

Round-Table discussion on International Projects

Sustainable Collaborative Laboratory Development

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National Institute of Fundamental Studies Sri Lanka
Hefei University of Technology, PR China

7th October 2022



Thank you

Round Table Discussion Points

0. Science and Research Collaboration
1. Research Problem & Collaboration
2. Collaboration vs. Assistance ships
3. NIFS Research Collaborations
4. Add any please- needed peered research group

What is Science ??

Correct thinking

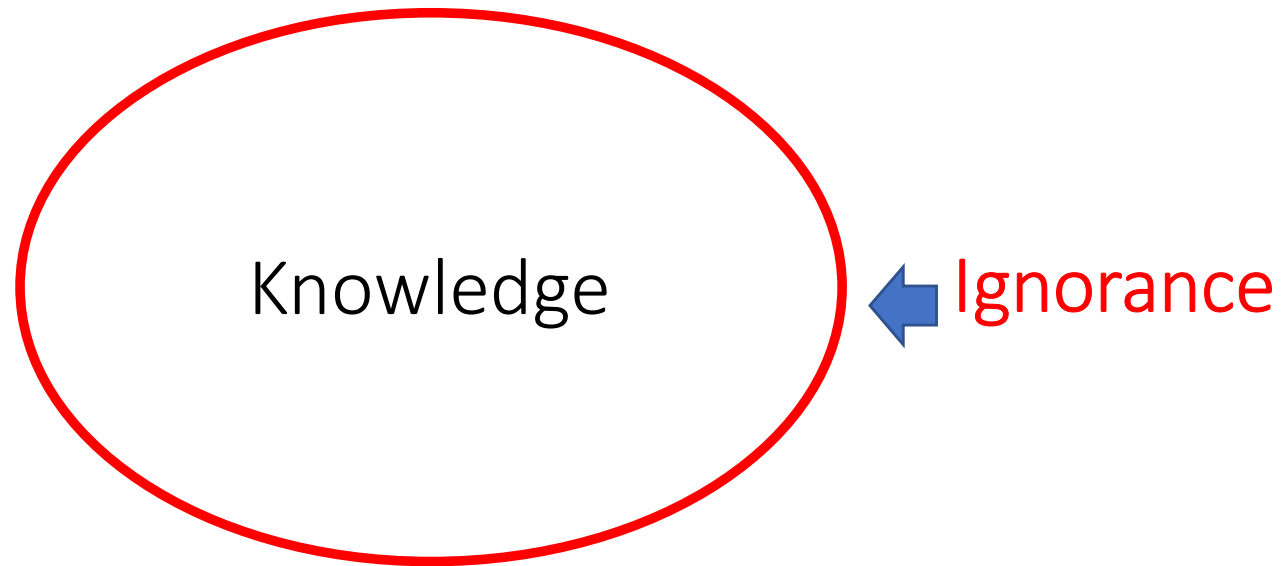
If not

$$1 = \sqrt{1} = \sqrt{(-1)(-1)} = \sqrt{-1}\sqrt{-1} = i \cdot i = -1.$$

Birth of Research Collaborations/ Groups – towards problem solving

Research Problems vs. Collaborations

If knowledge is an Island; its periphery is ignorance.- when **knowledge increases ignorance is also increased.**
- Albert Einstein



Please *Re*-search

Ignorance → unknown → research problem → collaboration

Research Problems vs. Collaboration

No Research Problem

then

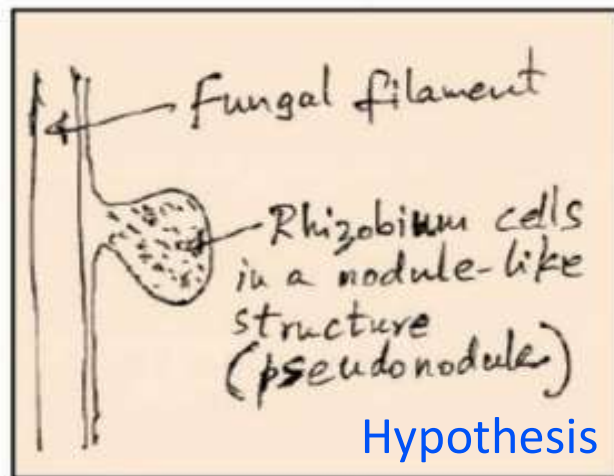
No Research Groups/Collaborations

Example Hypothesis → Research → Products

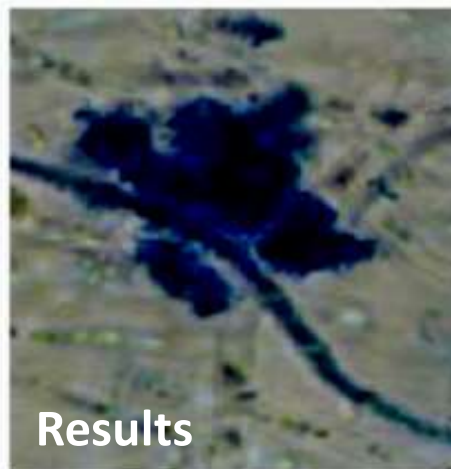
Discovery and *in vitro* development of fungal-rhizobial biofilms that led to biofilm engineering

Gamini Seneviratne, National Institute of Fundamental Studies, Kandy, Sri Lanka.
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When my first PhD student was doing an experiment investigating the effect of polyphenols on rhizobia in 2001-2002 period, she got frequent contaminations from fungi in her culture plates. Then, she was complaining me, saying that she was fed up with this study, because she could not get rid of the fungal contaminants. Then, I carefully observed her plates and found that rhizobial and fungal colonies interacted positively, showing a synergism (Sir Alexander Fleming observed an antagonistic fungal-bacterial interaction in penicillin discovery in 1928). Then, it came to my mind that the rhizobial cells might colonize the fungal filaments, like what happens in the initial stage of rhizobial colonization of plant root hairs in rhizobium-legume symbiosis. Then, I drew a sketch of my imagination in her lab note book (Fig. 1a), and asked her to co-culture rhizobium and the fungus in a broth and observe microscopically to see if there would be such structures in it. To our surprise, we observed the same with nice fungal filamentous colonization by rhizobia forming nodule-like structures (pseudo-nodules) in her broth cultures (Fig. 1b). The pseudo-nodules were found to fix N_2 , as evaluated by nitrogenase activity.



(a)



(b)



Product

Collaboration vs. Assistance ships

Schrodinger Equation cannot be solved except H atom.
- **electron-electron interactions** cannot be quantified.

Analogy

“2” + “2” > “4”

2 + 2 = 4

2 + 2 < 4

Collaboration

Ornamental collaboration

Assistance ship

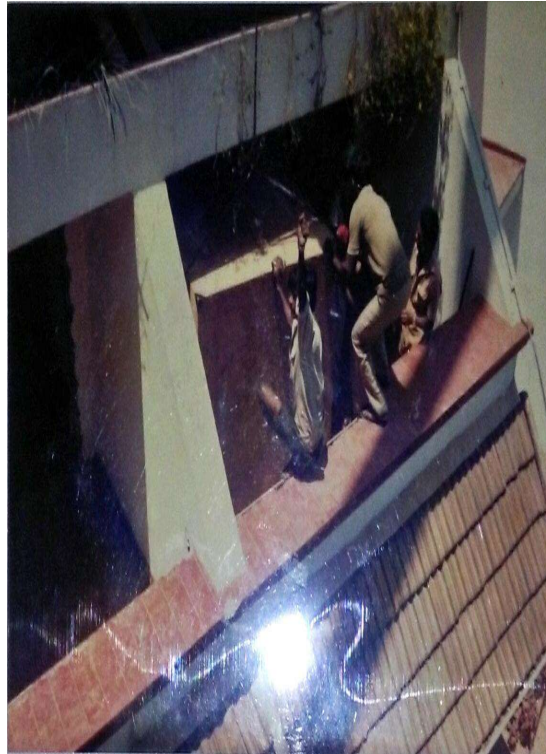
“scientific ethics” - very important

Case I: NIFS Electron Probe Microscopic Laboratory

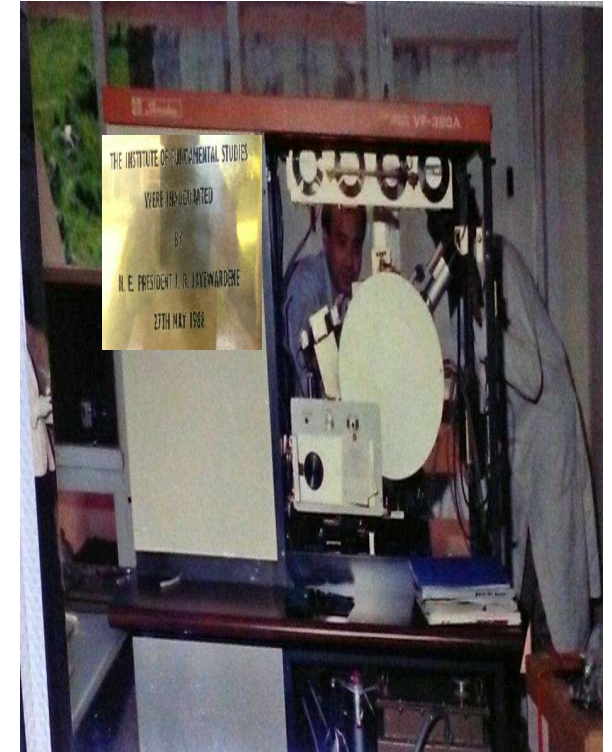
Example JICA-assistance



EPMA up in air



Entered lab through broken wall



EPMA re-assembly

Case 2: SATREP JICA PROJECT FACULTY OF ENG, UOP – SAITAMA UNI

RESRACH COLLABORATION



Collaboration Drivers Challenges

Drivers

- High impact publications
- Enhanced creativity
- Less work for all
- Increased efficiency
- Improved outcome
- Expand network
- Enhance resources

Types

- Inter-organizational collaboration
- Interdisciplinary research collaboration
- Academia vs industry collaboration
- International research collaboration

Challenges

- Miscommunications
- Cultural
- Legal
- Institutional framework
- Country framework

Ideal research collaborator

Research Quality

Expertise, Skills, Resources

Professional Quality

High ethics, Flexible, Reliable

Personal Quality

Open-minded, (emotionally) intelligent

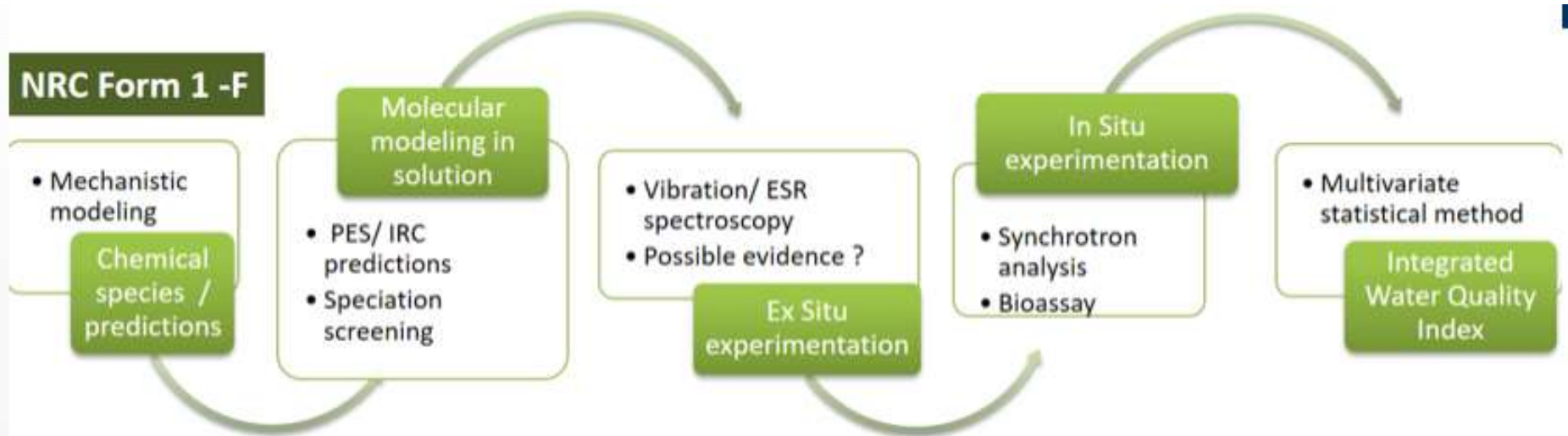
Social Quality

Polite, Honest, Respectful, Direct, Reasonable,
Copes well (conflicts of interest)

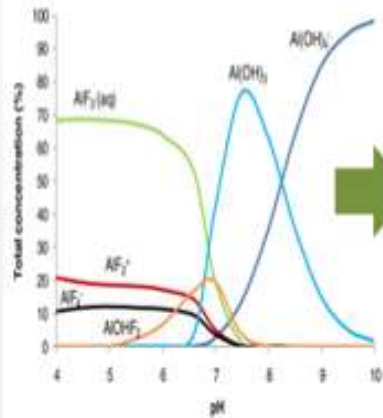
Source: <https://masterclasses.nature.com/part-1-introducing-collaboration>

Research Collaboration Cases

Integrated Water Quality Index-collaboration

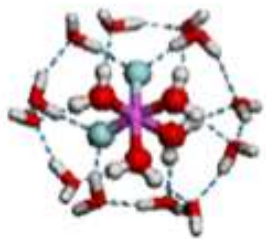


NIFS



Mechanistic Modeling
ICP-OES

UoP



(b) $cis-[Al(H_2O)_4F_2]^+$

Ab initio solvation
High speed Computer

NIFS



?

Ex-situ spectroscopy
Raman Facility

KIT, Germany



In situ spectroscopy

WQI
Excellent
Good
Fair
Bad

Bio assay
Multivariate statistics
TOC/TON Facilities73

Case SMARTPHONE/CLOUD CONTROL –Water Treatment Plant

State-Industry-Academia Collaboration

Ceylon Journal of Science 51(1) 2022: 51-62
DOI: <http://doi.org/10.4038/cjs.v51i1.7979>

RESEARCH ARTICLE

Sustainable pressure-driven membrane facility controlled by a smartphone application for groundwater desalination in the dry zone of Sri Lanka*

Z. Wu^{1,2}, N. Senanayake³, S. Dayaratna⁴, D. Bandara³, R. Pathmanadan^{1,3}, T. Ritigala⁵, S.K. Weragoda⁶, L. Jayarathna³, A.C.A. Jayasundara⁷, Y. Wei^{3,8}, X. Chen⁹ and R. Weerasooriya^{3,9*}

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²Wuhan New fibre Optics Electron Co., Ltd, Hubei, Wuhan 430074, PR China.

³National Institute of Fundamental Studies, Hantana, Kandy, Sri Lanka.

⁴Department of Environmental Science, Faculty of Science, University of Peradeniya, Peradeniya, Sri Lanka.

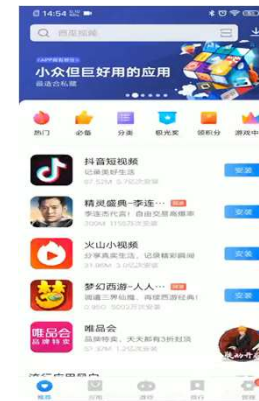
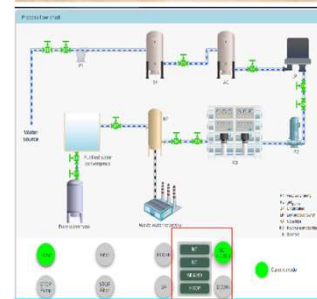
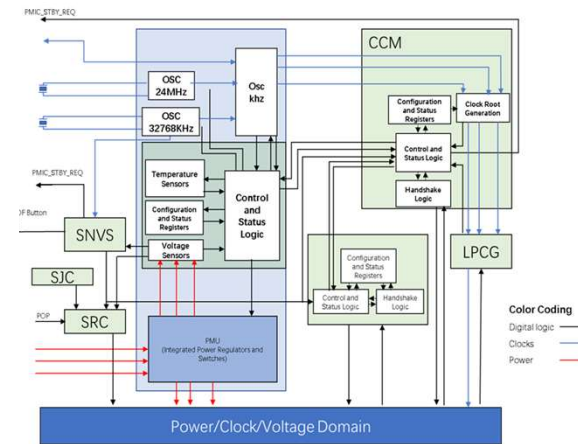
⁵Beijing Enterprises Water Group (BEWG) Limited, Colombo 06, Sri Lanka.

⁶China-Sri Lanka Joint Research and Demonstration Centre, Ministry of Water Supply, Peradeniya, Sri Lanka.

⁷Department of Chemistry, Faculty of Science, University of Peradeniya, Peradeniya, Sri Lanka.

⁸Research Centre for Eco-Environmental Sciences, Chinese Academy of Sciences, Haidian, Beijing 10085 PR China.

⁹Institute of Industry and Equipment Technology, Hefei University of Technology, Hefei 230009 PR China.



Demo platform address: <http://server2.whnf.cn:8128/#/monitoringNow4>

Case: Industry and Academia Collaboration

AGREEMENT

Background

Analytical Instruments, has a provision to assist community service programs which bear a national relevance. On the request of Prof. Rohan Weerasooriya Principal Investigator, National Institute of Fundamental Studies Kandy, NRC TO-16-015, and the approval of National Research Council of Sri Lanka, the Board of Governors of the Analytical Instruments agreed to donate LK 1,300,000 for the construction and supply of building complex for the model water treatment facility to be installed at A/ Natiyagama School, Mihintale as a part of village community water supply scheme.

This Agreement (hereinafter referred to as the "Agreement") is made at Colombo in the Democratic Socialist Republic of Sri Lanka on 28th day of November 2018.

MoU1: Building

any invalid or unenforceable provision with a valid or enforceable provision, which achieves to the greatest extent possible the economic, legal and commercial objectives of the invalid or unenforceable provision.

- 4.5 **Assignment.** Save as permitted herein, the Parties to the Agreement shall not assign or purport to assign or otherwise deal with any of its rights and obligations hereunder without the prior written consent of the other party.
- 4.6 **Amendments.** All changes and amendments to this Agreement or to any attachment thereto are valid only if made in writing and signed by duly authorized representatives of the Parties.
- 4.7 **Jurisdiction.** This Agreement shall be governed and construed by and in accordance with the laws of Sri Lanka and subject to the exclusive jurisdiction of the courts of Sri Lanka.

IN WITNESS, WHEREOF, THE PARTIES HAVE EXECUTED THIS AGREEMENT AS OF THE DAY AND YEAR FIRST ABOVE WRITTEN:

SIGNED AND DELIVERED	SIGNED AND DELIVERED	SIGNED AND DELIVERED
On behalf of ANALYTICAL INSTRUMENTS PRIVATE	On behalf of SUPPLIER - MR KAMAL PRIYANTHA	On behalf of the NRC - TO - 16-015 Project (NATIONAL RESEARCH COUNCIL OF SRI LANKA)



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E-mail: analytical@anipr.lk

mihintale

අවබෝධතා ගිවිසුම

කොට්ඨාශ අධ්‍යාපන කාර්යාලය, මහින්තලේ - ශ්‍රී ලංකා ජාතික පර්යේෂණ සභාව (NRC-16-015 ව්‍යාපෘතිය)

MoU2: Ministry of Education and Academia

- 7. 2021 -12-29 වන දින දක්වා ජල පවිත්‍රාගාරයේ අලුත්වැඩියා හා නඩත්තු කටයුතු සඳහා අවශ්‍ය සහය NRC 16-015 ව්‍යාපෘතිය මගින් ලබාදේ. මෙම කාලය තුළදී අපගේ පර්යේෂණ කණ්ඩායම විසින් තිරසාස වැඩ සටහන් නිර්මාණය කිරීමට අවශ්‍ය උදව් පාසලට ලබාදේ.
- 8. ජල මූලාශ්‍රයේ ජල සුරක්ෂිතතාවය සඳහා පාසලේ හා ගම්වාසීන්ගේ පූර්ණ සහයෝගය අපේක්ෂා කරමු.
- 9. වාර්ෂිකව පැවැත්වෙන NRC ව්‍යාපෘති ප්‍රගති සමාලෝචන රැස්වීමට ඔබ පාසලේ නියෝජිතයෙකු සහභාගී වීම අපේක්ෂා කරමු. එහිදී මෙම ව්‍යාපෘතිය සම්බන්ධව ඔබලාගේ අදහස් ඉදිරිපත් කිරීමට අවස්ථාව ලැබේ.
- 10. මෙම ජලපිරිපහදු ගොඩනැගිල්ල NRC-16-015-Model Water Treatment Plant යනුවෙන් නම්කර ඇත. රජයේ වෙනත් ව්‍යාපෘතියකින් පාසලට ජලය ලැබෙන්නේ නම් මෙම යන්ත්‍රය රජයේ වෙනත් පාසලකට අවශ්‍යතාවය අනුව මාරු කරනු ඇත.

The water plant is not a donation to the school. The school community is a research partner. If not satisfactory the utility will remove from the location.

කොට්ඨාශ අධ්‍යාපන අධ්‍යක්ෂක

විදුහල්පති - නැටියගම විද්‍යාලය

ශ්‍රී ලංකා ජාතික පර්යේෂණ සභාව (NRC-16-015)

Case: Research Collaboration

合作备忘录

Memorandum of Understanding

合作方 (Parties):

斯里兰卡. 国家基础研究所(以下简称“基础研究所”)

National Institute of Fundamental Studies, Sri Lanka (hereafter, NIFS)

中国. 武汉新峰光电股份有限公司(以下简称“新峰”)

Joint China and Sri Lanka Joint Research and Demonstration Centre for Water
Terchnology (JRDC)

Wuhan New Fiber Technology, PR China (hereafter, NFT)

斯里兰卡协议方同意在水质控制研究方面与新峰的合作达成如下协议:

The field of M.Phil. and Ph.D. research is restricted to Water Quality Control Research of Sri Lanka and approved and acknowledged by NFT.

4. 申请者需要在斯里兰卡佩拉德尼亚大学(或基础研究所指定的学校), 且是斯里兰卡大学教育资助委员会认可的大学注册攻读硕士学位。

The candidates are required to register for a postgraduate degree leading to the M. Phil. degree at UOP (or at institutions designated by NIFS), which is accredited by the University Grants Commission of Sri Lanka.

5. 在三名申请者之中, 至少有一名申请者需要在三年后升级至博士研究项目。

Case: Some NIFS Research Collaboration Promoters

Institutional Development – not listed

Research Laboratory Development US\$ ~ 5K

IDRC Canada

USAID USA

World Scholarship Program, Switzerland

PSTC, USA Israel

ANSO China

etc

Researcher Development

IFS, Sweden

TWA, Italy

World Scholarship Program, Switzerland

DAAD, Germany

AvH, Germany

Fulbright-Hayes USA

East West USA

NRC NSF, Sri Lanka

NIFS Water Researchers **do not compete** but *collaborate*

Thank you

Science and technology

Pandit Nehru, PM India

Science and technology cannot be applied to development.

Science and technology are indeed an integral part of development.