

# Opening Session

## Retsef Levi

*J. Spencer Standish (1945) Professor of Management; Professor of Operations Management; Co-Director of the Leaders for Global Operations Program, MIT Sloan School of Management*



**MIT Sloan Initiative for  
Health Systems Innovation**

 **#MITsloanHSI**

# MIT SLOAN INITIATIVE FOR HEALTH SYSTEMS INNOVATION (HSI)

**RETSEF LEVI**  
**J. SPENCER STANDISH (1945) PROFESSOR OF**  
**OPERATIONS MANAGEMENT**

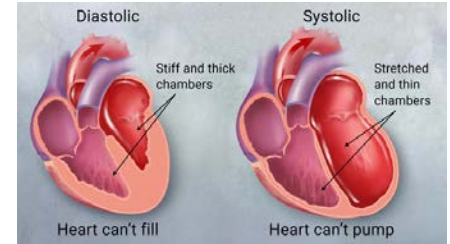


**INNOVATING HEALTH SYSTEMS –  
DIGITAL HEALTH TRANSFORMATIONS**

**Cambridge, MA, November 2017**

# Example: Heart Failure (HF) Patients

“Clinical syndrome that can result from any structural or functional cardiac disorder that impairs the ability of the ventricle to fill with or eject blood.”



- **HF is an epidemic** (900,000 new patients per year in the US and more than 2.5% of the US population by 2030)!
- **HF patients consume A LOT of resources** (1 million annual hospitalizations and projected annual cost by 2030 is \$70 billion which is \$244/ person in the US)



# HF Current Pay for Performance Approach

**Policy makers and payers focus on 30-day readmission reduction (national rate is 25%) by imposing penalties on hospitals:**

- Response: Hospital-based programs (e.g., transition clinics) with (some) visible success (temporarily?)

**MIT Sloan research (with a team at a large Boston hospital):**

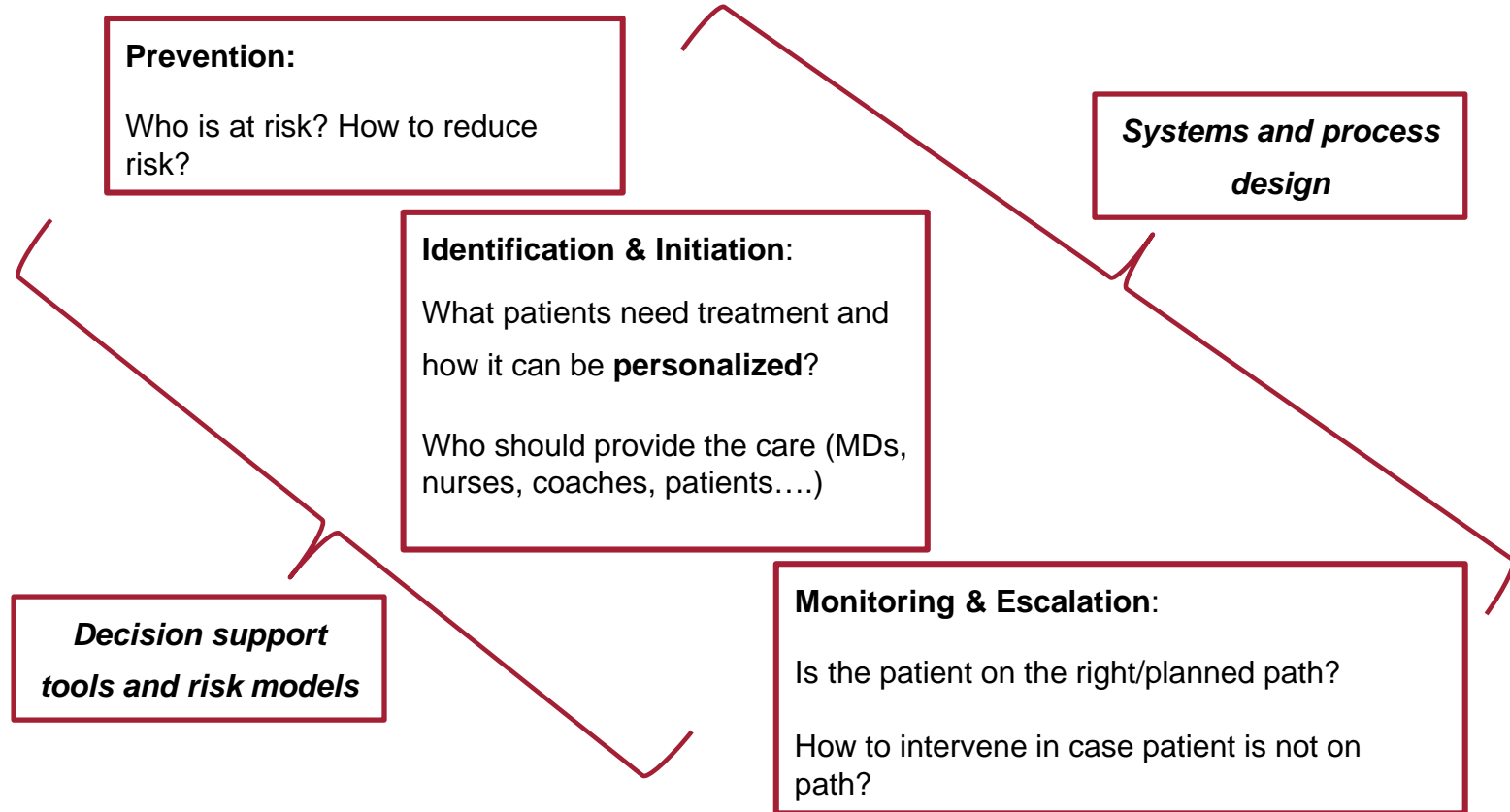
- 30-day readmissions account for about 10% of total Heart Failure hospitalization days
- Over 50-72% of HF patients admitted to the hospital did not have an outpatient appointment during the prior two weeks



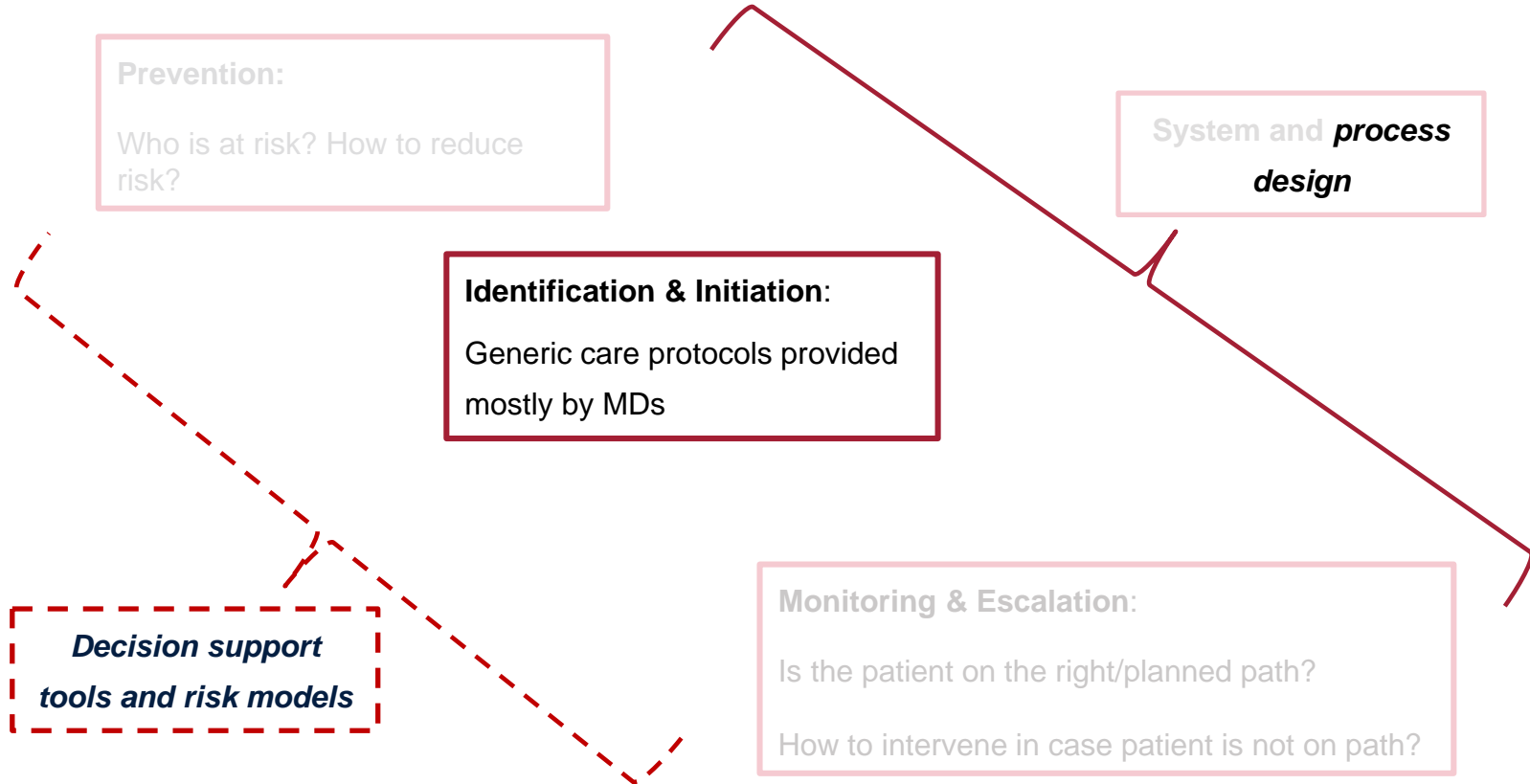
**Poor outpatient access and lack of systematic health management**



# Futuristic System to Manage Heart Failure (and Other Chronic Conditions)



# Current Hospital-Based Systems



# Transforming Health Systems

## Pay for Performance (P4P)

### Rationale:

Pay for value (quality & efficiency) rather than volume

Expectation: Change payment schemes and systems change and performance will follow

*Dominant paradigm driving policies, but with only partial success*

## Design for Performance (D4P)

### Rationale:

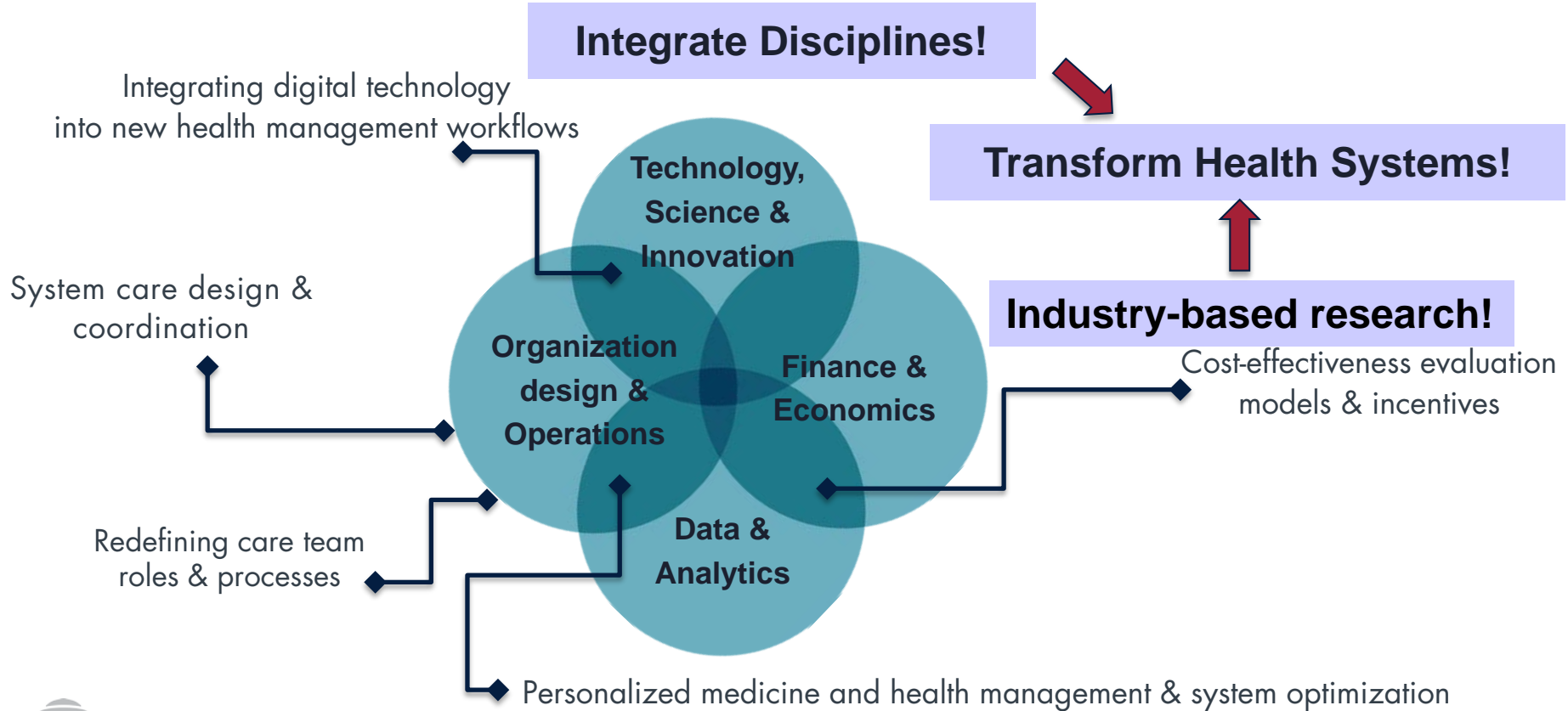
System change is hard and financial incentives are important but not sufficient

Expectation: Redesign the system to perform for value and then pay for it

*Flipping the mindset to primarily focus on quality measurement, cost-effectiveness evaluation and system design innovation*



# Health System Innovation (HSI) Initiative





# EXAMPLES OF CURRENT IMPACT



# MIT Sloan HSI Faculty Research Examples

1. Social Determinants of Health: Healthy Food (Doyle, Levi & Perakis)
2. Evaluating Effectiveness of Social Interventions: Healthcare Hotspotting (Doyle)
3. Personalized Medicine: Diabetes Treatment (Bertsimas)
4. Personalized Medicine: Early Diagnosis of Cancer (Farias)
5. Analytics & Operations Research: Optimizing Patient Flow (Levi)
6. Operations of Kidney Allocation (Bertsimas, Farias, Trichakis)
7. Drug Discovery Innovation Financing (Lo)
8. Telemedicine-based Models for Hypertension Management (Doyle & Levi)
9. Reforming Primary Care Practices (Kellogg, Levi)
10. Reforming Behavioral Health in the US Military (Carroll, Kochan & Quaadgras)
11. Workforce Management: Long-term Care (Osterman)

**Health  
Management**

**Analytics  
& System  
Optimization**

**Design  
for  
Performance**



# PERSONALIZED MEDICINE: EARLY DIAGNOSIS OF CANCER

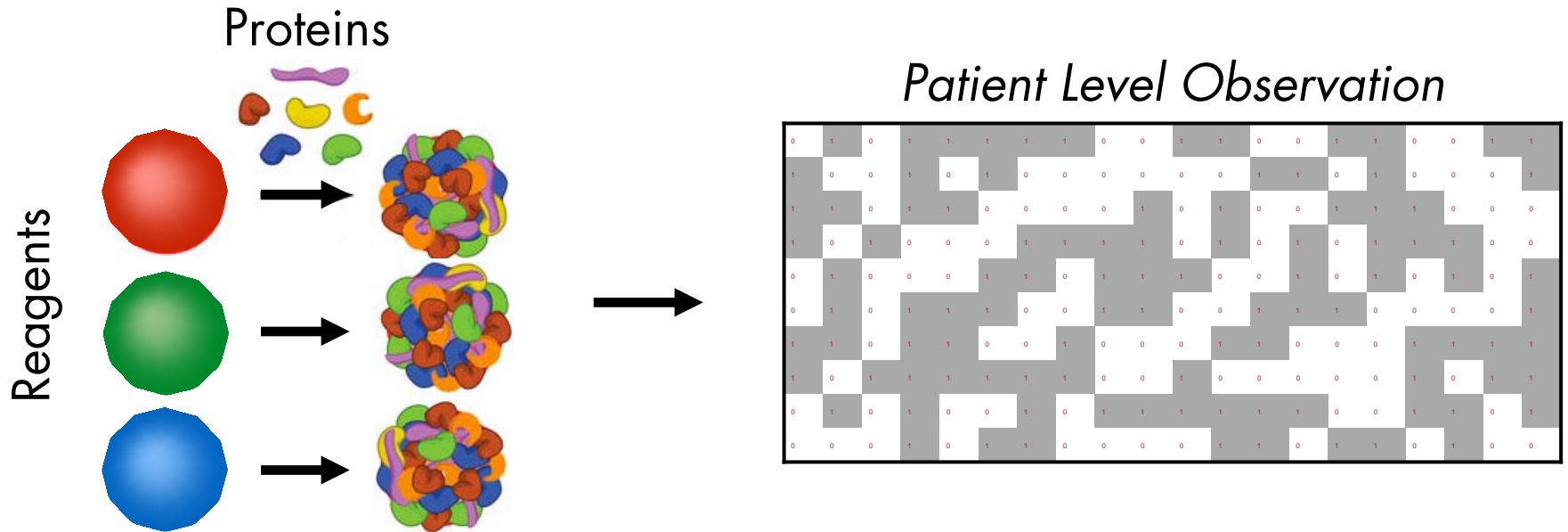


## **Professor Vivek Farias**

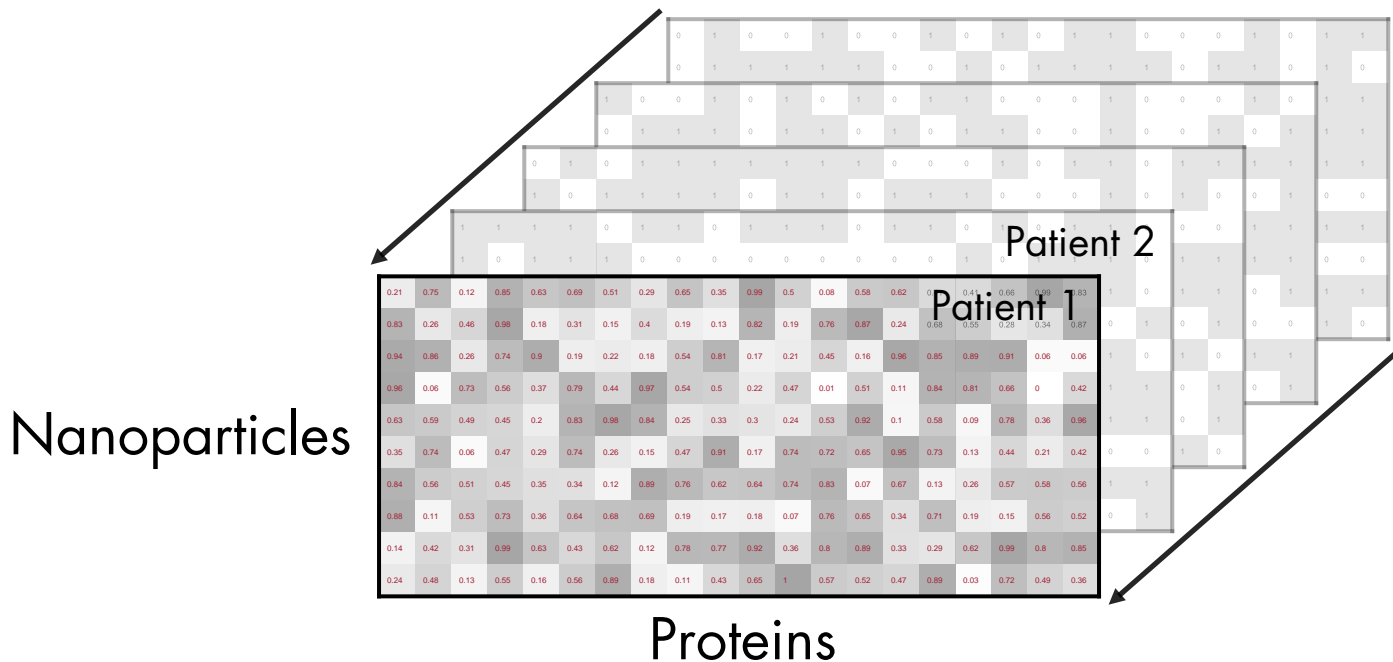
Joint work with Andrew Li (MIT) &  
Center for Nano-Medicine, Harvard Medical School

# New Proteomic Liquid Biopsy Diagnosis Technique

Diverse Reagents that multiplex proteins in the patient blood



# How to De-Noise Sparse Data?



**Only 10% of proteins are found in a single patient!**



# Remarkable Predictive Power

Current: Accuracy 96.2%			Future: Accuracy 94.1%		
Cancer	Sens.	Spec.	Cancer	Sens.	Spec.
Glioblastoma	100.0 %	98.9	Brain	100.0	100.0
Lung	94.0	100.0	Lung	83.2	99.6
Meningioma	98.5	97.0	Pancreatic	99.2	91.6
Myeloma	100.0	100.0			
Pancreatic	87.4	99.5			



# COLLABORATION WITH COMMUNITY CARE COOPERATIVE (C3)



**Professor Joseph Doyle, Economics**

**Professor Retsef Levi, Operations Management**

**Dr. Anne Quaadgras, HSI Director**

# HSI-C3 Collaboration Concept

## **C3 is an innovative community-based Accountable Care Organization (ACO):**

- 15 community health clinics, 120K+ underserved patients with high needs and cost (<http://c3aco.org/> )
- Participating in the Massachusetts Medicaid Accountable Care Organization program
- Behavioral health and long term support services are key to effective care

## **Research collaboration goal:**

- Leveraging analytics and design for performance to co-develop new systems & decision support tools to develop and enable a sustainable community-based ACO

## **Potential impact:**

- National scalability of a new community-based ACO model



Map source:

<http://www.massleague.org/About/MemberList.php>





# Challenges to Transform into the Future

➤ **Personalization = Medicine & Science meet Big Data**

*How to leverage analytics at scale via practical risk models?*

**Panel: Machine Learning in Surgery and Cancer (Dimitris Bertsimas, MIT Sloan)**

**Keynote: Dusty Majumdar, IBM Watson Health**

➤ **Monitoring & Escalation = Home & Outpatient Team-Based Engagement**

*How to use technology and redesign the workforce & processes*

**Panel: Digital Innovations & Long Term Care Workforce (Paul Osterman, MIT Sloan)**

**Panel: Emerging Digital Health Innovations (Eran Broshy, Tailwind Capital)**



# Challenges to Transform into the Future

- **Prevention = Manage socioeconomic and behavioral determinants**  
*What are cost-effective interventions that affect patient behavior?*
- **Remove Barriers = Incentivize New System Designs via Policies & Practices**  
*What should be measured? Models to evaluate cost-effectiveness? Internal incentives?*

**Panel: State Models and the Potential for Digital Innovations to Transform Population Health (Retsef Levi, MIT Sloan)**

**Keynote: Don Mordecai, Mental Health and Wellness, Kaiser Permanente**

