Harnessing Data Science for Health Discovery and Innovation in Africa (DS-I Africa)

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OSC (Common Fund) – DS-I Africa

Concept Clearance: Stage 2

Title: Harnessing Data Science for Health Discovery and Innovation in Africa (DS-I Africa)

Objective: Explore how advances in data science applied in the African context can spur new health discoveries and catalyze innovation in healthcare and health research, by:

1. Advancing health data science research and innovation in Africa with multisectoral partnerships
2. Increasing health data science capacity in Africa
3. Exploring Ethical and Social Implications (ESI) of emerging data science from an African perspective
4. Fostering a trans-African network of data scientists/collaborators and enhance supportive infrastructure
5. Responding effectively to opportunities for collaboration and to rapid changes in the field of data science

Funds Available and Anticipated Number of Awards: $19.1 - 19.15M per year for 32 meritorious awards (contingent upon funding availability)

Program Duration: 5 years

Council Action: Vote for approval of the concept for DS-I Africa Stage 2

Acknowledgements

Leadership

Kathleen Neuzil, M.D.
Director, FIC

Bruce Tromberg, Ph.D.
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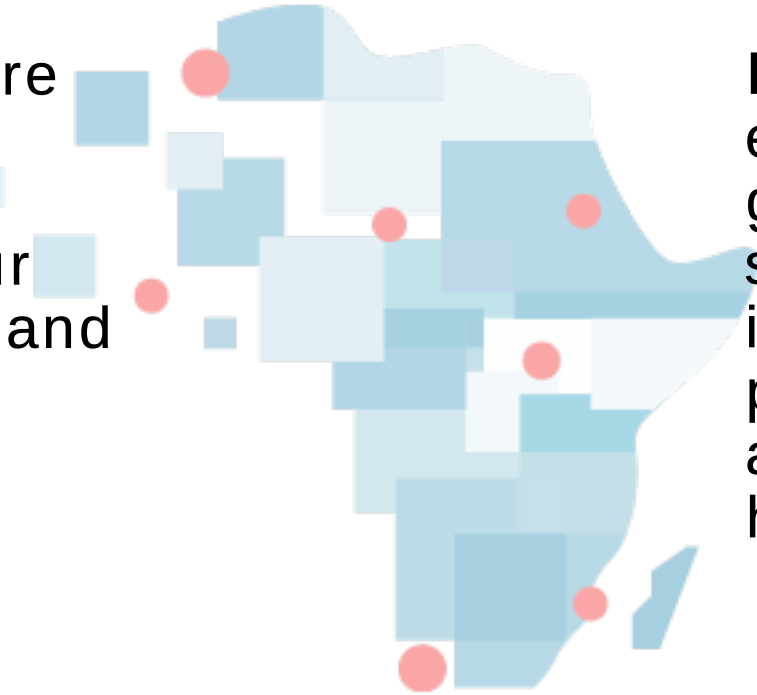
DS-I Africa Working Group ICOs:
FIC, NIBIB, NIMH, NLM, NCATS, NCI, NEI, NHGRI, NHLBI, NIAID, NICHD, NIDA, NIDCD, NIDCR, NIDDK, NIEHS, NIMHD, NINDS, OBSSR, ODSS

Harnessing Data Science for Health Discovery and Innovation in Africa

DS-I Africa Goal: Explore how advances in data science applied in the African context can spur new health discoveries and catalyze innovation in healthcare and health research.



Motivation: a coordinated effort to connect disparate groups in health data science and innovation, including multisectoral partnerships, could have an impact on significant health challenges in Africa

Africa is a continent teeming with youthful energy and untapped potential… by 2035, there will be more young Africans entering the workforce each year than in the rest of the world combined.

In the digital age, technology has the power to revolutionize Africa's socio-economic landscape. … providing young Africans with opportunities to acquire knowledge, develop innovative ideas and connect with the global community.

- Chido Mpemba & Chido Munyati, Youth Perspectives, World Economic Forum

DS-I Africa Consortium – Stage 1

$88 M over FY21-25 | 38 awards across 22 African countries + U.S.

Research
- 7 Research Hubs
- 13 Partnership for Innovation Projects

Capacity Building
- 7 Research Training Programs
- 6 Education Programs

ELSI
- 4 Ethical, Legal, and Social Implications Research Projects

Ecosystem
- Coordinating Center
- eLwazi Open Data Science Platform

Research Examples

- **Precision Public Health**
  - Tailored multimorbidity management
  - Dashboard development for healthcare providers
- **Viral & bacterial surveillance, tracking, modeling**
- **Diagnostics, Decision Support**
  - AI for clinical image analysis
  - mHealth tool for rapid trauma ID and triage

- **Youth Mental Health**
  - Integrate and analyze data from EHRs, movement trackers, phones
  - AI/ML for depression risk prediction
- **Climate Change and Health**
  - Understand MNCH impacts and develop early warning systems using weather, geospatial, air quality, and cohort data

Stage 1 Accomplishments - 1

In 3 years, multi-disciplinary teams throughout the consortium have:

1. applied data science approaches to develop new solutions for critical health problems
2. developed new data science and digital health innovations
3. leveraged new scientific advances in synthetic data generation to overcome barriers to data sharing
4. developed new African institutional capacity to store, manage, and analyze data

Stage 1 Accomplishments - 2

Innovation

- 150+ publications on topics like emerging ethical issues in AI and big data in Africa
- developed and deployed a scalable data-sharing gateway (https://elwazi.org)
- created an AI Chat Bot that helps researchers navigate data sharing regulations

Education

- launched health data science advanced degree programs at 8 African institutions
- training 120 students, 46 faculty, and 11 post-docs, including Ministry of Health staff

Collaboration

- 200+ partnerships developed and maintained
- engaged with hundreds of data scientists, companies, NGOs, and government staff through networking exchanges, workshops, and presentations

Stage 2 Planning: Portfolio & Landscape Analysis

ANALYSIS

- NIH portfolio
- World RePORT
- Other funders' activities
- State of Data Science writing project (Fogarty)

NIH DISCUSSIONS

- Awardees, site visits, consortium meetings, Steering Committee
- NIH staff and leadership

CONSULTATIONS

- Funding agencies (e.g., BMGF, Wellcome)
- Private sector (e.g., IBM Research, Google, Microsoft)
- Pan-Africa Networks (Deep Learning Indaba, Data Science Africa)

General Findings

- NIH is the leading funder of DS & health research in Africa
- Others are increasing investments in data science:
  - African governments
  - Private sector
  - Other funders

Opportunities for Stage 2

- Continue to build on past NIH investments & further catalyze the field
- Align activities with government & private sector
- Deepen collaboration with other funders
- Engage with African science councils and African Open Science Platform
- Identify pathways for sustainability through grantee partnerships

	Findings	Opportunities for Stage 2
 **Research**	Time needed to translate research into health outcomes	More time will enable new innovations and accessibility
 **Capacity Building**	Demand for research training greater than available degree opportunities	Scale up training activities to wider audiences
 **ELSI**	Ethics research is critical for emerging advances in the field	More focused funding
 **Ecosystem**	Funding models can't keep up with advances in the fast-paced field	Flexible and adaptable Strategic Investment Fund
	Data access, ownership, and management remain challenging	Early-stage data repositories

Program Goal and Initiatives

Stage 2 DS-I Africa Goal: Spur new health discoveries and catalyze innovation in healthcare, public health, and health research in Africa through application of data science. By:

1. Advancing health data science research and innovation in Africa with multisectoral partnerships → Research Hubs + Partnership for Innovation Research Projects
2. Increasing health data science capacity in Africa → Research Training Program + Research Education Awards
3. Exploring Ethical and Social Implications (ESI) of emerging data science from an African perspective → Ethical and Social Implications Research
4. Fostering a trans-African network of data scientists/collaborators and enhance supportive infrastructure. → ODSP/CC and Early-Stage Data Repositories
5. Responding effectively to opportunities for collaboration and to rapid changes in the field of data science→ Strategic Innovation Fund

Stage 2 Initiatives

Research
- Research Hubs
- Partnership for Innovation Projects

- Emphasize translation of data science innovations and sustainability through partnerships
- Expand possible research areas to include emerging technologies and approaches

Capacity Building
- Research Training Projects
- Education Projects

- Training Programs will work with the Coordinating Center to scale training outputs
- Education Programs will target a wider audience for skill building through short courses (DS skills, ethics, team science, entrepreneurship)

Stage 2 Initiatives

Ethical and Social Implications

- ESI of Emerging DS Research Projects

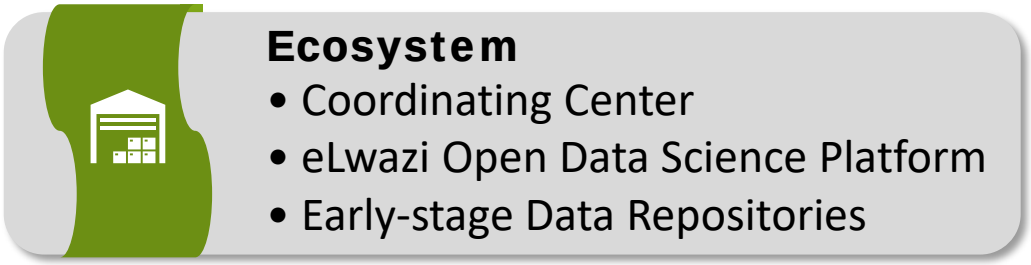
- Revise prior ELSI initiative to focus on ethical and social implications of emerging data science technologies and approaches

- Provide more flexibility for embedded research with DS-I Africa Consortium

- De-emphasize less generalizable legal implications research

- Research Hubs will incorporate activities to understand project-specific legal implications

Stage 2 Initiatives



- Grow eLwazi ODSP beyond DS-I Africa Research Hubs and work towards a data and knowledge network

- CC will work with Training Working Group to scale the outputs of the training programs: train-the-trainer, dissemination of curriculum

- Early-Stage Data Repositories will be multidisciplinary resources relevant to more than one disease or scientific focus
  - o Country-specific, regional, or African-wide
  - o Emphasize unique value proposition for the research community and plans for preservation & sustainability

Stage 2 Initiatives

Strategic Innovation Fund

- Flexible budget for NIH to respond to new opportunities to collaborate and to rapid changes in the field of data science
- Tackle emerging issues in Africa with African organizations, other global funders or commercial partners
- Plans will be informed by external consultants

ILLUSTRATIVE EXAMPLES

- A series of joint convenings between data science groups supported by separate funders
- Workshops that address emerging translational needs
- Supplemental funding to connect grantees to new, innovative resources or technologies

Anticipated Impact

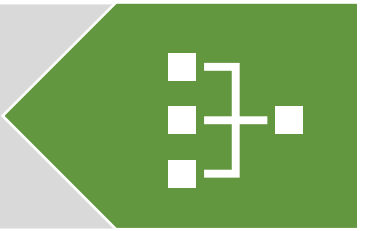
Recognized centers of excellence in various fields of data science and innovation

Demonstration of feasibility of data science innovation to improve health in Africa

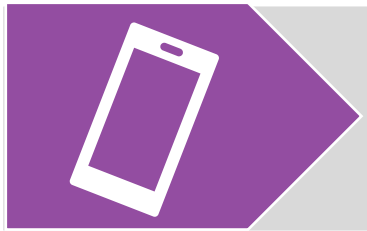
Advances in policy surrounding ethical issues around AI and other emerging data science technology

Increased capacity to advance African-appropriate tools and applications **that will catalyze new areas of research**

A **unique continental network** of scientists supported by a transforming **data ecosystem**



Products, some of which may spin off into start-up companies

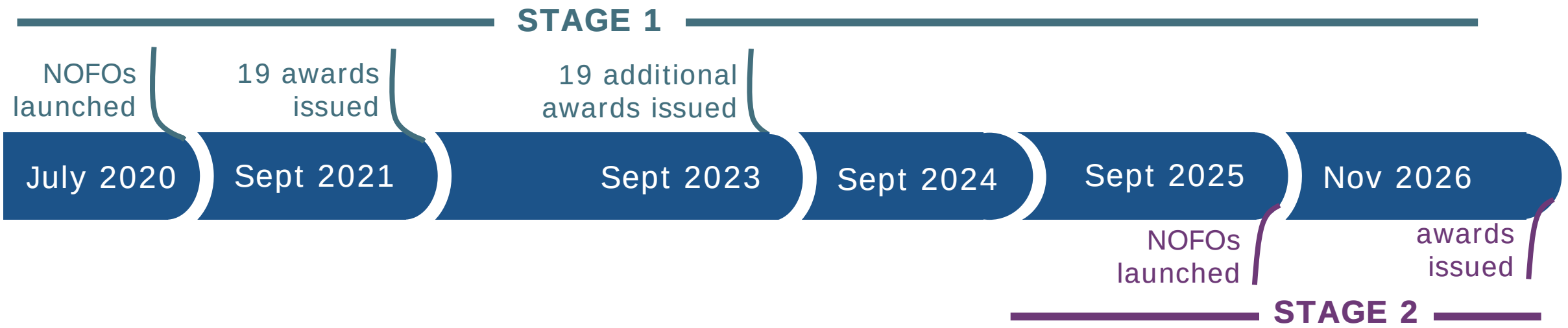


Sustainable platform of interdisciplinary **& multisectoral collaborations**

New scientific knowledge that improves **clinical practice & health**

Overall Budget & Timeline

- Requesting $95.65 million over 5 years (including RMS)
- Stage 1 Common Fund budget was $73.3 million ($88M total)
- Increase costs stem from requests for:
  - 1 additional Research Hub
  - 1 additional Training Program
  - Extension of PIRPs and Research Education Programs from 3 to 5 years
  - 4 Early-Stage Data Repositories
  - Strategic Innovation Fund



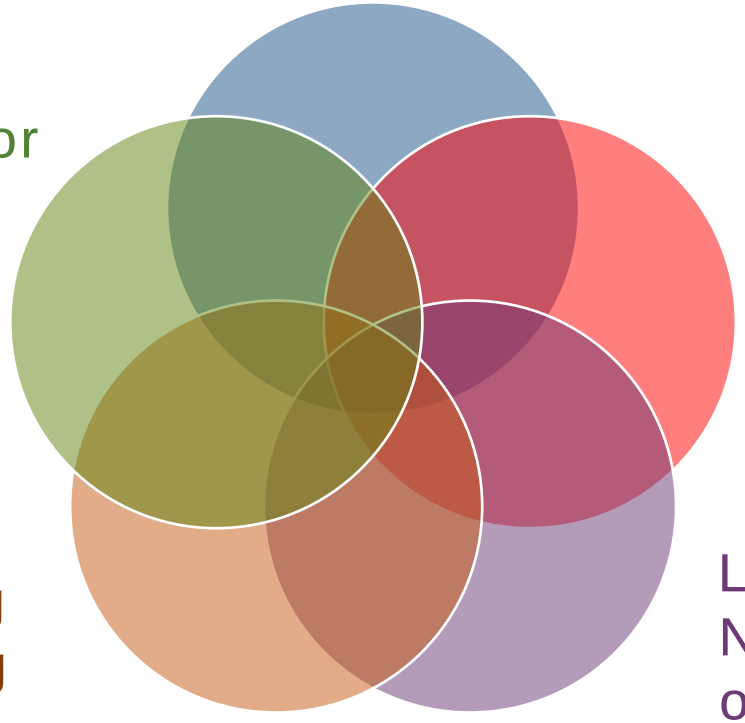
Common Fund Criteria

Transformative

Strengthening capacity enables African leadership and ownership

Novel

1st Africa-wide, multi-sector network for data science and health research



Catalytic

Connecting disparate activities, adding new partners, engaging government and private sector

Goal-Driven

Building on Stage 1 goals while addressing emerging opportunities and lingering challenges

Synergistic

Leveraging current and past NIH investments, aligning with other funders

Council Action: Vote for approval of the concept for DS-I Africa Stage 2

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