ICN2 workshop on research, strategy and innovation

Hotel Rey Don Jaime
Castelldefels, Barcelona
4-5 October 2018

ICN2
Institut Català de Nanociència i Nanotecnologia

ICN2 Strategy Presentation

Pablo Ordejón, Director

ICN2 Institut Català de Nanociència i Nanotecnologia

Member of:

BIST Barcelona Institute of Science and Technology

Institució CERCA Centres de Recerca de Catalunya

Generalitat de Catalunya Departament d'Economia i Coneixement

BOARD OF PATRONS:

CSIC Consejo Superior de Investigaciones Científicas

UAB Universitat Autònoma de Barcelona

ICN2 History in a Nutshell

Generalitat de Catalunya

ICN Institut Català de Nanotecnologia

2003

2006

CIN2 CENTRE D'INVESTIGACIÓ EN NANOCIÈNCIA I NANOTECNOLOGIA CAMPUS UAB, BELLATERRA, BARCELONA

"Centro Mixto"

ICN Institut Català de Nanotecnologia + CSIC

2013

ICN2 Institut Català de Nanociència i Nanotecnologia

2014

Severo Ochoa Award

2014-2017

CSIC

Integration in ICN2

CIN2 CENTRE D'INVESTIGACIÓ EN NANOCIÈNCIA I NANOTECNOLOGIA CAMPUS UAB, BELLATERRA, BARCELONA

In process of extinction

2017

Formal ascription of CSIC researchers to ICN2

2018

Severo Ochoa Award

Nanoscience and Nanotechnology: “There’s Plenty of Room at the Bottom”

Richard P. Feynman
Dec. 1959, APS Meeting @ CALTECH

Nanoscience and Nanotechnology:
"There's Plenty of Room at the Bottom"

"Manipulating and controlling things at a small scale"

- Better electron microscopes (could we see an atom)? — STM; TEM
- How to we write small? — nanolithography
- Rearranging the atoms one by one — Atomic manipulation (STM)
- Miniaturization: The Encyclopaedia Britannica in the head of a pin — hard disks
- Machines at the atomic level? — Nanorobots; Nanomotors
- Computer miniaturization — 22 nm technology
- "Swallow the surgeon" — Diagnosis, drug delivery, ...

- New science of the Small and the Complex
- Interplay with Biology

- Enormous number of technological applications

Research Groups at ICN2

200 people
130 Researchers
40 Admin
30 Technicians / support

18 Research Groups

Nanoscale Manipulation and Characterization
Aitor Mugarza, Jordi Fraxedas, Jordi Arbiol, Klaas-Jan Tielrooij

- Nanoscopies (SPM): STM, AFM
- PES, XRD, ...
- Ultrafast Dynamics

Theory and Simulation
Stephan Roche, Pablo Ordejón

- Atomistic Simulations
- Electronic Transport

Nano-Bio Interfaces and Devices
Arben Merkoçi, Laura Lechuga, Jose Garrido

- Biosensors
- Bioanalysis
- Biofunctionalization
- Bioelectronics
- Implants

Nanodevice Fabrication and Physical Properties
Clivia Sotomayor, Gustau Catalán, Josep Nogues, Sergio Valenzuela

- Spintronics
- Magnetic Nanostructures
- Oxide Nanoelectronics
- Photonics and Phononics

Chemical Routes to Nanostructures
Daniel Ruiz, Daniel Maspoch, Victor Puntes, Pedro Gomez, Monica Lira

- Supramolecular Chemistry
- Inorganic Nanoparticles
- Energy-oriented materials (photovoltaics and batteries)

Research Support

Scientific-Technical Support Divisions

- Electron Microscopy Division
- Nanomaterial Growth Division
- Instrument Development Division

Nanofabrication Lab

Core Support Facilities

- Surface Analysis Photoemission (XPS/ARUPS)
- Molecular Spectrometry
- Physicochemical analysis
- Light Microscopy
- X-Ray Diffraction
- SQUID Magnetometry
- Bio-Lab

Technical Facilities

- Mechanical Workshop

Foundational Mission of ICN2

"The mission of ICN2 is **to achieve the highest level of scientific and technological excellence** in the area of nanoscience and nanotechnology. All the human and material resources, initiatives and activities developed by ICN2 are addressed to achieve this mission."

Statutes of ICN2, Article 5.2

The ICN2 strategy is steered towards achieving this mission

What is Excellence?

Difficult to define precisely

- Numerical indicators - Impact factors, citations, rankings….
- Benchmarking
- Impact (other than citations)
- Fundamental vs. Application - Oriented research
- Peer Review

….. but "I know it when I see it"

1964 - US Supreme Court Justice Potter Stewart's ruling about Jacobellis vs. Ohio case (referring to hard-core pornography in a case of motion picture obscenity accusation)

"Excellence is ultimately what your peers value as excellent"

F.E. Baldeston (1995) Managing Today's University: Strategies for Viability, Change and Excellence

Capacity Building

”Capacity is [the] ability of individuals, organizations and systems to perform appropriate functions efficiently, effectively and sustainably” (UNESCO 2005).

a) **Human resource development:** providing the skills, information, knowledge and training to enable actors to perform effectively.

b) **Organisational development:** the elaboration of management processes, structures and procedures within organisations as well as with regard to their relationships to other stakeholders (such as the business community and government).

c) **Institutional and legal framework development:** creating and maintaining legal and institutional arrangements that enable organisations, institutions and agencies to enhance their capacities

OECD Report on “Centers of Excellence as a Tool for Capacity Building”, Tomas Hellström, 2013
“Centres of Excellence and Capacity Building: from Strategy to Impact”, Tomas Hellström, Science and Public Policy, 45(4), 2018, 543–552

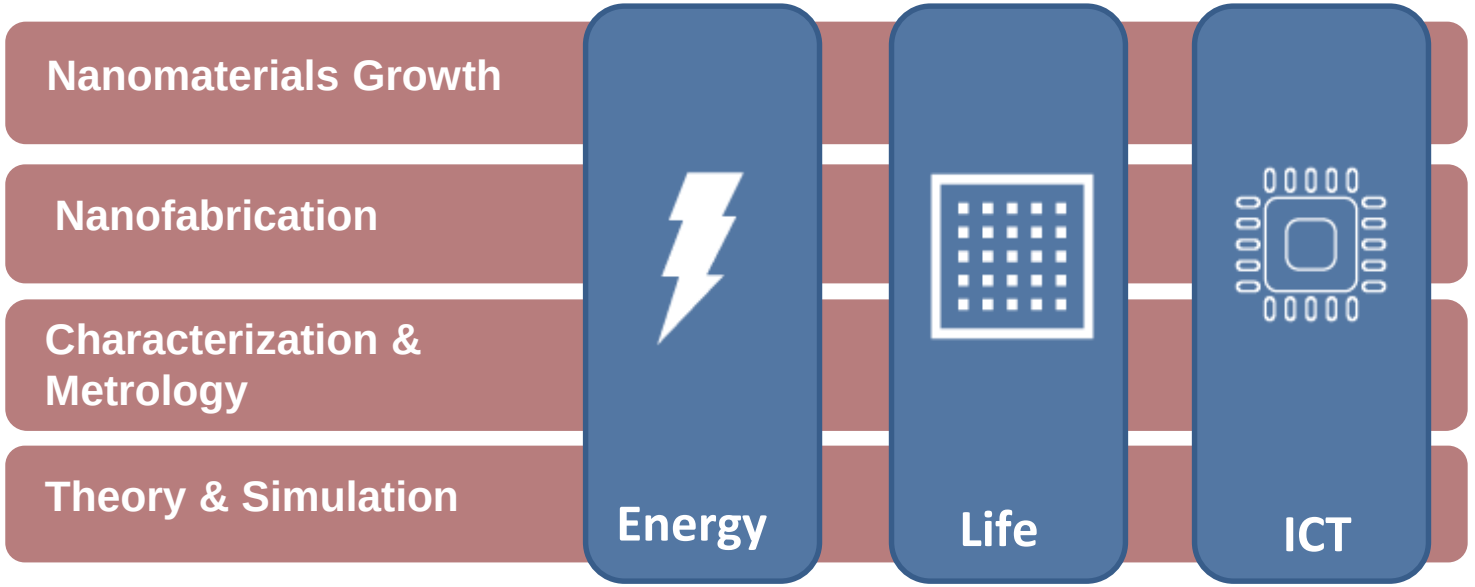
“Nanodevices for Societal Challenges”

A unifying, **strategic program** that brings together diverse lines of research of ICN2 in a coordinated, synergistic set of projects to significantly advance technologies along the whole process chain of **nanodevice design and fabrication**.

Severo Ochoa
Centre of Excellence Award
(2014-2018)

GOBIERNO DE ESPAÑA
MINISTERIO DE ECONOMÍA Y COMPETITIVIDAD

Basic knowledge to develop new, disruptive devices in three **Core Areas**:



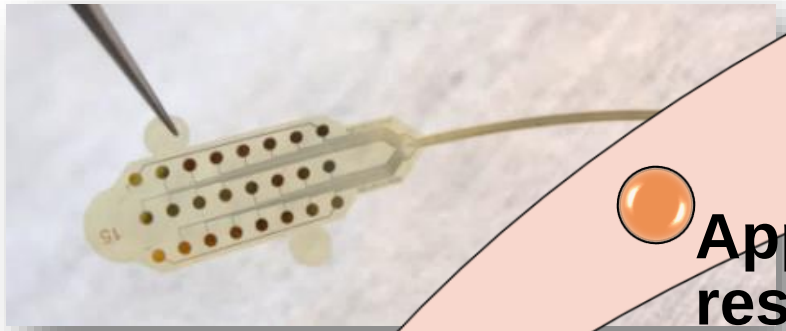
Severo Ochoa
Centre of Excellence Award
(2014-2018)

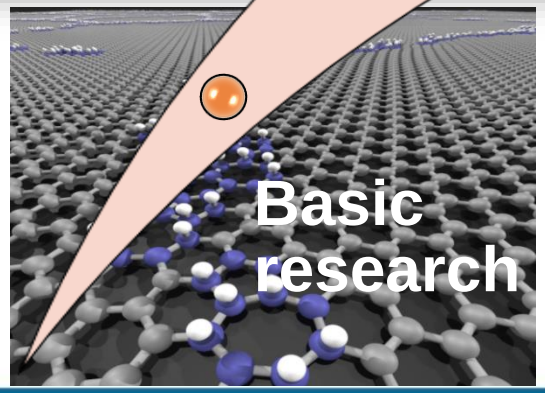
GOBIERNO DE ESPAÑA
MINISTERIO DE ECONOMÍA Y COMPETITIVIDAD

- The first **common scientific goals** for the institute
- Designed to **boost the collaboration between groups**
- With a target on **technological results**, based on fundamental science
- Professionalization of the **HR Department**, with a number of important actions
  - Recruitment processes based on OTM-R
  - Training Programs
  - People's developing officer
  - Equal-oportunities and diversity plan
  - ...
- Scientific Infrastructures – Clean Room & Mechanical Workshop
- Incorporation of 2 new groups
- Dissemination and Communication activities enhanced
- Boost of technological activity

HR EXCELLENCE IN RESEARCH

Graphene: the whole value chain





Basic research

Applied research

Spin-off companies

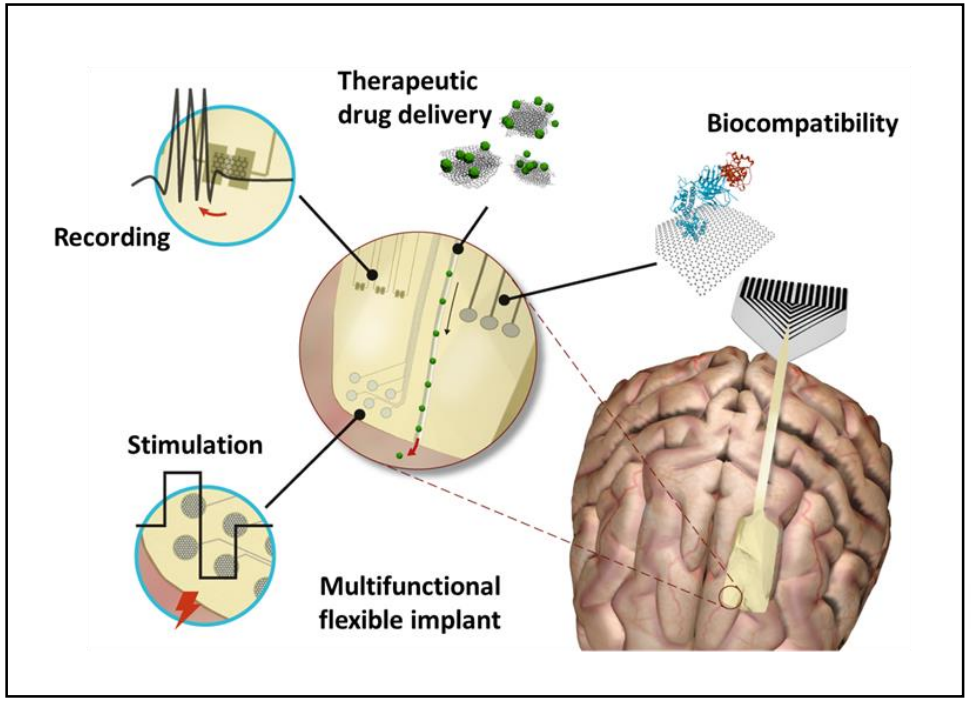
Product on the market

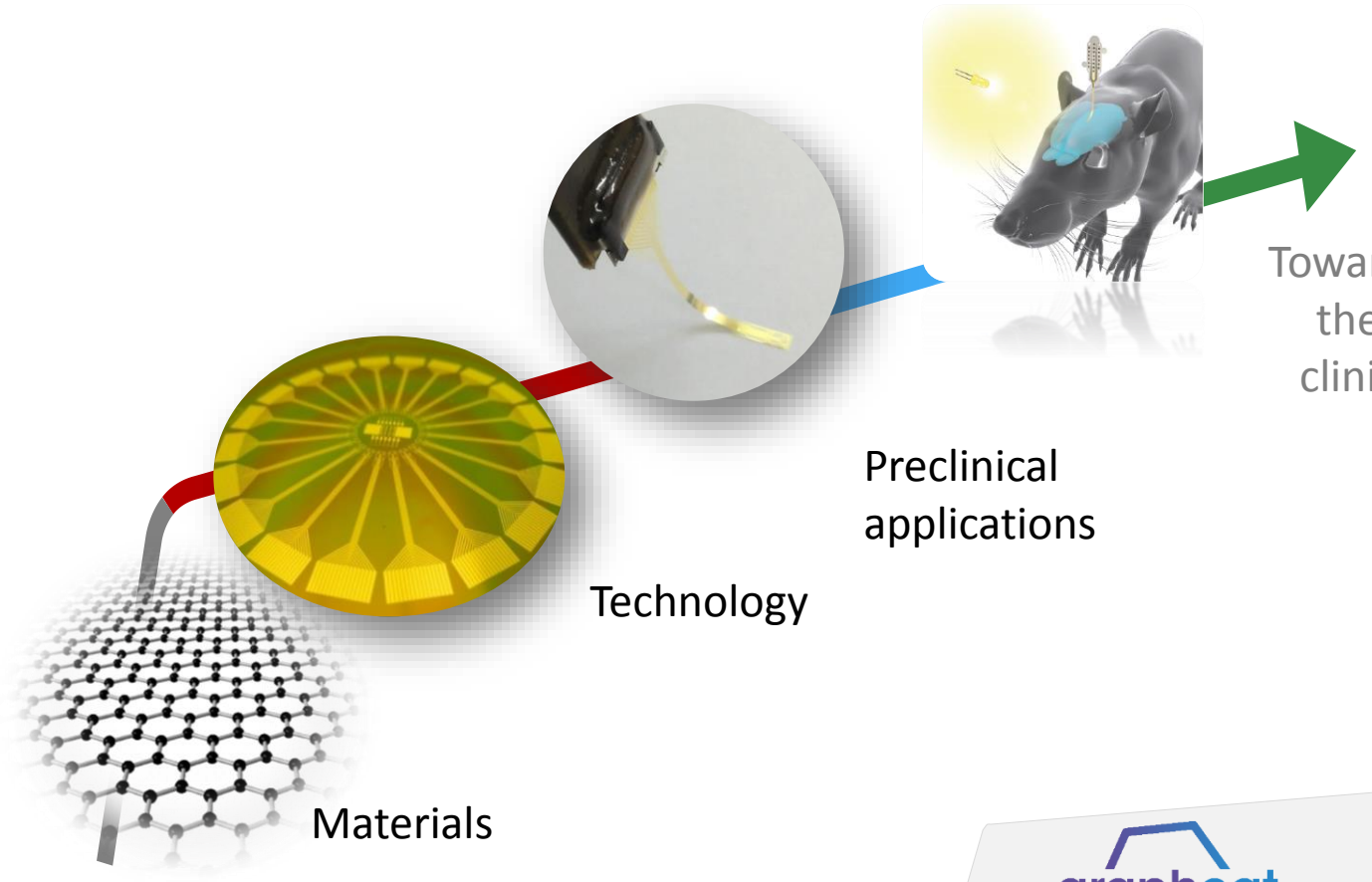
EARTHDAS

Graphenica Lab

From Research to the Clinic: graphene neural interfaces

Multifunctional cortical implants





GRAPHENE FLAGSHIP

BRAINCOM FET proactive

graphcat
The Graphene Community of Catalonia

J.A. Garrido

Collaborations with Industry (SO 2014-2018)

Henkel

Lucta

VITAE

SAMSUNG

LG
Life's Good

Lipotec

ferrer

nanotargeting

Chemipol

CARINSA
GRUPO

BARRAQUER

RUBI

Applus+

Almirall
Soluciones pensando en ti

GRUPO
Damm

Microsoft

eurofragance
FRAGRANCES & FLAVOURS

isovolta
GROUP

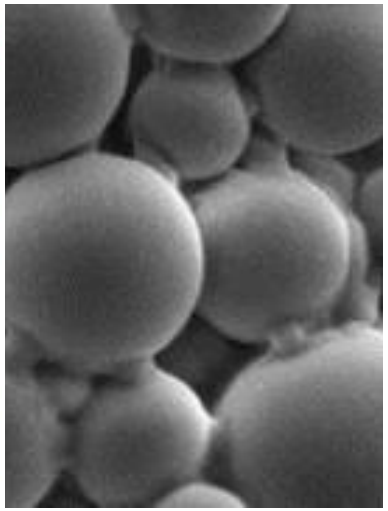
TECHNO-ALPIN

Lacer

ART·LENS
Prótesis Oculares

IBQ
FABRICS

Products in the market



Laundry softener

35.000 Kg of product
Income of 450.000 € for Lucta
Royalties of 13.251 € for ICN2

caprabo

Antifungal paints

Chemipol

Biogas+

APPLIED NANOPARTICLES
BioGAS+

Graphene Oxide Sensors

Graphenica

Spin-off companies based on ICN2 technology

LIFE

nanotargeting

APPLIED NANOPARTICLES

BIOGAS

ENERGY

sensia

EARTHDAS

paperdrop DIAGNOSTICS

Future chromes

SIMUNE ATOMISTIC SIMULATIONS

AHEAD THERAPEUTICS

BiOD Bio. Optical. Detection.

Graphenica Lab

ICT

Spin-off – Two likely success stories

AHEAD THERAPEUTICS

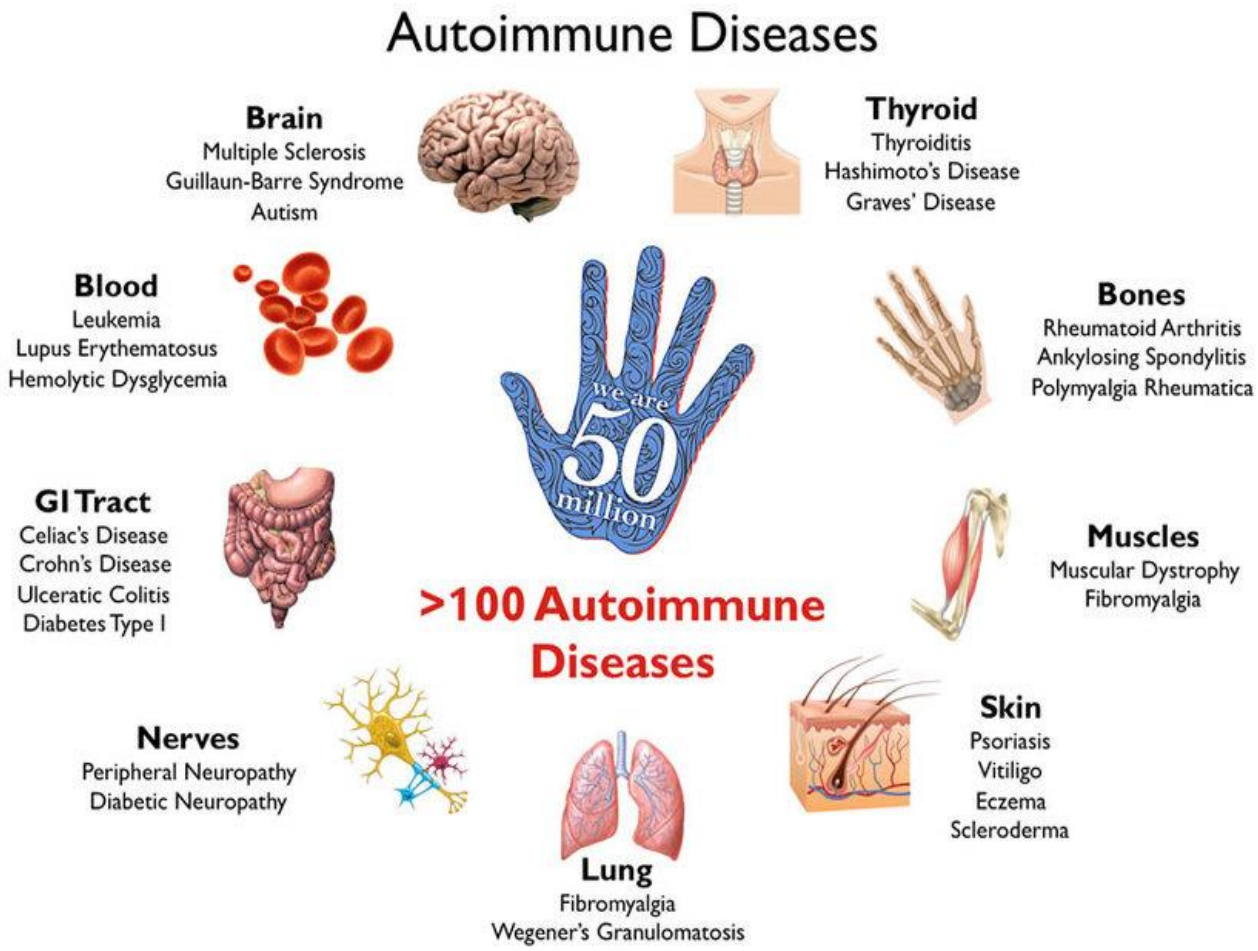
ICREA

IGTP Germans Trias i Pujol Research Institute

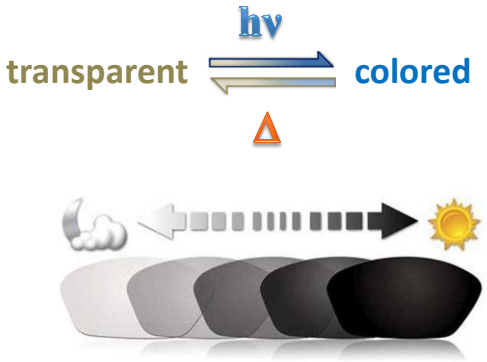
D. Maspoch

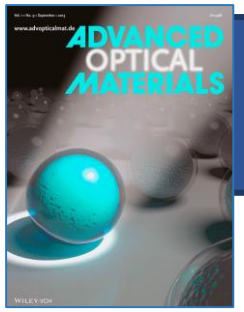
Liposme as a nanocapsule

Goal: Clinical Trials (humans)
5 years
Needs: 5.2 M€
Raised: 1.3 M€



Futurechromes





Technology: fast changing photochromic coating. Patent and publication

Futurechromes, S.L.
Spin-off created on 6/2014
ICN2 joins the Spin-off on 4/2015

CSIC

R&D and Distribution Agreement with a US global glasses manufacturer.

New joint US patent application by ICN2, CSIC, Futurechromes and US Company.

CSIC
Consejo Superior de Investigaciones Científicas

CSIC patent license.
CSIC received royalties
~ 83 k€ until now.

>1 M€ investment (100% private)
No public funding.

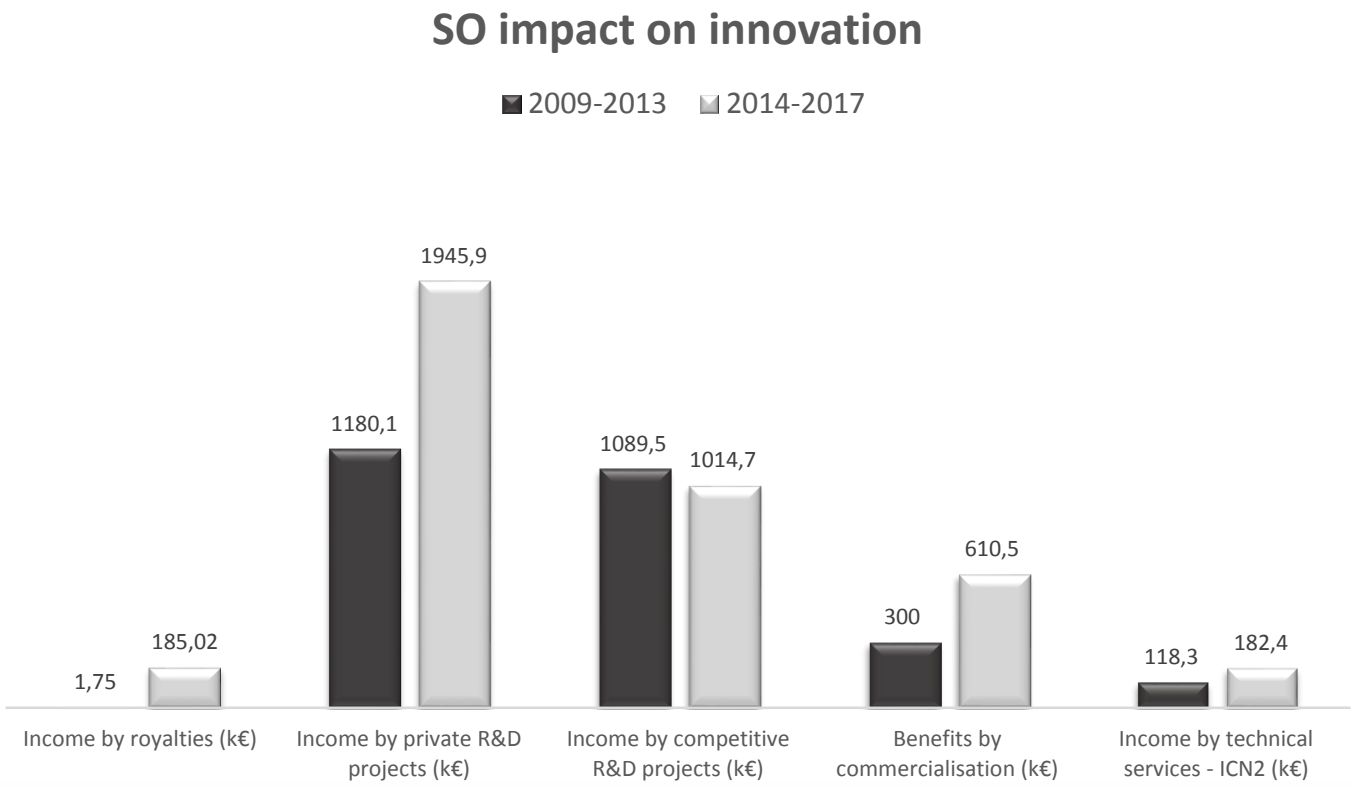
Commercial Product in TRL=6 (pre-production).
Royalty of 0,5US$/glass sold during 20 years.
Worldwide sales from 2018.

Severo Ochoa

Centre of Excellence Award

(2014-2018)

GOBIERNO DE ESPAÑA
MINISTERIO DE ECONOMÍA Y COMPETITIVIDAD

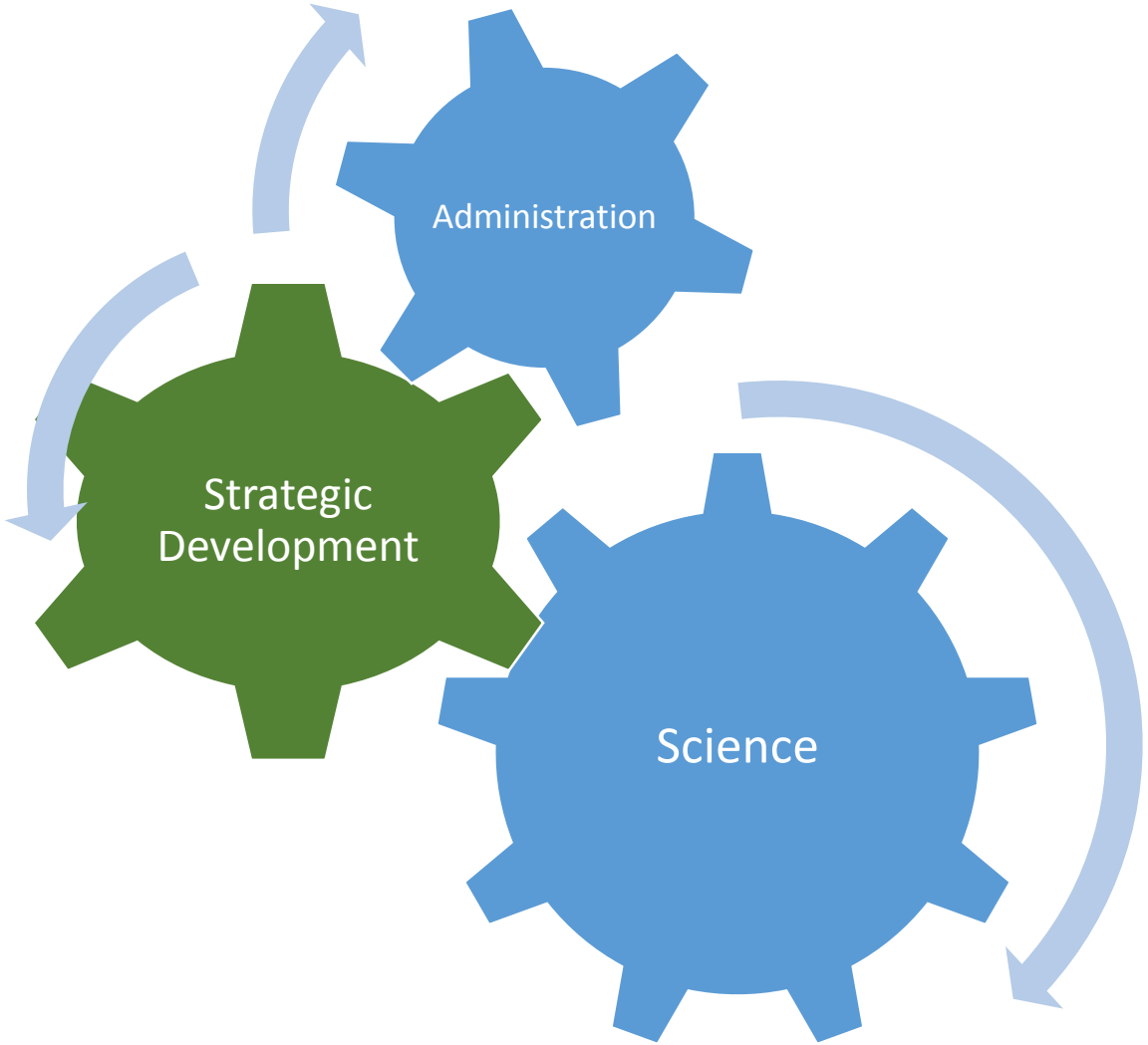


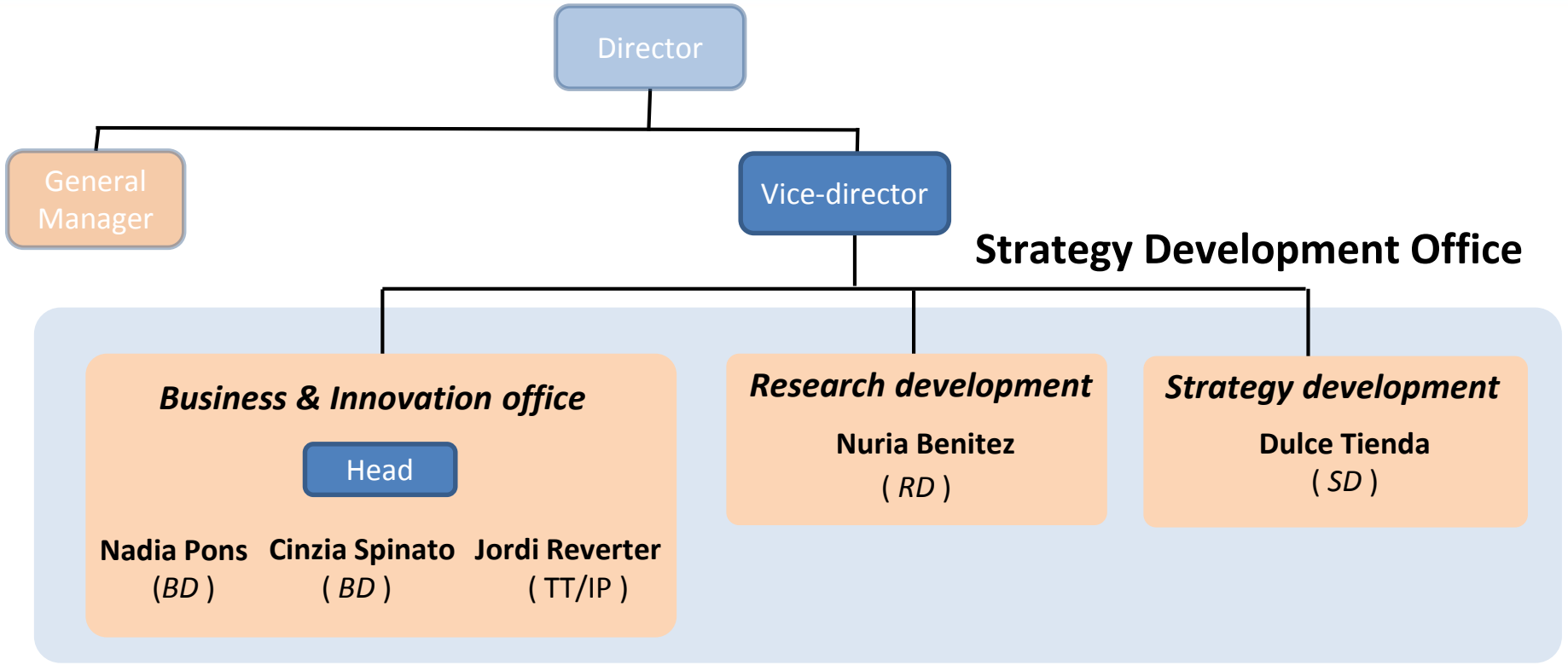
Severo Ochoa
Centre of Excellence Award

(2018-2022)

How do we jump to the next level?

Organizational Development





Roles of the Strategy Development Office

Strategy Development: Prepare and coordinate projects of strategic importance to the ICN2.

Research Development: Provision of advanced research funding support to ICN2 researchers.

Technology Transfer/IP Strategy: IP strategy & management, technology transfer support.

Business Development: Assist in developing and maintaining relationships with industry and the business community.

Strengthening the Technology Outcomes

- **Business and Technology Office**
- **Technology Accelerator:** resources (lab space, economic support for technology valorisation, mentoring) to support the early stages of technology transfer and drive value generation
- **ICN2 Venture Programme:** a financial instrument to allow participation in spinoffs based on emerging ICN2 technologies
- **KTT & BD Training and Mentoring Program**: an annual programme to identify and train ICN2 entrepreneurs.
- **A Roadmap for advancing TRLs**
- **Increase the links with the business sector,** by means of several actions

Recruiting

- **Junior Group Leader recruitment.** One already hired (Klaas-Jan Tielrooij, previously postdoc at ICFO); recruiting 2 more. Includes a generous start-up funding for expenses, personnel and equipment
- **Continued alignement of ICN2 recruitment procedures with European/International standerds.** OTM-R
- **Participation in several H2020 COFUND projects**
- **Relocation package for international PhD and Postdocs fellows**
- **International Woman Master's Grants.** Sponsoring 2 women per year for their Master completion in the Barcelona area, performing their Master Project at ICN2

Training

- **The ICN2 PhD Programme,** designed to boost the excellence of doctoral research at the ICN2, with an admission protocol, a training path, mentoring, and periodic assessment.
- **The ICN2 Mentoring Programme**
- **An Industrial PhD Programme**
- **The ICN2 Postdoctoral Training Programme,**

- **Research Competence Framework:** Aligning with the EC initiatives, define and implement a researcher competence framework, with competences defined for each career stage, based on the ECs research profile descriptors, with an emphasis on transferable skills.
- **Adoption of a Career Development Management Software** – control, tracking and management
- **Strengthening the ICN2 community**

Addressing the Gender Gap

The gender dimension will be addressed in all contexts:

- **ICN2 PhD Programme –** dissemination, selection panels including women, inclusion of members of the ICN2 Gender and Equality Committee in the selection processes
- **Mentoring Programme** – Roadmap designed for women
- **Working conditions and benefits:** family-friendly working conditions, incl. flexible working hours, temporary home-based working for personal/family reasons
- **ICN2 Governance:** Gender dimension and gender balance included into every decision-making process**.**

Specific tools:

- **Gender indicators used for internal evaluation at the group / unit level**
- **Membership of women in science associations**
- **Women in Science Seminars**
- **Travel allowances for women researchers**

ICN2 workshop on research, strategy and innovation

Thank you, and enjoy the Workshop!

Organised by:

ICN2 Institut Català de Nanociència i Nanotecnologia

Endorsed by the EARMA alumni:

EARMA
EUROPEAN ASSOCIATION OF RESEARCH MANAGERS AND ADMINISTRATORS