



## World Quality Forum of the International Academy for Quality

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*"Quality for Future  
of the World"*

# The Role of Quality Improvement Methods in Healthcare Delivery Science and Translational Research

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# HEALTHCARE DELIVERY SCIENCE

“Applying rigorous, high-quality science to the evaluation of real-world innovations aimed at improving the quality, safety and value of health care.”

Center for Healthcare Delivery Science  
Beth Israel Deaconess Medical Center  
Harvard Medical School Teaching Hospital



# TRANSLATIONAL RESEARCH

“Translational research fosters the multidirectional integration of basic research, patient-oriented research, and population-based research, with the long-term aim of improving the health of the public.”

Rubio et al., 2010

**Process** of moving a new idea into clinical practice and health outcomes



## Accelerating Discoveries Toward Better Health

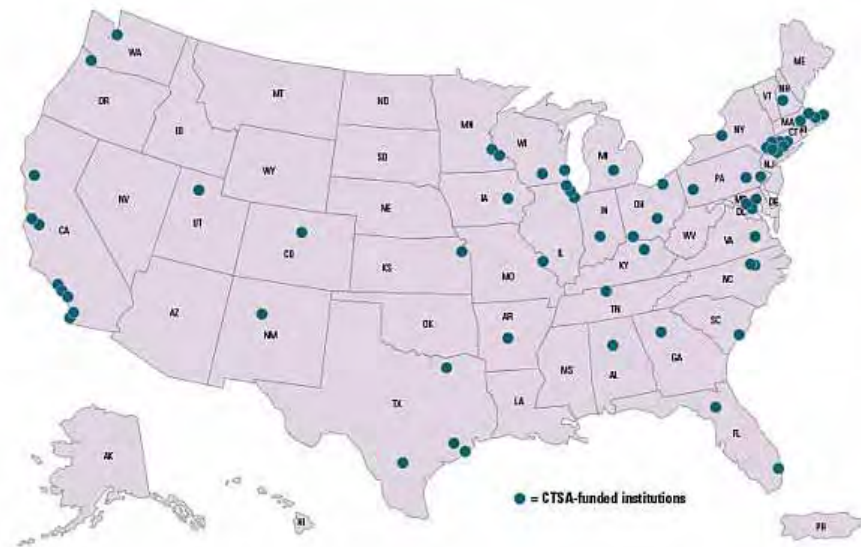


**2003** The NIH made translational research a central priority

**2006** The CTSA was launched

**2011** Award Penn State Hershey Medical Center

**2014** **62** medical research institutions



### Some stated goals...

- Develop **data-driven tools** to measure process milestones
- Tools for process evaluation and improvement

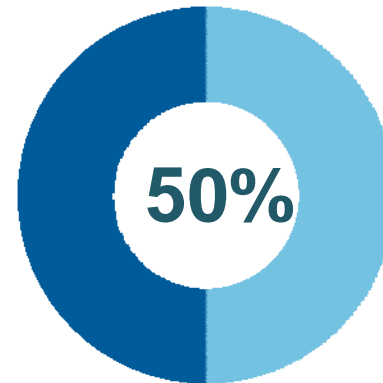
# BACKGROUND

## There is a huge gap between proven knowledge and its impact on people's health

IOM, 2001; Green, et al., 2009; Glasgow, et al., 2012

Americans receive only about half of their recommended care

McGlynn et al., 2003



In order to close this gap, new designs and solutions must be explored...

Glasgow, et al., 2012; Davies, et al., 2010; McHugh & Barlow, 2010; Reid, et al., 2005

# MOTIVATION

**Understanding large-scale process systems and their dynamics is a prime opportunity for linking multi-disciplinary collaboration and quality improvement**

Funding agencies have called for a stronger healthcare-engineering enterprise

(IOM, NAE, AHRQ)

Robust, generalizable, and sustainable frameworks are needed.

Glasgow et al., 2012



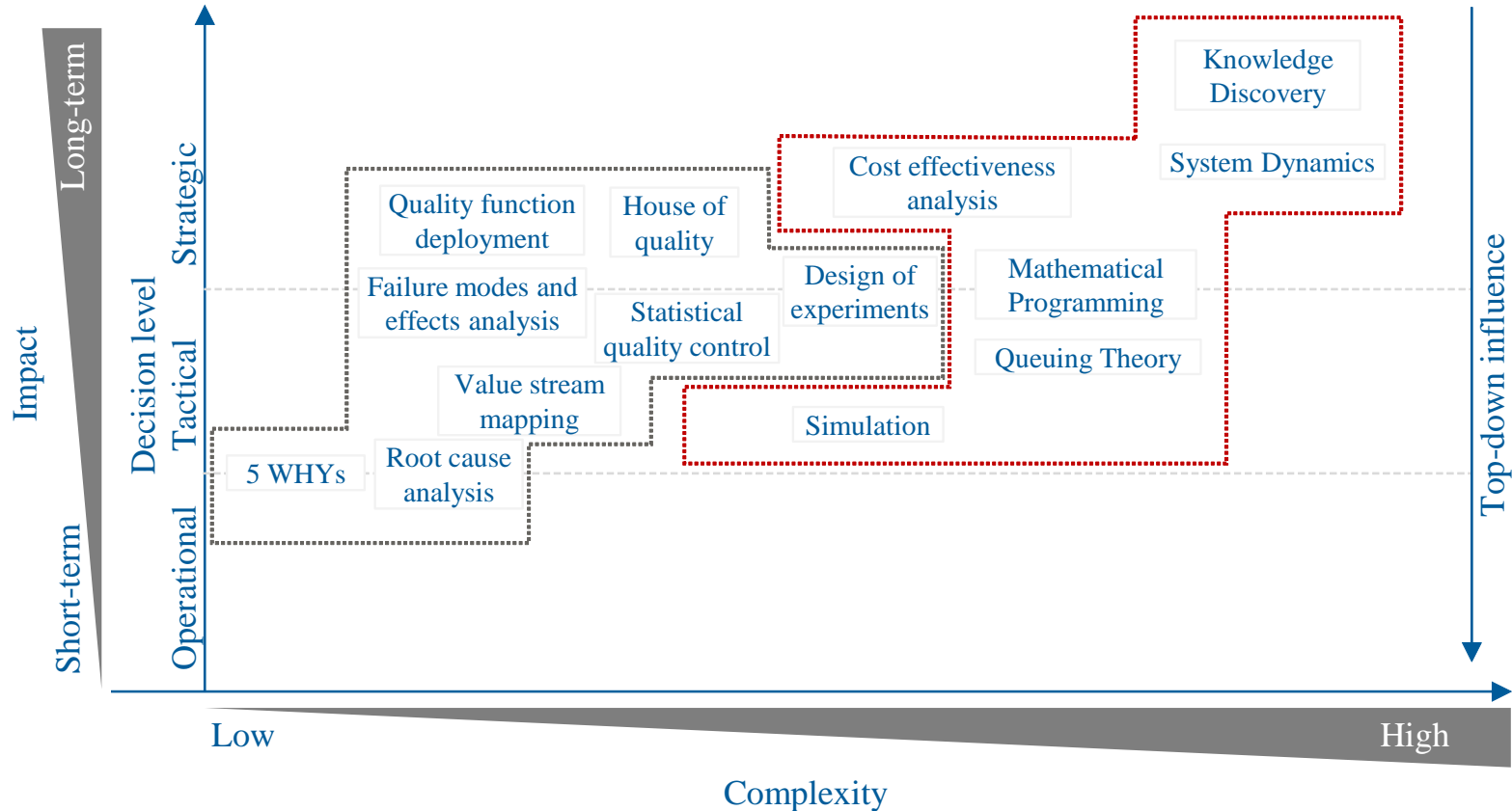
# FIVE OPPORTUNITIES FOR QUALITY IMPROVEMENT

**Quality Improvement methodologies can be implemented to assess and audit complexity in translational research and support a better strategic allocation of resources.**

- Provide models to map and quantify complexity in translational research
- Identify the key elements involved in translational research
- Investigate methods and metrics to assess translational collaboration networks
- Provide models to prioritize health interventions based on their value
- Develop robust frameworks to guide the understanding of healthcare interventions' impact based on cost-effectiveness

# QUALITY IMPROVEMENT RESEARCH

  Traditional (Basic) QI toolkit     
   Expanded QI research toolkit



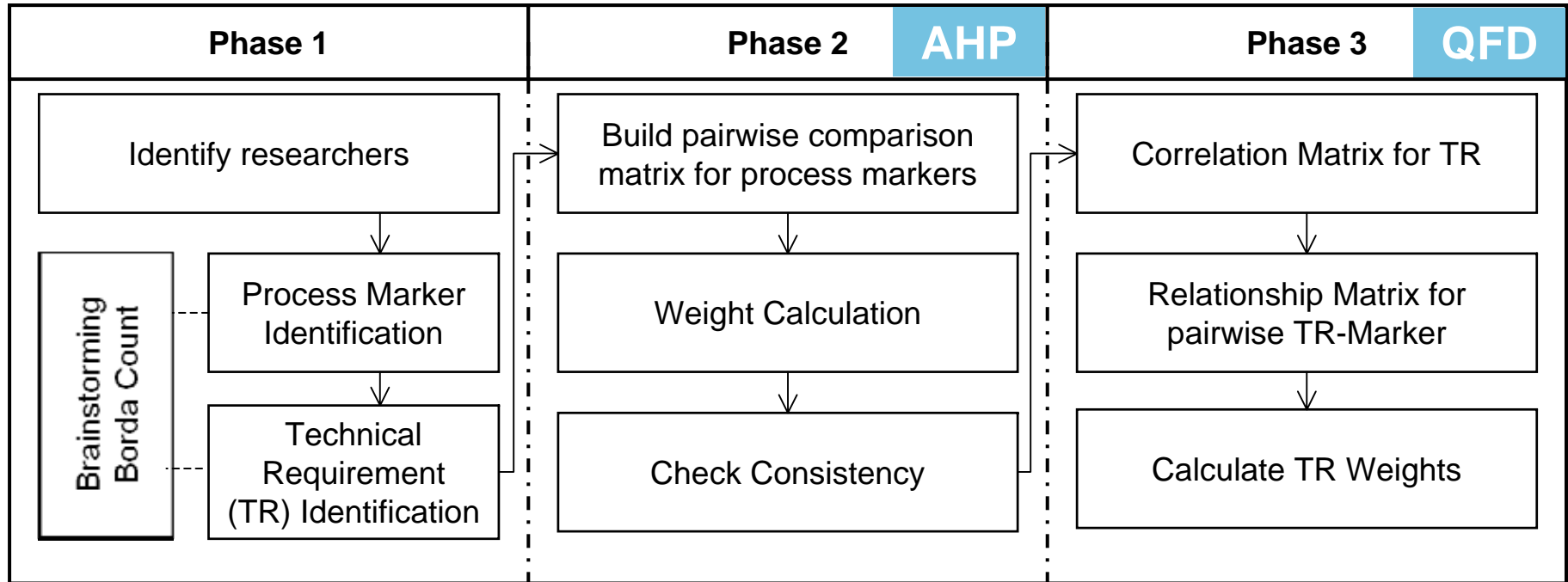
**The quality improvement framework cannot remain static... A fortification with OR/MS techniques is needed.**

Tang et al., 2007





# METHODOLOGY AND CASE STUDY



## CASE STUDY: PEER-LED OBESITY COUNSELING

The main objective of the research is to determine the short-term efficacy of a primary care-based weight control intervention in which successful volunteer peers deliver a group-based program.

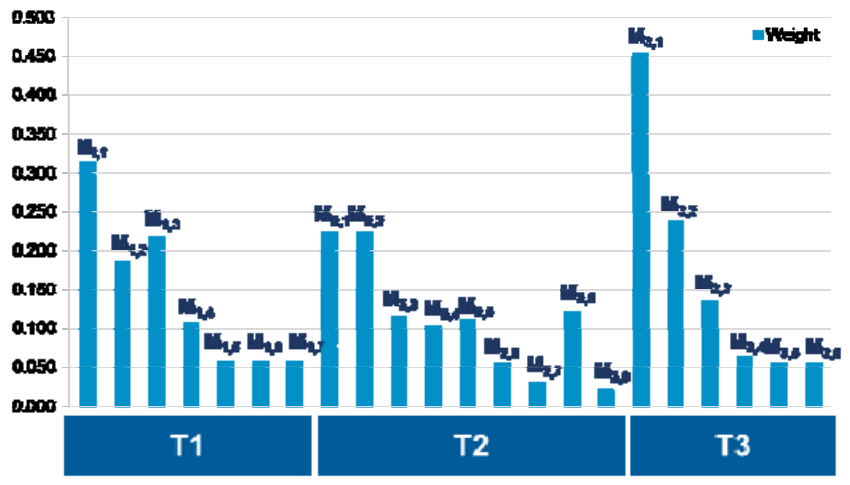
Project Leader: **Dr. Jennifer Kraschnewski**



# EXTENDED PROCESS MARKER MODEL AND TECHNICAL REQUIREMENTS

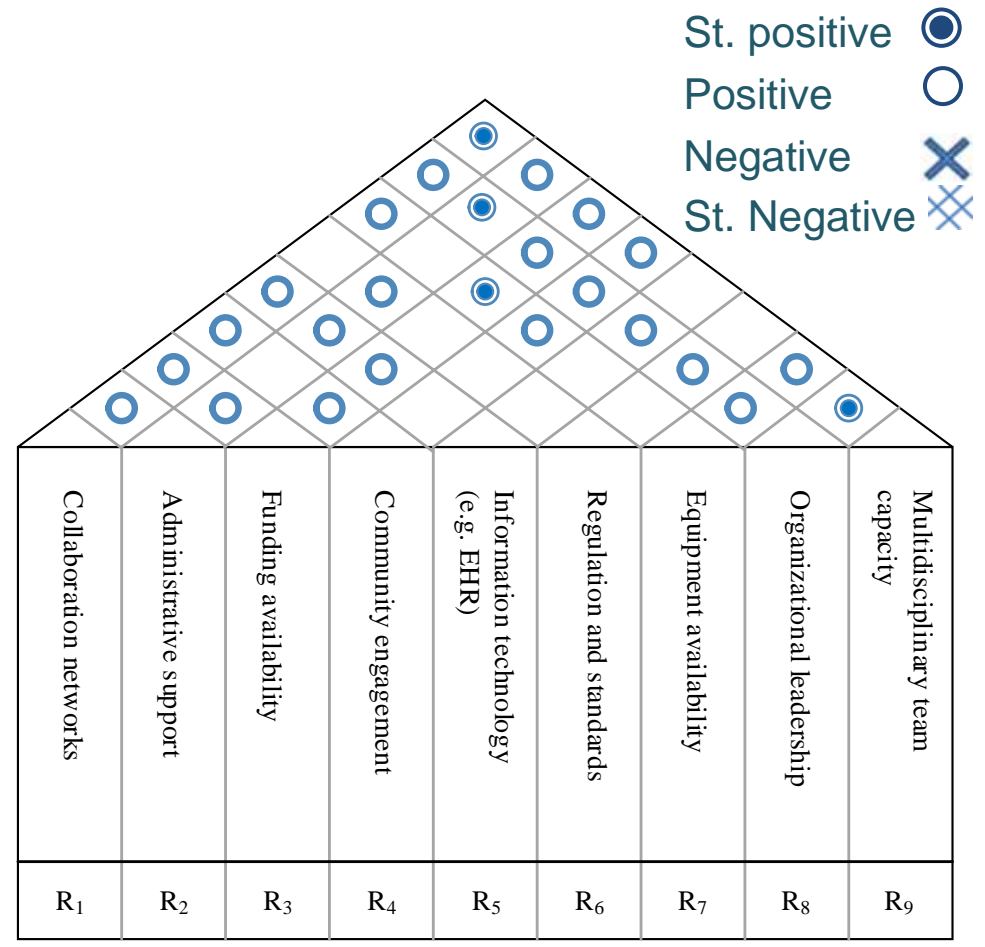
## AHP

What is the relative importance of the operational steps?



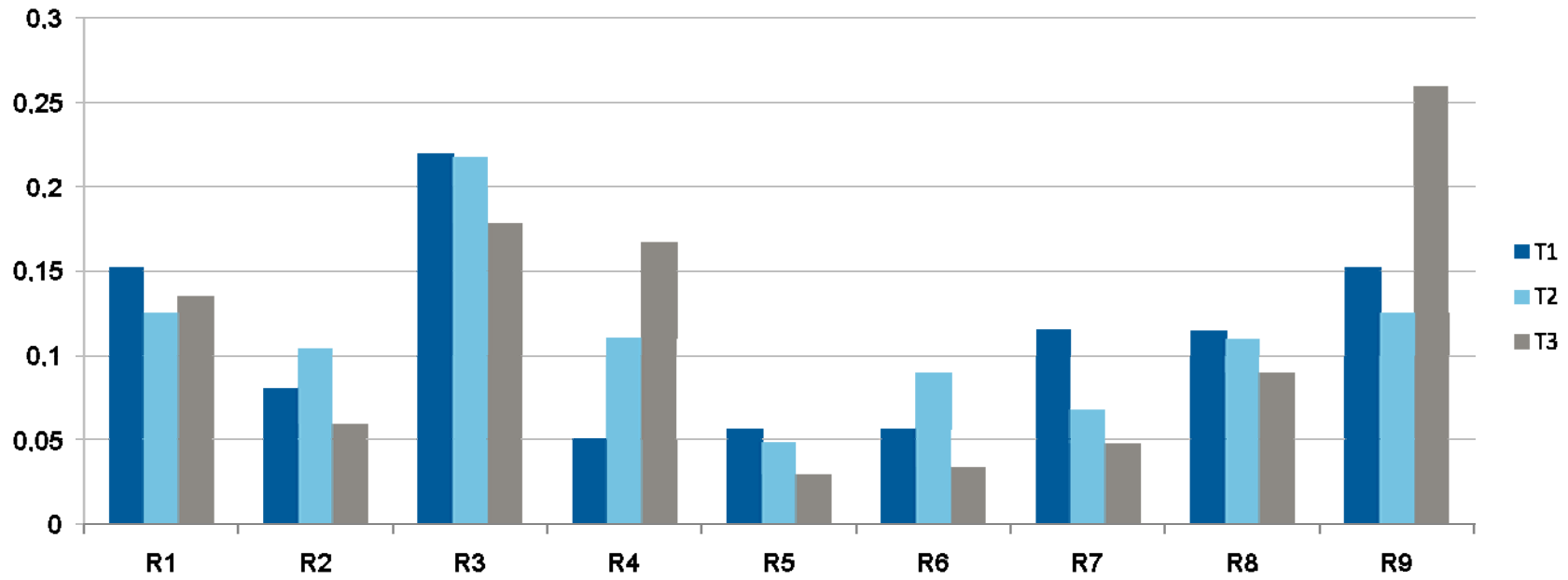
## QFD

How correlated are the TR?





# QFD-AHP Results



Relative importance of TR changes over time

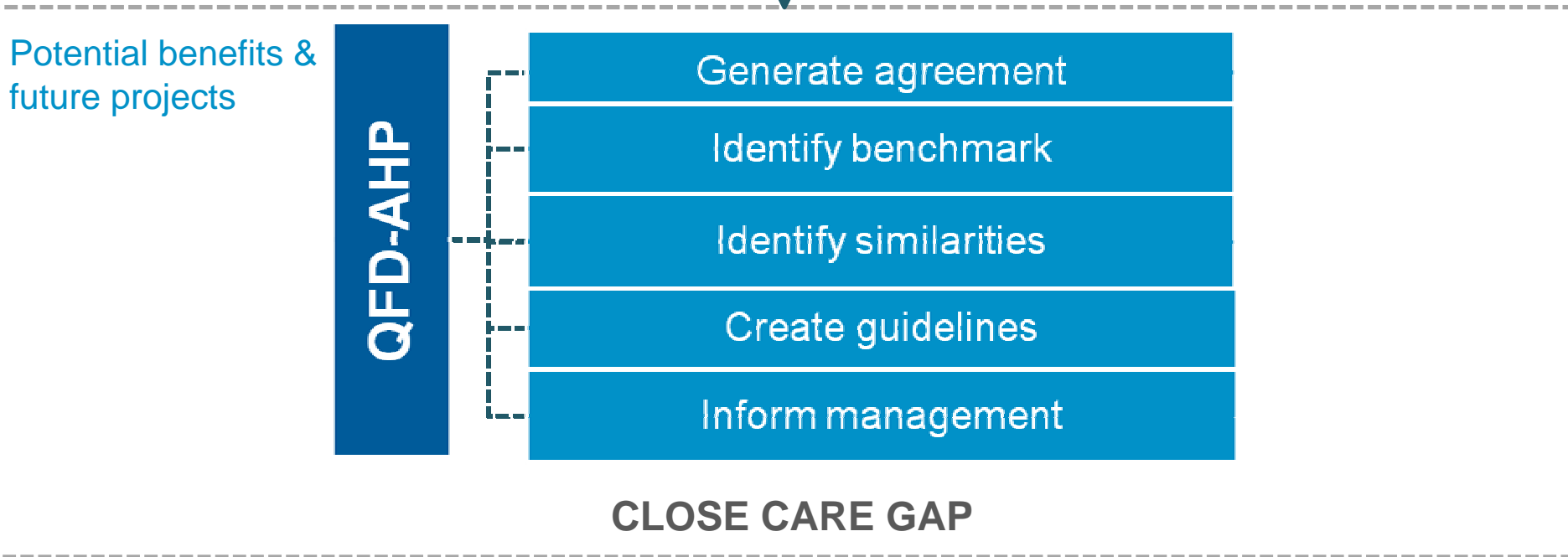
Of course... funding is important

Collaboration networks and multi-disciplinary team capacity are essential





# PLAN-DO-CHECK-ACT SUMMARY



# BUILDING UPON THE QUALITY IMPROVEMENT BASE

- Main operational steps
- Drivers in translational research
- Resource allocation to support translation
- Technical requirements to be prioritized
- Understand dynamic and complexity

- Formalize and operationalize strategy of an organization
- Incorporate multiple criteria into the resource allocation problem
- Impact of a healthcare intervention
- Incorporation of cost-effectiveness into the resource allocation process



- Strong collaborative networks
- Leaders, influencers and bridgers
- Structural collaborative holes
- Institutional support
- Interesting collaboration metrics
- Areas of opportunity

# ACKNOWLEDGMENTS

PENNSTATE



**Center for Integrated Healthcare  
Delivery Systems**

[www.CIHDS.psu.edu](http://www.CIHDS.psu.edu)



PENNSTATE HERSHEY



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# THANK YOU

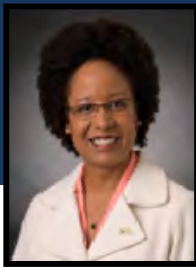
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## SPEAKER BIO

Dr. Harriet Nembhard has been a dedicated professor of Industrial Engineering for over 20 years. She also directs the Penn State Center for Integrated Healthcare Delivery Systems (CIHDS) and is the Penn State site-director for the NSF Center for Health Organization Transformation (CHOT) which focus on applied research and industry engagement to bring better modes of care to patients.

Dr. Nembhard has an extensive history of research and teaching in quality engineering and quality improvement. She is most well known for applying engineering and statistics principles to hospitals, but also has been recognized in the medical community for developing healthcare data visualization tools, monitoring the mammograms of women with breast cancer, and a patented manufacturing process for making small-scale medical devices. She is the author or co-author of over 50 research publications and has been the PI or co-PI on six federally-funded grants. Her textbook entitled *Healthcare Systems Engineering* will be published by Wiley in Spring 2016.

In addition to her many contributions to Penn State and the healthcare and engineering fields, Dr. Nembhard has served as a technical consultant for several major companies. She is an Academician of the International Academy for Quality and a Fellow of the American Society for Quality.