
Developing effective communication in science collaborations:

Diverse forms of teamwork

Dr. Darko Donevski

Assistant Research Professor in Astrophysics & Science Writer

1. NCBJ, AstroGroup, Warsaw
2. SISSA, Astrophysics Group, Trieste



darko.donevski@ncbj.gov.pl



www.darkodonevski.com

Biography mapping...



 **Where I studied/worked**

 **Where are the telescopes I use**

Why do we collaborate...

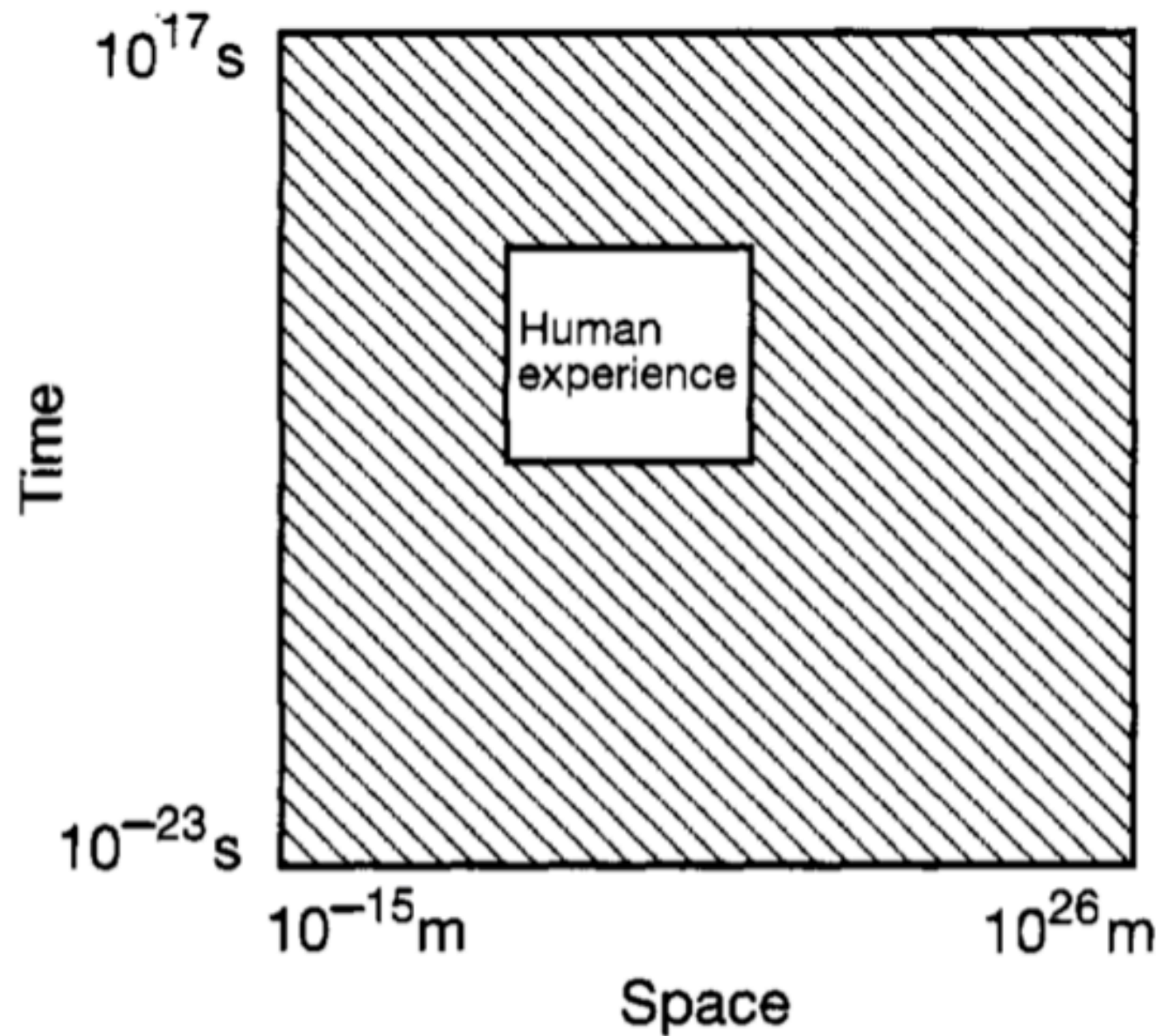
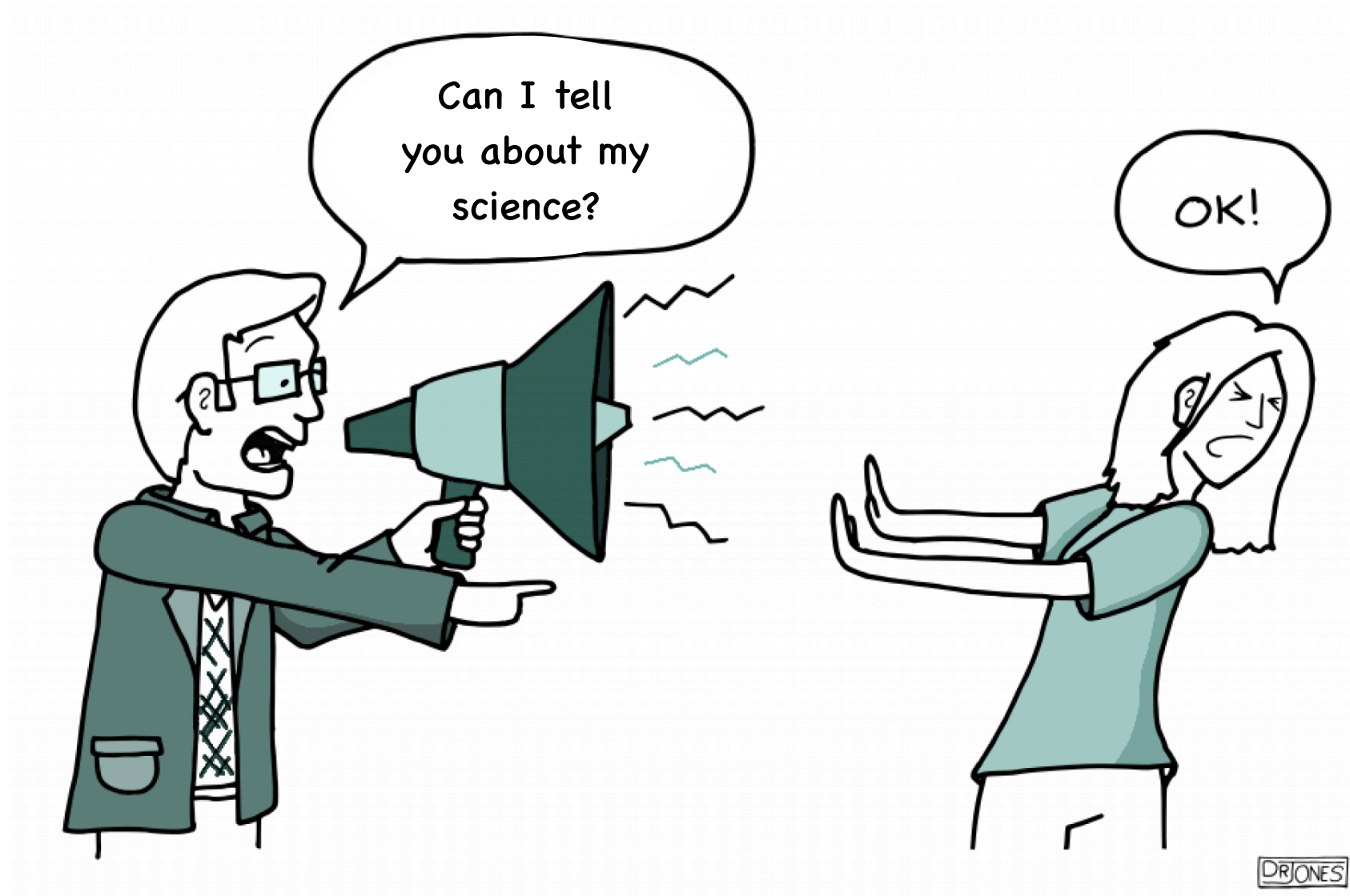


Figure 1.1: *Human experience of space and time in the physical world.*

credit: R. Blin-Stoyle, *Eureka*

... and how?



Content

1. International science collaborations

Benefits and challenges

+5 min
questions

2. Elements of collaborations

Principles and applications

+5 min
questions

3. From ideas to discoveries

Behind the scenes of collaborative research

+5 min
questions

4. Global perspective

General
discussion





Q: ... (for questions)

Part I

International collaborations:

benefits & challenges



James Webb Space Telescope

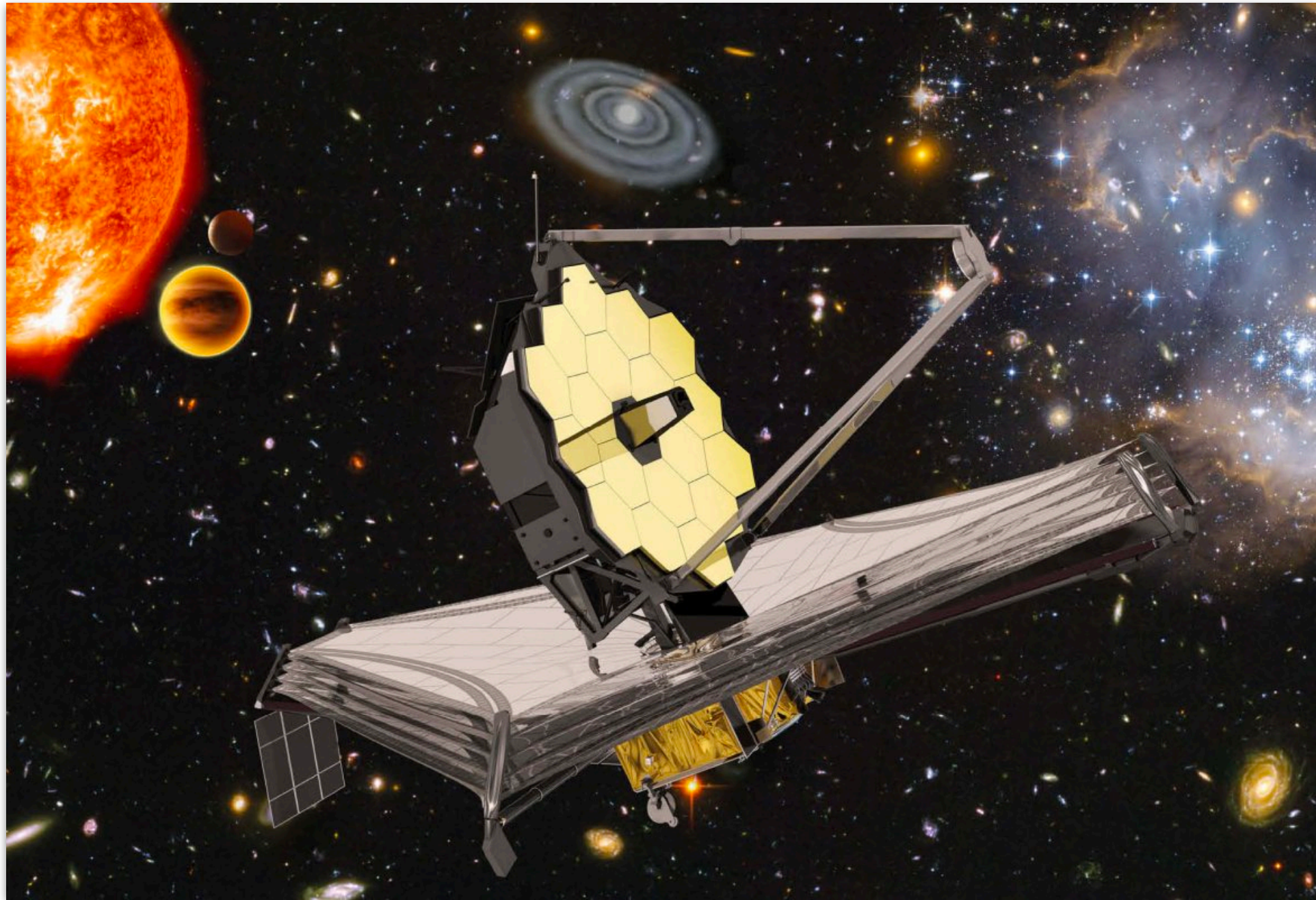
(launched: 25/12/2021)



credit: NASA/ESA

1.1 Why collaborations?

- Acquiring the data in astronomy and cosmology is very competitive process.



**James Webb Space Telescope
(JWST)**

1.1 Why collaborations?

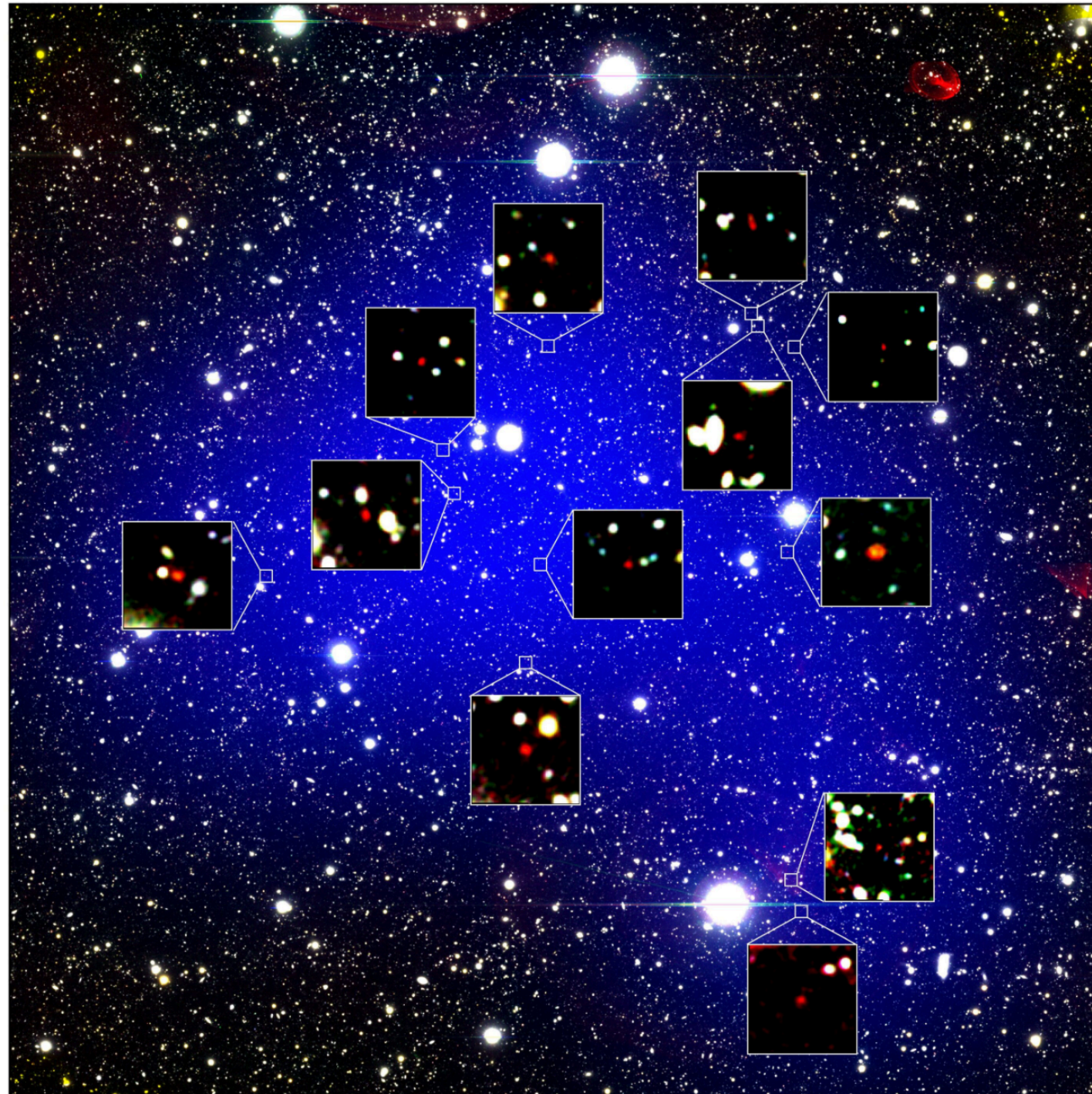
- Acquiring the data in astronomy and cosmology is very competitive process.



ALMA proposals
(credit: ESO)

1.1 Why collaborations?

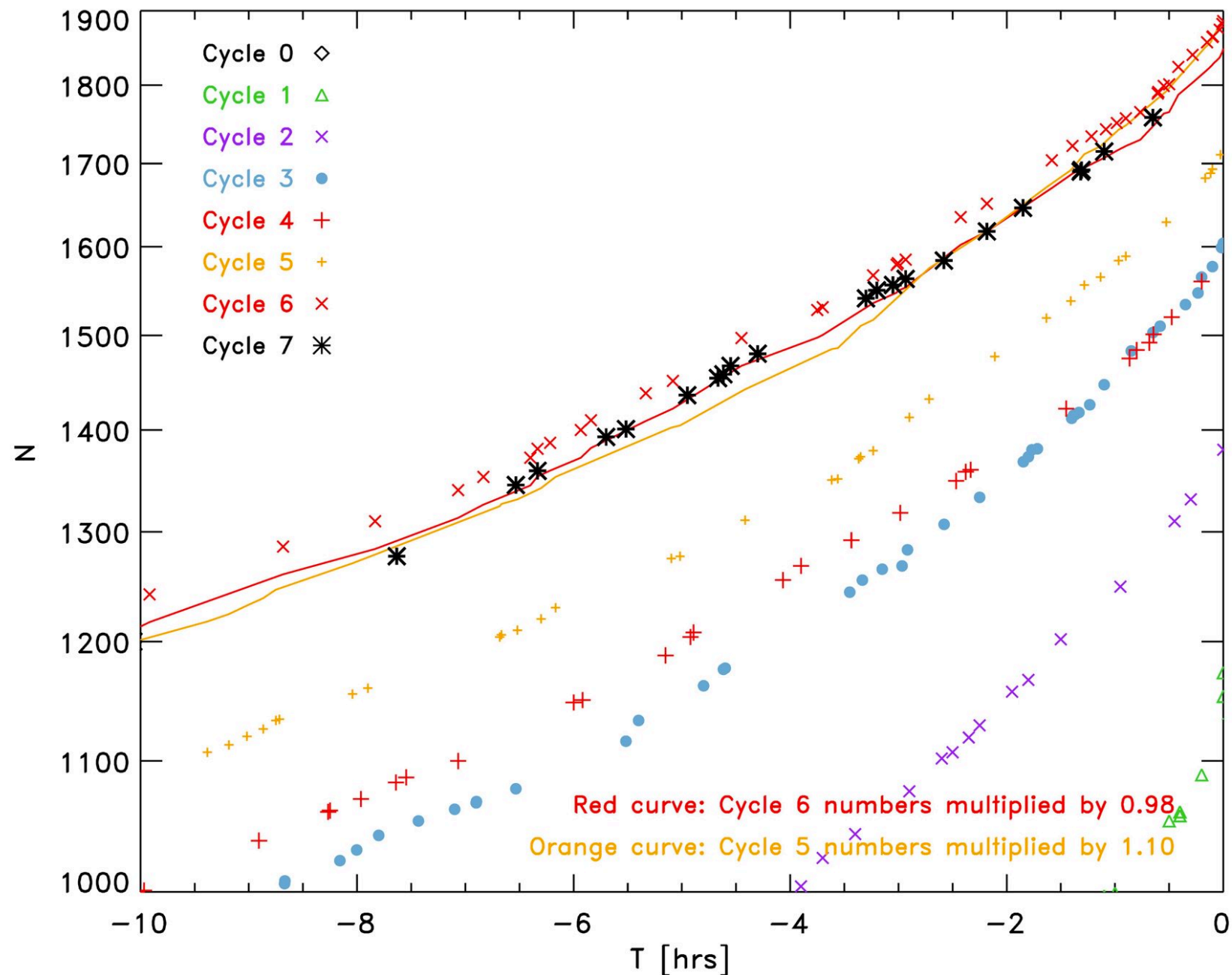
- Acquiring the data in astronomy and cosmology is very competitive process.



Beautiful galaxies are contained in very expensive data
(~ 100 000 \$)

1.1 Why collaborations?

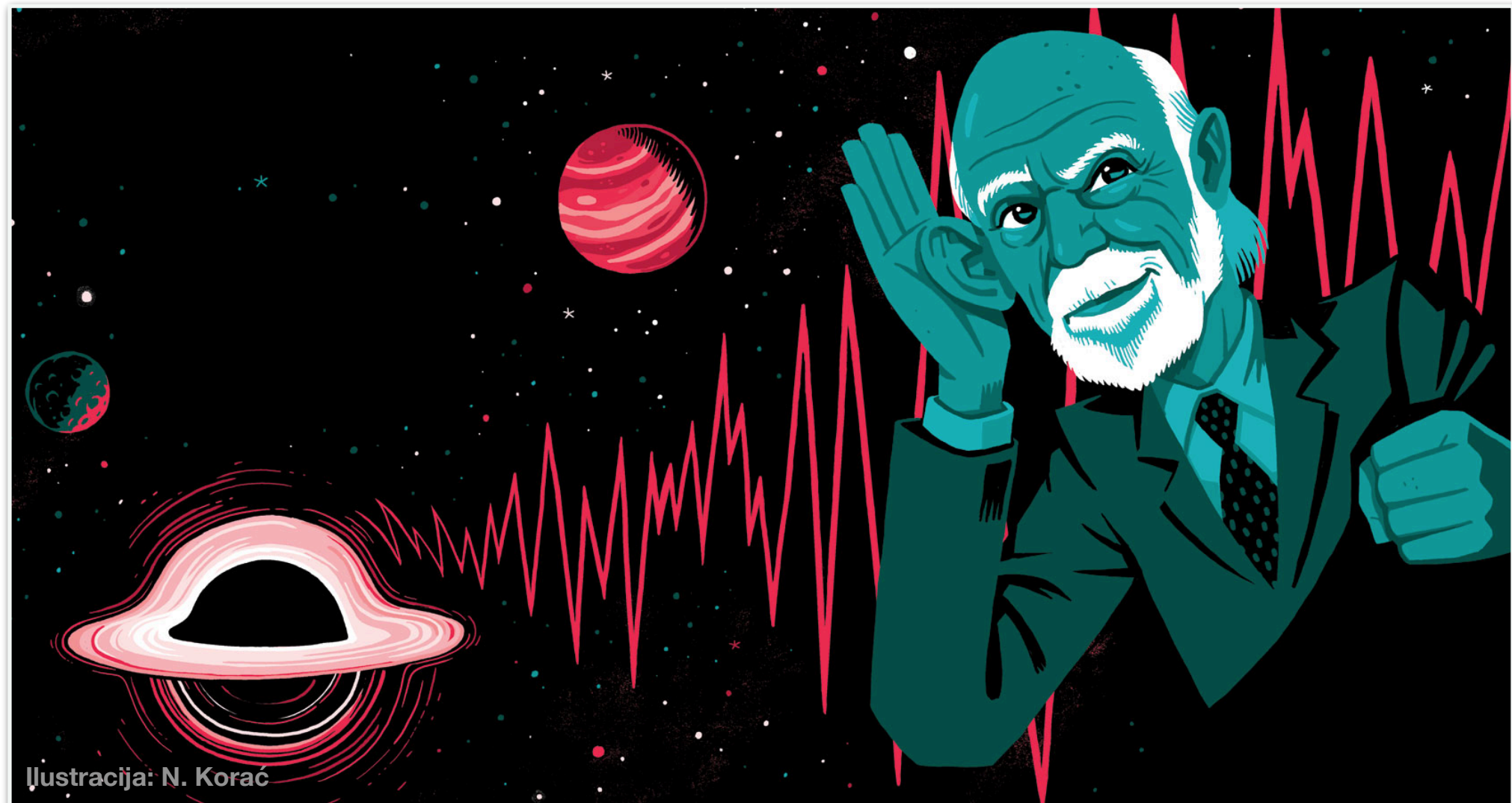
- Acquiring the data in astronomy and cosmology is very competitive process.



ALMA telescope proposals
(credit: ESO)

1.1 Why collaborations?

- *D.Donevski: Interview with the Nobel prize laureate, Barry Barish (magazine: Elementi 20)*



**“Science collaboration is building bridges!”
(B. Barish)**

1.1 Why collaborations?

- *D.Donevski: Interview with the Nobel prize laureate, Barry Barish (magazine: Elementi 20)*



**“We try to understand the Universe, but at the same time we yet have to understand how to communicate”
(B. Barish)**

1.1 Why collaborations?

- *D.Donevski: Interview with IAU inspiration medal winner, M. Povic (magazine: Elementi 25)*



“Collaborations are windows to the world for (African) scientists.”
(M. Povic)

1.1 Why collaborations?

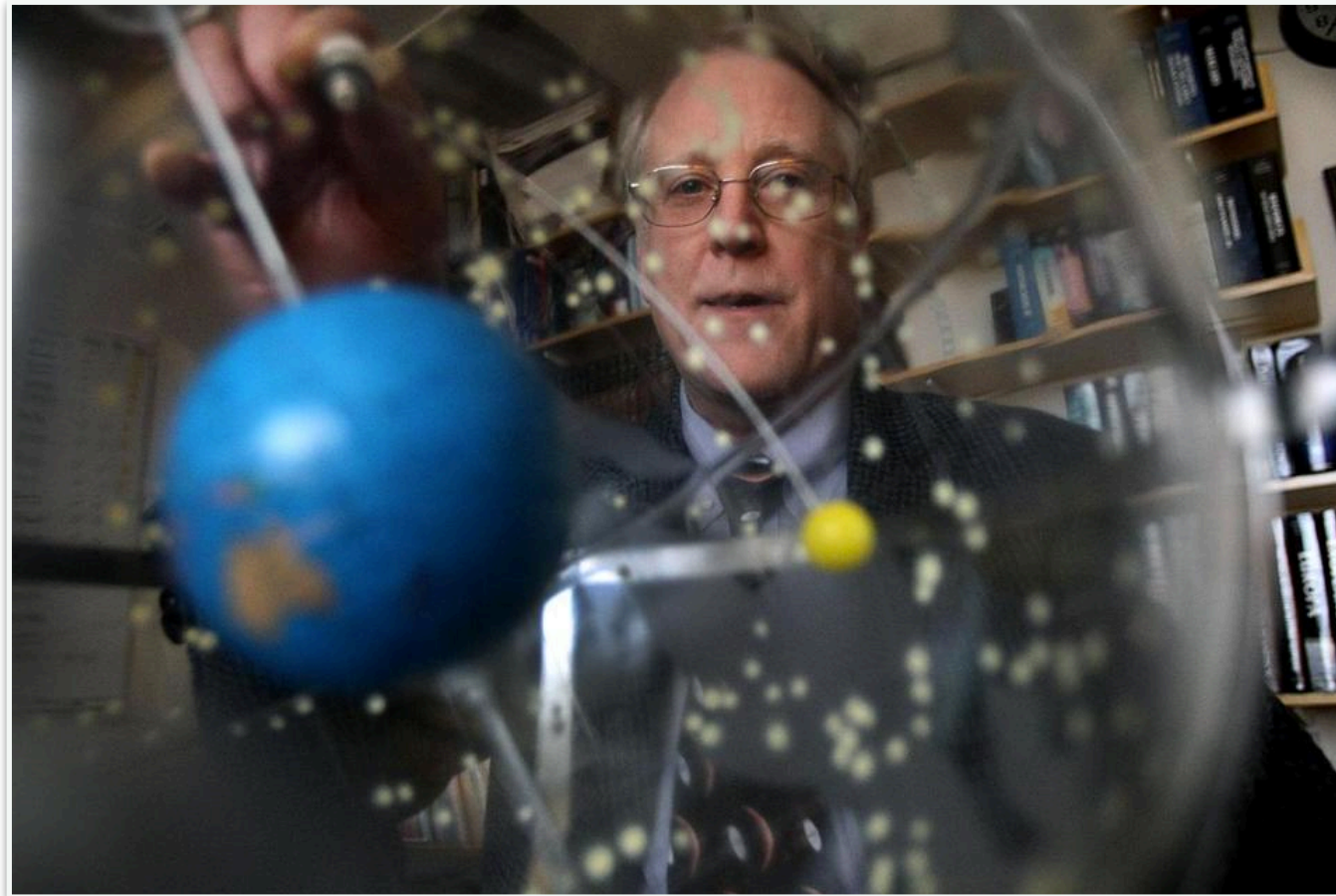
- *D.Donevski: Interview with awarded author Rosemary Sullivan (magazine: Elementi 21)*
-



**“Nobody knows everything! We need collaborations to replace the myth of a lone genius!”
(Rosemary Sullivan)**

1.1 Why collaborations?

- *D.Donevski: Towards the new horizons (portal Elementarium, 2016)*
Interview with prof. Richard Binzel (NASA New Horizons Mission co-I)



**“Evolution of science collaboration changes the way science is funded”
(Richard Binzel)**

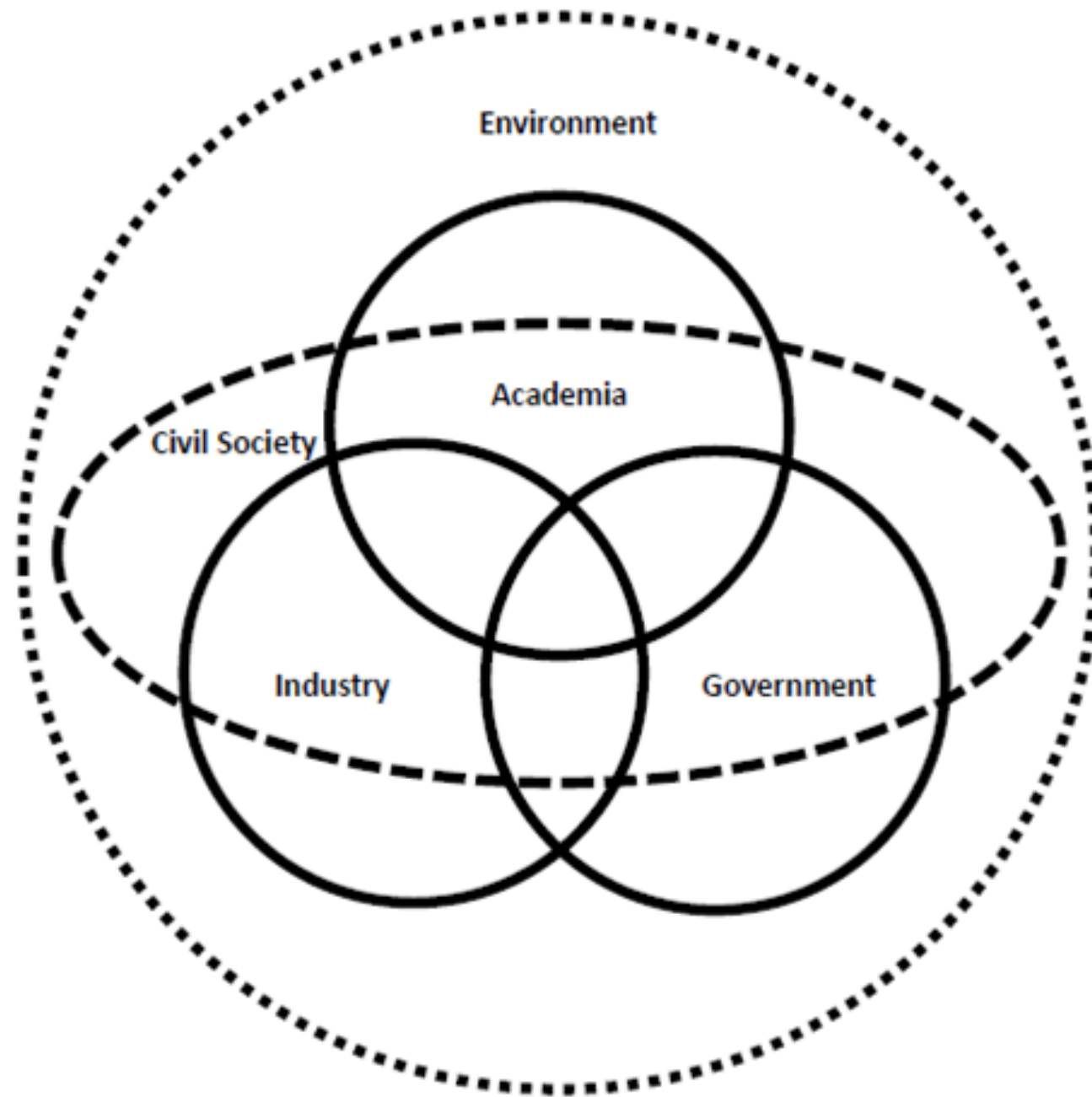
1.1 Why collaborations?

- *D.Donevski: Dynamics of dusty places (magazine: Elementi 22)*



“I prefer my science be like a good old wine - alone, untouched in the basement!”
(unnamed astronomer)

1.1 Why collaborations?



credit: C. Swartz

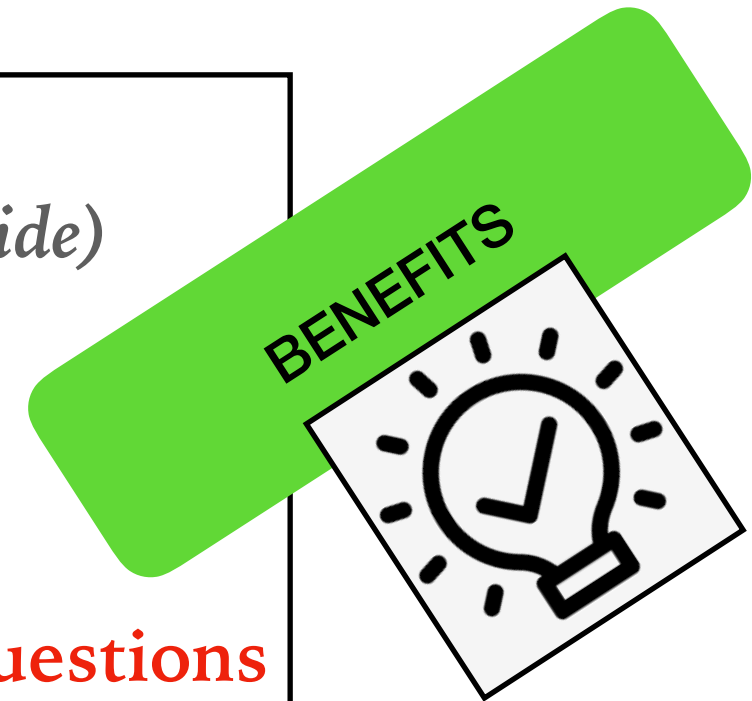
Collaborations are important for “smart co-evolutions” & sustainable development!

1.2 Types of collaborations

- **Intergovernmental**
(e.g., *European Space Agency ESA, CERN*)
- **International collaboration started from big multinational funds**
(e.g., *ESO*)
- **International collaborations between national agencies**
(e.g., *James Webb Space Telescope, Herschel telescope, ISS*)
- **International collaborations started from individual grants**
( *this talk*)
- **International collaboration started from interested individuals**
(various funding sources, not always specific for the proposed project)
- **Multi (Institute-industry-governmental) collaborations**
- **Collaborations between academia & community**
(e.g., *citizen science*)

1.3 Benefits and challenges

- 1. Science as a global endeavour**
(*dynamical relations amongst scientists worldwide*)
 - 2. Way to afford expensive infrastructure**
(*e.g., state-of-the-art telescopes, accelerators...*)
 - 3. Way to answer the most complex science questions**
(*e.g., COVID-19 pandemic*)
 - 4. Way to foster greater understanding, respect trust and knowledge**
- Many fields developed unique culture of collaboration...**



1.3 Benefits and challenges

... but, there are also various challenges!



- Institutions are organised by traditional boundaries...
- ... and complex problems often need approach that “converges” in a non-traditional way!

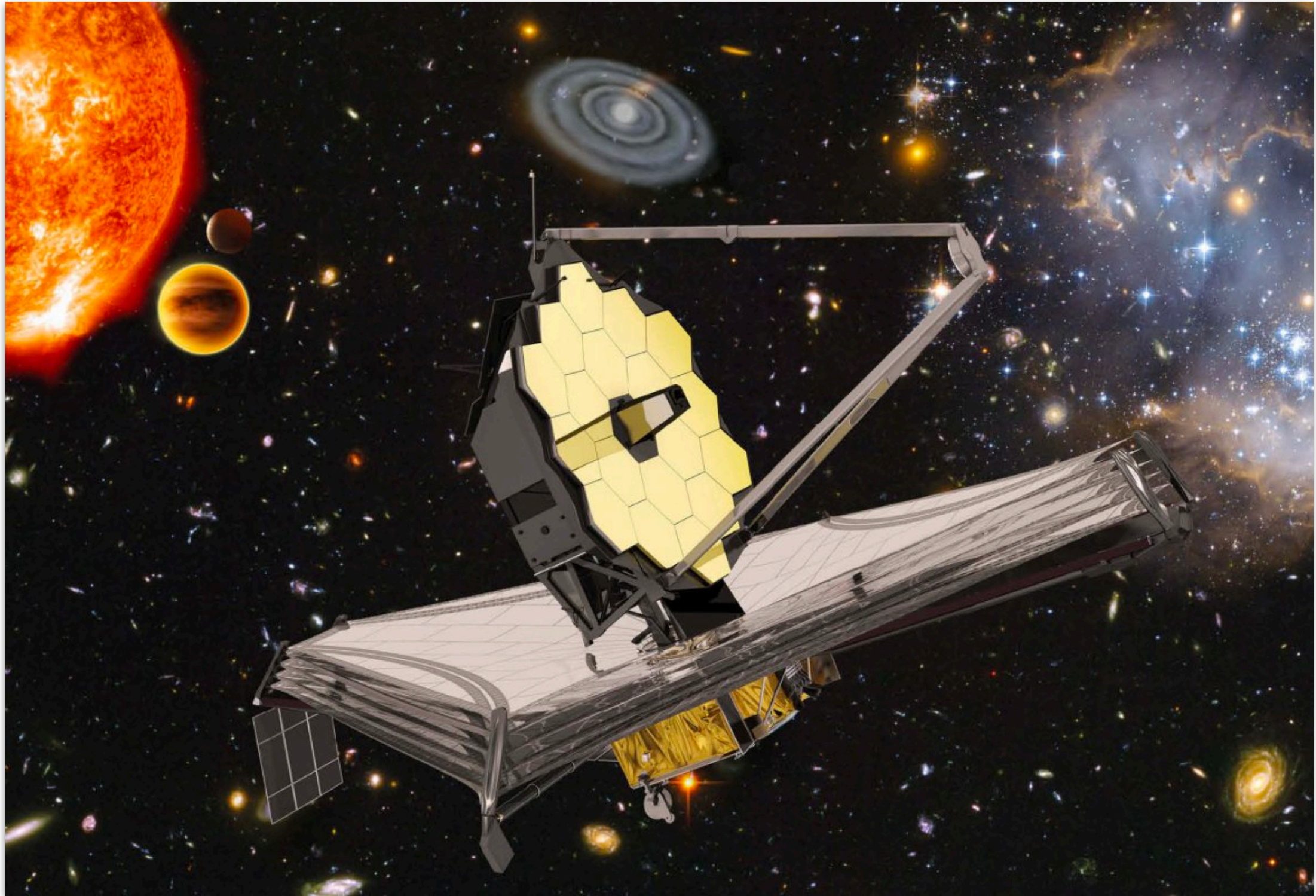
1.3 Benefits and challenges

... but, there are also various challenges!

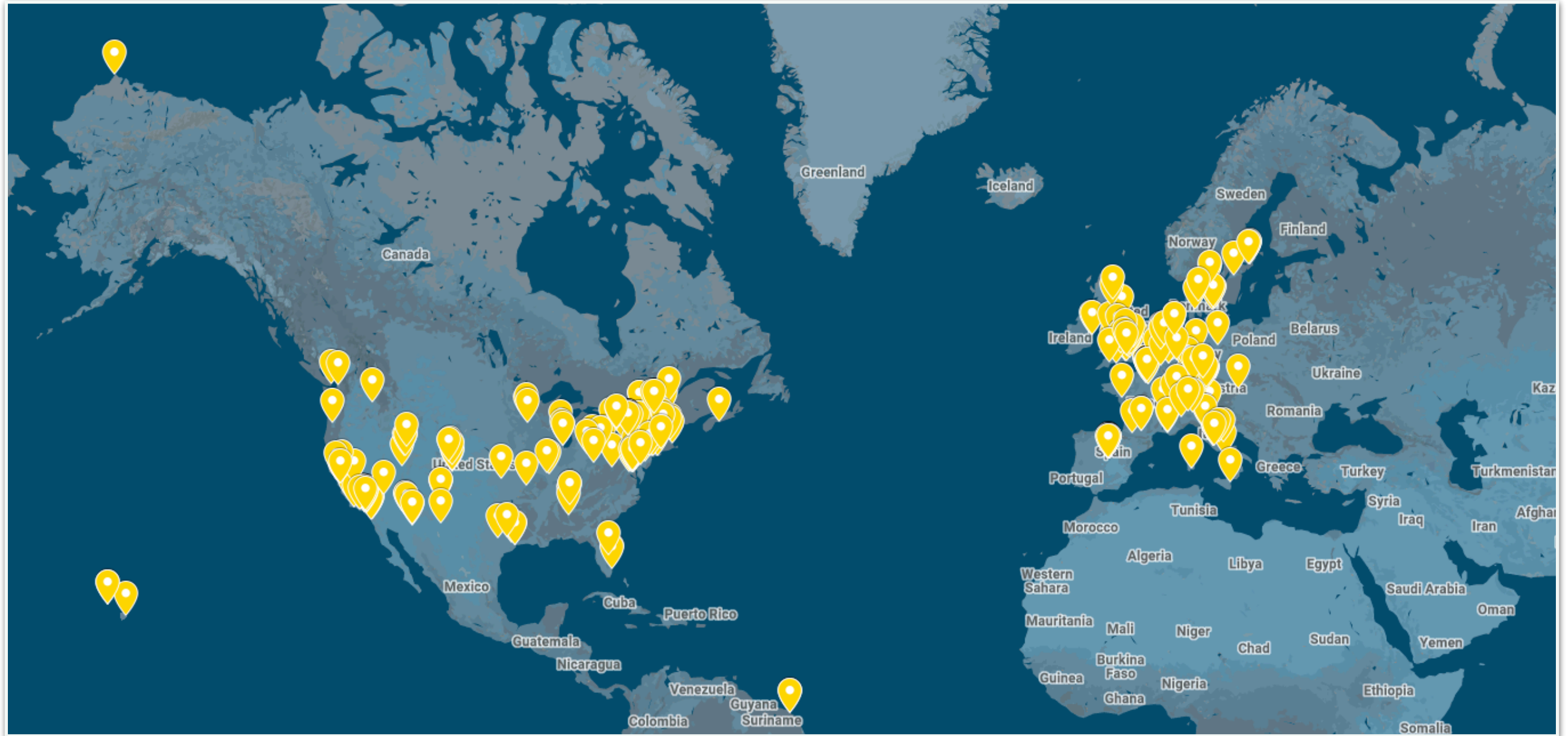


- **How to allow healthy debate in diverse environment?**
(e.g., How to ensure that each idea has equal weight!)
- **How to make collaboration a safe space?**
(in particular for women and scientists from underrepresented groups)
- **How to benefit from cross-cultural collaborations?**
(“Globalization does not mean the end of difference, but that we now have to deal with difference directly instead of at a distance”, R. Nollan, Purdue Univ.)

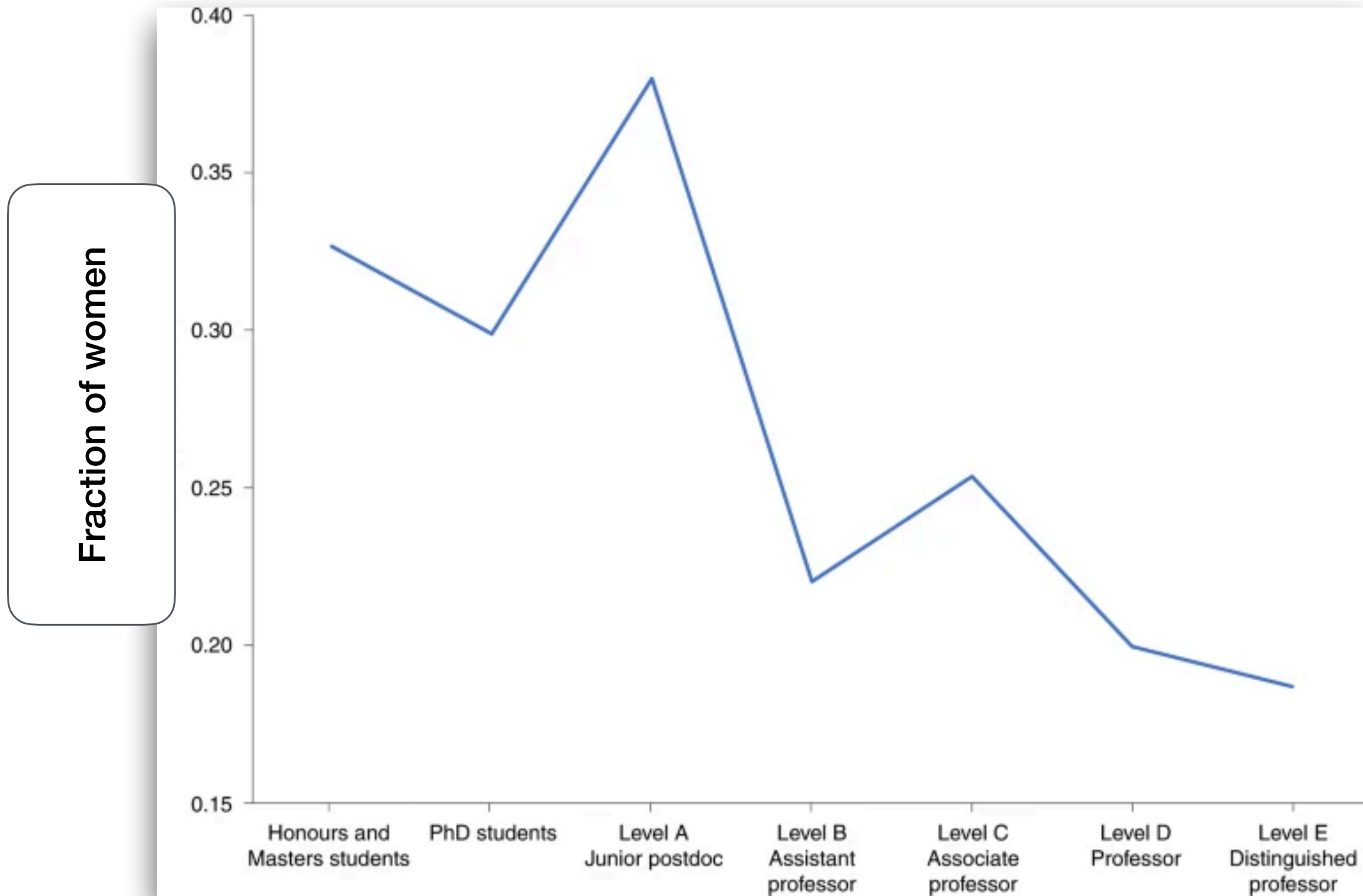
1.4 An example: JWST



1.4 An example: JWST



1.5 Evolution of international collaborations = evolution of research culture



Fraction of women at university levels in Australian astronomy
(L. Kewley, Nature Astronomy 5, 2021)

1.5 Evolution of international collaborations = evolution of research cultures

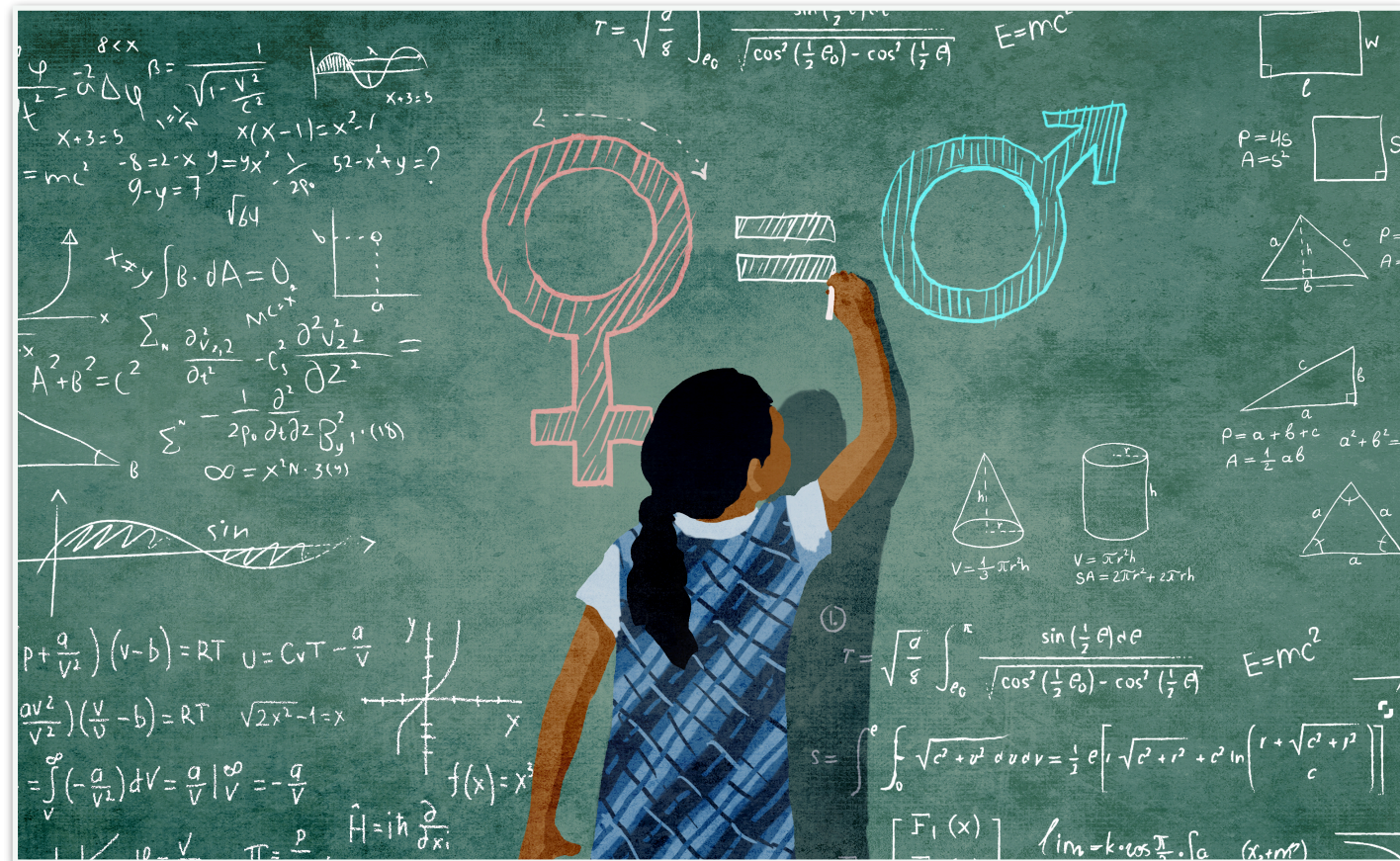
- International collaborations are full of opportunities...



- ... but can be precarious territory for women and scientists from underrepresented countries/groups...

Gender gap

- Breaking into the 'male dominating networks' of senior scientists can be difficult for women.



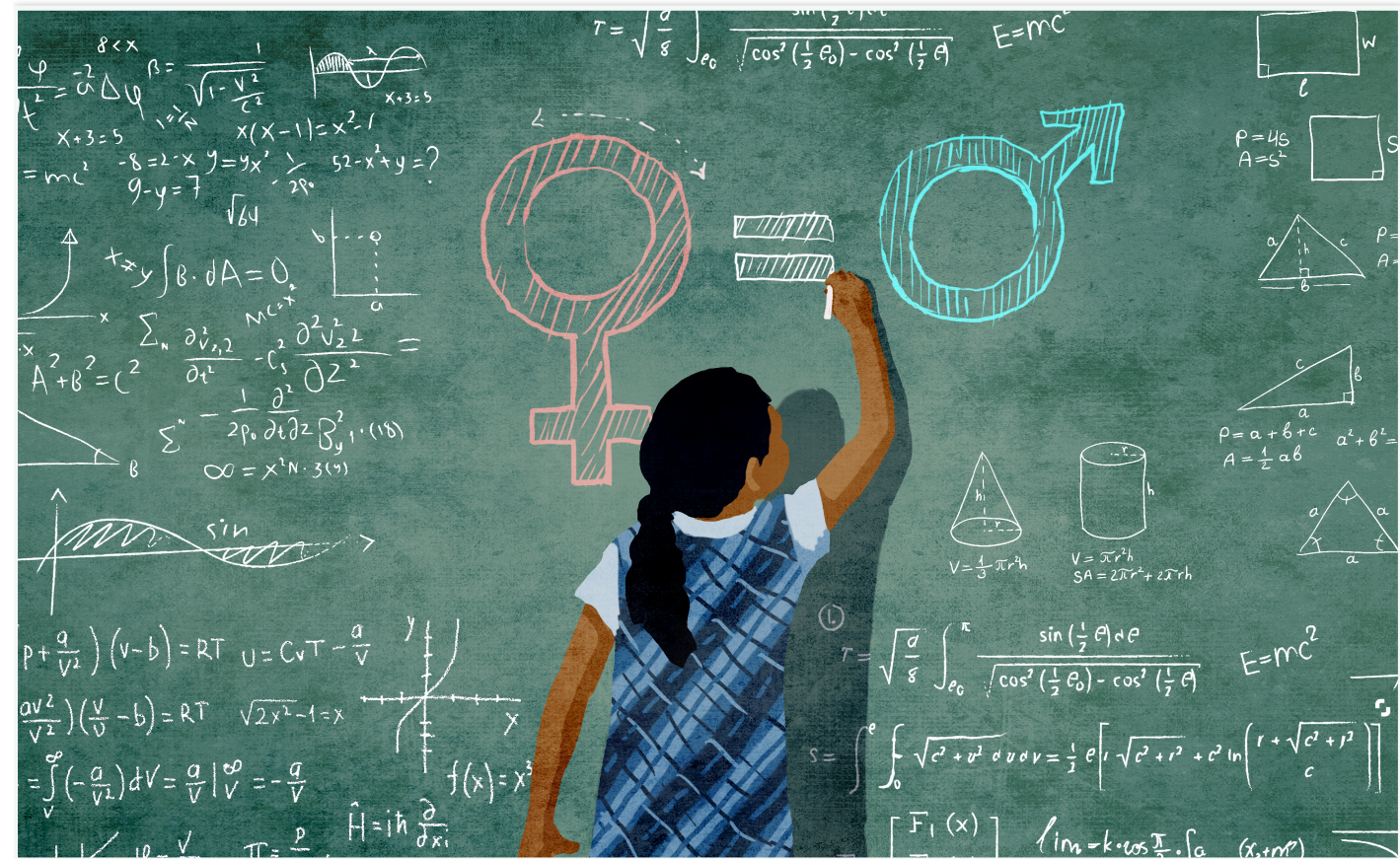
1.5 Evolution of international collaborations = evolution of research cultures

- International collaborations are full of opportunities...



- ... but can be precarious territory for women and scientists from underrepresented countries/groups...

- **Boosting the % of minorities in collaborations is difficult task**
(no systematic support, no equal starting opportunity etc.)
- **Gender/Minorities face increased risks of harassment!**
(AAS research, 2021)



1.5 Evolution of international collaborations = evolution of research cultures



Change of work culture!

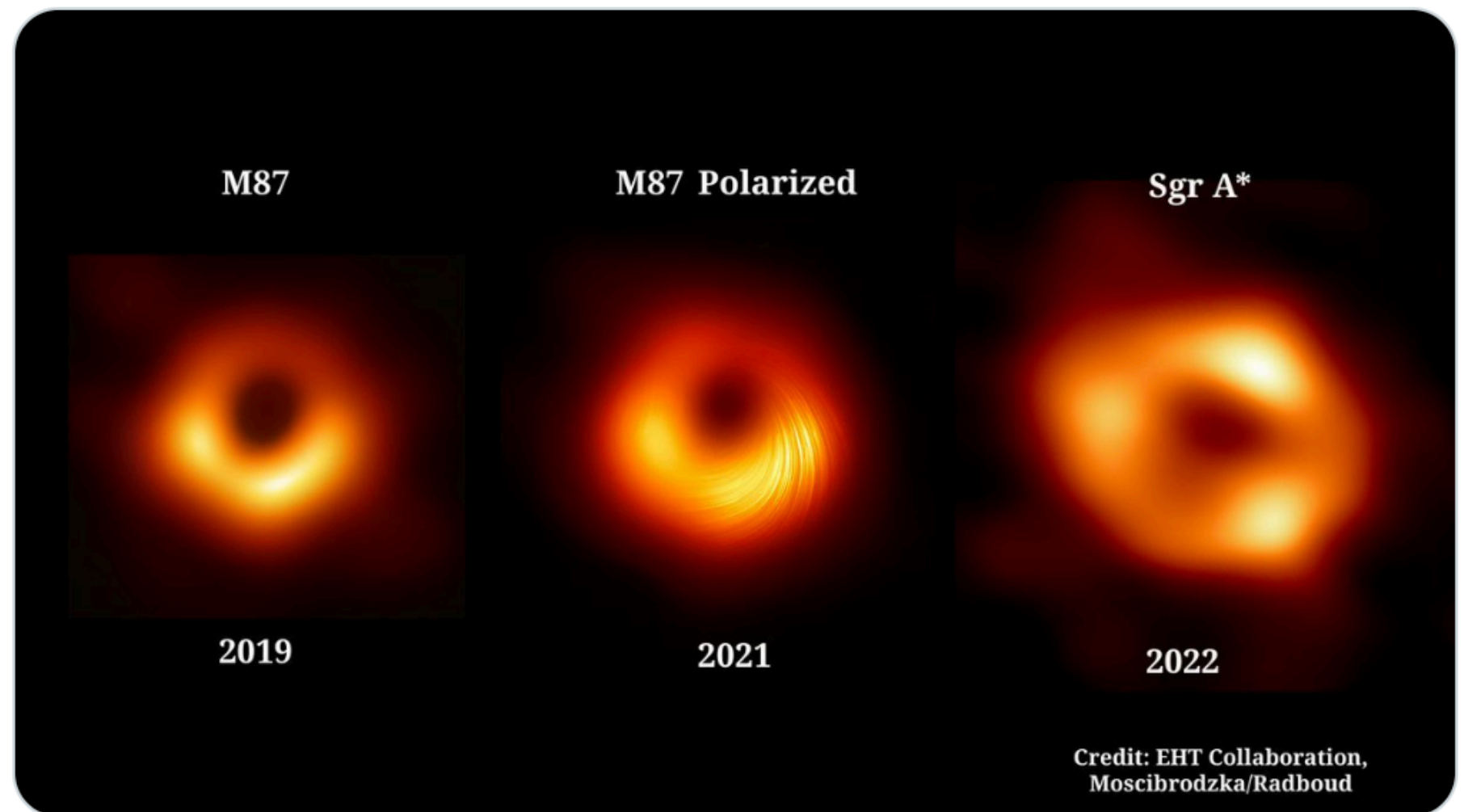
[Redacted]
[Redacted]
That's just what influenced me a lot. Although books of Strugacki "Monday starts on Saturday" with the idea that your love for science should be so strong that you don't have any desire to take a break on the weekend...

1.5 Evolution of international collaborations = evolution of research cultures



Did you know that it took 5 years to reduce, analyze, and interpret these 3 first images of black holes? I can't tell how many telecons/meetings/discussions it took, it was almost a nonstop work.

[#ourblackhole](#) [#eht](#)



7

10

94



Useful starting references/overviews/reports...



Shrum et al.
Structures of Scientific Collaborations



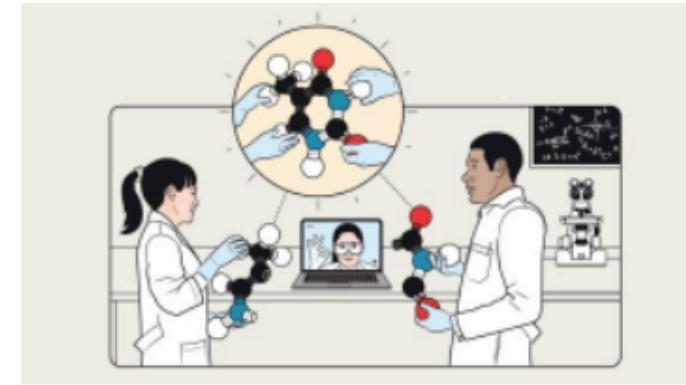
Useful starting references/overviews/reports...

nature > special

Special | 16 June 2021

How to collaborate in science

Science is a team effort, often straddling disciplines and regions. Research collaborations can foster greater understanding, respect trust and knowledge. These resources offer examples of how to keep collaborations harmonious and ensure that due credit is fairly assigned.



NEWS FEATURE | 16 June 2021

How the COVID pandemic is changing global science collaborations

The pandemic and political tensions might slow the march towards more globalized science.

Brendan Maher & Richard Van Noorden



Illustration by Fabio Buonocore

Nature Special, June 2021

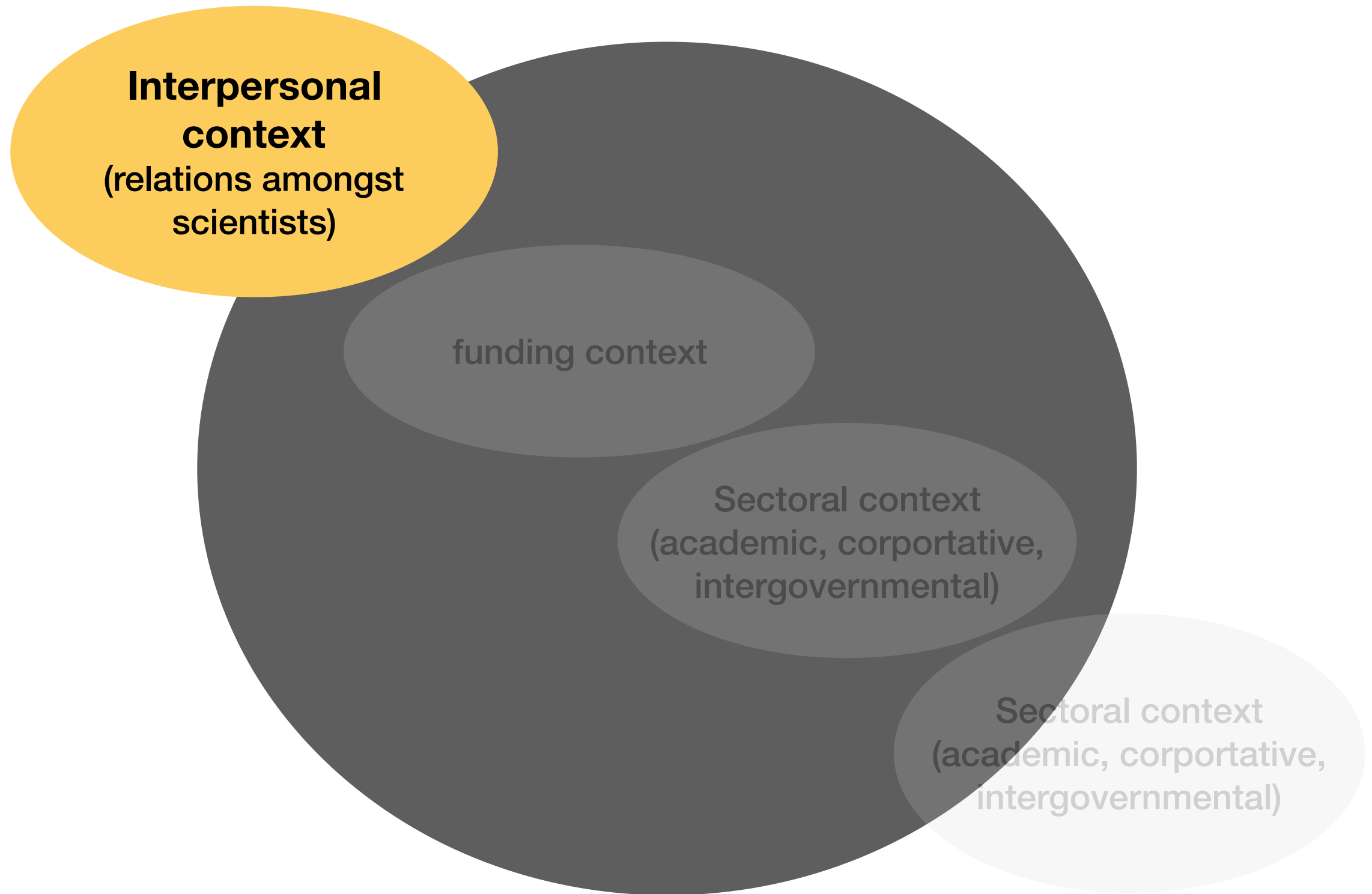
Part II

Evolution of collaborative science work:

principles & applications



Collaboration factors



2.1 How to create, foster and sustain your collaboration?



Don't start with poor approach: You need to explain what you bring to collaboration besides enthusiasm



Don't assume your chosen partner will make a good collaborator just because their work complements yours!

2.1 How to create, foster and sustain your collaboration?

Research collaboration team



Low

Level of integration / interaction



High



PI initiated:

- PI mainly works on his own

Collaboration:

- Group complementary work

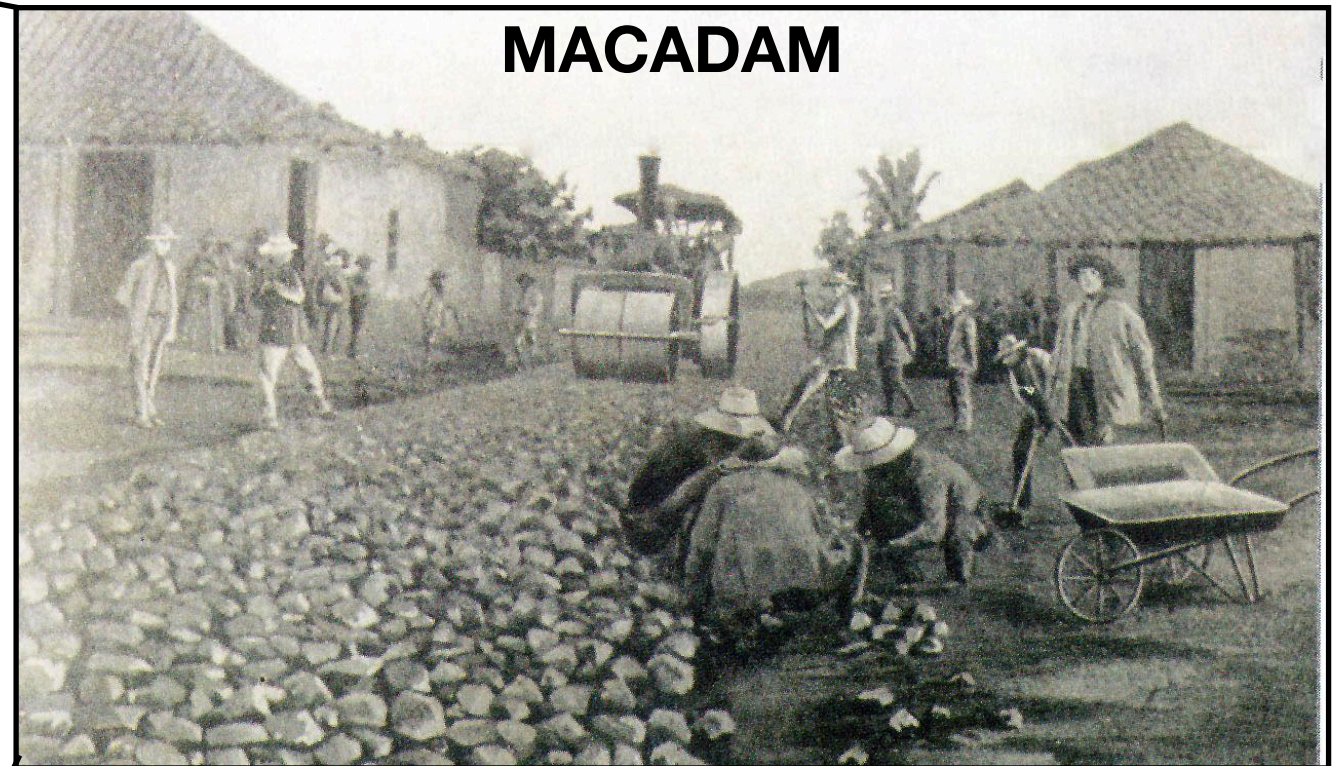
Integrated team:

- Separate expertise parts are fully integrated

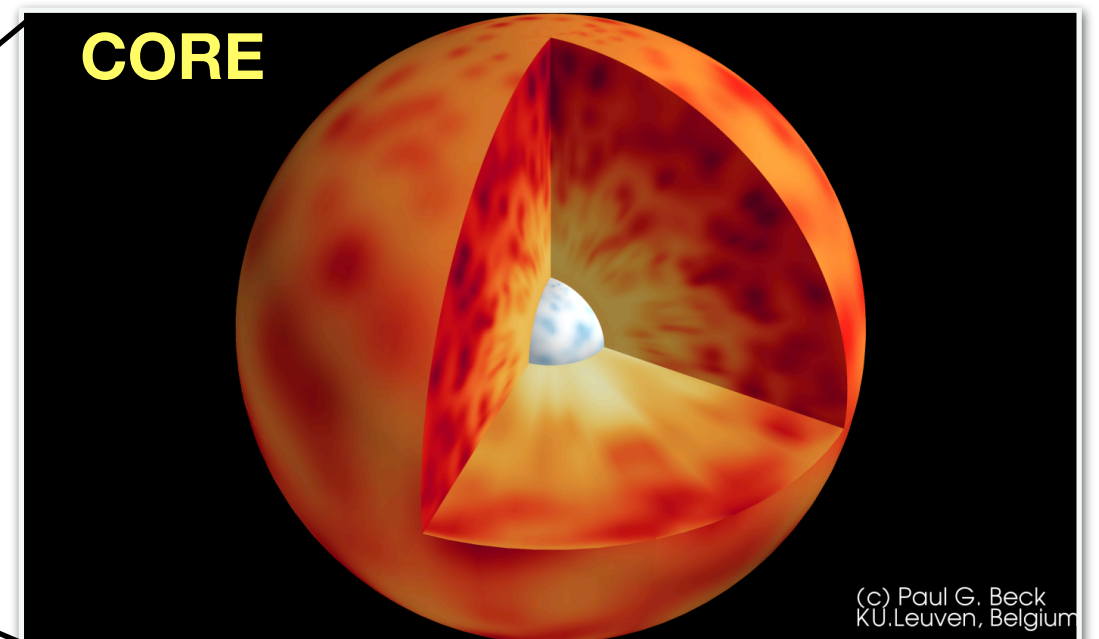
2.2 Elements of international collaborations (MACADAM / CORE framework)

MACADAM / CORE framework

- **M**enagement plan/Structure
- **A**ttitude
- **C**ontent
- **A**ction
- **D**ynamics
- **A**ccountability
- **M**obilisation



- **C**ommunication
- **R**elationaship



Essential elements of international collaboration

- **Management plan/Structure**
- Attitude
- Content
- Action
- Dynamics
- Accountability
- Mobilisation

- Mutually determine project questions & goals
- Define the way of sharing rewards and benefits

Essential elements of international collaboration

- Management plan/Structure
- **Attitude**
- Content
- Action
- Dynamics
- Accountability
- Mobilisation

- “This collaboration is important, and every collaboration can be learned!”
- “Great to work with experts in the complementary fields!”
- “This is a task that can only be achieved with teamwork!”



- Suppress big “I” (a.k.a. “big ego”) in collaboration!

Essential elements of international collaboration

- Management plan/Structure
- Attitude
- **Content**
- Action
- Dynamics
- Accountability
- Mobilisation

- What is our goal:

Paper?

(timescale: months/years)

Observational proposal?

(timescale: weeks/days!!!)

Funding proposal?

(timescale: weeks/months)

Essential elements of international collaboration

• Management plan/Structure

• Attitude

Q1

Qualitative: Refine big questions in the field

• **Content**

Q2

Quantitative: Access or collect the data

• Action

• Dynamics

Q3

Quantitative: Analyse the data

• Accountability

• Mobilisation

Q4

Qualitative: Answers / future prospects

Essential elements of international collaboration

- Management plan/Structure
- Attitude
- Content
- **Action**
- **Dynamics**
- **Accountability**
- **Mobilisation**

- **Taking the outcome of the collaboration and putting it into action.**
- *“Collaboration without an action is merely a conversation.” (D. Wendland)*

Essential elements of international collaboration

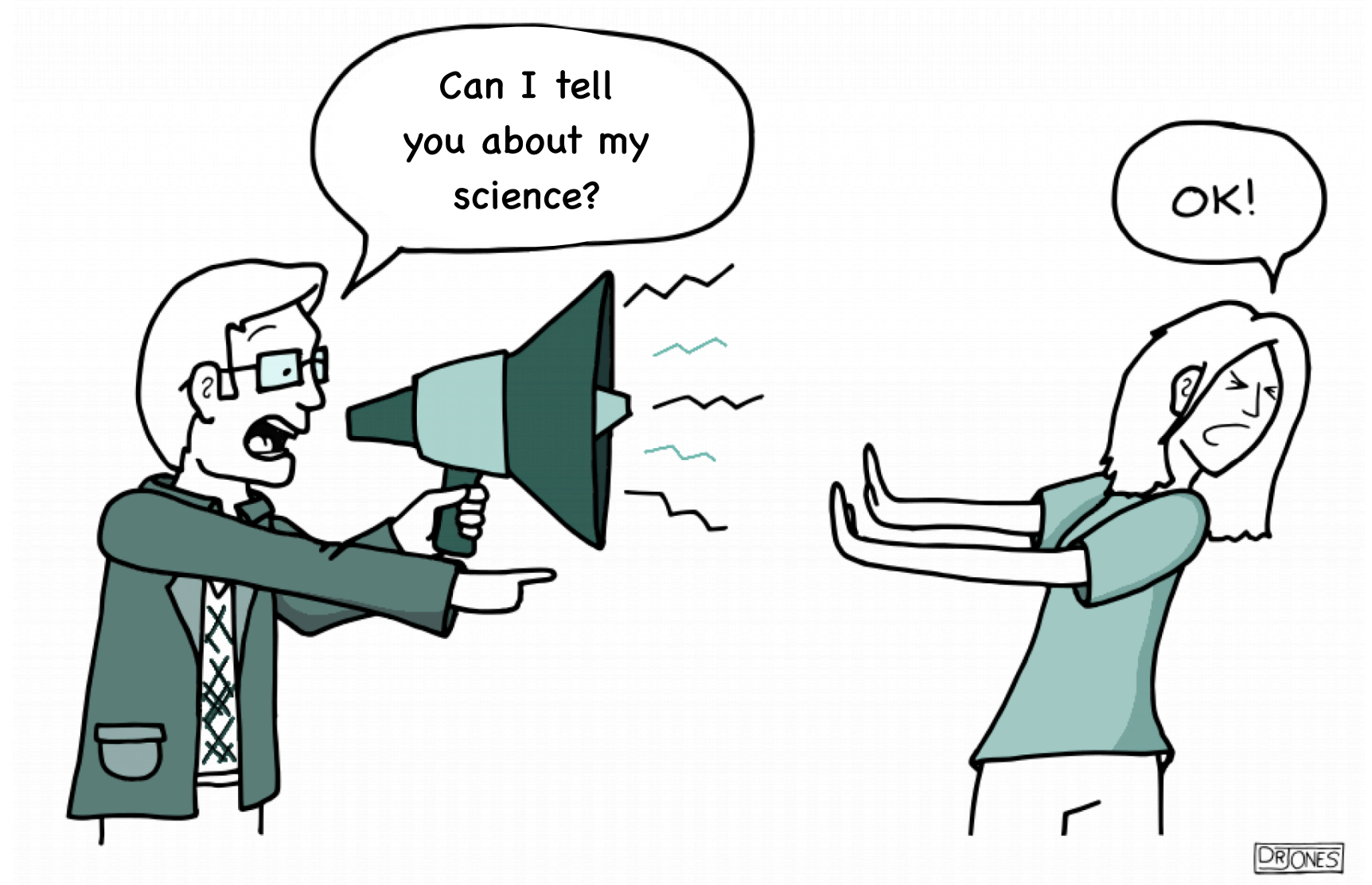
- Management plan/Structure
- Attitude
- Content
- **Action**
- **Dynamics**
- **Accountability**
- **Mobilisation**

- Research teams form and develop through four critical stages to achieve **peak performance**.
- When individuals from diverse backgrounds come together on teams, their roles and interactions **must evolve over time** in order to become highly functional groups.

Crucial for cross-cultural collaborations!

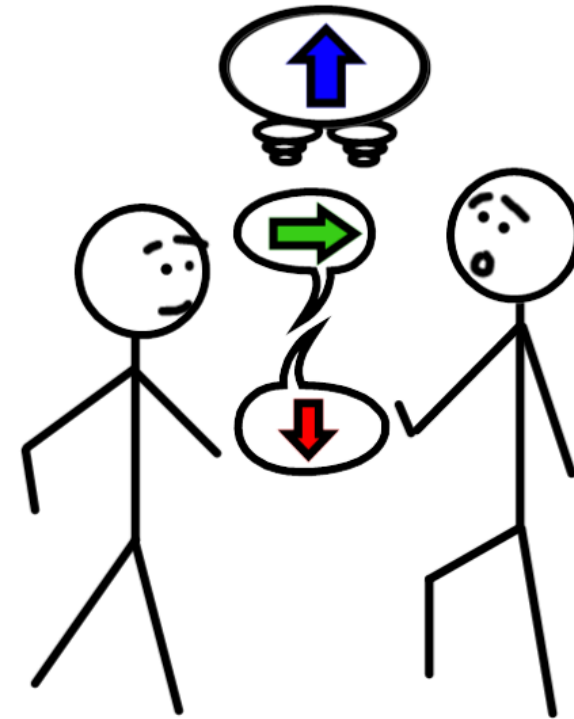
COmmunication & RElationship

- **Communication**
+ *Assertiveness*
- **Relationship**



COmmunication & RElationship

- **Communication**
+ Assertiveness
- **Relationship**



Effective communication creates
mutual understanding!



COmmunication & RElationship

- **Communication**
+ Assertiveness
- **Relationship**

- **Communicate your project results & future prospects**

(e.g., *How did we arrive to our findings? Why this research is important?*)

Future prospects, potential for funding proposals etc.

COmmunication & RElationship

- **Communication**
+ *Assertiveness*
- **Relationship**



Common problem is personal/culture's inflexibility and low tolerance for ambiguity in messaging, which leads to miscommunication!

COmmunication & RElationship

- Communication
+ *Assertiveness*
- Relationship

- It is not only communication what matters, but **communication style!**
- Collaborators should express their views and ideas **without violating the rights of others.**



COmmunication & RElationship

- Communication
+ *Assertiveness*
- Relationship

- Are we OK together?
- Can we trust to each other?
- Is everyone comfortable with role?
-
- Do we all see the same goal???
- ...
- How our relationship evolves?
Is it strengthening with time?



Building strong relations requires time & trust

COmmunication & RElationship

- Communication
+ *Assertiveness*
- Relationship

- Are we OK together?
- Can we trust to each other?
- Is everyone comfortable with role?
-
- Do we all see the same goal???
- ...
- How our relationship evolves?
Is it strengthening with time?



Don't be afraid of feedbacks!

COmmunication & RElationship

- Communication
+ *Assertiveness*
- Relationship

- Are we OK together?
- Can we trust to each other?
- Is everyone comfortable with role?
-
- Do we all see the same goal???
- ...
- How our relationship evolves?
Is it strengthening with time?



Don't be afraid of admitting mistakes!

COmmunication & RElationship

- Communication
+ *Assertiveness*
- Relationship

Strengthen the relationship...
...independently of tasks!



COmmunication & RElationship

- Communication
+ *Assertiveness*
- Relationship

Strengthen the relationship...
...independently of tasks!



Strong relationships are key in
international collaborations!



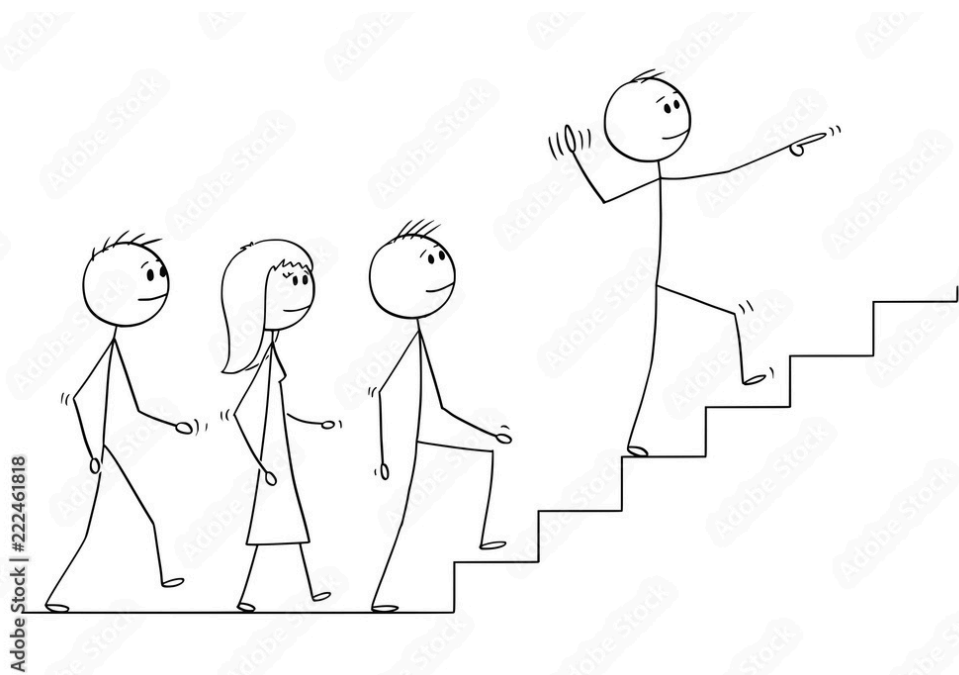
2.3 Summary of Part II

How to create, foster and sustain your collaboration?

“Collaboration is about having fun!”
(M.Rilling, UCWB)

- Pick the people you like, not only those with skills!

As a leader:



- Diversity of people / complementary skills & characters
- Be clear of expectations & deadlines (don't be tyrant! :))
- Exploit useful tools for collaborations (Overleaf, Slack, Google Docs, Asana)
- Strengthen relationships

2.3 Summary of Part II

How to create, foster and sustain your collaboration?

**“Collaboration is about having fun!”
(M.Rilling, UCWB)**

- **Pick the people you like, not only those with skills!**
-

As a contributor:



- **Find your feet, and keep the PI informed**
- **Be on time & be optimistic**
- **Make the team better
(don't underdeliver tasks)**
- **Focus on numbers, but be human in interaction :)**

Part III

Evolution of collaborative science work: *from ideas to discoveries*



3.1 From ideas to discoveries

- It's a common trap that many professional researchers work isolated from colleagues!
- Don't stop following the work of others!
 1. *Respect your competitors...*
 2. *...and ask them to collaborate (because, why not!)*

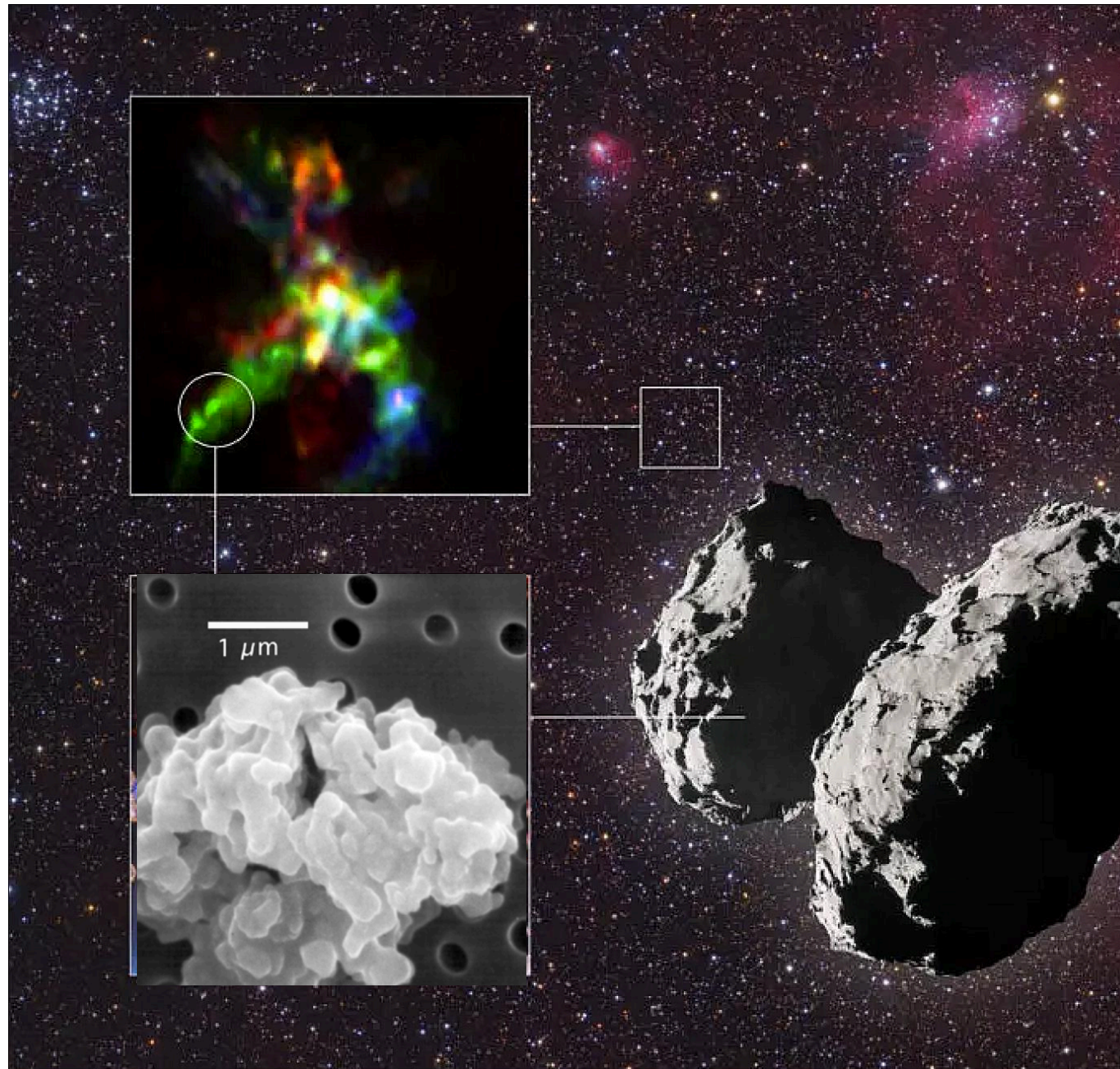


3.1 From ideas to discoveries: project DUSTY GIANTS



Galaxy evolution conference, Favignana 2018

3.1 From ideas to discoveries: research goal



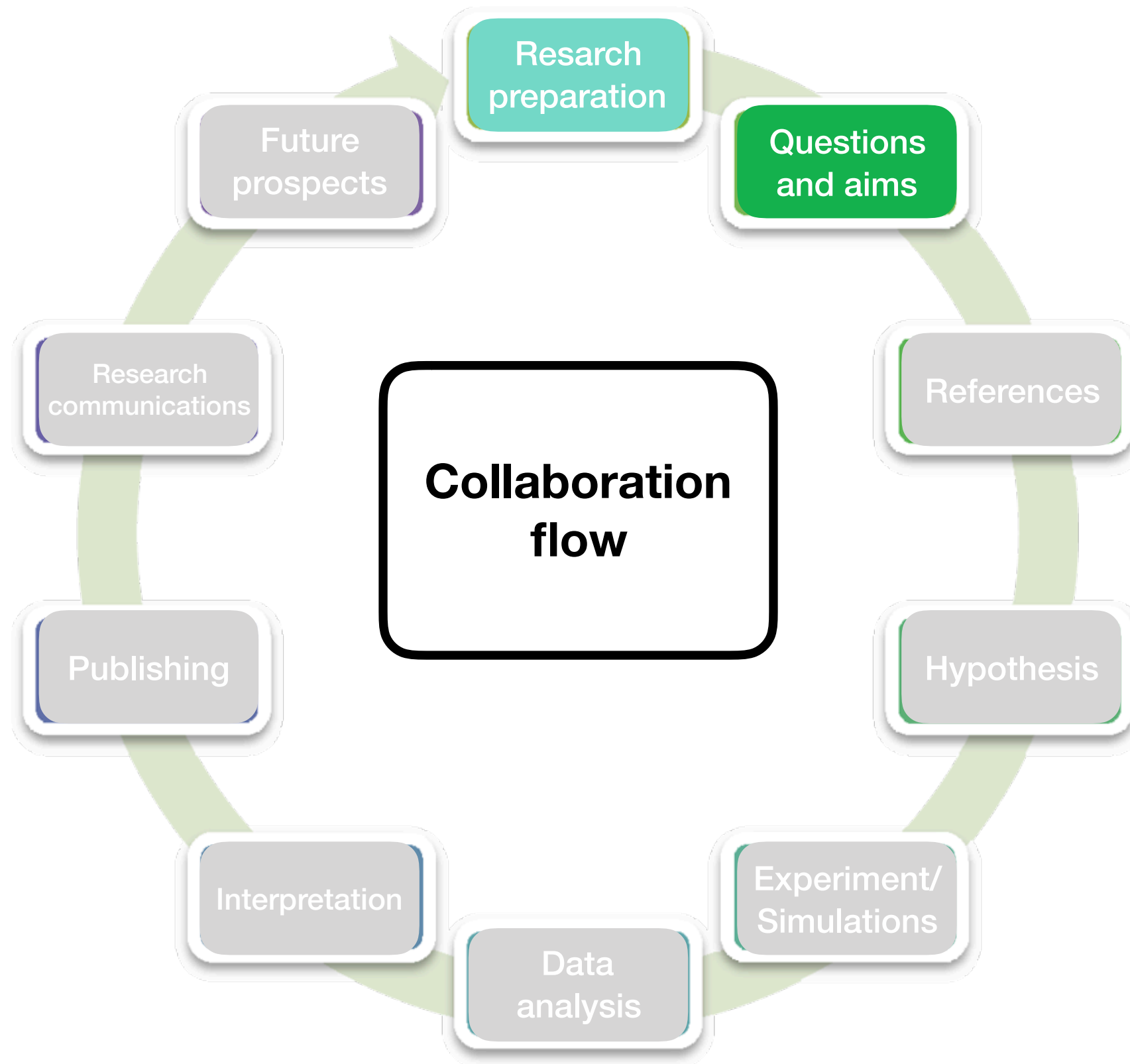
- **Searching for distant galaxies** = search for dust (complex structures) in the early Universe

3.1 From ideas to discoveries: **workflow**

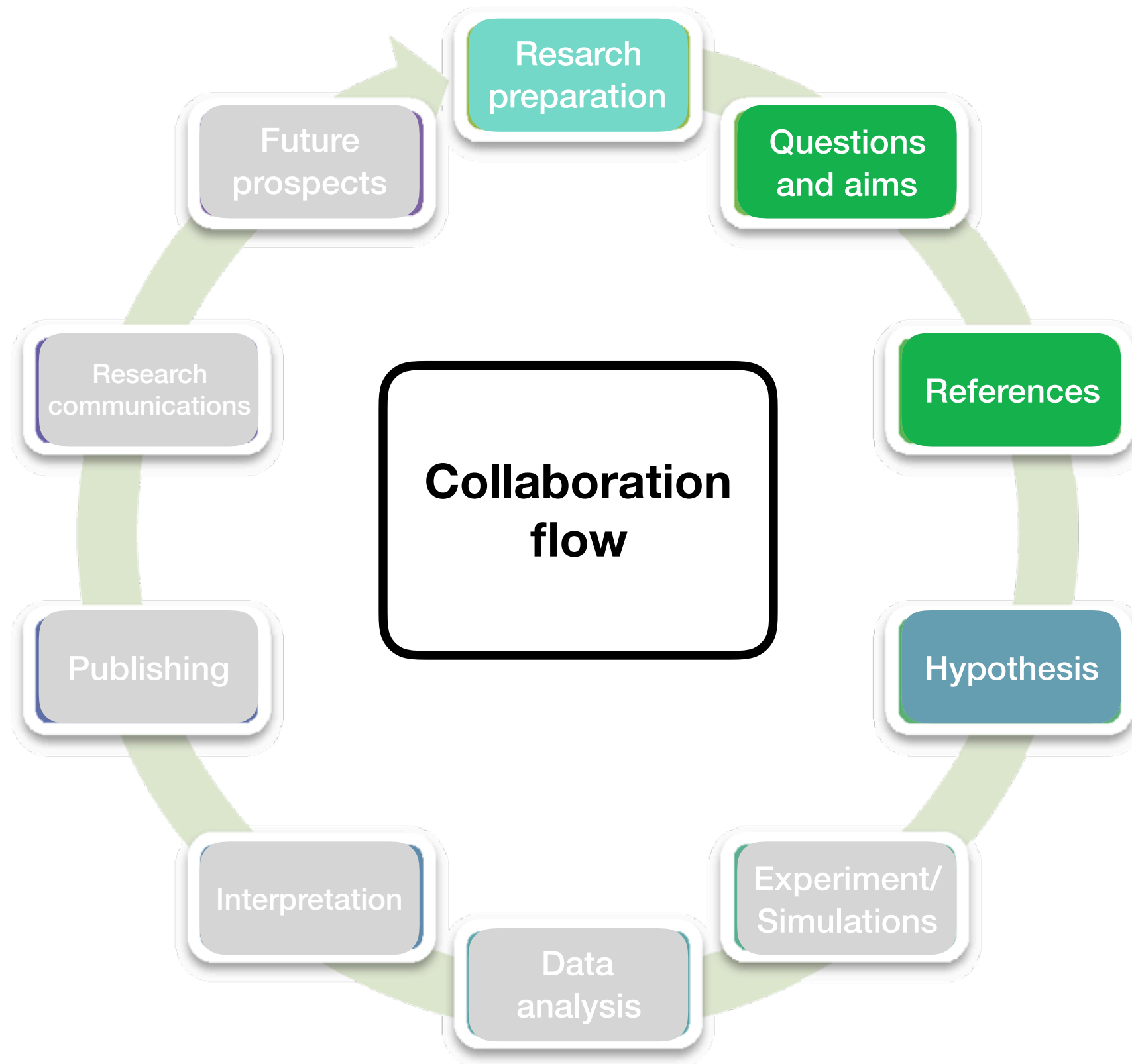
International collaboration
(scientists from 15 institutions in 7 countries)



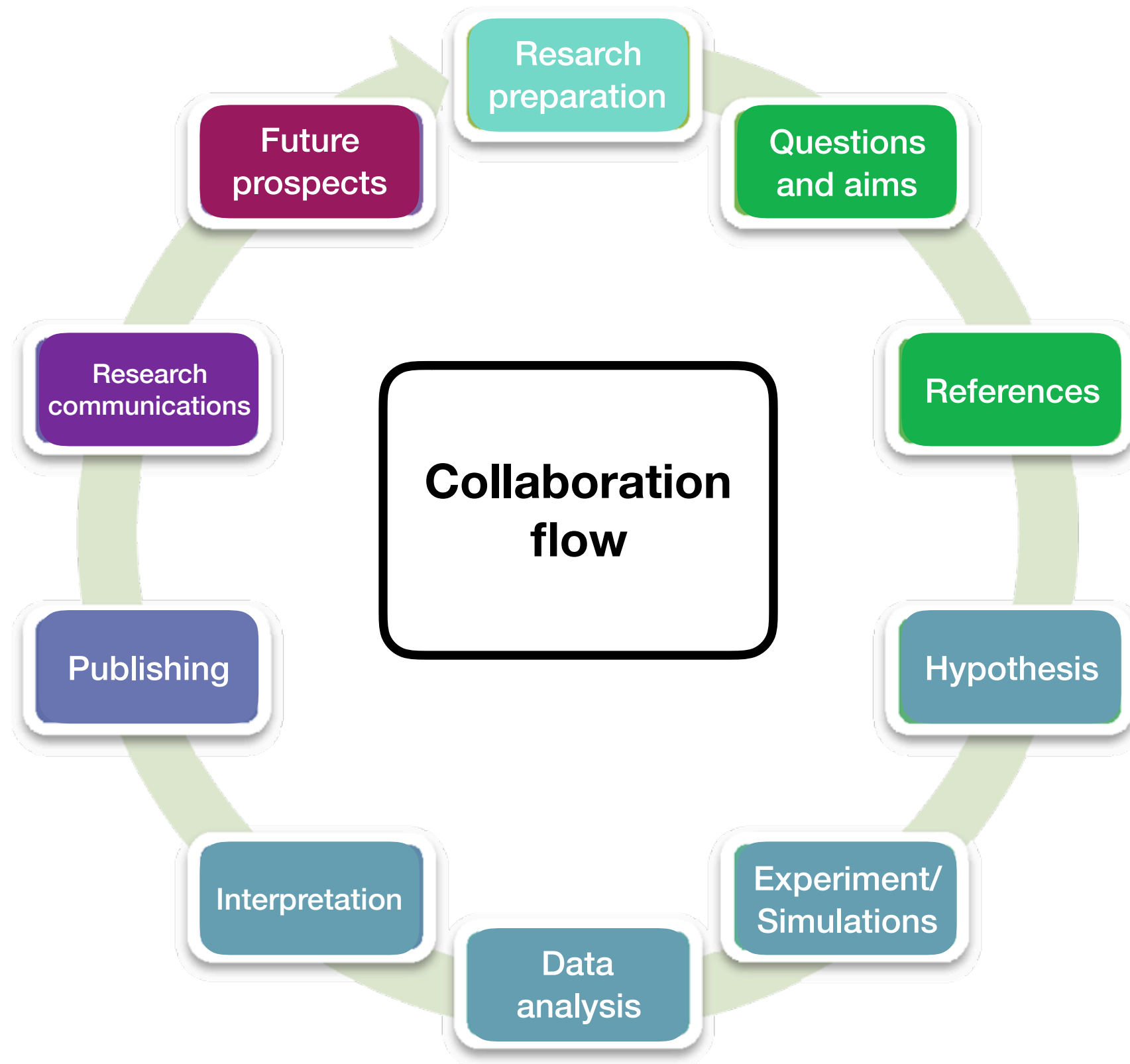
3.1 From ideas to discoveries: **workflow**



3.1 From ideas to discoveries: **workflow**



3.1 From ideas to discoveries: **workflow**



3.1 From ideas to discoveries



- How to make collaboration research inovative... and possible?

- If the topic/problem interesting only to me? :)
- Big picture approach?
- Proper anticipation of the work visibility



3.1 From ideas to discoveries

- Focus on one of the most important questions
- Realistic goal (temporal & technical)



- Don't create a research that is too "straightforward"
- Don't avoid challenge "a-priori"

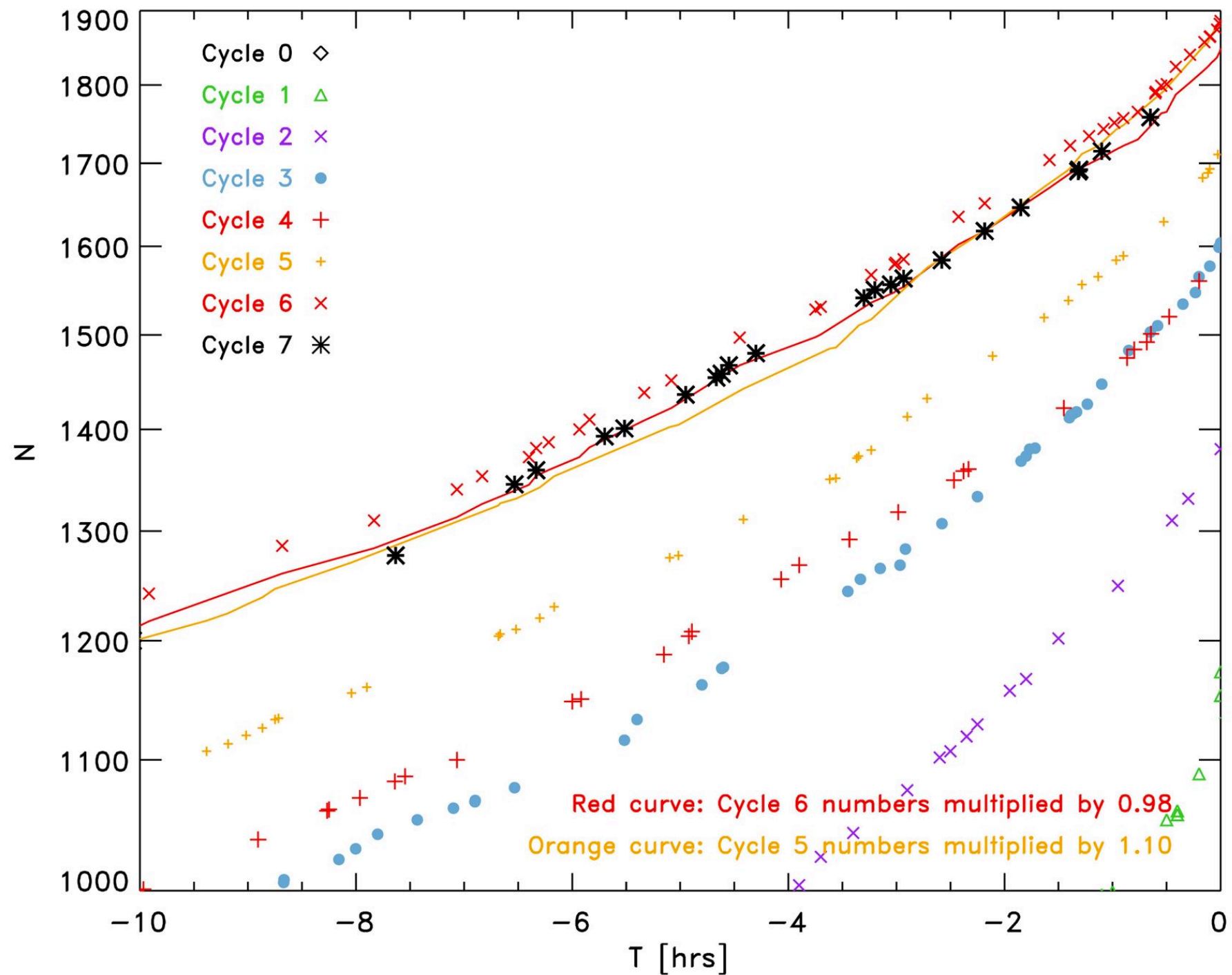


Don't forget to discuss a risk analysis!

3.1 From ideas to discoveries: data collection & analysis



3.1 From ideas to discoveries: data collection & analysis



We submitted 7 proposals for different telescopes (4 were succesful)

3.1 From ideas to discoveries: data collection & analysis



3.1 From ideas to discoveries: collaborative tools



Secure your external collaboration

slack.com/solutions/security

Trello Log in Sign up

Trello helps teams move work forward.

Collaborate, manage projects, and reach new productivity peaks. From high rises to the home office, the way your team works is unique—accomplish it all with Trello.

Email [Sign up—it's free!](#)

Create . Track . Comment . Share

Google Docs

Your smart online tool for collaboration and group work

Acme Inc. Taylor Maven

#acme-beacon-collab 31 | 7 | Two companies, one shared vision

Norman Andrews 3:07 PM
No problem... our team just put those together. Here are the meeting notes:

Norman Andrews 3:08 PM
PDF

Acme + Beacon Kickoff Meeting.pdf
7 MB PDF

Briefing & Brainstorm

Acme + Beacon Kickoff Meeting

3 thumbs up 4 star

Tina Chen 3:54 PM
Beacon team, you're the best!

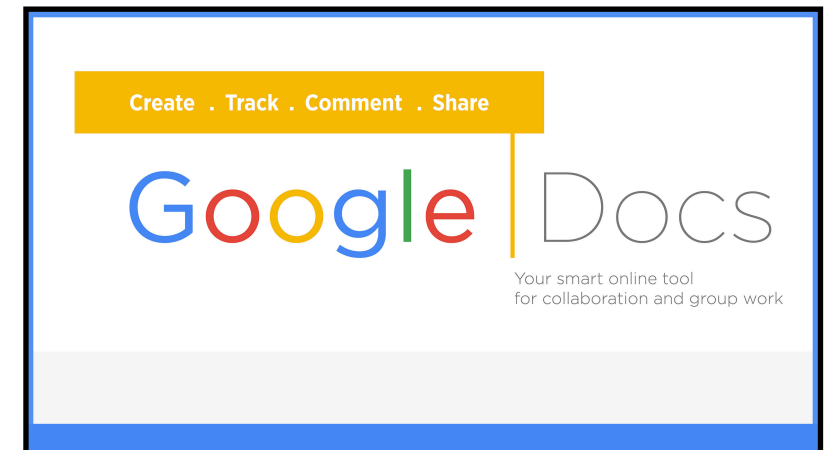
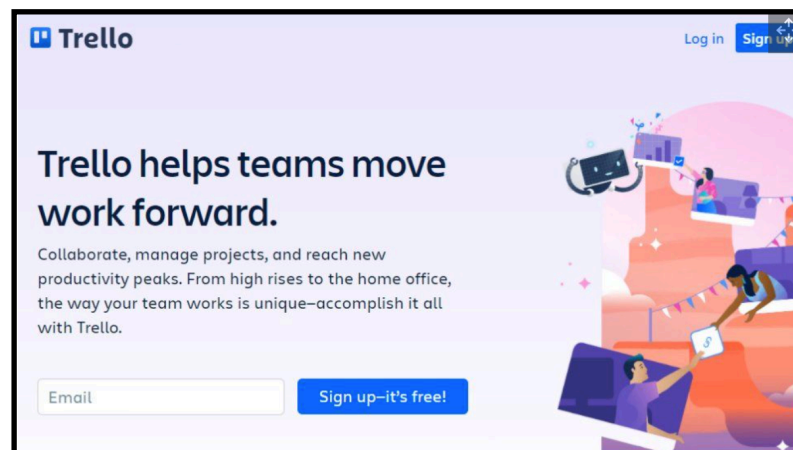
Message #acme-beacon-collab

3.1 From ideas to discoveries: collaborative tools



Secure your external collaboration

slack.com/solutions/security



Acme Inc. ▾
Taylor Maven

#acme-beacon-collab
31 | 7 | Two companies, one shared vision

Norman Andrews 3:07 PM
No problem... our team just put those together. Here are the meeting notes:

Jim James
Lisa Power
Marcel Gherkins

Tina Chen 3:54 PM
Beacon team, you're the best!

Message #acme-beacon-collab

- People feel less pressure & more engaged while communicating via Slack instead of email!
- Introducing unformal (but dynamic) environment helps us overcome communication boundaries.



3.1 From ideas to discoveries: collaborative writing tools



The screenshot displays the Overleaf web editor interface. On the left, the source editor shows a document with the following content:

1 This is the title

44

45

Abstract

46 Please provide an abstract of no more than 150 words. Your abstract should explain the main contributions of your article, and should not contain any material that is not included in the main text.

47

Introduction (Level 1 heading)

50

51

52 Thanks for using Overleaf to write your article. Your introduction goes here! Some examples of commonly used commands and features are listed below, to help you get started.

53

54 Here's a second paragraph to test paragraph indents. `\lipsum[1]`

55

Results (Level 1 heading)

56

57

58 `\lipsum[2-3]`

59

60 `\begin{table}[bt]`

61

On the right, the preview window shows a rendered version of a journal article:

THE ASTROPHYSICAL JOURNAL, 883:142 (16pp), 2019 October 1 <https://doi.org/10.3847/1538-4357/ab2cd5>

© 2019. The American Astronomical Society. All rights reserved.

SILVERRUSH. VIII. Spectroscopic Identifications of Early Large-scale Structures with Protoclusters over 200 Mpc at $z \sim 6-7$: Strong Associations of Dusty Star-forming Galaxies

Yuichi Harikane^{1,2,3}, Masami Ouchi^{1,4}, Yoshiaki Ono¹, Seiji Fujimoto^{1,5}, Darko Donevski^{6,7}, Takatoshi Shibuya⁸, Andreas L. Faist⁹, Tomotsugu Goto¹⁰, Bunyo Hatsukade¹¹, Nobunari Kashikawa⁵, Kotaro Kohno¹¹, Takuya Hashimoto^{3,12}, Ryo Higuchi^{1,2}, Akio K. Inoue¹², Yen-Ting Lin¹³, Crystal L. Martin¹⁴, Roderik Overzier^{15,16}, Ian Smail¹⁷, Jun Toshikawa¹, Hideki Umehata^{11,18}, Yiping Ao¹⁹, Scott Chapman²⁰, David L. Clements²¹, Myungshin Im²², Yipeng Jing^{23,24}, Toshihiro Kawaguchi²⁵, Chien-Hsiu Lee²⁶, Minju M. Lee^{3,27}, Lihwai Lin¹³, Yoshiaki Matsuoka²⁸, Murilo Marinello¹⁵, Tohru Nagao²⁹, Masato Onodera²⁶, Sune Toft²⁹, and Wei-Hao Wang¹³

¹ Institute for Cosmic Ray Research, The University of Tokyo, 5-1-5 Kashiwanoha, Kashiwa, Chiba 277-8582, Japan; han@icrr.u-tokyo.ac.jp
² Department of Physics, Graduate School of Science, The University of Tokyo, 7-3-1 Hongo, Bunkyo, Tokyo, 113-0033, Japan
³ National Astronomical Observatory of Japan, 2-21-1 Osawa, Mitaka, Tokyo 181-8588, Japan
⁴ Kavli Institute for the Physics and Mathematics of the Universe (WPI), University of Tokyo, Kashiwa 277-8583, Japan
⁵ Department of Astronomy, Graduate School of Science, The University of Tokyo, 7-3-1 Hongo, Bunkyo, Tokyo 113-0033, Japan
⁶ Aix Marseille University, CNRS, LAM, Laboratoire d'Astrophysique de Marseille, Marseille, France
⁷ SISSA, via Bonomea 265, I-34136 Trieste, Italy
⁸ Kitami Institute of Technology, 165 Koen-cho, Kitami, Hokkaido 090-8507, Japan
⁹ Infrared Processing and Analysis Center, California Institute of Technology, MC 100-22, 770 South Wilson Ave., Pasadena, CA 91125, USA
¹⁰ Institute of Astronomy, National Tsing Hua University, No. 101, Section 2, Kuang-Fu Road, Hsinchu, Taiwan
¹¹ Institute of Astronomy, Graduate School of Science, The University of Tokyo, 2-21-1 Osawa, Mitaka, Tokyo 181-0015, Japan
¹² Department of Environmental Science and Technology, Faculty of Design Technology, Osaka Sangyo University, 3-1-1, Nagatai, Daito, Osaka 574-8530, Japan
¹³ Institute of Astronomy & Astrophysics, Academia Sinica, Taipei 106, Taiwan (ROC)
¹⁴ Department of Physics, University of California, Santa Barbara, CA 93106, USA
¹⁵ Observatorio Nacional, Rua Jose Cristino, 77, CEP 20921-400, Sao Cristovao, Rio de Janeiro-RJ, Brazil
¹⁶ Universidade de Sao Paulo, Instituto de Astronomia, Geofisica e Ciências Atmosféricas, Departamento de Astronomia, São Paulo, SP 05508-090, Brazil
¹⁷ Centre for Extragalactic Astronomy, Department of Physics, Durham University, South Road, Durham DH1 3LE, UK
¹⁸ RIKEN Cluster for Pioneering Research, 2-1 Hirosawa, Wako-shi, Saitama 351-0198, Japan
¹⁹ Purple Mountain Observatory & Key Laboratory for Radio Astronomy, Chinese Academy of Sciences, 8 Yuanhua Road, Nanjing 210034, People's Republic of China
²⁰ Department of Physics and Atmospheric Science, Dalhousie University, Halifax, NS B3H 3J5, Canada
²¹ Astrophysics Group, Imperial College London, Blackett Laboratory, Prince Consort Road, London SW7 2AZ, UK
²² CEOU/Astronomy Program, Dept. of Physics & Astronomy, Seoul National University, Seoul, Republic of Korea
²³ School of Physics and Astronomy, Tsung-Dao Lee Institute, Shanghai Jiao Tong University, 800 Dongchuan Road, Shanghai, 200240, People's Republic of China
²⁴ IFSA Collaborative Innovation Center, Shanghai Jiao Tong University, Shanghai 200240, People's Republic of China
²⁵ Department of Economics, Management and Information Science, Onomichi City University, Hisayamada 1600-2, Onomichi, Hiroshima 722-8506, Japan
²⁶ Subaru Telescope, NAOJ, 650 N Aohoku Pl. Hilo, HI 96720, USA
²⁷ Division of Particle and Astrophysical Science, Graduate School of Science, Nagoya University, Furo-cho, Chikusa-ku, Nagoya 464-8602, Japan
²⁸ Research Center for Space and Cosmic Evolution, Ehime University, Bunkyo-cho, Matsuyama, Ehime 790-8577, Japan
²⁹ Cosmic Dawn Center (DAWN), Niels Bohr Institute, Juliane Mariesvej 30, DK-2100 Copenhagen, Denmark

Received 2019 February 20; revised 2019 June 11; accepted 2019 June 23; published 2019 September 30

Abstract

We have obtained three-dimensional maps of the universe in $\sim 200 \times 200 \times 80$ comoving Mpc^3 ($c\text{Mpc}^3$) volumes each at $z = 5.7$ and 6.6 based on a spectroscopic sample of 179 galaxies that achieves $\gtrsim 80\%$ completeness down to the Ly α luminosity of $\log(L_{\text{Ly}\alpha}/[\text{erg s}^{-1}]) = 43.0$, based on our Keck and Gemini observations and the literature. The maps reveal filamentary large-scale structures and two remarkable overdensities made out of at least 44 and 12 galaxies at $z = 5.692$ (z57OD) and $z = 6.585$ (z66OD), respectively, making z66OD the most distant overdensity spectroscopically confirmed to date, with >10 spectroscopically confirmed galaxies. We compare spatial distributions of submillimeter galaxies at $z \approx 4-6$ with our $z = 5.7$ galaxies forming the large-scale structures, and detect a 99.97% signal of cross-correlation, indicative of a clear coincidence of dusty star-forming galaxy and dust-unobscured galaxy formation at this early epoch. The galaxies in z57OD and z66OD are actively forming stars with star-formation rates (SFRs) $\gtrsim 5$ times higher than the main sequence, and particularly the SFR density in z57OD is 10 times higher than the cosmic average at the redshift (a.k.a. the Madau-Lilly plot). Comparisons with numerical simulations suggest that z57OD and z66OD are protoclusters that are progenitors of the present-day clusters with halo masses of $\sim 10^{14} M_{\odot}$.

Key words: galaxies: evolution – galaxies: formation – galaxies: high-redshift

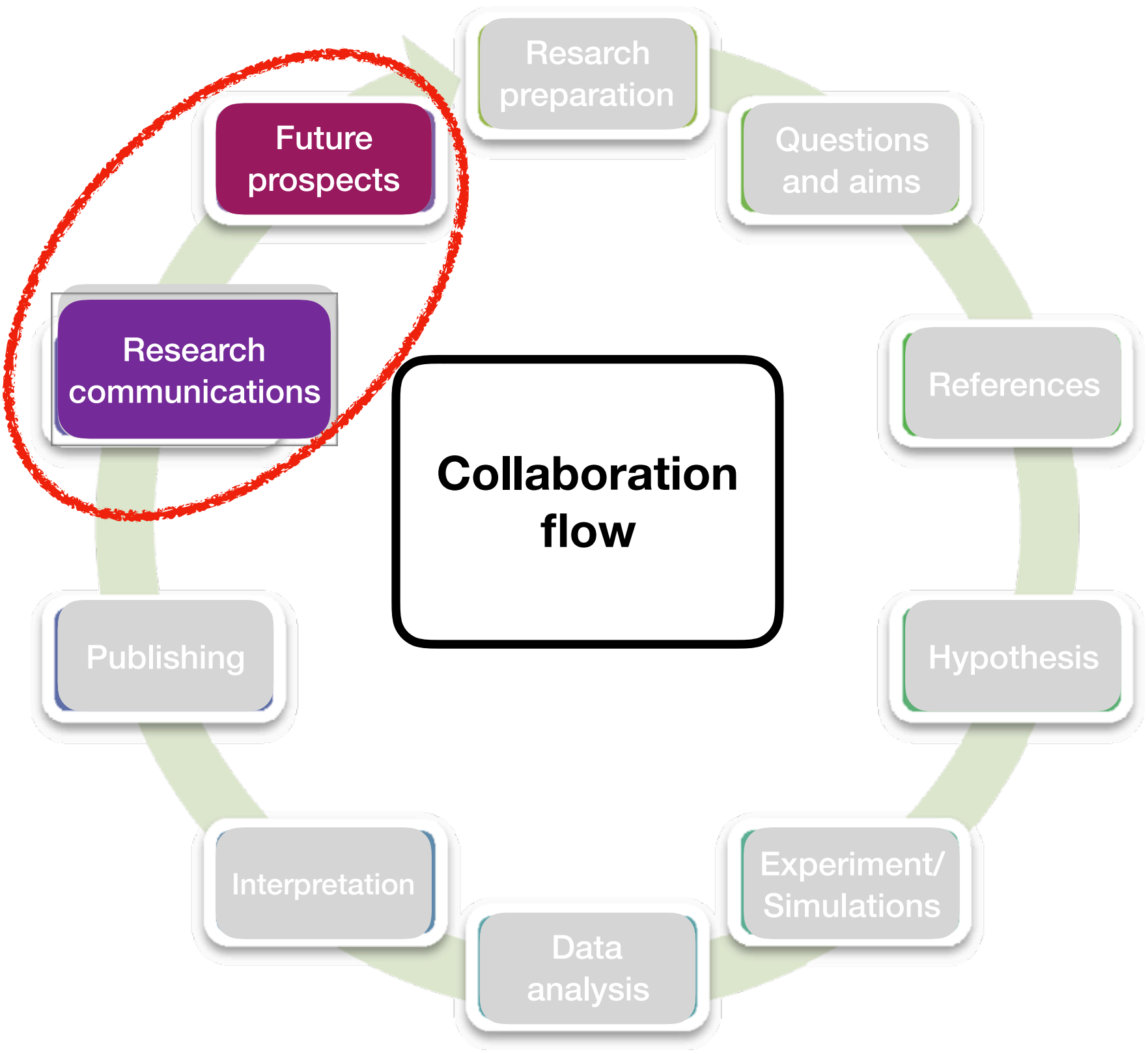
3.1 From ideas to discoveries: **outputs**



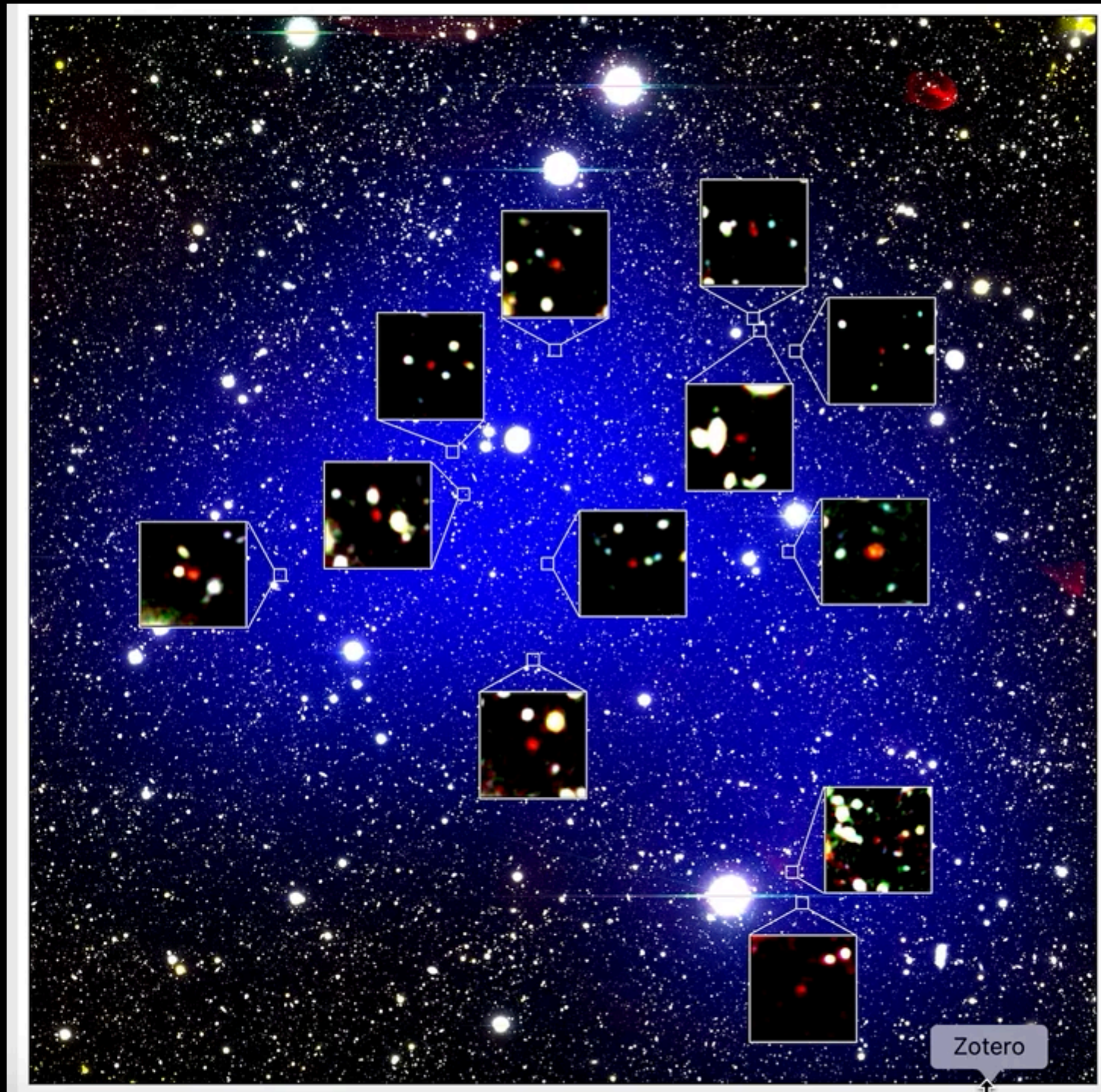
- **Embrace all types of outputs, not only papers!!!**



3.3 Contribute to the open data: *teamwork!*



3.2 Research discovery in a nutshell

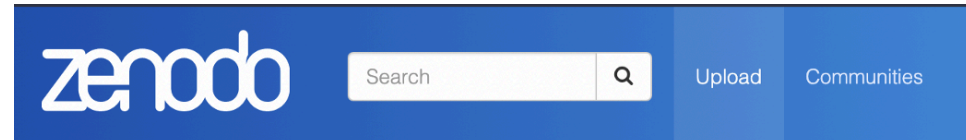


3.3 Contribute to the open data: *teamwork!*

Open platform for science papers

arXiv.org

Open database (big data,
computing codes etc.)



3.4 Communicate your research: teamwork!

EurekaAlert!

AAAS

HOME

NEWS RELEASES

MULTIMEDIA

MEETINGS

NEWS RELEASE 11-JAN-2021

Unveiling the double origin of cosmic dust in the distant Universe

An international team of researchers develops a new method for the study of large, massive, dusty galaxies and sheds new light on the physical processes involved in the production of dust in these 'giants'

Peer-Reviewed Publication

Kinderstube von Sternsystemen: Galaxien im jungen Universum weisen offenbar einen höheren Staubanteil auf als ältere. Diese künstlerische Darstellung zeigt ein Paar solcher jungen Galaxien.

Staub in allen Ecken

Frühe Galaxien hüllten sich in Wolken aus kosmischem Staub – doch wie konnten sich die in so kurzer Zeit zusammenballen? Mit ALMA, dem Atacama Large Millimeter/submillimeter Array, fanden Astronomen eine mögliche Lösung.

WIS wissenschaft in die schulen!

Unveiling the double origin of cosmic dust in the distant Universe

11 January 2021

An international team of researchers sheds new light on the physical processes involved in the production of dust in these 'giants'



...sua per gli astronomi: «Da una parte, sono difficili da individuare perché sono situate in zone dense dell'Universo lontano

A sinistra il ricercatore Darko Donevski, a destra il telescopio a cattedrale installato nel deserto dell'Atacama. Un team internazionale di ricercatori guidato dalla Sissa ha fatto luce sui processi avvenuti nelle galassie più lontane

Svelata la doppia origine della polvere cosmica

International media coverage of our discovery

3.4 Communicate your research: *teamwork!*



Public lecture / CPN Workshop, Belgrade (Serbia)

3.5 Exploit the reserach idea to build the team: *teamwork!*

Early career researchers won individual grants to form & lead their teams!



Part IV


Global perspective



Global perspective of science research

- Geographical diversity of main aims and applications
-

CANADA:
Science as a planning
& decision tool



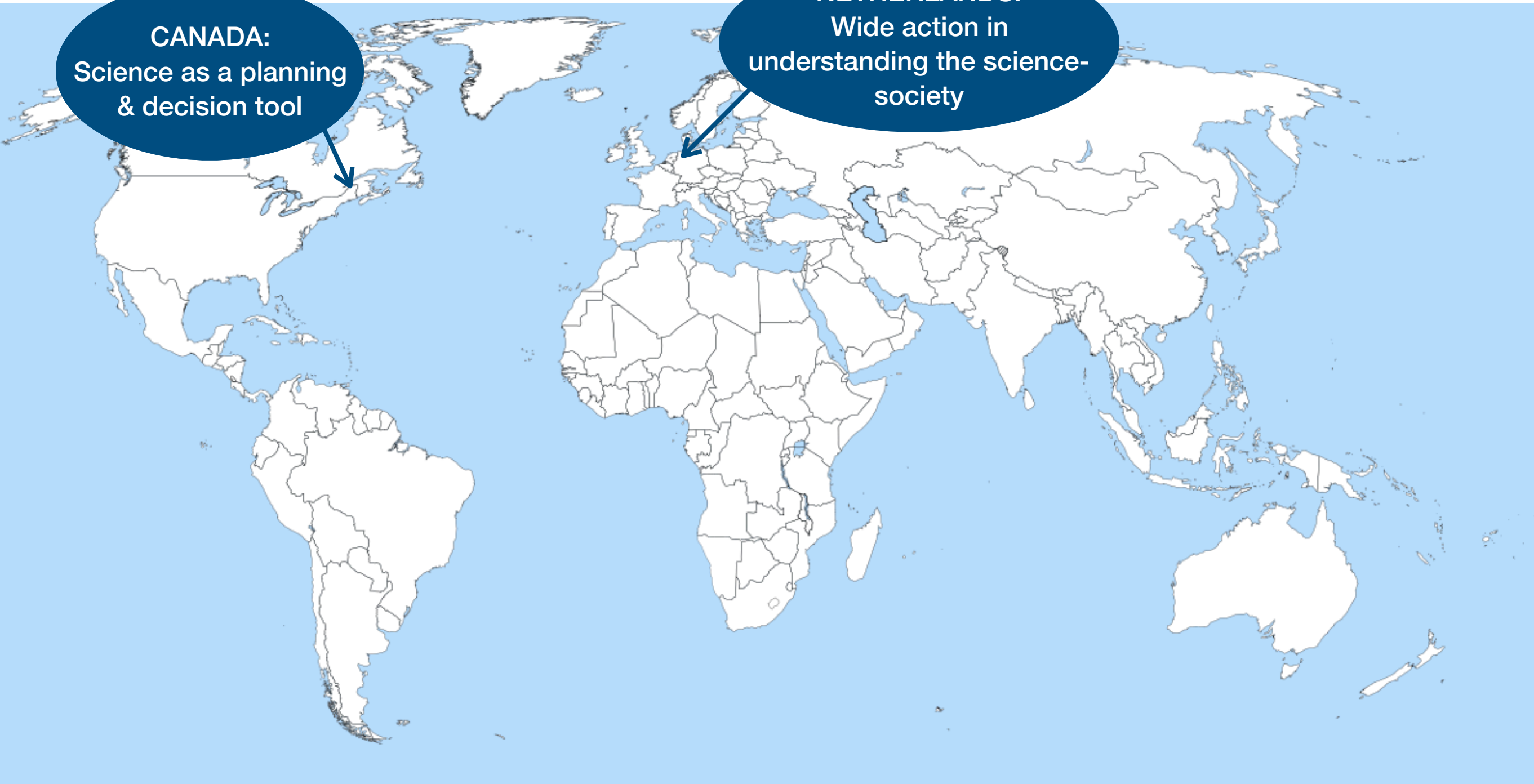
Based on *Science Communication: A global perspective, ANS 2020*

Global perspective of science research

- Geographical diversity of main aims and applications
-

CANADA:
Science as a planning
& decision tool

NETHERLANDS:
Wide action in
understanding the science-
society



Based on *Science Communication: A global perspective, ANS 2020*

Global perspective of science research

- Geographical diversity of main aims and applications

CANADA:
Science as a planning
& decision tool

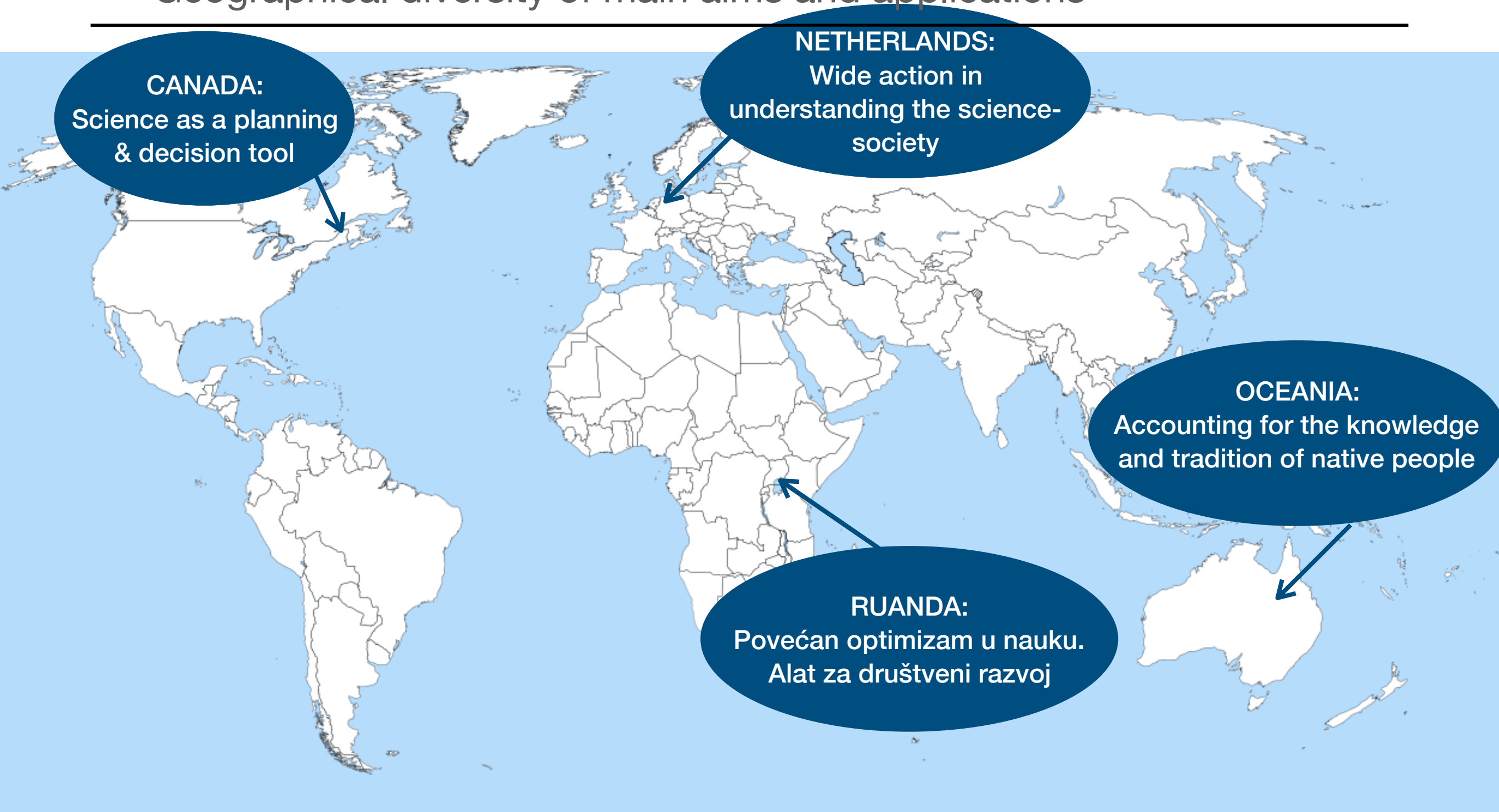
NETHERLANDS:
Wide action in
understanding the science-
society

RWANDA:
Science optimism -> Tool for
social development

Based on *Science Communication: A global perspective, ANS 2020*

Global perspective of science research

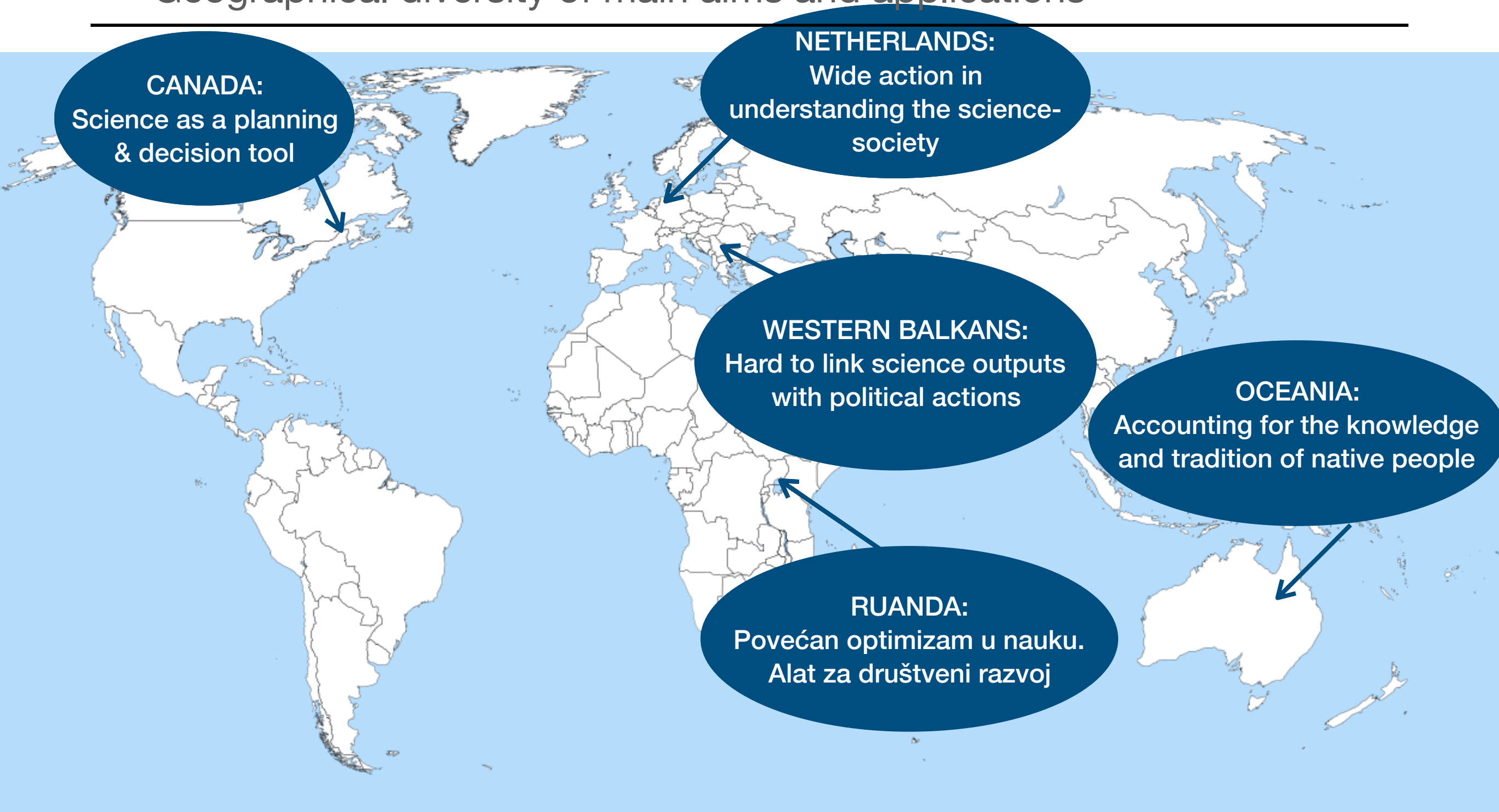
- Geographical diversity of main aims and applications



Based on *Science Communication: A global perspective, ANS 2020*

Global perspective of science research

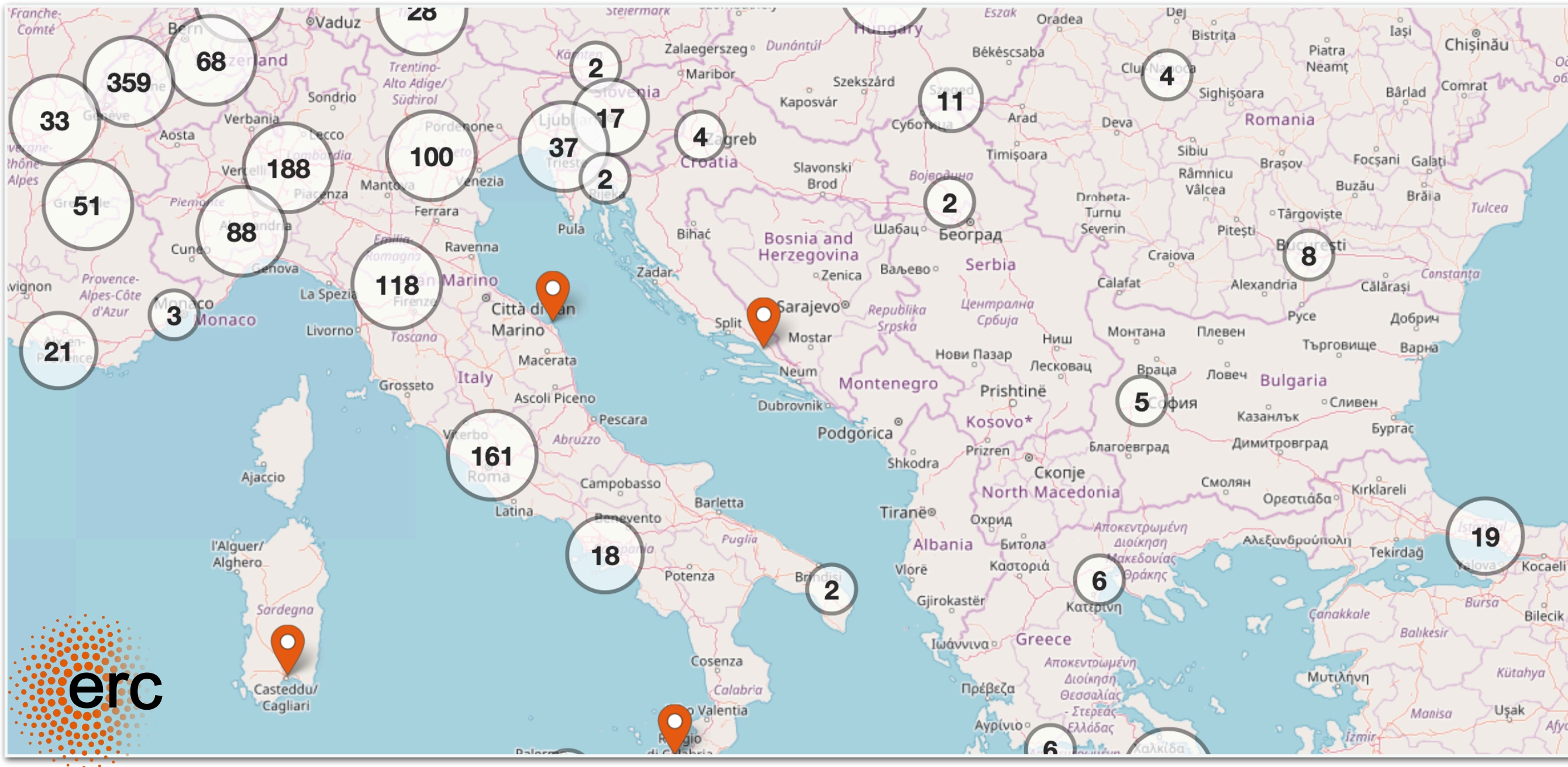
- Geographical diversity of main aims and applications



Based on *Science Communication: A global perspective, ANS 2020*

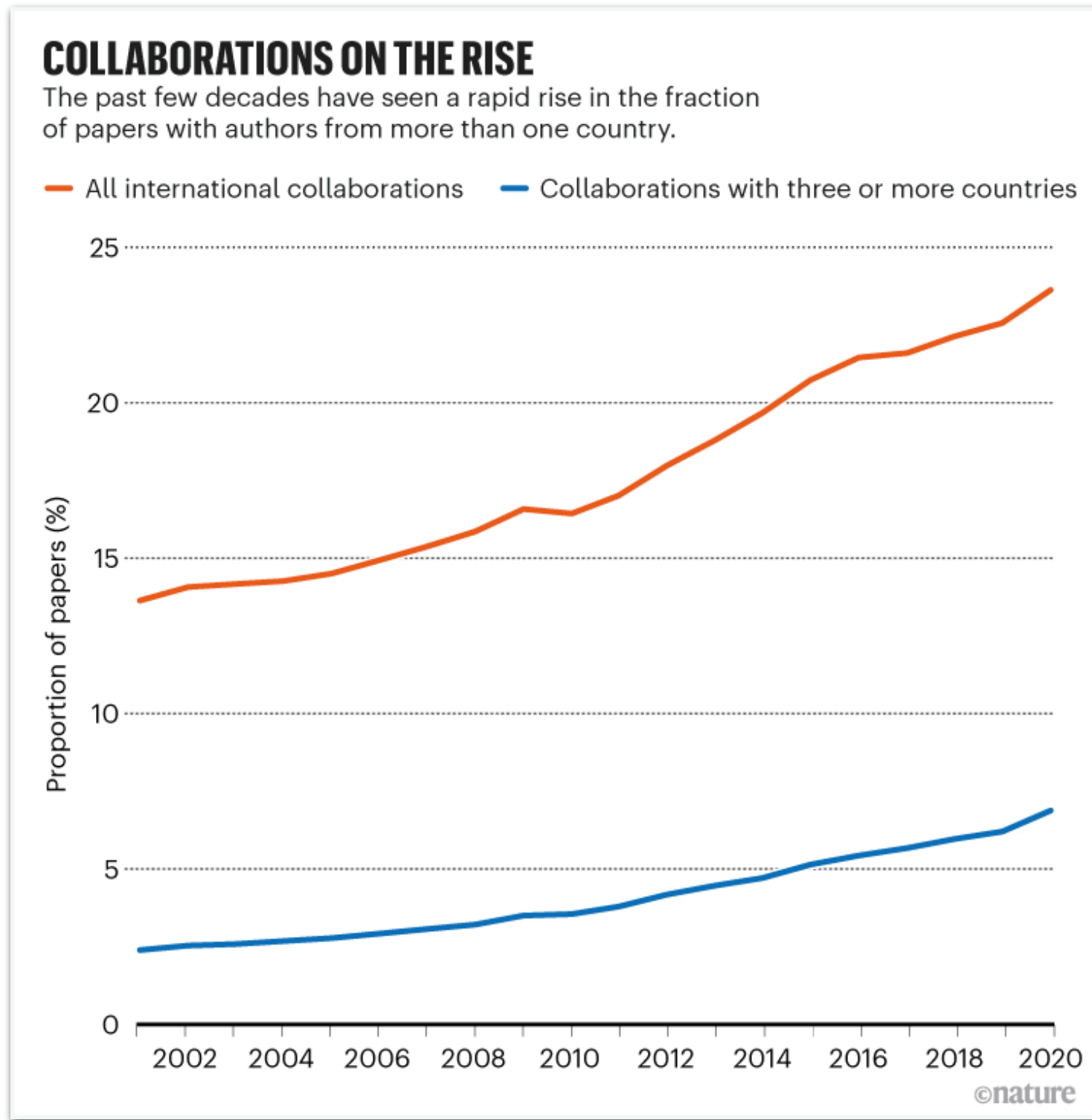
Global perspective of science research

- Collaborations reflect and link both local & global importance of science



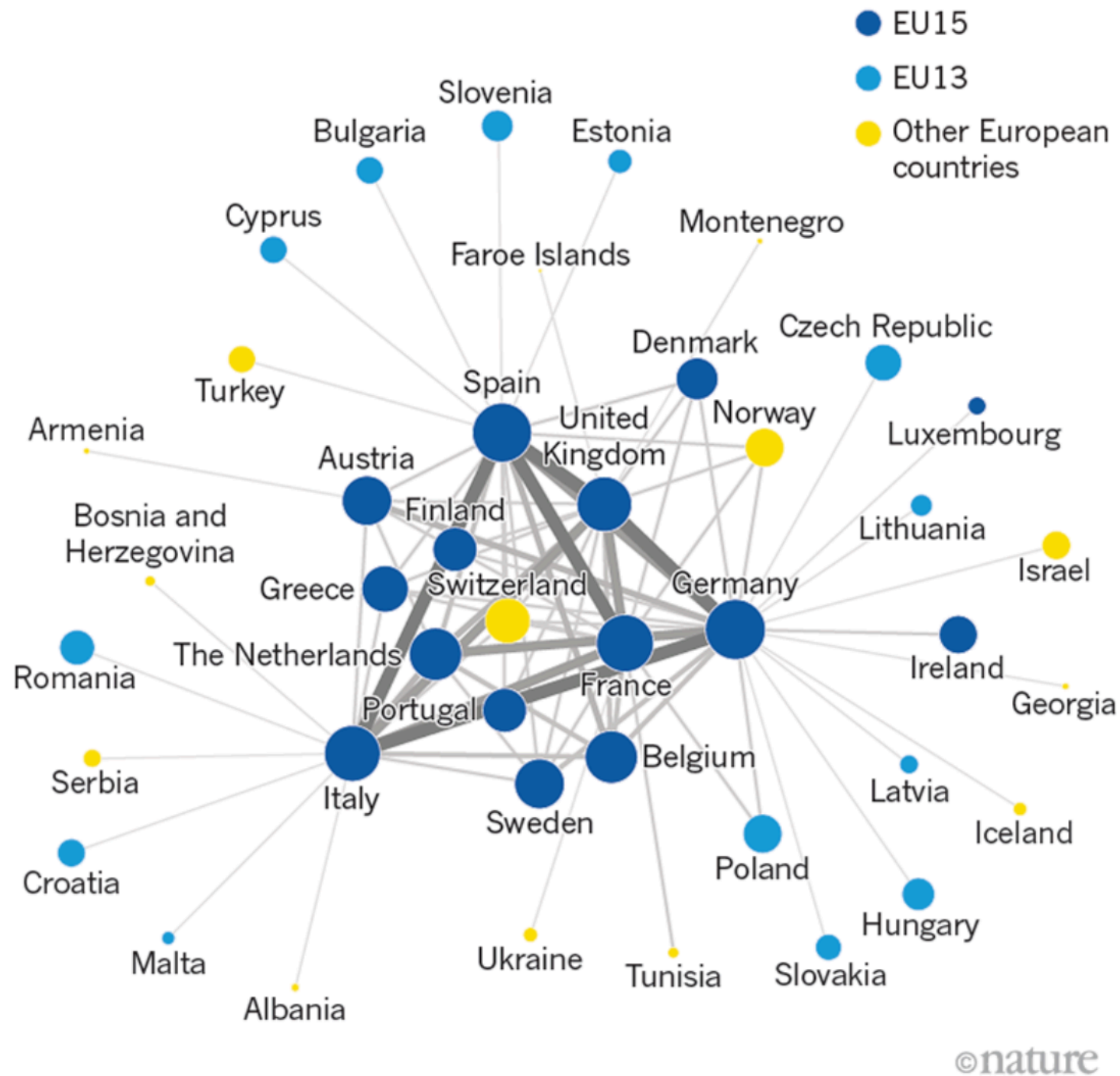
Number of ERC grants awarded so far
credit: ERC

Global perspective of science research



Global perspective of science research

The older EU countries dominate collaborative research projects in Horizon 2020. In this network chart, the size of the node represents how influential a participant is (on the basis of its connections), and the width of the links reflects the number of collaborations.



Source: European Commission: *From Horizon 2020 to Horizon Europe*

©nature

Highlights

- **Science collaborations have become a must!**
- **Access to (open) science is a human right...**
- **...and only collaborations can foster greater understanding, inspiration, respect trust & knowledge!**

Highlights



Common problem is personal/culture's inflexibility and low tolerance for ambiguity in messaging, which leads to miscommunication!

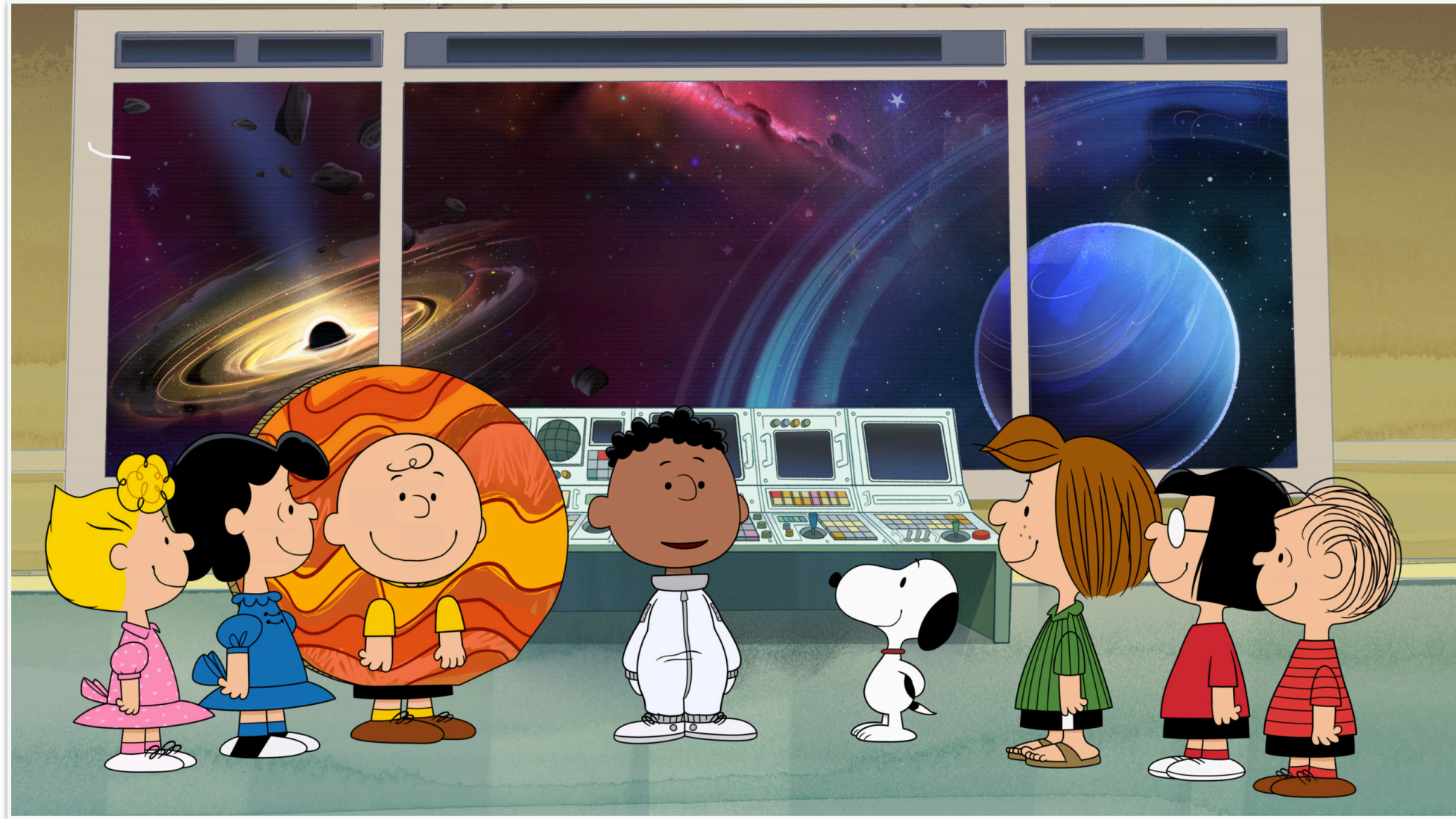
- **Strong relationships are key to success!**



- **Embrace all types of outputs, not only papers!**



Time for discussion



darko.donevski@ncbj.gov.pl



www.darkodonevski.com



[@darkOenergy](https://twitter.com/darkOenergy)

2.3 Evolucija: novi teleskopi i kolaboracije na Zemlji



Pre 2000. godine

2.3 Evolucija: novi teleskopi i kolaboracije na Zemlji



Posle 2000. godine

ALMA (Atacama Large Milimeter Array)

International collaboration:

- help advancing faster & better
- enable having institutes, people and funders in different world location.
- stimulating realisations in diverse teamworks/environments and foster inclusion and “healthy” research avoiding biases



ALMA (Atacama Large Millimeter Array)



ALMA: iskorišćavanje delova prirode u skladu sa prirodom



credit: ESO

After launch deployment & commissioning



ALMA: mobilnost



ALMA: iskorišćavanje delova prirode u skladu sa prirodom



ALMA: iskorišćavanje delova prirode u skladu sa prirodom



ALMA: iskorišćavanje delova prirode u skladu sa prirodom



ALMA: koleboracija



James Webb Space Telescope

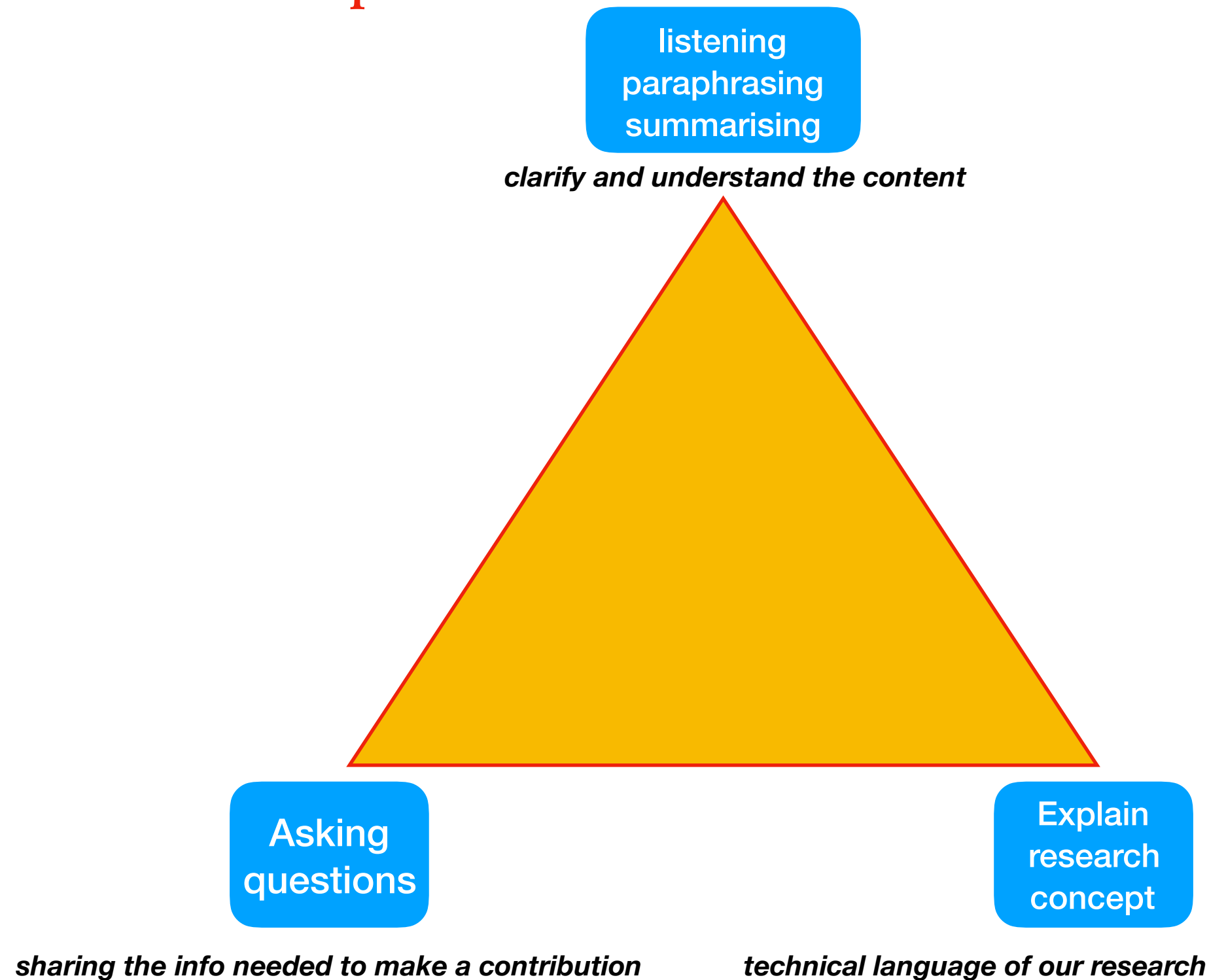
(lansiran: 25/12/2021. godine)



credit: NASA/ESA

COmmunication & RElationship

- **Communication**
+ Assertiveness
- **Relationship**



credit: E. Vance (Univ. of Colorado Boulder)

Global perspective of science research

Grant	Requirements
➔ ERC starting grants	<ul style="list-style-type: none">• From 2 to 7 yr after the PhD• Maximum 1.5 mil EUR for 5 yr
➔ ERC consolidator grants	<ul style="list-style-type: none">• From 7 to 12 yr after the PhD• Maximum 2 mil EUR for 5 yr
➔ ERC advanced grants	<ul style="list-style-type: none">• Top scientists, previous grant holders• Maximum 2.5 mil EUR for 5 yr
➔ ERC proof of concept	<ul style="list-style-type: none">• Top scientists, ERC holders, willing to explore commercial potential of their ideas.• Max. 150 000 EUR for 5 yr
➔ ERC synergy grant	<ul style="list-style-type: none">• Top science team of max. 4 people• Maximum 10 mil EUR for 5 yr