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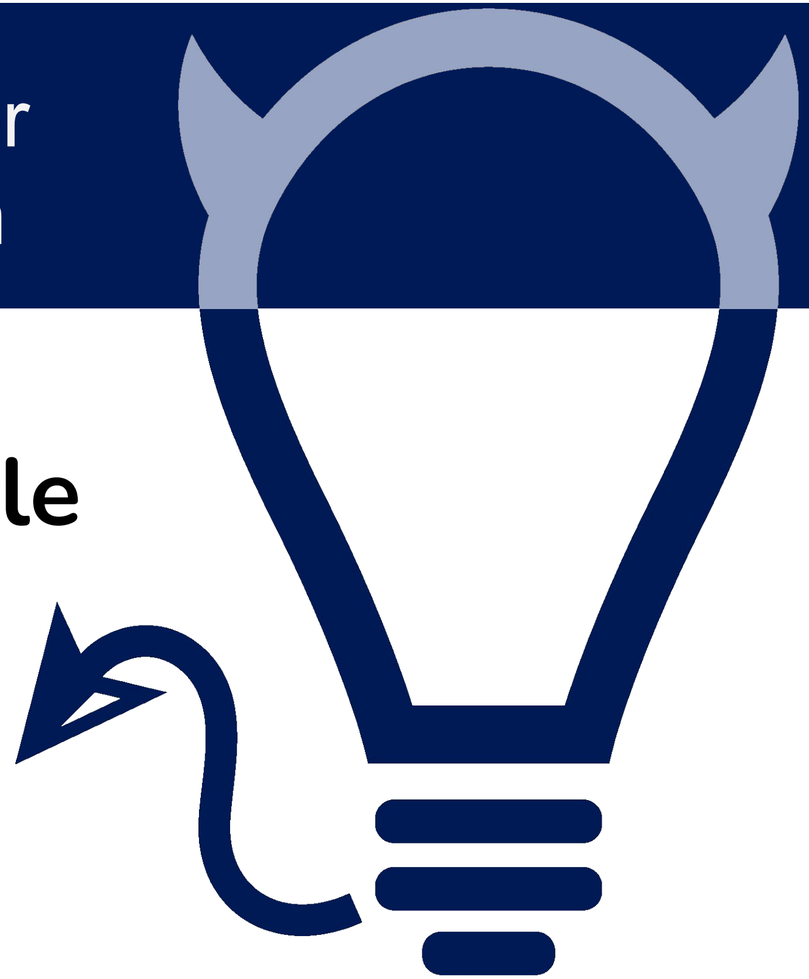

Health Equity Across the AI Lifecycle (HEAAL)

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**Network of 22+
Healthcare Organizations
and Ecosystem Partners**

Health AI Partnership

Mission

Empowering healthcare professionals to use AI effectively, safely, and equitably through community-informed up-to-date standards

Vision

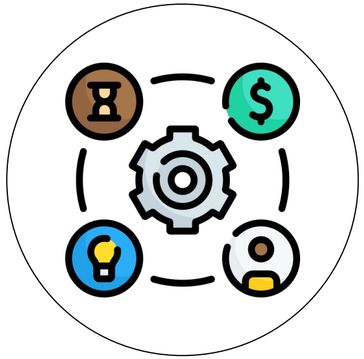
Be the trusted partner and up-to-date source of actionable guidance for healthcare professionals using AI

Values

- Advance health equity
- Improve patient care
- Improve the workplace
- Build community

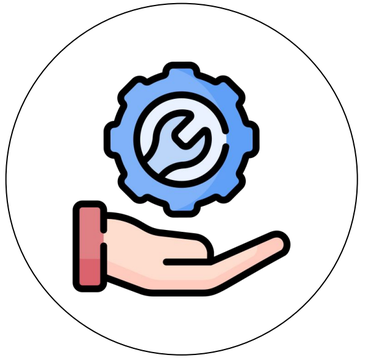
Health AI Partnership

Voice of healthcare organizations



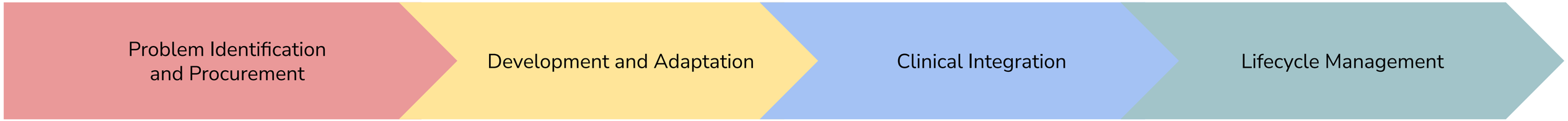
Support of high- and low-resource environments

Team of clinical, technical, operational, and strategic stakeholders



Provider of technical assistance for AI implementation

Eight key decision points of AI adoption



1. Identify and prioritize a problem
2. Identify requirements for an AI product as a viable component of the solution
3. Develop measures of outcomes and success of the AI product
4. Design a new optimal workflow to facilitate integration
5. Evaluate safety, effectiveness, and equity concerns of the AI product in the intended setting prior to clinical use
6. Execute AI product roll out, workflow integration, communication, education, and scaling
7. After operationalization, monitor and maintain the AI product and work environment
8. Update or decommission the AI product and work environment

Kim JY, Boag W, Gulamali F, Hasan A, Hogg HD, Lifson M, Mulligan D, Patel M, Raji ID, Sehgal A, Shaw K. Organizational Governance of Emerging Technologies: AI Adoption in Healthcare. InProceedings of the 2023 ACM Conference on Fairness, Accountability, and Transparency 2023 Jun 12 (pp. 1396-1417).

Need for a health equity framework

Regulatory frameworks

- White House
- HHS Office of Civil Rights
- ONC
- Office of the Attorney General in California

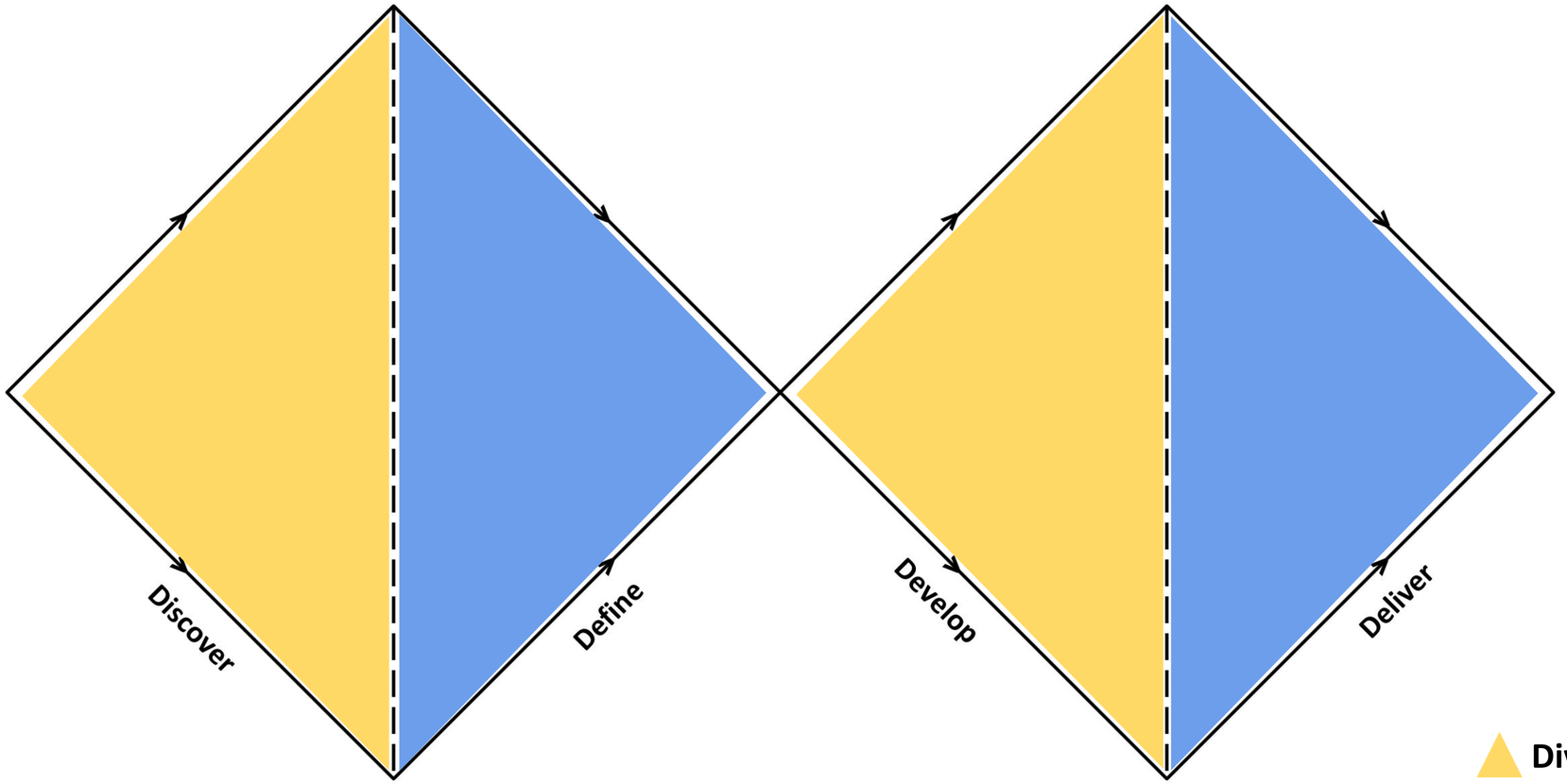
Academic papers

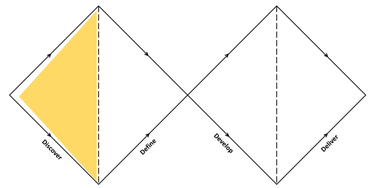
- Potential causes of bias in AI
- Strategies to mitigate bias

Our health system is considering adopting a new solution that uses AI.

How do we assess the potential future impact on health inequities?

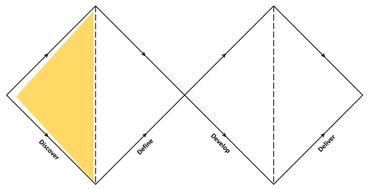
Method: Design research





Participants

Participant		Role	Responsibilities
C	Case study presenters	3 innovation teams that develop and implement AI solutions in healthcare delivery organizations	Curated a case study, presented it at the workshop, and tested out the framework
W	Workshop participants	77 stakeholders from 10 healthcare delivery organizations and 4 ecosystem partners with clinical, technical, operational, regulatory, and AI ethics expertise	Contributed to developing the procedures of the framework
F	Framework developers	A clinician, a community representative, a computer scientist, a legal and regulatory expert, a project manager, and a sociotechnical scholar	Created a scaffolding of the framework and contributed to developing its procedures
H	HAIP leaders	A clinical data scientist, a community organizer, 2 computer scientists, 3 lawyers, and a program director	Evaluated the framework and provided feedback
D	Design researchers	A clinical data scientist, a project manager, and a qualitative research scientist	Facilitated the co-design process by collecting, iterating, and synthesizing data from all other participants

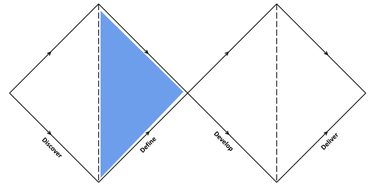


Discover

- **Goal**: Generate diverse approaches to incorporate into the framework

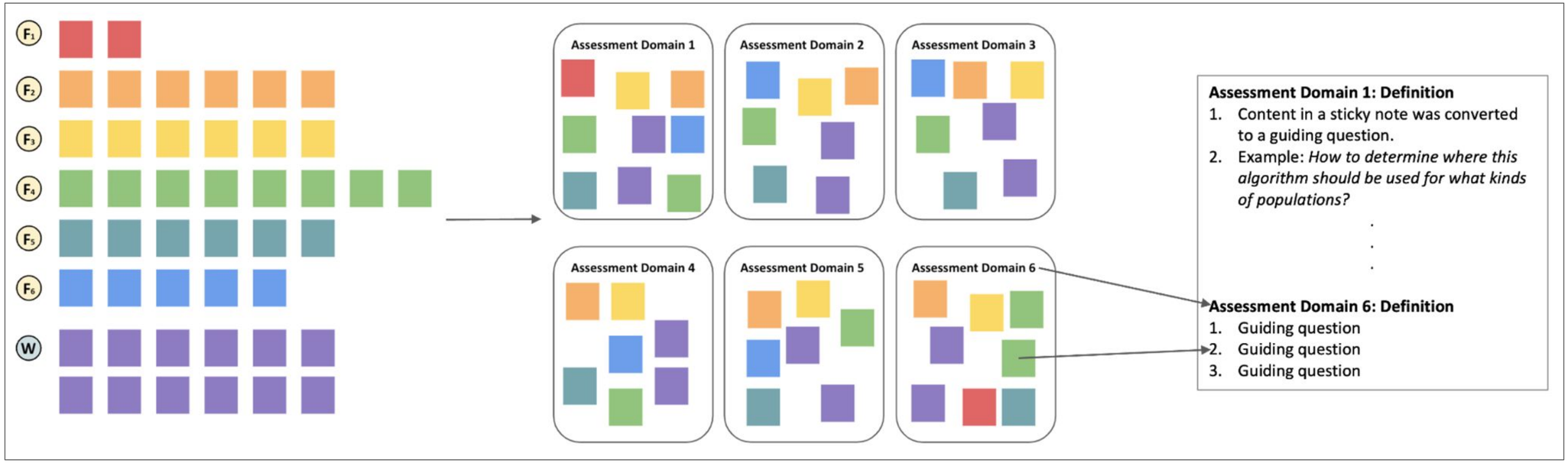
- **Participants**: 77 professionals from 10 healthcare delivery organizations and 4 ecosystem partners with clinical, technical, operational, regulatory, and AI ethics expertise

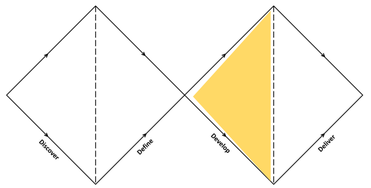
- **Method**: Case studies workshop
  - Postpartum depression algorithm from NewYork-Presbyterian (NYP)
  - Patient segmentation algorithm from Parkland Center for Clinical Innovation (PCCI)



Define

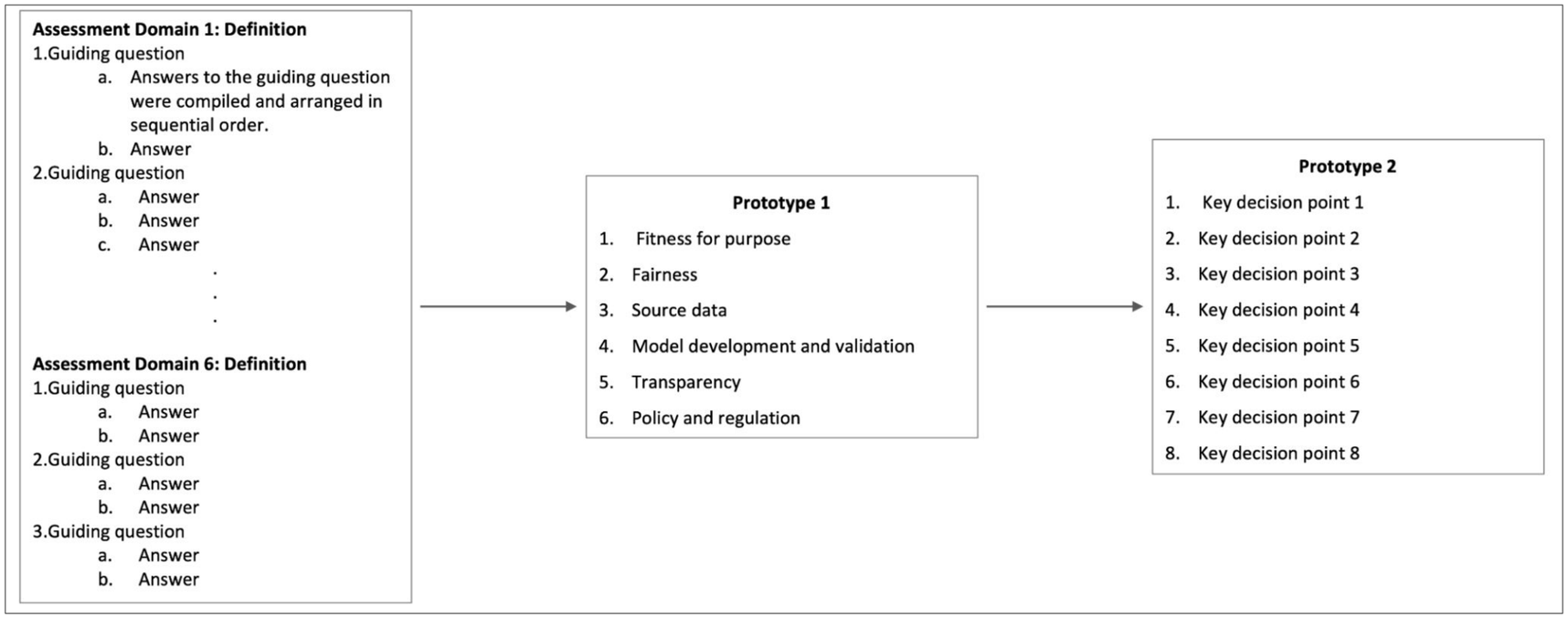
- **Goal**: Synthesize key insights of the workshop and develop assessment domains
- **Participants**: F D

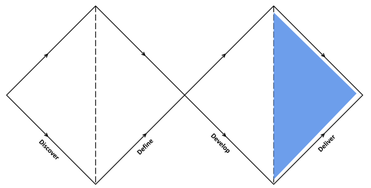




Development

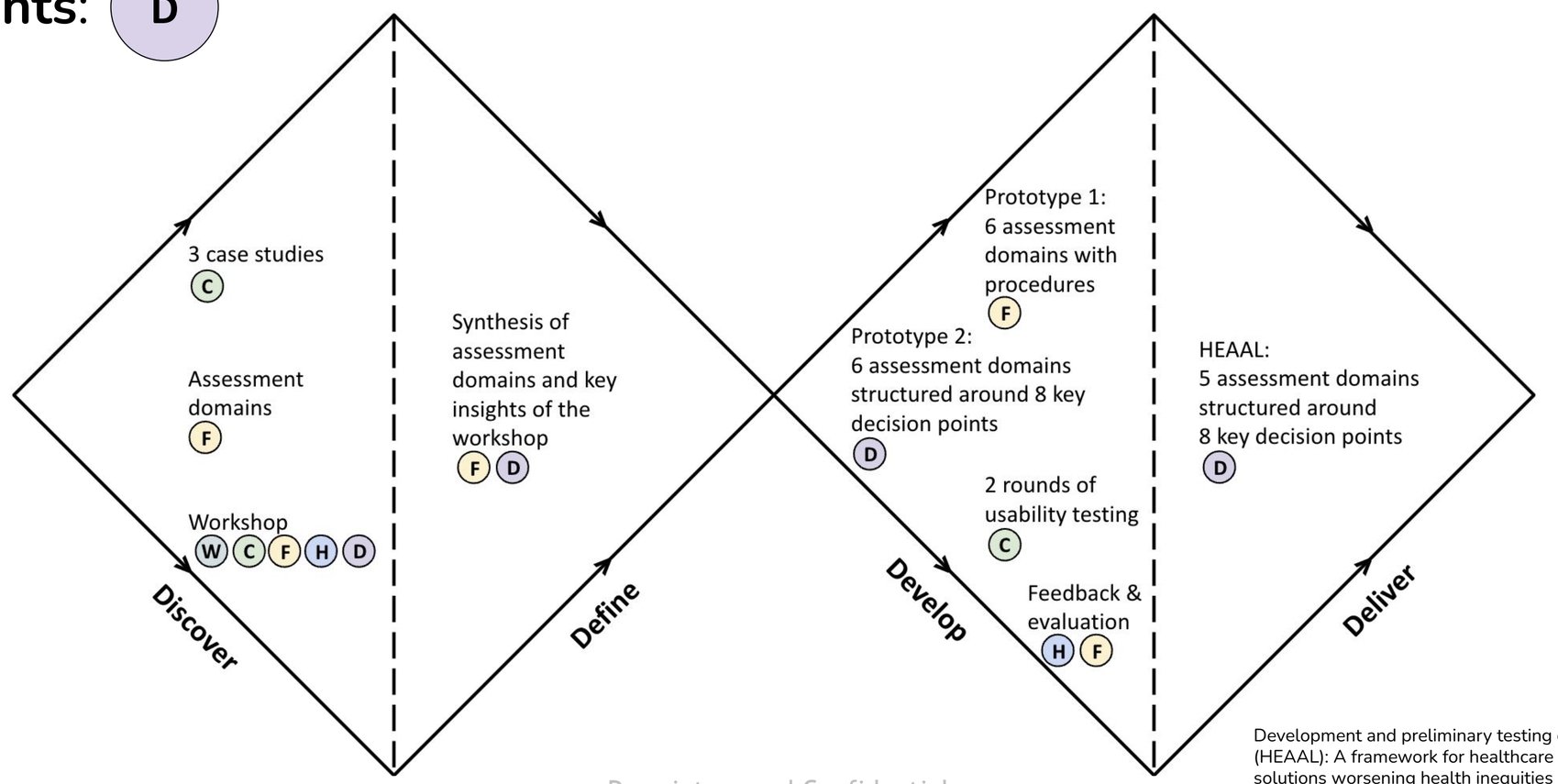
- **Goal**: Develop and test prototypes of the framework
- **Participants**: F D C H
- **Method**: Usability testing





Deliver

- **Goal**: Incorporate feedback and finalize the framework for dissemination
- **Participants**: D



Development and preliminary testing of Health Equity Across the AI Lifecycle (HEAAL): A framework for healthcare delivery organizations to mitigate the risk of AI solutions worsening health inequities

Results: HEAAL

Problem identification and procurement		Development and adaptation		Clinical integration	Lifecycle management	
1. Identify and prioritize a problem	**2.** Define AI product scope and intended use	**3.** Develop success measures	**4.** Design AI solution workflow	**5.** Generate evidence of safety, efficacy, and equity	**6.** Execute AI solution rollout	**7.** Monitor the AI solution	**8.** Update or decommission the AI solution
S, O, C, P	S, O, C, T, R, P	S, O, C	S, O, C, R, P	O, C, T, P	O, C, T, R, P	O, T, P	O, C, T, P
Flag for inequitably prioritized problem. Then, identify disadvantaged patient subgroups.	Flag for representation bias. + *For existing solution:* Flag for representation bias, label choice bias, measurement bias, and hidden stratification. Then, compare model performance across all patient subgroups and flag concerns.	Establish equity objectives and fairness metrics.	Flag for insufficient engagement from end users and members of disadvantaged patient subgroups, and a lack of inclusivity in the solution design.	Flag for missing data. Compare model performance across all patient subgroups and flag model performance not aligning with equity objectives and fairness metrics. + *For new solution:* Flag for representation bias, label choice bias, measurement bias, and hidden stratification.	Operationalize the communication plan, flag for potential user bias, and gather user feedback.	Flag for health inequities and monitoring outcomes not aligning with equity objectives and fairness metrics.	Make decisions regarding updating, decommissioning, or expanding the solution.

Domains of assessment
- Accountability
- Fairness
- Fitness for purpose
- Reliability and validity
- Transparency

Stakeholders
- S: Strategic
- O: Operational
- C: Clinical
- T: Technical
- R: Regulatory
- P: Patient

Data sources
- Local healthcare retrospective data
- Local healthcare prospective data
- Local non-healthcare data
- Training data
- Literature review
- Organizational data
- Qualitative data

Results: HEAAL

- An initial attempt to address the concern of assessing the impact of AI on health inequity through a comprehensive list of step-by-step procedures.
- Community generated, capturing diverse perspectives from an interdisciplinary team.
- Practical, grounded on real-world examples.

Adoption stage	Decision point	Equity goals	Procedures
Problem identification and procurement	1. Identify and prioritize a problem	Fitness for purpose	a. Ensure that problems are prioritized and funded equally across all patient subgroups. b. Determine whether there are patient populations for whom a solution to the prioritized problem should not be used, should be used differently, or whose experience with the system should be closely monitored.
	2. Define AI product scope and intended use	Reliability and validity, Fairness	a. List alternative solutions for the problem, including non-technical interventions and other non-AI technical interventions. b. Define an ideal label for model development. c. Seek an approval from an institutional review board, ethical review board, or research ethics board to access and use local healthcare retrospective data. d. Assess health inequities present in the local healthcare retrospective data and identify disadvantaged patient subgroups within the context of the prioritized problem. e. Examine whether a local healthcare retrospective data set is representative of demographic representation of local non-healthcare data. f. Assess health inequities present in the model training data and identify disadvantaged patient subgroups within the context of the prioritized problem. g. Examine whether the model training data is representative of the demographics present within the local healthcare retrospective data. h. Analyze label choice bias across disadvantaged and advantaged patient subgroups. i. Ensure that the model features are relevant to its actual label and capture the same meanings across disadvantaged and advantaged patient subgroups. j. Identify potential hidden stratification that masks unequal model performance between disadvantaged and advantaged patient subgroups. k. Gather model performance data and compare it between disadvantaged and advantaged patient subgroups. l. Determine which SDOH and demographic data are appropriate to be included in the model to minimize potential risk of worsening health inequities.

Kim JY, Hasan A, Kellogg K, Ratliff W, Murray S, Suresh H, Valladares A, Shaw K, Tobey D, Vidal DE, Lifson MA. Development and preliminary testing of Health Equity Across the AI Lifecycle (HEAAL): A framework for healthcare delivery organizations to mitigate the risk of AI solutions worsening health inequities. medRxiv. 2023 Oct 16:2023-10.

Results: Procedures

- Detailed step-by-step procedures to conduct in each key decision point
- Procedures tailored to an existing and a new AI solution

Key Decision Point	# of procedures	
	existing AI solution	new AI solution
1. Identify and prioritize a problem	2	
2. Define AI product scope and intended use	13	5
3. Develop success measures	2	
4. Design AI solution workflow	4	
5. Generate evidence of safety, efficacy, and equity	6	11
6. Execute AI solution rollout	4	
7. Monitor the AI solution	3	
8. Update or decommission the AI solution	3	
Total	37	34

Results: Five assessment domains

- 5 assessment domains evaluated across the span of 8 key decision points of AI adoption process

Assessment Domain	Definition
Accountability	Holds individuals, organizations, or systems responsible for their actions, decisions, and outcomes of the proposed AI solution
Fairness	Treats individuals or groups equally without bias in the procurement, development, integration, and maintenance of the proposed AI solution
Fitness for purpose	Ensures that the proposed AI solution is appropriate for solving the identified problem posed by the intended use
Reliability and validity	Ensures that the proposed AI solution achieves pre-specified performance targets across technical, clinical, and process measures consistently and accurately
Transparency	Explains clearly and openly how the proposed AI solution is developed, integrated, and maintained

Results: Key stakeholders

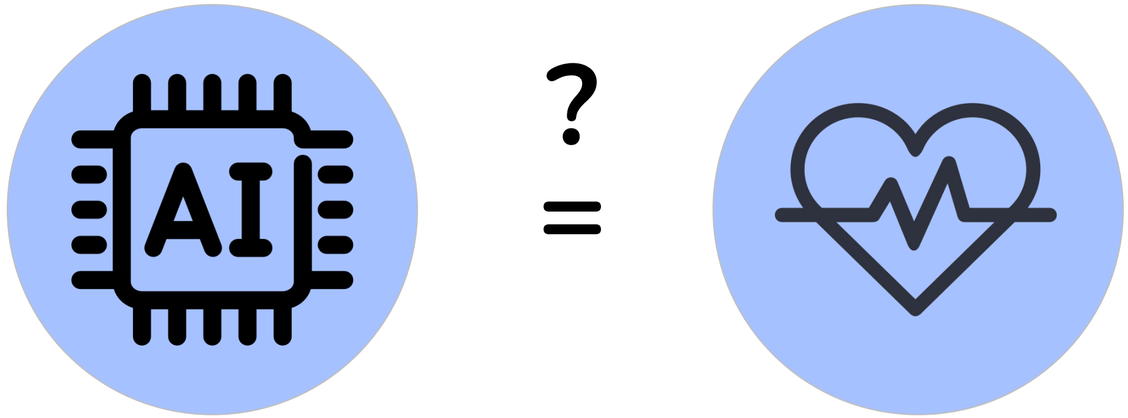
Stakeholder Type	Definition
Strategic (S)	Stakeholders who develop strategic plans and make decisions that align with organizational interests
Operational (O)	Stakeholders who manage workflow and make decisions to integrate
Clinical (C)	Stakeholders who provide clinical care to patients
Technical (T)	Stakeholders who develop the model and its infrastructure
Regulatory (R)	Stakeholders who review the model from regulatory and ethical perspectives
Patient (P)	Stakeholders who receive clinical care and provide insights on their community experiences
Clinical champion	Clinical stakeholders who lead the project and provide clinical expertise in model development
Project manager	Stakeholders who manage the project and communicate with various stakeholders involved in the project

Results: Data sources

Data Source	Definition
Local healthcare retrospective data	Historical healthcare data that is curated within the primary healthcare delivery organization seeking to adopt an AI product.
Local healthcare prospective data	Real-time healthcare data that is curated within the primary healthcare delivery organization seeking to adopt an AI product.
Local non-healthcare data	Non-healthcare data that is curated within a geographic setting where a healthcare delivery organization is based. The local non-healthcare data can be derived from a variety of external sources, including US Census.
Training data	Data used for training a model.
Literature review	Data collected through reviewing previously published scholarly works on a specific topic.
Qualitative data	Data collected through qualitative research methods, including surveys, focus groups, and interviews.

Results: Algorithmic fairness and health equity

- Procedures for the AI model
- Procedures for the implementation context
- Algorithmic fairness and health equity may not align.

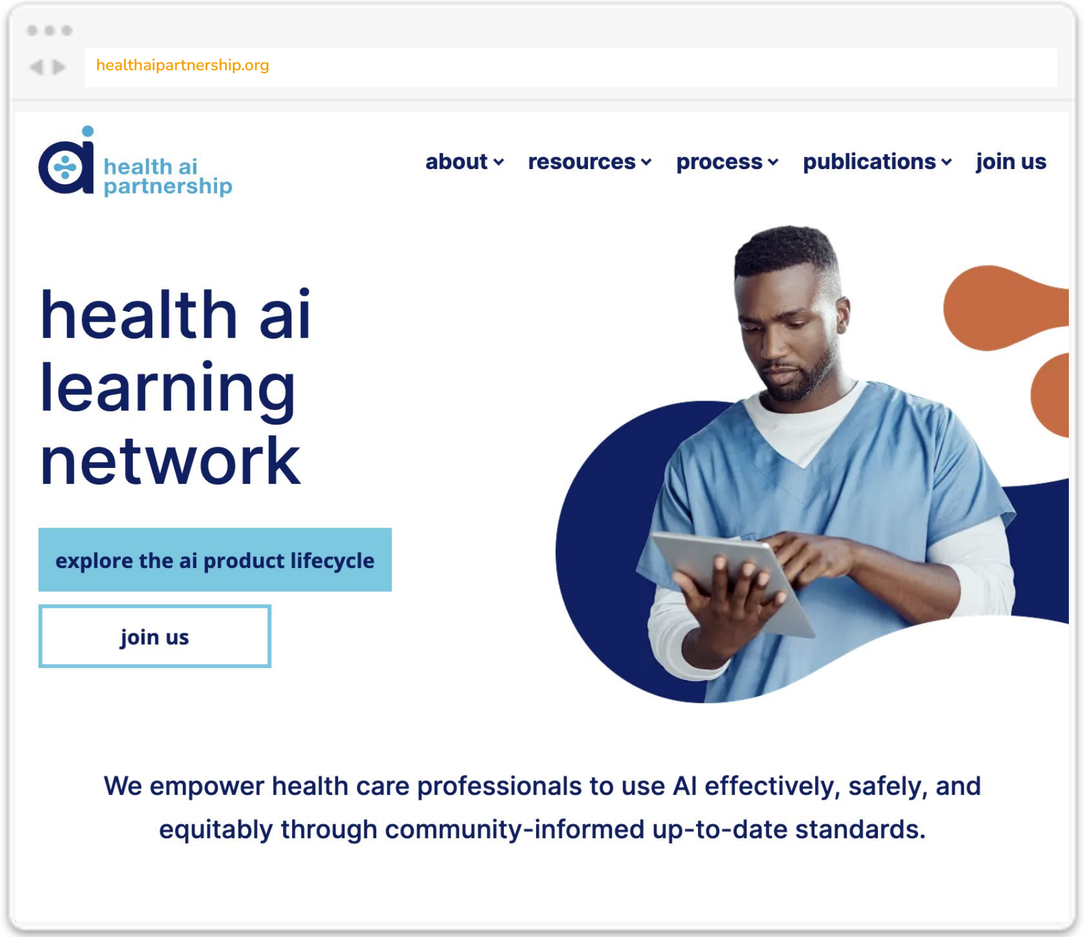


Takeaways: Implications for practice

- HEAAL is applied in a context-specific fashion that is not easily scalable.
- Successful implementation of HEAAL requires significant expertise, technology infrastructure, and personnel effort.
- Applying a tool like HEAAL must be accounted for in reimbursement for medical AI.
- There is concern that HEAAL can serve as a ‘rubber stamp’ for healthcare organizations to outwardly project commitment to equity while minimizing changes to organizational practices.

Future direction

- HEAAL is currently undergoing peer review for publication and will be accessible on the HAIP website.
- Continue developing content related to AI best practices
- Expand participation and adoption



Engage with our community of practice!

health ai partnership

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Website healthaipartnership.org

Thank you

- Gordon and Betty Moore Foundation
- Health AI Partnership leadership team
- Framework developers
- Case study presenters
- DIHI data scientists
- Interview participants
- Workshop participants

- Suresh Balu
- Freya Gulamali
- Jeffry Hogg
- Joanne Kim
- Claire Carroll
- Shira Zilbersteini

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