# Impact Frameworks & Infrastructures

Parallel Session

# Impact Frameworks & Infrastructures

**Stéphane Mercure (Chair)**

Senior Evaluation Officer, Canada Foundation for Innovation, Canada

CANADA FOUNDATION FOR INNOVATION
FONDATION CANADIENNE POUR L'INNOVATION

# Impact Frameworks & Infrastructures

## *Measuring the impact of research infrastructure*

***Introduction by Stéphane Mercure***
***Director, Performance Analytics and Evaluation***

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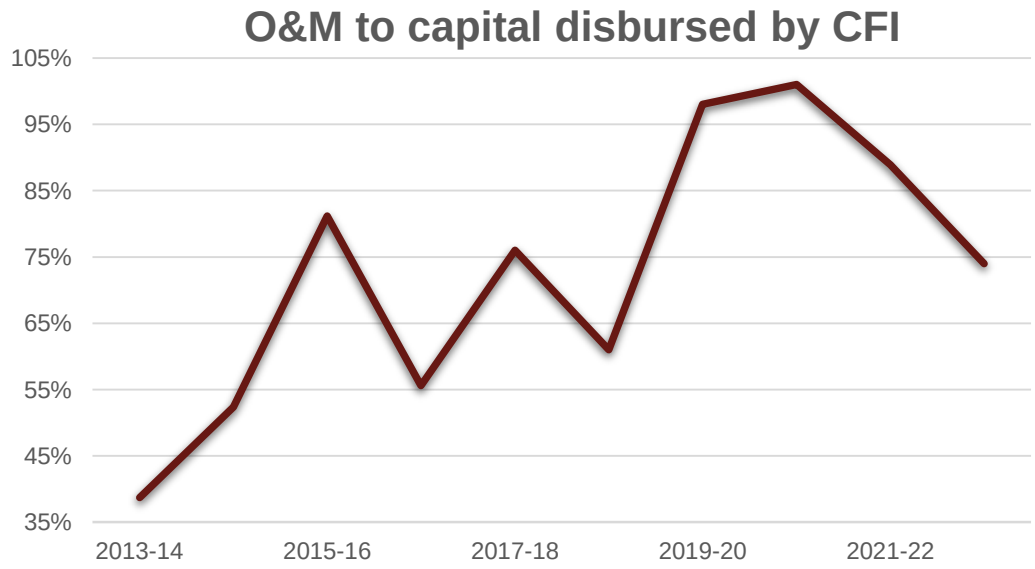
Canada Foundation for Innovation
Fondation canadienne pour l'innovation

# About the CFI

- Created by the Government of Canada in 1997
- Invests in **research infrastructure (RI)** across Canada in all areas of science
- Committed so far about $7 billion in capital support to more than 12,800 projects at 172 research institutions across Canada
- Current budget of about $450M per year (capital + O&M)

# Trends in RI

- Heterogeneity of RI
- Movement toward shared facilities (in a recent competition: ~40% of $)
- Growing attention to sustainability of infrastructure




# Drivers of measures of impacts

## CFI OBJECTIVES

- Support economic growth & job creation, as well as health & environmental quality through innovation
- Increase Canada's capability to carry out world-class research & tech development
- Provide support through RI for the development of highly qualified personnel
- Promote productive networks & collaboration

## CFI EXPECTED RESULTS

- Attract & retain world's top researchers
- Train the next generation of researchers
- Enable researchers to undertake world-class research & tech development that benefit Canadians
- Support private sector commercialization & innovation

# Measuring the impacts of RI

- CFI has a relatively structured approach to impact assessment of RI investments but no framework per se
- Monitoring of funded projects mostly through progress reports (limited in scope and time).
- For longer term impacts, mostly case studies
- Our processes are informed by existing frameworks including:
  - RI-PATHS
  - OECD framework on impacts of RI

**Data on RI contribution to :**

- Researcher attraction & retention
- Training
- Research dissemination
- Collaborations & research agreements
- IP & spin-off companies
- Users of research outcomes + Benefits outside academia

**In addition, we seek to learn…**

- Challenges with implementation, operations & maintenance
- Infrastructure quality, remaining useful life & use (level, who)

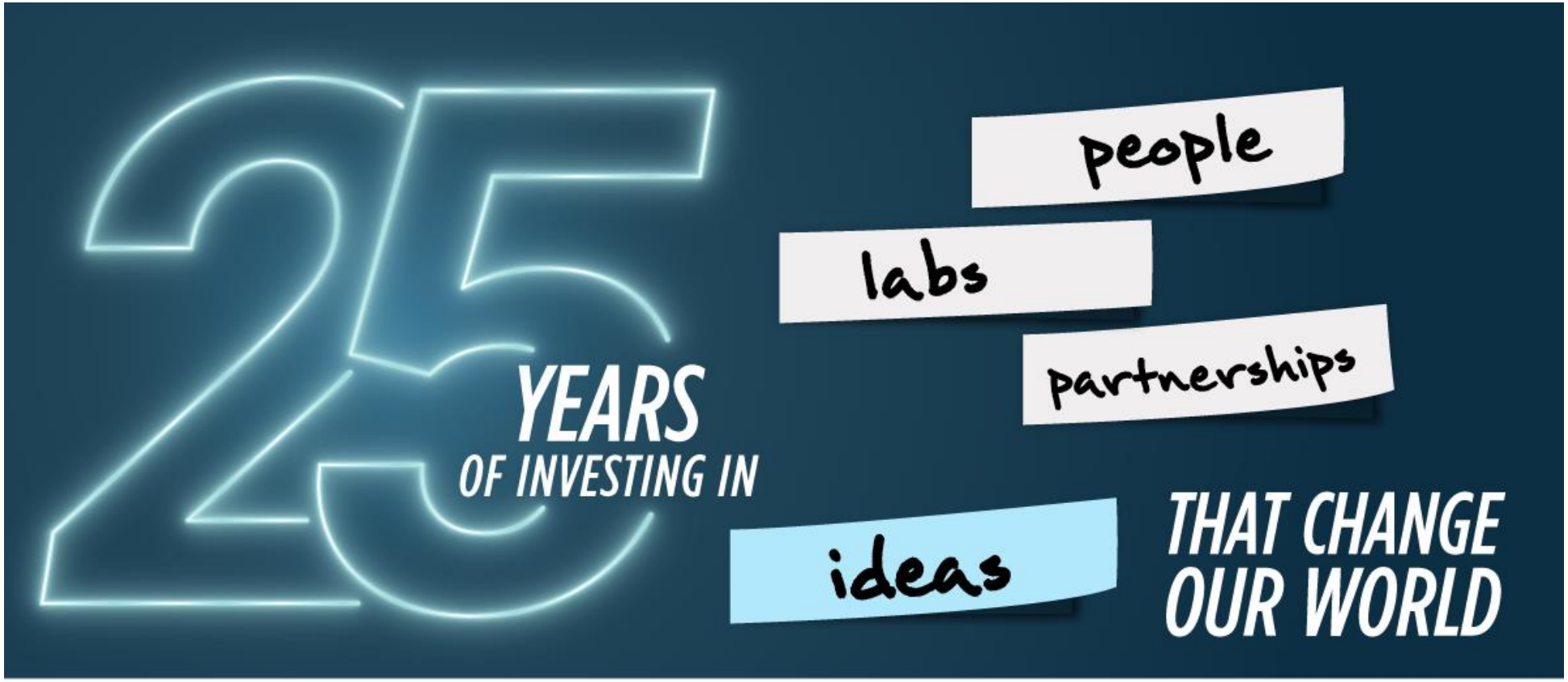
# Some challenges

- Time lag can be greater with RI
- Multiciplicity of users
- Contribution of intense vs limited use of RI to downstream impacts
- Diversity of impact pathways to consider when funding across all disciplines

# Today's Speakers

- **Matias Barberis -** Researcher, EFIS Centre, France
- **Claire Brown -** President, Canada's Network of Scientific Platforms
- **Michiel Roelse -** Director, Topsector T&U, The Netherlands

# Thank you for your attention

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Parallel Session

# Impact Frameworks & Infrastructures

**Matias Barberis Rami**

Researcher, Resilience, Socio-Economic Impact, Research

Policy European Future Innovation System Centre, France

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# Charting the impacts of research infrastructures

## Societal Impact of Science Conference

## Session: Impact frameworks & infrastructures

Dr. Matias Barberis

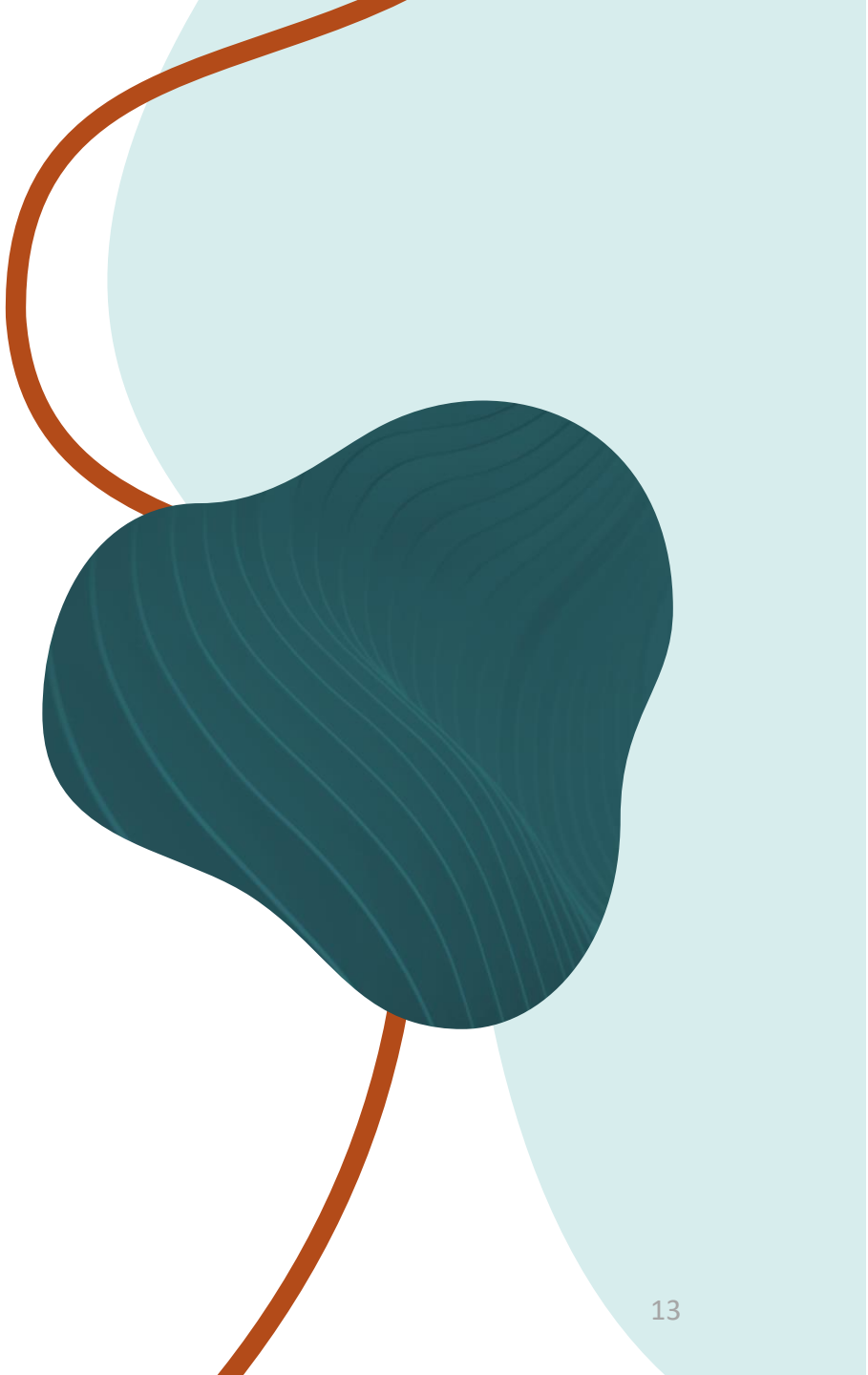
Halifax, Canada – 20 June 2023

# About EFIS Centre

European Future Innovation System (EFIS) Centre is a not-for-profit (ASBL) policy lab established in December 2014.

Our experts have vast experience in all aspects of research and innovation (R&I) policy and ecosystem governance. We challenge the status quo with new policy and practice insights, concepts, methodologies, and analysis. We are committed to helping public sector decision-makers design and implement the **R&I systems of the future**.

Our registered office is in the university town of Louvain-la-Neuve and our operational office is at the heart of the EU district in Brussels.



# EFIS Centre expertise on impact assessment of RIs

1. In-depth experience with evaluations and impact assessments in R&I policy field
2. A decade long track of record for assistance to RI strategy development, implementation of monitoring and evaluation frameworks and RI policy consulting
3. Leading knowledge creation projects, e.g. Horizon 2020 project Research Infrastructure imPact Assessment PaTHways (RI-PATHS) and support projects to individual RIs
4. Engagement in global networks on the topic on socio-economic impact assessment of RIs (EC, ESFRI, OECD Working Groups, Global Research Council, ICRI, etc.)
5. Extended knowledge of participatory evaluation techniques and novel impact assessment methods

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# Developing impact frameworks

# Context

Considerations about socio-economic impacts of RIs are gaining an **increasing importance in policy decisions**.

***Investment in research infrastructures*** is increasingly viewed as a way of ensuring not only enhanced research excellence but as a means to address economic and societal challenges – this requires RI managers to address multiple user groups.

RI manager are expected to deliver on a growing number of ***impact requirements*** for various stakeholders and funding bodies:

- European level: ESFRI, Horizon Europe projects have impact section, DG Regio and EIB impact requirements for major project and investment applications, etc.
- National level: Most systematic approaches to impact in UK, Ireland annual assessments, but much less prescriptive, France and Sweden request assessments at specific RI stage, Germany and Spain does not request formally, but on case-by-case basis, etc.

# Context

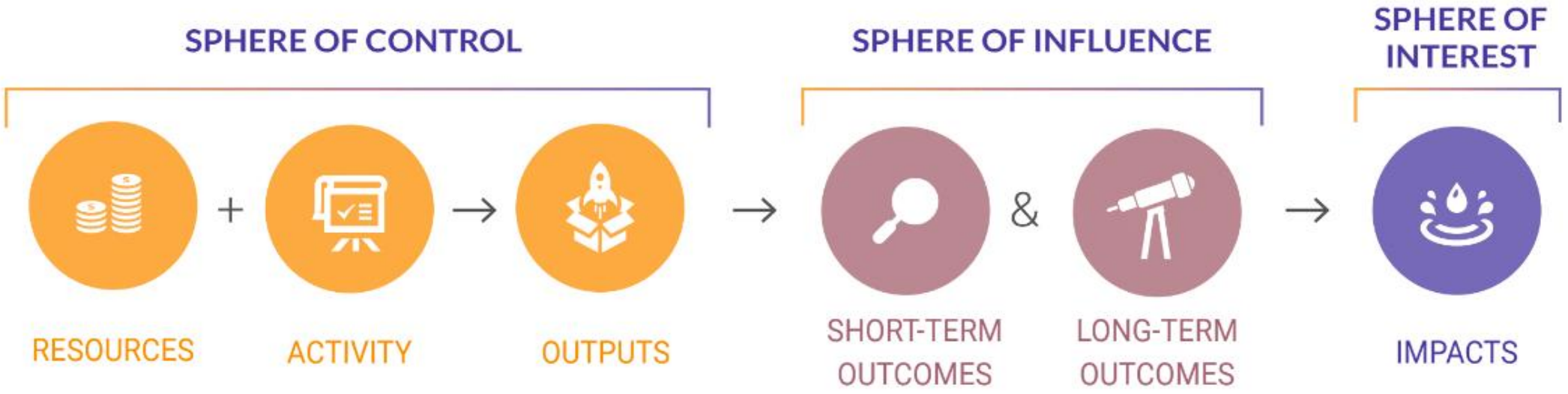
- In the last decade different interpretations have prevailed on how to **understand and define broader impacts**, and diverse methodologies have been used to scope and measure these impacts
- **Impact assessment guidelines** from policy makers and funding agencies remain quite diverse, but important steps are taken for a **more unified approach** on how to approach this increasingly important topic (e.g. Horizon Europe funded projects, OECD reference framework, ERICs addressing the topic, ESFRI Working Group deliberating common impact guidelines by end of 2023)
- Acceptance achieved that it is not realistic to develop a standard approach that can be used for all RIs

# Contribution from RI-PATHS project

Identification of **13 generic impact pathways** how investments in Research Infrastructures lead to various impacts on the economy and society

Grouping pathways along three high-level missions of Research Infrastructures

- **Enabling science**
- **Problem solution**
- **Science and society**



# Impact pathways

**Enabling science**

P1 Publication-citation-recognition
P2 Employment, operations & standardised procurement
P3 Technology transfer and licensing
P4 Learning and training through joint development of instruments and tools
P5 Learning and training by using RI facilities and services
P6 Training and higher education cooperation

**Problem-solving**

P7 Interactive problem-solving for the private sector (industry)
P8 Addressing societal and public-sector challenges
P9 Provision of specifically curated/edited data

**Science and society**

P10 Changing fundamentals of research practice
P11 Creating and shaping scientific networks and communities
P12 Promoting engagement between science, society and policy
P13 Communication and outreach

# Design of an impact framework

- Impact framework gives at-a-glance overview of all relevant impact pathways of your Research Infrastructure → focus not only on individual pathways, but also links between them
- Impact framework outlines most relevant impact areas (the strategic focus) and enlists a limited number of most prominent impact pathways → presents a comprehensive hypothesis how RI activities lead to impact
- For the design of the framework need to involve key staff members in charge of main activity lines (e.g. communication, liaison with industry, database development, etc.) → co-design is at the heart of the activity
- Impact framework allows a shared understanding of the topic among all RI stakeholders → essentially it also serves as strategy design and communication tool

# Data collection & reporting

- **Keeping track of RI activity and results** including, for instance, *the number of scientific publications, procurement contracts, patents and other innovation output, visitors and doctoral students, social media output and other dissemination products, participation in relevant discussion with policy makers, downloads of open data and software, etc.*
- This **systematic tracking** is the basis for the assessment of impacts. It is usually performed by the RI staff as part of internal reporting. Hint: Make inventory of existing indicators collected by all departments.
- **Performing regular surveys of stakeholders interacting with the RIs**, such as *former students, supplier companies, users, citizens*, etc. This activity helps to grasp useful **insights in the way outcomes and impacts materialise** and the way to maximise them.
- **Carrying out various qualitative analyses and case studies** to report on some **intangible impacts**, such as the contribution of RIs to gender balance, social inclusion, environmental issues, sustainability, public security challenges, etc.

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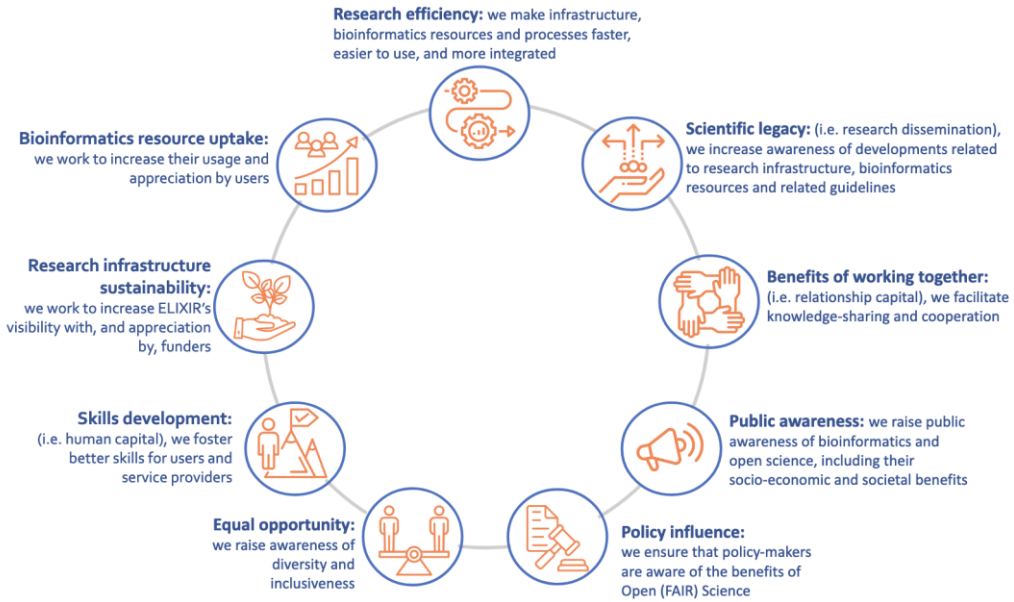
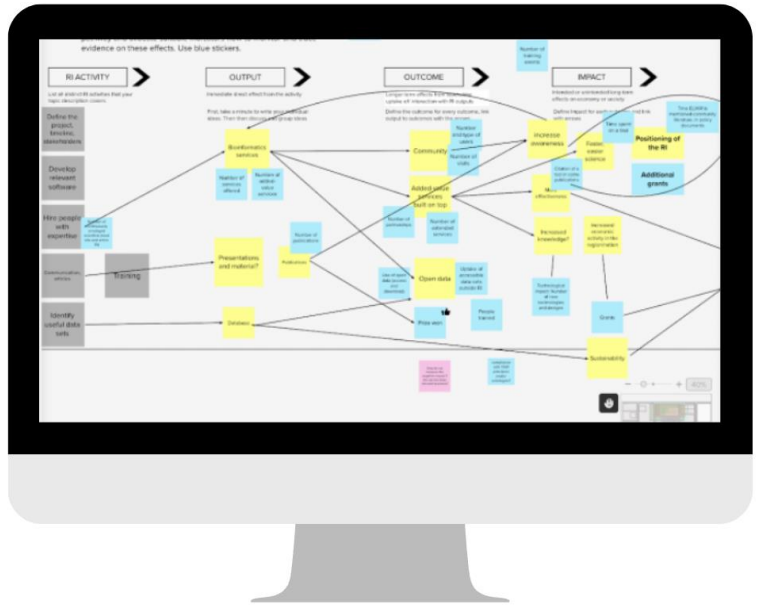
# Some examples

# Case 1: ELIXIR

Implementation Study aimed to increase capacity in impact evaluation across a set of national ELIXIR Nodes.

EFIS designed and implemented specialised training events for ELIXIR Nodes with hands-on learning complemented by knowledge-exchange.

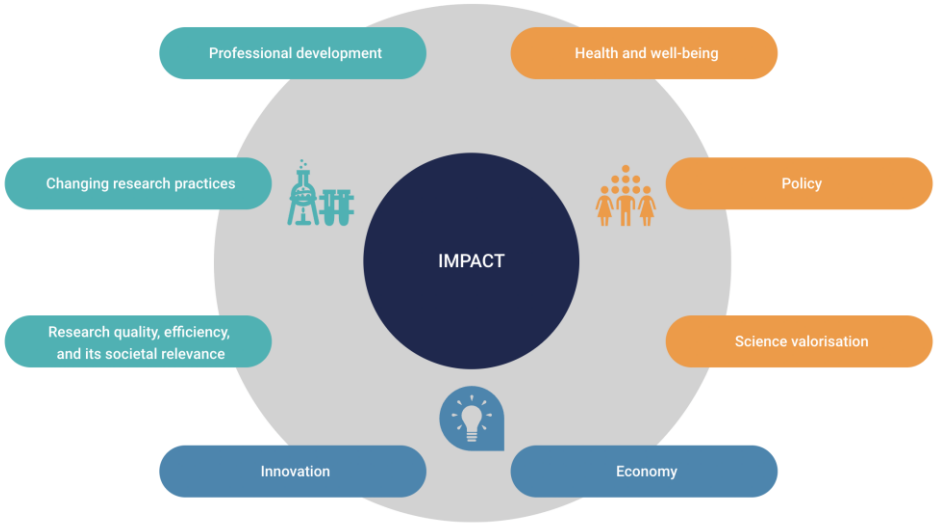


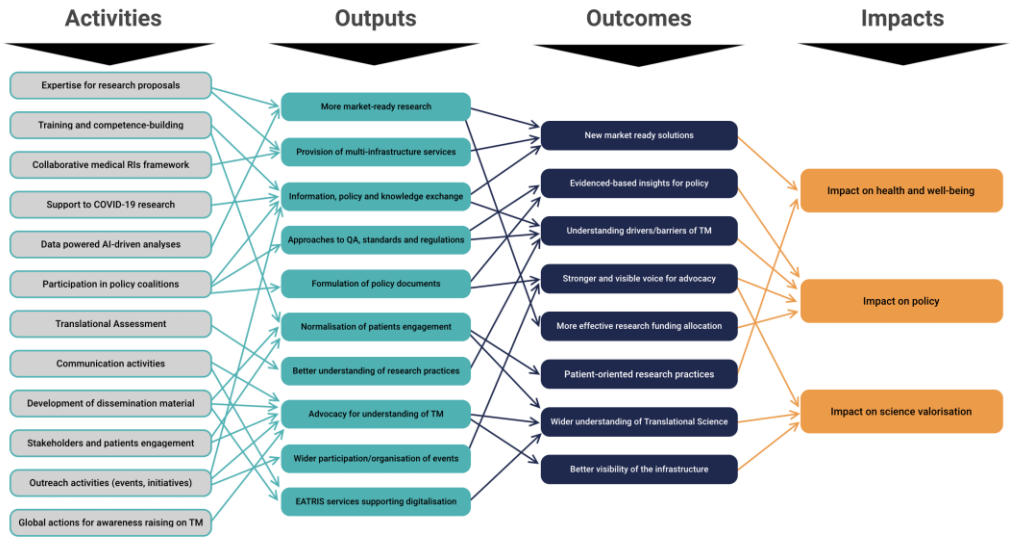



# Case 2: EATRIS

EFIS provided support to refine the initial thinking on EATRIS impact (pilot of RI-PATHS) through a deliberation of a more **comprehensive impact assessment framework**.

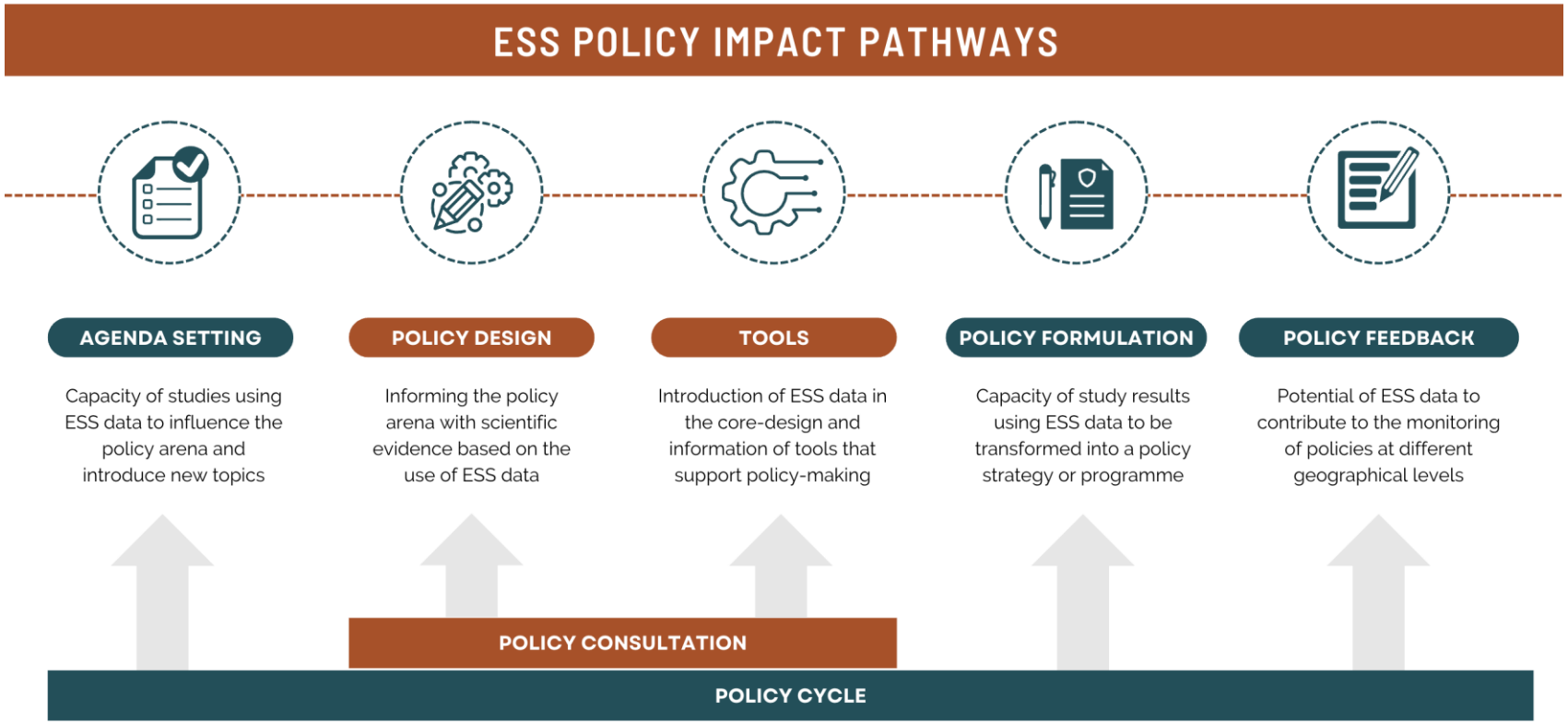
The developed impact framework serves EATRIS not only in adoption of the future strategic plan, but also has been acknowledged as a useful communication tool that explains in **concise way what EATRIS does and why it matters to society.**



# Case 3: EUROPEAN SOCIAL SURVEY

The study provides a comprehensive charting of the main avenues how **policy impacts** are realised at various points in the policy cycle and enhances the available evidence base on the concrete mechanisms how ESS policy impact is materialised in practice.



# Policy Support Facility - Greece


- Independent review of the R&I policy in Greece in order to further support and upgrade the National Research Infrastructures.
- The key areas under review are: RIs governance and management efficiency; National framework for the RI; and indicators for monitoring and assessment of the RIs.
- **Recommendations**
  - Strategic: criteria for optimising future investment
  - Operational: enhancing NRI quality

# Criteria used to assess the progress of NRI - traffic light grid

| Maturity of governance structure and management procedures | Quality of user access policy | Strategic outlook | European collaboration | Impact on research excellence (including training of researchers) | Impact on innovation (on one or more S3 priorities). |
|---|---|---|---|---|---|
| •Green: Complete and well-functioning governance structure and dedicated central management team<br>•Orange: Governance structure in place but coordination and collaboration processes require strengthening and a reinforced management team<br>•Red: Incomplete governance set up and/or poorly functioning collaboration between partners. | •Green: centralised and functional (online, auditable) access to a single catalogue of services, user training, support service<br>•Orange: Decentralised access procedure (or contact by email only), catalogue of services per node, user training, support provided on ad hoc basis<br>•Red: User access procedures and catalogue of services not yet available, user training/support processes to be developed. | •Green: Unique and strong infrastructure with strong partners and users and excellent alignment with national strategy<br>•Orange: NRI has unique features, but strategic outlook could be improved by consolidation or stronger collaboration at the national level<br>•Red: The uniqueness of the infrastructure and strategic importance should be re-examined. | •Green: Established membership in European RIs (or similar networks) and significant funding secured from European or other international sources;<br>•Orange: Good basis for developing European presence and cooperation; European funding secured to date is minor but further opportunities exist;<br>•Red: Limited ties with European RI projects and/or limited or unexploited European funding opportunities. | •Green: NRI already providing services to researchers and likely to have high impact on research excellence;<br>•Orange: Identifiable potential impact on research excellence but further efforts required to ensure broader scale of impact;<br>• Red: Low to modest current and potential future impact on research excellence. | •Green: NRI is providing services to business & other non-science users and has good potential for a future impact on business innovation and/or a contribution to meeting societal challenges in one or more S3 priority areas<br>•Orange: Examples of support for innovation exist but further efforts required to ensure broader business/ societal engagement and impact;<br>•Red: Low or unproven existing or potential impact on innovation |

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# Key takeaways

- Each RI is a complex system of interactions; impact assessment requires contextual understanding (a systems view)

  → **no 'one-size-fits-all'**

- RIs need to understand in more nuanced ways their areas of impact and key corresponding impact pathways

  → **a tailored 'impact framework'**

- The overall RI impact framework and strategic aims (why the assessment is done) shapes the selection of indicators and measurement approaches

  → **prioritise understanding before measuring**

- None of the existing methods in their traditional formulation provides a comprehensive and satisfactory answer to the question of assessing the socio-economic impact of RI.

  → **apply smart combination of quantitative and qualitative methods**

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# Thank you


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Parallel Session

# Impact Frameworks & Infrastructures

**Claire Brown**

President, Canada's Network of Scientific Platforms, Canada

# Societal Impact of Imaging Infrastructures

CLAIRE M. BROWN, PHD

PRESIDENT, CANADIAN NETWORK OF SCIENTIFIC PLATFORMS (CNSP)

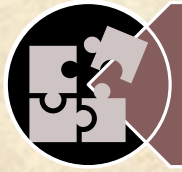
# OUTLINE

Scientific Platforms/Canadian Network
Advanced BioImaging Facility (ABIF)

Institutional Scientific Platforms
Northwestern University Case Study

Multi-national Networks – Euro-BioImaging Case Study

National Network – Microscopy Australia Case Study

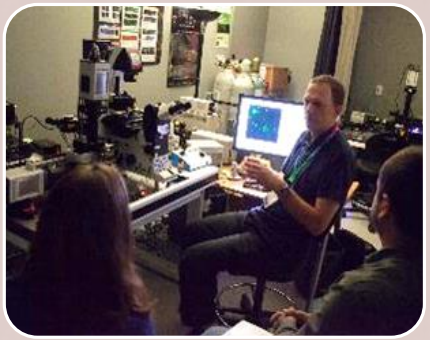


Challenges/Solutions

# Scientific Platforms

## Core Facilities
## Share Research Resource Laboratories

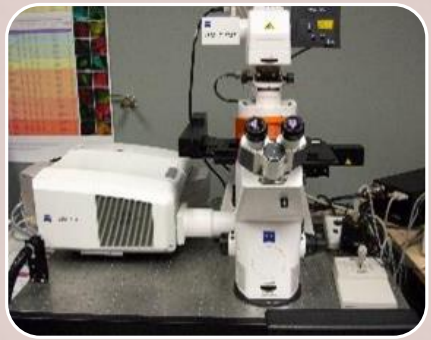
# Scientific Platforms – Horizontal Structure – Distributed Impact



Centralized

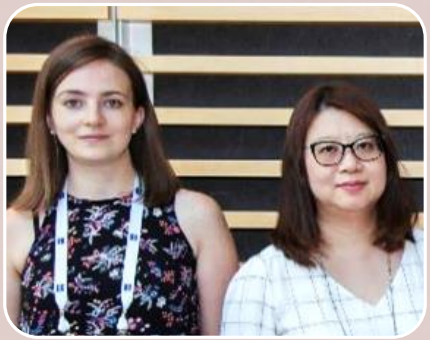
Shared Laboratories

Economy of Scale



Specialized Instrumentation

Specialized Services



Dedicated Experts

Platform Scientists

Multidisciplinary Science

Open to the Community

Equitable Access

Discrete Units

Dedicated Space

Dedicated Equipment

**Scientific Platforms:** Facilities, resources and related services that are used by the scientific community to conduct top-level research in their respective fields and covers major scientific equipment or sets of instruments; knowledge-based resources such as collections, archives or structures for scientific information; enabling Information and Communications Technology-based infrastructures such as Grid, computing, software and communication, *biobanks or tissue banks* or any other entity of a unique nature essential to achieve excellence in research. Such infrastructures may be “single-sited” or “distributed”.
*Definition based on The Directorate-General for Research European Commission (text in italics was added)*

# Canadian Network of Scientific Platforms (CNSP)


CNSP RCPS
Canadian Network of Scientific Platforms
Réseau canadien des plateformes scientifiques


Expert Platform Scientists
Training & Education
High Quality Reproducible

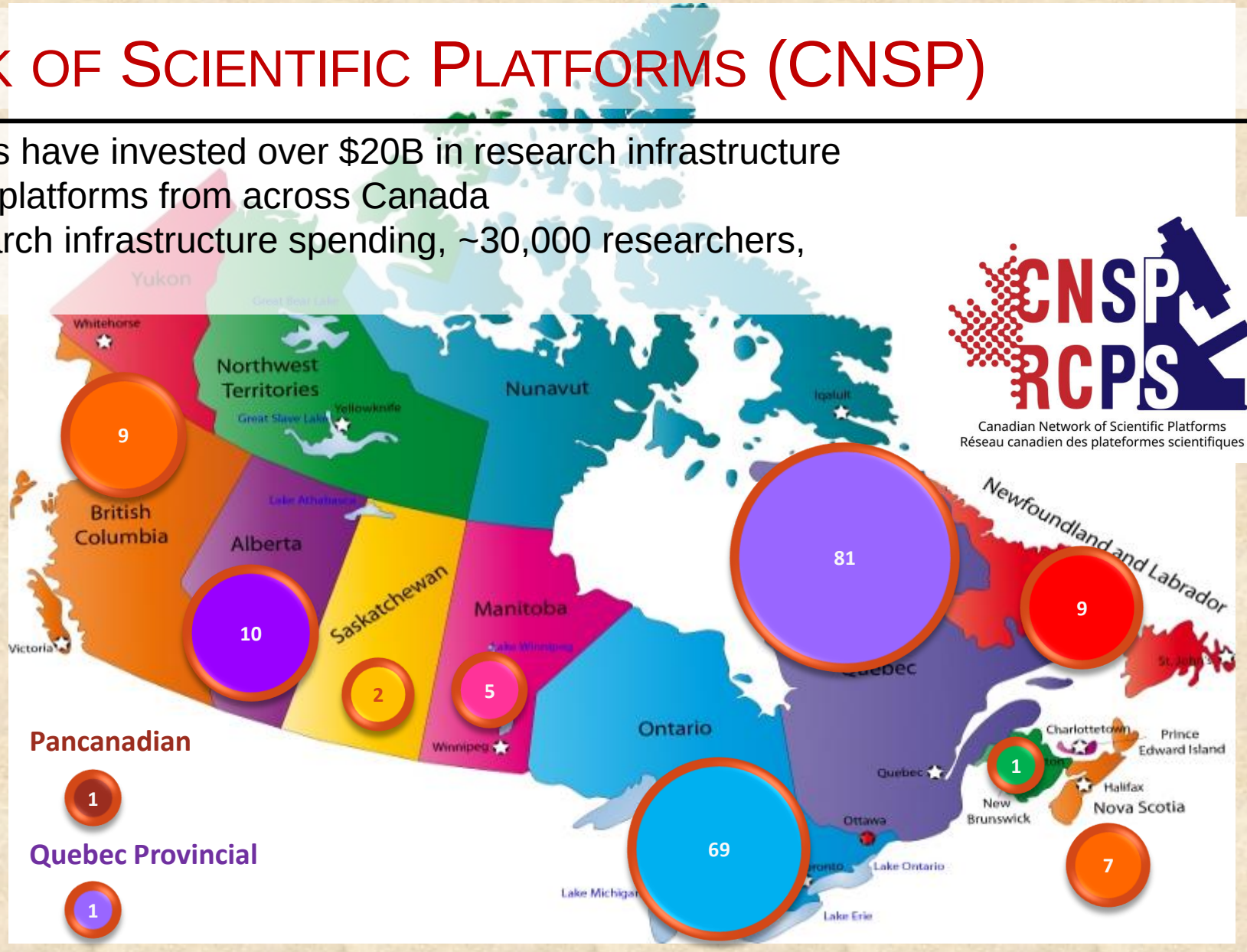
Agility
Accelerate
Mobilize
Connect


# Canadian Network of Scientific Platforms (CNSP)

- Since 2000 the CFI and partners have invested over $20B in research infrastructure
- CNSP represents 194 scientific platforms from across Canada
- CNSP represents ~$1B in research infrastructure spending, ~30,000 researchers, ~10,000 research laboratories

**Engineering, Life Sciences, Health Sciences**

- Nanofabrication
- Light Microscopy
- Electron Microscopy
- Flow Cytometry
- Tissue Banks
- Viral Vector Production
- Mass Spectrometry
- Nuclear Magnetic Resonance (NMR)
- Proteomics
- Animal Cores



# Advanced BioImaging Facility (ABIF)

**Extensive Userbase**

76 laboratories

21 departments and institutions

4 faculties

**12 Advanced Microscopes**

Widefield

Laser Scanning Confocal

Lattice Lightsheet

Spectral Imaging

**Training & Education**

200 one-on-one training sessions

Customized training programs

Courses

Workshops

Train-the-Trainer

**Expert Staff**

Imaging Scientists

Image Analysts

Technology Specific Expertise

**Image Analysis**

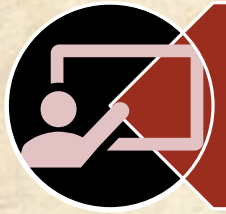
Custom analysis support

Imaris

FIJI/ImageJ

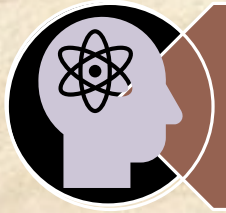
From Planning to Publishing

# Advanced BioImaging Facility (ABIF)

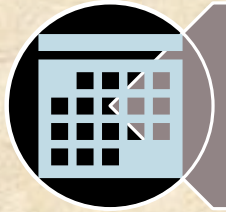


~200 one-on-one training sessions per year
~230 unique users

76 Laboratories
21 Departments & Institutions
4 Faculties



Dedicated Imaging Scientists and Imaging Analysts

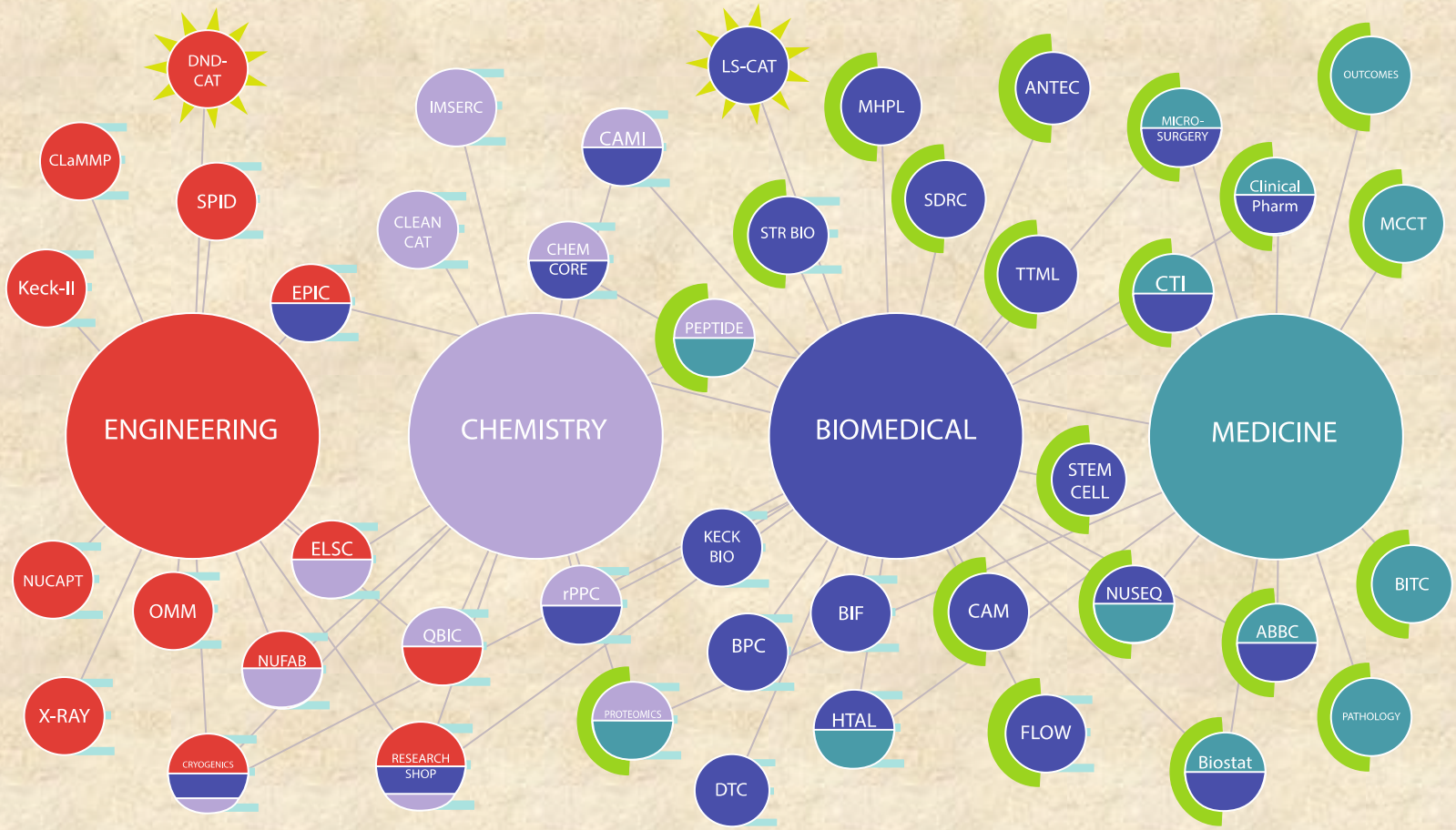


~30 publications per year
13,000 hours of microscope use per year
5,000 image sessions per year, 14 imaging sessions per day

From Planning to Publishing

# Northwestern University – Case Study

# Northwestern Core Facilities

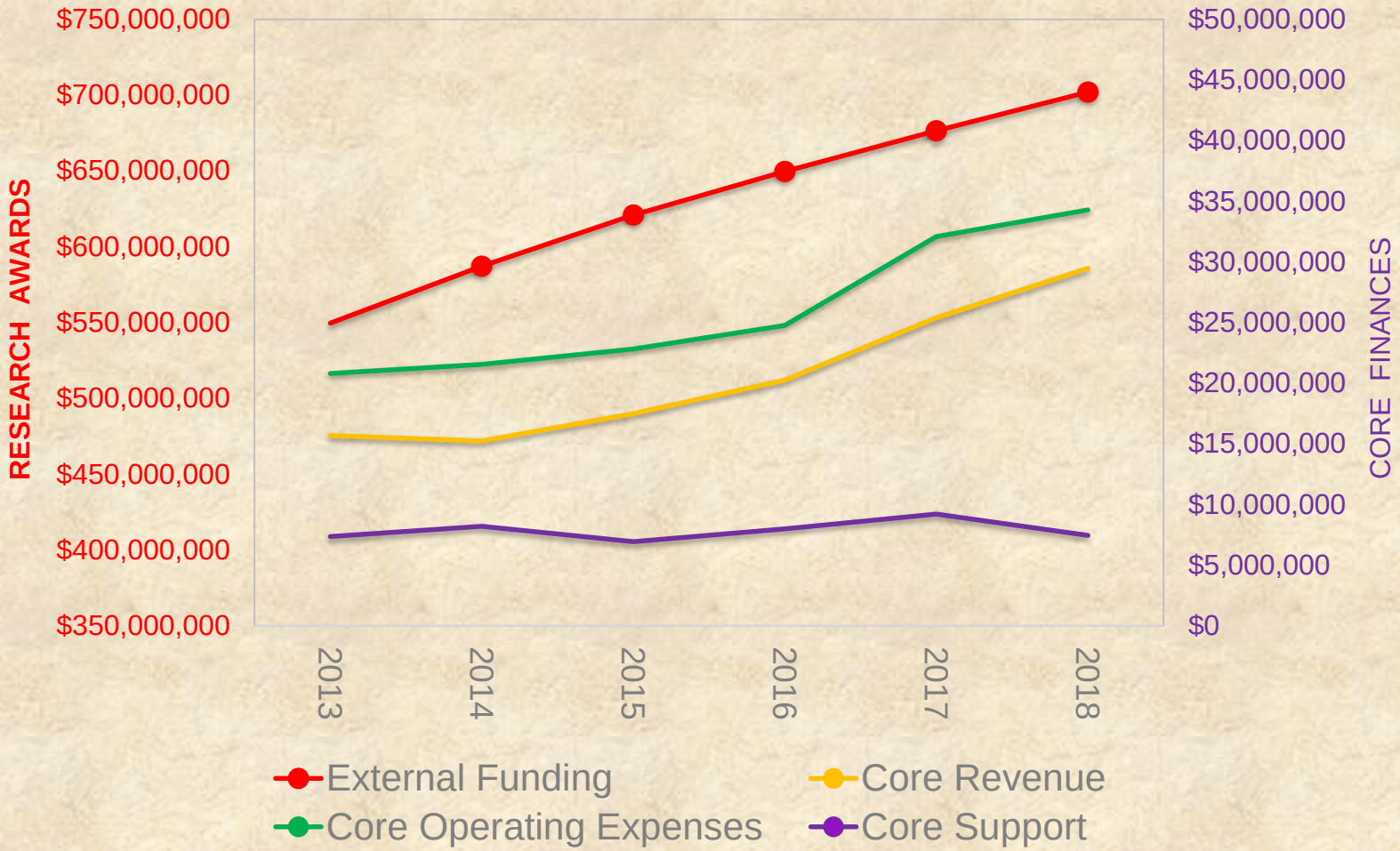



- 44 Facilities
- Two Campuses
- Many Directors are Research Faculty
- Invest $4.5M USD per year

Northwestern

Argonne Chicago Evanston Chicago/Evanston

# Research Awards and Core Support

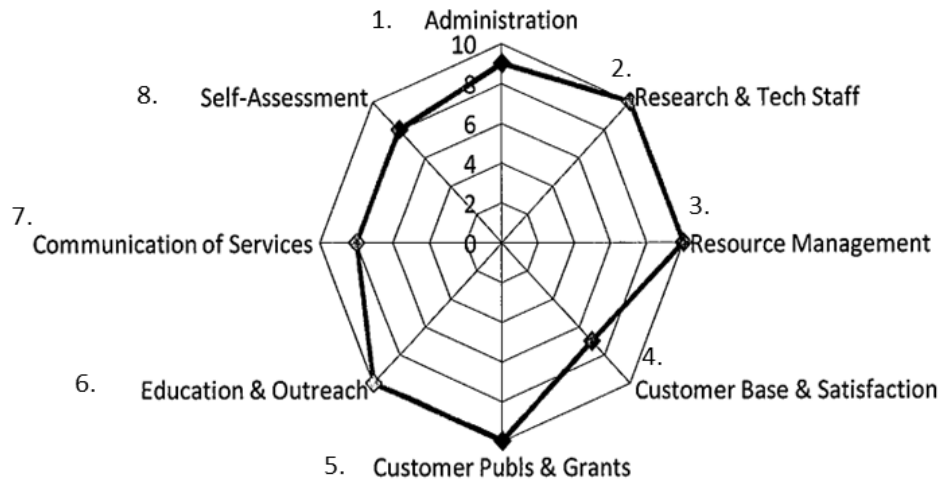


# Measure Key Performance Indicators Well

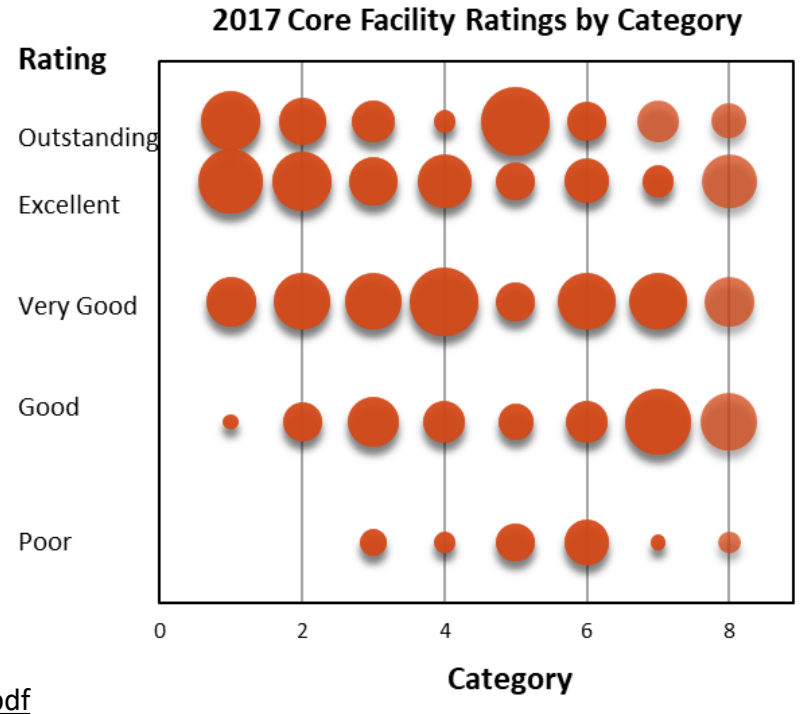
Measure impact on the institution, focus on research outputs, do not measure societal impact

## "Spider Diagram"

Evaluation of 8 Categories per Facility




## Comparison across core facilities




**Building a Sustainable Portfolio for Core Facilities**
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6078059/pdf/jbt.29-79.pdf

# EURO-BIOIMAGING – CASE STUDY

EURO BIOIMAGING

# EURO-BIOIMAGING IN A NUTSHELL

THE EUROPEAN RESEARCH INFRASTRUCTURE FOR BIOLOGICAL AND BIOMEDICAL IMAGING

**17**
ERIC MEMBERS (16 COUNTRIES & EMBL)

**35**
NODES

**173**
FACILITIES

**100+**
TECHNOLOGIES

**432**
USERS

**43**
USER COUNTRIES

*Numbers from January 1st 2023*

# Cross RI collaboration to be used to explore multidisciplinary science

EU RESEARCH INFRASTRUCTURES OFFER:

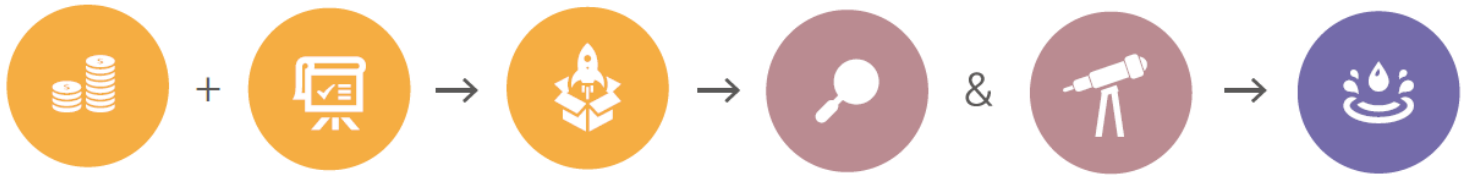
- 15 new research infrastructures in Europe provide services & support
- Wide range of services for life science applications
- Open to all scientists
- Many different opportunities for user funding exist

*The scientific and technical revolution in the life sciences is recognized by research ministries and the European Commission.*


https://lifescience-ri.eu/catalogue-of-services.html

# RI PATHS FRAMEWORK

Figure 1: Example of an impact pathway from communication and public outreach activities




| RESOURCES | ACTIVITY | OUTPUTS | SHORT-TERM OUTCOMES | LONG-TERM OUTCOMES | IMPACTS |
|---|---|---|---|---|---|
| Money, skills, knowledge and dedicated staff | Communica-tion and public outreach activities of a Research Infrastructure | Number and type of stakeholders reached by communication / attending public events / partici-pating in educa-tional visits, etc. | Better public awareness of science and improved understading of Research Infrastructure's contribution to society | | Increased trust in science<br>Increased scientific literacy of society<br>More students attracted to science careers (inspiration effects) |

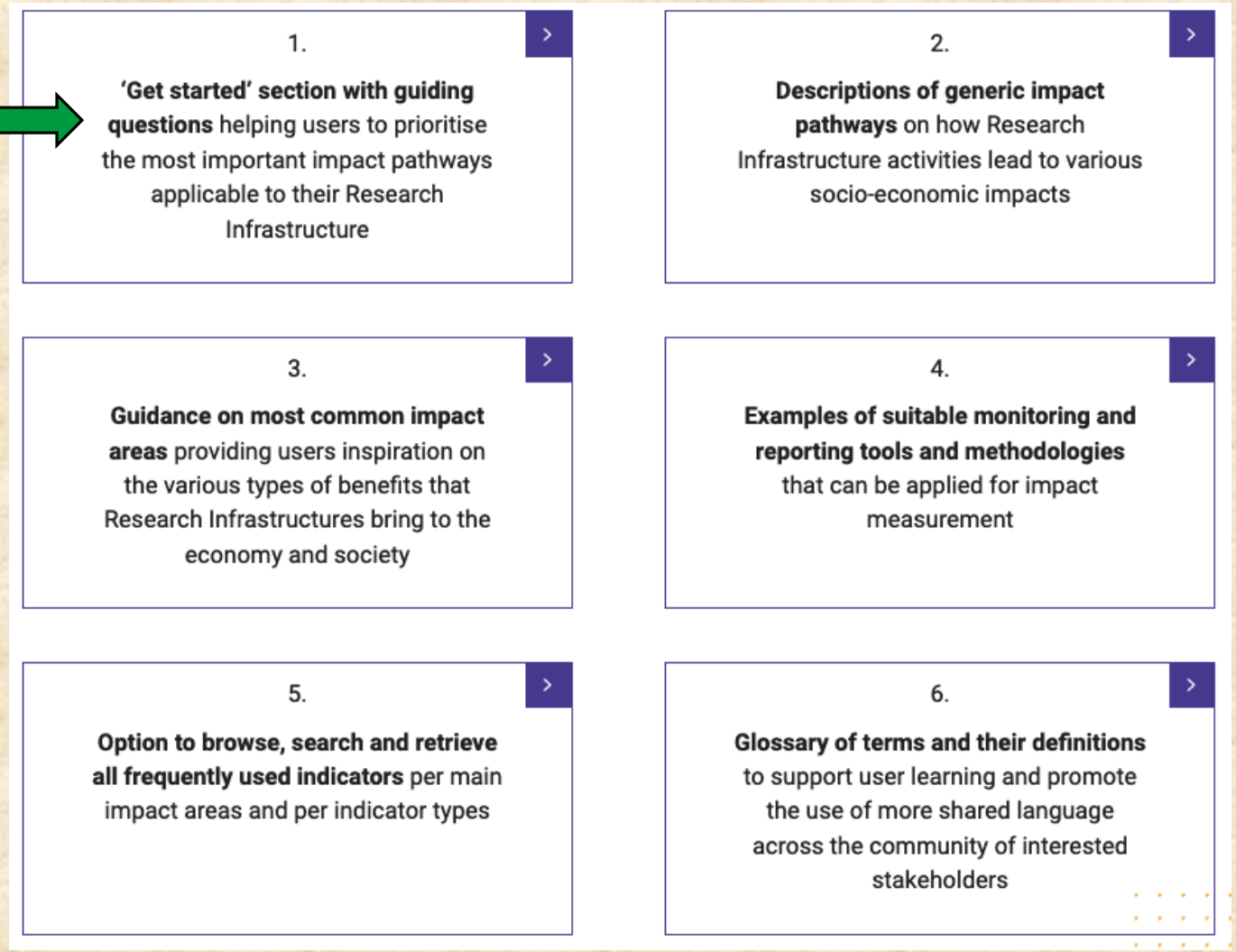
Source: RI-PATHS project

# RI PATHS IMPACT ASSESSMENT TOOLKIT

EURO BIOIMAGING

- Dedicated personnel to run the Euro-BioImaging network
- Well established international network of research infrastructure and expertise

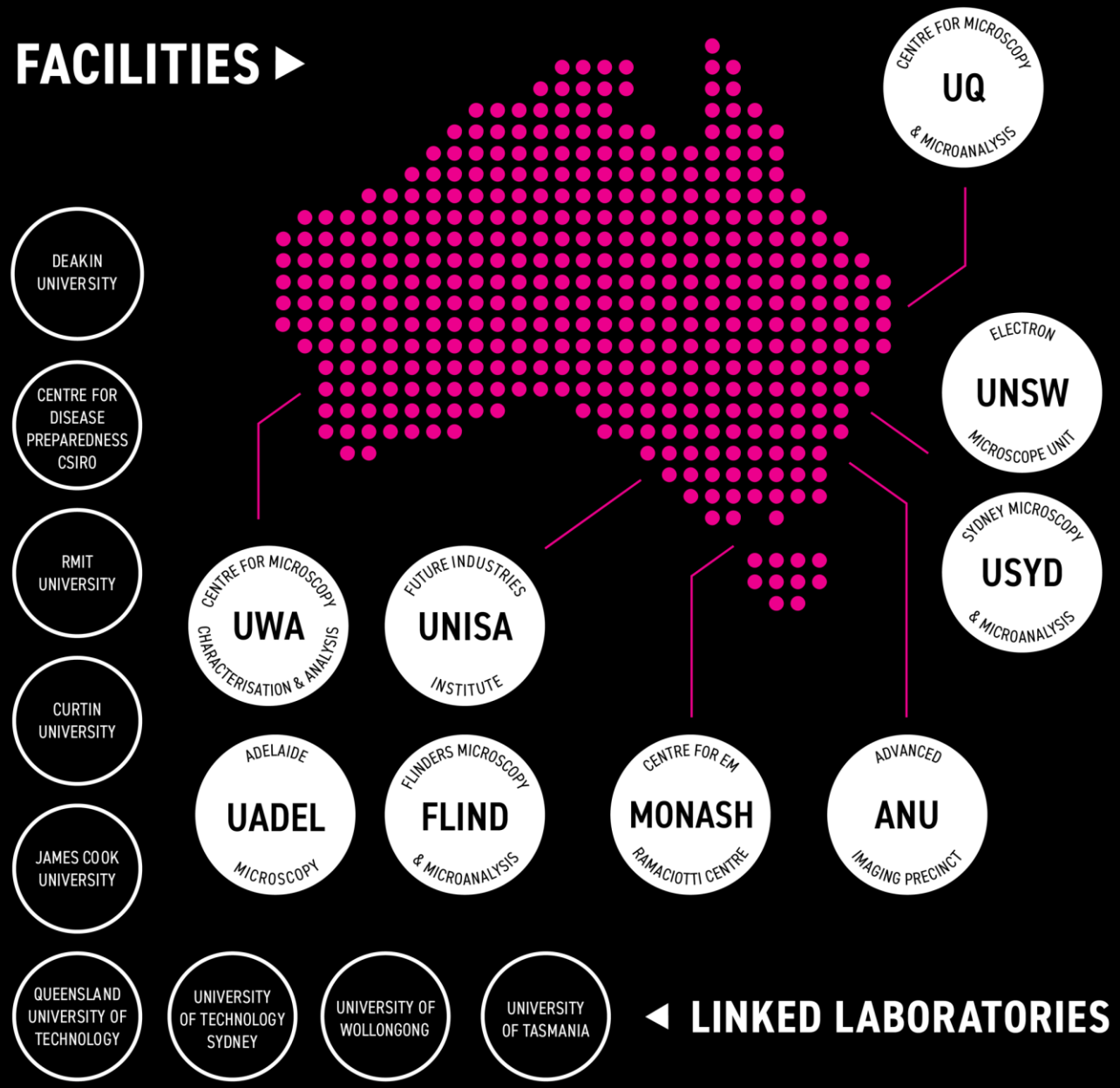
Lacking dedicated personnel to do the impact assessment



# MICROSCOPY AUSTRALIA – CASE STUDY

MICROSCOPY AUSTRALIA

# OPEN ACCESS NETWORK OF FACILITIES AROUND AUSTRALIA



# EACH YEAR WE SUPPORT...

BASED ON AVG ANNUAL DATA 2017-2021

**250+**
INSTRUMENTS

**130+**
EXPERTS

**3400+**
USERS

**150+**
INDUSTRY CLIENTS

**250,000+**
HRS BEAMTIME

**130,000+**
MYSCOPE USERS

**1,400+**
PUBLICATIONS


15% GEOSCIENCE & ENVIRONMENT
48% PHYSICAL & MATERIALS
37% BIOLOGICAL & MEDICAL


37% RESOURCES & ENVIRONMENT
46% MANUFACTURING
17% BIOMEDICAL

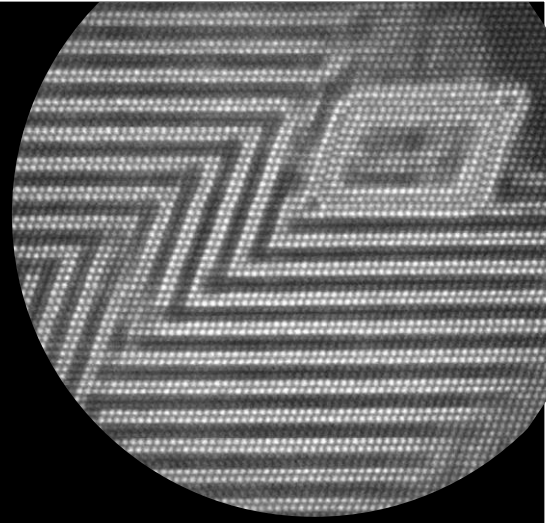
# ENABLING RESEARCH

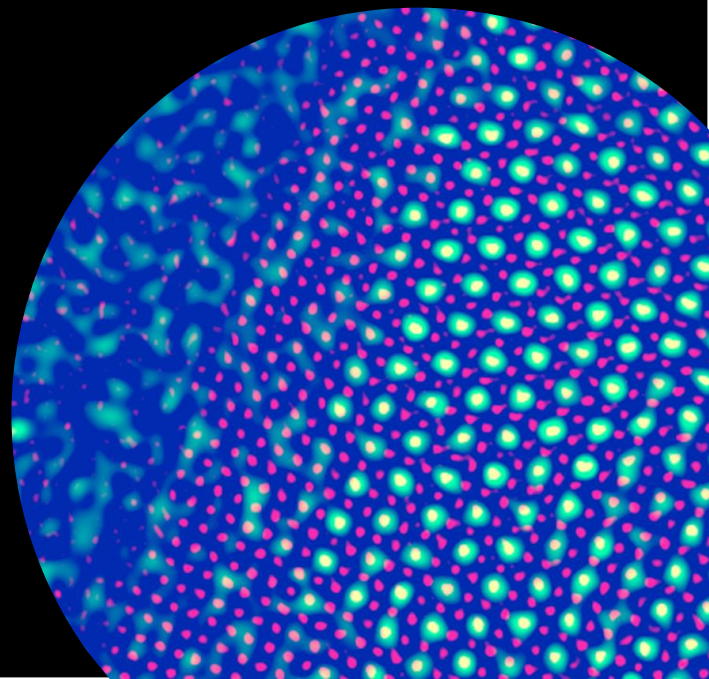
**98%** of users would recommend to a colleague

**58%** of users expect their future use to increase

**33%** of papers in top 10% cited journals

(SNIP; 2017–2021 publications)





MICROSCOPY AUSTRALIA


# BUILDING FUTURE FOOD SECURITY

## CHALLENGE

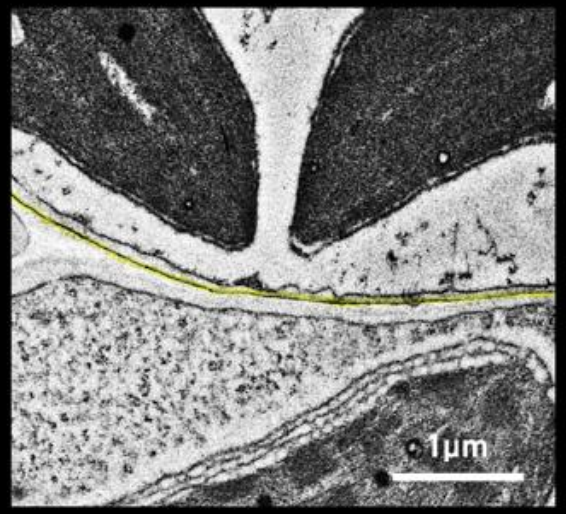
- Rice feeds 3 billion people with an increasing global population

## RESEARCH

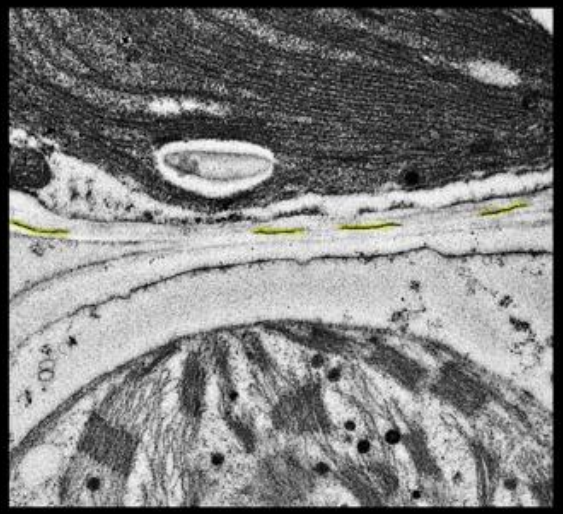
- $C_3$ plants (like rice) are less efficient at photosynthesis than $C_4$ plants.
- Using TEM, researchers showed the $C_4$ plants have a barrier layer that retains $CO_2$.

## IMPACT

- $C_4$ rice could increase photosynthetic productivity and improve water and nitrogen use.
- Improved production would match projected population growth and move toward global zero hunger.

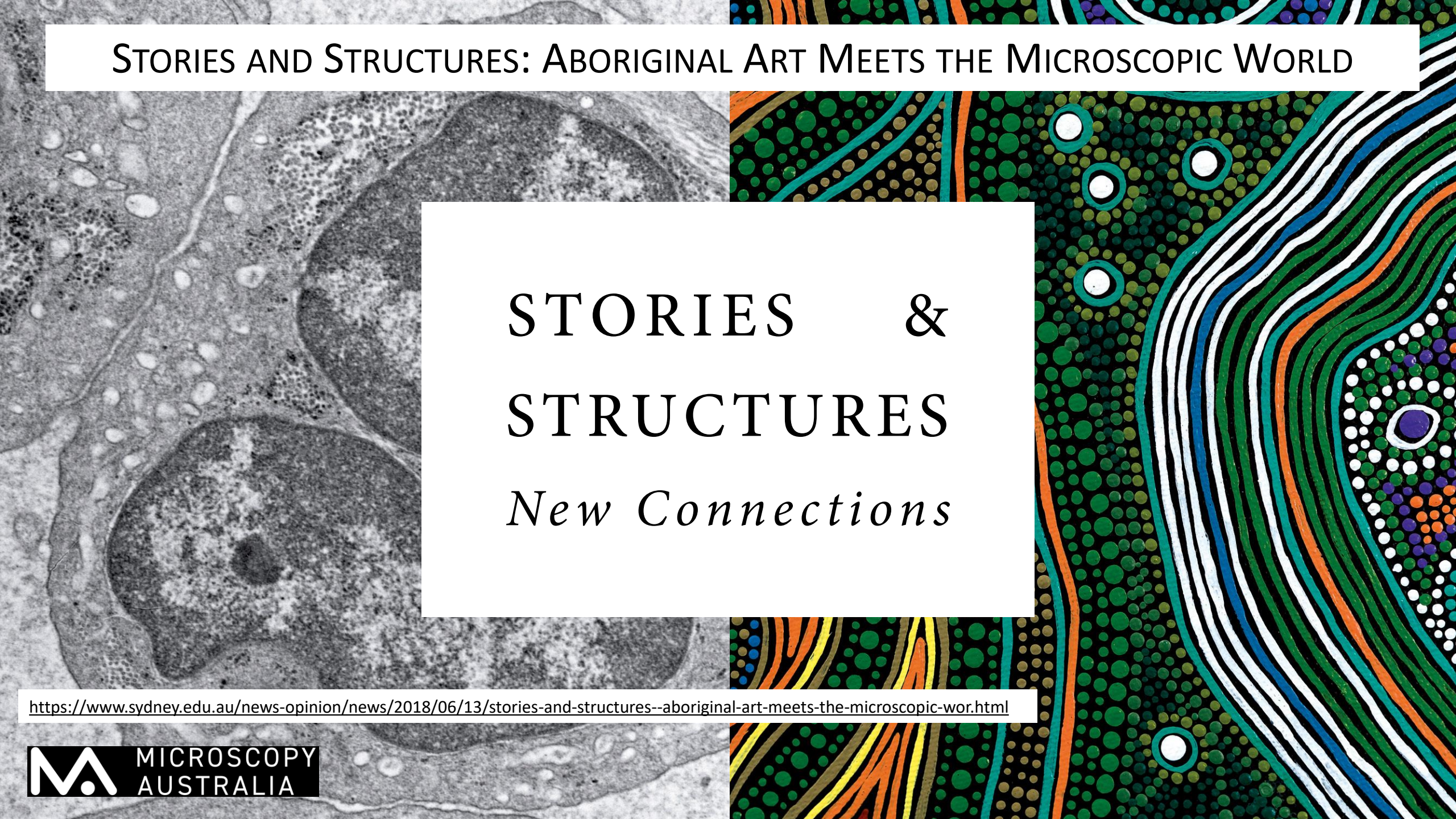



TEM IMAGE OF BUNDLE SHEATH CELLS IN NORMAL C4 MILLET - ANU



TEM IMAGES OF BUNDLE SHEATH CELLS IN MUTANT C4 MILLET - ANU

# Stories and Structures: Aboriginal Art Meets the Microscopic World




https://www.sydney.edu.au/news-opinion/news/2018/06/13/stories-and-structures--aboriginal-art-meets-the-microscopic-wor.html

MICROSCOPY AUSTRALIA

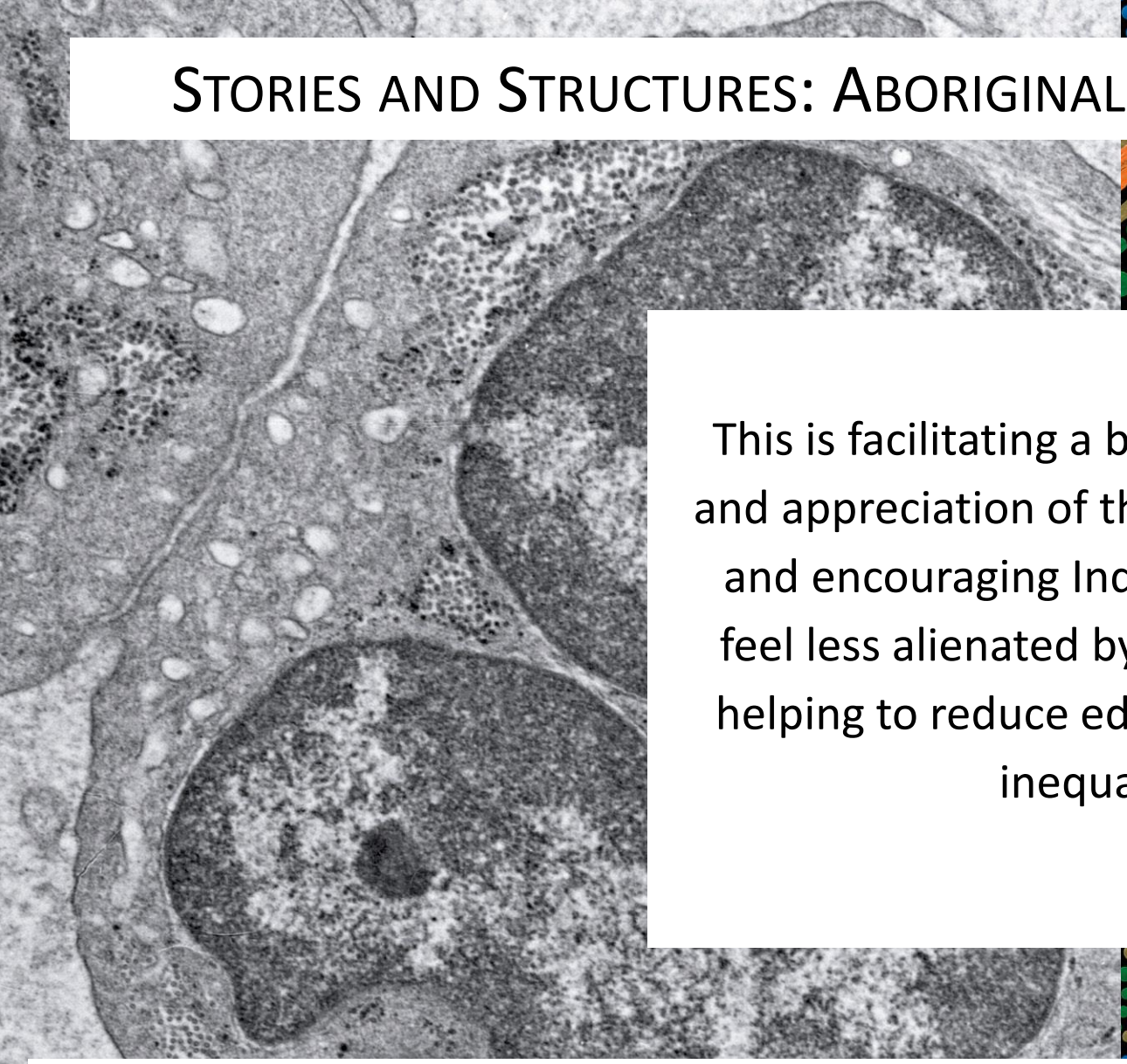
# Stories and Structures: Aboriginal Art Meets the Microscopic World

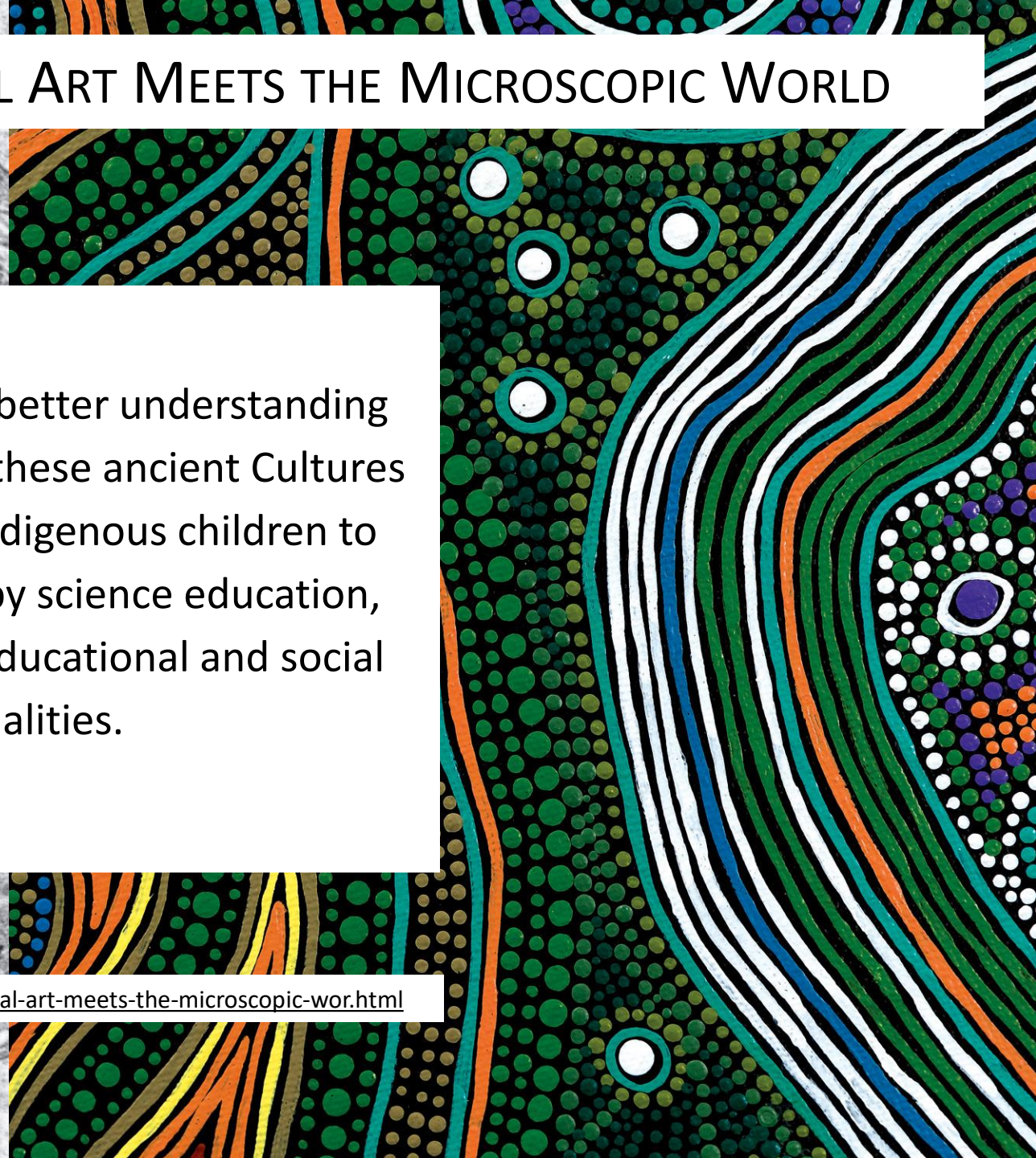
Bringing together TEM images of Australia's environment with Indigenous artists and their artworks, thereby demonstrating the intimate connection that our First Nations Peoples have with their Country.

https://www.sydney.edu.au/news-opinion/news/2018/06/13/stories-and-structures--aboriginal-art-meets-the-microscopic-wor.html

MICROSCOPY AUSTRALIA

# Stories and Structures: Aboriginal Art Meets the Microscopic World

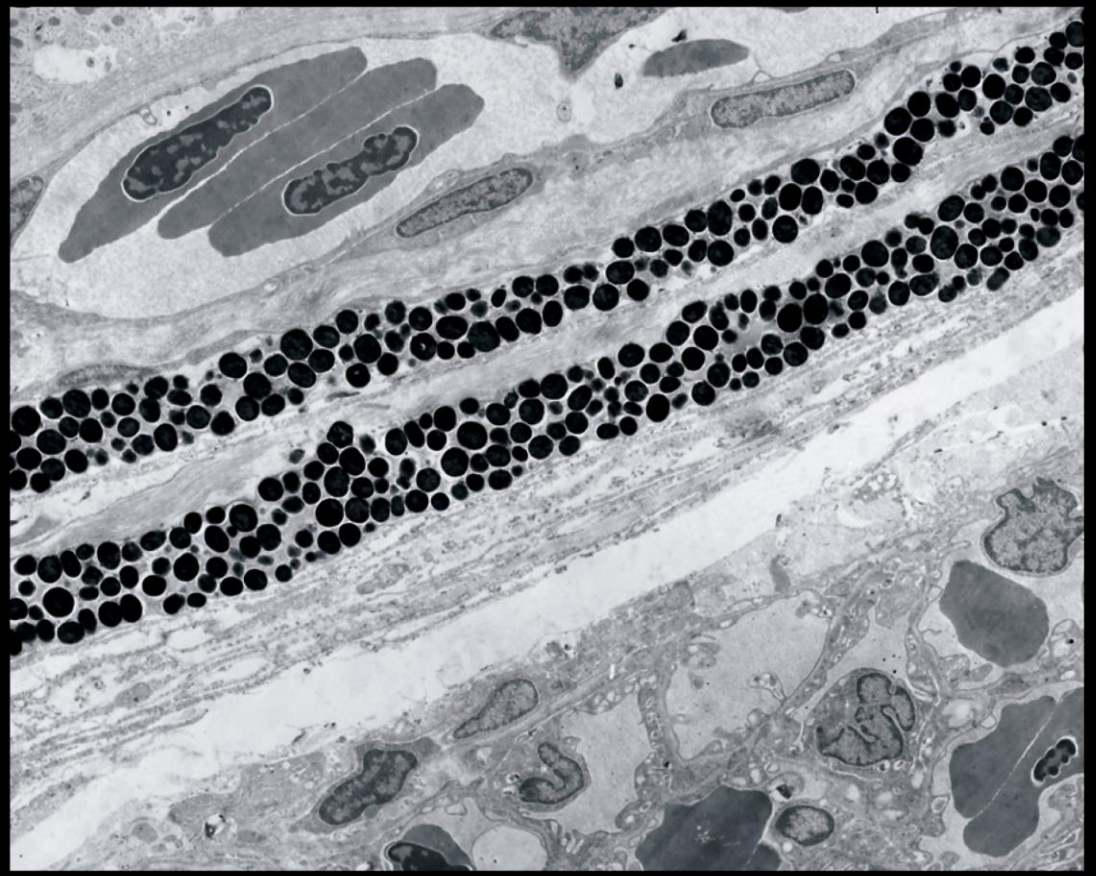




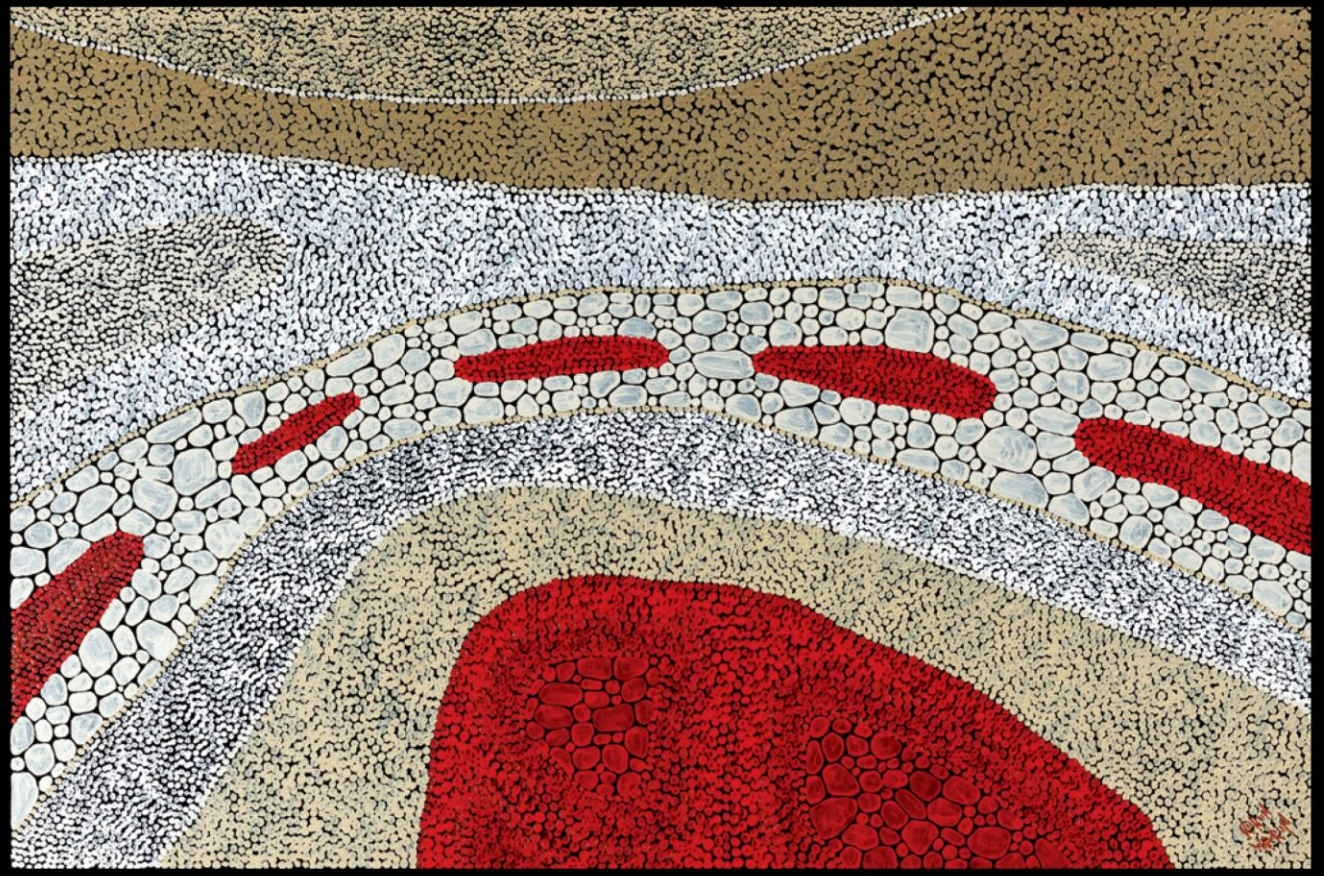
This is facilitating a better understanding and appreciation of these ancient Cultures and encouraging Indigenous children to feel less alienated by science education, helping to reduce educational and social inequalities.

https://www.sydney.edu.au/news-opinion/news/2018/06/13/stories-and-structures--aboriginal-art-meets-the-microscopic-wor.html

MICROSCOPY AUSTRALIA



Fish Eye – Blood Flow | Shaun Collin



Dry River Bed | Kurun Warun

MICROSCOPY AUSTRALIA

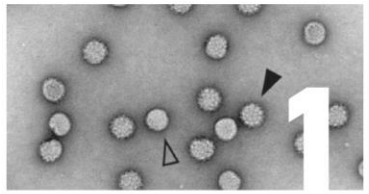
Ribosomes | Created at the University of Sydney

Janganpa Jukurrpa (Brush-tail Possum Dreaming) | Judith Nungarrayi Martin

MICROSCOPY AUSTRALIA

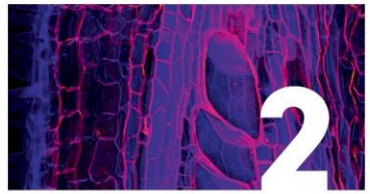
MICROSCOPY AUSTRALIA

# Supporting SDGs...



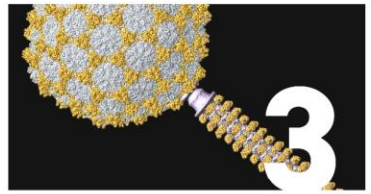

## NO POVERTY

cheap and effective solutions for issues facing the poor, including solar-powered water desalination and decontamination; and new temperature-stable vaccines, drugs and devices to tackle antibiotic resistance, emerging and tropical diseases, and natural disasters.




## ZERO HUNGER

more productive, drought tolerant and pest resistant crops; better fertilisers and pesticides; improved soils; and new low-energy, on-site technology to produce the world's most important fertiliser, ammonia, reducing the need for bulk storage, and therefore risk of explosion.




## GOOD HEALTH & WELLBEING

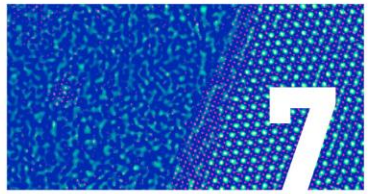
a spectrum of vaccines, drugs and medical devices to treat and prevent infectious and non-infectious diseases, including the HD-MAP for temperature stable vaccines, bacteriophages to fight antibiotic resistance, and bee venom to treat aggressive breast cancer.


## QUALITY EDUCATION

providing effective online learning tools that bring advanced microscopy education to a worldwide audience and through our public engagement, we encourage Indigenous Australian to connect with science through microscopy and its visual connection to Country and Culture.

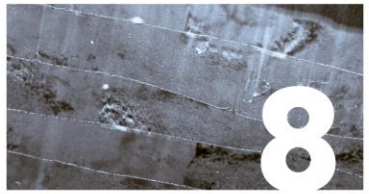

## CLEAN WATER & SANITATION

cheap, portable water desalination and decontamination technologies that don't rely on electricity; polymer sponges made from waste that remove contaminants from water; and new non-toxic industrial materials that require less energy.



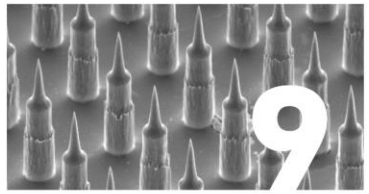

## AFFORDABLE & CLEAN ENERGY

new, affordable, less toxic and more efficient solar materials, such as, quantum dots, perovskite and kesterite; new batteries for more reliable power; new alloys for hydrogen transport and storage; and low energy ammonia production method to reduce global energy.



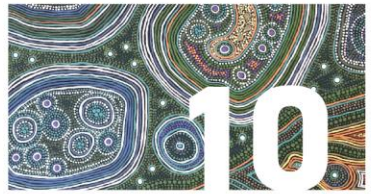

## DECENT WORK & ECONOMIC GROWTH

more efficient extraction and use of natural resources; lighter, stronger, more durable materials such as alloys, ceramics, graphene and nanocellulose for advanced manufacturing; and technology to build a circular economy.



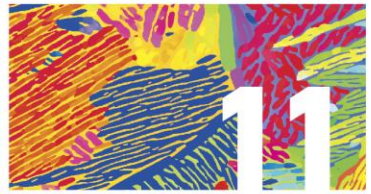

## INDUSTRY, INNOVATION & INFRASTRUCTURE

new technologies to create sovereign capability including seven of the World Economic Forum's top ten emerging technologies: microneedles, sun-powered chemistry, electric aviation, digital medicine, low-carbon cement, quantum sensing, and green hydrogen.



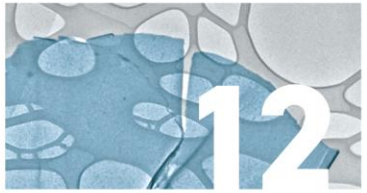

## REDUCED INEQUALITIES

diseases prevalent in Indigenous communities and by facilitating cross-cultural understanding through our Stories & Structures exhibition, we can help reduce the educational and social inequalities across Australian society.



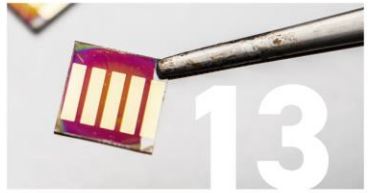

## SUSTAINABLE CITIES & COMMUNITIES

lighter, greener, and stronger materials for more efficient buildings and fuel-efficient transport systems; cheap, non-toxic, and low-energy solutions for critical infrastructure such as power, water and sanitation; and ways to turn waste into industrial feedstock.



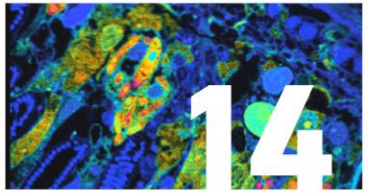

## RESPONSIBLE CONSUMPTION & PRODUCTION

technologies that underpin the circular economy; enable more efficient exploration, mining and mineral processing; allow for more efficient use of existing resources by making lighter, stronger materials that use less toxic and reactive components.



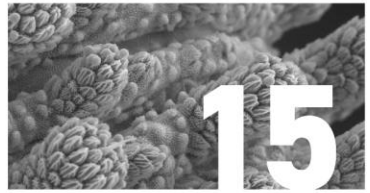

## CLIMATE ACTION

technologies that prevent and create resilience to climate extremes and their consequences, including green energy and its storage; drought- and salt-resistant crops; medical devices, portable power and water purification for emergency response to disaster.



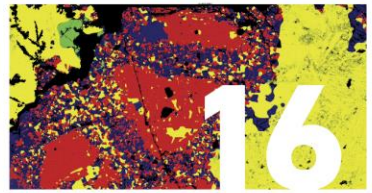

## LIFE BELOW WATER

coral bleaching, reef health and seagrass meadows; fish development and growth; the impacts of ocean acidification and microplastics on marine life; and technologies to absorb oil spills.




## LIFE ON LAND

restoration of degraded soils and ecosystems, through use of biochar, plant probiotics and removal of contamination; the impact of bushfire on native ecosystems; exploring Australia's biodiversity as a resource for new drugs, materials and crops.




## PEACE, JUSTICE & STRONG INSTITUTIONS

Our University of Western Australia facility is the first university in the world to join the United Nations' international nuclear verification program, to help monitor global nuclear safeguards.


## PARTNERSHIPS TO ACHIEVE THE GOAL

We are helping to build an active international network of microscopy facilities that includes developing nations, through our membership in Global Bioimaging. Through this initiative we take an active role in developing international standards for best practice in microscopy.

# Microscopy Australia – Resources are Available

- Measuring the impact of research infrastructures is measuring the impact of the technology experts.
- Annual User Satisfaction Survey
- 40% of papers in top 10% cited journals
- **Metrics officer**
- Marketing and business development officer
- Graphic designer, scientific writer
- Communications & research data management


MICROSCOPY AUSTRALIA

# Challenges & Potential Solutions

# CHALLENGES

Platform scientists are trying to measure impact

Lack of awareness of the need to measure impact

Lack of resources to measure impact

Lack of dedicated personnel to collect data

Lack of dedicated personnel to analyze, interpret, present & understand metrics & indicators

# Potential Solutions

Collaboration with social scientists who have the appropriate expertise to measure impact

Seminars, webinars, outreach to raise awareness of the need to measure impact

Develop and promote resources to measure impact

Advocate policy changes to ensure adequate funding for human resources to measure impact

Build a network of experts and funding mechanism to analyze, interpret, present & understand metrics & indicators

# THANK YOU – QUESTIONS?

Susanne Vainio
Camilo Guzman Gutierrez

Philip Hockberger

Jenny Whiting
Lisa Yen

Parallel Session

# Impact Frameworks & Infrastructures

**Michiel Roelse**

Director, Topsector Horticulture & Starting Materials, The Netherlands

TOPSECTOR
HORTICULTURE & STARTING MATERIALS

# An introduction to the Top Sector Horticulture & Starting Materials

Societal impact of Science Conference,
Halifax, June 20, 2023

TOPSECTOR
HORTICULTURE & STARTING MATERIALS

# Michiel Roelse

The Top Sector for Horticulture & Starting Materials)

# In figures

TOPSECTOR
HORTICULTURE & STARTING MATERIALS

| | Horticulture & Starting Materials complex – Statistics Netherlands/LEI 2019 | | | | | |
|---|---|---|---|---|---|---|
| **Key figures** |  |  |  |  |  |  |
| | **Production value chain,** Horticulture & Starting Materials | **Added value** | **Number of companies** (primary horticulture*) | **Workforce** (annual work units) | **Export value NL** | **R&D expenditure in NL** |
| **Size (in € billion)** | 27,9 | 21,1 | 23.7K | 254K | 24,5 | 0,76 |
| **Share of the Netherlands (%)** | 2,7 | 2,7 | 1,6 | 3,4 | 4,7 | 4,9 |

* Top Sector Monitor, Statistics Netherlands

# Who, what, how

TOPSECTOR
HORTICULTURE & STARTING MATERIALS

- Executive policy making body for the primary production sector in the Netherlands
- Liaison to broad network of companies (LEs & SMEs), research performers and governmental institutions in the sector in the Netherlands
- Non-dilutive funding of RDI-projects & PPPs in the sector
- Focus on societal challenges & solutions through customized impact 2025 program
- Dedicated explorer and accelerator of (inter-) national cross overs between PM-sector and adjacent fields (FHE-continuum)

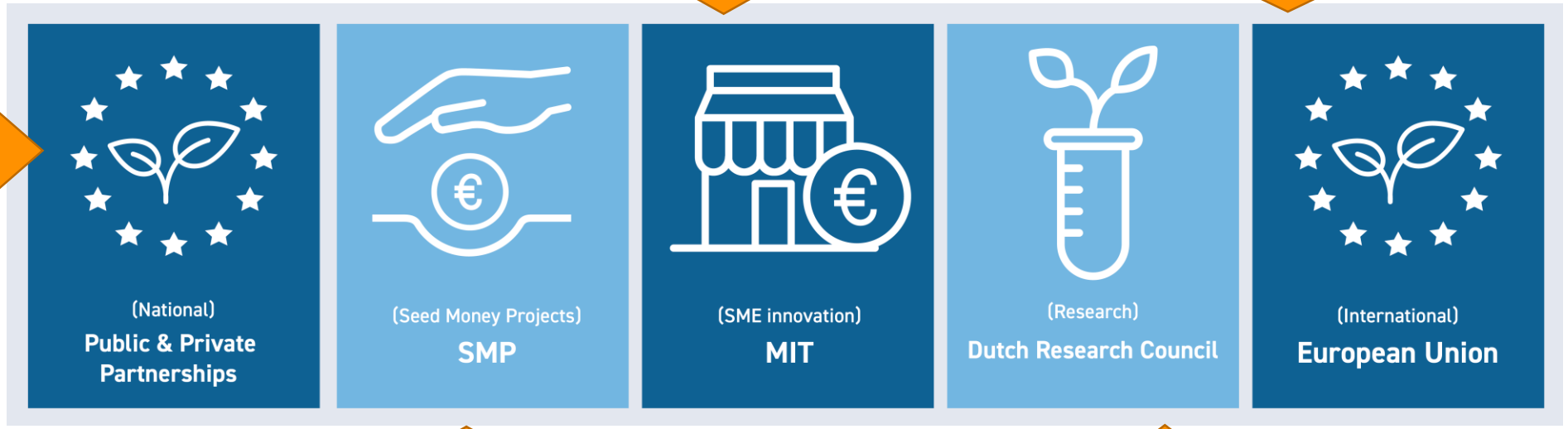
# Schemes

TOPSECTOR
HORTICULTURE & STARTING MATERIALS

The programme for the encouragement of innovation among SMEs (MIT) encourages innovation among small and medium-sized enterprises across regional borders. Instruments: research vouchers and collaborative projects in the field of feasibility and R&D.

Various international schemes for SMEs in the Netherlands

Annual call for research projects, in which companies, industry associations, NGOs and public organisations join forces with recognised research organisations.




SMP supports SMEs from the horticulture and agri-food sector in the start-up of innovative, international partnerships in which the formation of a consortium is a key aspect.

The Dutch Research Council is the Dutch funding organization for the scientific community and is charged with promoting scientific research in the Netherlands.

# Crossovers

Horticulture & Starting Materials is engaged in many valuable crossovers with other top sectors

## Logistics

- Infrastructure
- Chain management and logistics optimisation
  - ICT, track & trace, RFID
- Multimodal networks
- Sustainability of transport and conditioning

## High Tech Systems and Materials/ICT

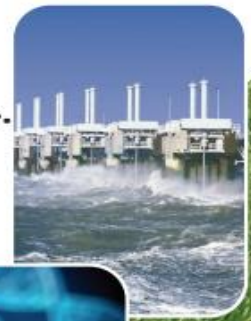
- Control, precision techniques, grading and marketing
  - Robotics, smart systems
- Controlled cultivation
  - LED, bio-nanotechnology
- Logistics
  - RFID track & trace
- IT
  - Big data, smart breeding
- Artificial Intelligence
  - The autonomous greenhouse

## Creative Industry

- The image of the sector
- Architecture (the importance of greenery in public spaces)
- Product design

## Water

- Sustainable and efficient use of water (reduce, re-use and recycle)
- Reduction of emissions to ground and surface water
- Drought and salinity tolerance
- Daylightless cultivation

Horticulture & Starting Material

## Life sciences & Health

- Health
  - a balanced diet
  - production of pharmaceuticals
- Technology
  - supporting technology
  - systems biology
  - synthetic biology
- Healthy diet
  - more flavour
  - less fat
- Improving health
  - anti-obesity
  - antioxidants

## Energy

- Sustainable and decentralized energy production
  - decentralised local energy systems
  - smart grids
  - $CO_2$ capture and/or distribution
  - sustainable heat production
  - sustainable electricity production

## Bio-based Economy

Substances for other factors through breeding, facilitating optimal fractionation through breeding, the use of bio-based materials

## Agri&Food

- Healthy food
- Resource efficiency
- Food security
- Phytosanitary policy
- Soil management
- Vegetable proteins
- Food waste
- Closed-circuit farming

## Chemistry

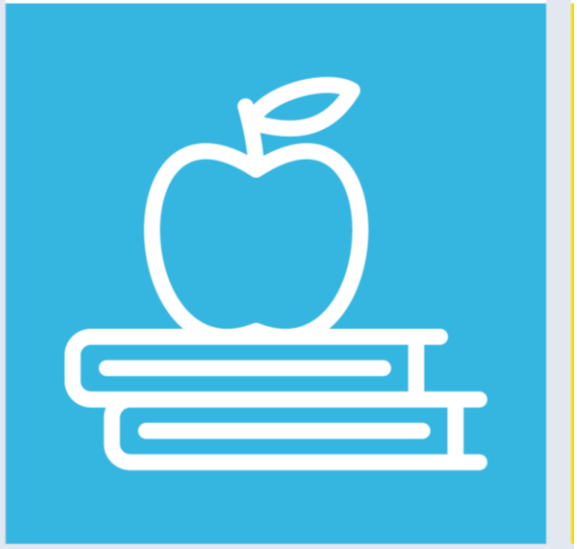
# Priority Themes

TOPSECTOR
HORTICULTURE & STARTING MATERIALS

**Research and Innovation Agenda Agriculture Water Food**
(Development of knowledge)



**GROENPACT**
(Education)



**DUTCH HORTICULTURE**
(International)

**IMPACT 2025**
(Knowledge sharing)

# Research& Innovation

TOPSECTOR
HORTICULTURE & STARTING MATERIALS


- The goal of the Top Sector Horticulture and Starting Materials is to be the world leader in successful solutions for global societal challenges in the areas of food, the environment in which we live, climate, energy and sustainability. Cooperation between entrepreneurs, research and educational institutions and government is of paramount importance in achieving this goal.
- The Research and Innovation Agenda of the Top Sector Horticulture & Starting Materials outlines what the business community, government and knowledge and research institutions will be working on in the coming years.

# IMPACT 2025

TOPSECTOR
HORTICULTURE & STARTING MATERIALS


Through the **IMPACT 2025** programme, the Top Sector for Horticulture & Starting Materials aims to collect ideas and involve new parties in order to translate both new and existing research into concrete applications in practice: from challenges and meet-ups to start-up support and the Innovation Prize awarded by the Top sector for Horticulture & Starting Materials.


TOPSECTOR
HORTICULTURE & STARTING MATERIALS
Thank you for your attention!

# Recommendation

**“To measure the impacts of research infrastructure we need to work together as a broad community, have the appropriate resources and frameworks inclusing a common understanding of impact pathways.”**