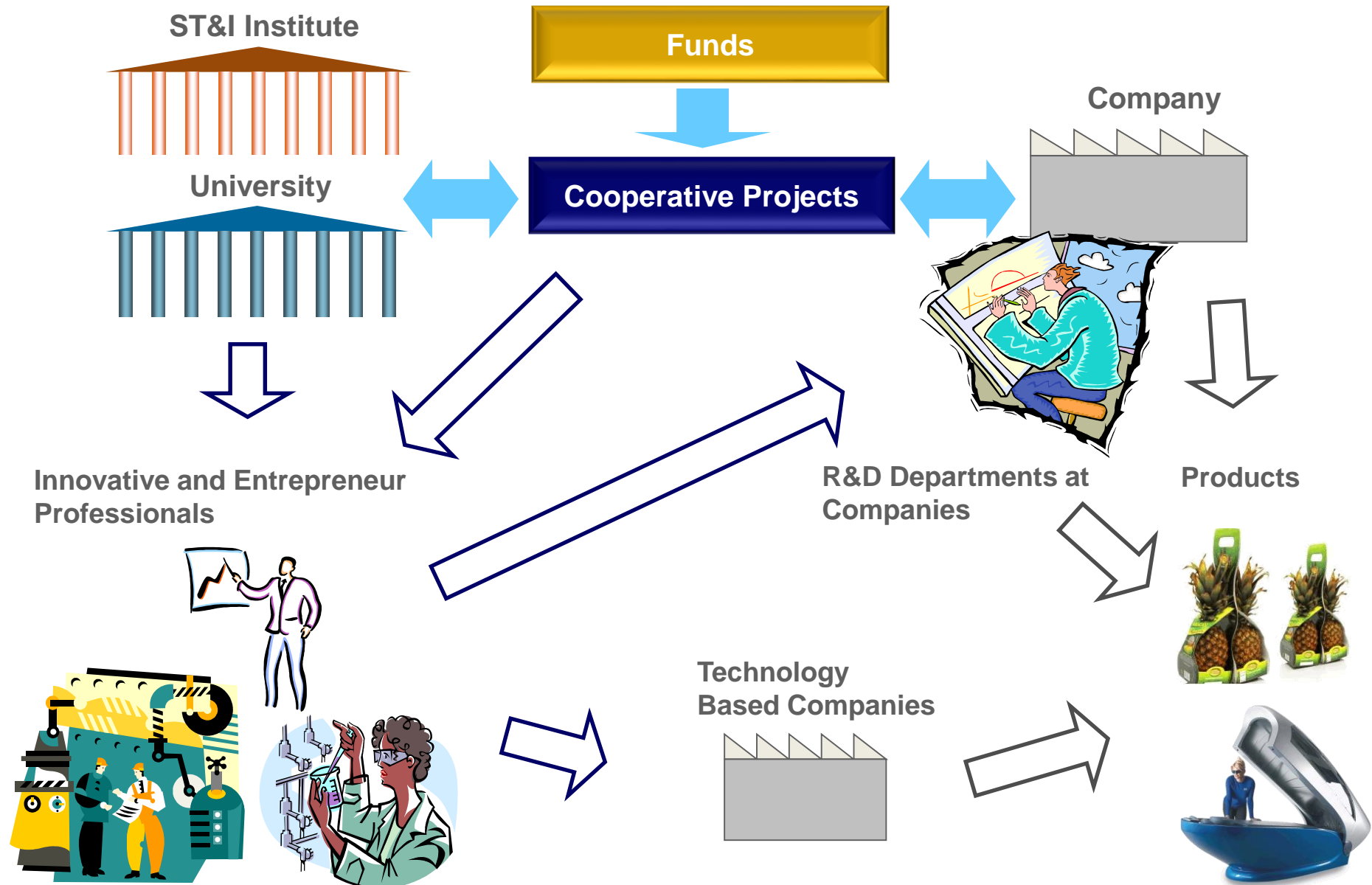
Publications



Technology Based
Companies



Interaction University/ST&I Institute - Company



University – Industry Relationship

- University – industry relationship should start with small projects:
 - The research group learns about the industry necessities
 - The engineering group understands the potential contributions from the university
 - The difference between engineering services and technological research can be understood.

- Projects with industry provide several benefits:
 - Motivate university to research on themes of interest of the society
 - Stimulate to identify new research frontiers
 - Undergraduate and graduate students involved with actual necessities
 - Financial resources: RH payment; equipment; infrastructure
 - Non-financial resources: Components; services
 - Patents: Industrial property and royalties: *It should not be the main focus!*

University – Industry Relationship

- Students with early engagement with industry:
 - Internships in integral time
 - Technology and innovation programs at university with industry participation
 - Collaborative engineering programs

- Professionals :
 - **Engineers:** Solid and general formation in a engineering area.
 - **Master of Eng.:** Specialization on a specific field: Differential on the Brazilian industry
 - **Doctor of Eng.:**
 - Industry R&D departments: rare opportunities!
 - ST&I centers; Universities: The main target!



CTC



**FEDERAL UNIVERSITY OF SANTA CATARINA
TECHNOLOGICAL CENTRE**

**MECHANICAL ENGINEERING
DEPARTMENT**



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