Parallel Session (Ondaatje Hall)

The role of AI and Big Data on Science and Societal Impact

Angela McGuire (Chair)

Collaboration Manager, Research Evaluation, Elsevier,
United Kingdom

Gagan Gill

Program Manager, AI & Society, CIFAR, Canada

AESIS

Interdisciplinary Approaches for AI & Society

CIFAR

Gagan Gill
Manager, AI & Society

Canadian Institute for Advanced Research

CIFAR is a Canadian-based global research organization that convenes extraordinary minds to address the most important questions facing science and humanity.

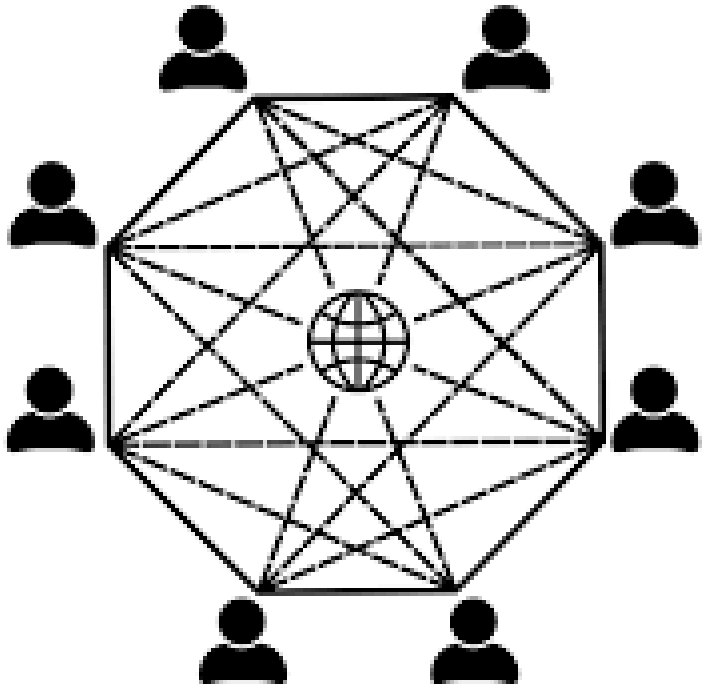
- Founded in **1982**
- Connects the world's top researchers through highly interdisciplinary research networks

15 research programs

400 fellows, advisors & scholars

Canadian Institute for Advanced Research

- CIFAR allows researchers from **across disciplines** and **geographies** to collaborate and come at these questions from different perspectives
- Flexibility for researchers to think **outside the box**, **take risks, build collaborations**, and make decisions they can’t in a single discipline
- Each research program meets **2x per year**



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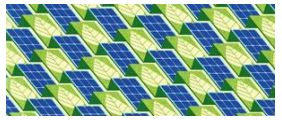
CIFAR's Research Portfolio

Brain, Mind, & Consciousness



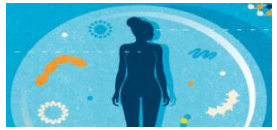
Bio-inspired Solar Energy

Boundaries, Membership & Belonging

Child & Brain Development

Earth 4D: Subsurface Science & Exploration

Fungal Kingdom: Threats & Opportunities



Multi-scale Human

Future Flourishing

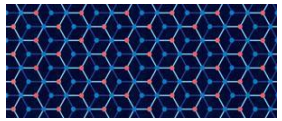
Gravity & the Extreme Universe

Humans & the Microbiome

Innovation, Equity & the Future of Prosperity

Learning in Machines & Brains

Quantum Information Science



Quantum Materials

Humanity's Urban Future

CIFAR

AI at CIFAR

- CIFAR's very first research program launched in **1983** on, **Artificial Intelligence, Robotics & Society**

- In 2017, the Government of Canada invested **$125M** in a Pan-Canadian Artificial Intelligence Strategy

Pan-Canadian Artificial Intelligence Strategy

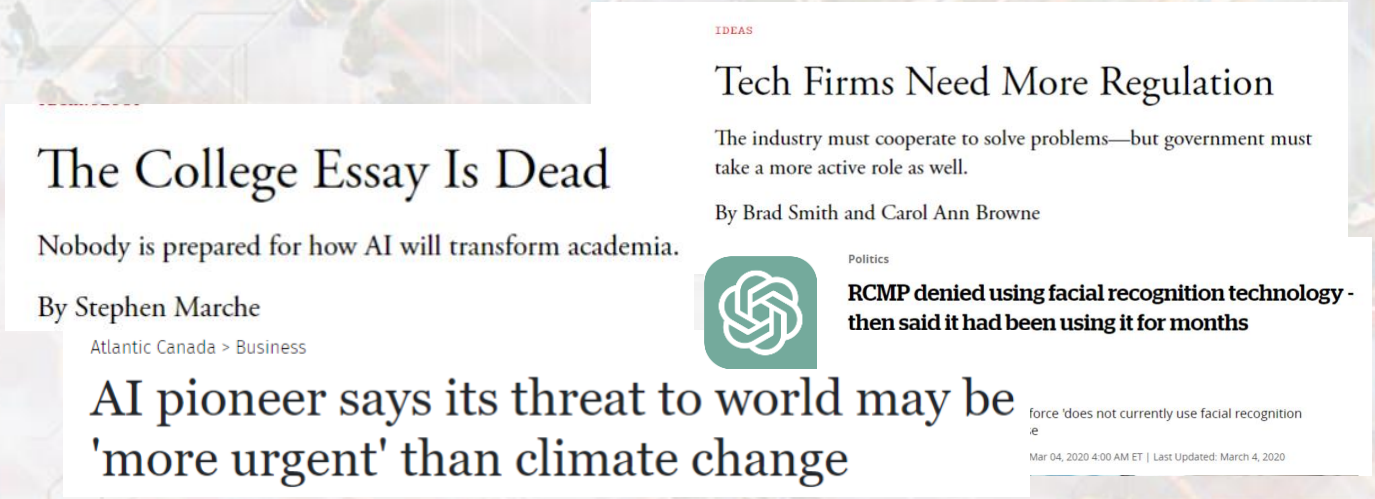
National AI Institutes

- → Advancing EDI in AI
- → Understanding & addressing the impacts of AI on society

- Advancing AI Science
- AI for Health
- AI for Energy and the Environment
- AI Commercialization

AI & Society

- **Advance knowledge and fill gaps in our understanding of the societal implications of advances in AI**



- **Identify societal challenges related to AI, and seek sustainable solutions to address these challenges to deploy responsible AI**

AI Insights

A series of policy briefs that shape the future of responsible AI.

Workshops/Symposia

CIFAR SOLUTION NETWORKS

DESIGN SOLUTIONS FOR RESPONSIBLE AI

CIFAR

CIFAR Solution Networks Program

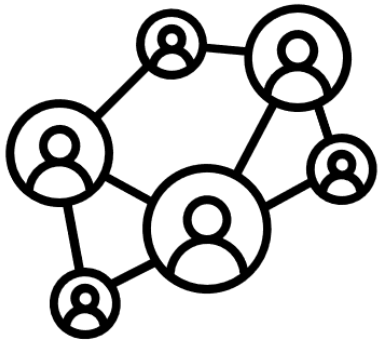
- Launched in 2020
- Responding to the need to move beyond frameworks & principles to practice & action by developing and implementing solutions to the barriers of responsible AI

A Solution Network is an international or national network of diverse, cross-sectoral, and multi-disciplinary experts who design, develop and implement solutions which respond to the challenges of deploying responsible AI.

CIFAR SOLUTION NETWORKS
DESIGN SOLUTIONS
FOR RESPONSIBLE AI

The Solution Network Model

- Based on the CIFAR model of convening interdisciplinary experts over a longer term to work together on challenges
- Provide teams with an unparalleled environment of trust, transparency, and knowledge sharing so they can pursue high-risk, high-reward solutions to responsible AI challenges
- Funded for 3 years; stipend, meeting support & programmatic & administrative support



- ➔ 6 members, including 2 co-directors
- ➔ at least one computer/data scientists
- ➔ at least one expert in the ethical, legal, or policy implications of AI
- ➔ at least one member based in the setting where the solution will be applied

CIFAR SOLUTION NETWORKS
DESIGN SOLUTIONS
FOR RESPONSIBLE AI

The Solution Network Model

- Apply leading research and practice insights to the development of novel interventions/approaches
- Test interventions to ensure uptake (including community consultations)
- Inform policies or practices that support and build trust in AI and mitigate potential social, ethical and economic harms; and
- Initiate efforts to scale the intervention

will not fund:

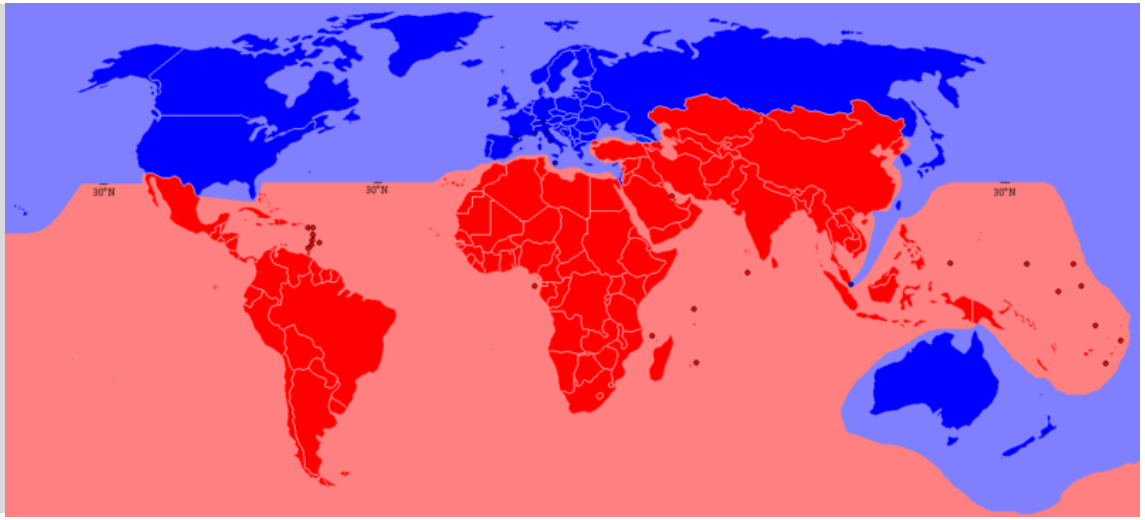
- New knowledge or understanding to advance a field of study
- Purely technical solutions

CIFAR SOLUTION NETWORKS
DESIGN SOLUTIONS
FOR RESPONSIBLE AI

AI Governance in Low-Middle Income Countries

Call for Proposals:

- Solution Network that will design and develop **governance solutions** that could have a transformative impact on the deployment of responsible AI in low-middle income countries (LMIC)



IDRC CRDI

Designing cooperative and sustainable approaches to the governance of emerging technologies.

SEWA
SELF EMPLOYED WOMEN'S ASSOCIATION


Colin Clark


Revathi Sharma Kollegala


Luke Church


Eva de Lera


Salonie Muralidhara Hiriyur


Patrick Shulist

Thank you AESIS!

gagan.gill@cifar.ca

CIFAR

Interdisciplinary collaboration

Challenges + opportunities

Kate Geddie, PhD
Senior Director, Research
AESIS Conference, Halifax
June 21, 2023

CIFAR 40 YEARS ANS

CIFAR is a global research organization that convenes extraordinary minds to address the most important questions facing science and humanity.

By supporting long-term interdisciplinary collaboration, CIFAR provides researchers with an unparalleled environment of trust, transparency and knowledge sharing.

But what are the inherent challenges?

Three interconnected pillars

Brain, Mind, & Consciousness

Bio-inspired Solar Energy

Boundaries, Membership & Belonging

Child & Brain Development

Earth 4D: Subsurface Science & Exploration

Fungal Kingdom: Threats & Opportunities

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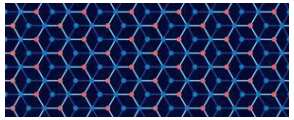
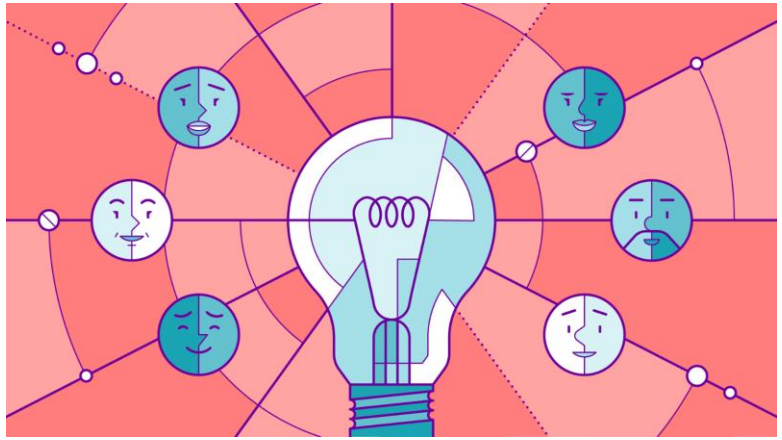


Quantum Materials

CIFAR's research program model

Interdisciplinary, sustained networks focused on generating transformative knowledge

- Comprised of 15-25 fellows from around the world (mix of career stages)
  - 2 co-directors
  - 4-6 Advisory Committee to steer and make recommendations to CIFAR
  - 2-3 early career faculty
- 2-3 meetings per year: deeply collaborative networks funded for 5-year terms (renewable), with a 10-year+ vision
- Catalyst funds to encourage collaboration



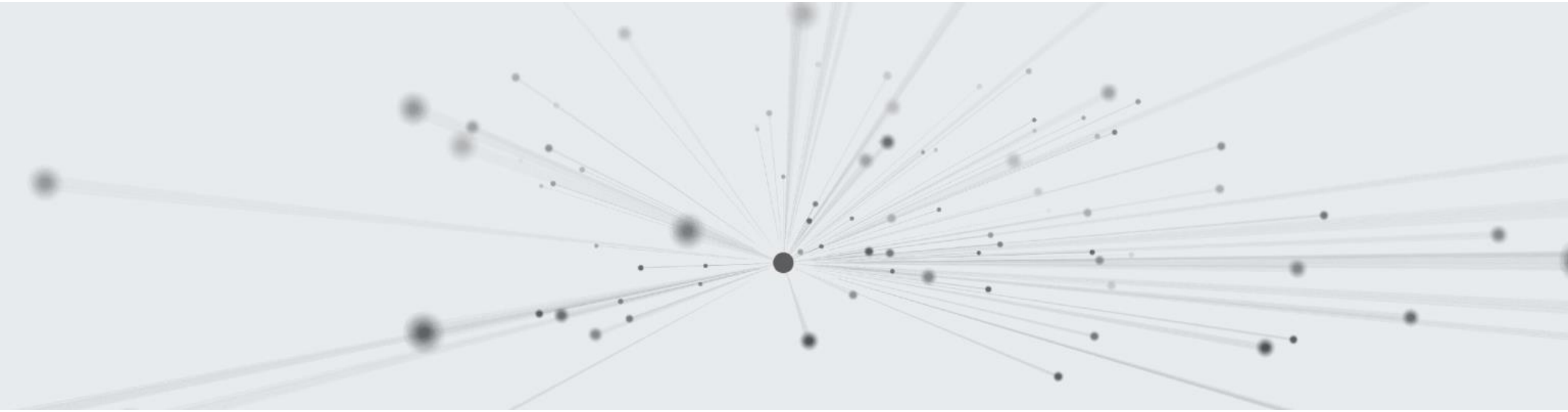
Enabling conditions for successful collaboration

- Creating an optimal environment of trust and information-sharing
- Commitment to long-term relationships
- Individuals with deep expertise + an open spirit
- Visionary and open leadership
- Flat hierarchy
- Flexibility

\+ intentional practices

The multidimensionality of interdisciplinary collaborations

- Cognitive
- Emotional
- Interactional



(Lamont, Mansilla + Sato, 2016)

Challenges:
1. to successful collaboration
2. to assessing impact

Challenges for interdisciplinary collaboration?

1. Inability to establish mutual understanding, respect, and a common language
2. Inability to maintain positive/productive emotions
3. Group dynamics + power hierarchies disrupt the flow of information

How to assess successful collaborations?

Continual assessment of program health (short + medium-term outcomes):

- Meaningful individual benefit
- Active participation and diverse engagement in formal interactions (program meetings)
- New collaborations (publications; novel + strategic use of catalyst funds)
- Active engagement in knowledge mobilization initiatives
- Active engagement between meetings
- Sense of collective ownership + a shared agenda

How to assess impact?

1. Expert peer-review panels assess interdisciplinary scholarly impact on a global scale – evidence of transformative knowledge creation
2. Case studies to assess broad range of impact (longitudinal, mixed methods)

Challenges:

- Long time horizon is essential: too long for many funders
- Wide range of characteristics of impactful research (policy change, economic impact, transferability): makes impact narrative challenging to tell
- ATTRIBUTION challenges!

Different levels of knowledge outcomes

Science-Metrix 2015, Evaluation of CIFAR


CIFAR
BRINGING CANADA to the WORLD...
FUTURE FOCUSED
A.I IS MORE LIKE A HUMAN BRAIN...
IN 1983, CIFAR TOOK a GAMBLE and FUNDED RESEARCHERS to COLLABORATE on A.I. WHEN the WORLD HAD LOST INTEREST IN IT. LAYING the FOUNDATION FOR MODERN DEEP LEARNING!
A.M. TURING AWARD
CANADA IS A WORLD LEADER IN A.I. as a RESULT of this EARLY INVESTMENT!
CHILD and BRAIN DEVELOPMENT
INNOVATION and the FUTURE of PROSPERITY
REVOLUTIONARY THINKING!!
SEARCHING for SCIENTIFIC BREAKTHROUGHS!
BIO INSPIRED SOLAR ENERGY
EVERYTHING is CONNECTED
QUANTUM
MIND BLOWING RESEARCH
and the WORLD to CANADA!
20 COUNTRIES
$8.3m IN PRIVATE REVENUE
427 AFFILIATED RESEARCHERS TODAY
1737 MAJOR AWARDS
109 CIFAR AZRIELI GOBAL SCHOLARS
87 PARTNER SHIPS
20 NOBEL PRIZE WINNERS
PAN CANADIAN A.I. STRATEGY
BOUNDARIES and BELONGING
THE FUNGAL KINGDOM
CONTINUOUS GROWTH
HIGH-RISK
HIGH REWARD IDEAS
IDEAS THAT CAN TRANSFORM CANADA's ECONOMY!
FORESIGHT
NEW KNOWLEDGE for a BETTER WORLD
COLLABORATION
to ADDRESS COMPLEX and URGENT CHALLENGES
PROVIDE YOUNG TALENT ACCESS to BIG BRAINS
FUTURE NOBEL LAUREATE!
WHAT's the NEXT BIG IDEA?
20-30 YEARS in the FUTURE
TRAINING PROGRAMS
PIPELINE of FUTURE TALENT!
an INVESTMENT in OUR YOUTH!
NOBEL LAUREATE
PHILOSOPHER
SCIENTIST
ENGINEER
ECONOMIST
BIGGEST BRAINS at the TABLE!
INTERNATIONAL, MULTI-DISCIPLINARY DREAM TEAM!
EQUITY DIVERSITY INCLUSION
SUPPORTING the DEVELOPMENT of FUTURE RESEARCH LEADERS
DRIVING SOCIETAL IMPACT THROUGH KNOWLEDGE MOBILIZATION
ADVANCING SCIENTIFIC KNOWLEDGE IN HIGH-RISK, COMPLEX AREAS of ENQUIRY


CIFAR
40
YEARS
ANS

Jude Kong

Executive Director, Africa-Canada Artificial Intelligence and Data Innovation Consortium, Cameroon

Jude Kong, Ph.D.
Executive Director | Africa-Canada Artificial Intelligence and Data Innovation Consortium (ACADIC)
Executive Director| Global South AI for Pandemic and Epidemic Preparedness and Response Network (AI4PEP)
Assistant Professor | Department of Mathematics & Statistics |
Twitter: @dzevela

Impact of Responsible, Explainable, and Local AI on Communities across the Global South.

The Societal Impact of Science Conference, Halifax, Canada

June19-21, 2023

Acknowledgement: funders

IDRC · CRDI
International Development Research Centre
Centre de recherches pour le développement international
Canada

Sida

New Frontiers in Research Fund
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My community: Healthcare needs and challenges

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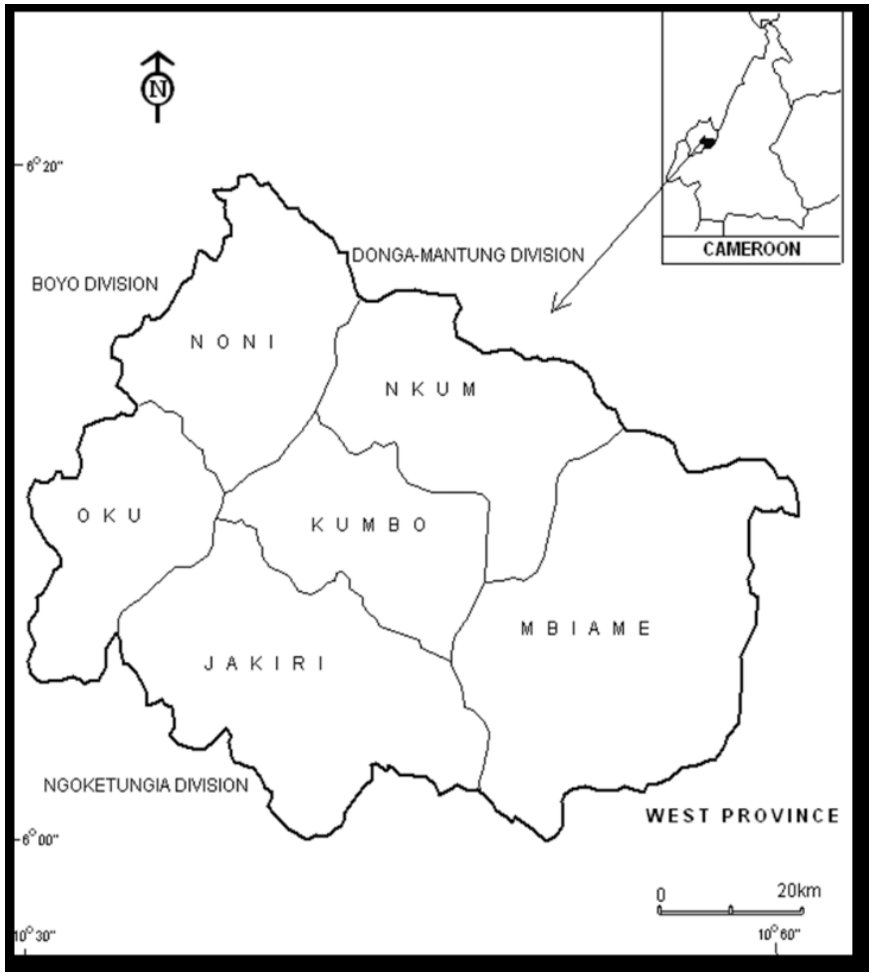
Need for proactive tools



Health Challenges Posed by Atmospheric aerosols

Kanana, Gold Mining Town, South Africa

https://www.intechopen.com/chapters/16226

https://www.dw.com/en/landslide-kills-at-least-14-people-at-a-funeral-in-cameroon/a-63910281

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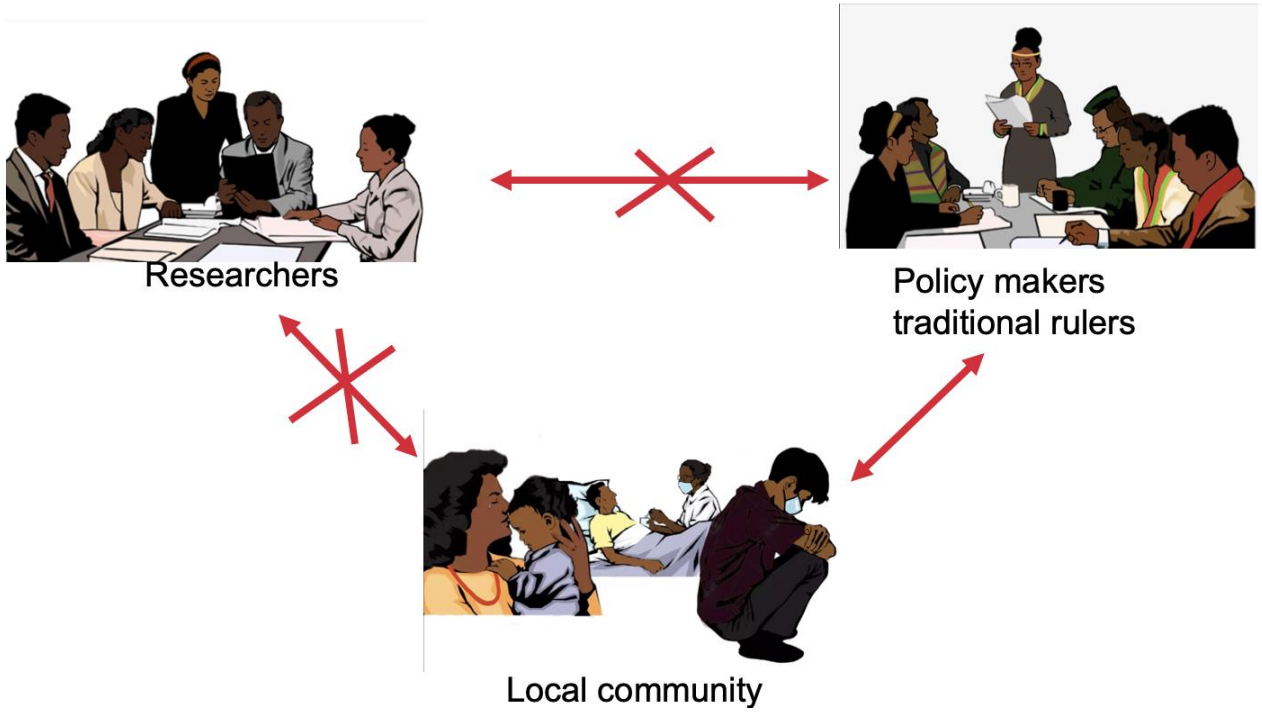
Our Approach



Interdisciplinary approach grounded in an intersectional feminist and decolonial framework

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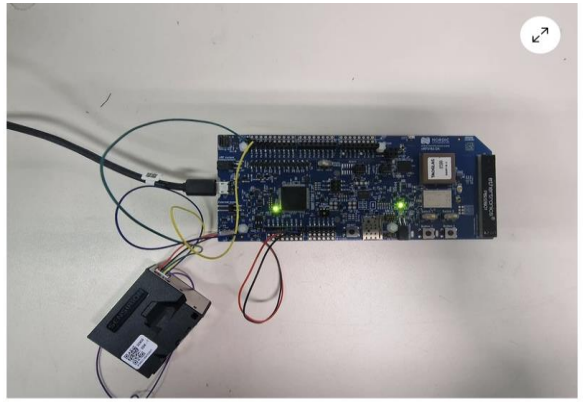
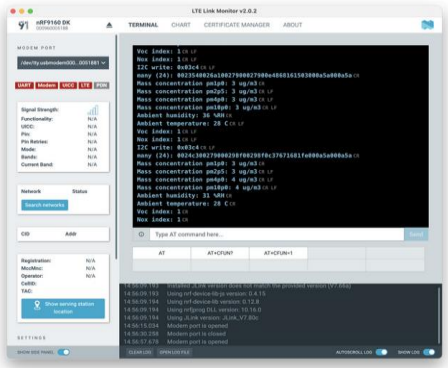
ACADC Air Quality Monitoring Device





```
Mass concentration pm1p0: 3 ug/m3 CR
Mass concentration pm2p5: 3 ug/m3 CR LF
Mass concentration pm4p0: 4 ug/m3 CR LF
Mass concentration pm10p0: 4 ug/m3 CR LF
Ambient humidity: 55 %RH CR LF
Ambient temperature: 25 C CR LF
Voc index: 1 CR LF
Nox index: 1 CR LF
```

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Jacaranda's SMS-based support package for expectant & new mums

01
Mums register for service

A pregnant woman, Lucy, signs up for PROMPTS for free at a local hospital or in the community.

02
Messages sent to mums

Lucy starts receiving 'prompts' or nudges via text message encouraging health-seeking behaviors based on stage of pregnancy.

03
Mums ask questions

Lucy is able to easily text a trained Helpdesk agent with questions about her pregnancy. General questions like, 'can I eat avocados during pregnancy?' and more urgent questions like, 'I'm bleeding, what should I do?'

04
AI Triage kicks in

If one of Lucy's questions is flagged with a potential danger sign, we use AI to triage her so she can be screened by a Helpdesk agent.

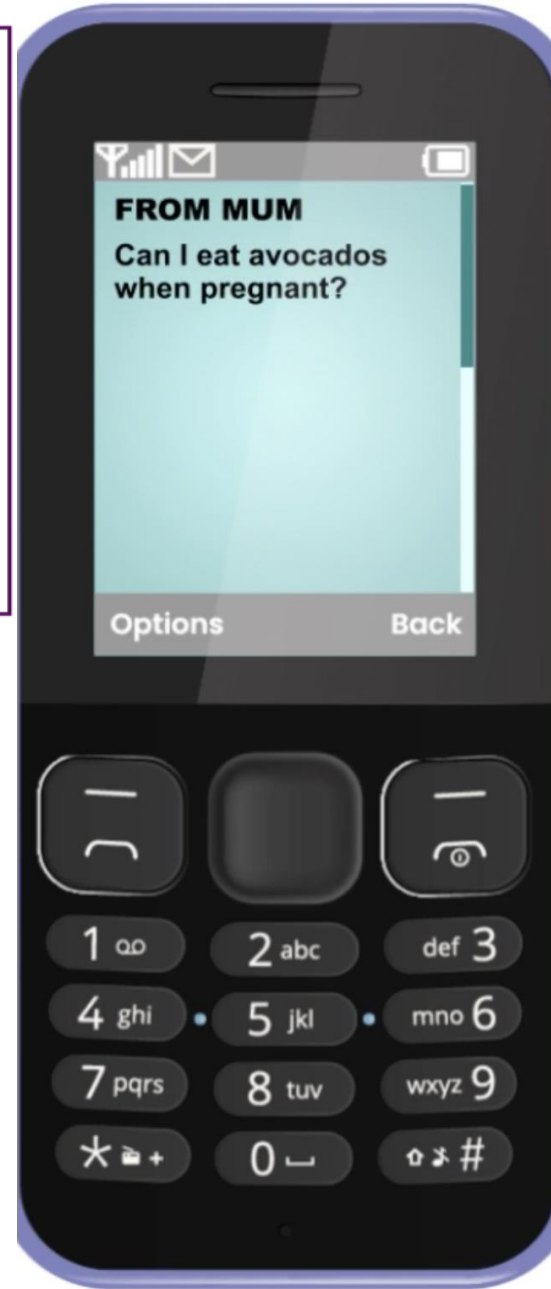
We designed a 'Triage Bot' that uses Natural Language Processing (NLP) to categorize the intent of thousands of user questions. For example, pain can be described as 'paining', 'my side is hurting', 'strain in the side'.

05
Mums are sent for care

If Lucy requires urgent care, a Helpdesk agent will refer her to the nearest facility. They will share a digital file with the providers at the hospital so they are aware of the incoming case, and can act immediately when she arrives.

06
Quality care provided

Lucy and her baby receive the care that they need and continue to receive 'prompts' from the service.



https://www.jacarandahealth.org/prompts

Estimating unemployment

- Measuring unemployment rate using the traditional approach:
  - Is expensive and time-consuming.
  - Requires a lot of man-power and administrative personnel.
  - Faces many difficulties and obstacles e.g. low public cooperation, dealing with migration/homelessness/nomadism, privacy concerns.
  - Mostly done on seasonal and annual basis.
  - The results are ready to report several months later

Measuring Unemployment

KwaZulu-Natal

frontiers | Frontiers in Public Health

TYPE Original Research
PUBLISHED 02 December 2022
DOI 10.3389/fpubh.2022.952363

OPEN ACCESS

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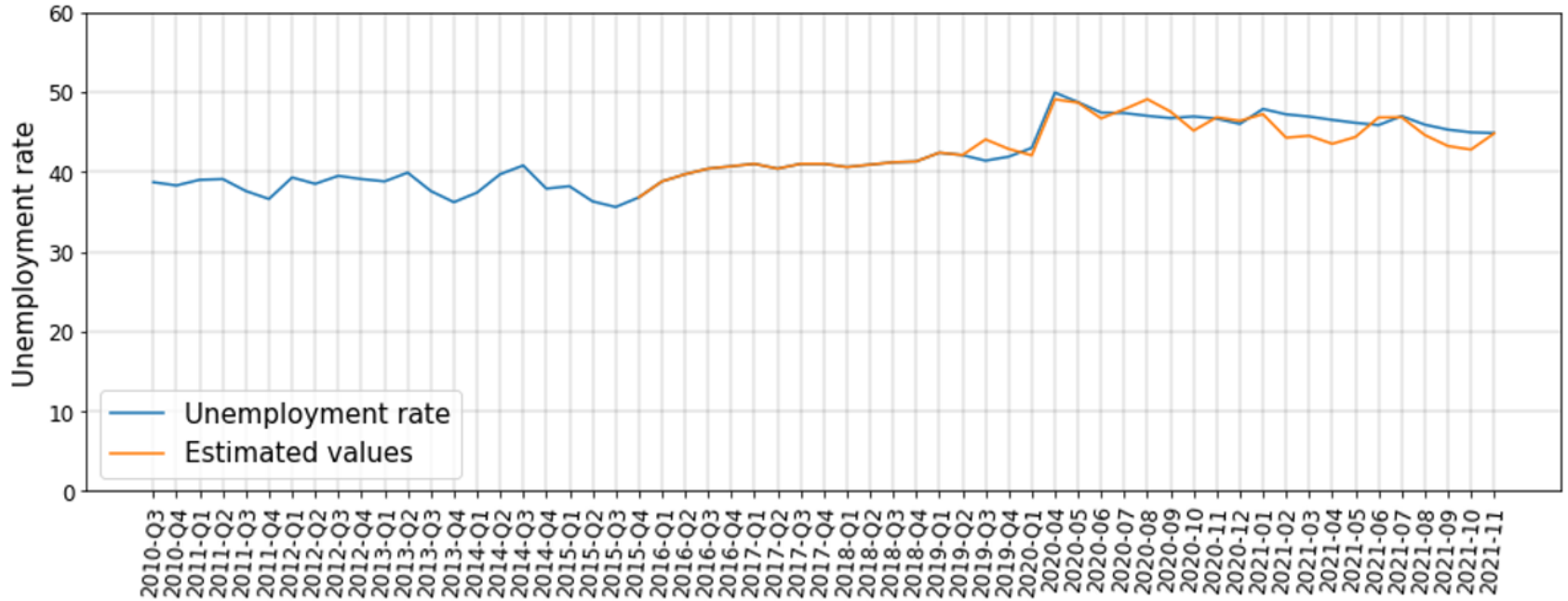
Nowcasting unemployment rate during the COVID-19 pandemic using Twitter data: The case of South Africa

Zahra Movahedi Nia[1], Ali Asgary[2†], Nicola Bragazzi[1†], Bruce Mellado[3†], James Orbinski[4†], Jianhong Wu[1†] and Jude Kong[1*†]



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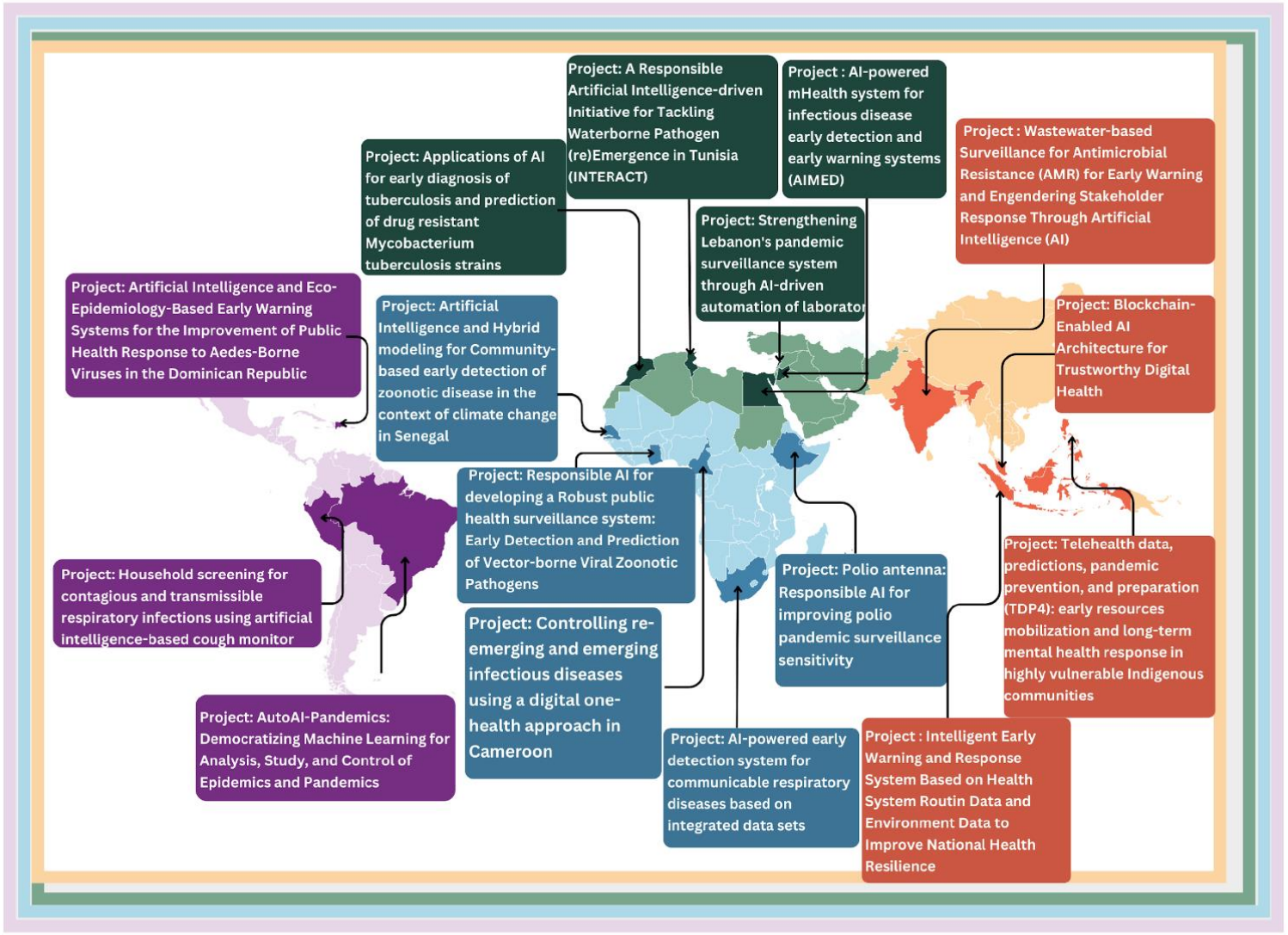
AI4PEP NETWORK

SUD GLOBAL
RÉSEAU AI4PEP



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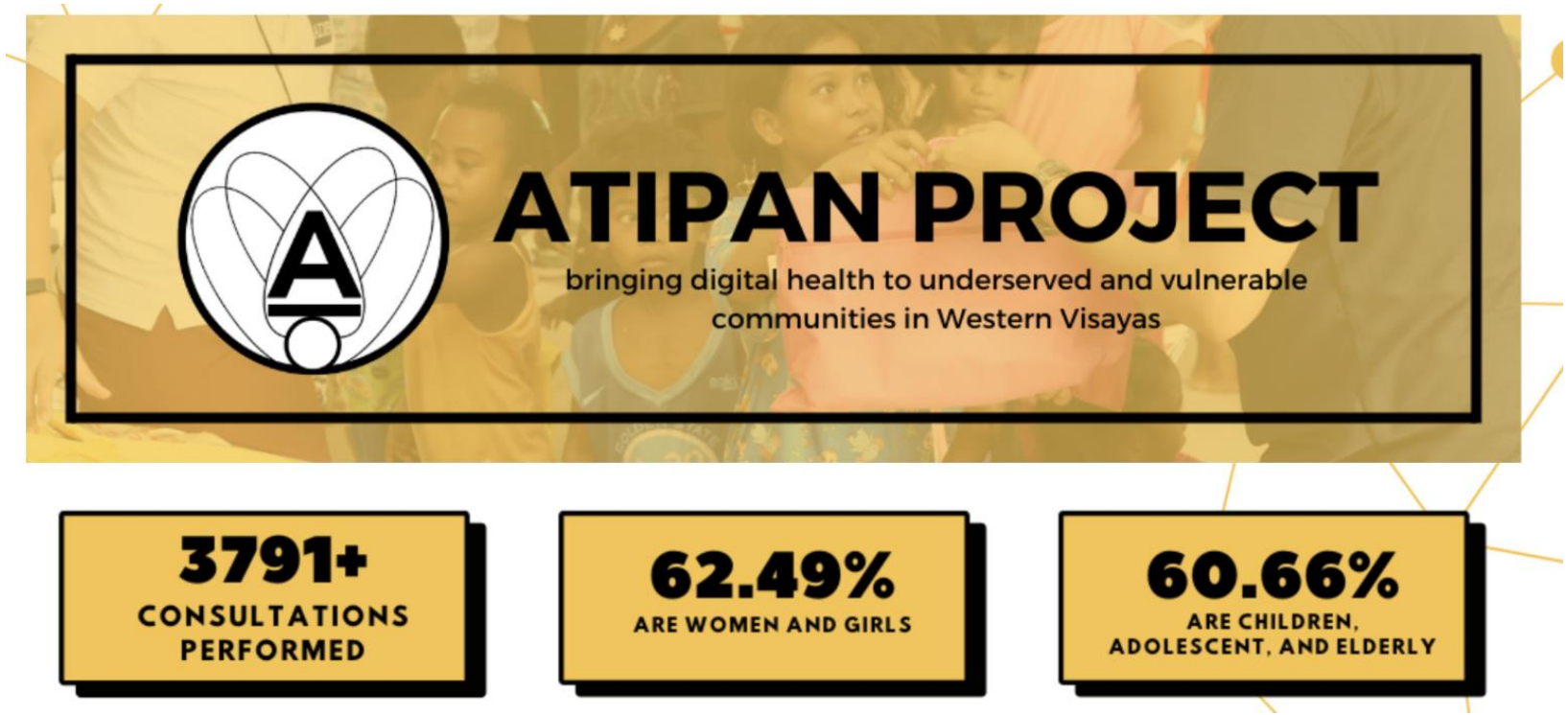
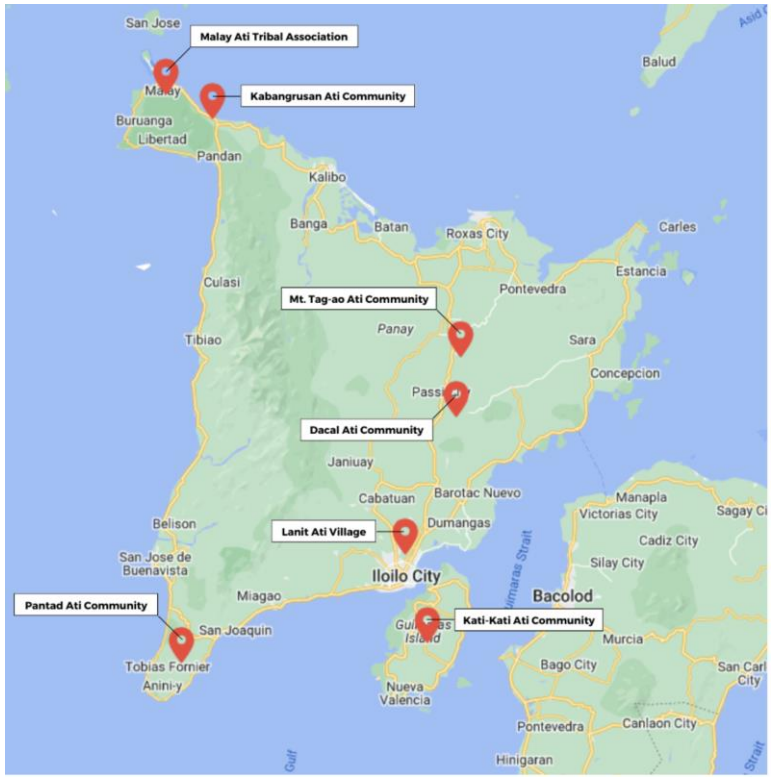
University of San Agustin led telehealth data, predictions, pandemic prevention and preparation project





https://www.usacfi.net/atipan-project.html

Our AI-based framework adopted to address clinical public and global health needs

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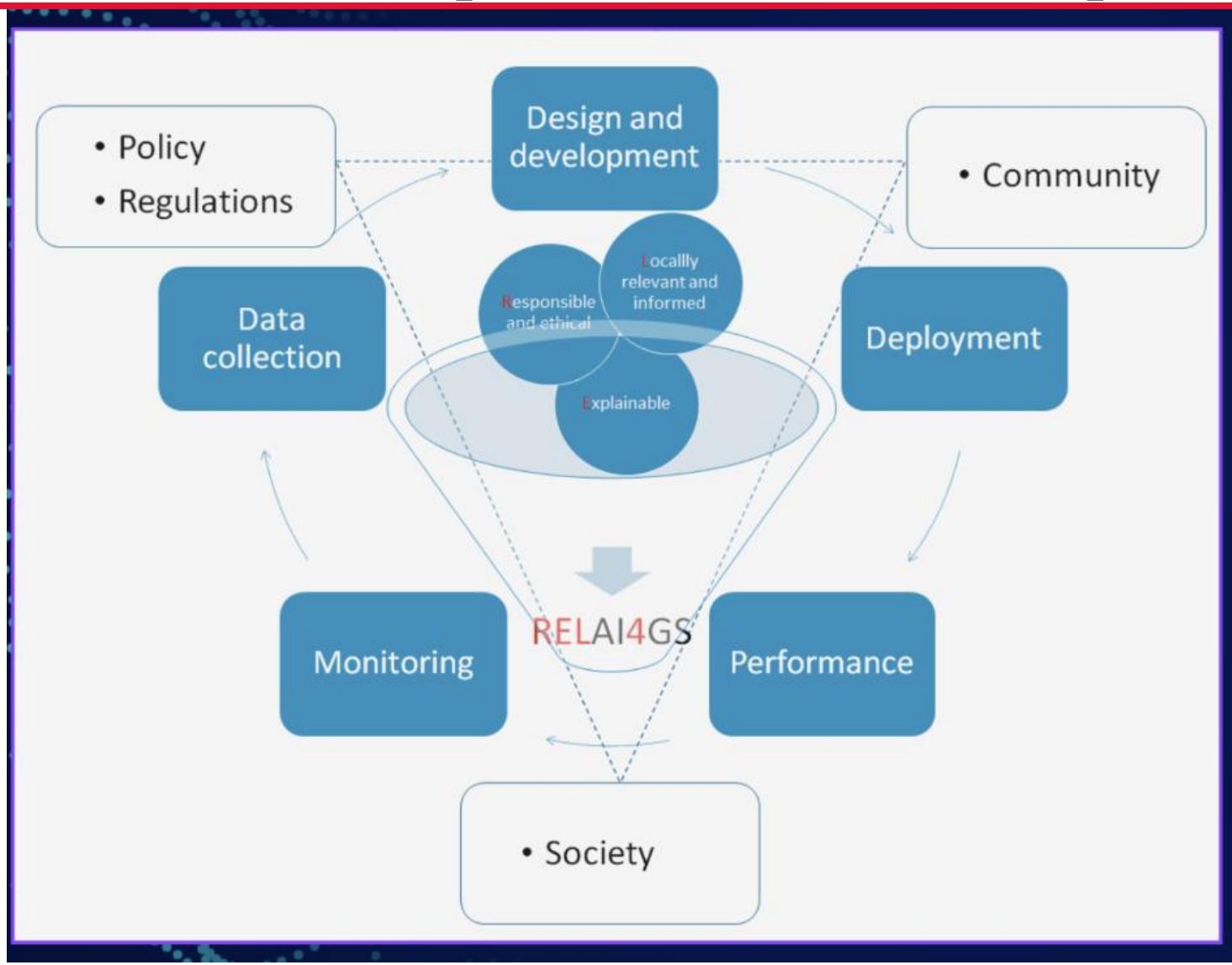
Resemblance between Historical Colonialism and Current Data Colonialism

Appropriation of natural resources	**Appropriation** [and quantification] of human life (through datafication)
Expropriation of land, resources, bodies	**Expropriation** of social life (e.g., social media) and bodies (e.g, IoT is upcoming) ▪ People are "just there" for capital to "discover" and exploit
Exploitation through industrial capitalism	**Exploitation** through AI capitalism (commodification of human life

Framework adopted to address clinical public and global health needs



- **Responsible:** accountable, auditable, compliant, ethical, respectful, safe and secure
- **Explainable:** equitable, fair, interpretable, reliable, reproducible, transparent, trustworthy, unbiased
- **Local:** autonomous, caring, connecting, decolonized, human- and community-centred, inclusive, intentional, intersectional, just, practival, protecting, process-based, sustainable

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Conclusion

- **AI bias:** In addition to working with a diverse team to ensure that a variety of feedback and perspectives are kept in the loop, algorithms should always be tested and validated and, as much as possible, made open, publicly available, and transparent, so as to be scrutinized, criticized, and reproduced.

- **Inequality:** Whilst automation and AI are generally conceived as responsible for labor displacement and job losses, they can be, on the contrary, valuable allies, in that:

  - they can analyze real-time (local and global) market demands and forecast future trends in terms of emerging skills.
  - AI can identify new market needs and roles, and be employed for reskilling and retraining, helping counteract and mitigate against job disruption.

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Take Home Message

It is important to :

1. Plan with the communities to develop methods and applications to address issues within the communities.

2. Learn from the communities as we go.

3. Act with the communities at any given time.

4. Build capacity in the communities.

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Thank you!
Merci!

Recommendation

The role of AI and Big Data on Science and Societal Impact

“ ”