# Enhancing Industry-Academic Collaboration through Development of Science Parks

Kathleen A. Denis, PhD, CLP, RTTP
Associate Vice President
The Rockefeller University

# Science Parks – Next Generation

- Science Park – proper space for technology development
- Incubator – space and equipment
- Accelerator – space, equipment, management and money

# Overview: Accelerator

- Mission:
  **Efficient** and **disciplined**
  - Identification
  - Evaluation
  - Capitalization; and,
  - Development

  of emerging technologies
- Focus:
  - **Quality** of deals
  - **Capital efficiency**
  - **Bandwidth efficiency**
  - **Milestone** achievement
- Path:
  - Provide key **Resources**
  - Leverage unique **Sources**

# Accelerator: Seattle and NYC

- Accelerator I, II, III –Seattle – Nine investments over five years, $44MM capital deployed
  - Partner institution – Institute for Systems Biology
  - Diverse portfolio – multiple therapeutic areas and clinical diagnostics
- Accelerator IV – Seattle and New York – Planning on 10 investments in next 5 years.
  - Retain emphasis on biomedical technologies
  - Both strategic and venture investors
  - Partner institutions – Rockefeller, NYU, MSKCC, Weill Cornell, Mt. Sinai, Einstein [Columbia]

# Sources

***World-class sources of deal flow – access to emerging technologies***

- Four primary categories of **Sources**
  - Partner institution technology
  - Referred by Partner institutions
  - Referred by Investors
  - Accelerator

- Proprietary deal flow
  - Most not widely seen in the venture community

# Sources: Referred by Investors

- "Too Early"
  - Biotech venture firms still see high quality early-stage opportunities
- Accelerator syndicate has global reach
  - Top-tier investors
  - Extensive networks

# Sources: Accelerator

- "Push"
  - More than 500 unsolicited business plans since 2003 inception

- "Pull"
  - Accelerator management is well connected in biotech and venture capital communities

# Accelerator Resources

***In one entity, all of the resources necessary to give emerging biotechnology start-ups the greatest likelihood of success:***

- Scientific Expertise & Technical Support
- Venture Capital
- Management
- Facilities and equipment

# Resources: Scientific Expertise & Support

- Partner Institutions
  - World class faculty and staff available to assist in:
    - Identification
    - Evaluation
    - Development
  - Core Facilities
    - Excess capacity in expert-operated core facilities available to Accelerator companies
- Investor Network
  - Cadre of scientific advisors and other connections to thought leaders in virtually any area of interest

# Resources: Venture Capital

- Not just $'s, but value added $'s
  - Proven track record for building great companies
  - Extensive network within pharma and biotech to make appropriate partnership introductions
  - Extensive network within venture capital to enable high quality syndication in future rounds
  - Deep pockets to enable participation all the way to the finish line

# Resources: Management

- All non-technical functions including:
  - Administration
  - Business Development
  - Finance
  - Human Resources
  - Operations

- Pre-negotiated contracts with key service providers:
  - Audit/Tax
  - Facility Maintenance – Alexandria Real Estate Equities
  - Insurance
  - Legal
    - Company counsel
    - Intellectual Property
  - Professional Development
  - IT Network

# Accelerator Candidates

- Leading-edge biotechnology which would benefit from access to Accelerator Resources
- "Too Early"
  - Technology not sufficiently developed to attract significant top-tier venture capital independently
- Milestones within reach
  - Identifiable fundable Milestones
  - Clear R&D Plan to reach Milestones
  - Timeline and Budget that relate to that Plan
- Driven Innovators, brilliant Innovations
  - "Old School" technology-based investment

# Accelerator: Investment Process

- Rigorous technical and IP due diligence
  - Tap into world leading scientific and industrial experts at Partner institutions and network of scientific advisors affiliated with the Investors
  - Utilize dedicated firm to provide IP due diligence
  - Satisfy investment criteria of all Investors
- Milestone-based investments
  - Identify financeable Milestones
  - Structure R&D plan to fit milestones
  - Build budget & timelines to match R&D plan
- Standard Series A Preferred Stock investments with customary terms

# Accelerator Summary

- Vehicle for Emerging Biotech Investment
  - Capital efficient
  - Bandwidth efficient
  - Focused development (milestone achievement)
  - Disciplined assessment
- World-Class Stakeholders
  - Top-tier syndicate
  - Anchored by Institute for Systems Biology
- Track Record
  - >$150M invested in Accelerator Companies

# Future Generations?

- Science Parks 4.0
  - Collaborative spaces for true rapid innovation
  - Ecological and economic sustainability
- Rise of Research Clouds
  - Collaborative labs where universities, small and large companies co-locate despite very different space needs and ability to pay
- Dematerialized Innovation
  - Crowdsourcing, virtual collaboration platforms

cctec
Cornell Center for Technology Enterprise and Commercialization

WHERE INNOVATIONS MEAN **BUSINESS**

cctecconnect@cornell.edu

**AUTM – Asia 2013**
**March 21, Kyoto, Japan**

# *Enhancing industry-academia collaboration through development of Science Parks – The Incubation Infrastructures at Cornell University*

---


Alan Paau, MBA, PhD, CLP™
Vice Provost - Technology Transfer and Economic Development, Cornell University

Executive Director - Cornell Center for Technology Enterprise & Commercialization

President - Cornell Research Foundation, Inc.

# Overview

1. A Few Words About Cornell University and its Technology Transfer Program (Cornell Center for Technology Enterprise & Commercialization – CCTEC)

2. Why Incubator ?
   - New Businesses
   - Clusters
   - Ecosystem
   - Roles of Universities

3. Cornell's Incubation Infrastructure

# Cornell University - Two Major Campuses

*Manhattan Medical Campus*

*Ithaca General Campus*

*WCMC-Qatar*
*Doha, Qatar*

*NYSAES*
*Geneva, NY*

CCTEC
Cornell Center for Technology Enterprise & Commercialization

# The Cornell Research Enterprise

*~$620M – FY2010 research expenditure*
*~$796M – FY2011 research expenditure*
*~$653M – FY2012 research expenditure*
*Three Year Total = $2.07B research expenditure*
*Average = $690M per year research expenditure*

## *Cornell University in Ithaca, New York*

- *~1600 faculty*
- *~20,000 students (grad and undergrad)*
- *7 Undergraduate colleges*
- *3 Graduate & professional only schools*

*NYSAES in Geneva, NY*

## *Weill Cornell Medical College, New York City*

- *~1,000 faculty (including clinical)*
- *~800 students (MD, PhD only)*
- *23 departments*
- *>30 Centers and Institutes*

*WCMC Qatar*

*… 41 Nobel Laureates (faculty and former students)*

# Cornell University

One of eight members of the Ivy League Schools

- has been around for a long time (1865)
- has mediocre sport teams with no athletic scholarship
- the most comprehensive Ivy
  - Agriculture & Life Sciences (oldest)*
  - Engineering
  - Arts & Sciences (Astronomy & Physics)
  - Industrial Labor Relations*
  - Human Ecology*
  - Hotel Administration
  - Architecture, Art, and Planning
  - Veterinary Medicine*
  - Law
  - Johnson Graduate School of Management
  - Weill Cornell Medical College

# Cornell University

*"I would found an institution where any person can find instruction in any study."*

*Ezra Cornell*

-An inventor (US Patent)

-Responsible for all the wires & cables hanging overhead (worked with Morse to implement telegraph - the first "telecommunication system") – an innovator

-Founder of Western Union (first generation of "banking at a distance" – wiring money) – a visionary entrepreneur

- Cornell's heritage is inventive, innovative & entrepreneurial

CCTEC
Cornell Center for Technology Enterprise & Commercialization

# CCTEC by the Numbers – FY2010 to 12

*One technology transfer program*
*two campus offices (Ithaca, Manhattan)*

*11 Licensing Officers*
*3 Licensing Assistants*
*3 Outreach & Economic Development*
*12 Operational Support*

| | 2012 | 2011 | 2010 | 3-Yr Total | 3-Yr Average |
|---|---|---|---|---|---|
| New Businesses Founded | 7 | 10 | 12 | 29 | 9.7 |
| New IP Disclosures Received | 390 | 367 | 338 | 1,095 | 365.0 |
| New Commercial Licenses Granted | 181 | 162 | 123 | 466 | 155.3 |
| New Patents Issued | 158 | 166 | 140 | 464 | 154.7 |
| Revenues ($M) | 12.6 | 67.9 | 31.9 | 112.4 | 37.5 |

# Outcome (Impact)

*Currently:*

*>1,500 active licenses (5 continents, 24 countries)*
*>180 products currently on the market from licensed Cornell technologies*

*Historically:*

*>120 new businesses founded with licensed Cornell technologies historically, more than half are still operating independently today (excluding acquisitions, mergers, and liquidations)*

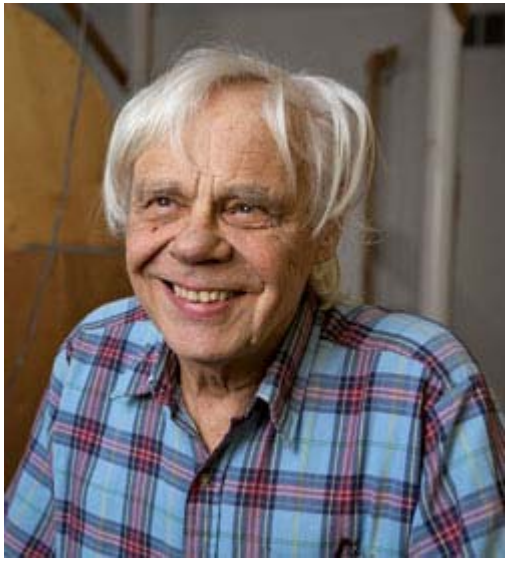
# Locating Deep-Well Casing by Magnetic Field Sensing – Before Its Time But Impactful

## Hometown Hero: Arthur Kuckes

### Kill Drill

The BP oil well blowout in the Gulf of Mexico mushroomed into an environmental and economic disaster after an explosion on a drilling rig less than 50 miles off Louisiana killed 11 workers on April 20, 2010. The next day, an emergency call was made to a small Ithaca-based company (Vector Magnetics – A Cornell Startup in 1985).

**http://www.engineering.cornell.edu/news/magazine/spring2011/kuckes.cfm**



*Real Impact - 20 employees with high technical expertise in Cherry Street, Ithaca office and business engagements globally.*

# Science Park - New Business Incubator

New Businesses in different industries have *Different Needs*:

Classification is often difficult –

A. The *nature of technology and science* upon which the new businesses are based on ?

B. The *market* opportunities that the new businesses address ? (SIC codes)

Academic institutions tend to lean towards A. That's what we know and keep track of "strength" and "performance" for academic leadership to make "decisions"

Industrial enterprises tend to lean towards B. That's how they make profits and address their "stakeholders"

# Why New Business Incubation ?
# Concepts of Community

The “Cluster” Concept has evolved to the “Ecosystem” Concept very quickly in business:

“Cluster” = *a group of same or similar elements gathered or occurring closely together – promulgated* initially by Michael Porter (1990) – but original concept of “agglomeration economies” dated back to Alfred Marshall (1890) – concept of “critical mass” – basic, still valid but fails to address synergism provided by different but complementing elements

“Ecosystem” = a *system of interconnecting and interacting parts* - promulgated by James Moore (1993) – the “buzz” of today with the lime light on biotechnology – addresses the positives of synergism provided by different but complementing elements

# New Business Incubation – The Ecosystem of Business

*An economic community supported by a foundation of interacting organizations and individuals—the organisms of the business world. The economic community produces goods and services of value to customers, who are themselves members of the ecosystem. The member organisms also include suppliers, lead producers, competitors, and other stakeholders.*

*Over time, they coevolve their capabilities and roles, and tend to align themselves with the directions set by one or more central companies. Those companies holding leadership roles may change over time, but the function of* ***ecosystem leader*** *is valued by the community because it enables members to move toward shared visions to align their investments, and to find mutually supportive roles*

# An Academic View – The Ecosystem of Business

*The view of an academic –*

*Leadership – university (other research institutions) – outcome of research "is valued by the community because it enables members to move towards shared visions to align their investments and to find mutually supportive roles" + very long-living and itself very adapted to evolve = but early stage and needs "development" and hence, incubation*

Research brings discoveries and valuable new technologies. Diverse community members take advantage of them to invest and to find mutually supportive roles

- IP protection (law firms)
- management talents & $$$$ (entrepreneurs, investors)
- small businesses: new products/new services
  (from suppliers of components to professional services – accounting, banking, shipping)

# Why Incubation Infrastructure ?

**A flourishing ecosystem needs a nurturing ground**

*Proximity – more than a matter of convenience (physical)*

- reassurance that “you are not alone” (mental)
- learn from each other with similar ambitions and issues
- easier to find out “what you don’t know to even ask”
- economies of scale
  - supplies (from energy to services)
  - attract suppliers and customers – build snowball
  - ease of mentoring
- lower risk of “risk taking” and allow easier recruitment

Why is university qualified for the leadership role ?

- lots of experts with cutting-edge knowledge
- well connected to the world
- great supply of skilled and driven workers

# Incubation Infrastructure at Cornell -1

*General "Purpose" Incubators*

Langmuir Laboratories (donated by GE in 1965)
- two interconnected buildings
- multi-tenants – not suitable for "life sciences"

Cornell Business & Technology Park (under continuous development since 1951)
- rentals + "build to suit"
- 300 acres by the regional airport & Marriott
- 26 buildings, 80 tenants (large and small)
- 60% "tech companies" (mostly Cornell Startups)
- Rest = mostly service providers
- 1,600 direct hires by tenants
- a "top 10" taxpayer in Tompkins County

The 5-miles distance is a "negative" (especially in winter)

# Incubation Infrastructure at Cornell -2

*Special "Purpose" Incubators*

eLab (undergraduate students only, 24 tenants)

Cornell Agriculture & Food Technologies Park – the "Tech Farm" – in Geneva, NY at Cornell's NYSAES campus - 50 miles from Ithaca main campus

McGovern Family Center – (life science focus) – on Ithaca main campus with specialized equipments and regulatory permits for biological research and development activities – 3 tenants with "wet lab" - all Cornell Startups

NYC Tech Campus – "Google Incubator" being developed – all IT "layer" to serve healthcare industry, network security, and the "living environment"

# The Challenges & Opportunities at Cornell

**Location & History** – upstate New York & Rural tradition

like most of the northern US, has been experiencing population decline – shrinking "retainable" young talent pool, workers, and l al market

Cold climate

Agricultural, rural and manufacturing traditions

Lack of risk capital – has never been a financial center

Difficult commute

A great university with a long-history of top-notch research (41 Nobel laureates – faculty and students)

Graduate highly talented students – need to keep them around

Progressive leadership with a great alumni network

CCTEC
Cornell Center for Technology Enterprise & Commercialization

# Stay in Touch-More Info

apaau@cornell.edu

http://www.cctec.cornell.edu/

http://www.facebook.com/CornellTechTransfer

http://twitter.com/#!/CU_TechTransfer


MINATEC®
CEA Technological Research
and
the MINATEC Innovation Campus
Thomas Iljic
AUTM Asia 2013, March 21st
Education Research Industry

# CEA at a glance

**CEA Head Office**

***Defence Security***

*(DAM)*

***Nuclear Energy***

*(DEN)*

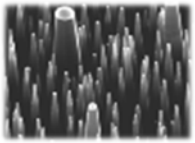
***Key Enabling Technologies***

***(TRD)***

*Technology*

***Fundamental Research***

*Material Science Division*
*Life Science Division*



*Science*

*15867 employees*

*10 research centers*

*4,3 B€ budget*

*650 patents filed (2012)*

*150 new high tech companies created since 1984*

- *DAM : **Strategic** independance of France*
- *DEN : **Energetic** independance of France*
- *DRT : **Economic** competitiveness of France => **CEA Technological Research***

# CEA Technological Reseach: key figures

## Human Res.

**4500** people → **3000 permanent**

## PATENTS

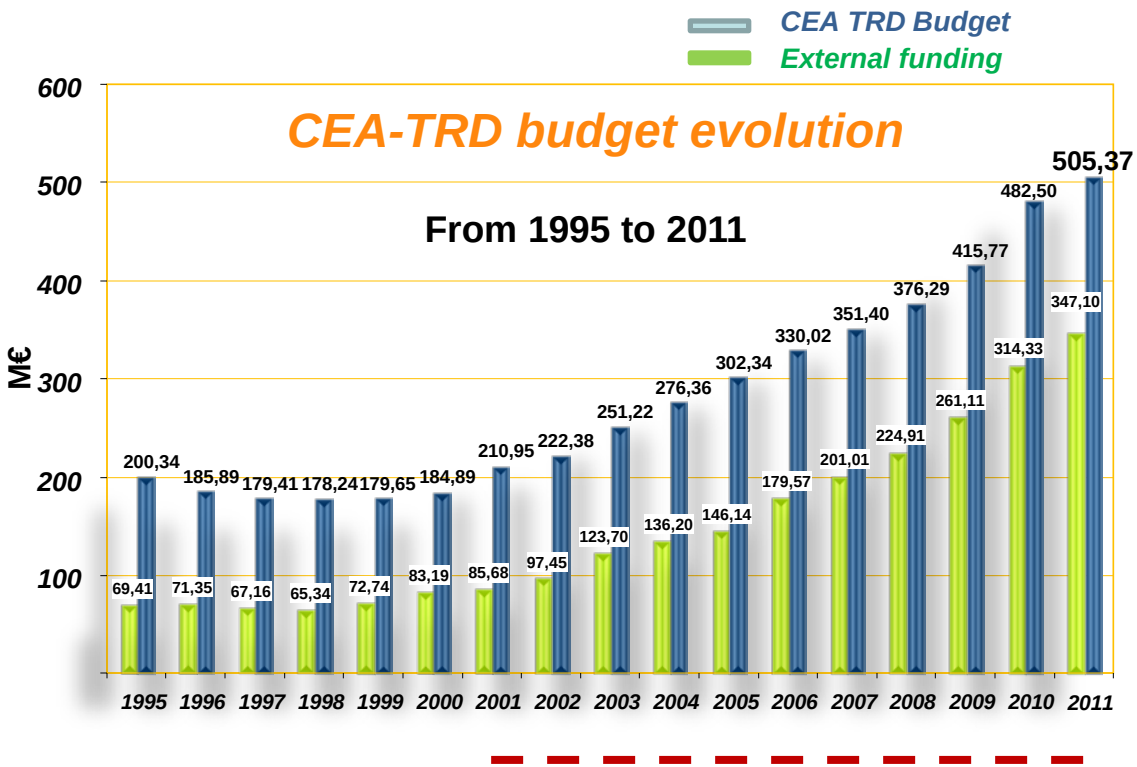
**> 500** patents / year

## BUDGET

**> 500 M€** Annual budget

- 25 % subsidy
- 40 % industrial contracts
- 35 % public competitive funding

- 47 % personnel expenses
- 33 % opex
- 20 % capex



# CEA Tech. Research: Organization

**leti** — 1967 - Grenoble

Laboratory of Electronics and Information Technologies

*Staff 1700 - 250 M€*

Micro-nanotechnologies and their integration in systems

**list** — 2003 - Paris Sud

Laboratory of Integrated Systems and Technologies

*Staff 700 - 70 M€*

Software-intensive systems

**liten** — 2005 - Grenoble / Chambéry

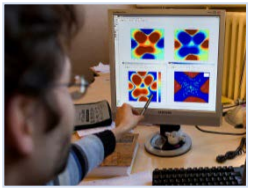
Laboratory of Innovation for new Technologies for Energy and Nanomatérials

*Staff 900 - 130 M€*

New energy technologies and nanomaterials

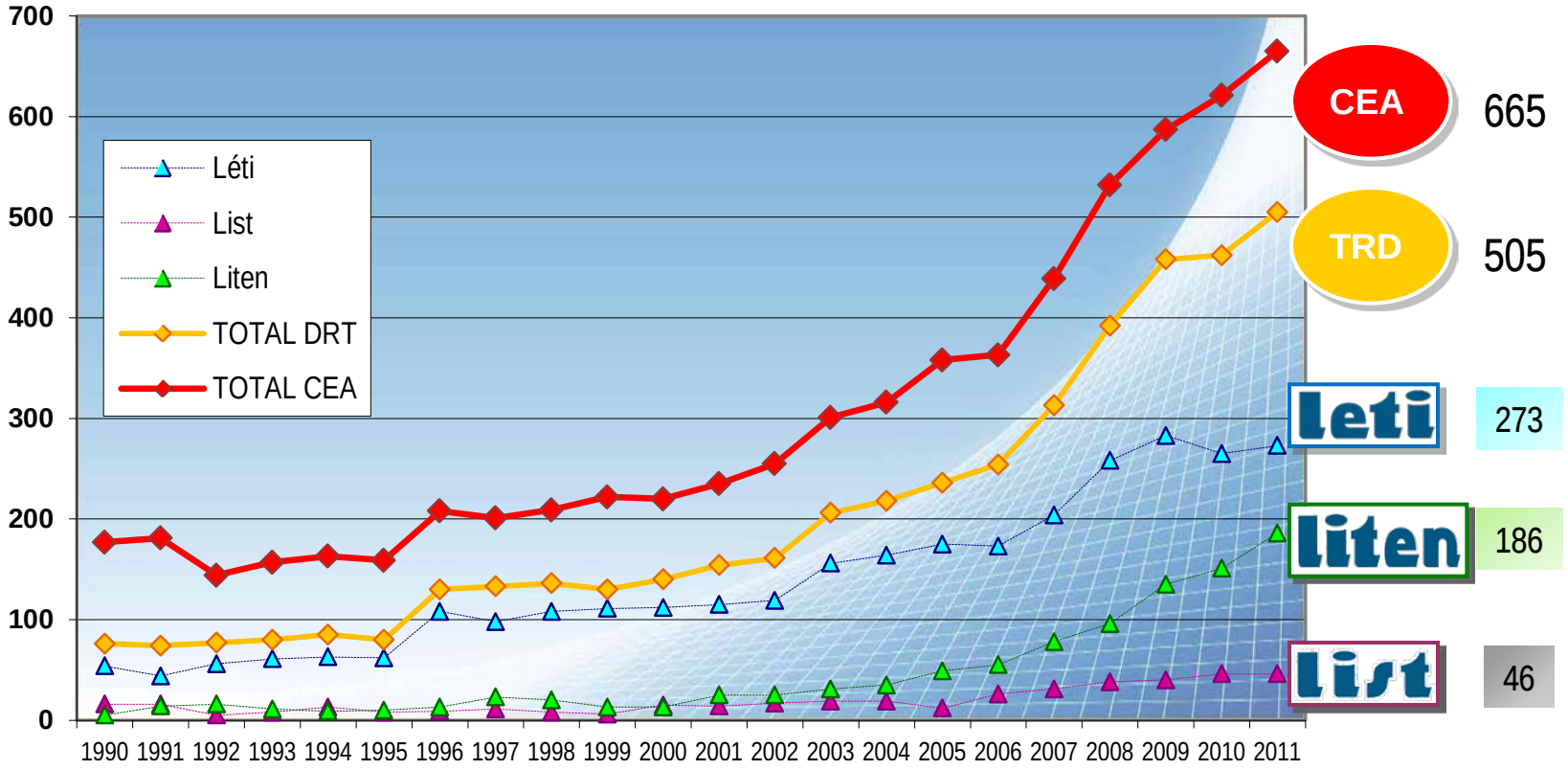
**Solar**

ines INSTITUT NATIONAL DE L'ENERGIE SOLAIRE



# Creation of IP

***CEA: - Worldwide: 1st patent depositor as a Research Organisation***
***- National ranking: 3rd depositor INPI 2011***




| Rang 2011 | Nom du déposant | Brevets publiés |
|---|---|---|
| 1 | PSA PEUGEOT CITROEN** | 1 237 |
| 2 | GROUPE SAFRAN** | 573 |
| 3 | COMMISSARIAT A L'ENERGIE ATOMIQUE ET AUX ENERGIES ALTERNATIVES** | 545 |
| 4 | GROUPE L'OREAL SA** | 482 |
| 5 | EADS (incluant Airbus)** | 405 |

# CEA Technology Transfer Office

Technology Transfer Office
70 people at the service
of the laboratories

- Attractive and evolutionary business model
- Professional support in contract negotiation

**CONTRACT NEGOCIATION**

**IP MANAGEMENT**

- Professional IP management
- Dedicated competencies and means for IP litigation

**STRATEGIC MARKETING**

- S&T Marketing
- Benchmarking of competitors and international best practices
- Business development dedicated to SMEs and international groups

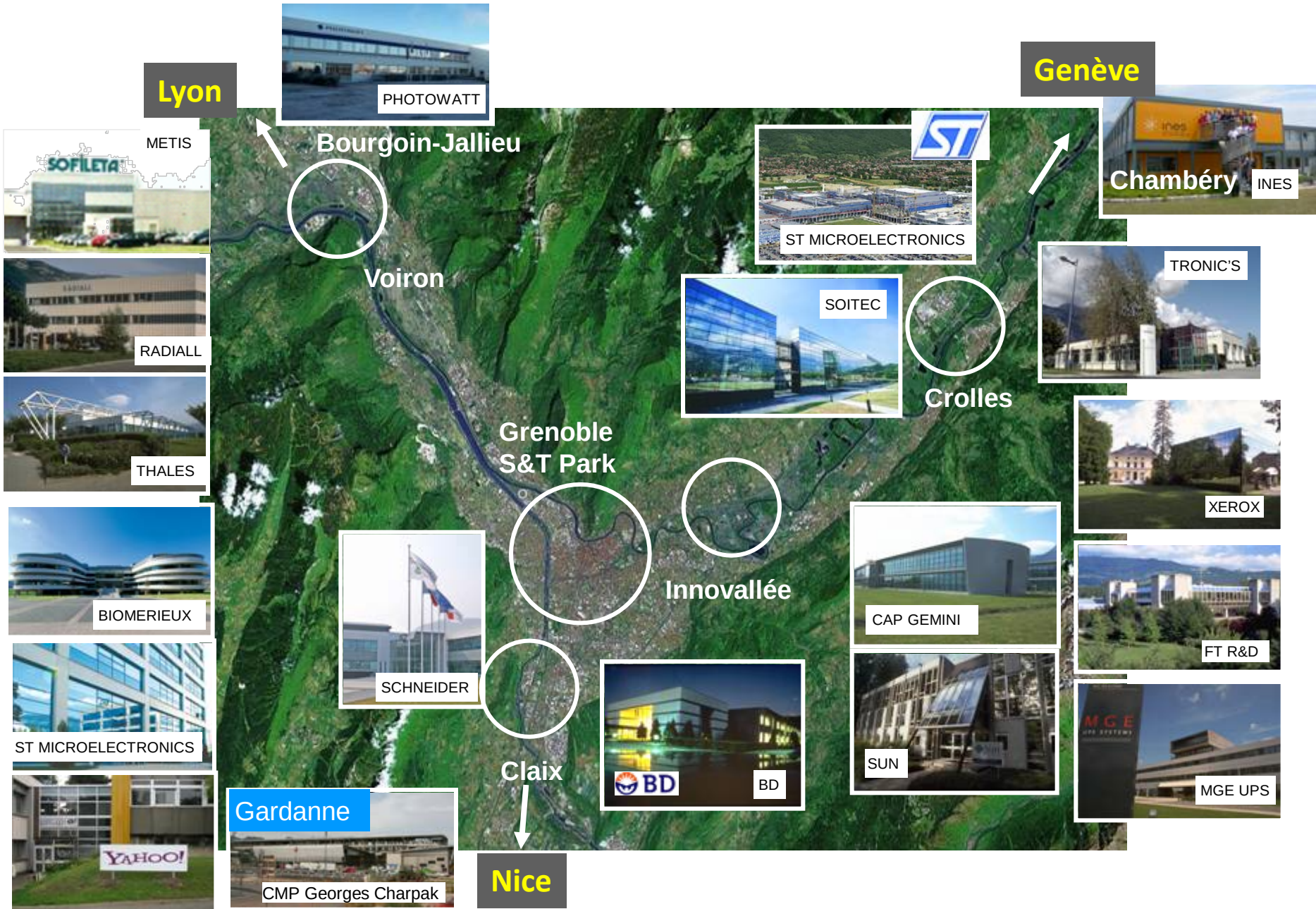
**START-UP CREATION**

- Support until proof of concept Follow-up and counseling
- during the funding rounds


MINATEC®
MINATEC
Innovation campus for micro & nanotechnologies
Education Research Industry

# MINATEC: Grenoble / Rhones-Alpe Region

# Grenoble: a high tech industry



# MINATEC: 2000 ➔ 2010

# MINATEC: 2000 ➔ 2010

# Grenoble scientific polygone

# MINATEC Statement

*« Our mission is to become an international leader in innovation and technology »*

- Build a unique innovation ecosystem:
  - A platform dedicated to **TRAINING**
  - A platform dedicated **RESEARCH**
  - A platform dedicated **TECHNOLOGY TRANSFER**


- Mission and statement:
  - **COLLABORATION**: guaranty collaboration between research, industry dedicated to value creation
  - **GOVERNANCE**: create a long-term and effective cooperation mode
  - **SUBSIDIARITY**: increase complementarity while guarantying each partner know-how and skills

# MINATEC Campus : Key Figures

**1.5 B€ invested in 10 years for research facilities**

## Education
## 1,400 people

- Attractivity
- Skills for the future

Grenoble INP phelma

## Research
## 2,400 people

*(560 PhDs & post-docs)*

- Inter-disciplinarity
- Creativity
- Technology Transfer

cea leti inac

FMNT

MINATEC®

## Industry
## 600 people

- Technology transfer & industrial partnerships
- Jobs creation

- **> 3000 research staff**
- **Annual Budget: 350 M€**
- **> 1200 students**

  Industry & contracts: >60%
- **10 000m² cleanrooms**

- **20 joint laboratories**
- **~ 350 new patents/year**
- **1600 scientific publicatior**
- **>400 Graduates MS/PhD**


MINATEC®
MINATEC
Facilities & Platforms
Education – Research – Industry
Education Research Industry

# Education : INP PHELMA Engineering School


PHysics


ELectronics


MAterials

- Part of Grenoble INP group
- > 1200 students, 200 professors
- First European Master in micro-nanotechnologies
  (time share with EPFLausanne & Politecnico de Torino)

- Initial training
- Professional training

# Education : CIME Nanotech Platform

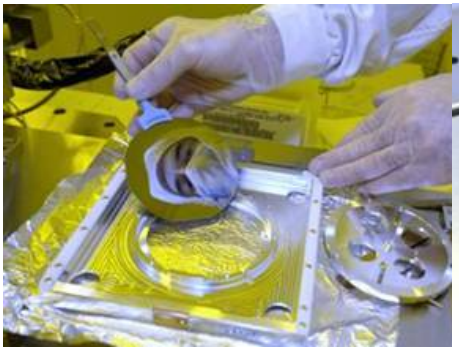
Training for local and foreign companies (Saudi Electronics Materials & Components)

- **2500m²** platform dedicated for training activities (700m² cleanrooms)
- **10M€** initial investment
- Annual budget: **2.5M€** (1M€ running costs)
- **1300** students on the platform in 2008
- Dedicated actions for high school

# Research : Upstream research platform

**Dedicated facilities for University, CEA, CNRS,..**

- Methods and equipment facilities for lithography, deposition or etching enabling integration of nano-objects and nano-materials or patterning of thin layers in the nanometric range.
- Flexibility and ease of access : an original management and administration system run by the INAC and the FMNT.
- The overall operation is supported by the user laboratories.

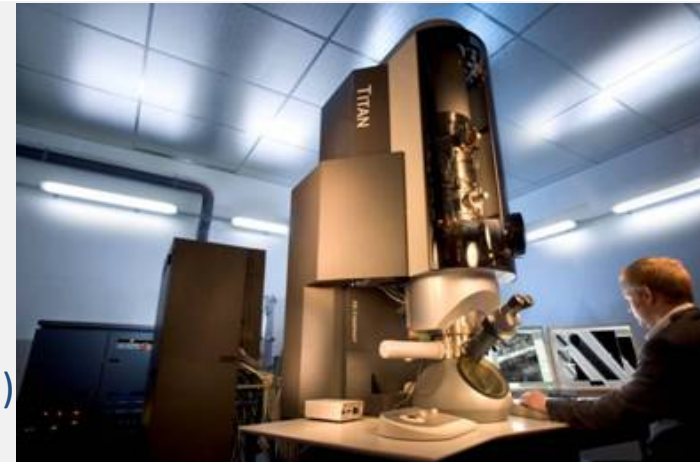



# Research : Nanocharacterization platform

**A unique in-line & off-line platform in Europe**

- Research team on caracterization
- Close to large research infrastructures (Synchrotron, neutrons,..)
- Collaboration with both upstream and technological research teams

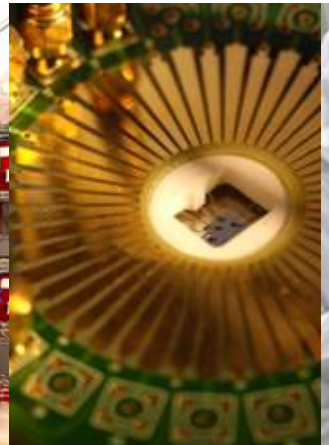
- **100** pers.
- **1500m²** cleanrooms
- **3M€**/yr investments
- **40** heavy equipments
- **80** in-line equipments (100 à 300mm)
- Cooperation with eqt suppliers (Titan from FEI)

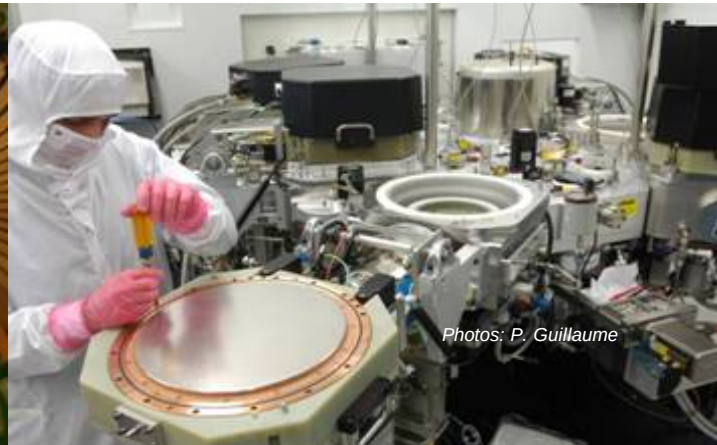


# Technological Research : Nanotec & MEMS platforms

**“More Moore & 3D 300 line” / “More than Moore 200 line”**
**8 000 square meters of clean room, at industrial standard**

- Activity : proof of concept, prototyping, pre-production => from process step to packaging
- Operated by Leti
- Initial investissement (2006): 15M€
- 24/7 operation
- Equipment sharing with start-ups
- Industrial partnerships & international cooperation with fundamental research labs (Cambridge, ALS) or applied research (IMEC) and industrials (**STMicroelectronics**, OMICRON)





*Photos: P. Guillaume*

# Technology Transfer : « Maison MINATEC »

**A unique gathering in Europe:**
**150 people involved in technology transfer activities in micro&nanotechnologies**


**Research trends: Observatory for Micro-Nanotechnologies ( OMNT )**

**Strategic Marketing**

**Competitive Intelligence / benchmark**

**Networking and projects:** Minalogic Cluster office, SEMI

**Patents:** engineers, lawyers

**Technology transfers and contracts**

**Investments – Start-ups**

# Industry: Industrial R&D labs on-site

**A dedicated building for industrial partners, including Start-ups**

Offices, laboratories and cleanrooms to rent

➔ **In permanent contact with research teams**

➔ **Access to common MINATEC facilities**

MINATEC® ENTREPRISES

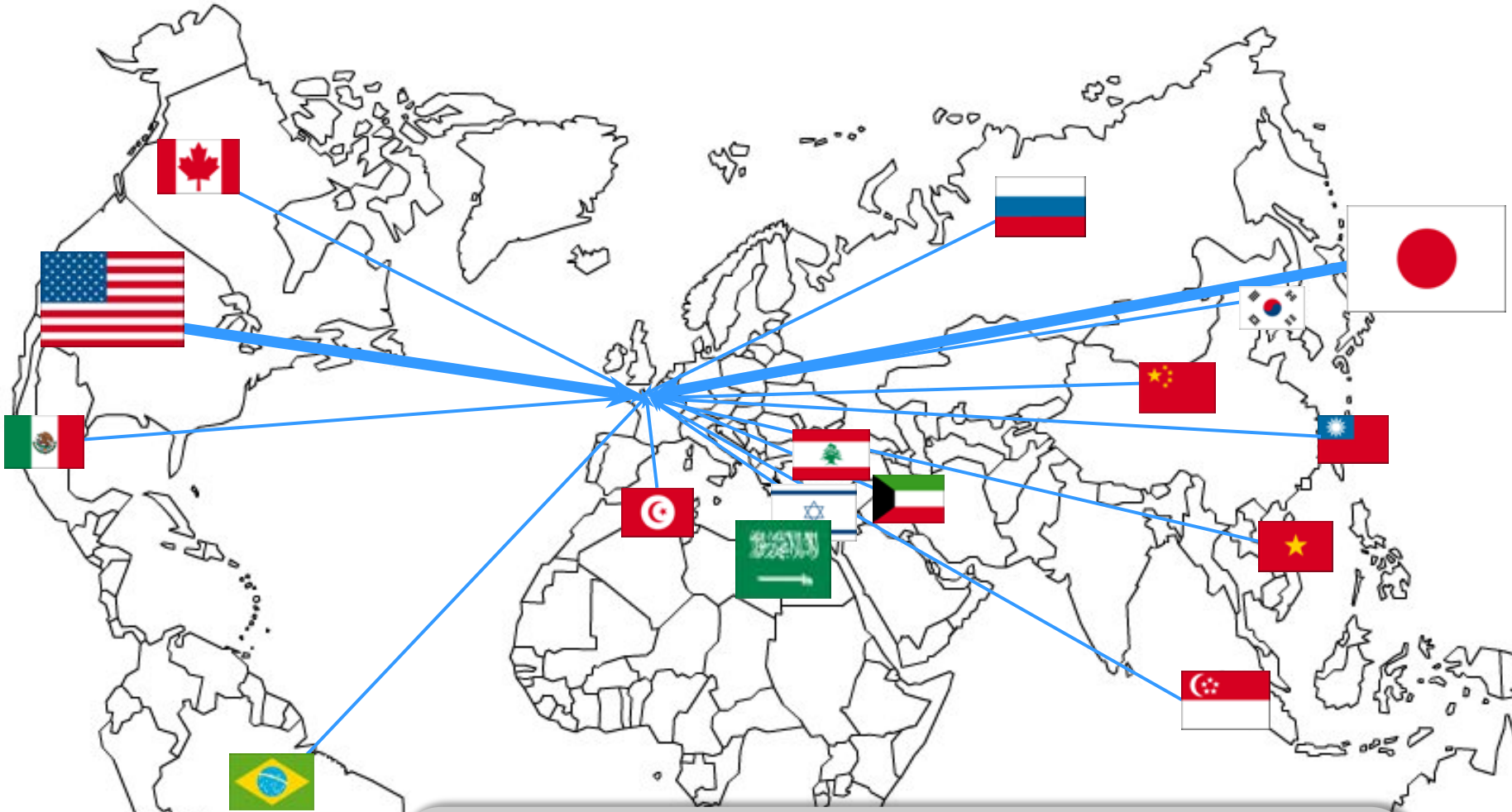
- BIOSYSTEMS ON CHIPS – MEMS 200
- CROCUS TECHNOLOGY
- CYTOO
- ESSILOR
- JEMI FRANCE
- MICROOLED
- MOVEA
- PX'THERAPEUTICS
- SEMITOOL
- SERMA TECHNOLOGIES
- ST UTC

# Industry: Industrial partnerships with MINATEC ®


Contract negotiation supported by a highly specialized team of engineers and legal experts

> 250 contracts

# International Reach



- 2 official delegations weekly to discover our campus
- 40 000 visitors in 2011
- Strong increase in foreing PhD, scientists

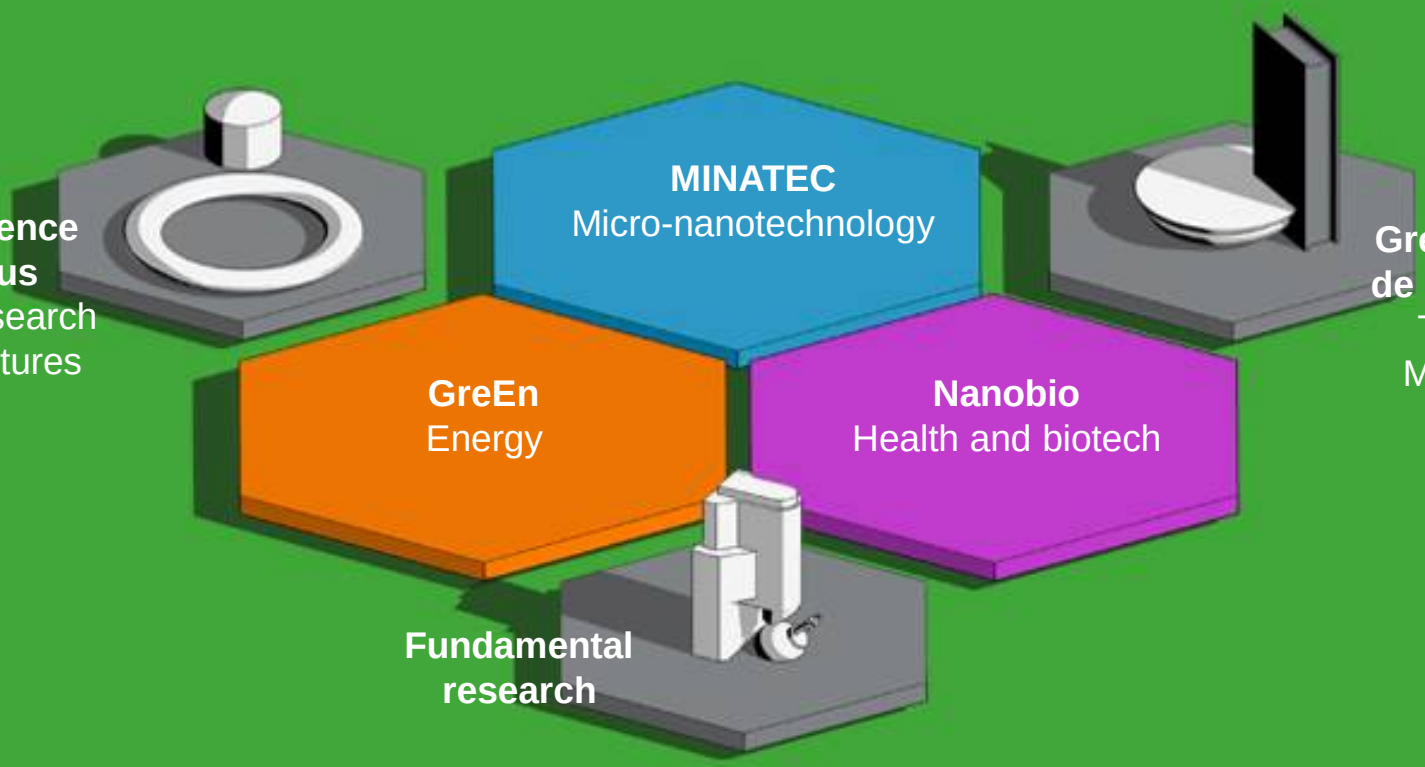
# MINATEC, some factors of success

- Partners' strong commitment visible in:
  - Massive investments
  - Reactivity and efficiency in project management
  - Support from Local Authorities to endorse financial risk
- Important Involvement from CEA, benefiting from a high tech image and a long culture of applied research with and for industry.
- An anchor company (St Microelectronics) that drives money, projects and innovation
- Strong Network, with collaboration between EDUCATION / RESEACH & INDUSTRY


MINATEC®
MINATEC tomorrow ?
Education Research Industry

# Grenoble and the GIANT's vision
# **Six Centres of Excellence**

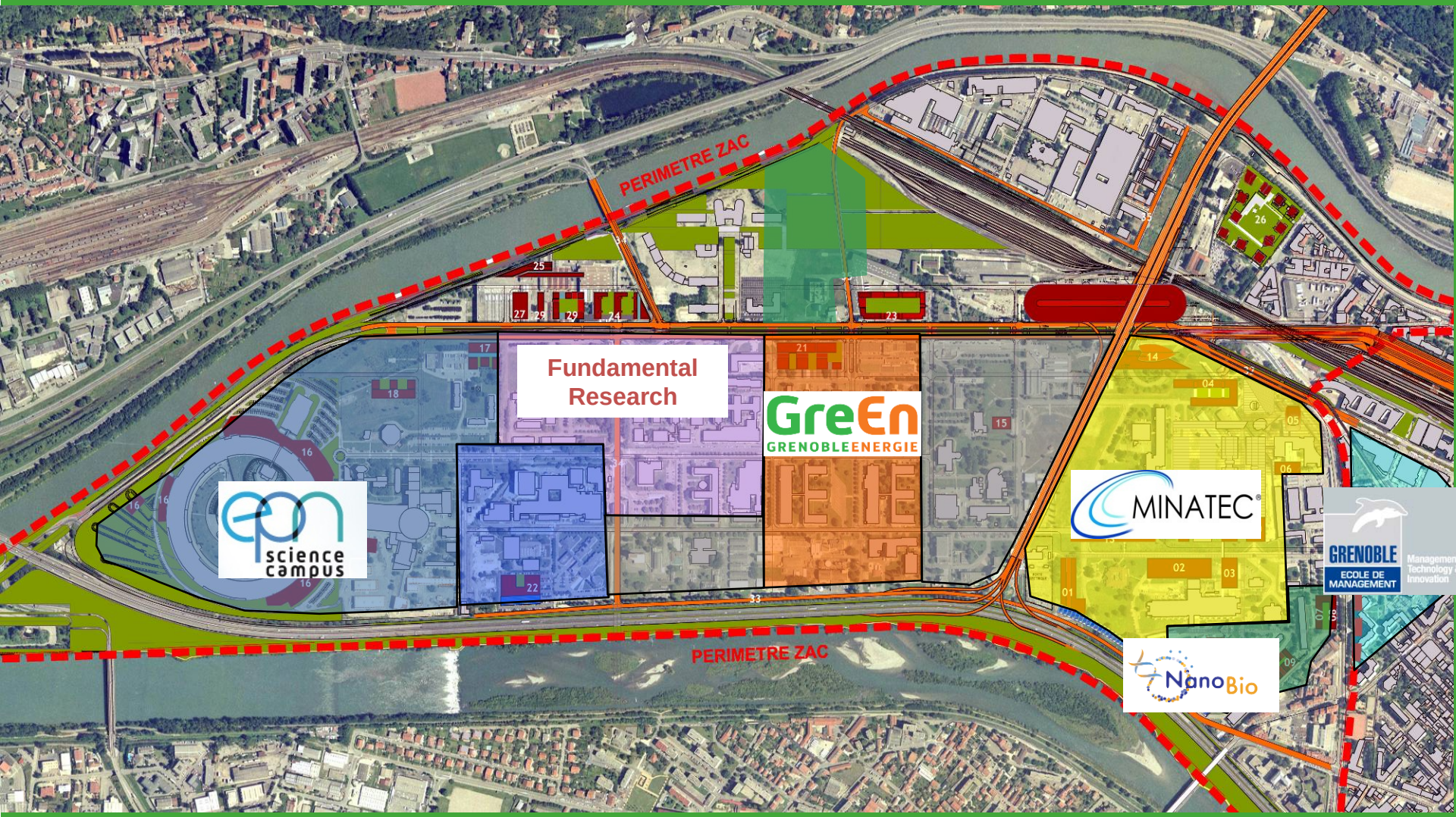
GIANT



GIANT

GIANT's vision

# The six Centers of Excellence over 250 ha



# GIANT in figures

GIANT

**GIANT today**

**6 000** researchers
**5 000** industrial jobs
**5 000** students
**300** inhabitants

**GIANT tomorrow**

**10 000** researchers
**10 000** industrial jobs
**10 000** students
**10 000** inhabitants

**10 000** visitors annually
**5 000** publications annually
**500** patents filed annually
**€4 billion** direct and indirect annual economic impact
**50** start-ups launched in past five years
**€1,2 billion** investment (2010-2016)


MINATEC®
Thank you
for your attention
http://minatec.org
http://www.giant-grenoble.org/fr/
Education Research Industry