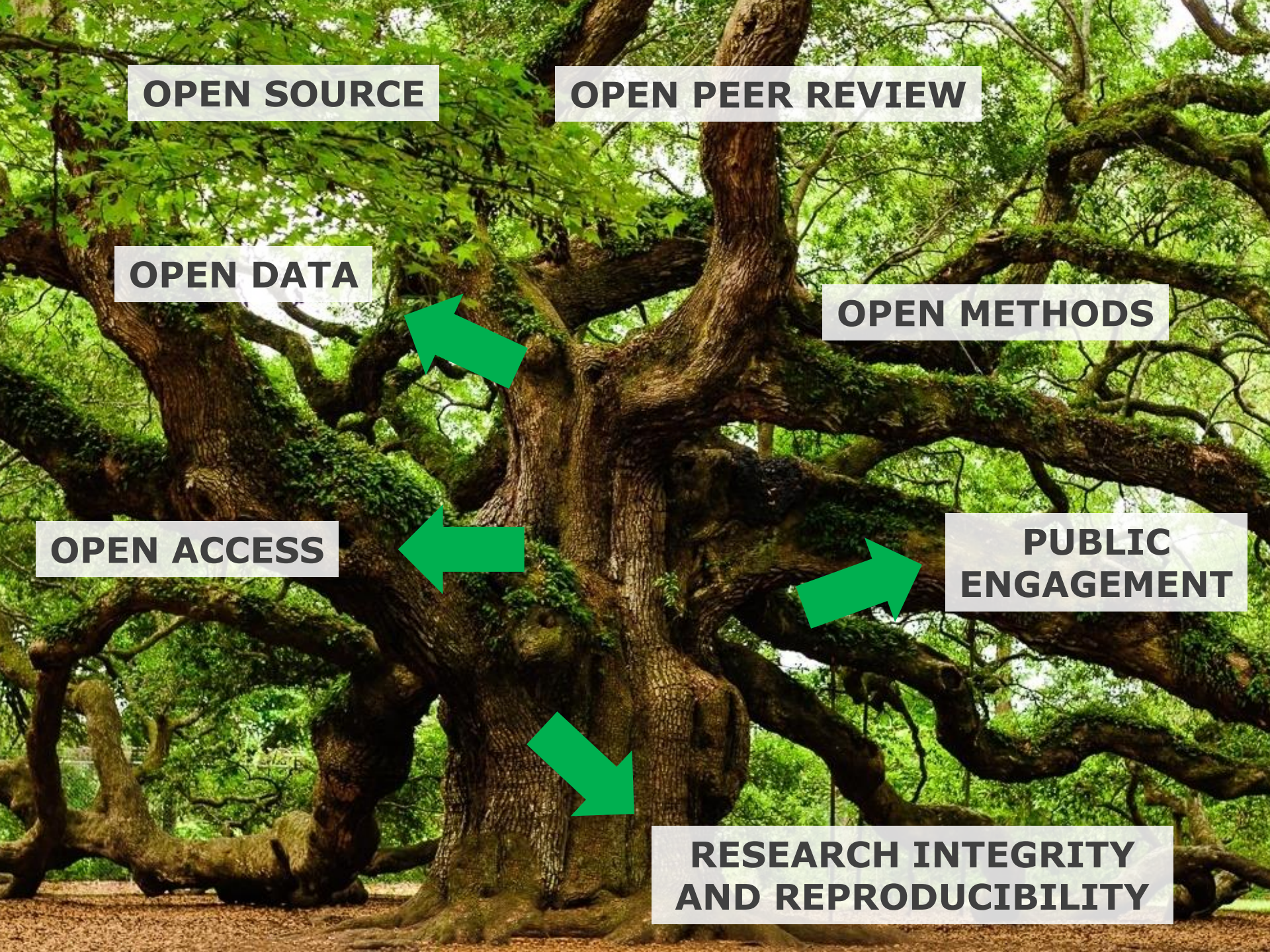
CRG
Centre for Genomic Regulation

Open Science: a perspective from a research institute and its researchers

Michela Bertero, PhD
Head of International and Scientific Affairs

EXCELENCIA SEVERO OCHOA

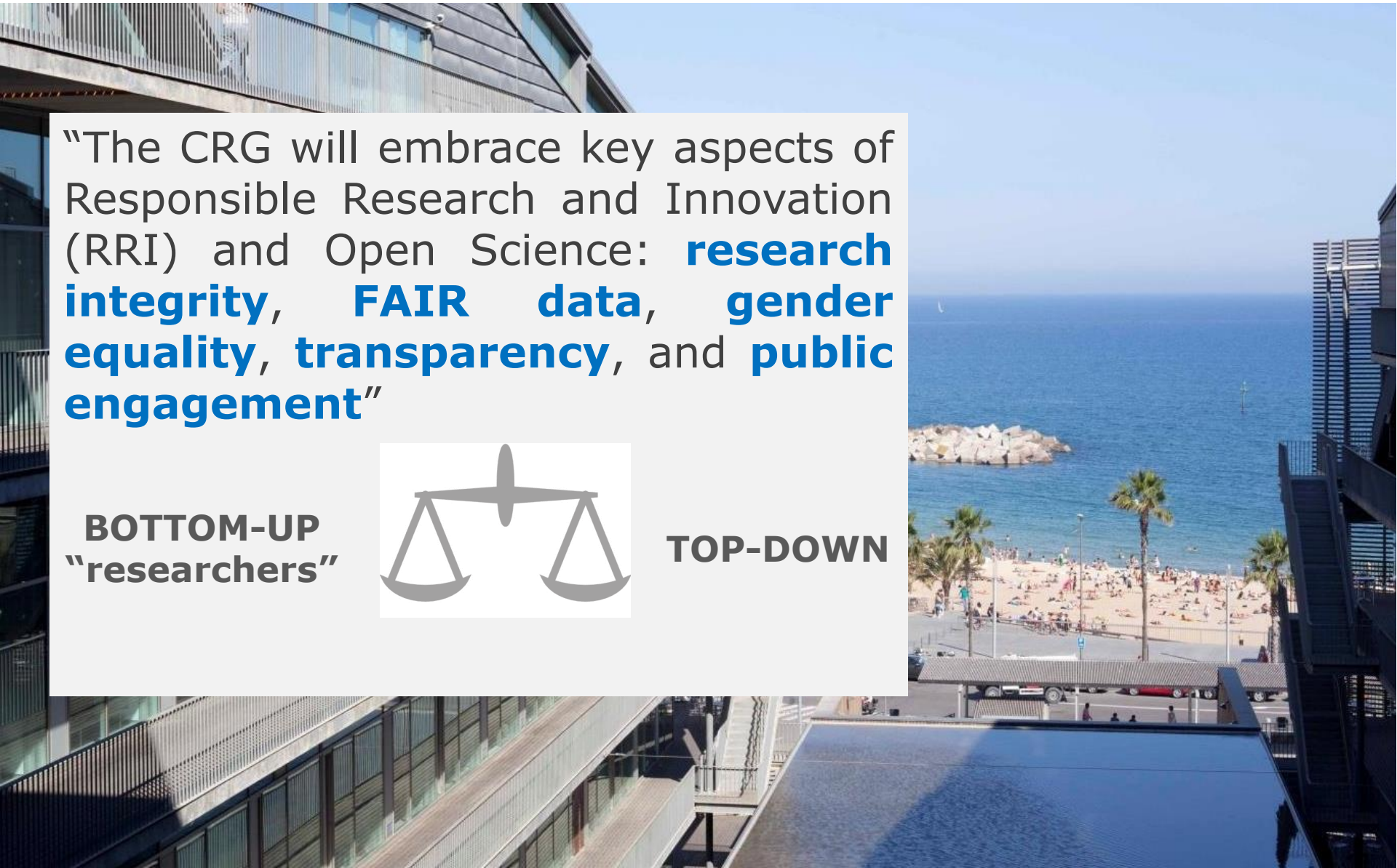

OPEN SOURCE
OPEN PEER REVIEW
OPEN DATA
OPEN METHODS
OPEN ACCESS
PUBLIC ENGAGEMENT
RESEARCH INTEGRITY AND REPRODUCIBILITY

THE CRG IN A NUTSHELL

- ✓ Scientific focus on biomedicine: genomics, epigenetics, stem cells…
- ✓ Founded in 2000, Barcelona
- ✓ 519 staff - 64% foreign researchers (43 nationalities)
- ✓ 25 groups + 7 core facilities
- ✓ International PhD/postdoc programmes
- ✓ >200 publications/year (~70% gold OA)
- ✓ **Open science as pillar in strategy plan (2017-2021)**

EXCELENCIA SEVERO OCHOA

OPEN SCIENCE AS PILLAR IN OUR STRATEGY



"The CRG will embrace key aspects of Responsible Research and Innovation (RRI) and Open Science: **research integrity**, **FAIR data**, **gender equality**, **transparency**, and **public engagement**"

BOTTOM-UP
"researchers"

TOP-DOWN

“I am open in order to be more efficient. When you think about the most efficient systems it is clear that this system is open”.

Gullaume Filion, CRG – International Open Access Week 2017


RESEARCH INTEGRITY
AND REPRODUCIBILITY

REPRODUCIBILITY

nextflow

A computational platform that enables **reproducibility** in bioinformatics and **big data**

Cedric Notredame, CRG

Course@CRG (September 2017):

- International course launched before publication
- 31 participants from all over the world
- Hackathon and community building

£2m target as Barcelona genomics business sets up in Cambridge

An example of **Open Innovation**: new start-up, Lifebit, in Cambridge

ETHICS AND RESEARCH INTEGRITY

POLICY

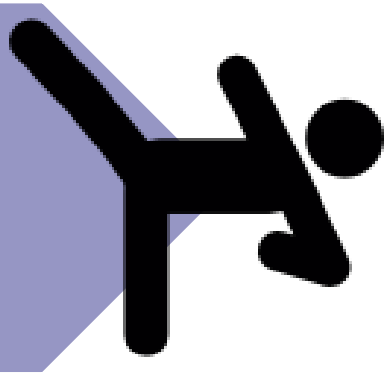
- Code of Conduct and Good Practice
- Code of good scientific practice
- Intellectual Property
- Conflict of Interest and Scientific Misconduct

TRAINING

- “Science in Action” for PhD students
- EPIGEUM online training for all new researchers
- Specialized sessions for junior researchers
- Embedding RI in technical courses

PRACTICE

- PRBB WG on Good Scientific Practice
- Word café on integrity in scientific publishing
- PRBB survey
- Other awareness events




BIOETHICAL
SYSTEM
CLINICAL RESEARCH
STEM CELLS


Reasons
for scientific
misconduct?
Which
misconduct
have
you already
experienced?
1957
CHEVROLET


OPEN DATA
OPEN ACCESS

A CULTURE OF OPENESS IN GENOMICS

SCIENTIFIC DATA | SCIENTIFIC DATA

Data Matters: Interview with Ben Lehner

October 19, 2016 | 1:10 pm | Posted by Andrew Hufton | Category: Data Matters, Featured

Ben Lehner is a group leader at the EMBL/CRG Systems Biology Research Unit, in Barcelona, Spain.

Could you briefly introduce your own research?

My lab works on genetics, essentially. It's a mixture of producing our own data, and using other people's data. We're a combined wet and dry lab, and we work with organisms and data from bacteria, through yeast, worms, all the way up to human clinical genetic data.

Broadly, how open do you think the human genom data?

I think ther
the human
that is des

At the end of the day, we have to remind ourselves why we are funding or doing clinical research – this is to increase our understanding of human biology and of the causes of disease and how to prevent and treat them. Not sharing data slows all of this down. It isn't an efficient way to spend money on science. I also personally think that it isn't ethically acceptable either.

THE EUROPEAN GENOME-PHENOME ARCHIVE

Resource for permanent **secure archiving** and **sharing** potentially identifiable bio-molecular and phenotypic data from biomedical research projects.

The EGA in numbers

- > 1,400 Studies
- > 4,900 Datasets
- > 620 Data Providers
- > 11,500 Data Requesters
- > 4.5 Petabytes

THE EUROPEAN GENOME-PHENOME ARCHIVE

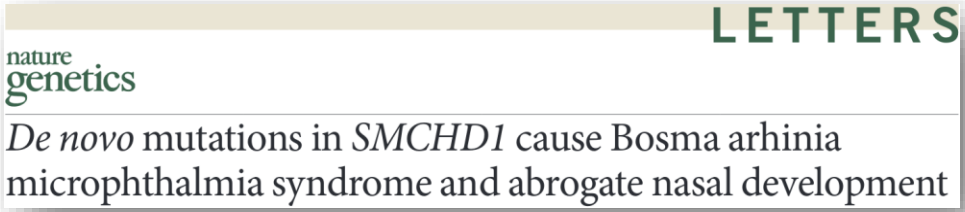
The relevance of data sharing in **personalized medicine**

Data stored at EGA are useful for the research and medical community.

Data re-usage is contributing to clinical practice.

- Identifying genetic factors related to human diseases
- Improving diagnosis, prognosis and treatments

Shedding light on rare human diseases


LETTERS

nature genetics

De novo mutations in *SMCHD1* cause Bosma arhinia microphthalmia syndrome and abrogate nasal development

- EGA Study reference: EGAS00001002193
- Bosma Arhinia Microphthalmia Syndrome (BAMS) is an extremely rare condition, characterized by complete absence of the nose and presence of ocular defects
- Causal mutations have been discovered in all the 14 out of 50 worldwide reported cases under analysis
- SMCHD1 gene has a very prominent role during craniofacial development

OPEN ACCESS

PUBLICATIONS

- Open Access Policy
- Dedicated support
- Access to University repository
- Training for PhD students
- Raising awareness activities
- Documentalist WG

DATA

- "Genomics culture" of sharing
- Specialized databases (EGA)
- Electronic Lab Notebooks
- Policy/training on data management under development

OPEN ACCESS CHALLENGES

PUBLICATIONS

- Ensuring high quality peer review
- Reputation of certain journals
- "Mixed feeling" about BiorXiv
- Research evaluation system
- High costs for gold Open Access

DATA

- Not every field has high quality repositories, standards, etc.
- High costs and competition of resources
- Complexity of law framework
- Lack of skills


PUBLIC
ENGAGEMENT

PUBLIC ENGAGEMENT

"In a democratic society, citizens have to decide on the limits of science"

Roderic Guigó, CRG

CITIZEN SCIENCE

Scientific research conducted, in whole or in part, by large numbers of amateur (or non-professional) scientists (from "Wikipedia")

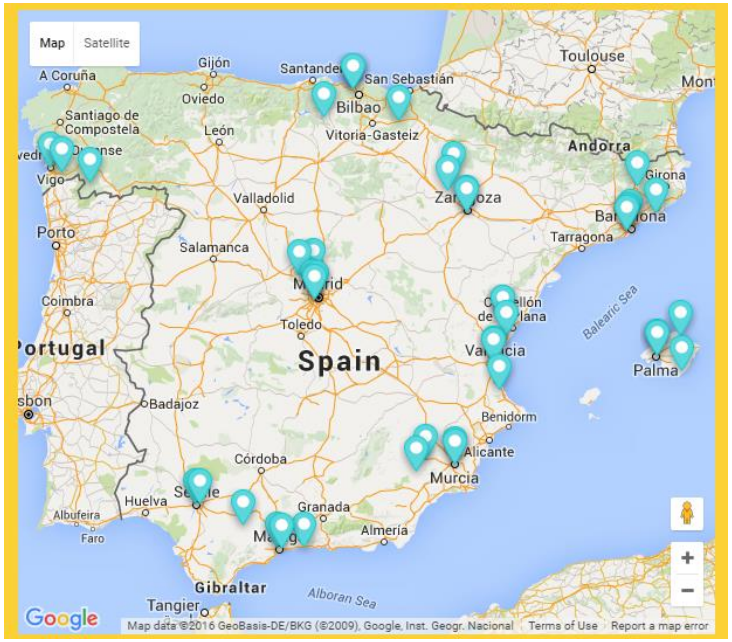
- ✓ Anyone can participate: no special background is needed because you learn by participating in the project
- ✓ Participants use the same protocol so data can be integrated and be high quality
- ✓ Results are open and shared
- ✓ Citizen participation adds value to research projects

Source: httpshttp://www.wholehealthnow.com/courses/microbiome.html

Source: https://io9.gizmodo.com/is-it-really-worth-having-your-gut-bacteria-tested-1507503526

CITIZEN SCIENCE: *SACA LA LENGUA*

SACALALENGUA
El proyecto del microbioma bucal



- ✓ Investigating the **mouth microbiome and its relationship with health and life style**
- ✓ 1st edition: 40 Spanish schools; 2nd edition: same schools 2 years later, and patient associations
- ✓ **>7.000 participants** all over Spain
- ✓ Citizens´ participation: hypothesis, survey, samples, analysis
- ✓ Didactic material, training, educational events, continuous feedback
- ✓ http://www.sacalalengua.org/

Iniciativa de: CRG Centre for Genomic Regulation
Entidades colaboradoras: eduCaixa Obra Social "la Caixa" · CREAL
Con el apoyo de: Excelencia Severo Ochoa · illumina · eppendorf

CITIZEN SCIENCE: *SACA LA LENGUA*

THE SCIENTISTS

- Samples´ richness
- New ideas for survey and hypothesis
- New scientific knowledge
- New scientific publications
- Feeling rewarded
- Improved skills to communicate science to lay audience

THE CITIZENS

- New knowledge and curiosity
- Feeling useful
- "Our opinion is valuable"
- Feeling rewarded
- Visibility and acknowledgment

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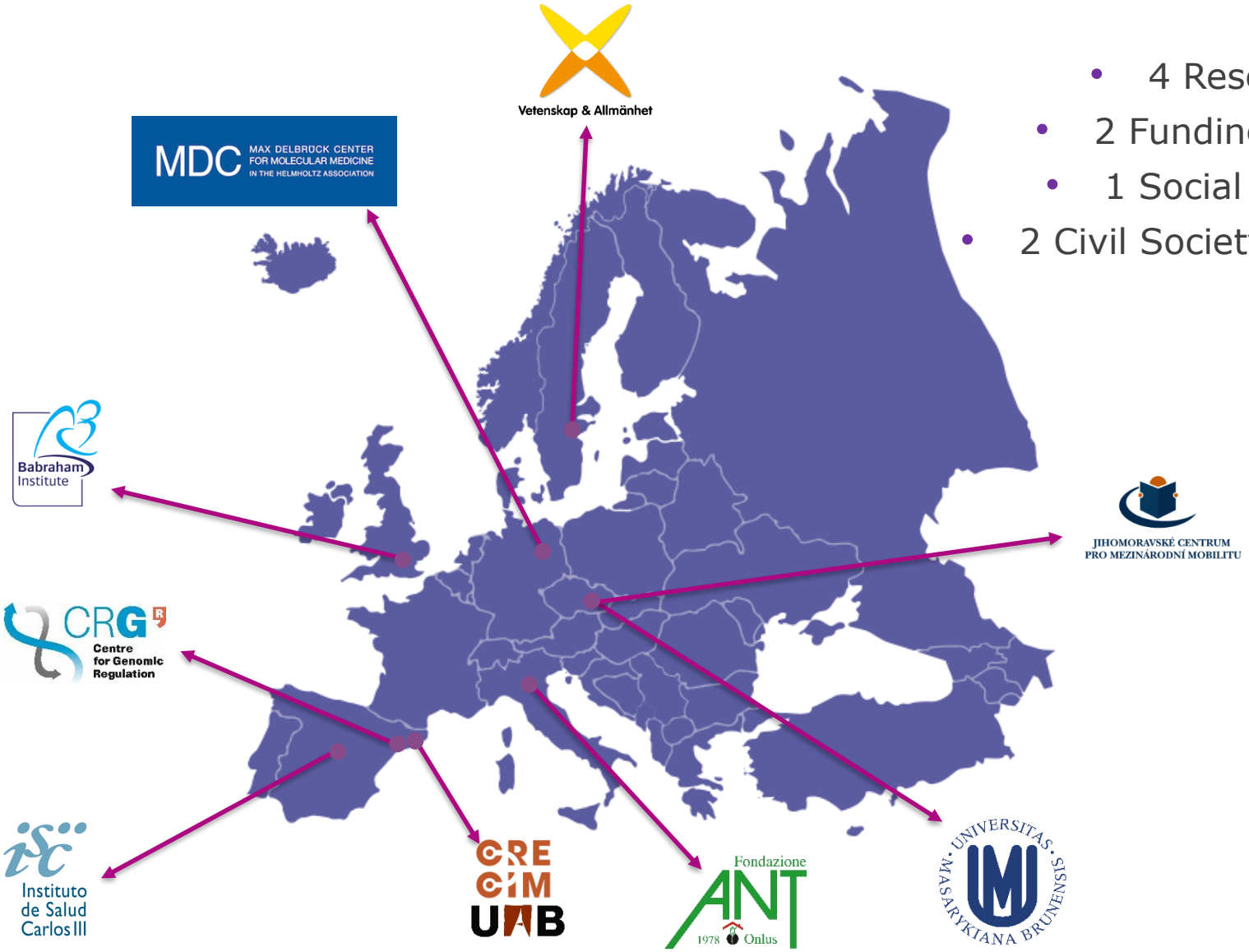
H2020 ORION PROJECT

From May 2017 to April 2021, 9 organizations seek to "embed" ***RRI principles*** *(ethics, gender, governance, open access, public engagement, and science education) in Research Performing and Funding Organisations by implementing the concept of* ***open science****.*

www.orion-openscience.eu

@ORION_OpenSci

ORION PARTNERS



- 4 Research Institutes
- 2 Funding Organizations
- 1 Social Sciences group
- 2 Civil Society Organizations

ORION EXPERIMENTS

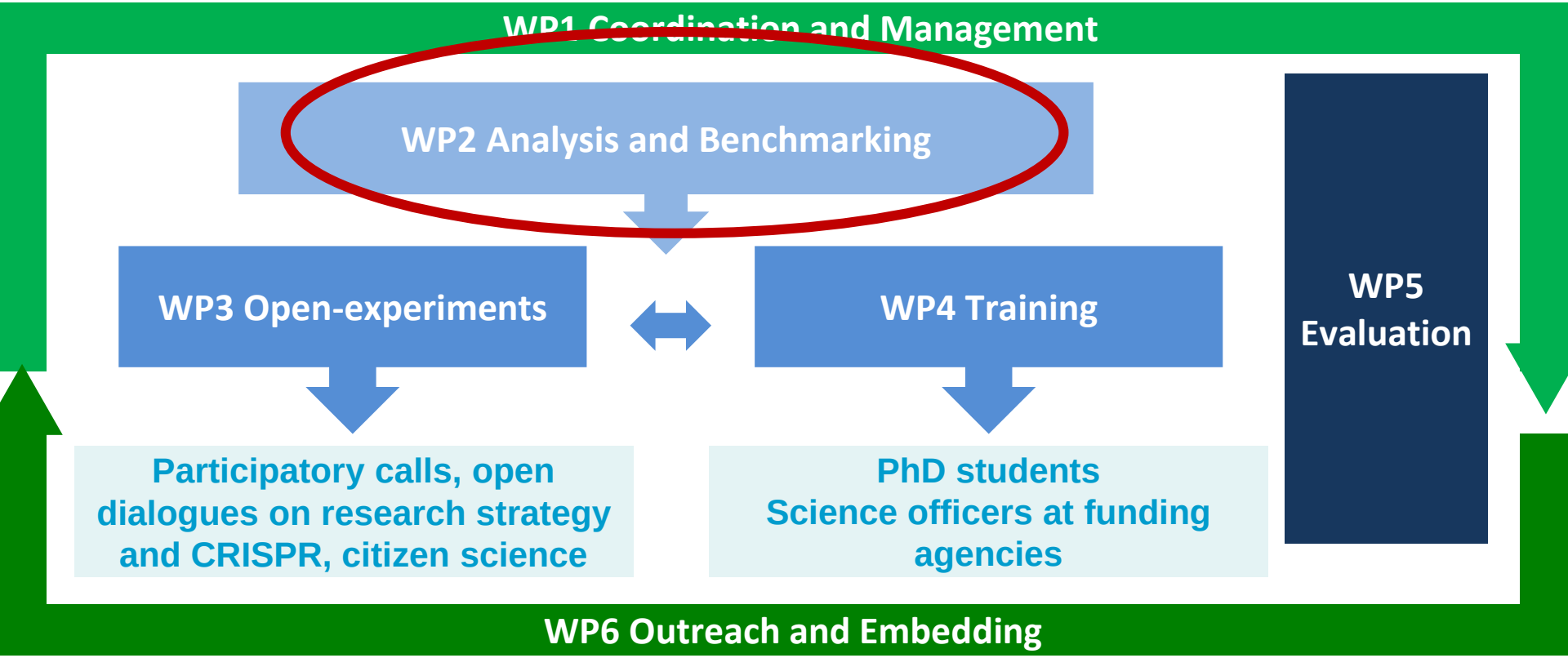
The project will use tools as training, public dialogues and citizen science initiatives to ***promote institutional and cultural changes in scientists, institutions and funders****.*

"OPEN EXPERIMENTS"

- More "open" funding schemes
- Dialogues on research strategy
- Dialogues on genome editing
- Citizen science

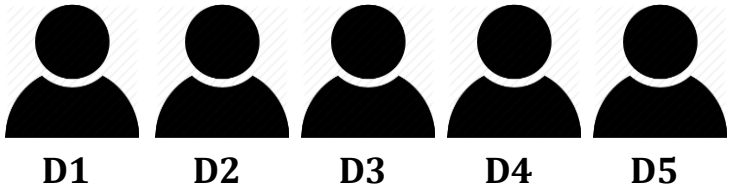
Source: http://staff.napier.ac.uk/services/information-services/research-cycle/Pages/home.aspx

ORION WORK PLAN



ORION: INTERNAL ANALYSIS

STEP 1: DIRECTORS´ INTERVIEWS



4 Directors of ORION RPOs
1 Director of Associated RPO

I. **PERSONAL OPINION** on Open Science/RRI: *What does Open Science mean to me (as director of….)?*

I. **STATE OF THE ART** of Open Science/RRI at my institution: *What is our starting point in Open Science/RRI? What are we doing in Open Science/RRI at the moment?*

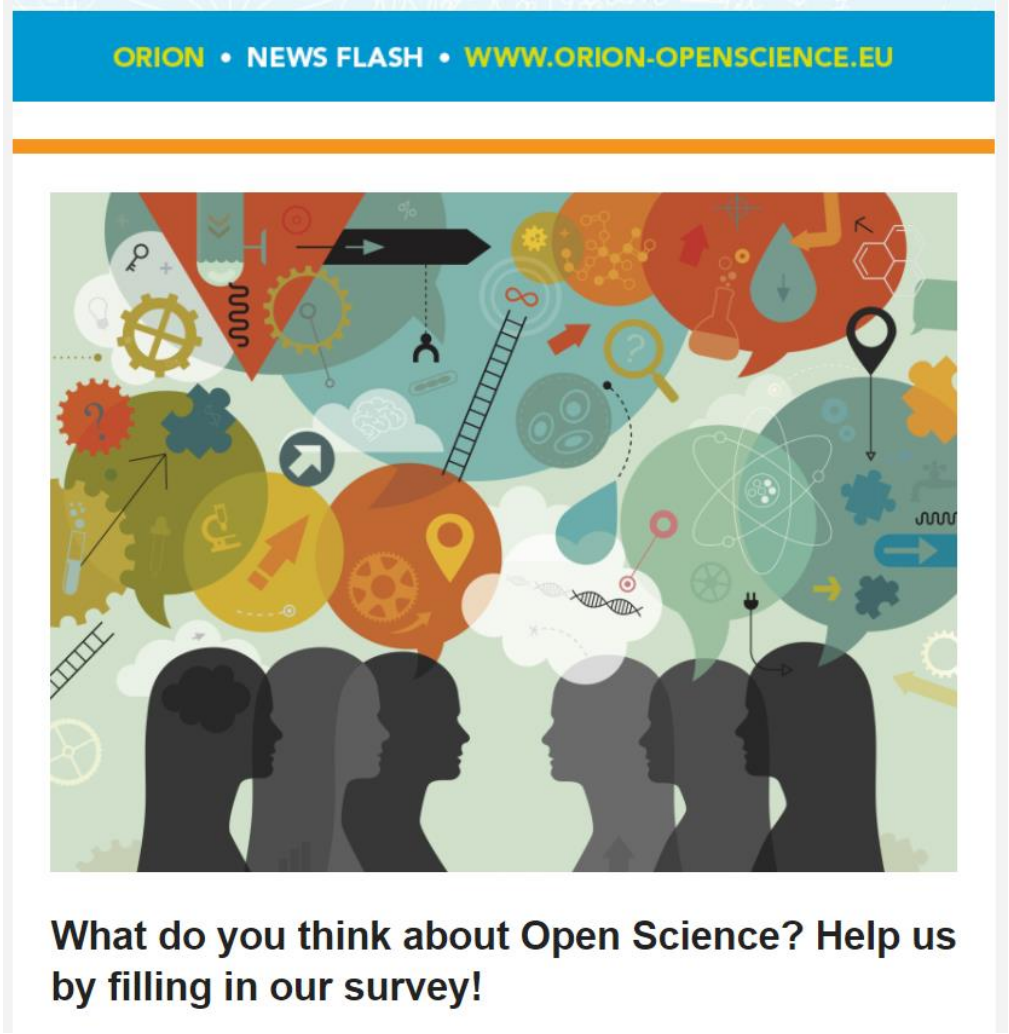
I. **FUTURE** of Open Science at my institution: *What do we expect to do in 4-year time about Open Science? What are next steps for us?*

45 min

Anonymity Consent form

Audio & Video recorded

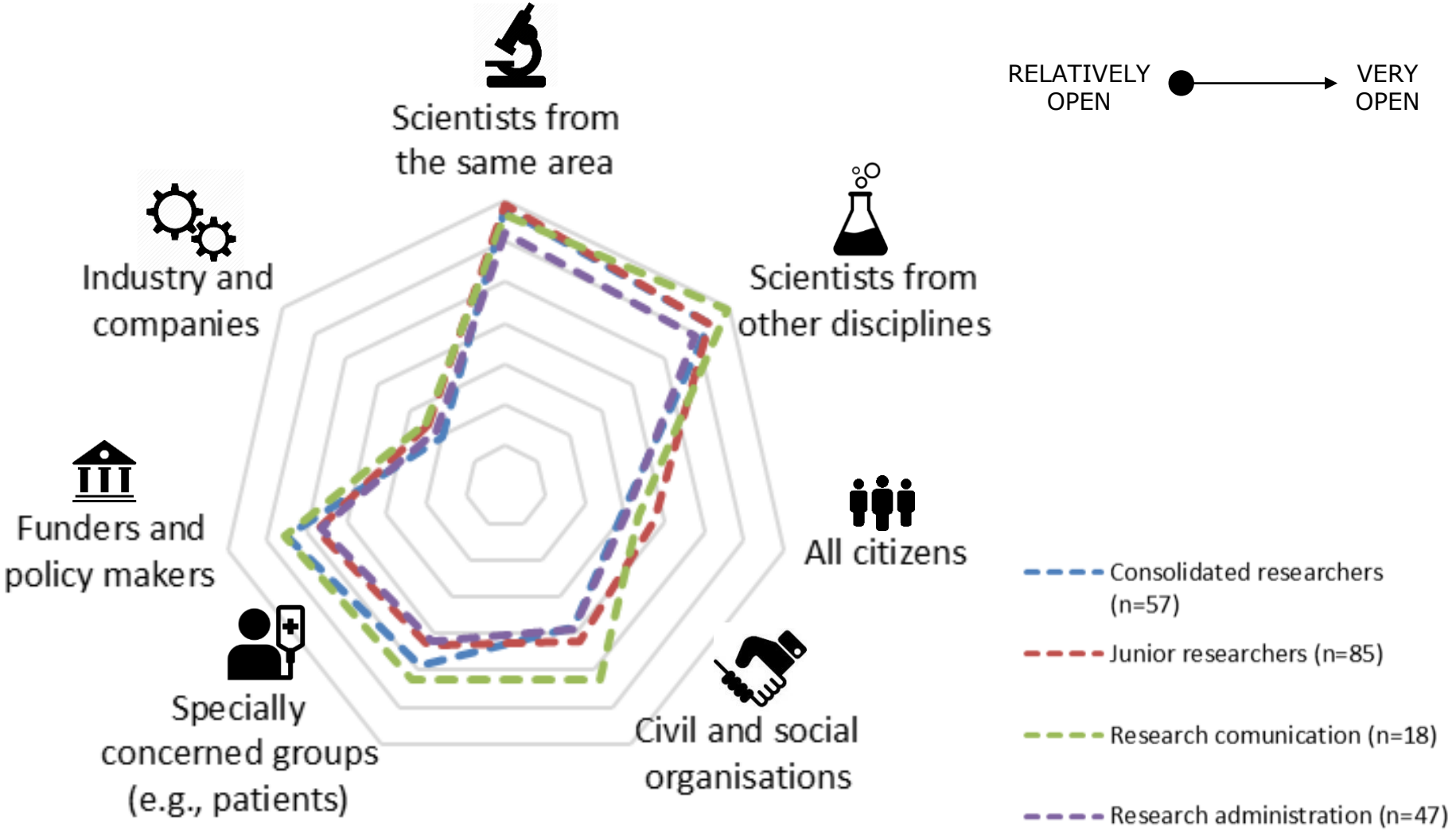
STEP 2: GENERAL SURVEY



- 10 Questions
- 5 Institutes
- Open to researchers and managers
- Target 20%
- Preliminary results (231 answers)

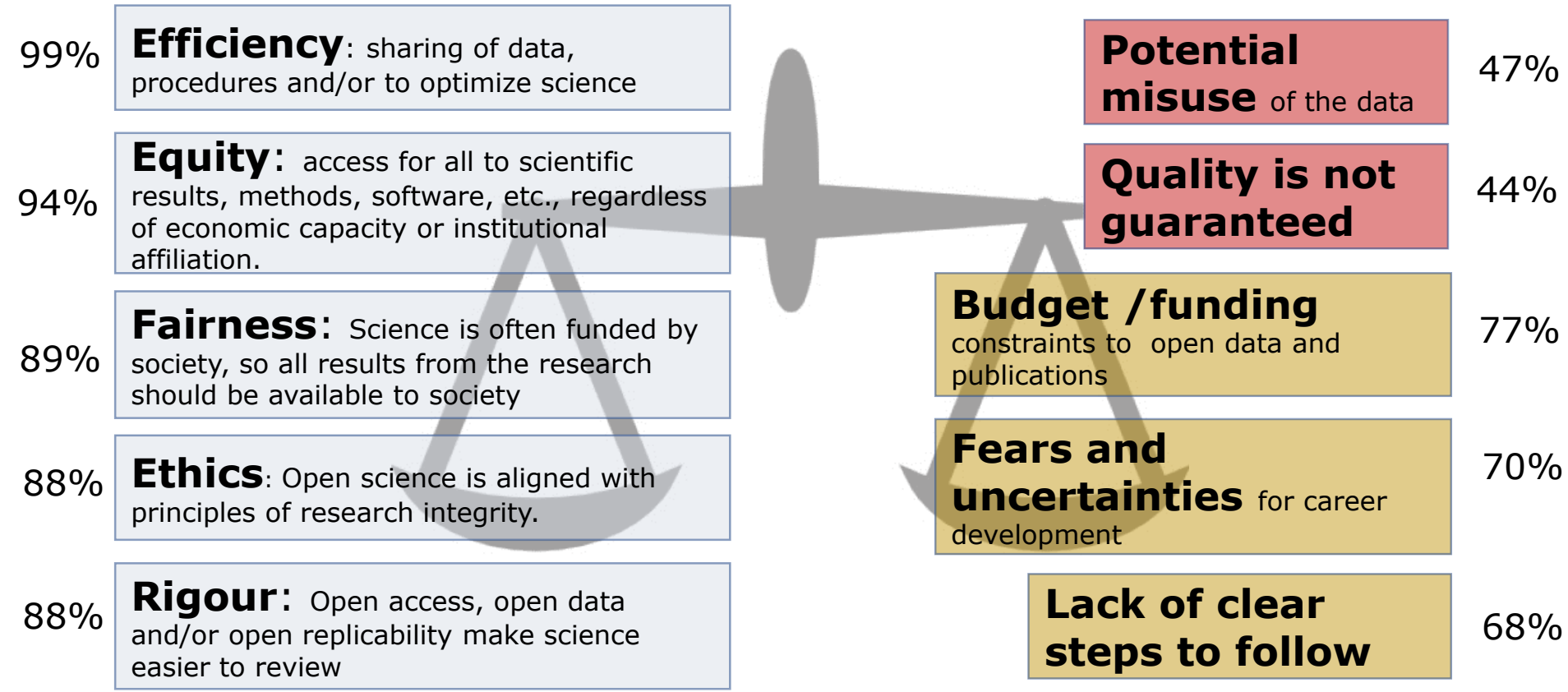
ORION: INTERNAL ANALYSIS

OPEN TO WHOM?



ORION: INTERNAL ANALYSIS

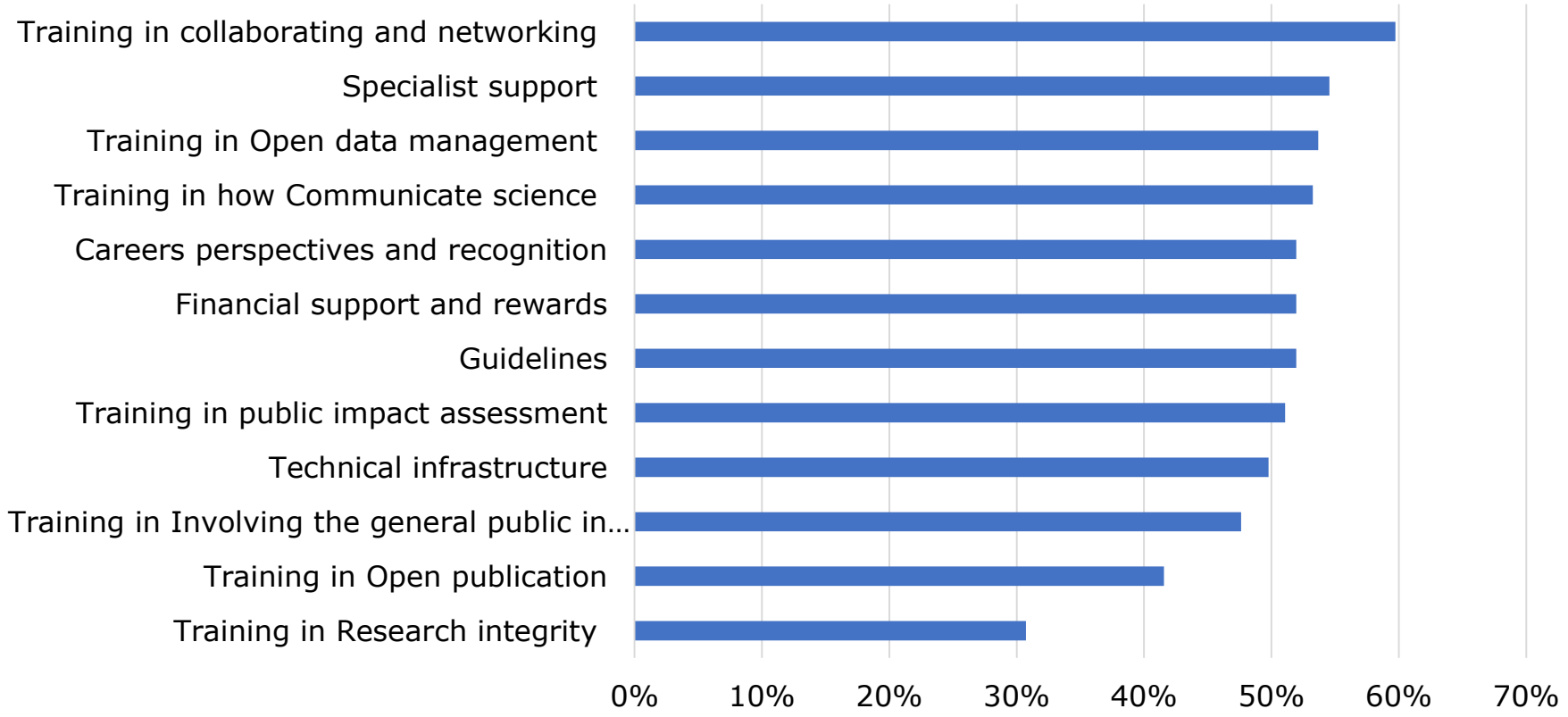
PROS, CONS and BARRIERS



Number of participants who consider that those are important or the most important reasons for Open Science (blue) / against Open Science (pink) / barriers for Open Science (yellow) (n=231)

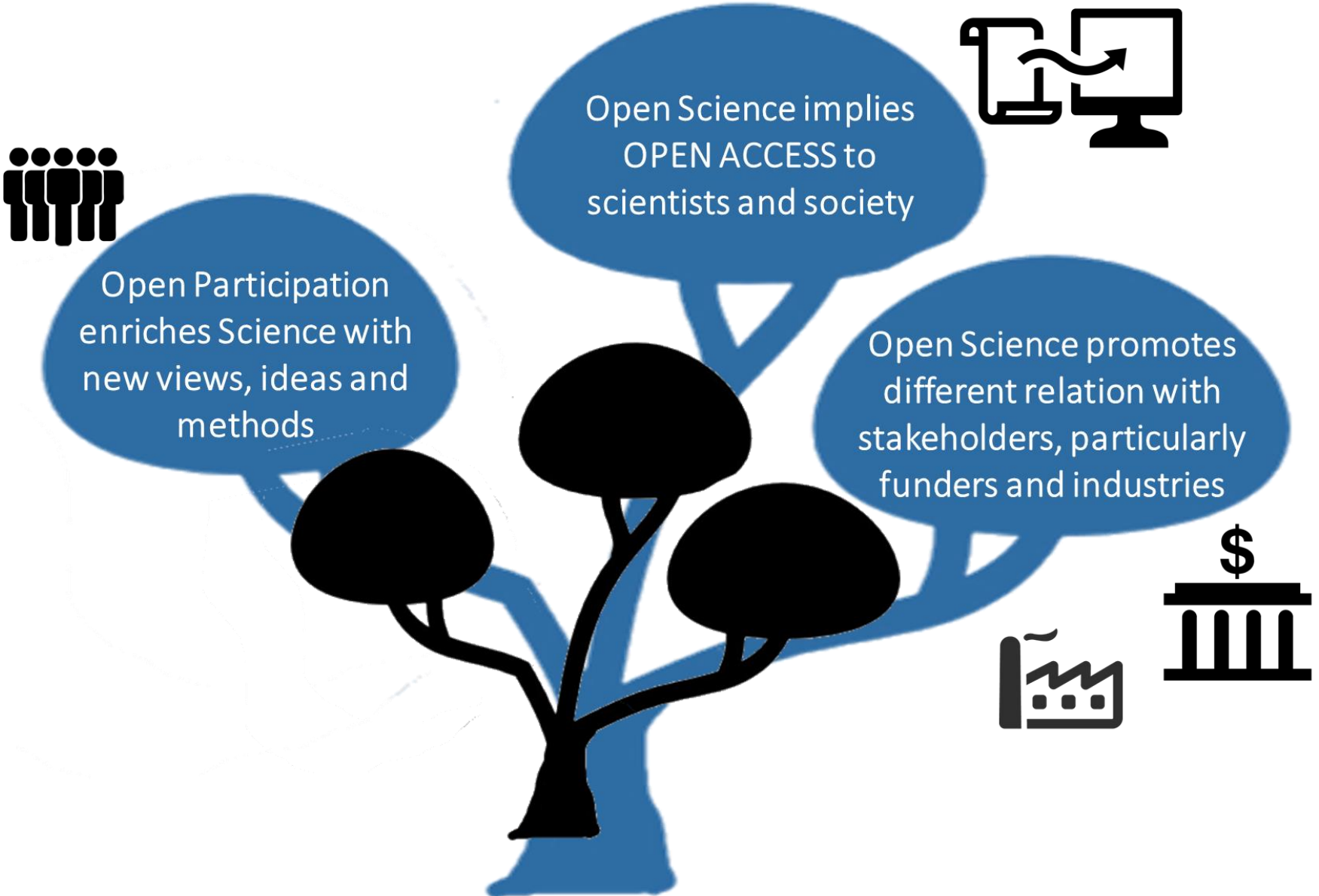
ORION: INTERNAL ANALYSIS

WHAT IS NEEDED?




Jean-Pierre Lescourret via Getty Images

ORION EXPECTATIONS



MANY CHALLENGES AHEAD…

INTEGRITY ETHICS

- Developing new engaging training material
- Gathering case studies
- Reaching senior PIs

EXCELLENCE IN OPEN SCIENCE

FAIR DATA

- Developing training
- Provide incentives, indicators
- Raising funds for data infrastructure
- Developing expertise

ENGAGING SOCIETY

- Engaging scientists
- How to engage citizens in fundamental research?

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CONTACT

michela.Bertero@crg.eu

@MichelaBertero

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