

Digital Health

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Digital

- **Digital** usually refers to something using digits, particularly binary digits.
- Examples:
 - **Digital signal**, signals formed from a discrete set of distinguishable waveforms, rather than signals formed from continuous ranges
 - **Digital electronics**, electronic circuits designed to operate using digital signals
 - **Digital computer**, a computer handling information represented by discrete values

Health

- **Health** is the level of functional or metabolic efficiency of a living organism.
 - In humans it is the ability of individuals or communities to adapt and self-manage when facing physical, mental or social challenges.
 - A state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity (WHO, 1948)

Digital Health

- **Convergence of the digital and health**
 - Empowering people to better track, manage, and improve their own and their family's health, live better, more productive lives, and improve society.
 - It's also helping to reduce inefficiencies in healthcare delivery, improve access, reduce costs, increase quality, and make medicine more personalized and precise.

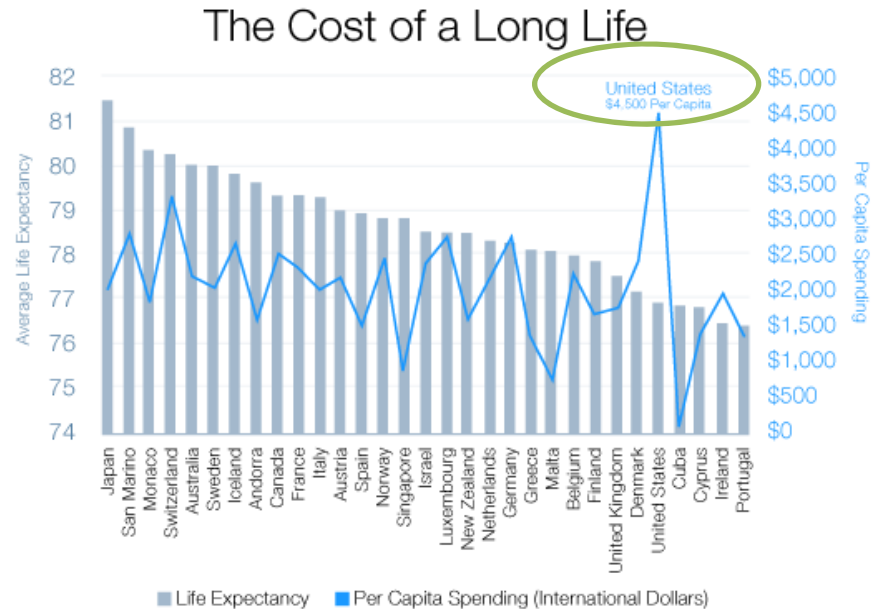
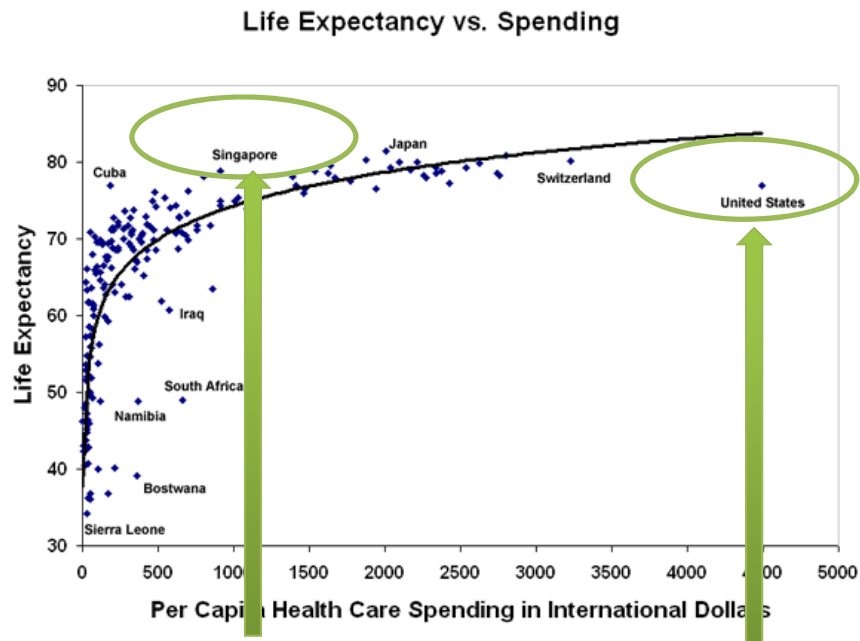


THE STATE OF HEALTHCARE

Measuring a Healthcare System

- Quality
 - Effective care
 - Safe care
 - Coordinated care
 - Patient-centered care
- Access
 - Cost-related access
 - Timeliness of care
- Efficiency
 - Output versus input
- Equity
 - Variation based on personal characteristics
- Long, healthy, productive lives
 - Preventable deaths

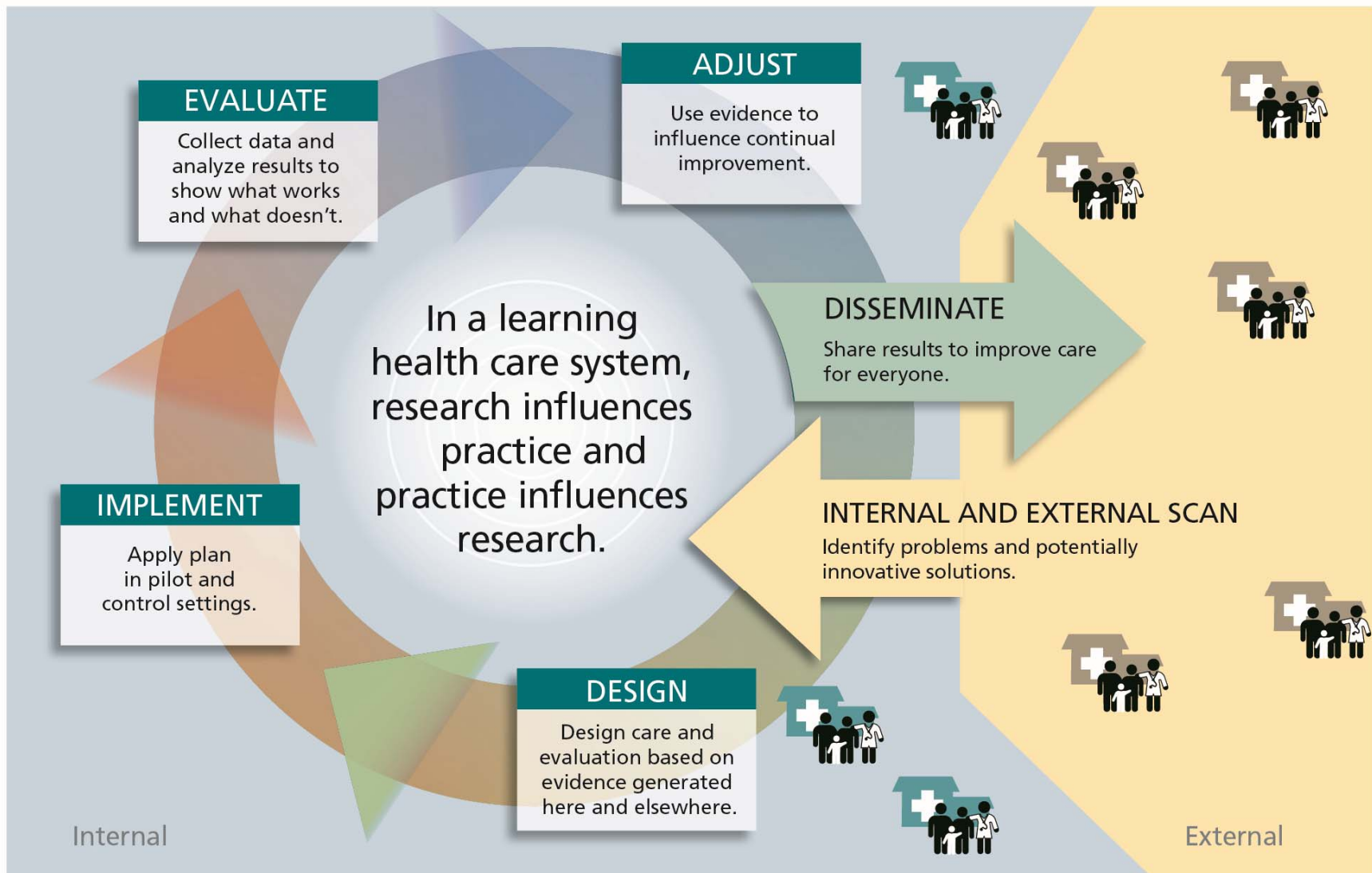
Relative Cost of a Long Life



Why? The Healthcare Setting

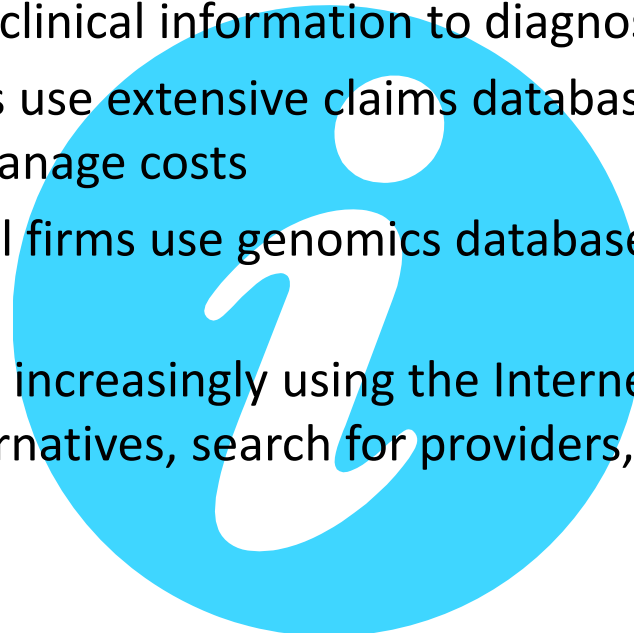


- Nature of work
 - Uncertainty, risk, stakes, autonomy
- Workforce
 - Hierarchy, identification
- Leader-workforce relations
 - Transactional, goal conflict
- Performance measurement
 - Underdeveloped, misaligned
- Incentives

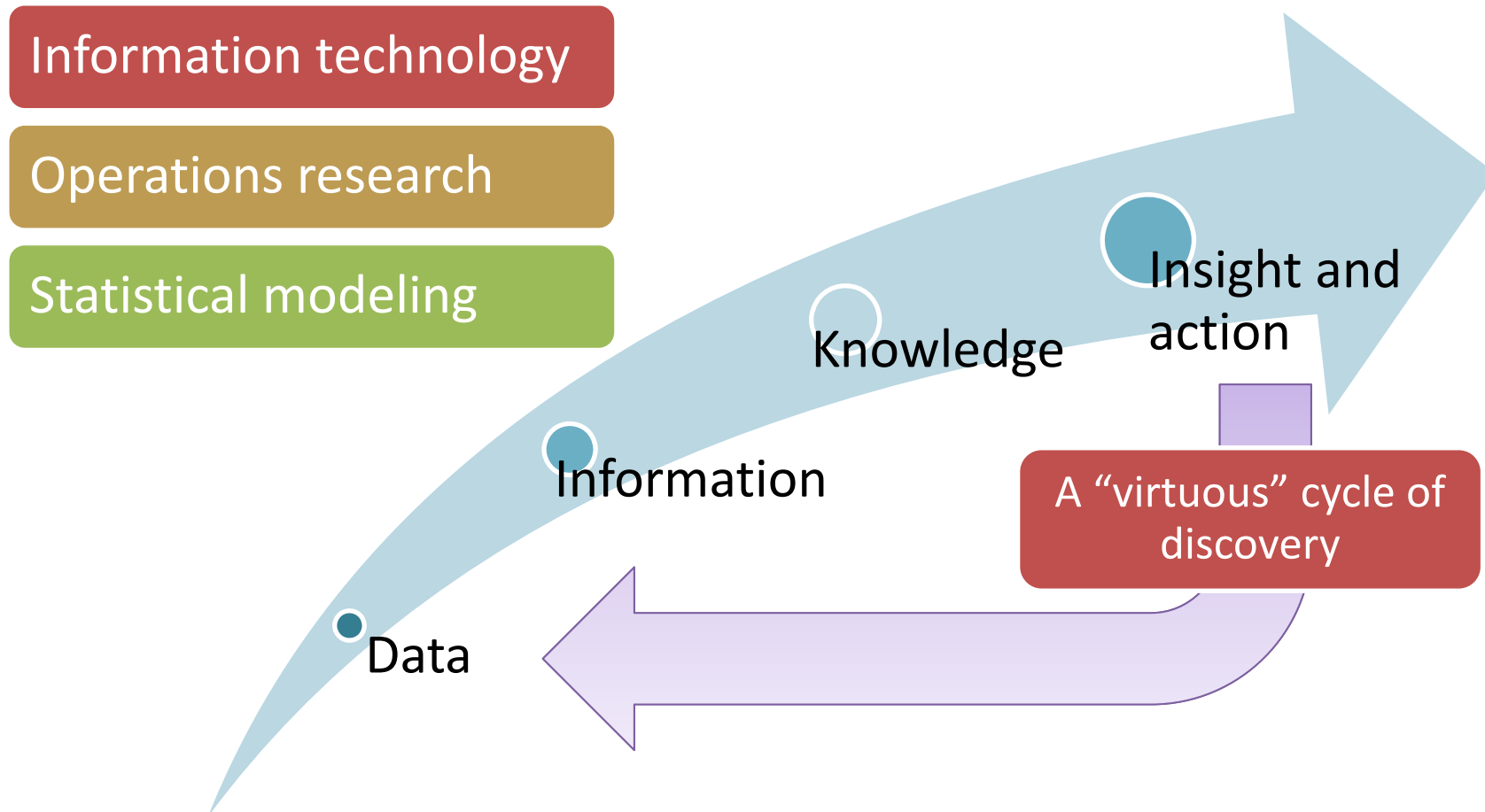


Why? The Information Deficit

- Information is the “life-blood” of healthcare
 - Physicians use clinical information to diagnose and treat patients
 - Health insurers use extensive claims databases to price their product and manage costs
 - Pharmaceutical firms use genomics databases to identify new drug candidates
 - Consumers are increasingly using the Internet to learn about treatment alternatives, search for providers, and transact with health insurers



A Learning Health System



Important Puzzles

Diffusion and assimilation of health IT innovations

Entrepreneurial opportunities, new ventures, and viability

Quantification of economic and social value

Health 2.0, health and the Internet

Vulnerabilities created by the digitization of health information

Big data and healthcare

Mobile health

Artifacts/Tools in Digital Health

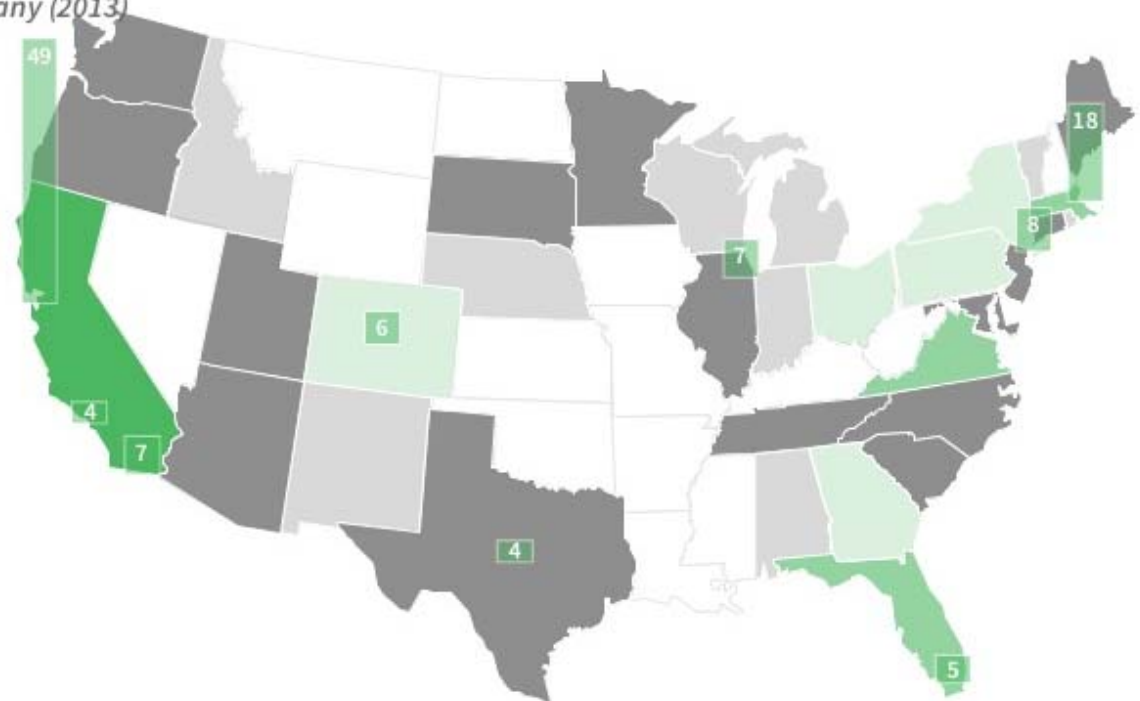
- Electronic Health Records
- Clinical Decision Support Systems
- ePrescribing Tools
- CPOE
- Personal Health Records
- Web Enabled Health Management Systems
- Health 2.0
- Health Information Exchanges
- National Health Information Network (NHIN)
- Clinical Datasets
- Personalized Medicine
- Remote Monitoring Devices
- Surveillance Systems



Denver is in the top 10 for Digital Health: We want to be in the top 5!

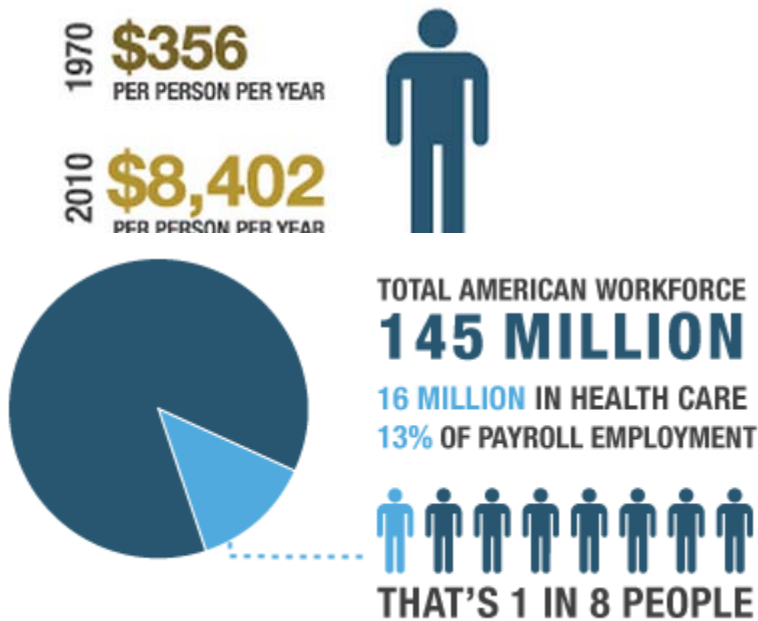
THE CENTER OF THE UNIVERSE

Funding by geographic location of company (2013)

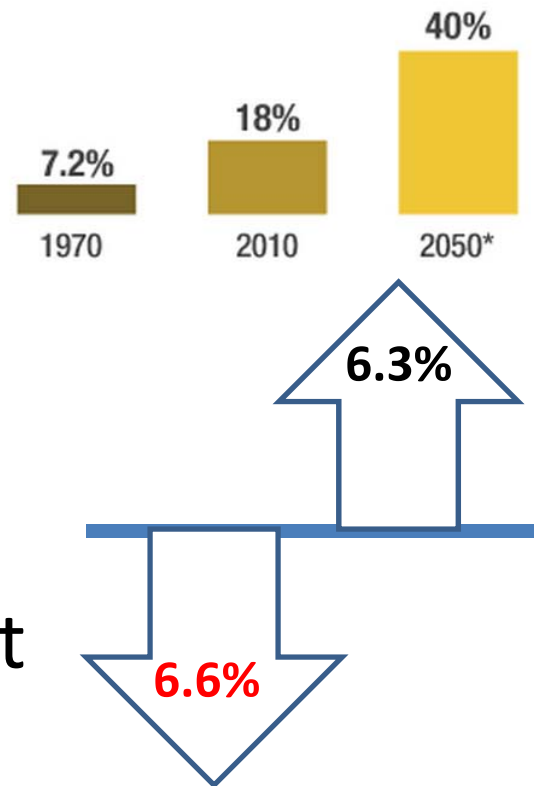


They are hiring!

- Historical trend:



Health care costs as a percentage of U.S. GDP



- Since 2007, employment

CITI-DH Consortium Initiative

Education

Classroom and Trainings

- Provide digital health, information systems, entrepreneurship , and bio-innovation education
- Gain research and development experience
- Classes available to industry partners and consortium members

Research

Testing and Development

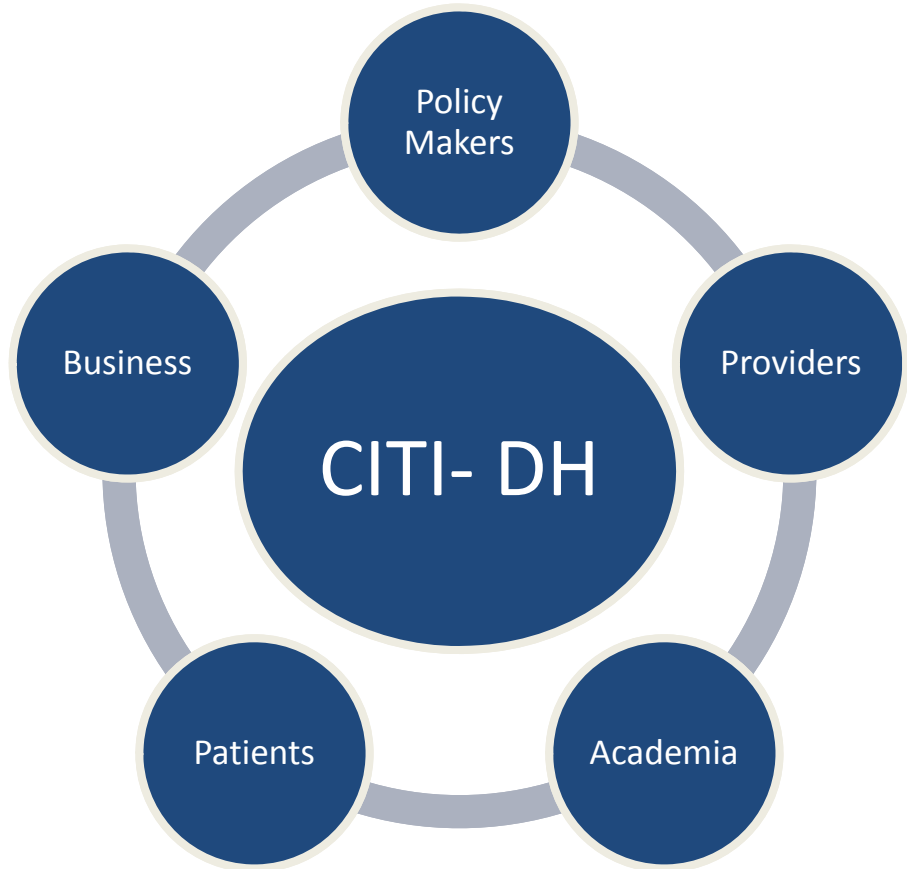
- Assist with designing and developing digital health products and services that provide patient defined value
- Translational research, getting digital health ideas from design to adoption and use in the community

Services

Consulting and Design

- **Business Consulting**
- **Incubator and accelerating assistance**
- **Business Development and VC connections**
- **Phase 1, 2 and 3 FDA clinical product testing**
- **Technical development assistance**
- **Data analytics and programming**

Academic Institutional Settings: CITI-Digital Health Consortium



CITI- DH Stake Holders:

Policy Makers

- Inform the formulation of policy

Providers

- Inform the practice of Healthcare

Academia

- Archival knowledge
- Train future leaders

Patients

- Empowerment
- Improve health outcomes

Business

- Key inputs for investment decisions

In Conclusion....

- Healthcare represents a consequential sector for business schools and society
- Tremendous opportunity for students
 - Strong demand in industry
- Robust business opportunities for entrepreneurs
- Rich set of scientific puzzles