INNOVATION & AI :

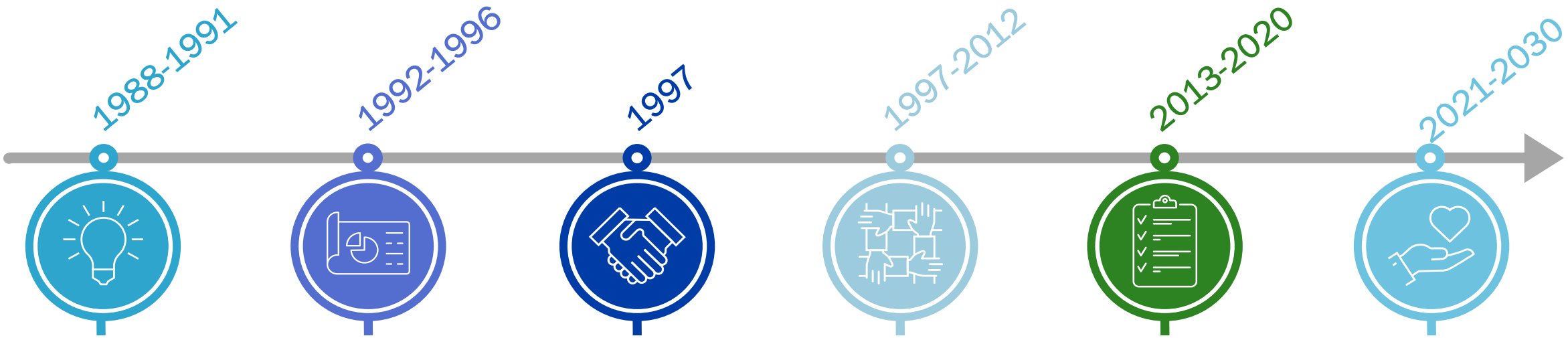
HOW NORTHWELL IS TRANSFORMING HEALTHCARE

Jill Kalman, MD
Executive Vice President
Chief Medical Officer
Deputy Physician-in-Chief
Northwell Health

Northwell Health

NORTHWELL'S HISTORY

THE JOURNEY | 1988-2030



Beginnings

Creation of the North Shore Health System

The big merger of North Shore and LIJ creating North Shore-LIJ Health System

Attaining "systemness" to create an integrated continuum of care

Building for sustainable success

Evolving into a diversified organization that treats illness and promotes health and wellness

GROWTH OF THE HEALTH SYSTEM

Northwell Health®

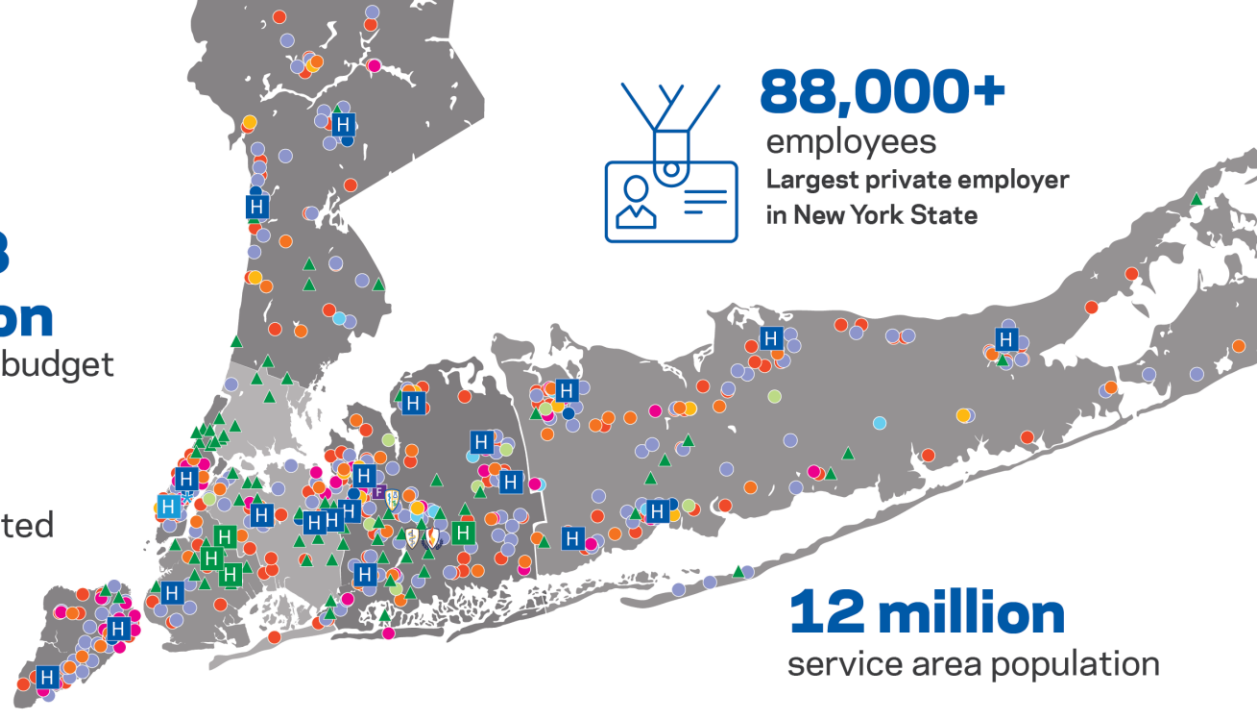
ECONOMIC IMPACT

$18.0 billion annual operating budget

$1.3 billion capital budget

21 hospitals } **11** magnet-designated

875+ ambulatory facilities



88,000+ employees
Largest private employer in New York State

12 million service area population

CAREGIVERS

12,000+ credentialed physicians

19,000+ nurses

5,800+ employed physicians
Largest Physician Group in the New York Area

2,000+ residents & fellows in 160 programs

4,000+ advanced care providers

5,550+ volunteers

OPERATING STATISTICS

5.5 million patients encounters
— 2 million patients treated annually

850,000+ emergency visits*

250,000+ ambulatory surgeries*

37,000+ births

1,000+ active clinical research studies

1 million home health visits

250+ principal investigators

*2022 budgeted

COMMUNITY IMPACT

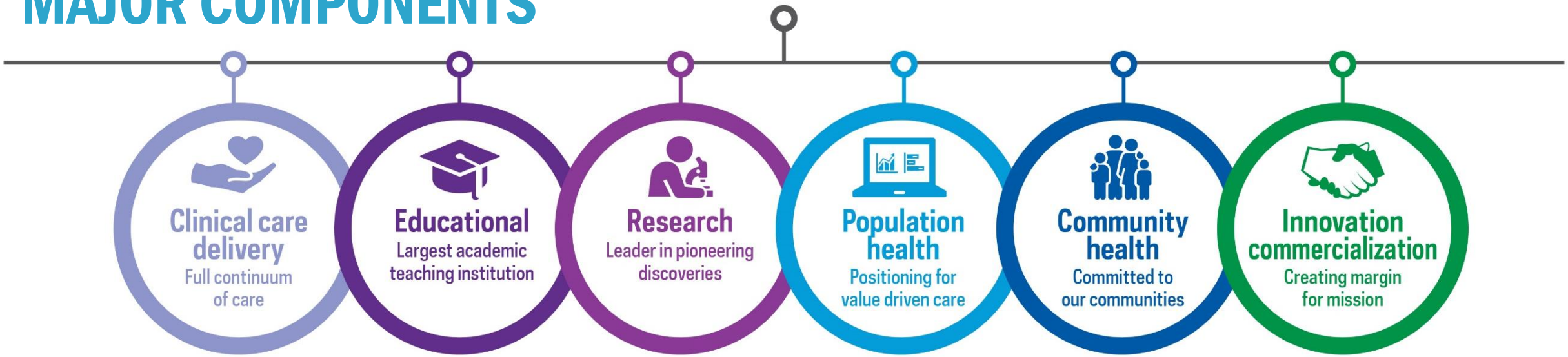
$485 million in education & research

$465 million in health improvement services & building

$221 million in charity care

WHO WE ARE TODAY

MAJOR COMPONENTS



- Inpatient facilities
- Ambulatory
- Long term/Rehab
- Home care
- Hospice
- Medical group
- Clinical joint ventures
- Medical transport
- Telehealth
- E-Health

- GME/CME
- Zucker School of Medicine
- Elmezzi Graduate School
- School of Nursing & Physician Assistants
- Center for Learning & Innovation
- Patient Safety Institute
- Bioskills Education Center

- Feinstein Institutes
  - Bioelectronic medicine
  - Health system science
  - Molecular medicine
  - Cancer research
  - Behavioral science

- Value based programs
- Accountable care analytics
- Transitional care management
- Complex care management
- Advanced illness management
- 24/7 clinical call center

- Community benefit
- Access and education programs
- Veterans programs
- Specialized children's programs
- Focus on social determinants of health
- Environmental, Social, and Governance (ESG)
- Center for Gun Violence Prevention

- Joint Ventures
- Northwell Direct
- Northwell Ventures/ Holdings
- True North Enterprises
- Flexstaff
- Data Intelligence
- Pharma ventures
- Consulting
- Partnerships
- New businesses

CENTER FOR LEARNING AND INNOVATION

Leadership Development

- Beginnings Orientation
- Leadership Development Programs
  - Executive Leadership Development
  - LeadNext
  - Administrative & Clinical High Potential
  - Leadership Essentials

Patient Safety Institute (PSI) & Clinical Skills Center

- Simulation Based Education
- Interprofessional Team Education
- Educator Development
- Educational Research
- Workflow Testing
- Formative & Summative Assessment
- Physical Exam & Communication Skills

Physician Leadership Institute

- Physician Beginnings Orientation
- Physician Leadership Development Program
- Department Specific Education
- Department Team Building
- Clinical Education at PSI
- Chief Resident Education
- Physician Administrative Fellowship

Scholar Pipeline

- Administrative Fellowship
- Domestic & International Internships
- Medical Scholars Pipeline
- Institute for Health Professions
- Northwell Health School Based Programs
  - SPARK Challenge
  - Healthcare Exploration

Emergency Medical Institute

- Paramedic Program
- Emergency Medical Technician (EMT) Program
- Hybrid Paramedic & EMT Recertification
- American Health Association Certification Courses
- Pre-hospital Continuing Medical Education
- EMT-CC to Paramedic BRIDGE Program
- EMS Difficult Airway Program

School of Nursing & PA Studies
Zucker School of Medicine

- Formative & Summative Assessment
- Clinical Skills Education
- Clinical Simulation
- Procedural Skills Education at Bioskills
- Educational Research
- Faculty Development

Bioskills Education Center

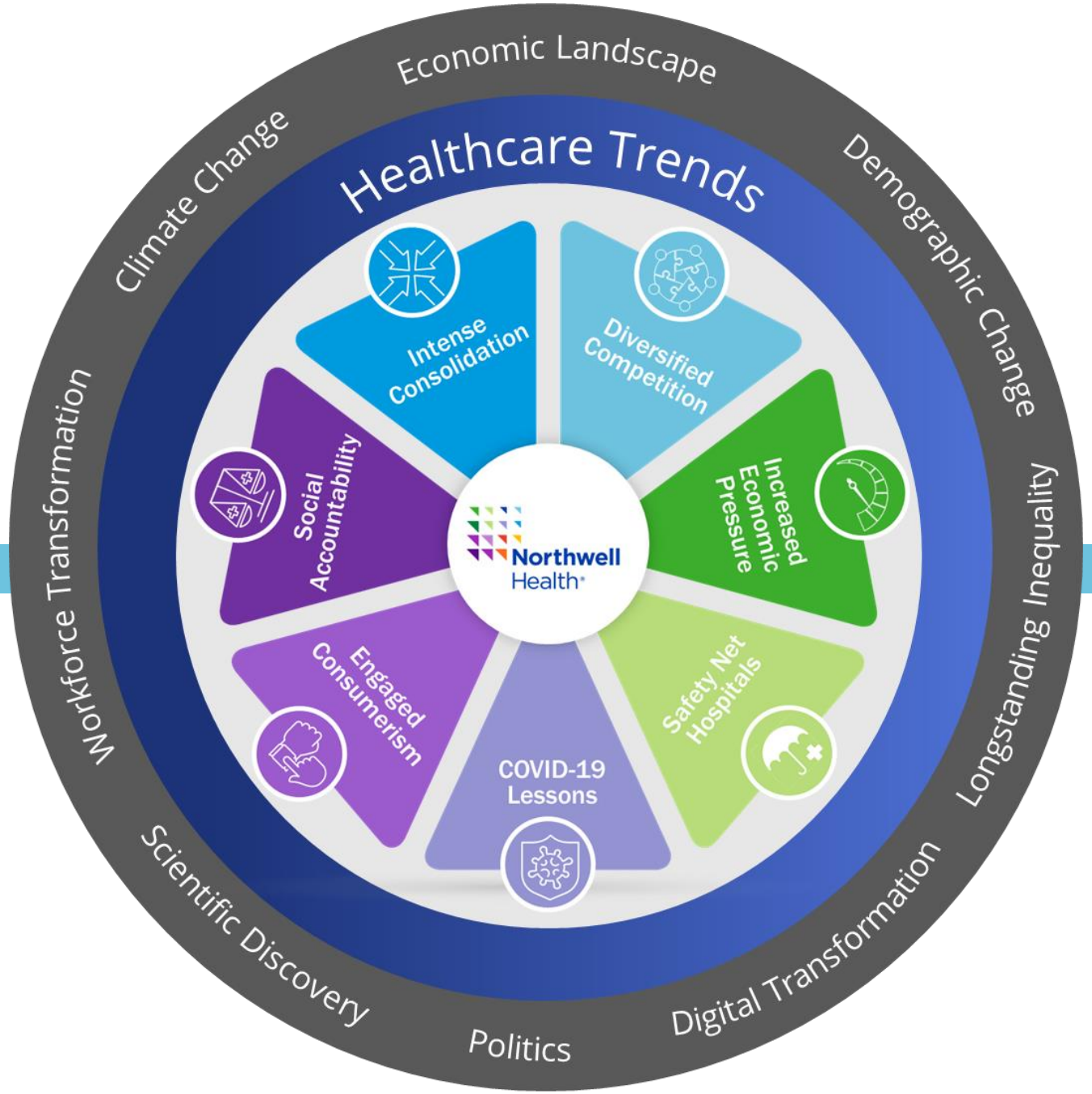
- Attending & Resident Physician Program
- Advanced Clinical Practice Fellowship Program
- Continuing Medical Education
- Hybrid Simulation
- daVinci Xi Robotics Surgical Training Center
- Vendor Sponsored Programs
- Military, FDNY & Law Enforcement Officers (LEO)

Clinical Transformation

- LEAN/Six Sigma Program
- Program/Project Management
- Large Scale Process Design/Redesign
- Clinical Collaborations
- Industrial Engineering
- Process Simulation & Optimization Modeling
- Implementation & Change Management

OUR STRATEGY

TRANSFORMATIVE FORCES:
SHAPING OUR STRATEGY



Northwell Health®
STRATEGIC PRIORITIES
Creating Life-Long Customer-Patient Loyalty
Enhancing Performance by Optimizing Technology
Broadening Our Mission: Going Upstream
Reimagining & Redesigning Care Delivery
Growth: Broadening Our Footprint & Impact
Accelerating the Advancement of Research, Discovery, & Innovation
Advancing Our Culture of Continuous Learning and Human Capital Investment
Business Diversification and Value Creation
Infrastructure Modernization
Marketing Our Brand

ENHANCING PERFORMANCE BY OPTIMIZING TECHNOLOGY

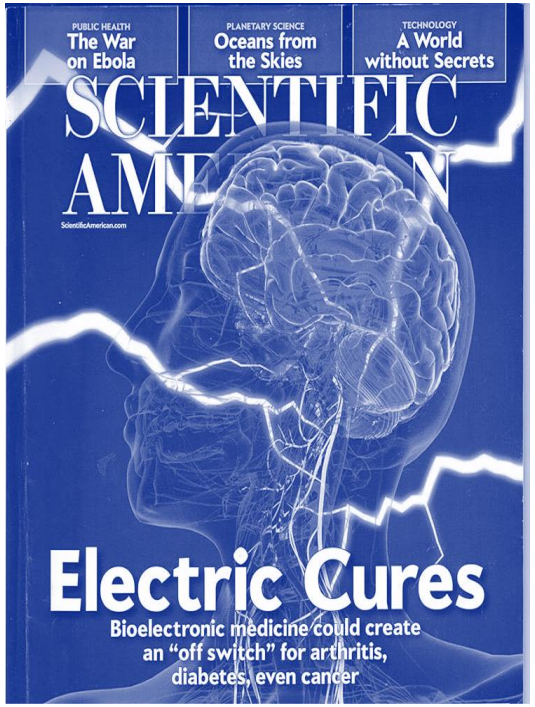
ACCELERATING THE ADVANCEMENT OF RESEARCH, DISCOVERY, & INNOVATION

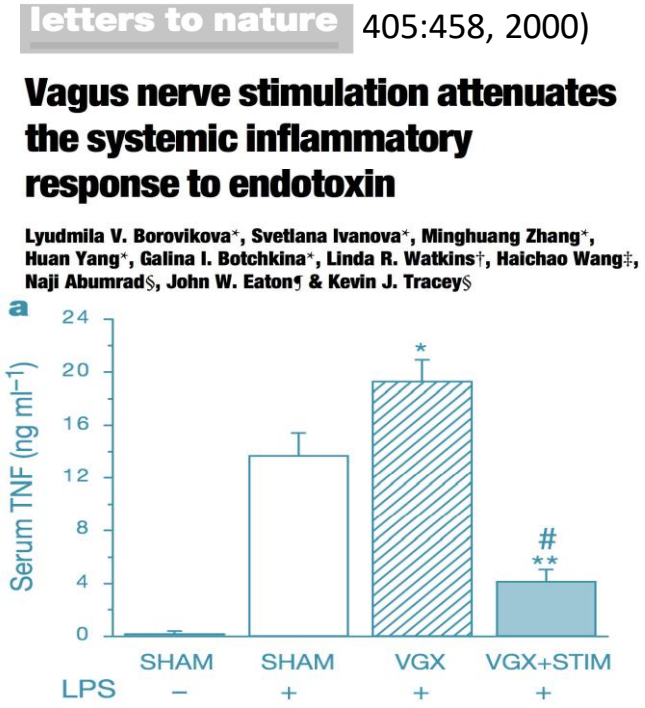
A DRIVE FOR INNOVATION

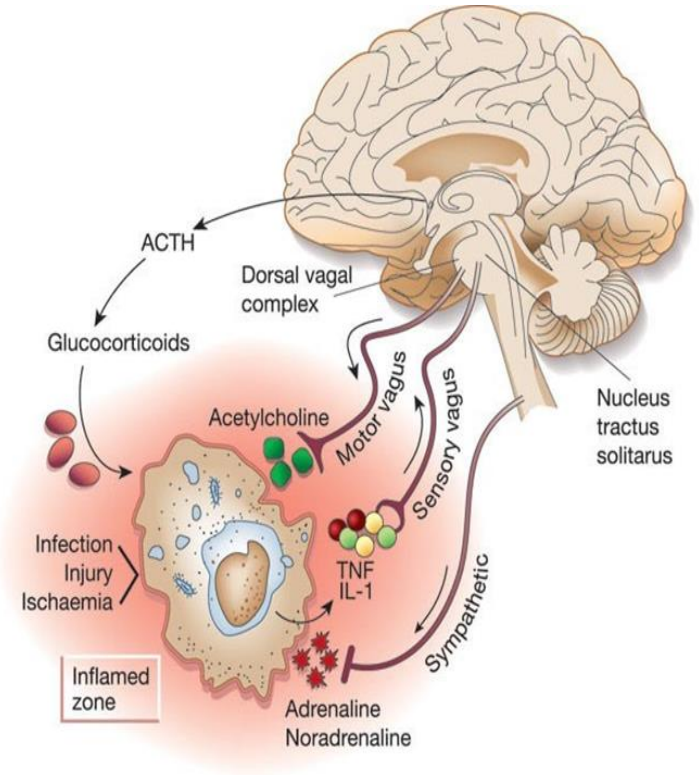
Innovation, a core cultural value at Northwell Health, is the creative process of imagining, researching, discovering, and inventing a new future. Tomorrow's world will be healthier and safer because we are innovating today.

INNOVATIONS IN BIOELECTONIC MEDICINE

INFLAMMATION AND THE INFLAMMATORY REFLEX





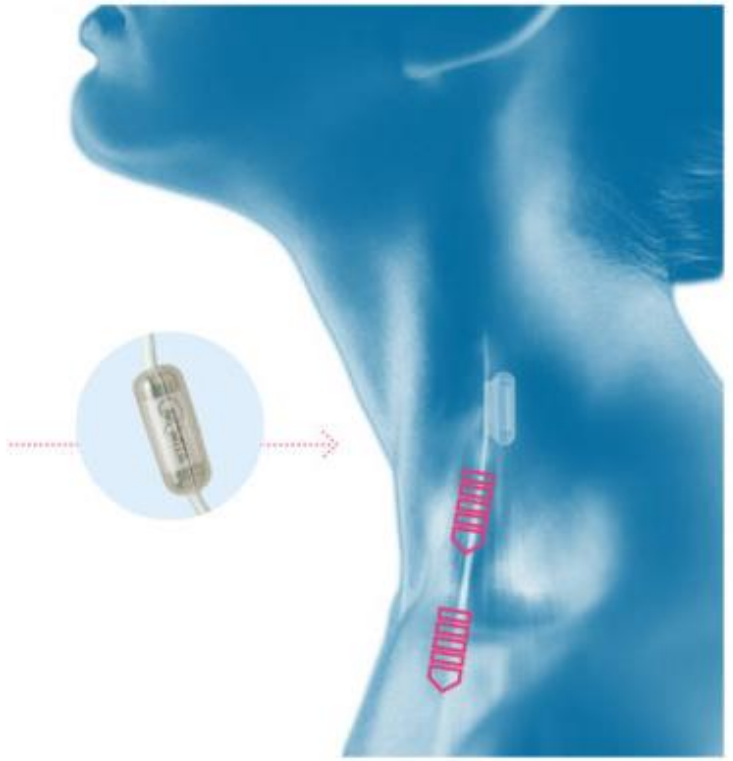


Inflammation contributes to more than **40 million** deaths annually, contributing to cancer, cardiovascular disease, dementia, neurodegeneration, diabetes, and metabolic syndromes.

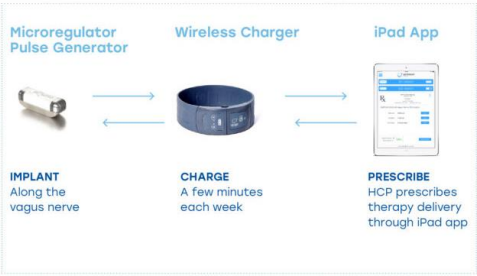
BIOELECTRONIC MEDICINE

- SetPoint Medical's platform uses a small, implantable device to deliver targeted electrical pulses along existing physiologic pathways to trigger the body's own biological responses to overcome inflammation in autoimmune diseases (e.g. RA and Crohn's disease.)

- In a major milestone, a clinical study was conducted to explore the treatment for rheumatoid arthritis. The study showed significant improvement in patient response, marking a significant step forward in treating autoimmune diseases with bioelectronic therapies. It's now on its way for FDA approval.



SETPOINT® MEDICAL

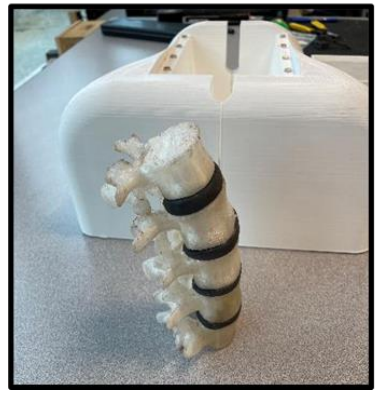


3D INNOVATION LAB

Medical Devices: Patient and Employee Safety

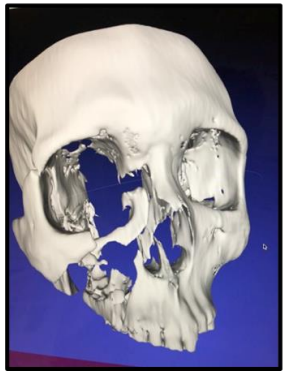
Medical devices with commercial opportunity

Training models for skills development



Teaching Anatomy

Plate bending and bone reconstruction

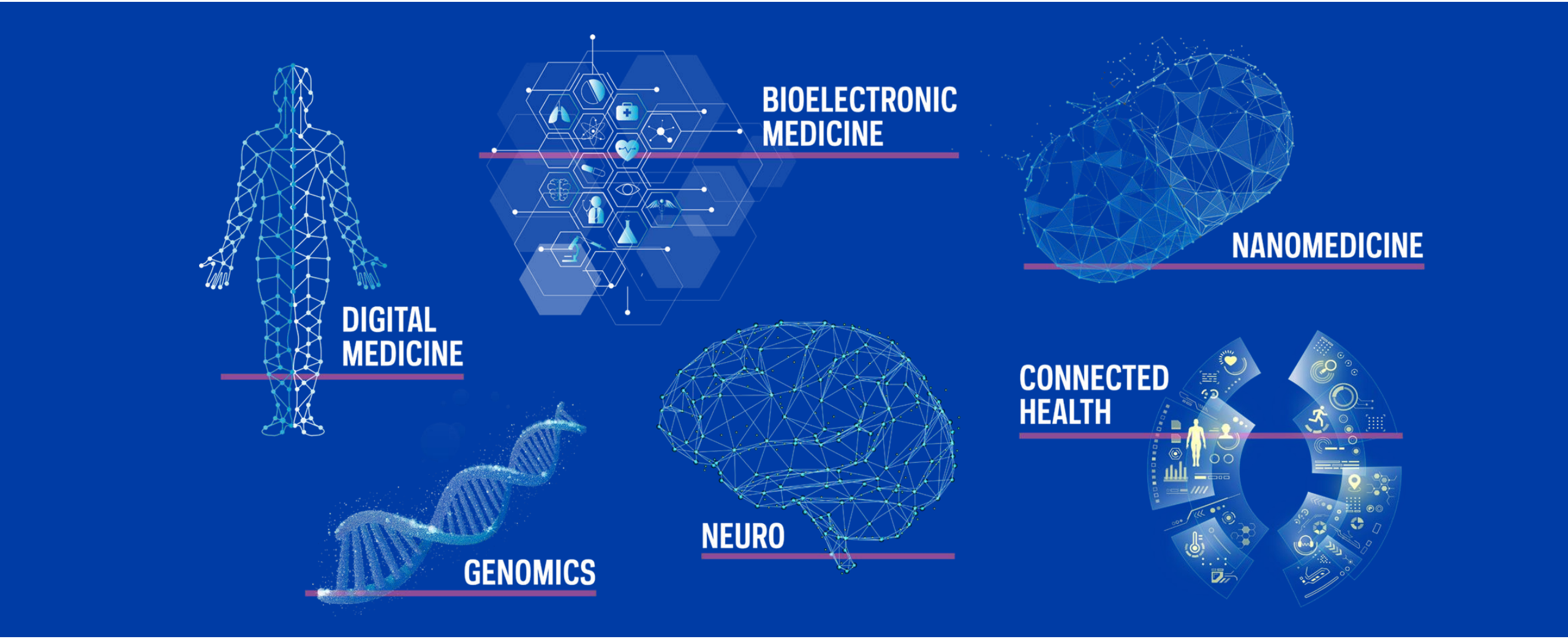


COLD SPRING HARBOR LABORATORY

"There is really no place that I know of that has this combination of fantastic scientists on campus, but also the ability to bring groups together for some of the best meetings and courses that occur anywhere in the world. Cold Spring Harbor Laboratory has placed itself at the center of great science and great education."

- Dr. Francis Collins, Former Director National Institutes of Health

INNOVATIONS IN MEDICAL CARE AND HEALTH CARE DELIVERY



ARTIFICIAL INTELLIGENCE
CATALYZER

AI CATALYZER AMBITION

Northwell has established an AI Catalyzer to accelerate and harness the power of AI to raise health, equity, and access for our patients, families, and communities.

- Accelerate the transformation of care and operations by leveraging AI at scale
- Democratize access to AI tools to empower team members and amplify their ingenuity and creativity
- Drive quality, value, outcomes, and sustainable margin through trustworthy safe AI
- Educate team members and evolve their skills for the future
- Elevate Northwell's brand and protect patients, communities, and team members from AI risks
- Foster collaboration, speed, and safety across stakeholder groups that utilize AI
- Influence the global conversation on health and AI

TRUSTWORTHY AI GUARDRAILS

Fair & Impartial

AI bias could lead to unequal and unfair recommendations for certain groups

Guardrail: Assess models' data for bias and employ bias mitigation techniques such as running pilots and reverse engineering results to detect bias

Robust & Reliable

Models might produce outputs that are factually false

Guardrail: Continuously monitor outputs and suggest performance improvements to implement additional fine-tuning as-needed

Transparent & Explainable

Customers/patients are entitled to know why actions, medications, and treatments are recommended when leveraging AI

Guardrail: Clearly communicate *when* and *how* AI outputs are being used to inform diagnosis, treatment, and care

Accountable

Obligation of Northwell to ensure that AI is developed, deployed, and used in ethical ways

Guardrail: Establish an ethics review board comprised of multi-disciplinary experts such as ethicists, lawyers, and domain experts to review AI use cases

Private

Internal and external vendor guidelines on PHI/PII data usage—including access, storage, processing, & consent

Guardrail: Enforce data usage practices for what, how and when access is provided to external models

Safe and Secure

Safe, secure, and ethical AI use is an organizational North Star to maintain customer/patient safety and trust

Guardrail: Ensure that AI can cause no harm to patients using techniques such as fine-tuning and prompt rejection

Responsible

All AI-generated content must be verified by reasonable means

Guardrail: Ensure that there is a human-in-the-loop to provide oversight and review

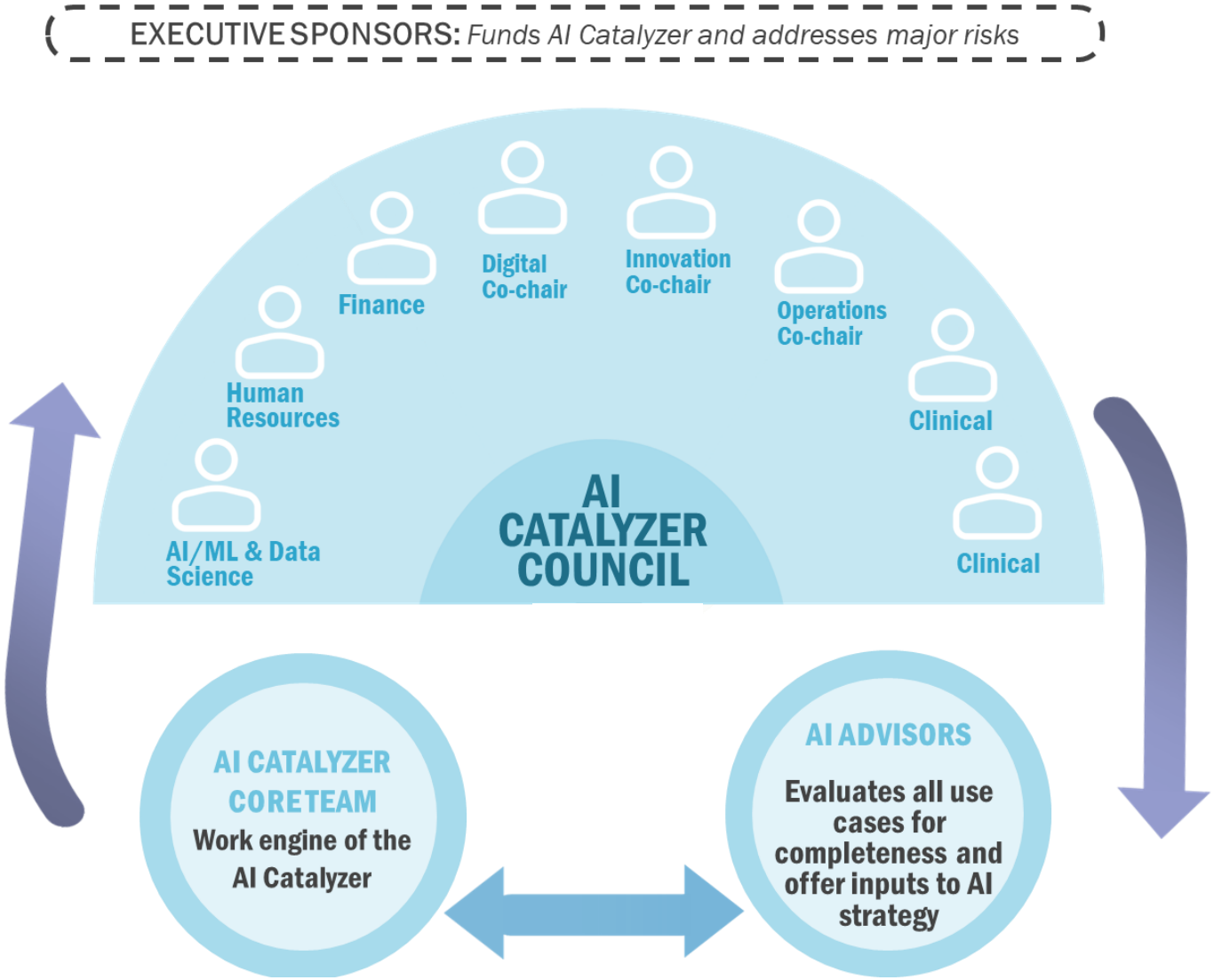
AI CATALYZER FUNCTIONS

AI Catalyzer will drive toward the following AI outcomes—with collaboration from clinical stakeholders and business units

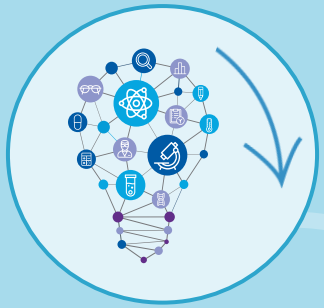
FUNCTIONS
Strategy and Optimization
Trustworthy AI
Technical Delivery
Value Creation
Brand, Education, and Engagement

ARTIFICIAL INTELLIGENCE COUNCIL

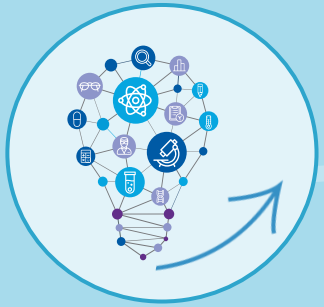
An enterprise AI council—supported by multi-disciplinary advisors and a dedicated core team will enable the democratization of AI innovation across Northwell. They will drive prioritized use cases from pilots to scale, while mitigating potential risks.



ACCELERATING
USE CASES ALONG MULTIPLE PATHWAYS



TOP-DOWN
IDEAS



BOTTOM-UP
IDEAS

AI
CATALYZER

BUILD – BUY
– PARTNER
DECISION
POINT

PILOT, IMPLEMENT & SCALE

Partner
With
Ascertain

Build
Internally

Buy From
Vendor

EVALUATION ON EXPECTED IMPACT AND EXECUTION ABILITY

KPIs for evaluating expected impact would depend on the use case type: operational, clinical, or mission-driven; while execution ability would be consistently evaluated on four factors for all use cases

Y-Axis: **Expected Impact** Depends on the Use Case Type		
Operational Use Cases • 5-Year Return on Investment (ROI)	**Clinical Use Cases** • % Improvement on Clinical KPIs (all) • 5-Year ROI (if available)	**Mission-Driven Use Cases** • % Improvement on Social Impact KPIs

X-Axis: **Execution Ability** is Evaluated Across All Use Case Types
Speed to Value: Time it takes to develop & deploy use case across the enterprise
Data Management & Availability: Quality & availability of use case data
Data Platform & Interoperability: Use case infrastructure requirements & alignment to enterprise architecture
Data Science & Digital Resources: Resources available with required skills

EVALUATION ON EXPECTED IMPACT AND EXECUTION ABILITY

KPIs for evaluating expected impact would depend on the use case type: operational, clinical, or mission-driven; while execution ability would be consistently evaluated on four factors for all use cases

Operational Use Cases	Clinical Use Cases	Mission-Driven Use Cases
• 5-Year Return on Investment (ROI)	• % Improvement on Clinical KPIs (all) • 5-Year ROI (if available)	• % Improvement on Social Impact KPIs

Speed to Value: Time it takes to develop & deploy use case across the enterprise
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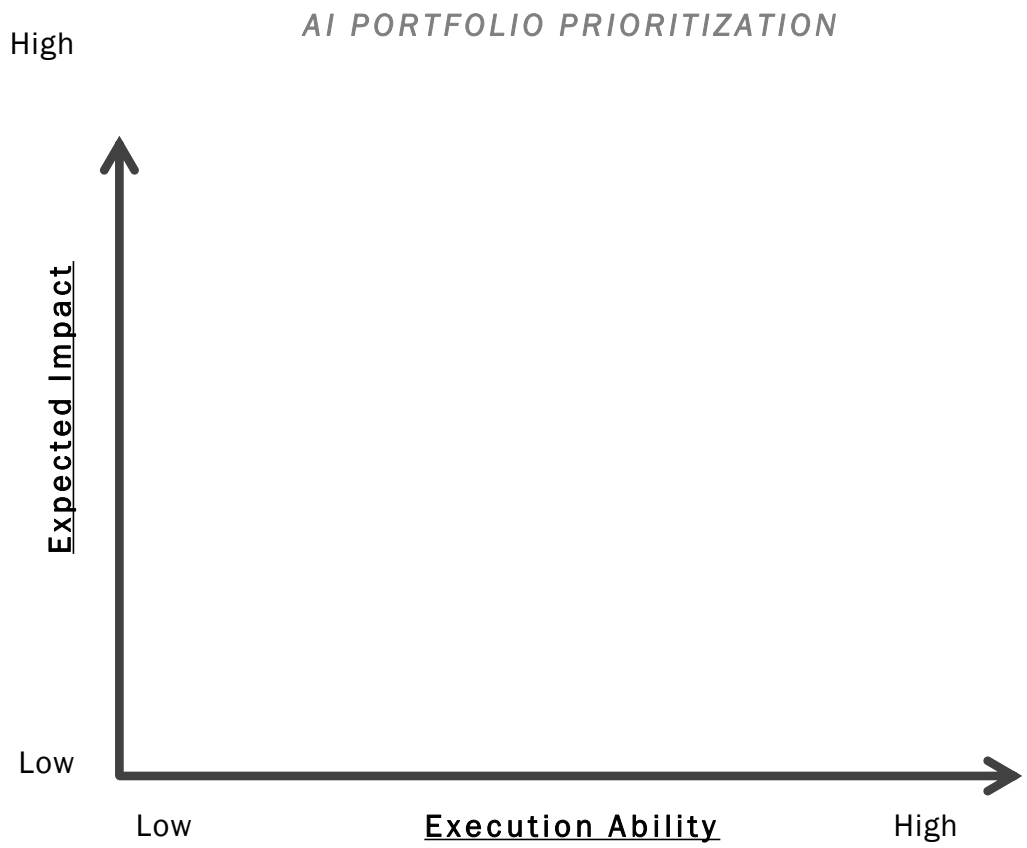
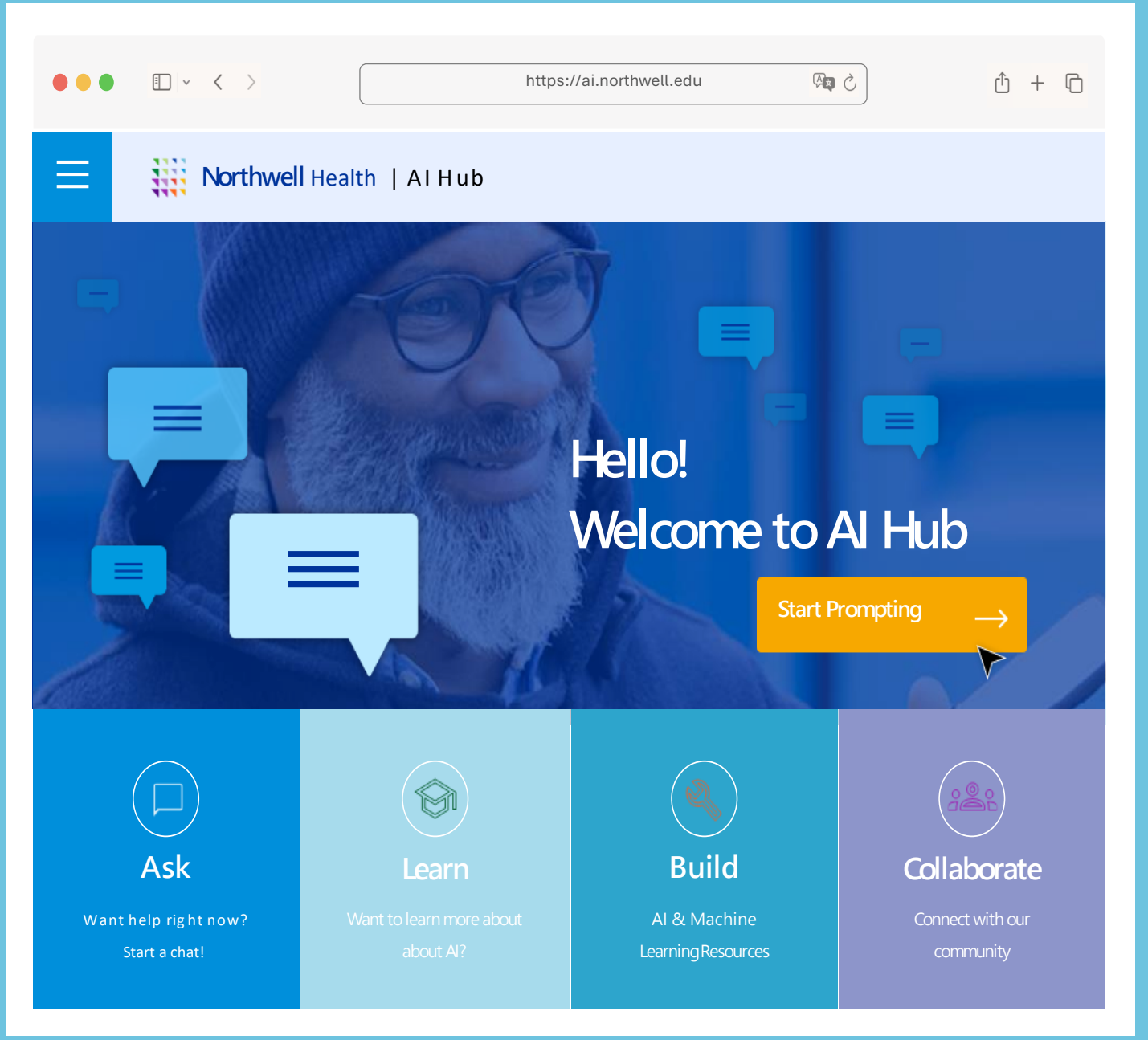


ARTIFICIAL INTELLIGENCE
HUB

AI HUB

WHERE NORTHWELL'S 88,000+ TEAM MEMBERS CAN UNLOCK THE POTENTIAL OF GENERATIVE AI

- Access Large Language Models (LLMs) securely
- Generate workplace efficiencies
- Collaborate and scale AI models across the enterprise



NORTHWELL GENERATED MODELS WORKING ENTERPRISE-WIDE

NW-customized models

GenAI content creation and comprehension

A secure platform to access Large Language Models

AI Hub Capabilities
Enterprise Value

Oversight

Data security

Enterprise visibility

Risk management

Productivity

Extraction of information (i.e., Compliance)

Summarization (i.e., clinical notes)

Automation of tasks (i.e., e-mail, reports)

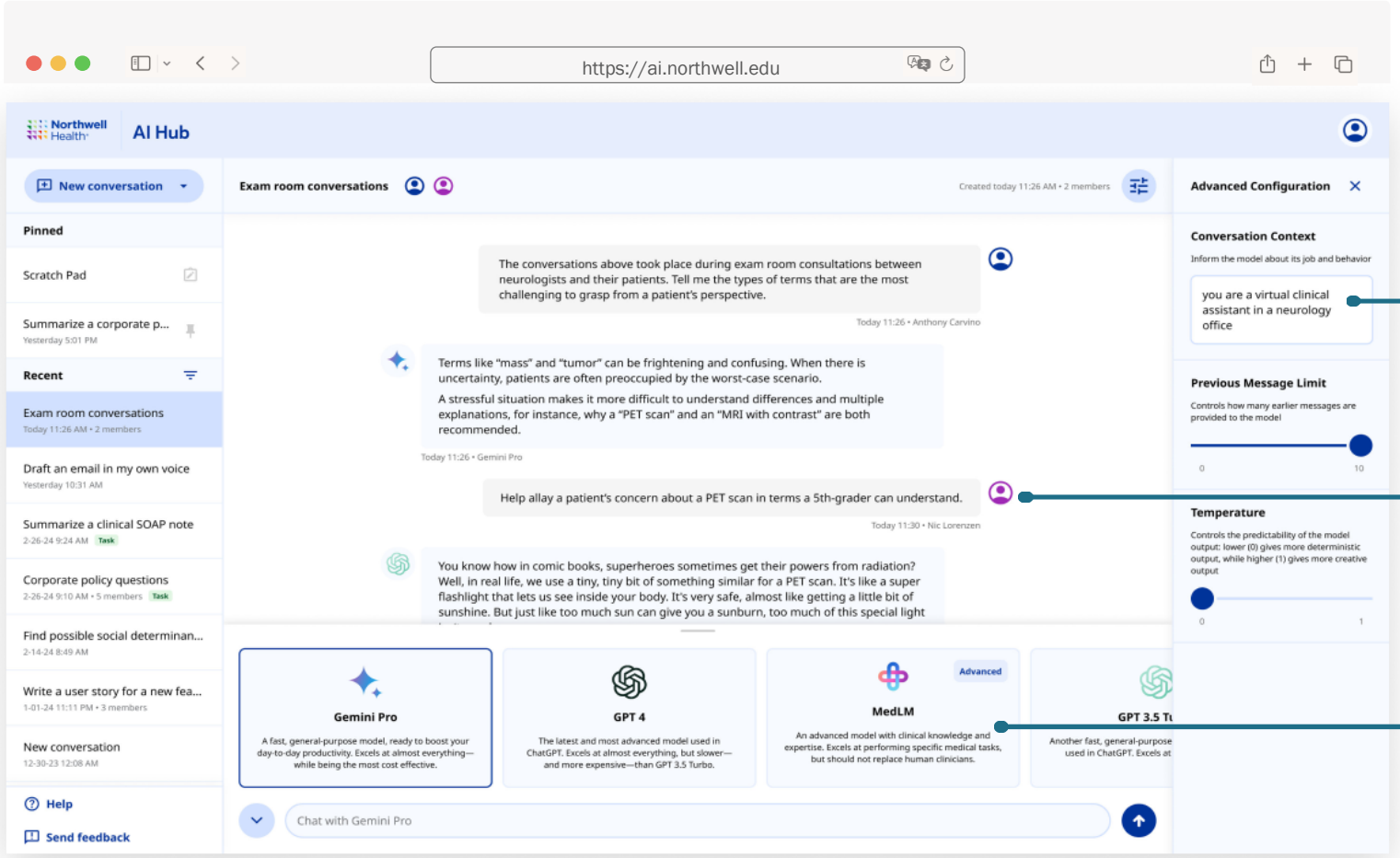
Business + Health Outcomes

Detection of incidental findings

Identification of gaps in care

Optimization of clinical workflows

AI HUB 1.0 IS UP AND RUNNING



AI Hub 1.0 is built on the Google Cloud Platform and serves access to the most popular LLMs.

Control the conversation
Vary parameters based on the task and desired outputs

Invite others to collaborate
Join a conversational thread with partners across Northwell

Explore different models
Switch between LLMs based on performance and cost considerations

VENTURES & INVESTMENTS

NORTHWELL HOLDINGS
FOR PROFIT INITIATIVES TO DRIVE MARGIN

Venture Investment	Aegis Strategic Partnership	Data Strategy	Commercialization of Internal Innovation
Capital investment in early-stage companies, aligned with Northwell's mission, which generate risk adjusted returns	In collaboration with Aegis Ventures, develop, launch, scale and exit NewCos including virtual care and AI-enabled solutions	Leverage enterprise data assets to develop solutions to improve patient care, increase operational efficiencies, and extend Northwell's brand	Incubate and commercialize new products conceived by Northwell team members

ASCERTAIN

Ascertain was formed through a joint investment from Aegis Ventures, a NY based digital health focused venture studio and Northwell Health, New York's largest healthcare provider and private employer.

THE NORTHWELL – AEGIS PARTNERSHIP
A MODEL FOR HEALTH SYSTEM INNOVATION

This collaboration has generated a company creation process, spanning from ideation to implementation, which functions as the catalyst for launching commercial entities which will diversify health system margins

caire

- An advanced patient automation platform, designed to enhance patient experiences and streamline clinician and administrative workflows using intelligent AI agents

hume

- Hume is an AI technology company which has developed the world's leading sentiment analysis capabilities
- Hume's voice interface which understands and emulates tones of voice, word emphasis and more to optimize human-AI interaction.

ASCERTAIN

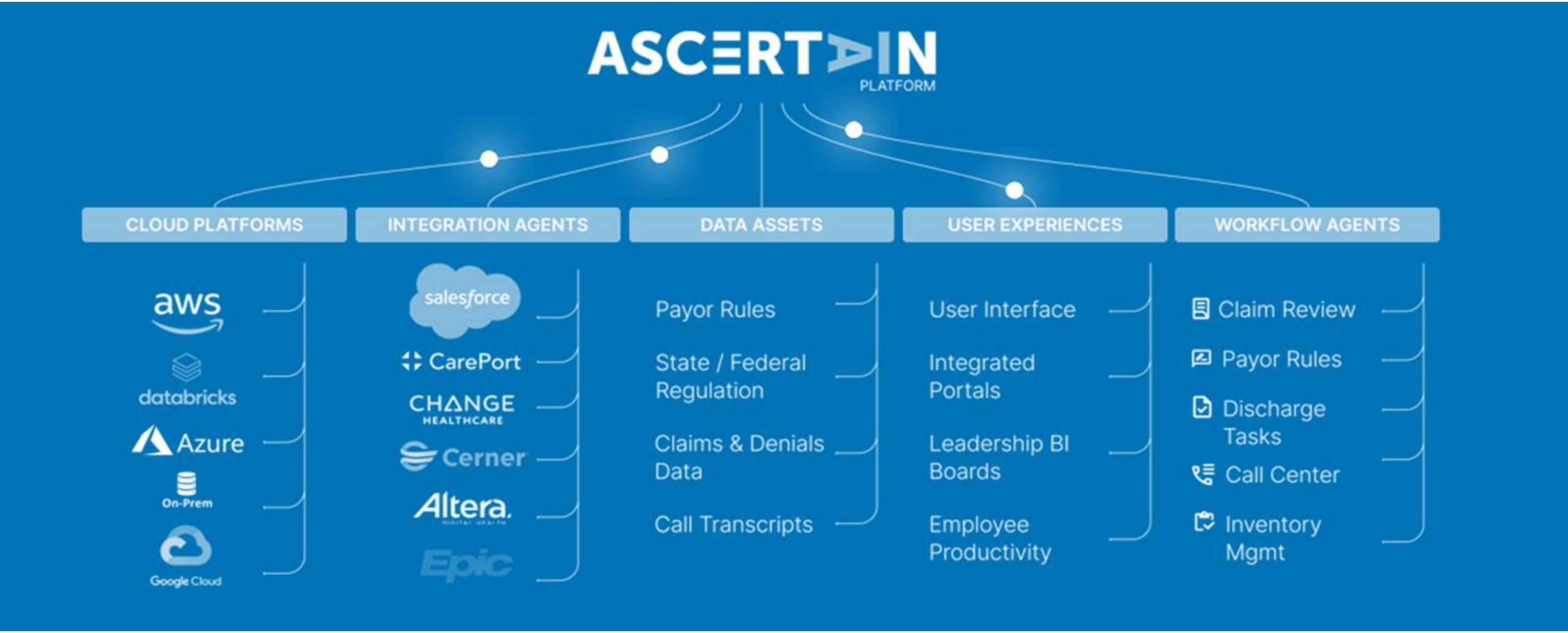
- A technology company which develops an AI-Agent ecosystem providing health systems with the building blocks to create custom agent workforces with the goal to remove administrative burden, decrease cost and improve operational efficiencies
- Northwell initial use cases include Transitions of Care and Vivo Specialty Pharmacy

optain

- Optain harnesses the power of advanced AI-enabled retinal imaging technology to non-invasively evaluate patient health and identify diseases that affect the microvascular system.

AGENT ECOSYSTEM

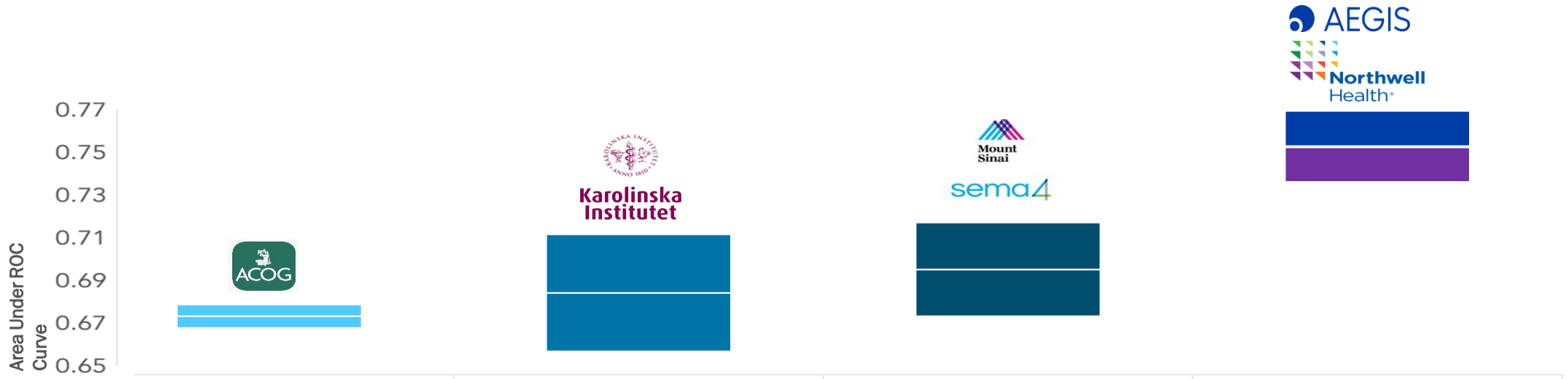
Ascertain's agent ecosystem provides our customers with the building blocks to create their custom agent workforce.



MATERNAL HEALTH

DEVELOPING "BEST-IN-CLASS" PREDICTIVE ALGORITHMS FOR MATERNAL HEALTH

Algorithm development emanates from a unique data partnership with Aegis Ventures enabling us to build algorithms trained, tested, and validated on health system EHR data – a template for future health system collaborations



121,622

Maternal health patients included (2017-2022)

Additional Algorithms

Including postpartum preeclampsia have been fully developed, with gestational diabetes, pre-term birth, and severe maternal morbidity solutions in the pipeline

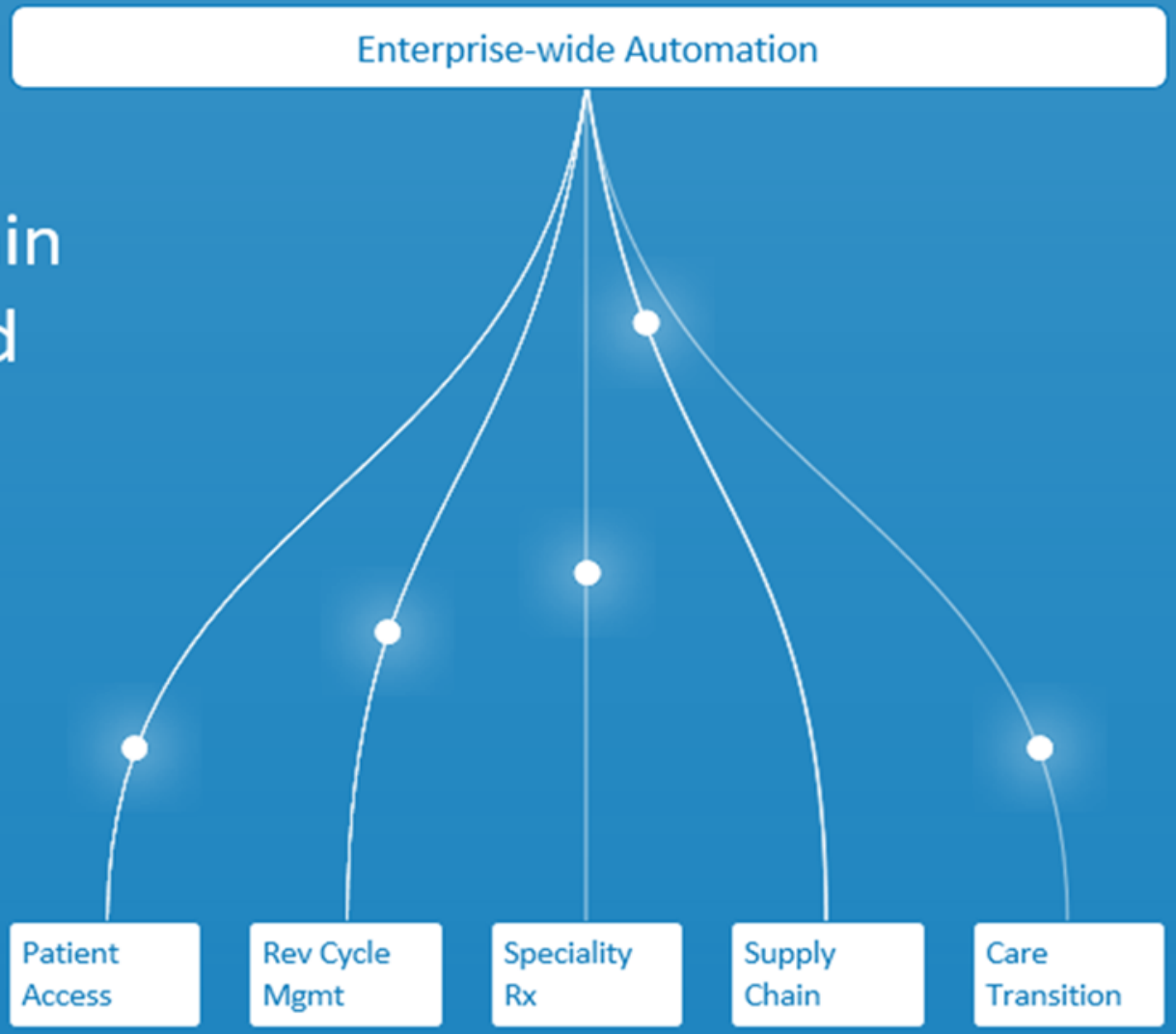
Poster and Plenary Presentation

At the Society for Maternal-Fetal Medicine (SMFM) Annual Conference

OPERATIONAL INITIATIVES

- Our Goal

Identify operational pain points within within the Healthcare Ecosystem and and co-develop solutions using enterprise-wide automation technologies (i.e., “agents”).



CASE STUDIES

Streamlining Discharges to Post Acute Care for Northwell

PROBLEM

Unnecessary hospital days due to discharge barriers such as post-acute care facility requirements and prior authorizations

SOLUTION

Transition of Care application which leverages AI to solve core pain points experienced by discharge managers

Putting a Specialty Rx Program Into Hyperdrive

PROBLEM

Partner's specialty pharmacy 340B program has become a major source of revenue but has had its growth curtailed by the associated labor costs around audits, authorizations, and medication adherence

SOLUTION

A specialty pharmacy application that leverages AI agents to support manual and critical 340B related workflows

Properly Equipping Case Managers for Patient Calls

PROBLEM

Northwell's case management's team is struggling with the burden of preparing for patient calls and need access to appropriate data context and data quickly and easily

SOLUTION

A call support interface that prepares case managers with the right data prior to patient engagement and live support during conversations

A NEW ALLIANCE:
TRUVETA

NATIONAL CARE ALLIANCE

TRUVETA

Saving Lives with Data

We propose to establish an alliance of health systems at a national level focused on transforming healthcare for the good of all.

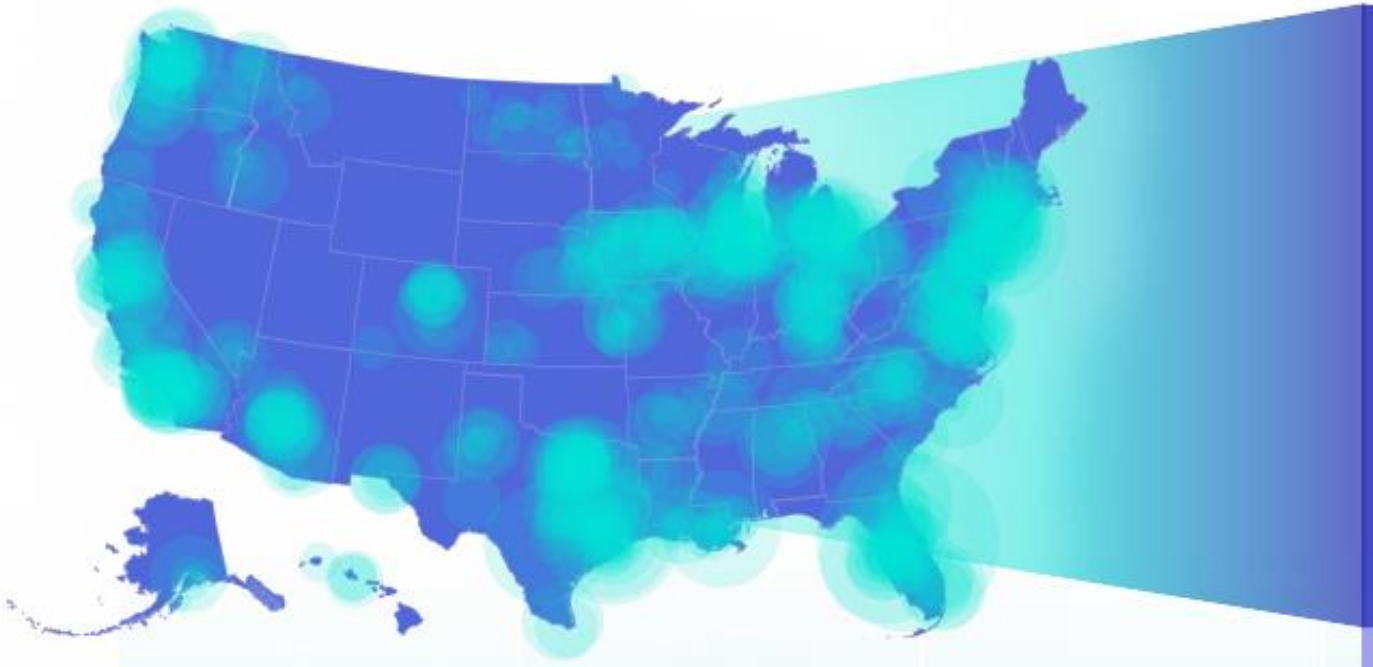
- Healthcare in the United States requires a transformation.
- Proposal to establish a national care alliance to advance health systems' application of data-driven insights.
- Regulatory-grade EHR data enabling scientifically rigorous research.

MEMBERS COMMITTED TO SAVING LIVES WITH DATA

Providence
ADVOCATE HEALTH
Trinity Health
Tenet Health
Northwell Health
AdventHealth
Baptist Health
BaylorScott&White HEALTH
BON SECOURS MERCY HEALTH
centura
CommonSpirit
HAWAIʻI PACIFIC HEALTH
HealthPartners
HENRY FORD HEALTH
HONORHEALTH
Inova
Lehigh Valley Health Network
MedStar Health
MEMORIAL HERMANN
MetroHealth
NOVANT HEALTH
Ochsner Health
Premier Health
Saint Luke's
SANFORD HEALTH
Sentara
Texas Health Resources
TriHealth
UnityPoint Health
Virtua Health
WellSpan HEALTH

TRUVETA DATA

COMPLETE, TIMELY, CLEAN, AND REPRESENTATIVE EHR DATA



Semi-structured data

- Diagnosis (SNOMED, ICD)
- Procedure (CPT,HCPCS)
- Medication (RXNORM,NDC)
- Labs (LOINC,UCUM)
- Immunizations (CVX)
- Implanted/Explanted Device (UDI)
- In-patient / out-patient care settings
- Pharmacy
- Mother-child data

Unstructured data

- Notes
- Medical images
- Genomics

Linked data

- SDOH
- Mortality
- Claims

5B+
Clinical notes

85M+
Imaging studies

1M+
Mother-child pairs

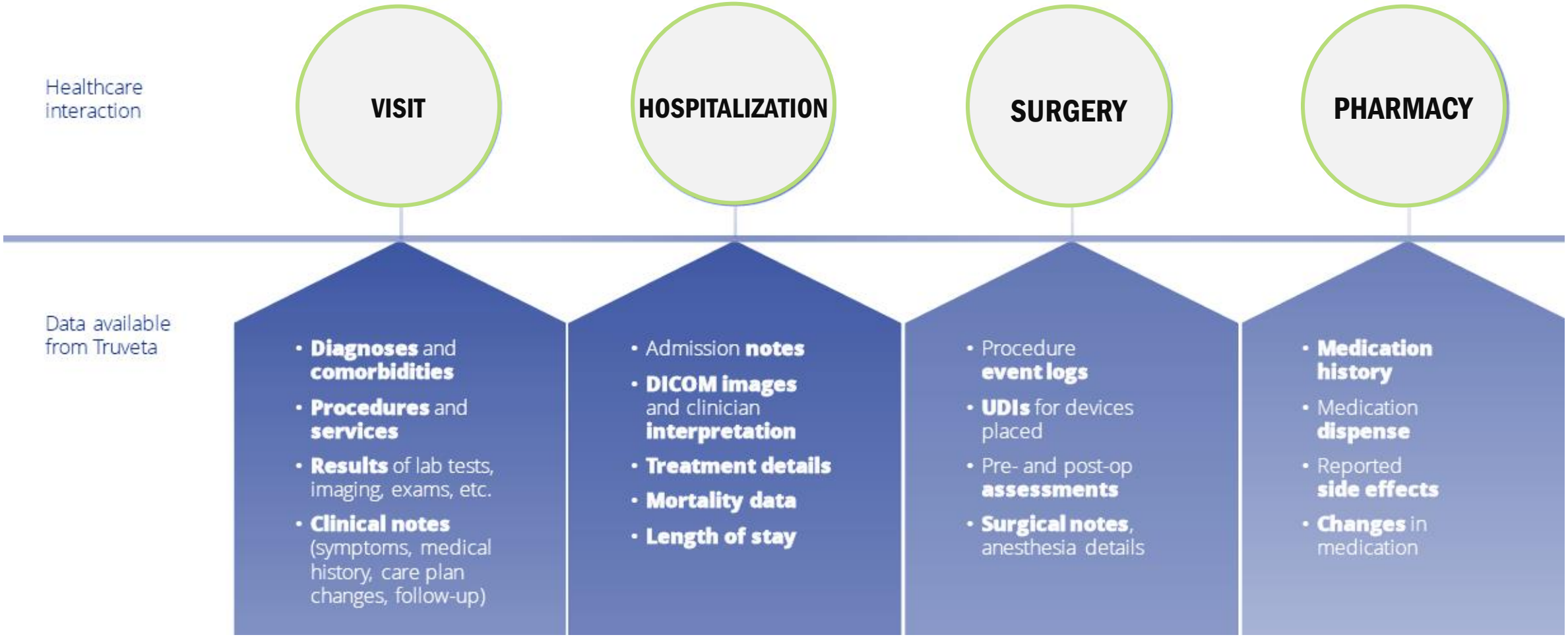
8+
Years longitudinal patient history

72M
Patients with SDOH attributes

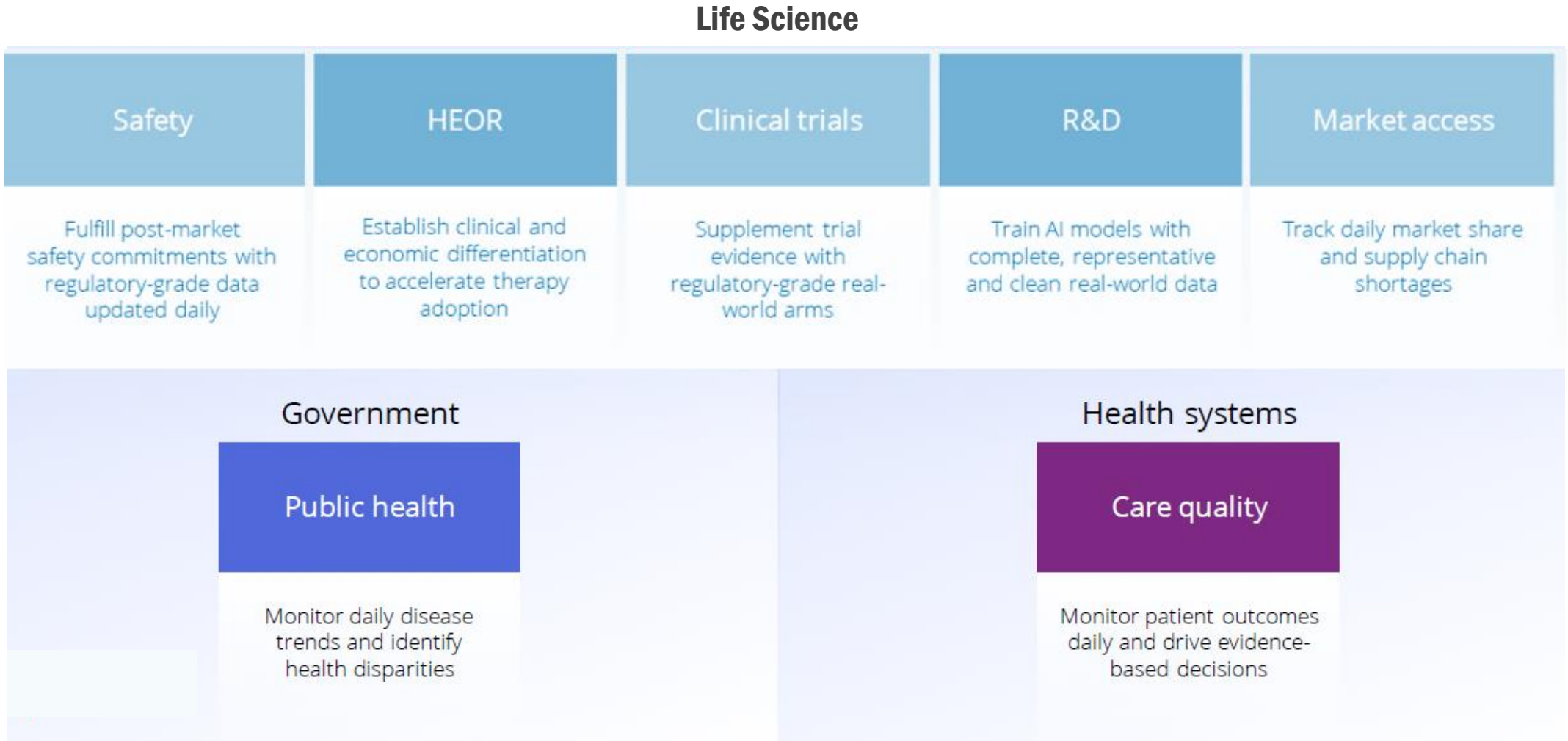
188K+
Unique devices

BRINGING IT ALL TOGETHER

SURFACING INSIGHTS ACROSS THE PATIENT JOURNEY



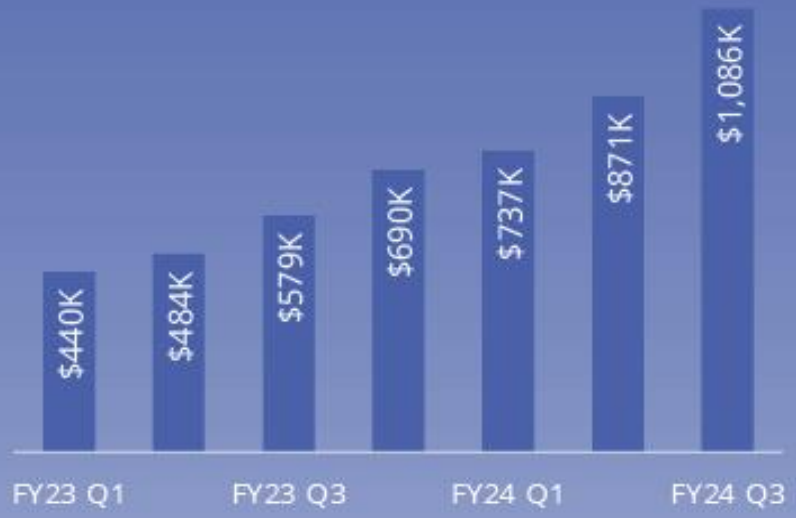
ACCELERATE ADOPTION OF NEW THERAPIES AND ADVANCE PATIENT CARE



TRUVETA MEMBERSHIP VALUE

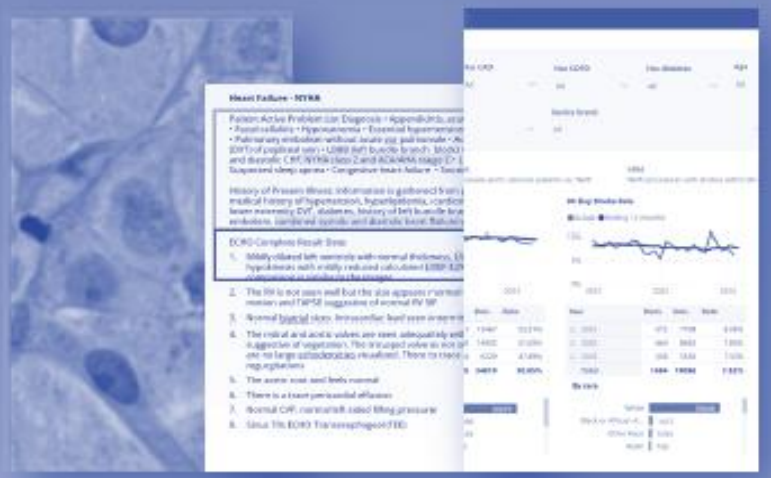
New revenue

Compensation when your de-identified data is used by others



Opex savings

Save 70%+ on patient data storage and registry submission; Reduce care variation with US benchmarks



New research

Scientifically rigorous analytics, with new opportunities for life science sponsorship

WHY USE TRUVETA FOR RESEARCH?

Truveta Data	Complete	• Longitudinal patient records linked across health systems, including full diagnoses, vital signs, lab tests, devices, clinician notes and images • Augmented with extensive, patient-level social drivers of health (SDOH), medication dispense, mortality and claims data
	Timely	• Updated daily • Immediate access to data with no need to request separate datasets
	Clean	• All data mapped to a common data model and normalized to standard medical ontologies
	Representative	• 30+ health systems with patients from all 50 states and more than 800 hospitals and 20,000 clinics • Truveta Data supports studies on any disease or treatment with statistical significance
Truveta Studio	Enabling scientifically rigorous, fast, and compliant analytics	• 100M patient records • Immediate access to de-identified, patient-level data • No per user licensing – pay only based on use • Make the most complex clinical scenarios computational, including symptomology and time constraints; with the ability to carry out deep statistical analysis

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OPEN DISCUSSION