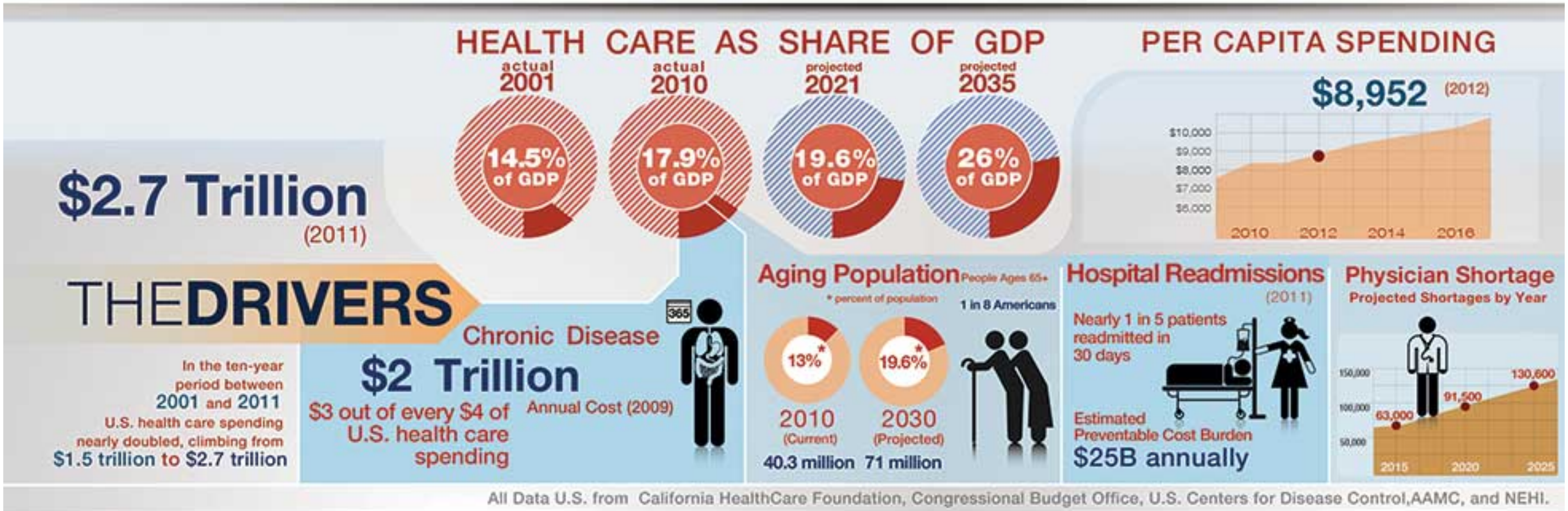
November 2, 2013

Pitting systems engineers against the US health care cost problem

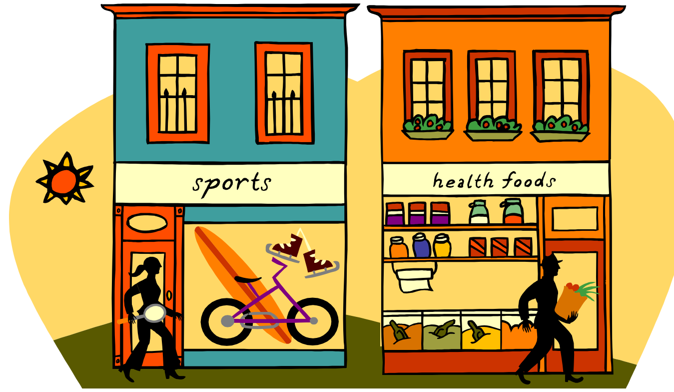
John N. Wood, PhD

The U.S. health care cost problem



The cost problem affects…

Government
(Federal, state, & local)



Businesses

YOU ARE HERE

and Consumers!

What comprises the health care system?

“Who ya gonna call?”

Systems engineering & reinventing health care

- **West Health Institute**
  - Creating four Disease Solution Teams, each with a dedicated SE
  - More information in the following slides
- **Institute of Medicine**
  - Formed *Systems Approaches for Health Innovation Collaborative*
  - Joint project with the National Academy of Engineering
  - Comprised of SEs, Industrial Engineers, Operations Researchers, etc.
- **President's Council of Advisors on Science and Technology**
  - Per Presidential request, 2014 agenda includes study on leveraging systems engineering in health care
  - Study will be performed by the 21 members appointed from industry, academia, research institutions, and other non-governmental organizations

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four organizations with a shared mission
to lower the cost of health care

Innovate	Educate	Invest	Accelerate
westhealth™ institute	westhealth™ policy center	westhealth™ investment fund	westhealth™ incubator

Disease Solution Teams

Mission: To lower health care costs by creating innovative, patient-centered solutions that deliver the right care at the right place at the right time.

- **Team Lead**
- ***Systems Engineer Lead*** → *Bring the voice and objectivity of systems engineering, guide problem solving, and invoke the discipline of full process/ solution development.*
- **Health Care Operations Lead**
- **Clinical Lead**

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Systems engineering tools

What's inside?

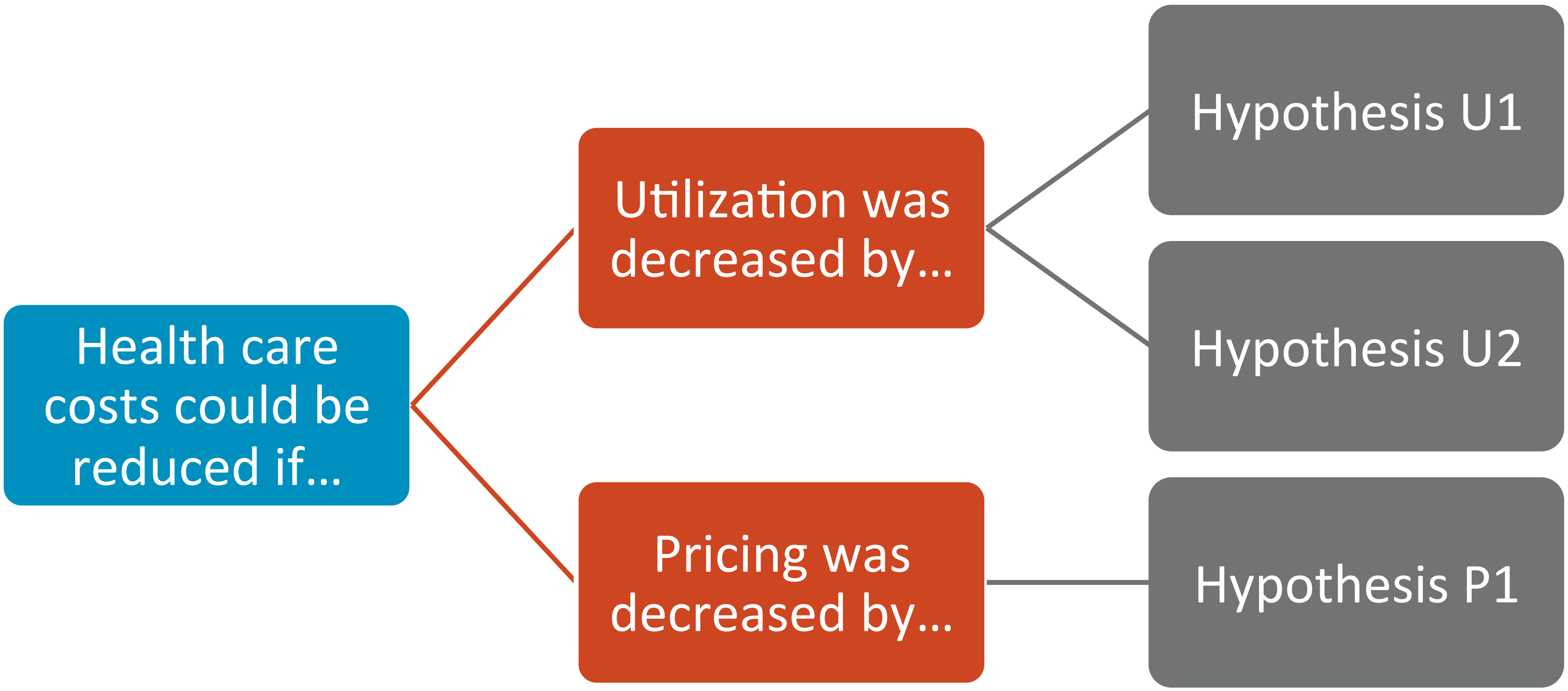
Nautilus: WHI's innovation engine

- **Founded on Six Sigma's DMAIC methodology**
  - **Define:** Establish the context and objectives of the process
  - **Measure:** Determine the baseline performance and capability of the process
  - **Analyze:** Use data and tools to understand the cause-and-effect relationships in the process
  - **Improve:** Develop the modifications that lead to a validated improvement in the process
  - **Control:** Establish plans and procedures to ensure that improvements are sustained
- **Performed in a spiral, fast-fail approach**
  - Equal attention is given to each of the five areas listed above
  - Incrementally expand DMAIC analysis as ideas graduate to subsequent phases listed below
- **Phases paired with Medical Research Organization (MRO) requirements**
  - **Explore:** Examine issues, root cause, potential savings, and possible solutions
  - **Enlist:** Solicit support of the MRO's service lines (e.g., clinical, legal, human resources, etc.)
  - **Execute:** Perform research to prove/disprove hypothesis
  - **Exit:** Transfer solution (or lessons learned) so that others may benefit

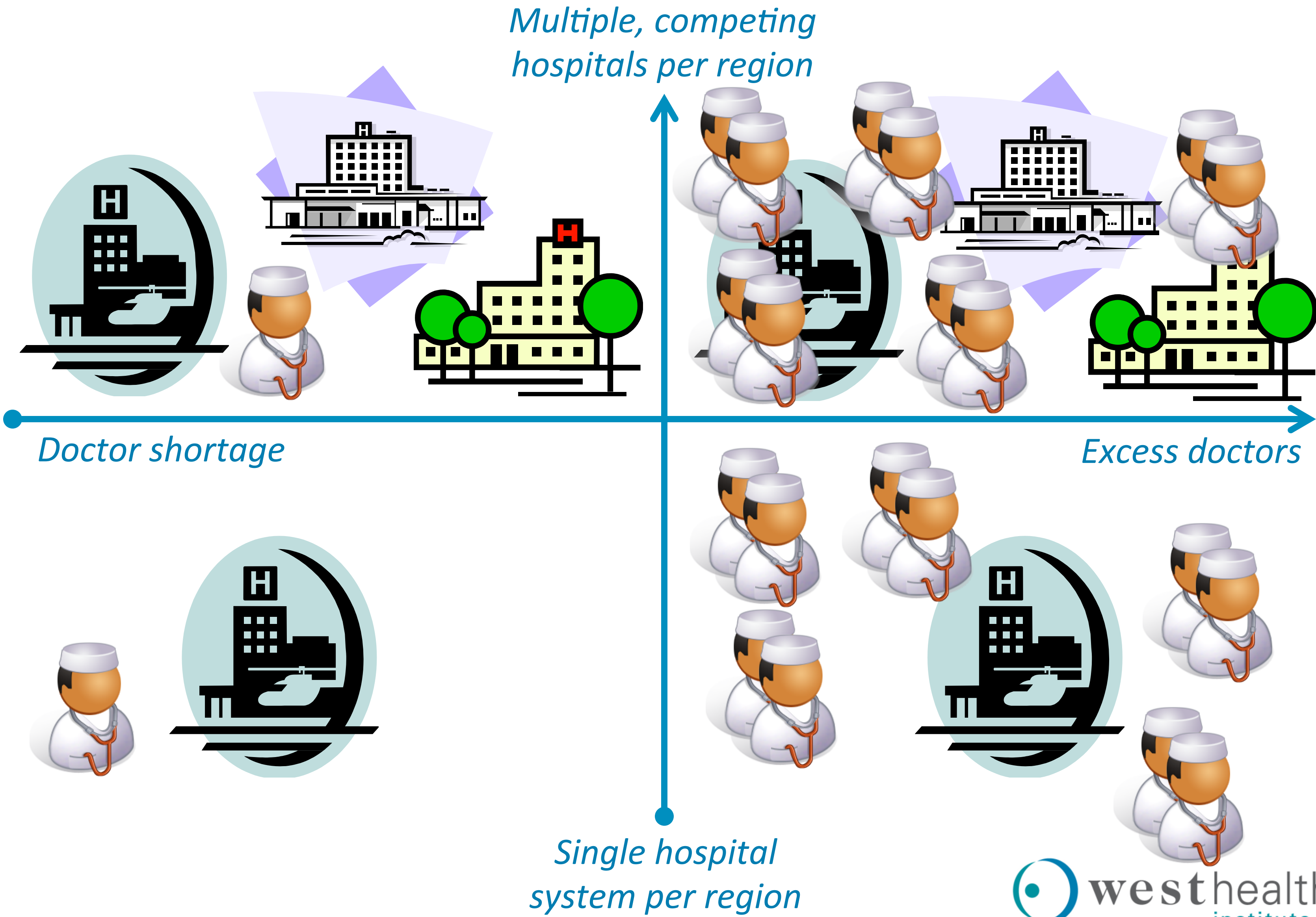
“Fact Pack”

- **Contains**
  - Facts
  - Figures
  - Scholarly articles
- **Does not contain**
  - Commentary
  - Interpretations (including our own!)
- **Supports domain analysis phase**
- **Serves as a go-to reference throughout the project**

Hypothesis tree



Scenario-driven futuring



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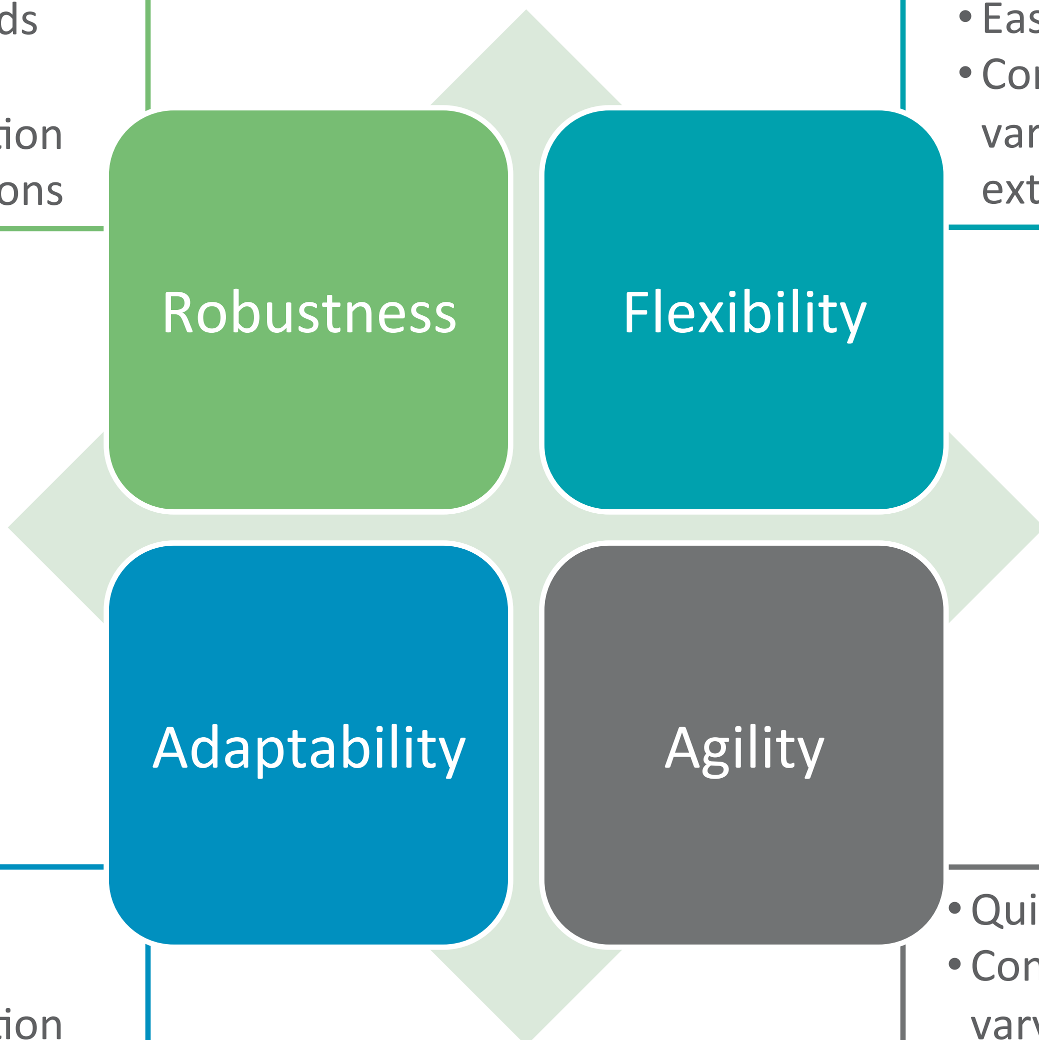
Design for change

- Insensitive towards change
- Continue to function in varying conditions

- Easy to change
- Continue to function in varying conditions after external interaction



- Self-adapting to change
- Continue to function in varying conditions

- Quick to change
- Continue to function in varying conditions after external interaction

What I’ve learned

- **Health care is a complex systems problem**
  - Combinations of people, patients, processes, and technology
  - Treatments take time (systems dynamics)
  - Domain is constantly changing via new policy, technology, science, etc.
- **Systems Engineering fundamentals apply universally**
  - Don’t lose sight of the requirements
  - Mind the interfaces
- **Medicine does not always invoke systems thinking, but it should!**
  - Co-morbidities (i.e., multiple diseases) are often treated individually
  - Many studies are performed in an unrealistic “A vs. B” fashion

Thank you!

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Disease Solution Team

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We're hiring!