

 **University of Massachusetts, Amherst**

September 18, 2012
ENSCBP, Talence



LabEx

A M A D E U S

Advanced MAterials by Design

<http://amadeus.labex-univ-bordeaux.fr/>



Organization of the French academic research

↳ **Basic unit: laboratory***

- Supposed to be **unsustainable**
- Renewable five-year contracts** between supervising institutions
- More or less **specialized in one research field**
- Led by a director** and deputy directors
- Composed of **permanent staff** (tenured researchers, full or assistant professors, engineers, technicians), **post-doc fellows** and **PhD students**
- Organized in **research teams**
- Assessed every five years** on the basis of its recent activity and next project by an independent authority (AERES, Evaluation Agency for Research and Higher Education)

* But sometimes called « Institute... » or « Research Center... »

Organization of the French academic research

↘ **Local supervising institutions such as**

- University Bordeaux-1 Sciences and Technology
- University Bordeaux Segalen Life and Health Sciences
- Institut Polytechnique de Bordeaux comprising four engineering schools

↘ **National supervising institutions such as**

- National Center for Scientific Research (CNRS)
- French National Institute of Health and Medical Research (INSERM)
- Sometimes an industrial company

↘ **Their role towards the laboratories**

- Recruits, appoints, pays, assesses and manages the career of its employees
- Provides buildings and money for running costs*

* Completed by applications to calls of regional, national or European funding agencies and by direct contracts with industrial companies

Positioning in the local context

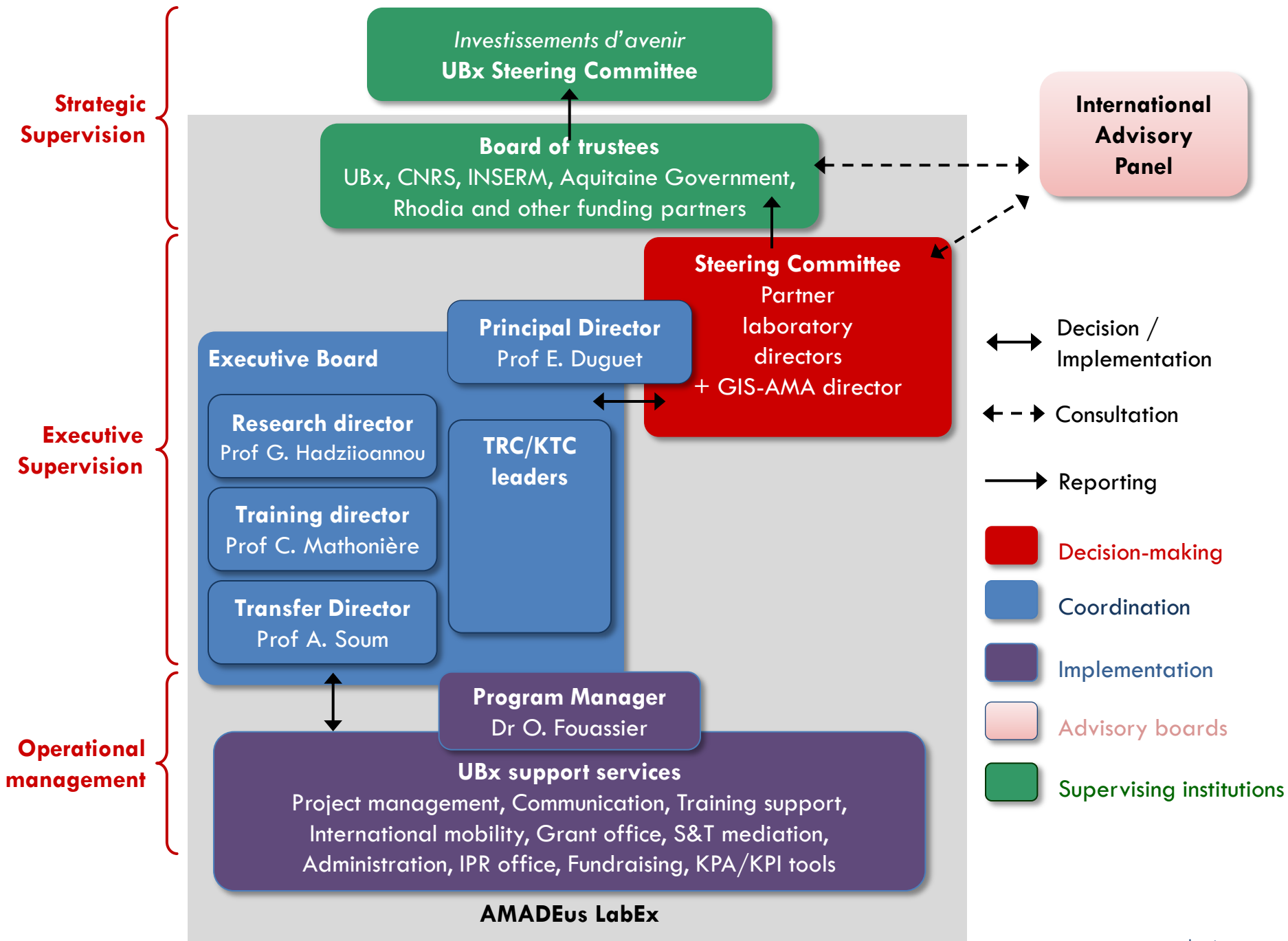
↘ Existing structures

- About 15 laboratories in the field of Materials
- Pôle d'Excellence Materials* (permanent staff: 400)
- Groupement d'Intérêt Scientifique Advanced Materials in Aquitaine* (2008-12)



↘ **AMADEus LabEx ?**

- Strategic cluster focused on selected areas**
- Contributing to the strengthening of the leadership and international exposure of the Bordeaux campus
- Including pull effect and theme renewal
- Not a legal administrative structure
- Functional organization running on a project mode



Resources that can be mobilized

↘ 12 partner laboratories



LCPO



LABORATORY
OF THE FUTURE
UMR5258

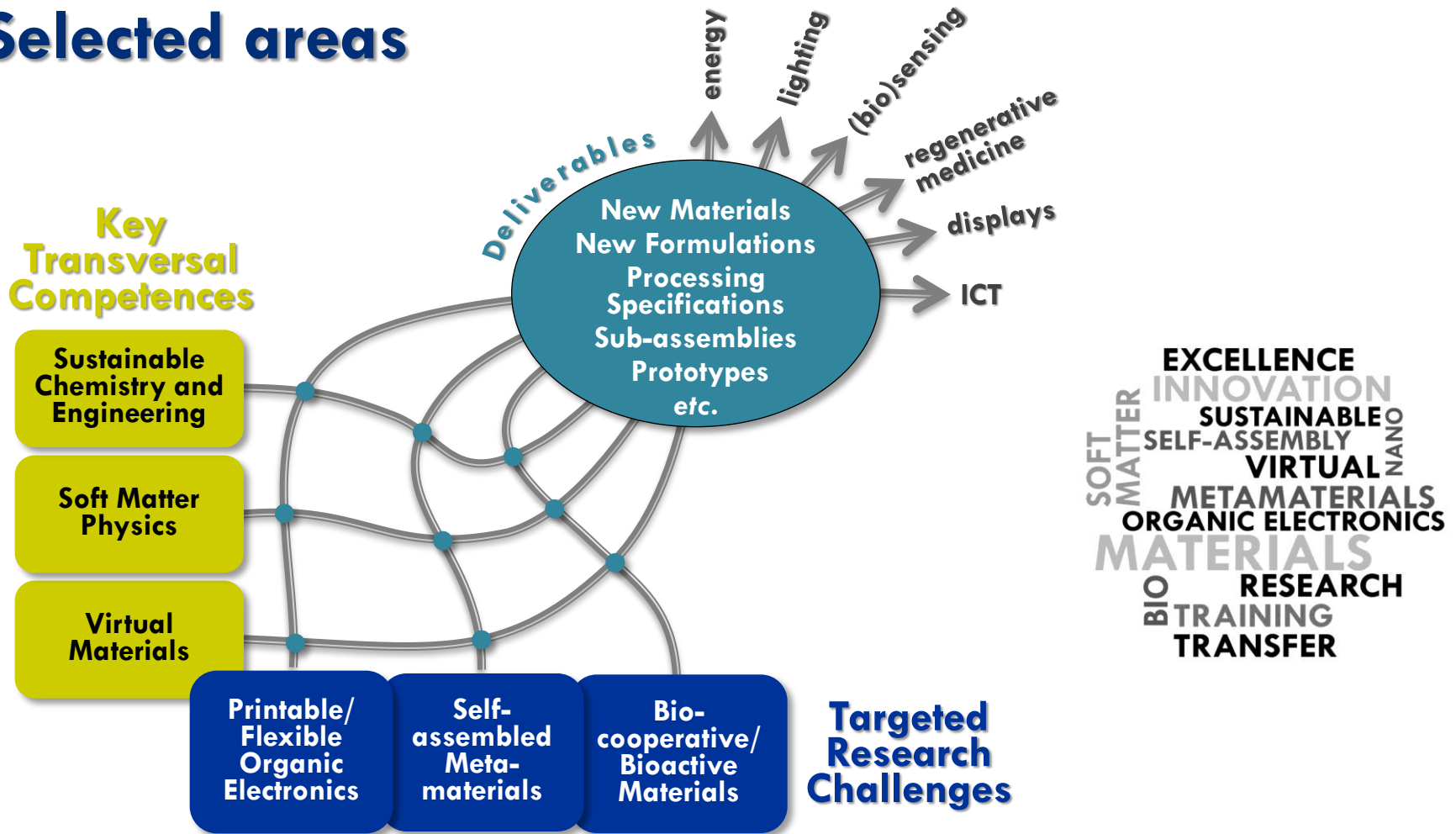


- ❑ including their equipment, facilities and administrative staff

↘ about 35 research teams

- ❑ 80 (associate) professors (7 IUF members)
- ❑ 50 junior and senior researchers
- ❑ 30 engineers/technicians
- ❑ Average age: 47

Selected areas



Our ambition

- **To have a long-term structuring role in both the academic and economic spheres**
- **To produce and transfer cutting-edge knowledge in emerging materials science and technology**
- **To play a major role in the definition of research agendas**
- **To help industrial companies to switch to next-generation high-added value materials**
 - ❑ by providing access to new technologies
 - ❑ by creating a pool for hiring of highly skilled young scientists and engineers

Our ambition

- **First pillar: develop ambitious research activities**
- **Second pillar: train people**
- **Third pillar: optimize the exploitation of results, with a focus on innovation**

Allocation of resources

- **Non-expendable allocation: 37 060 207 €**
- **Grant: 13 M€ up to 2019**
- **Making resources increasing by call applications**

General schedule

- **M-10 to M-5:** proposal negotiation and writing
- **M0 (April 2011):** official project start
- **M5:** kick-off meeting
- **M9:** research program validated by IAP, and then BofT
- **M12:** implementation of research activities
- **M27 (July 2013):** 1st internal assessment by IAP
- **M45 (January 2015):** 2nd internal assessment by IAP
- **M48:** 1st external and critical assessment
- **M104:** end of the project

IAP meeting (08-10/01/2012)

↘ Members



Prof. Matt Tirrell (Pres.)
University of Chicago



Prof. Krzysztof Matyjaszewski
Carnegie Mellon University, Pittsburgh



Prof. Arthur Carty
Waterloo Institute of Nanotechnology



Prof. Markus Antonietti
MPI Colloids and Interfaces, Potsdam

Prof. Luisa De Cola

Westfälische Wilhelms-Universität, Münster



Prof. Costas Soukoulis

Iowa State University, Ames



Prof. Clément Sanchez

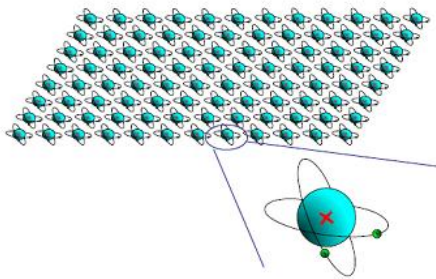
Collège de France, Paris



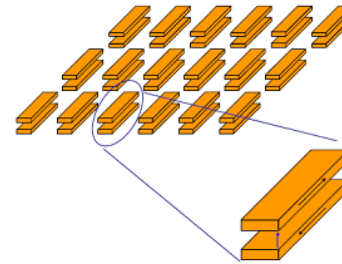
TRC1: Printable/Flexible Organic Electronics

- ↘ **Upgrading the chemistry of π -conjugated polymers and organic-inorganic hybrid structures**
- ↘ **Ink formulation**
- ↘ **Electrical and electronic properties**
- ↘ **Mechanical and thermal energy harvesting**
 - ❑ Conversion of mechanical energy from ambient or biomechanical vibrations: Soft piezoelectrics (polymers, composites), Soft materials and liquids with giant permittivity for variable capacitors (nanocomposites, complex fluids)
- ↘ **Organic MEMS**
 - ❑ Design and characterization of basic MEMS structures including both electrical transduction for mechanical deformation and electromechanical actuation

TRC2: Self-assembled metamaterials



A natural material
with its atoms

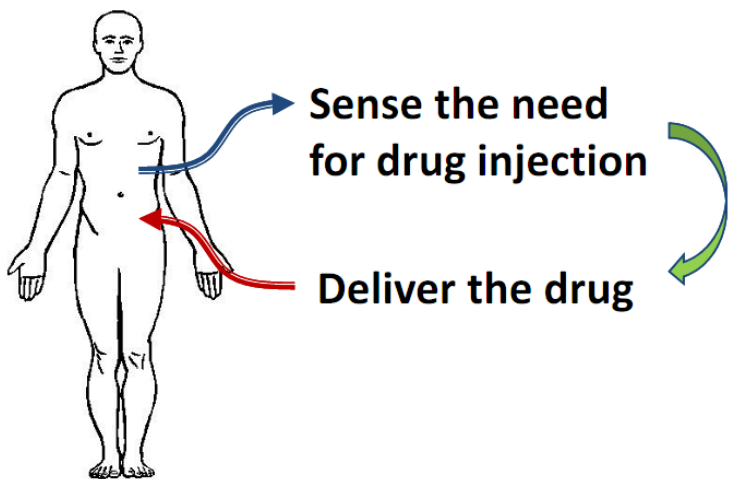


A metamaterial
with artificially
structured « atoms »

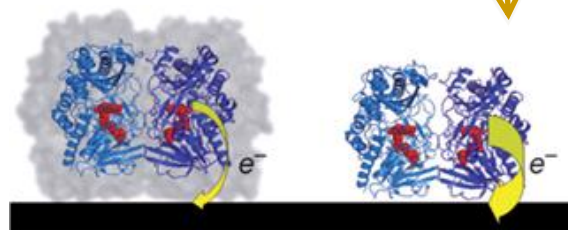
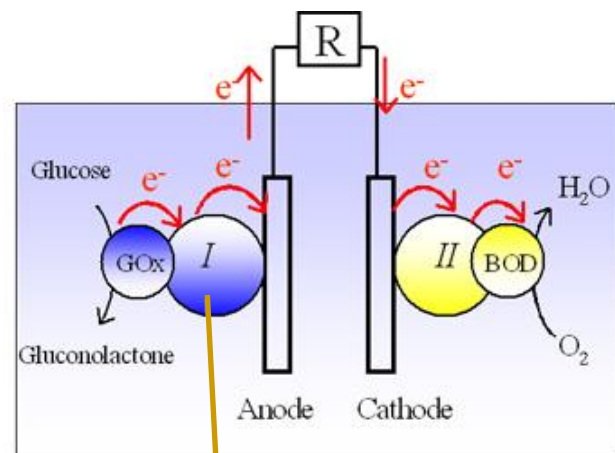
- **Nanostructured EM metamaterials** for visible light
- **Microstructured EM metamaterials** for THz range
- **Millimetric acoustic metamaterials**

TRC3: Biocooperative/bioactive materials

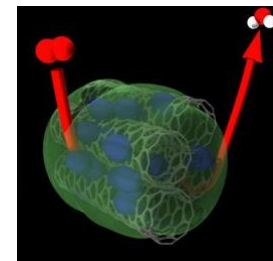
↳ Point-of-care autonomous closed-loop drug delivery device



according to the patient's need, in real time



Enzyme engineering



CNT microelectrode

Training ambition

↳ Higher Education, Integration into the workplace

- Promotion and support of the **FAME Erasmus Mundus Master**
- Promotion and support of the **International Doctoral School IDS FunMat**
- Actions for **attracting students** towards materials sciences
- Actions for **preparing students to international careers**
- Actions for **improving the student employability in industry**
- Actions for **preparing students to academic careers**
- Actions for **developing e-learning**
- Actions for **the long-life training of industry employees**
- Professorship creation**

Exposure/attractiveness ambition

- ↘ **Themed years focused on TRC/KTC and combining**
 - invitation of world-recognized scientists and engineers
 - creation of specific e-programs for Master degree students
 - hosting of one international conference
 - organization of one summer school

- ↘ **2012-2013: Organic Electronics**
 - Intern. Symp. on Functional π -electron systems (F π 11), Arcachon, June 2013

- ↘ **2013-2014: Metamaterials**
 - Metamaterials' 2013, Bordeaux, Fall 2013

- ↘ ...