



Transformational AI Opportunities in Healthcare

David C. Rhew, M.D.
Global Chief Medical Officer & VP Healthcare





HHS AI Strategic Plan

Draft; Expected to be published in January 2025

Goal 1: Encourage health AI innovation and adoption

Goal 2: Promote Trustworthy AI Development and Ethical and Responsible Use

Goal 3: Democratize AI Technologies and Resources

Goal 4: Cultivate AI Empowered Workforces and Organizational Cultures

Agenda

Health AI Innovation

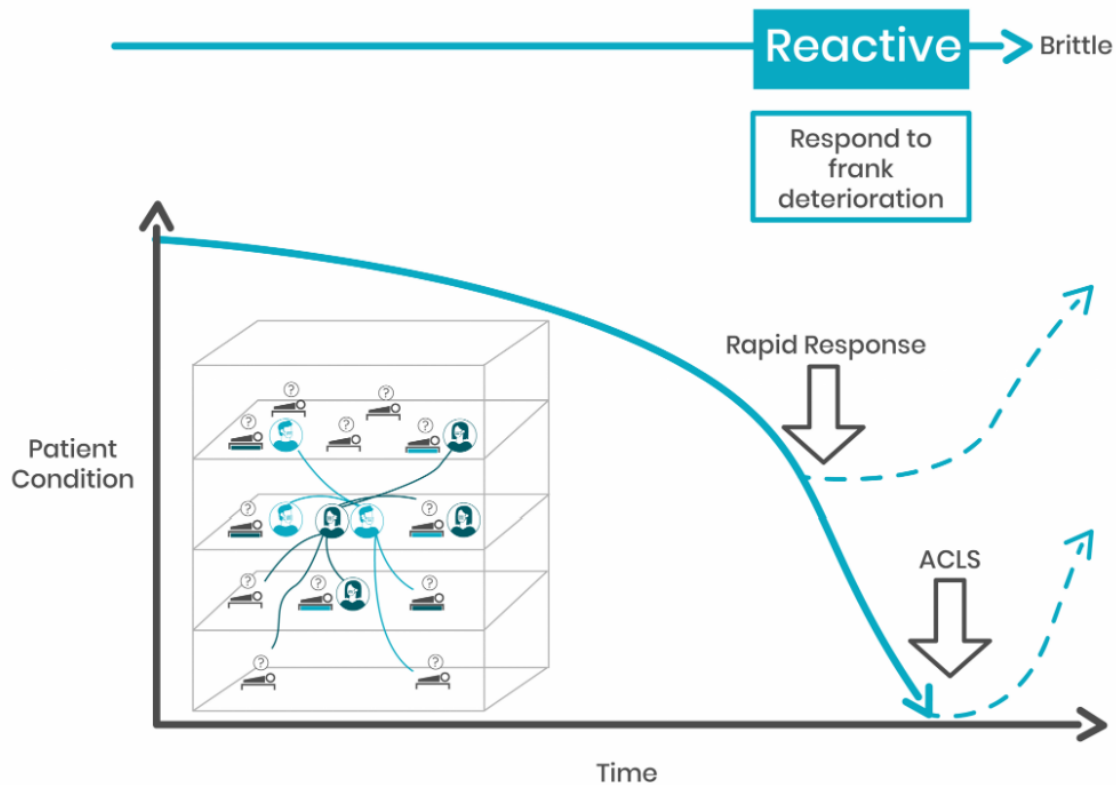
Trustworthy AI

Democratize AI

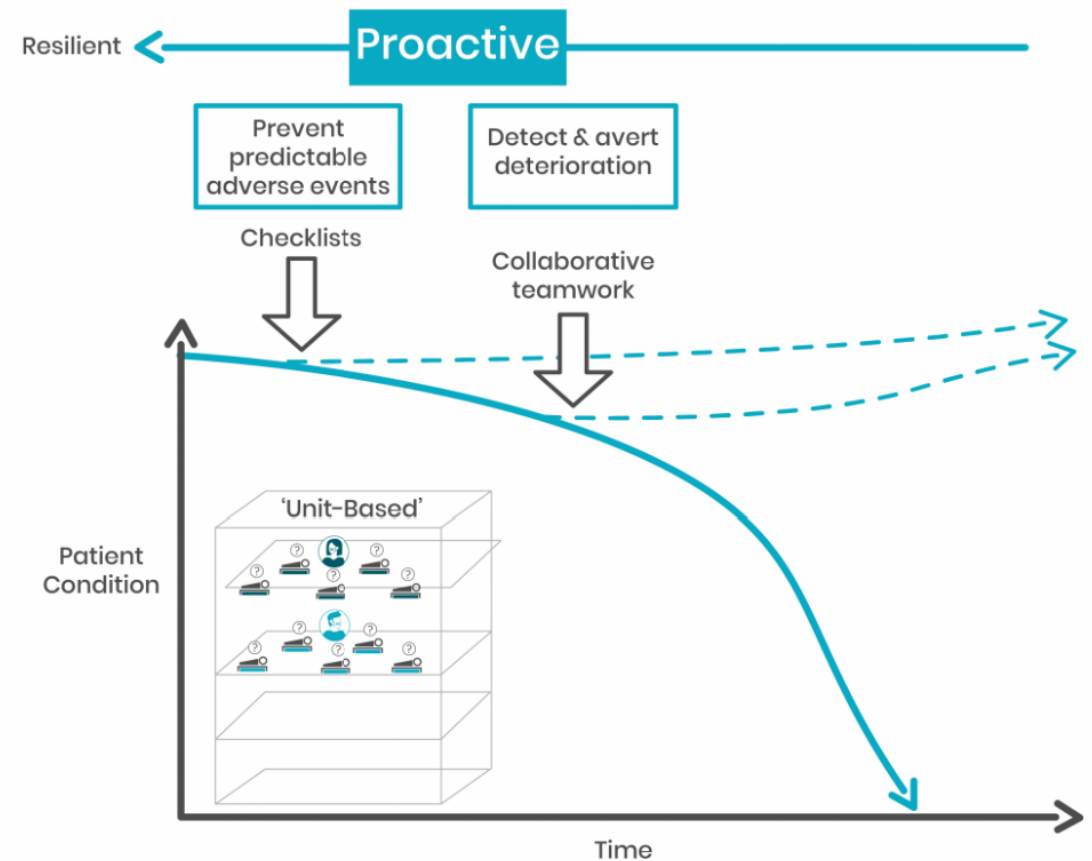
AI Empowered Workforce

Reactive to Proactive Care

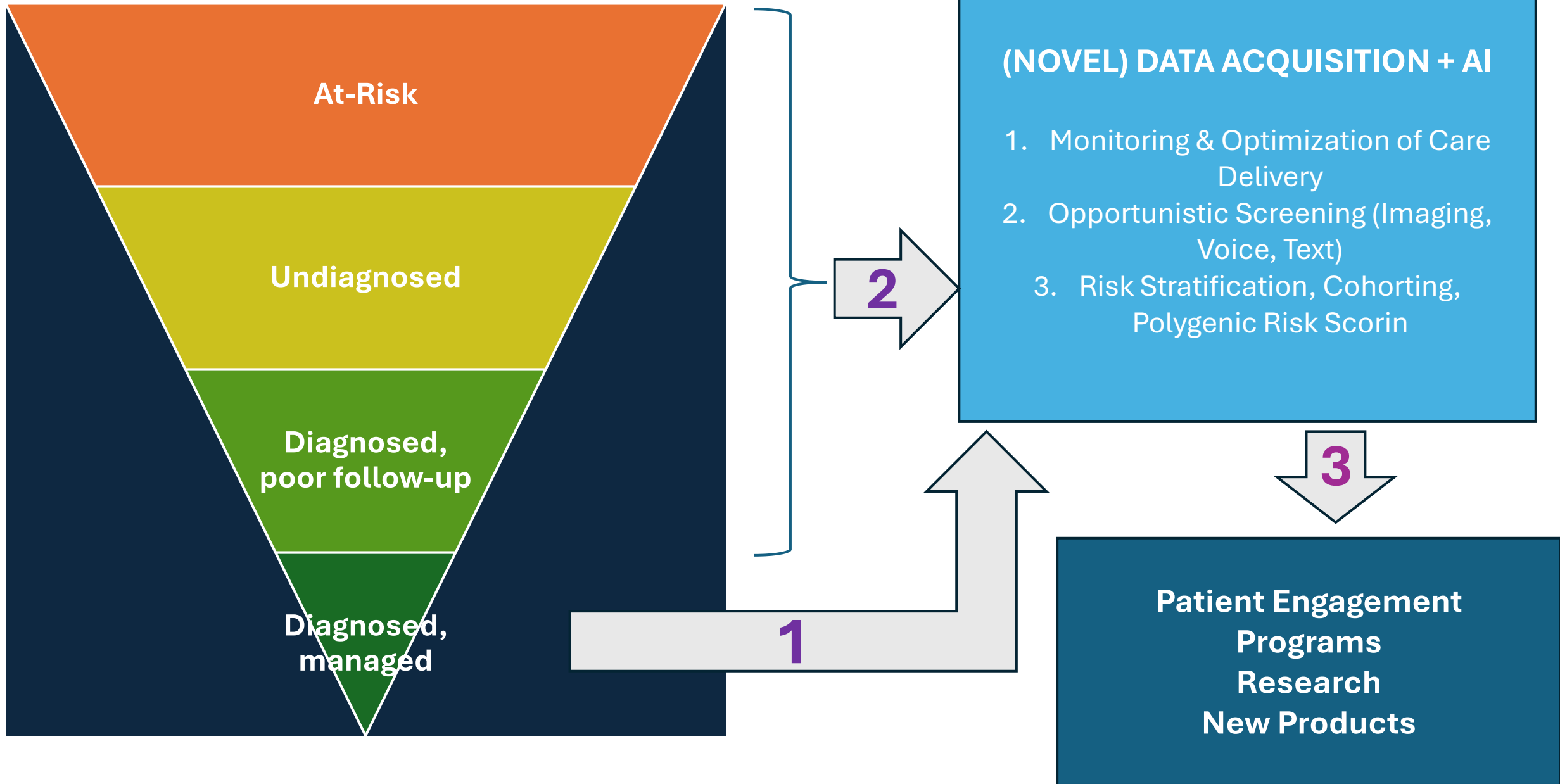
Reactive Care



Proactive Care



Proposed Approach



Screening with AI-powered Healthcare From The Eye

CURRENT SCREENING ENVIRONMENT



DIABETES

Blood test (FPG, A1C) + body measures



CARDIOVASCULAR DISEASES

Blood test + ECG/CT



NEUROLOGICAL DISEASES

MRI, PET, spinal fluid analysis



EYE DISEASES

Slit lamp biomicroscopy



HEALTHCARE FROM THE EYE

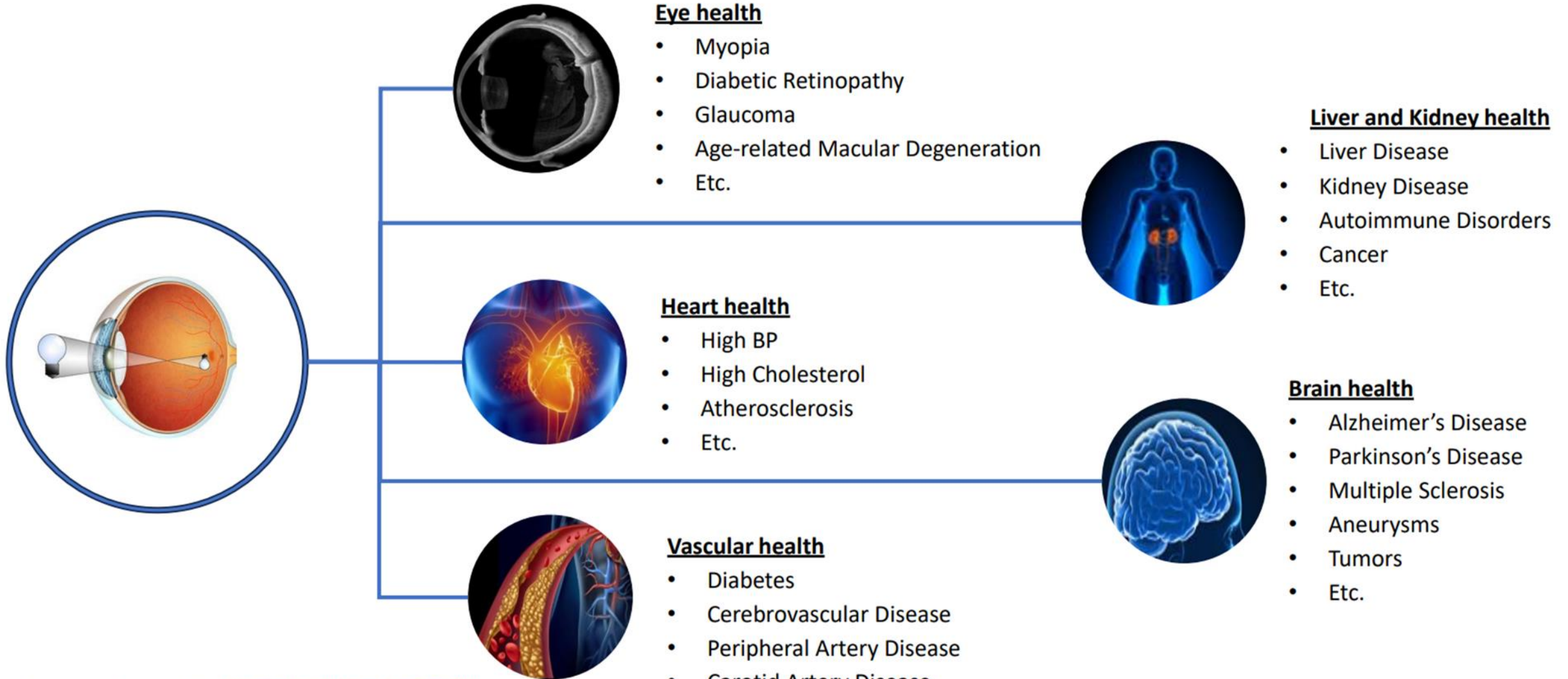
**Robotic, rapid, accessible, and
affordable eye test**



AI-powered risk calculators



Healthcare Through The Eye



- The eye as a window to rare endocrine disorder: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3354836/>
- Eyes offer a window into Alzheimer's disease: <https://alz-journals.onlinelibrary.wiley.com/doi/10.1002/dad2.12181#pane-pcw-related>
- Beyond the Liver: Liver-Eye Communication in Clinical and Experimental Aspects <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8740136/>
- The eye and the heart: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3640200/>
- Cardiovascular Disease Risk Factors in US Adults with Vision Impairment: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9336192/>
- Ocular manifestations of Autoimmune disease: <https://www.aafp.org/pubs/afp/issues/2002/0915/p991.html>
- 20 Surprising Health Problems as Eye Exam Can Catch: <https://www.aao.org/eye-health/tips-prevention/surprising-health-conditions-eye-exam-detects>

Success Stories Across Healthcare and Life Sciences

01

Discovery of Miscoded Lung Cancer Patients

- ▶ **296%** more patients found compared to ICD codes;
- ▶ **88%** - Sensitivity
- ▶ **87%** - Precision

02

Discovery of Miscoded Ovarian Cancer Patients

- ▶ **179%** more patients found compared to ICD codes;
- ▶ **90%** - Sensitivity
- ▶ **82%** - Precision

03

Early Discovery of Cancer Patients with Cachexia

- ▶ Collaboration with **7 NHS Trusts**
- ▶ **522%** more patients found
- ▶ **50%** reduction in costs and **£1B savings**

04

Discovery of Lupus Nephritis & Severe SLE Patients (SLEDAI-2K $\geq$ 6) for Clinical Trials

- ▶ **71%** more LN and
- ▶ **2300%** more SLE patients found compared to ICD codes

05

Creation of High Quality Research Datasets for Measuring Health Inequity

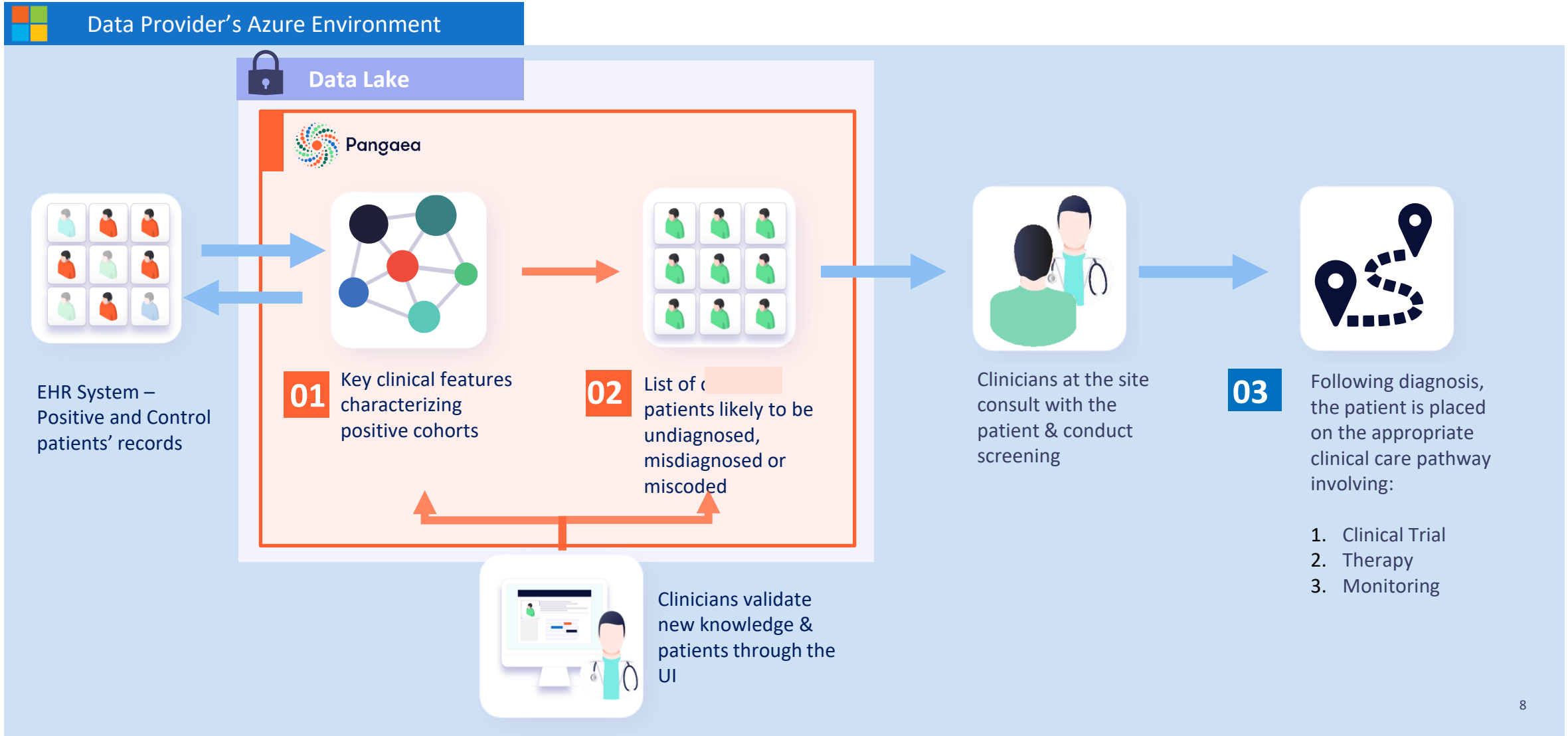
- ▶ Collaboration with **7 US Medical Centers**, Being
- ▶ scaled to **5M records**

06

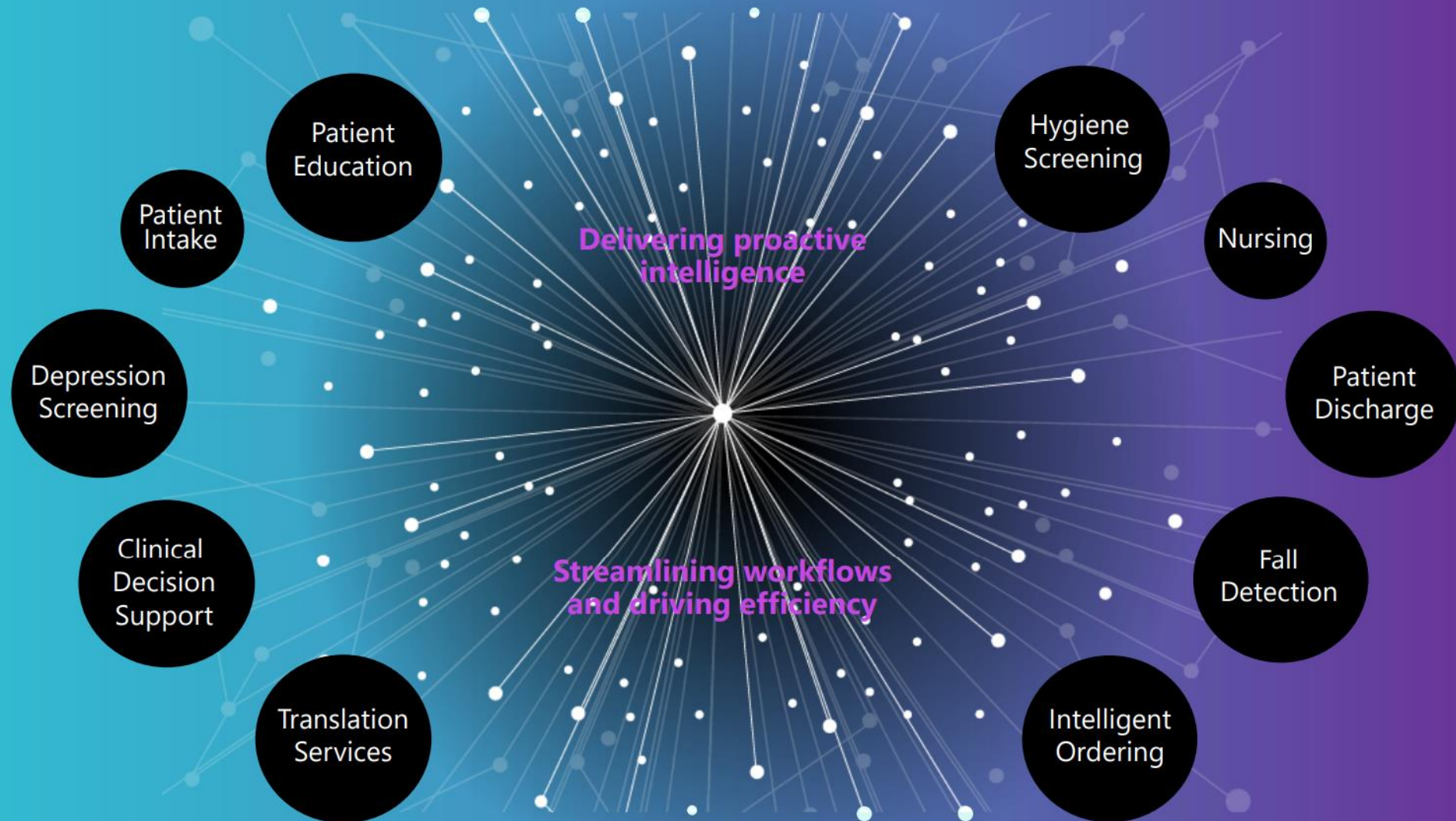
Summarization of Intelligence for Records and Pre-clinical Reports

- ▶ **90%** - accuracy & traceability
- ▶ **90%** - reduction in time and costs

Workflow Behind Patient Characterization



DAX: Providing an AI ecosystem of Co-Pilot Capabilities*



Nuance DAX Audio Meets the Benchmark for Vocal Biomarker Analysis

In partnership with Intermountain Health, a 33-hospital system in the Mountain West spanning 7 states, the Canary Speech research team analyzed Nuance DAX audio and successfully processed the data with vocal biomarker analytical models for confirmation of symbiotic relationship.

GAD-7 Scoring (standard cutoffs)			
Score	Category	Screening	Canary Vocal Category
0-4	Minimal	No Generalized Anxiety Disorder (GAD)	Low
5-9	Mild		Medium
10-14	Moderate	Generalized Anxiety Disorder (GAD)	High
15-21	Severe		

PHQ-8/9 Scoring (standard cutoffs)			
Score	Category	Screening	Canary Vocal Category
0-4	None / Minimal	No Major Depressive Disorder (MDD)	Low
5-9	Mild		Medium
10-14	Moderate	Major Depressive Disorder (MDD)	High
15-19	Moderately Severe		
20-27	Severe		

Results

Audio #	Role	Vocal Anxiety	Vocal Depression	Vocal Energy (Power)	Vocal Energy (Speed)	Vocal Energy (Dynamics)	Canary Wellness
1	patient	high	high	14.56	52.11	66.69	44.97
2	patient	low	medium	37.16	31.36	56.11	74.85
3	patient	low	low	70.69	47.85	47.48	89.36
4	patient	medium	high	17.5	63.84	63.6	49.3
5	patient	high	medium	48.35	30.4	74.62	52.73
6	patient	low	medium	38.23	38.01	61.39	74.66
7	patient	low	high	40.71	51.1	67.51	70.34
8	patient	low	high	46.98	37.48	70.28	66.62
9	patient	low	medium	60.86	45.71	55.77	81.48
10	patient	low	medium	42	25.94	76.11	62.51
1	clinician	medium	low	36.31	51.36	67.57	74.44
2	clinician	low	medium	59.04	67.35	38.03	73.26
3	clinician	low	low	73.2	65.53	34.31	75.09
4	clinician	low	low	12.95	78.35	76.32	58.05
5	clinician	low	low	53.79	50.62	75.73	82.8
6	clinician	high	low	75.99	50.62	36.92	65.71
7	clinician	low	low	25.32	61.9	72.58	71.82
8	clinician	low	low	41.36	64.14	76.77	74.83
9	clinician	medium	low	35.07	26.41	86.57	53.65

BY THE NUMBERS: CLINICAL TRIALS AWARENESS



11%

OF SITES FAIL TO
ENROLL EVEN A
SINGLE PATIENT



37%

OF SITES DO
NOT MEET THEIR
ENROLLMENT
GOALS



40%

OF SURVEYED
ADULTS DON'T
UNDERSTAND
CLINICAL TRIALS

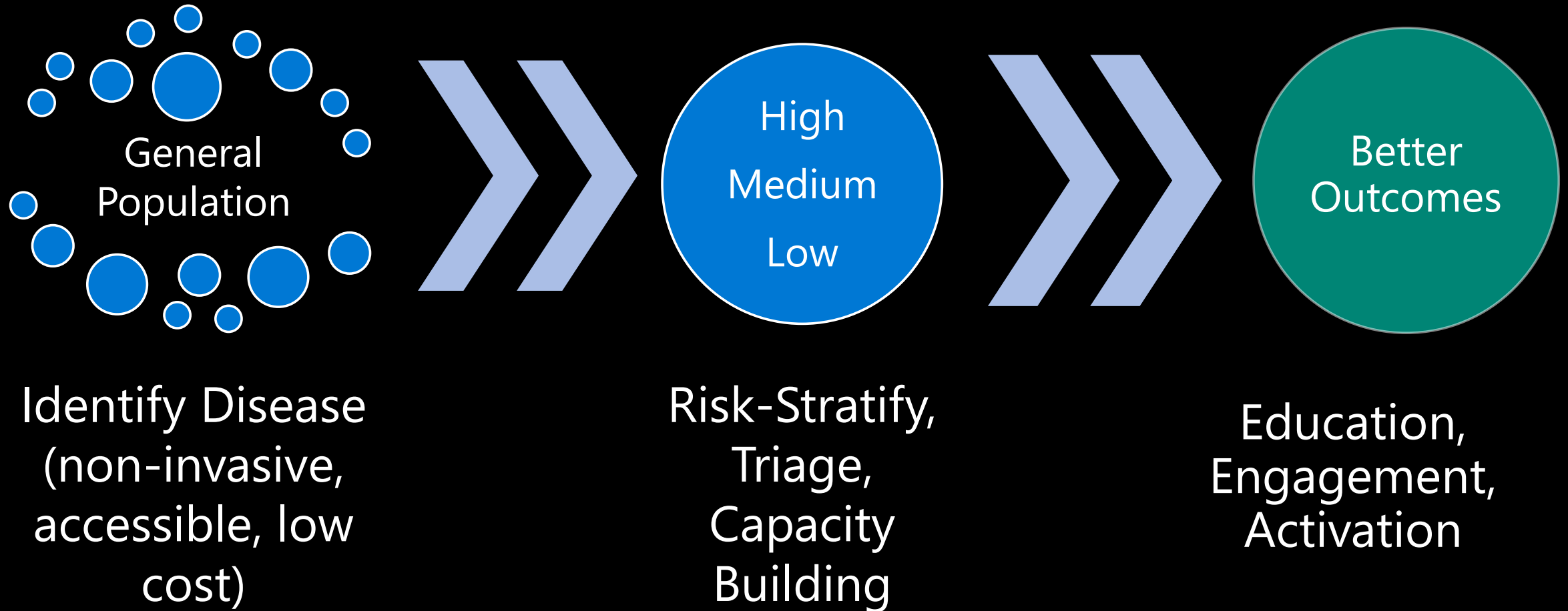


32%

OF SURVEYED
ADULTS SAY
THEY'D
CONSIDER
PARTICIPATING—
AFTER THEY
UNDERSTAND WHAT A
CLINICAL TRIAL IS

SOURCES: TUFTS CENTER FOR THE STUDY OF DRUG DEVELOPMENT [HTTP://CSDD.TUFTS.EDU/NEWS/COMPLETE_STORY/%20PR_IR_JAN-FEB_2013](http://CSDD.TUFTS.EDU/NEWS/COMPLETE_STORY/%20PR_IR_JAN-FEB_2013)
JOURNAL OF CLINICAL ONCOLOGY [HTTP://JCO.ASCOPUBS.ORG/CONTENT/21/5/830.SHORT](http://JCO.ASCOPUBS.ORG/CONTENT/21/5/830.SHORT)

Population Health & AI



AI Partner Ecosystem



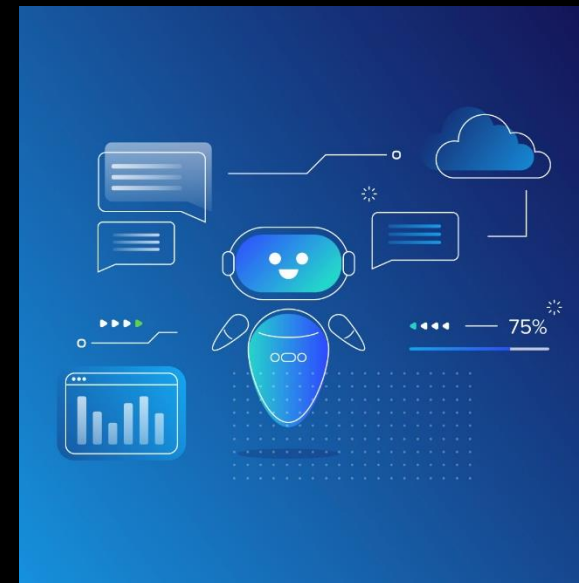
Early Identification

- Imaging
- Blood
- Patch
- EHR



Risk Stratification, Triage, Capacity Building

- Virtual Care
- Genomics



Patient Education, Engagement, Activation

- Nudging
- Chatbots



HHS AI Strategic Plan

Draft; Expected to be published in January 2025

Goal 1: Encourage health AI innovation and adoption

Goal 2: Promote Trustworthy AI Development and Ethical and Responsible Use

Goal 3: Democratize AI Technologies and Resources

Goal 4: Cultivate AI Empowered Workforces and Organizational Cultures

Agenda

Health AI Innovation

Trustworthy AI

Democratize AI

AI Empowered Workforce

U.S. TRAIN: Launched on March 11, 2024

New consortium of healthcare leaders announces formation of Trustworthy & Responsible AI Network (TRAIN), making safe and fair AI accessible to every healthcare organization

March 11, 2024 | Microsoft Source



ORLANDO, Fla. — March 11, 2024 — Monday, at the [HIMSS 2024 Global Health Conference](#), a new consortium of healthcare leaders announced the creation of the Trustworthy & Responsible AI Network (TRAIN), which aims to operationalize responsible AI principles to improve the quality, safety and trustworthiness of AI in health. Members of the network include AdventHealth, Advocate Health, Boston Children's Hospital, Cleveland Clinic, Duke Health, Johns Hopkins Medicine, Mass General Brigham, MedStar Health, Mercy, Mount Sinai Health System, Northwestern Medicine, Providence, Sharp HealthCare, University of Texas Southwestern Medical Center, University of Wisconsin School of Medicine and Public Health, Vanderbilt University Medical Center, and Microsoft as the technology enabling partner. Additionally, the network is collaborating with OCHIN, which serves a national network of community health organizations with solutions, expertise, clinical insights and tailored technologies, and TruBridge, a partner and conduit to community healthcare, to help ensure that every organization, regardless of resources, has access to TRAIN's benefits.

Europe TRAIN: Launched on June 16, 2024

Trustworthy and Responsible AI Network expands to help European healthcare organizations enhance the quality, safety and trustworthiness of AI in health

June 16, 2024 | Microsoft Source



GOAL: Efficiently* Operationalize RAI



Apply RAI
Technologies



Collaborate with
Health Systems



Test/Monitor with
Technology Partner
Support

* Reduce time, resources, & costs



Four Key Questions

01

REGISTRATION

Can you identify all the AI you have running in your organization today?

02

LOCAL TESTING

Are you testing the AI on your local data sets, both pre- and post-deployment?

03

BIAS ASSESSMENT

Are you assessing for bias in the AI, and what measures are you applying to mitigate the bias?

04

GOVERNANCE

Do you have a scalable governance process in place?

Diving into RAI Safety Systems



Application

- Confidential Sharing
- Human in the loop
- Monitoring clinical workflows



AI

- Explainability, provenance
- Monitoring
- Feedback



Data

- Bias, stereotyping
- Outside of cohort training data
- Privacy
- Security

- Response Cues & Alerts
- Content Safety Rules
- Clinical Relevance assertion
- Self Verification
- Coding/Guideline following
- Specialized summarization
- Explainability/Provenance
- Real-Time monitoring

Need for Standardized Implementations

FOCUS ON QUALITY

By Jane Metzger, Emily Welebob, David W. Bates, Stuart Lipsitz, and David C. Classen

Mixed Results In The Safety Performance Of Computerized Physician Order Entry

DOI: 10.1377/hlthaff.2010.0160
HEALTH AFFAIRS 29,
NO. 4 (2010): 655-663
©2010 Project HOPE—
The People-to-People Health
Foundation, Inc.

ABSTRACT Computerized physician order entry is a required feature for hospitals seeking to demonstrate meaningful use of electronic medical record systems and qualify for federal financial incentives. A national sample of sixty-two hospitals voluntarily used a simulation tool designed to assess how well safety decision support worked when applied to medication orders in computerized order entry. The simulation detected only 53 percent of the medication orders that would have resulted in fatalities and 10–82 percent of the test orders that would have caused serious adverse drug events. It is important to ascertain whether actual implementations of computerized physician order entry are achieving goals such as improved patient safety.

Jane Metzger (jmetzger2@csc.com) is a principal researcher at CSC Healthcare in Waltham, Massachusetts.

Emily Welebob is an independent consultant in Indianapolis, Indiana.

David W. Bates is division chief for general internal medicine at Brigham and Women's Hospital in Boston, Massachusetts.

Stuart Lipsitz is a researcher at Brigham and Women's Hospital.

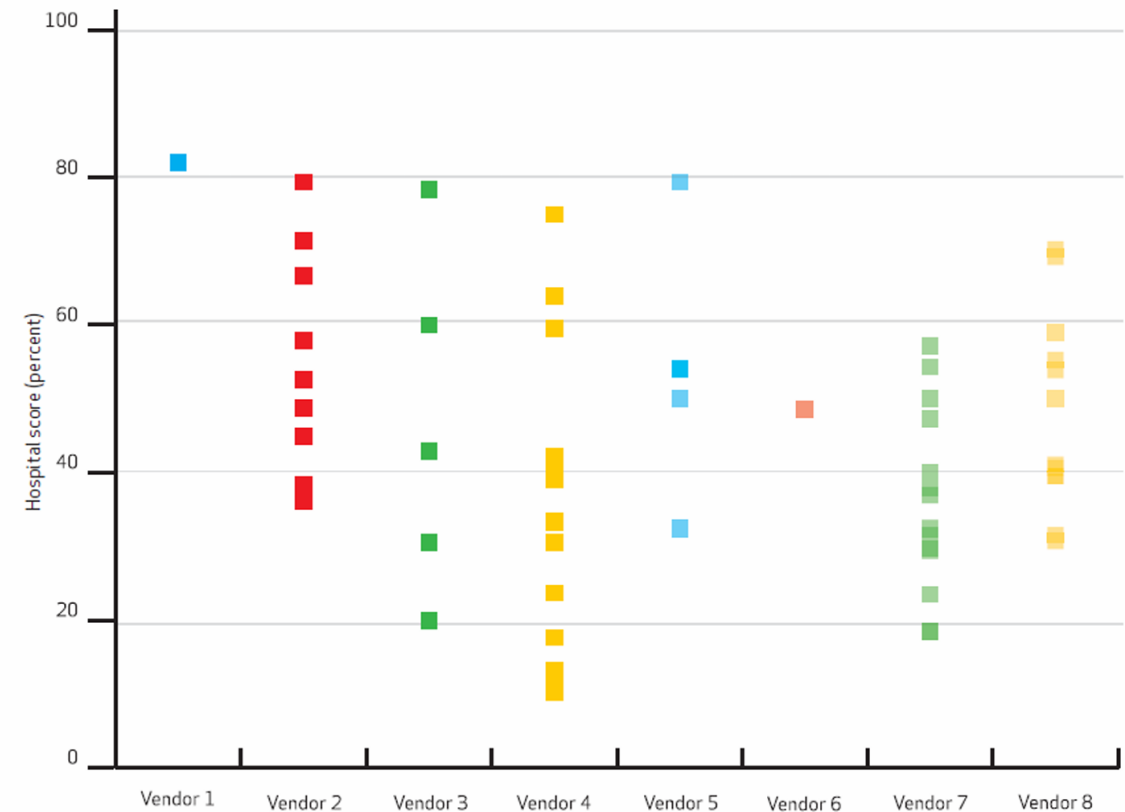
David C. Classen is an associate professor of medicine at the University of Utah in Salt Lake City, and is also with CSC Healthcare.

Many people have suggested that electronic health records represent essential infrastructure for the provision of safe health care in the United States. For several years, the Institute of Medicine, the Leapfrog Group, the National Quality

In this application of clinical decision support, physicians are made aware of potential safety issues that can result—for example, when ampicillin is given to a patient with a known allergy to penicillin, or the dose being ordered for a pediatric patient is much higher than the therapeutic range for a child of this age and weight. Prescrib-

EXHIBIT 2

Hospital Scores For Detection Of Test Orders That Would Cause An Adverse Drug Event In An Adult Patient According To The Software Product (Vendor) Implemented



Standardized Implementations

- Who receives the output from the AI?
- When do they receive it?
- How do they receive it?
- What happens next?



HHS AI Strategic Plan

Draft; Expected to be published in January 2025

Goal 1: Encourage health AI innovation and adoption

Goal 2: Promote Trustworthy AI Development and Ethical and Responsible Use

Goal 3: Democratize AI Technologies and Resources

Goal 4: Cultivate AI Empowered Workforces and Organizational Cultures

Agenda

Health AI Innovation

Trustworthy AI

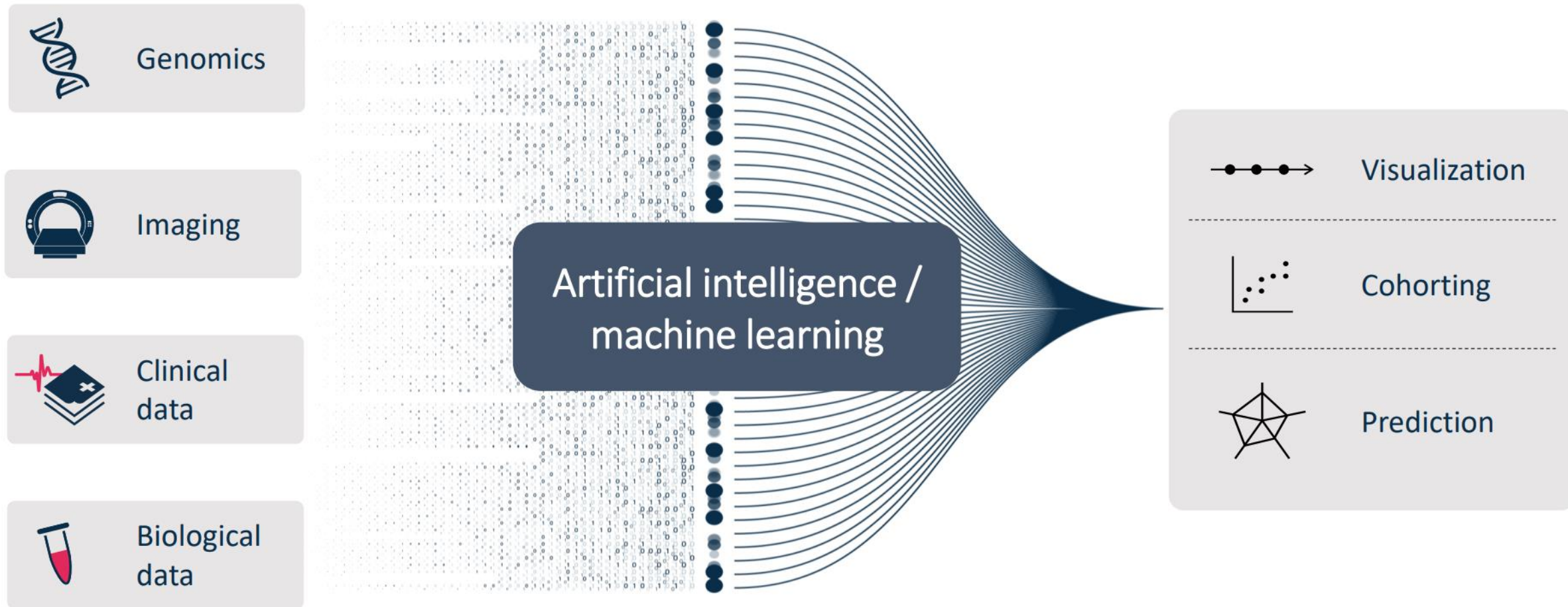
Democratize AI

AI Empowered Workforce



Multimodal data offers a stronger window

into human biology and disease



Adapted (Multimodal) AI Models

General Reasoner	Query	Ask question, perform task, generate reports				
Adaptors (fine tuned)	Connect/ Analyze	Detect disease across modalities				
Embedding Model (out of the box)	Sort/ Organize	Find similar images, post AI deployment data monitoring				



MAM



XRAY



PATH

Placeholder for text content

TEXT





Are there any signs of early-stage breast cancer or abnormalities



Prov-GigaPath

- Whole-slide pathology foundation model
- Pretrained on 1.3 billion 256×256 pathology image tiles in 171,189 whole slides from Providence (28 cancer centres, >30,000 patients covering 31 major tissue types)

RESULTS

- Superior Gene Mutation Prediction
- Superior Cancer Subtyping

nature

Explore content ▾

About the journal ▾

Publish with us ▾

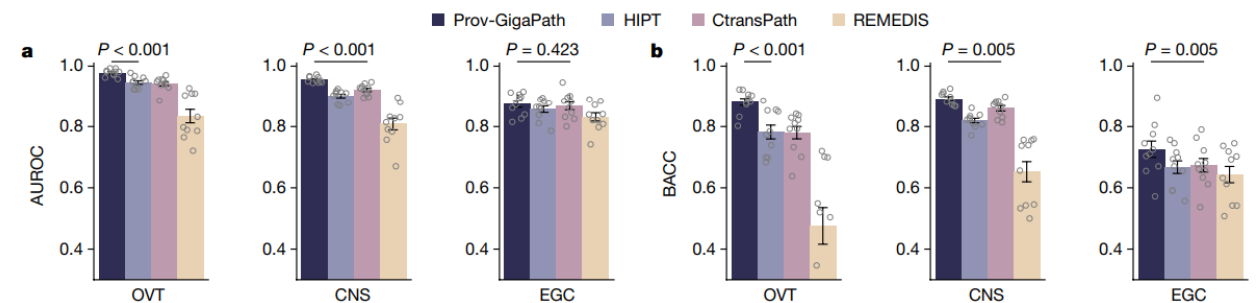
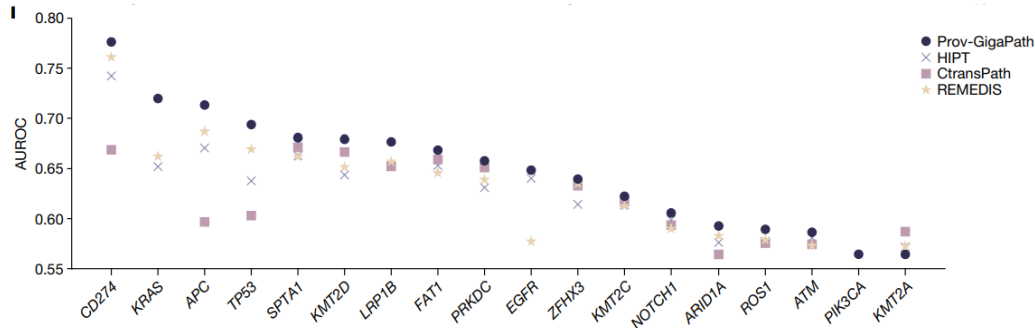
[nature](#) > [articles](#) > article

Article | [Open access](#) | Published: 22 May 2024

A whole-slide foundation model for digital pathology from real-world data

[Hanwen Xu](#), [Naoto Usuyama](#), [Jaspreet Bagga](#), [Sheng Zhang](#), [Rajesh Rao](#), [Tristan Naumann](#), [Cliff Wong](#), [Zelalem Gero](#), [Javier González](#), [Yu Gu](#), [Yanbo Xu](#), [Mu Wei](#), [Wenhui Wang](#), [Shuming Ma](#), [Furu Wei](#), [Jianwei Yang](#), [Chunyuan Li](#), [Jianfeng Gao](#), [Jaylen Rosemon](#), [Tucker Bower](#), [Soohee Lee](#), [Roshanthi Weerasinghe](#), [Bill J. Wright](#), [Ari Robicsek](#), ... [Hoifung Poon](#)  [+ Show authors](#)

[Nature](#) **630**, 181–188 (2024) | [Cite this article](#)



Rural Hospitals: Cloud, Cyber, AI Initiatives

 | [Source](#) [Our Company](#) [AI](#) [Innovation](#) [Digital Transformation](#) [Diversity & Inclusion](#)

Microsoft to help rural hospitals defend against rising cybersecurity attacks

June 10, 2024 | Microsoft Source



New program will address exponential growth in attacks threatening access to care for Americans and bring enterprise-quality cybersecurity to the most vulnerable rural hospitals

REDMOND, Wash. — June 10, 2024 — On Monday, Microsoft Corp. announced a new cybersecurity program to support hospitals serving more than 60 million people living in rural America. In 2023, the health care sector reported [more ransomware attacks than any other critical infrastructure sector](#), and attacks involving [ransomware against the healthcare sector were up nearly 130%](#). Cybersecurity attacks disrupt health care operations across the country and pose a direct threat to patient care and essential operations of hospitals. In rural communities these attacks can be devastating, particularly to smaller, independent Critical Access and Rural Emergency hospitals with limited means to prevent and remediate security risks and often the only healthcare option for many miles in the communities they serve.

According to the [National Rural Health Association](#), rural health clinics are one of the top targets for cyberattacks. The new Microsoft Cybersecurity Program for Rural Hospitals is designed to support the unique cybersecurity needs of these organizations and will deliver free and low-cost technology services for these hospitals, along with free training and support.

Rural Health AI Lab (RHAIL) Progress

RHAIL MVP #1: 835 Copilot

Problem

- Denied Insurance Claims cost healthcare providers \$20B annually, and the average small hospital spends \$330K annually to investigate and resolve

MVP

- The “835 Copilot” uses claims data, institutional knowledge and payer logic to surface recommendations to rectify a denied claim
- Deployed at 4 early adopter sites; 6 in flight

GTM

- Plan to make available on GitHub in Q3 FY '25
- Scale through key Market Partners by end of FY
- Ongoing measurement of impact KPIs

Impact

- Increased revenue for hospitals
- Claims specialist throughput and accuracy
- Storytelling re: hospital and payor efficiency

Rural Health Tech Highlights

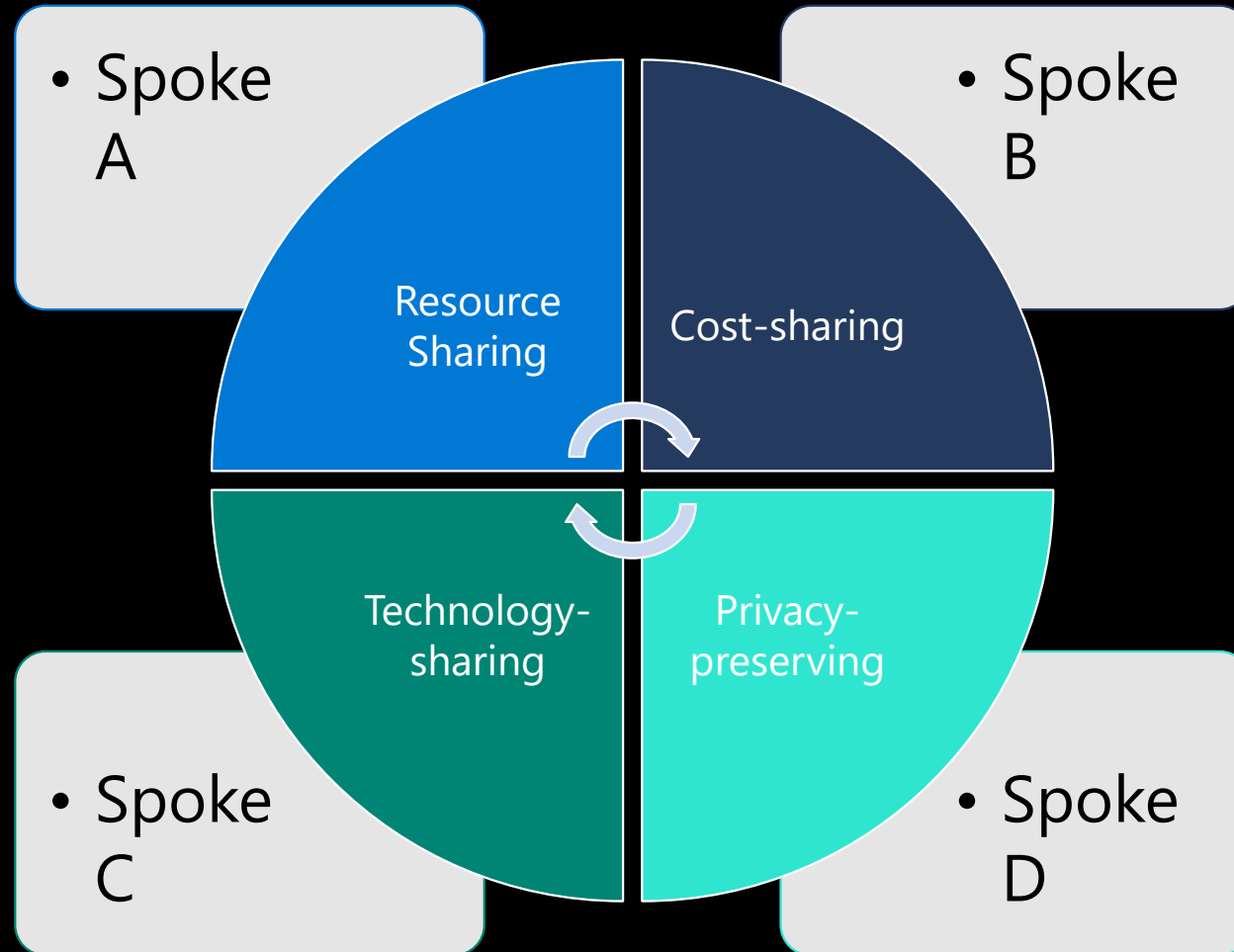
- **511 rural hospitals registered for the Cybersecurity Program YTD.**
 - 273 assessments completed
 - 48% of all eligible hospitals have accessed our nonprofit product offering (discounted licenses)
- **OneMicrosoft effort** - collaboration w/ HLS, SGA, and TechSpark to promote program
- **11 Depth Engagements** (MS-funded remediations) in flight; first case study in development
- **Skilling interest** outpacing anticipated demand
- **Two** story telling videos completed
- **Two** Rural Health AI Lab (“RHAIL”) projects in flight

KPI	FY Target	YTD Target	YTD Status
MS Program Registrations	800 36% of RHs	560	511
Cybersecurity Assessments Completed	600 30% of RHs	300	273
Rural Hospitals Purchasing Products through Nonprofit Pricing	365 50% of eligible RHs	183	233
Rural Hospitals Purchasing M365 E5 Security Offer	150 15% of RHs in a system	75	TBD – Program Team Partner Outreach Underway
Rural Hospitals who have “Taken Action” to become more secure*	720 33% of RHs	360	408
Skilling Sessions	1000 50% of RHs	665	719
Completed Storytelling	4	1	2
Rural Hospitals Using RHAIL 835 CoPilot (Insurance Denial Mgmt Tool)	10	5	4

* Unique hospitals

Health System Equity

"Hub & Spoke Model"



Confidential Compute

A *hardware root-of-trust*, *customer verifiable* with *remote attestation*, and *memory encryption*

EXISTING ENCRYPTION



Data at rest

Encrypt inactive data when stored in blob storage, database, etc.



Data in transit

Encrypt data that is flowing between untrusted public or private networks

CONFIDENTIAL COMPUTING



Data in use

Protect/encrypt data that is in use, while in RAM, and during computation

Value Proposition



Enforces Policies
through Technology



Ensures High-
Fidelity data



Protects Data & Model IP



HHS AI Strategic Plan

Draft; Expected to be published in January 2025

Goal 1: Encourage health AI innovation and adoption

Goal 2: Promote Trustworthy AI Development and Ethical and Responsible Use

Goal 3: Democratize AI Technologies and Resources

Goal 4: Cultivate AI Empowered Workforces and Organizational Cultures

Agenda

Health AI Innovation

Trustworthy AI

Democratize AI

AI Empowered Workforce

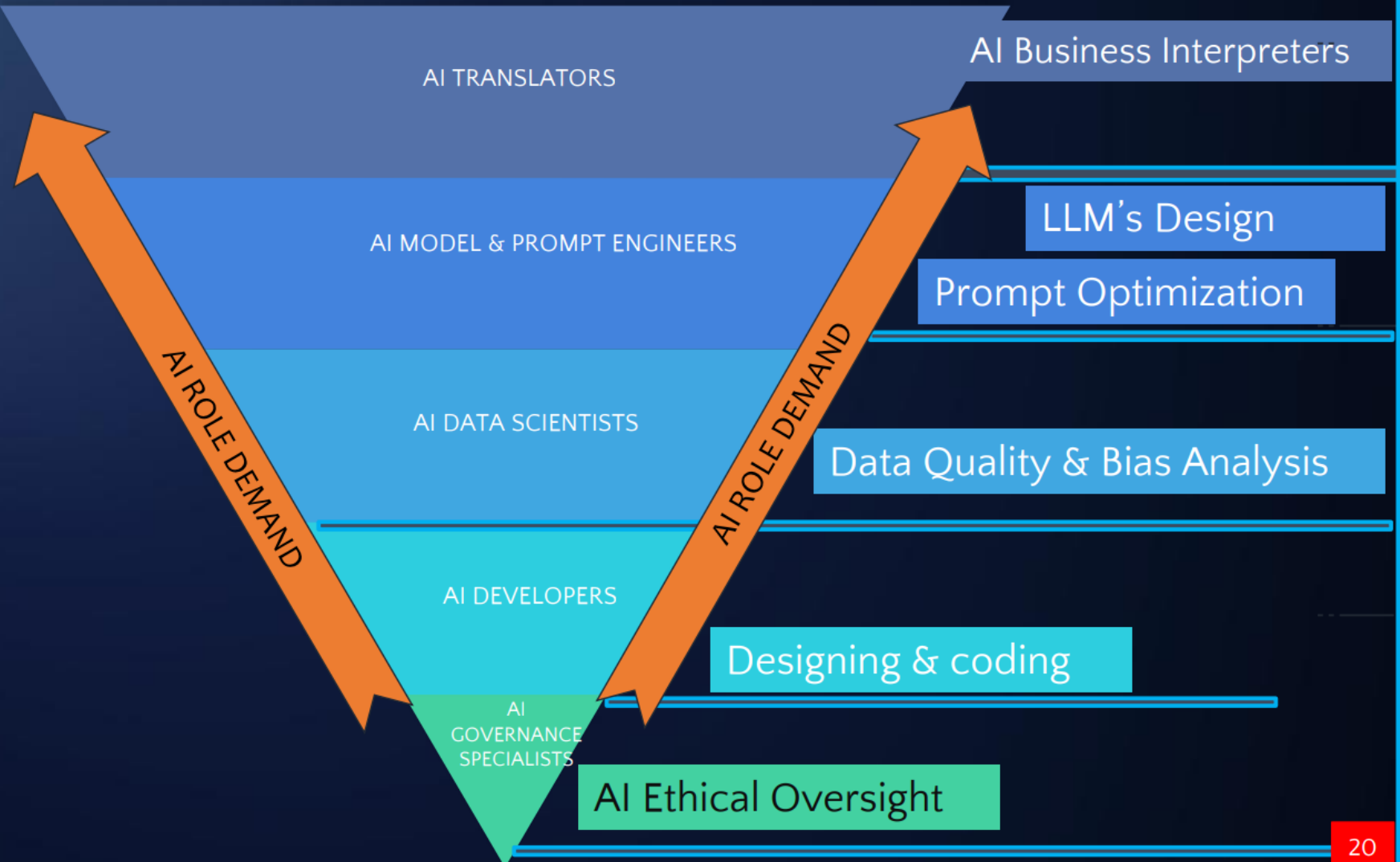
From Traditional to AI-Driven: Changing Career Landscapes

Jobs with the highest potential for automation

Occupations	Exposure
Credit Authorizers, Checkers and Clerks	88%
Management Analysts	76%
Telemarketers	87%
Statistical Assistants	74%
Tellers	93%
Forensic Science Technicians	60%
Receptionists and Information Clerks	69%
Brokerage Clerks	74%
Production, Planning and Expediting Clerks	72%
File Clerks	63%
Word Processors and Typists	63%
Bookkeeping, Accounting and Auditing Clerks	78%
Legal Secretaries and Administrative Assistants	77%
Loan Interviewers and Clerks	80%
Bill and Account Collectors	63%

LEGACY ROLES

Advanced AI Specialized Roles



AI Adoption Framework

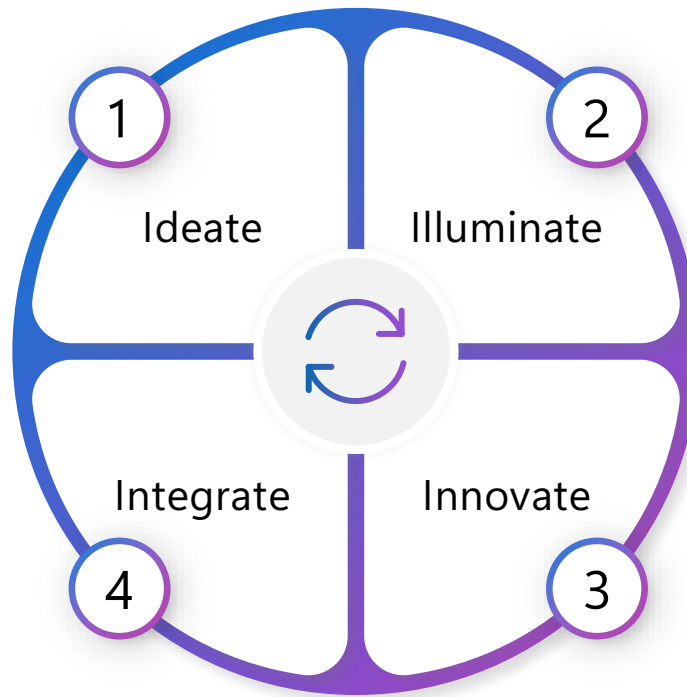
This framework has been used to help early-adopter institutions make progress on AI. The program framework for your institution may vary – what's important is to have a multi-faceted approach.

Inspire

Nurturing innovative minds and groundbreaking ideas.
Collaborating with universities to establish a robust AI ecosystem.

Scale and Release

Creating a more informed, efficient, and innovative society.
Leveraging Microsoft's cutting-edge technology and expertise.



Prompt-a-thon

Fostering creativity and development in the realm of AI.
Integrating advanced technology into educational programs.

Hack-a-thon

Building a future where technology and education merge seamlessly.
Enabling safe and effective AI interaction for students and faculty.

LEARNING

DOING

Thank You!

