

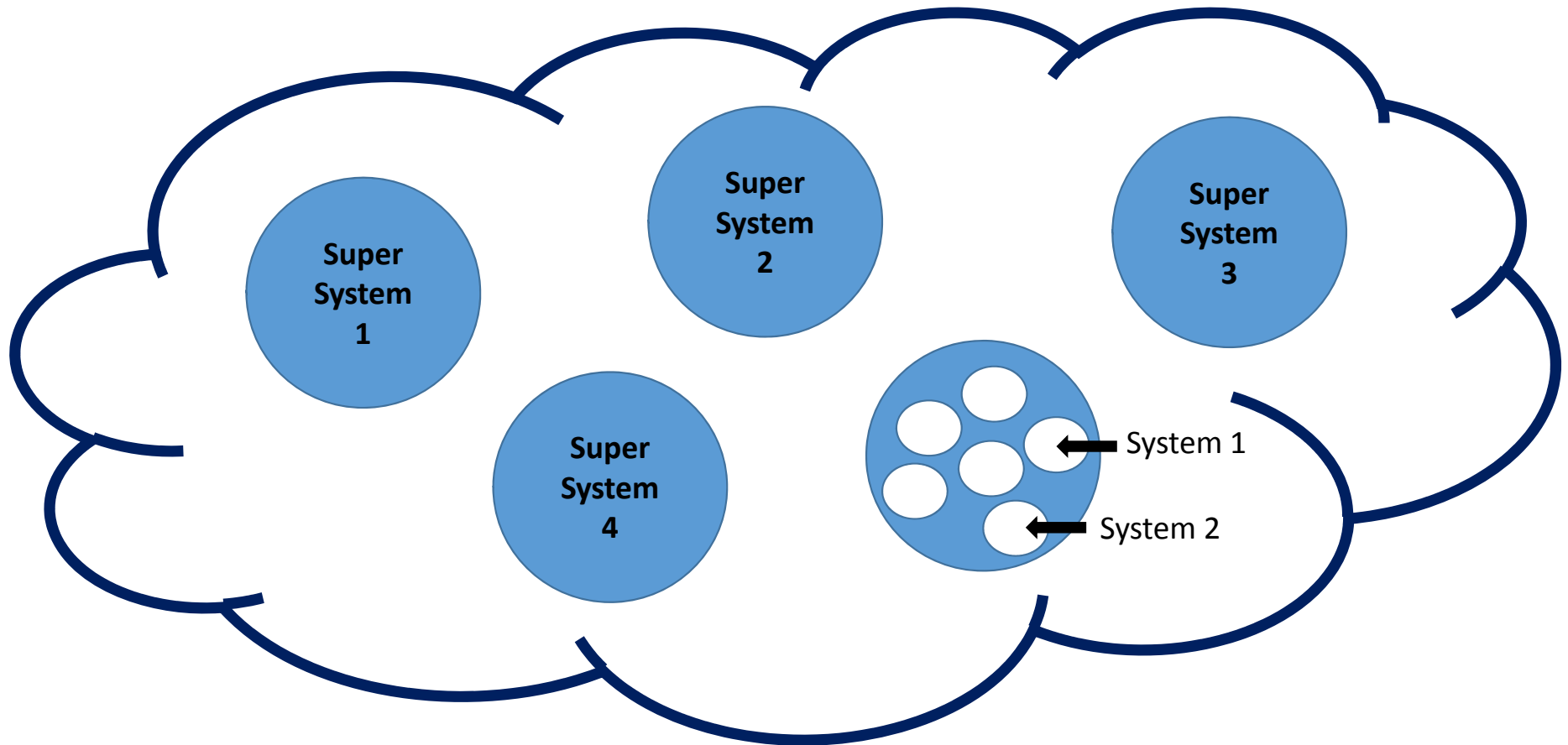
Healthcare Systems s Kick Off Meeting

Scary and Humbling: a \$3 trillion giant segment of economy

Bohdan "Bo" W. Oppenheim, PhD
Professor of Systems Engineering
Loyola Marymount University, Los Angeles

Biomedical and Healthcare Systems Working Group
INCOSE IW-2015, Los Angeles

U.S. Healthcare = Hyper System



What is the Mission of the INCOSE Healthcare Systems?

- Do we want to attack this question first, or try to understand the problems first?
- Please treat all of the following slides as questions that I propose for our brainstorming

Top Level National Goals?


- Bend the cost curve downward (how far? To CPI?) - without sacrificing quality or access
- Increase quality + science without increasing costs
- Improve access

Understand the Presently Imperfect State?

EXHIBIT ES-1. OVERALL RANKING

COUNTRY RANKINGS

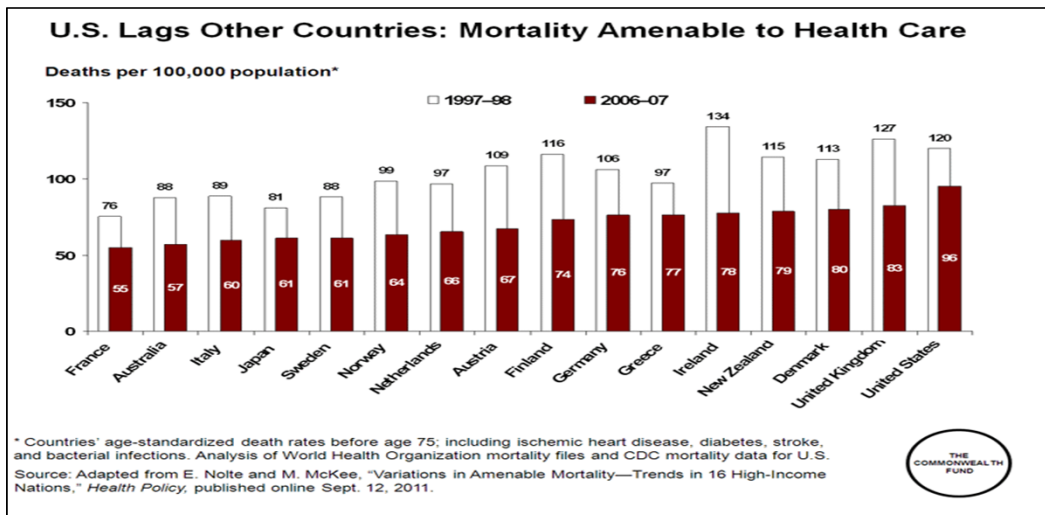
Top 2*
Middle
Bottom 2*



	AUS	CAN	FRA	GER	NETH	NZ	NOR	SWE	SWIZ	UK	US
OVERALL RANKING (2013)	4	10	9	5	5	7	7	3	2	1	11
Quality Care	2	9	8	7	5	4	11	10	3	1	5
Effective Care	4	7	9	6	5	2	11	10	8	1	3
Safe Care	3	10	2	6	7	9	11	5	4	1	7
Coordinated Care	4	8	9	10	5	2	7	11	3	1	6
Patient-Centered Care	5	8	10	7	3	6	11	9	2	1	4
Access	8	9	11	2	4	7	6	4	2	1	9
Cost-Related Problem	9	5	10	4	8	6	3	1	7	1	11
Timeliness of Care	6	11	10	4	2	7	8	9	1	3	5
Efficiency	4	10	8	9	7	3	4	2	6	1	11
Equity	5	9	7	4	8	10	6	1	2	2	11
Healthy Lives	4	8	1	7	5	9	6	2	3	10	11
Health Expenditures/Capita, 2011**	\$3,800	\$4,522	\$4,118	\$4,495	\$5,099	\$3,182	\$5,669	\$3,925	\$5,643	\$3,405	\$8,508

Notes: * Includes ties. ** Expenditures shown in \$US PPP (purchasing power parity); Australian 3 data are from 2010. Source: Calculated by The Commonwealth Fund based on 2011 International Health Policy Survey of Stepped Adults; 2012 International Health Policy Survey of Primary Care Physicians; 2013 International Health Policy Survey; Commonwealth Fund National Scorecard 2011; World Health Organization; and Organization for Economic Cooperation and Development, OECD Health Data, 2013 (Paris: OECD, Nov. 2013).

- \$8,508 per capita (UK: \$3,406)
- Millions still without medical insurance
- Medicines unaffordable to a hundred million people
- Over 30% of U.S. adults skip a recommended test or treatment because of cost
- U.S. ranked #70 in wellness (mostly due to obesity)
- U.S. ranked last among 11 countries in preventable deaths



Understand the History and Context of U.S. Healthcare?

- Lack of consensus for universal care
- Employer-based system
- Historically wrong financial incentives (pay per service)
- Weak systemic push-back on costs
- Highly fragmented system
- Crazy reimbursement/insurance system

Characteristics of Good Healthcare?

- Affordable
- Safe
- Effective
- Patient centered
- Timely
- Efficient
- Equitable
- Inclusive of Latest Science

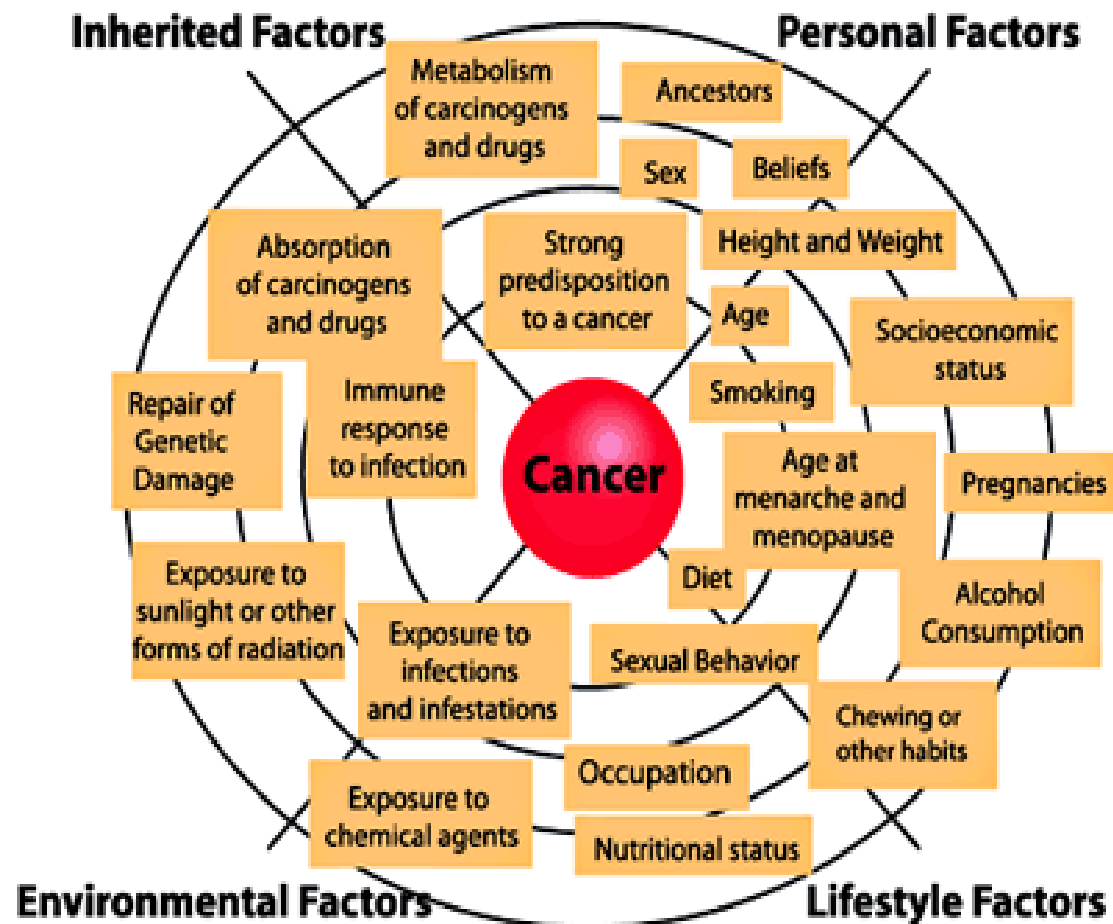
Stakeholders?

- Patients (all human beings living within the U.S. plus U.S. travelers abroad)
- Medical professionals: providers, MDs, Nurses, Assistants
- Medical facilities (hospitals, clinics, labs)
- Researchers of Medical Knowledge in academia, NIH, NSF, Institutes
- Researchers and engineers of Medical Equipment
- Pharmaceuticals
- Insurances
- Employers
- Federal Government and regulatory bodies
- All three branches of governments at Federal, State (and Local ?) levels
- Military and Veterans Administrators
- Academia and schools teaching and researching medicine-related knowledge
- Fire Departments and Ambulances
- ????

Wearing the Systems Engineering Hat?

- Define “Healthcare **Systems**”
- Identify Healthcare **System of Interest** to INCOSE (several?)
- Identify Subsystems
- Identify Externalities
- Identify Interfaces among subsystems and with externalities

Example: Systems Thinking about Cancer Risk Factors



**Mining big data
= powerful new
opportunity.
Number of
records:**

KP: 10,000,000
U.S.: 300,000,000
World: 9,000,000,000

Apply the Systems Thinking Knowledge

1. For each selected System define the unstructured problem (challenges, problems, issues)
2. Repeat as a structured problem: define current state and a desired future state (Goals, top level requirements).
3. Define CATWOE:

C = customer (beneficiary or victim)

A = Actors who make the transformation happen

T = input-output transformation process

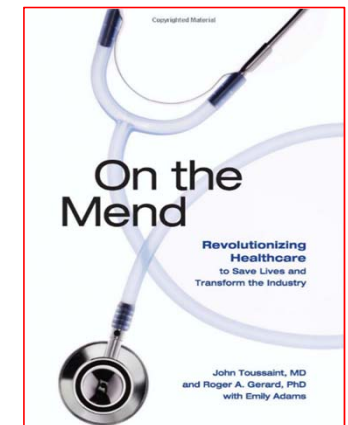
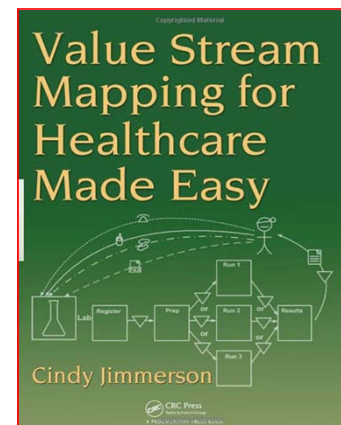
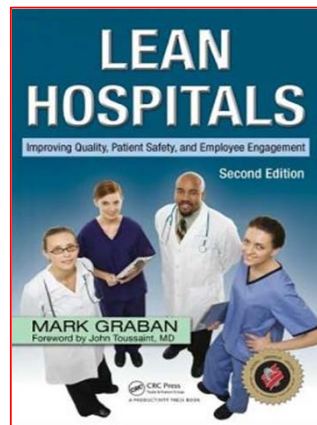
V = (Weltanschauung) = view point based on some common-good

O = Owner of the element

E = externalities or constraints acting on the element

...and then, in close cooperation with broad range of professionals, apply our Expertise in Systems Engineering

- Top level Requirements
- Architecting
- Requirements management
- MBSE and OR Modeling
- Lean/Agile Systems Engineering
- The ...ilities
-



Great News

1. We start with a clean state, unburdened by any INCOSE or SE bad practices in Healthcare
2. We have access to extraordinary experts. Today:
 - Michael Kanter, M.D., Kaiser Permanente Regional Medical Director of Quality & Clinical Analysis
 - Steve Tarzynski, M.D., Chief of Pediatrics, Kaiser Permanente West LA and activist

U.S. Healthcare = Hyper System

