Supélec

Information, Energy and Systems

www.supelec.fr

Supélec

Rennes

Metz

Gif-sur-Yvette

- Created 1894
- One institution, three Campuses
  - Awarding the same degrees
- Private status / public body
  - Agreement with the French State
- Aims
  - Education:
    - Engineers (in the French meaning), Masters, Ph.D.
    - Continuing education
  - Research, closely linked to industry

Key Facts and Figures (2013)

▸ **Graduate studies**
  - ▸ 2220   students (including PhD candidates)
  - ▸ 460   engineering degrees
  - ▸ 110   master degrees
  - ▸ 265   PhD candidates
  - ▸ 72   PhDs conferred

  - ▸ 140   full-time faculty
  - ▸ 713   part-time teachers

▸ **Executive education**
  - ▸ 170   training programs
  - ▸ 6   Executive Master programs
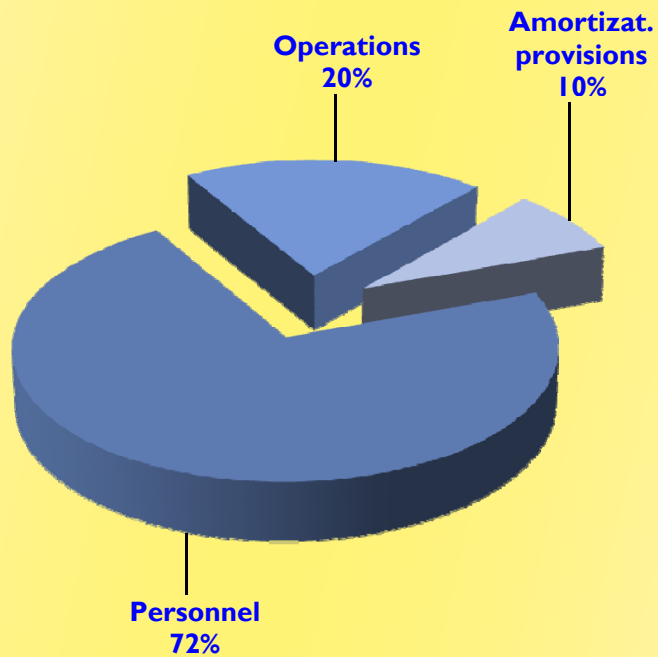
Key Facts and Figures (2013)

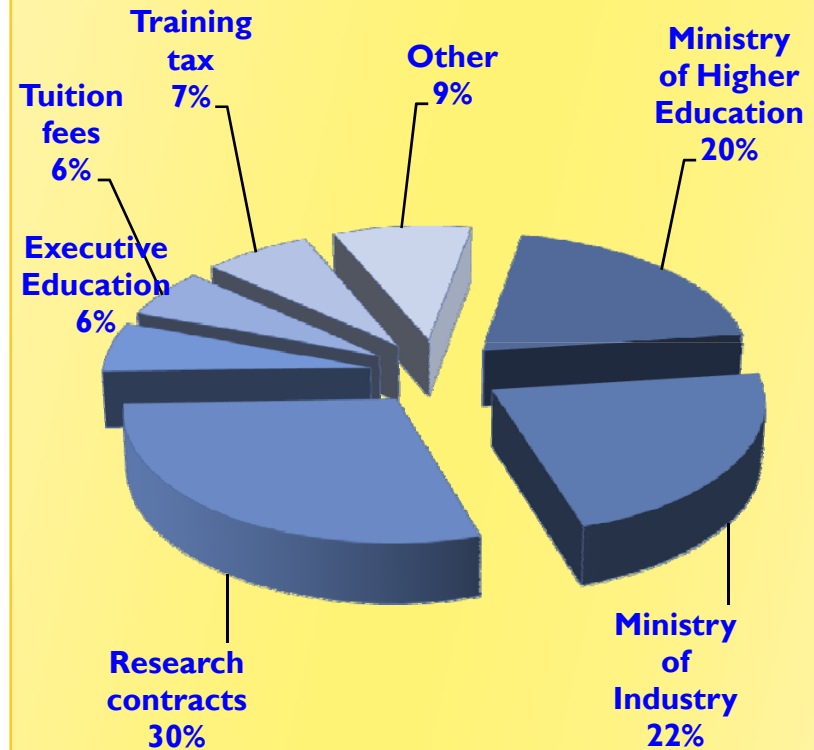▶ Research

   ▶ 7   laboratories and research units

   ▶ 5   common laboratories

   ▶ 140   full-time Supélec faculty

   ▶ 88   university or CNRS researchers

   ▶ 922   major publications or conference papers

   ▶ 16   patents

   ▶ 121   partner companies and institutions

   ▶ 11.5 M€   research funding (incl. 9.5 M€ research contracts)
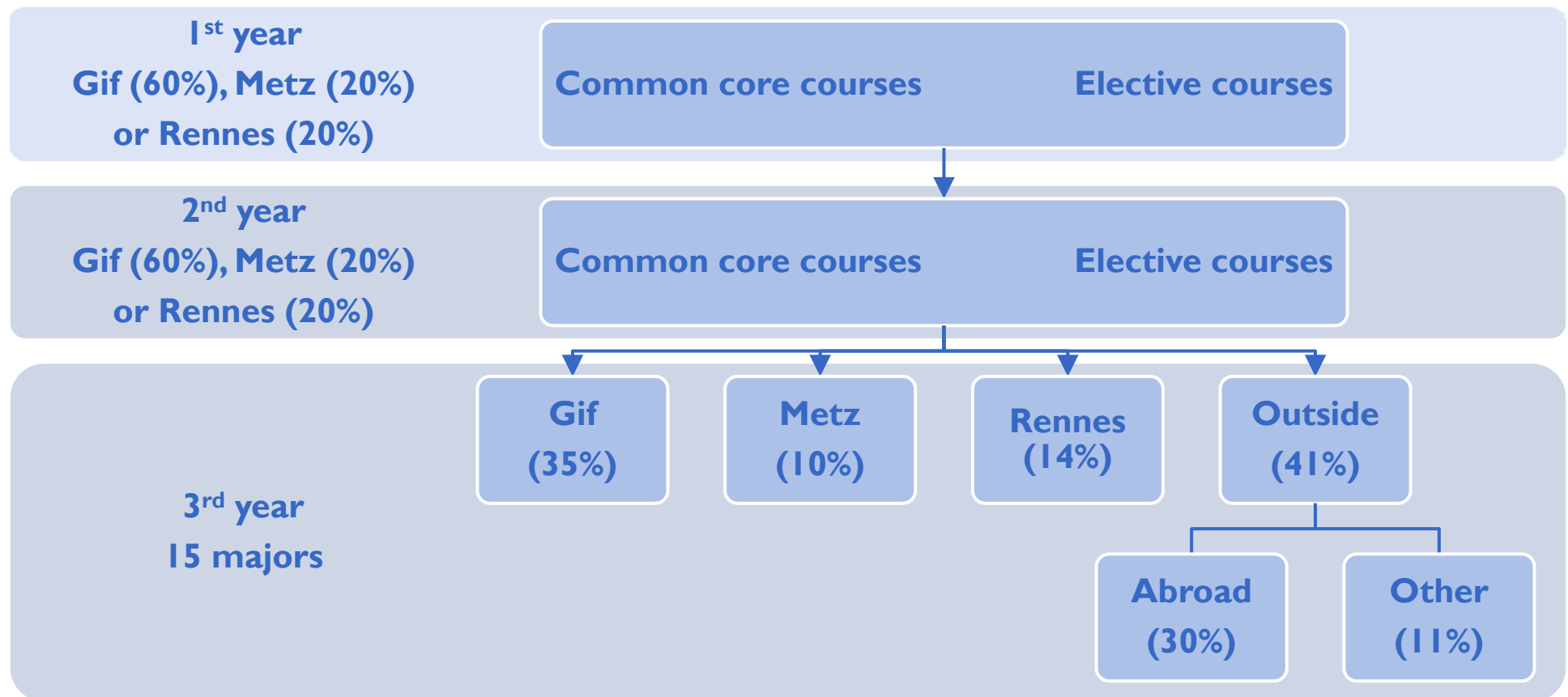
Budget (2013): 41.3 M€

Expenditures

- Operations 20%
- Amortizat. provisions 10%
- Personnel 72%

Revenues

- Tuition fees 6%
- Training tax 7%
- Other 9%
- Ministry of Higher Education 20%
- Executive Education 6%
- Research contracts 30%
- Ministry of Industry 22%

Industrial partners

- ✓ **ACCENTURE**
- ✓ **ALCATEL-LUCENT**
- ✓ **ALSTOM**
- ✓ **ALTRAN**
- ✓ **AMADEUS**
- ✓ **AREVA**
- ✓ **ATEME**
- ✓ **ATOS**
- ✓ **BNP PARIBAS**
- ✓ **BOUYGUES TELECOM**
- ✓ **BULL**
- ✓ **CAP GEMINI**
- ✓ **CEGELEC**
- ✓ **EADS**
- ✓ **EDF**
- ✓ **ERDF**
- ✓ **GDF-SUEZ**
- ✓ **HEWLETT-PACKARD**
- ✓ **IBM**
- ✓ **LCL**

- ✓ **MAZARS**
- ✓ **MICHELIN**
- ✓ **MOTOROLA**
- ✓ **MUREX**
- ✓ **NEXANS**
- ✓ **ORANGE**
- ✓ **PSA PEUGEOT CITROEN**
- ✓ **RENAULT**
- ✓ **RTE**
- ✓ **SAFRAN**
- ✓ **SCHLUMBERGER**
- ✓ **SCHNEIDER**
- ✓ **SIEMENS**
- ✓ **SNCF**
- ✓ **SOCIETE GENERALE**
- ✓ **SOLUCOM**
- ✓ **SPIE**
- ✓ **ST Microelectronics**
- ✓ **THALES**
- ✓ **VALEO**
- ✓ **WEAVE**

Supélec's Foundation

- **Founder companies:**
  - ABB, EDF, France Telecom, RTE, Schlumberger, Schneider Electric

- **Granted activities**
  - Visiting professors, sabbatical terms…
  - Student scholarships (Post-doctorate, PhD, Masters…)
  - Research Projects:
    - As a general trend: *mastering factors of complexity of systems.*
    - Ongoing projects:
      - *uncertain environment (design, control, production…)*
      - *hybrid systems and advanced control*
      - *optimization of large power systems in an open-market environment (joint technical and economic optimization)*

A Flexible and Open Curriculum

1st year
Gif (60%), Metz (20%)
or Rennes (20%)

| Common core courses | Elective courses |

2nd year
Gif (60%), Metz (20%)
or Rennes (20%)

| Common core courses | Elective courses |

3rd year
15 majors

Gif (35%) — **Metz (10%)** — **Rennes (14%)** — **Outside (41%)**

Abroad (30%) — **Other (11%)**

Syllabus of the First Two Years
(Common core courses - 24 hours of lectures+tutorials)

▸ **Mathematics and Physics** (6 courses)

▸ **Electronics and Electrical Engineering** (8 courses)

▸ **Computer Science** (5 courses)

▸ **Signal - Systems - Control** (5 courses)

▸ **Professional Knowledge** (4 courses)

Courses of the common core for the 1st and 2nd year are now available in English

Syllabus of the First Two Years

- ## Laboratory Work
  - 7 subjects in first year and 6 in second year, a total of 216 hours are connected with common core courses.
- ## Project Work
  - 3 Projects are organised, one in software development and the others in electronics, automatic control, power electronics and systems, signal processing or radio-communications. Students work in small groups to get used to team work.
- ## Foreign languages
  - at least 3 hours per week, a minimum of 168 hours over the two years. (Arabic, Chinese, English, German, Hebrew, Italian, Japanese, Portuguese, Spanish, Russian, French as a foreign language).
- ## Industrial internship
  - as a worker (at least 1 month) at the end of first year
  - as a technician (at least 2 months) at the end of second year.

Third Year Programmes (majors)

- Automatics
  - Systems & Controls
  - Control & Systems Engineering
- Power Engineering
  - Energy Conversion
  - Power Systems
  - Energy
- Computer Science
  - Interactive Systems and Robotics
  - Computer Science : Secure Information Systems
  - Computer Science & Software Engineering

- Communications
  - Telecommunications Engineering
  - Electromagnetics and Communications
  - Photonics
- Electronics and Signal Processing
  - Electronic Systems, Networks and Images
 - Applied Mathematics for Signal and Information Processing
  - Micro & Nano Electronics

Master's programs

- **Control Systems, Signal and Image Processing (ATSI)**
- **Components and Antennas for Telecommunications (CAT)**
- **Systems Design and Technologies (CTS)**
- **Complex Computer Systems Design and Management (COMASIC)**
- **Electrification & Powertrain (EPA)**
- **Networks Industry and Digital Economye (IREN)**
- **Mechanics and Aerospace (MAS)**
- **Mathématics (MATH)**
- **Computer Sciencee (MRI)**
- **i-Micro-technologies, Architectures, Networks and Communication Systems (i-MARS)**
- **NanoSciences (NS)**
- **Energy Physics and Engineering (PIE)**
- **Physics, Plasmas, Photoncs (P3)**
- **Signal, Image, Embedded Systems, Automatics (SISEA)**
- **Advanced Wireless Communication Systems (SAR) (taught in English)**

- **International Master Nuclear Energy (taught in English)**

Extracurricular activities
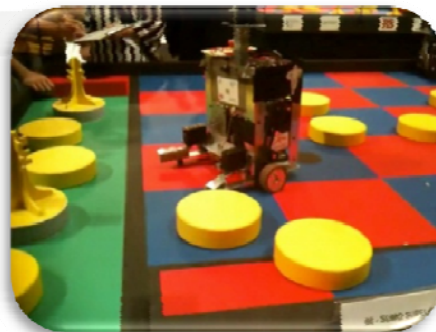
Supélec

International - Facts and Figures

- More than 80 partnerships in over 30 countries
- Networks memberships
  - T.I.M.E.
  - CESAER
  - n+i
  - Erasmus
- Students flows
  - Supélec Students Abroad   169 starting
                                                                357 studying
  - International Students at Supélec (incl. PhD candidates)   460 (22 %)
  - 50 nationalities represented
  - Double degrees awarded   178
  - Non-Degree Exchanges   29

- Industrial Internship abroad in 1st, 2nd or 3rd year : ≈ 150 students
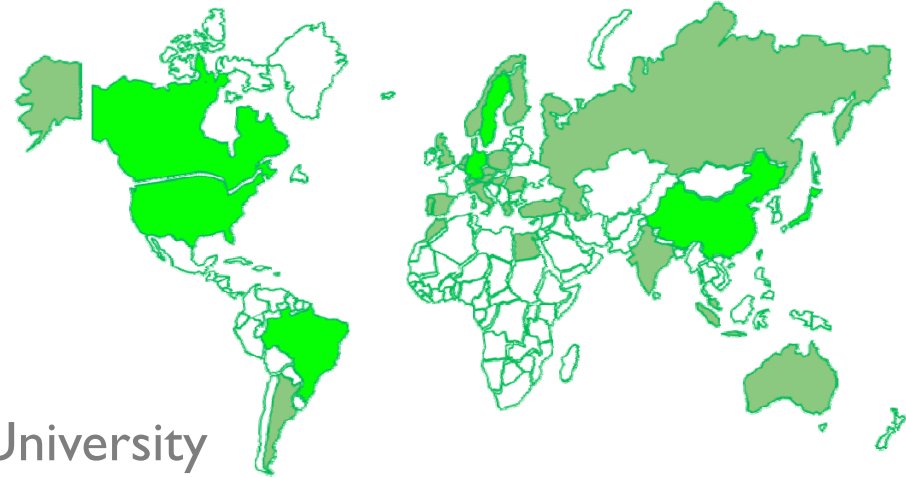
Strategic Partners / Countries

- **Europe**
  - Sweden – KTH
  - Germany – TU Munich
  - Italy – Politecnico di Milano
- **Americas**
  - USA – Georgia Tech, Columbia University
  - Canada – Ecole Polytechnique de Montréal
 - Brazil – USP, Unicamp, UFRJ
- **Asia**
  - Singapore – NUS
  - China – Beihang, Tsinghua, Xi'an Jiaotong,
  - Japan – Keio University
  - Taiwan – National Taiwan University

Supélec's research features

▸ **Information technology, energy and systems as a core domain**

▸ **Systematic thinking for cross-domain applications**

▸ **Special features of research**

  ▸ Academic research and industrial applications are jointly conducted

  ▸ Research and education are closely linked

"Science/industry feed-forward"
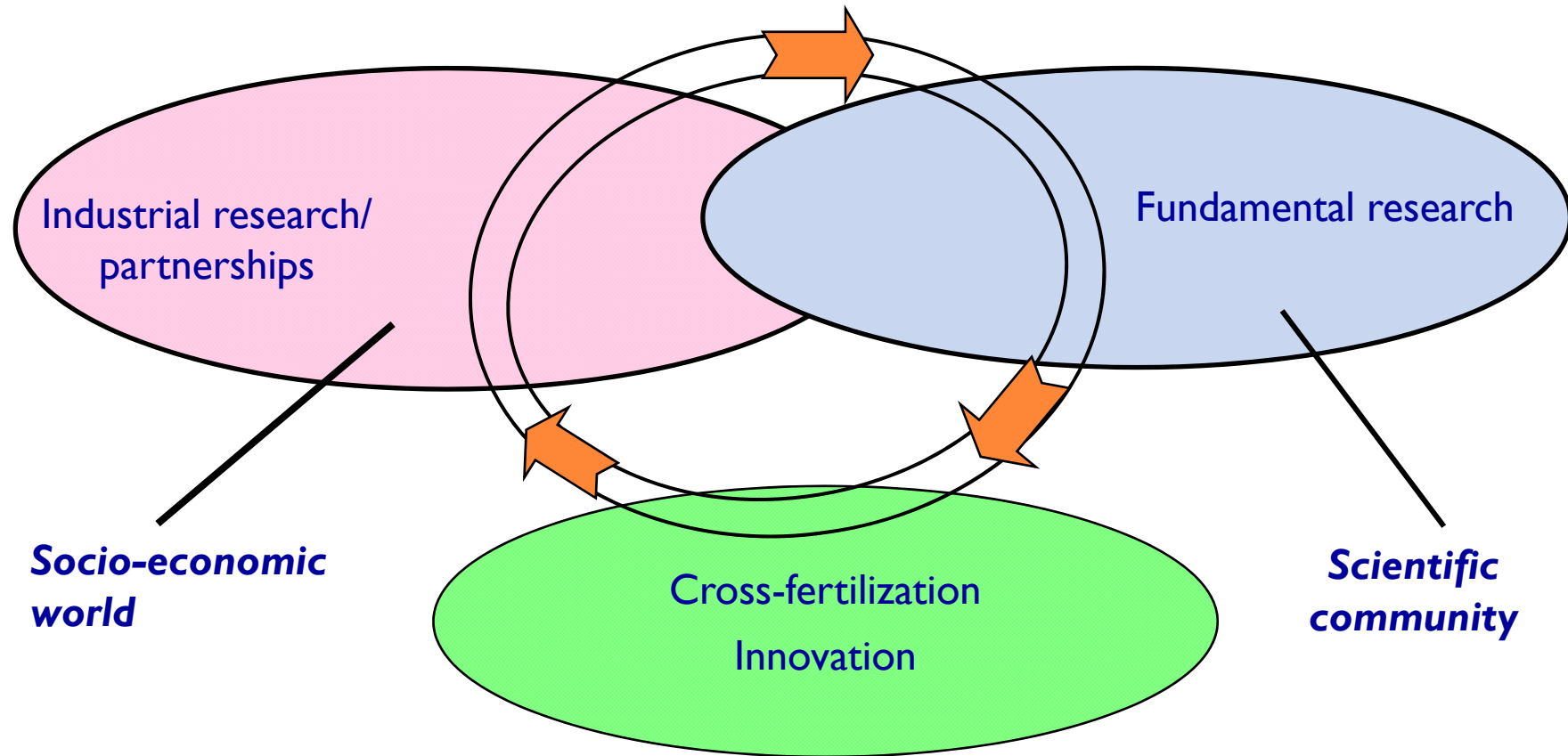
Main research areas

- Control and Systems

- Electrical Power Engineering

- Electromagnetism and Waves

- Signals & Statistics

- Telecommunications

- Microelectronics and Photonics

- Computer Science and Networks

Joint Laboratories

▶ **Gif Campus**

  ▶ Laboratory of Signals and Systems (45 researchers, 50 Ph.D. candidates)

    L2S: CNRS, Supélec, University Paris 11

  ▶ Paris Laboratory of Electrical Engineering (32 researchers, 30 Ph.D. candidates)
    LGEP: CNRS, Supélec, University Paris 11, University Paris 6

  ▶ SONDRA (Supélec / National University Singapore)
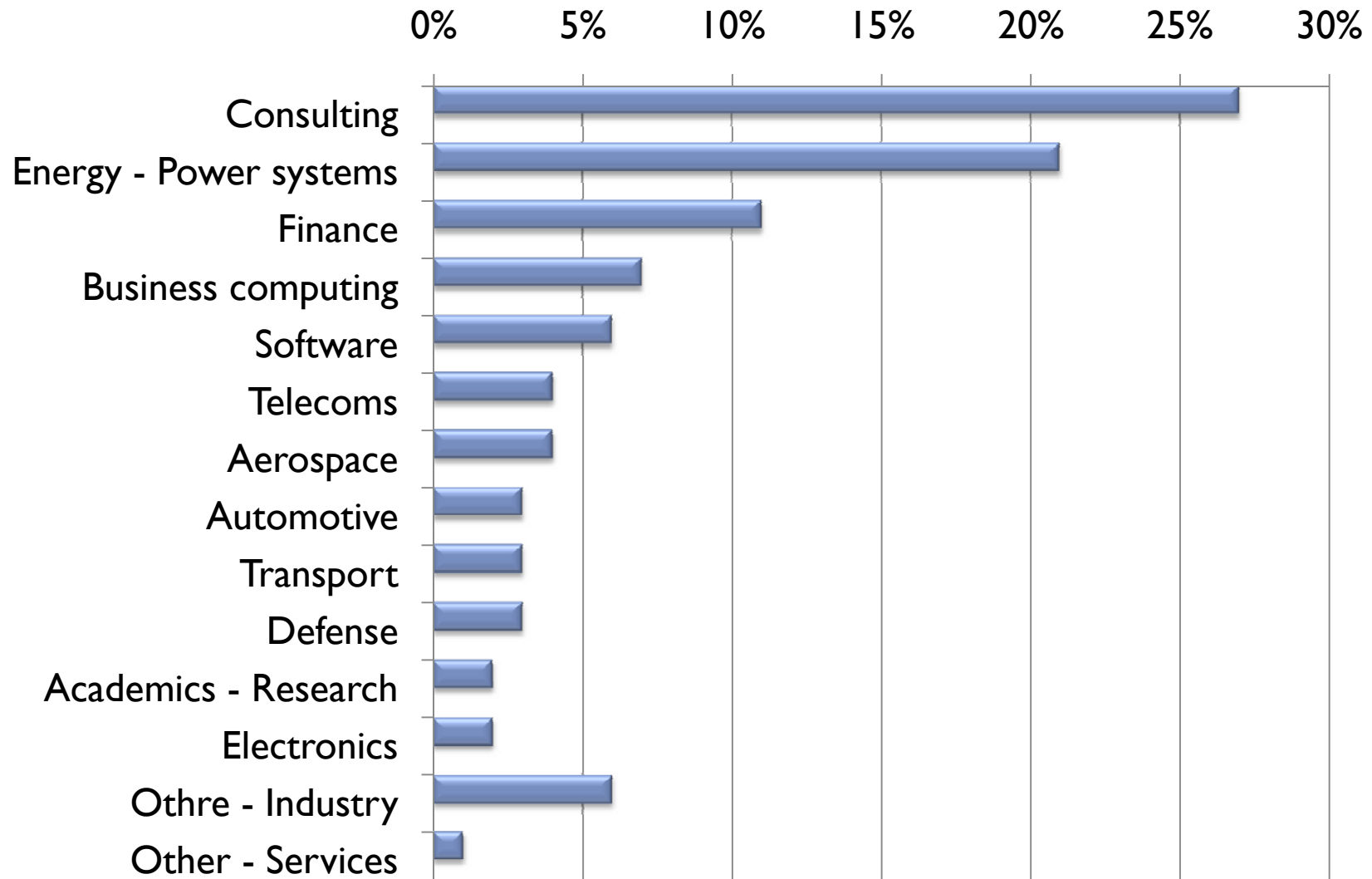
▶ **Metz Campus**

  ▶ UMI : a common CNRS research unit between Georgia Tech and Supélec. Two focus areas:

    ▶ Photonics

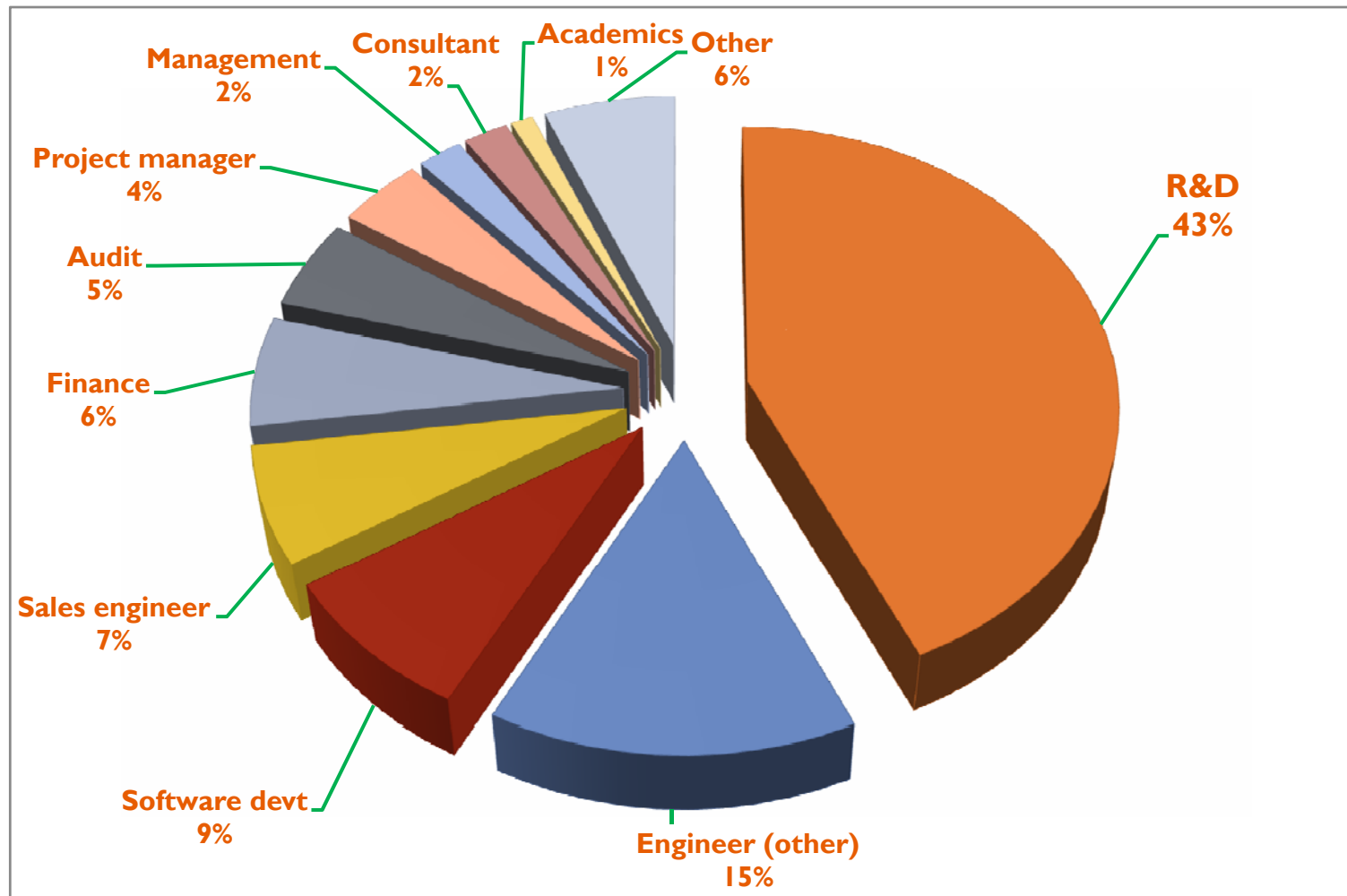   ▶ Cognitive Robotics

▶ **Rennes Campus**

  ▶ Rennes Institute of Electronics and Telecommunications

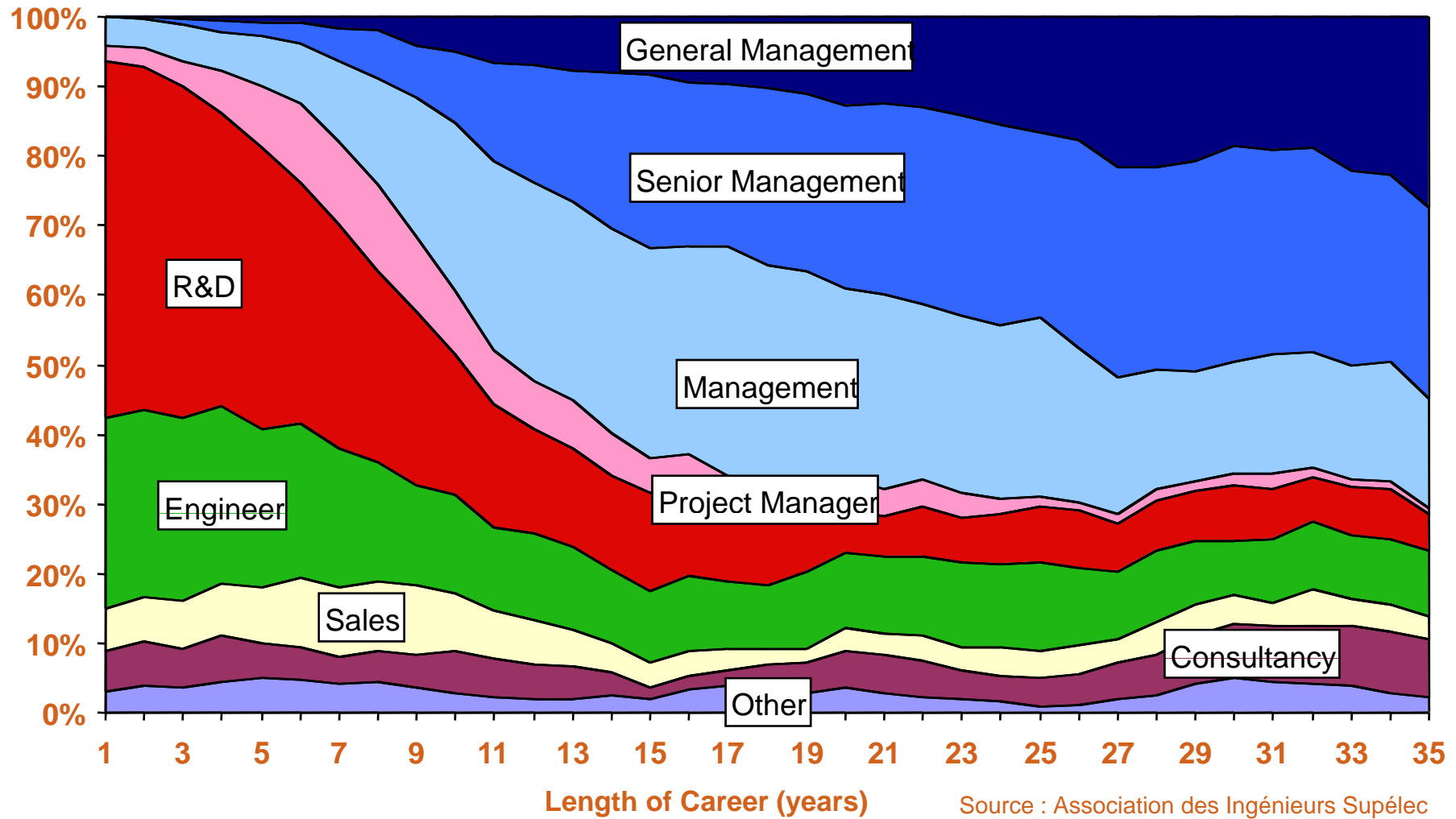   IETR : CNRS, INSA, University RENNES 1, Supélec

Post Supélec

First job : Sectors of Industry

First job : Fields of Activity

Subsequent career development

General Management

Senior Management

R&D

Management

Engineer

Project Manager

Sales

Consultancy

Other

100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%

1   3   5   7   9   11   13   15   17   19   21   23   25   27   29   31   33   35

Length of Career (years)

Source : Association des Ingénieurs Supélec

Ongoing projects

▶ **Centrale Paris - Supélec Alliance : two top French Engineering Schools merging**

　▶ Education : common majors & joint agreements with business schools

　▶ Research: Centrale-Supélec Joint Venture in Research related to C3S

　▶ Continuing education and validation of professional experience

　▶ International strategy

　▶ Top management staff sharing

　▶ To be finalized 2014

　▶ Centrale Paris will be moving to Gif-sur-Yvette in 2017

▶ **Université Paris-Saclay**

Main research topics (2)

- **Telecommunications:** digital communications (MIMO systems, multiple access…), access networks (UWB…), mobile communications (4G), signal processing for communications and multimedia (equalization, channel estimation, joint source and channel coding, watermarking…), software and cognitive radio…

- **Microelectronics and Photonics:** architectures of mixed-signal integrated circuits and microsystems (analog to digital conversion of HF signals, band pass sigma-delta converters, microsystems, resonant MEMS), algorithm integration, thin-film semiconductors , superconducting thin films and devices , analysis, modeling and simulation of laser diodes, optical interconnects, optical materials for laser beam generation and processing…

- **Electromagnetism and Waves**: near-field techniques (characterization of base station antennas), electromagnetic compatibility, inverse wawe problems, microwave sensors and probes, electromagnetic dosimetry, electromagnetism of complex media (applied to microwave devices), electromagnetism and radars…

- **Signals and Statistics**: modeling and analysis (multi-step prediction, time-frequency methods, space-time processing), indirect measurement (optimal modeling, statistical characterization), non-uniform sampling, inverse problems, compression of image and sound, digitization systems…

- **Computer Science and Networks:** networks and information systems securty (intrusion detection systems, mobile networks security…), design of heterogeneous systems, formal proofs…), semantic web (adaptive hypermedia, handling of ontologies), parallel and distributed intelligent systems, Cognitive Robotics …

Main research topics (3)

▸ **Control and Systems**: robust multivariable control, predictive control (non-linear, hybrid systems), hybrids systems (modeling and control), non-linear control of hybrid systems…

▸ **Electrical Power Engineering**: power networks, optimization of power systems in an open-market environment, power electronics, electrical machines and drive, energy conversion, modeling of electromagnetic systems, electrical contacts, electrical discharges…

Gif Campus