Institute for Healthcare Improvement

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NCIOM

Improving Health and Health Care: Opportunities and Challenges in Achieving Higher Quality and Better Value

Don Goldmann, MD
Chief Medical and Scientific Officer, IHI
Clinical Professor of Medicine, Harvard Medical School
Professor of Epidemiology, Harvard School of Public Health

Dgoldmann@ihi.org; @DAGoldmann

Science of Improvement

- Scientific regardless of name:
  - Science of Improvement
  - Health care delivery science
  - Implementation science
  - Systems strengthening
  - Systems engineering

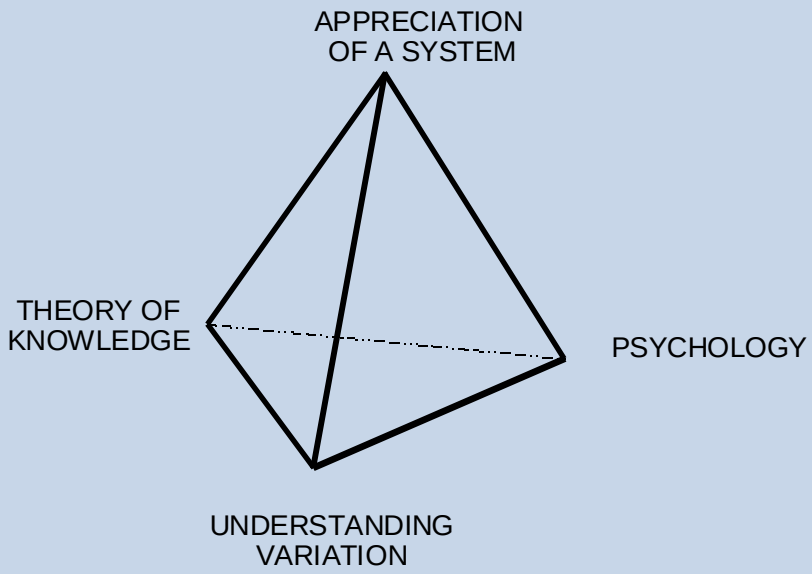
Key Attributes of Improvement Science (Model for Improvement Methodology)

- Clear, measurable aim
- A measurement framework in support of reaching the aim
- Clear description of the ideas (content) and how these ideas are expected to impact results (the causal pathway from changes to desired outcomes, and their attributable effect)
  - Conceptual or logic model, or “driver diagram”
- Clear description of the implementation strategy
  - What will be done to ensure reliable adoption of the content
- Dedication to rapid testing (PDSA) - prediction and learning from tests
- Understanding/describing/visualizing systems (process map, value stream)
- Learning from variation and heterogeneity
  - Use of time-ordered data to detect special cause and improvement
  - Understanding why results differ by ward, organization, region
- Application of behavioral and social sciences

The Model for Improvement Simplified

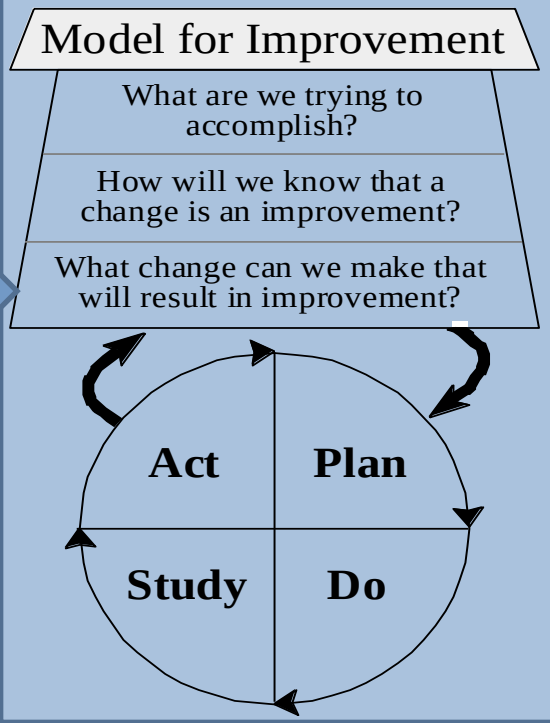
Deming 1900-1993

System of Profound Knowledge



Langley et al 1997

The Model for Improvement



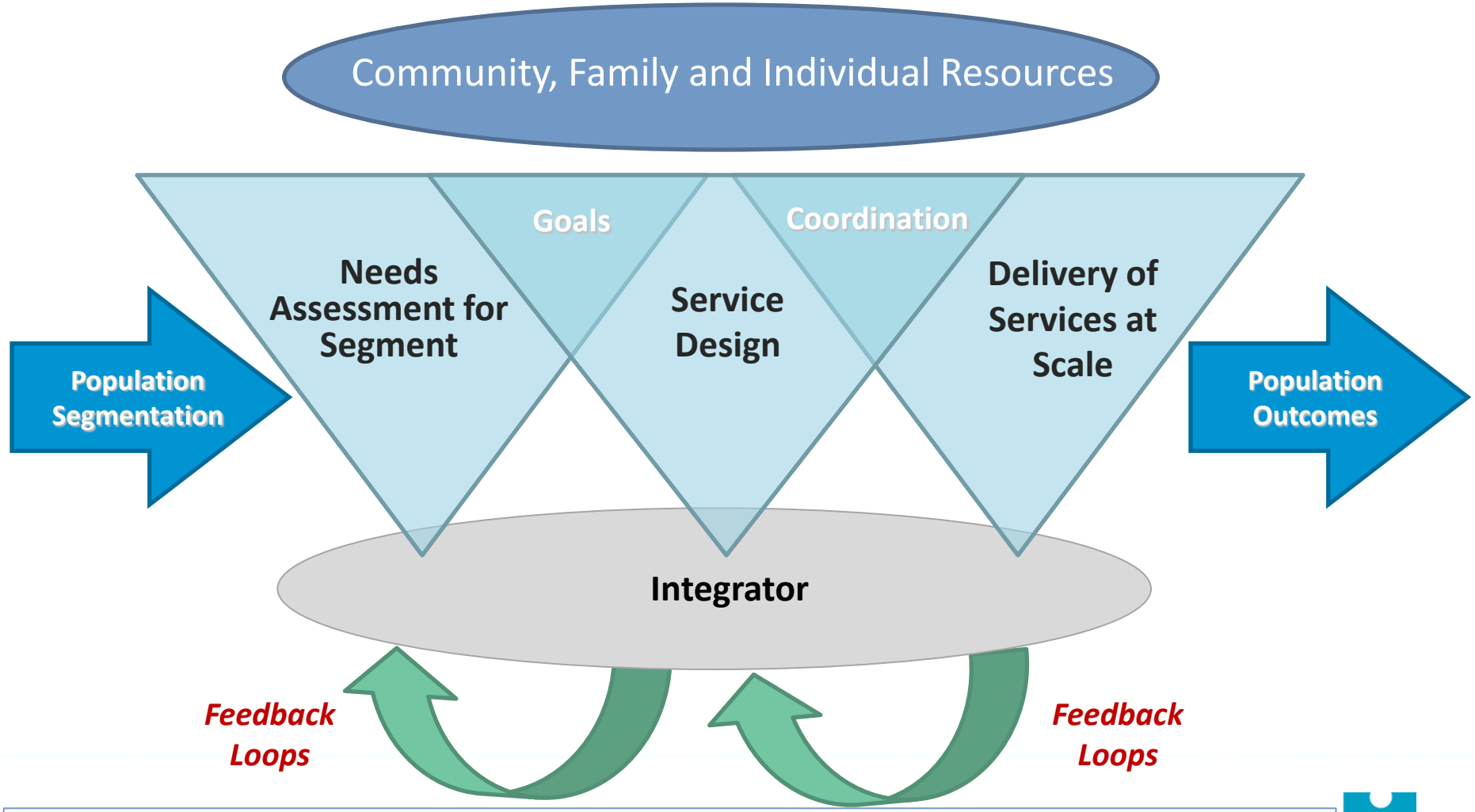
Definition

IHI *Triple* Aim

System designs that simultaneously improve three dimensions:

- Improving the health of the population;
- Improving the patient experience of care (including quality outcomes and satisfaction); and
- Reducing the per capita cost of health care.

Managing Services for a Population



Challenge: Can the Triple Aim be achieved by working on segments?

One Way to Think about Achieving the Triple Aim At-Scale

- Develop strategy and portfolio of actions/projects for all 6 layers of the system:
  - Person/patient
  - Community
  - Clinician/provider
  - Microsystem
  - Organization/health care system
  - Policy, payment, regulation
- Framed in equity and social justice

Chin and Goldmann, JAMA 2011;305:404-5
After Berwick and Bohmer

A Way to Organize Thinking About Triple Aim Initiatives

Kirkpatrick Levels for Results

1) Experience	What was the participants' experience? Did they have an excellent experience working on the improvement project?
2) Learning	What did participants learn that would enhance their chances of improving outcomes? Did they learn improvement methods and begin testing?
3) Process/Behavior	Did participants modify their behavior? Did they work differently and see changes in key process measures?
4) Outcomes	Did performance/outcomes improve?

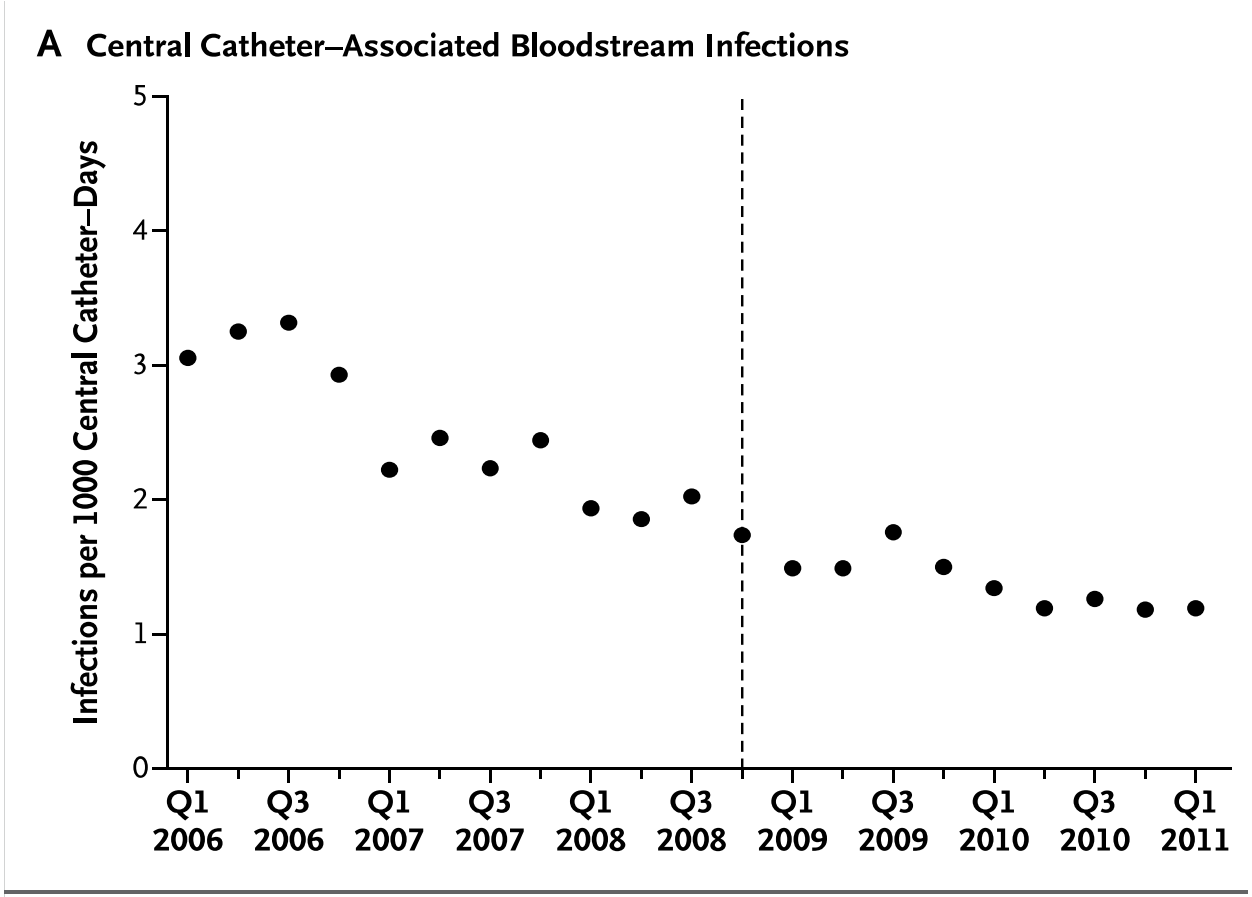
Role of Pay for Performance and Value-Based Purchasing in Achieving the Triple Aim

- Is this an important lever to change behavior and transform health care?
- Or is it preferable to focus on re-designing the payment system (e.g., bundled payments and other payment reform approaches)?

Pay-for-Performance

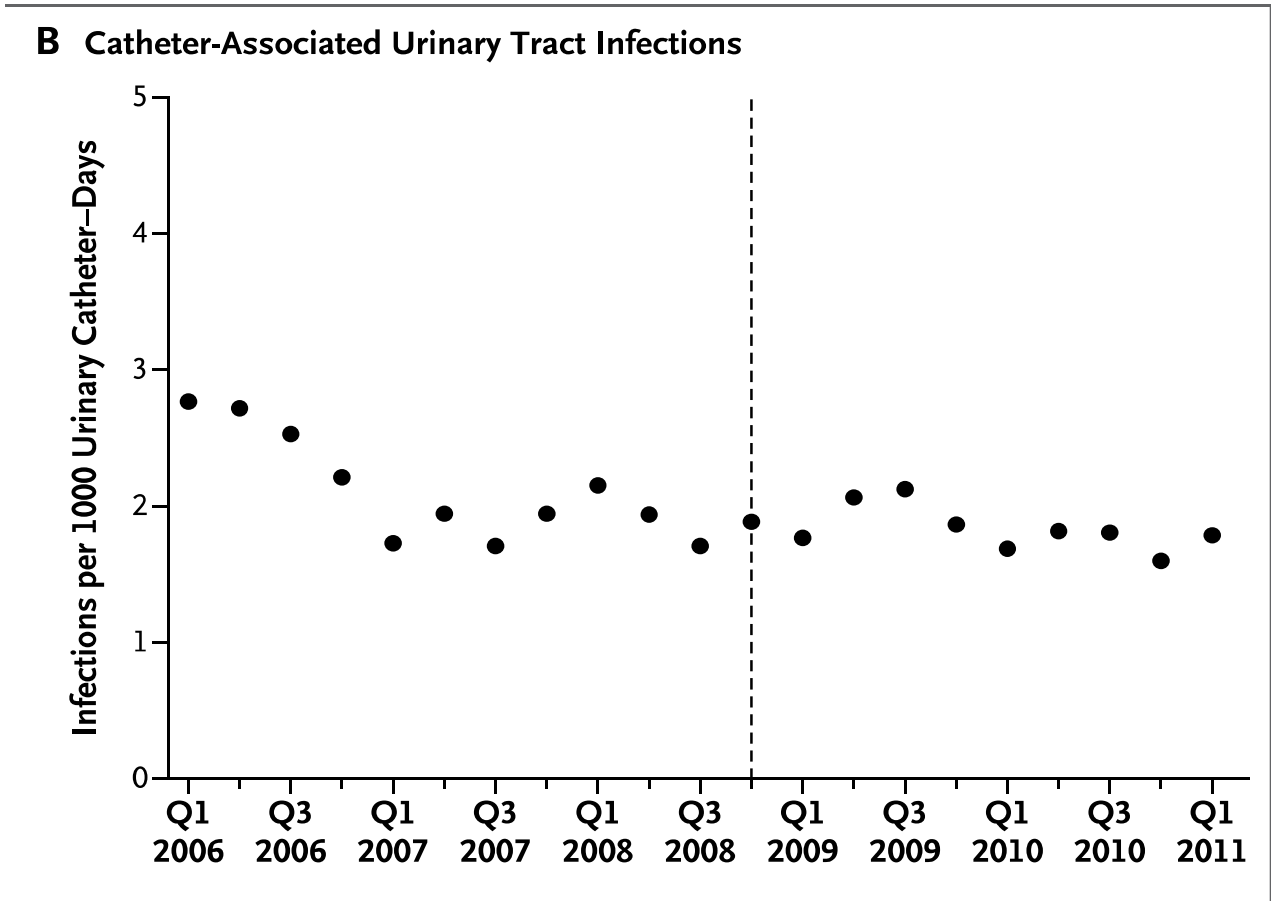
- Very little evidence that P4P is effective, particularly in the long term
  - Limited number of reliable, validated quality measures
    - Provider-specific measures problematic because of limited volume for most conditions (imprecise point estimates)
    - Case-mix adjustment remains challenging (e.g., readmissions penalties for safety net hospitals)
  - NHS primary care incentive scheme resulted in quick improvement in quality at great cost, followed by a frustrating plateau
  - When improvement does seem to have occurred (e.g., CMS readmissions penalties), it is difficult to attribute to P4P because there are so many concurrent initiatives (e.g., Partnership for Patients)
  - Hospital infection rates a “signature” example – a pioneer condition for CMS P4P – what do the data show?

CLABSI Rates Pre and Post CMS Payment Policy Change



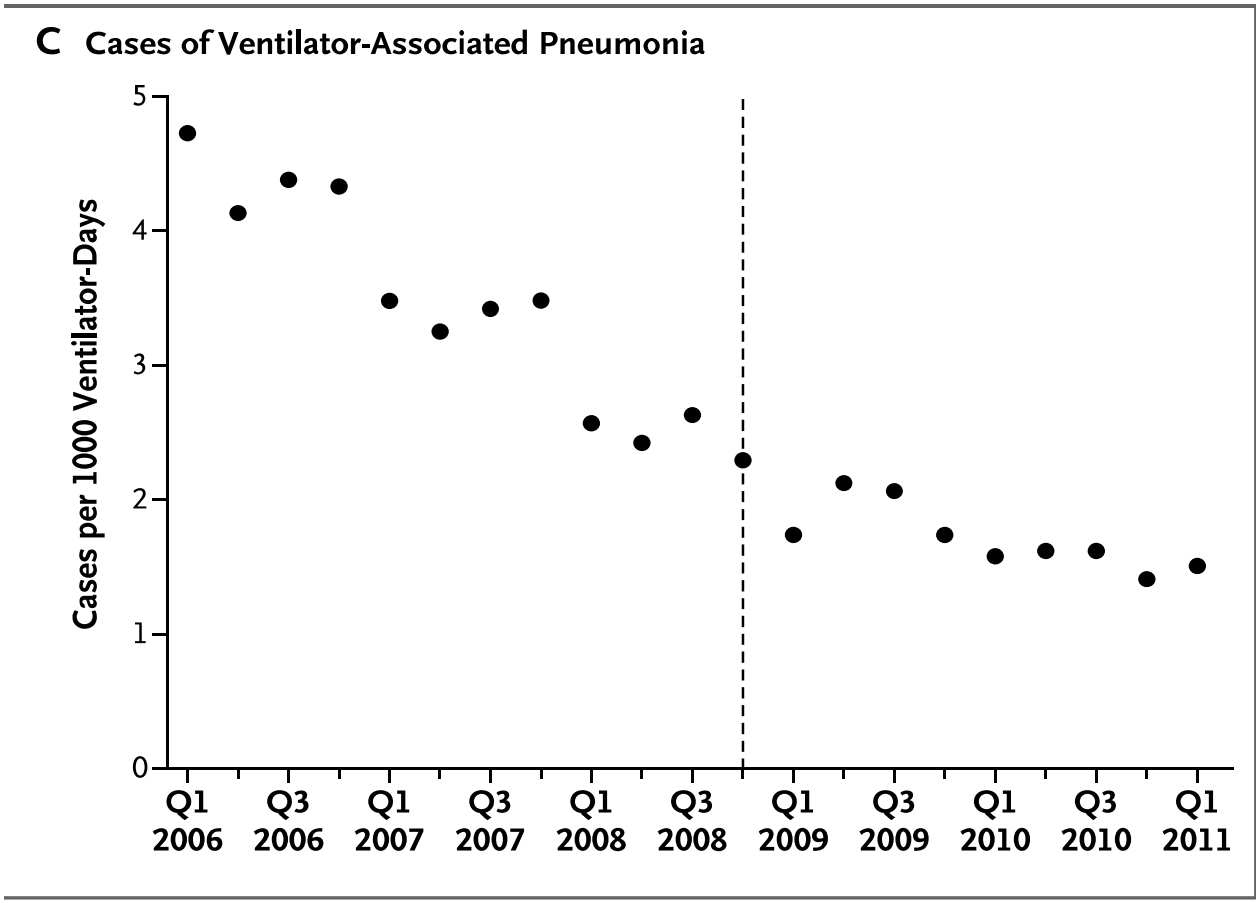
CDC NHSN data

CAUTI Rates Pre and Post



CDC NHSN data

VAP Rates Pre and Post



CDC NHSN data

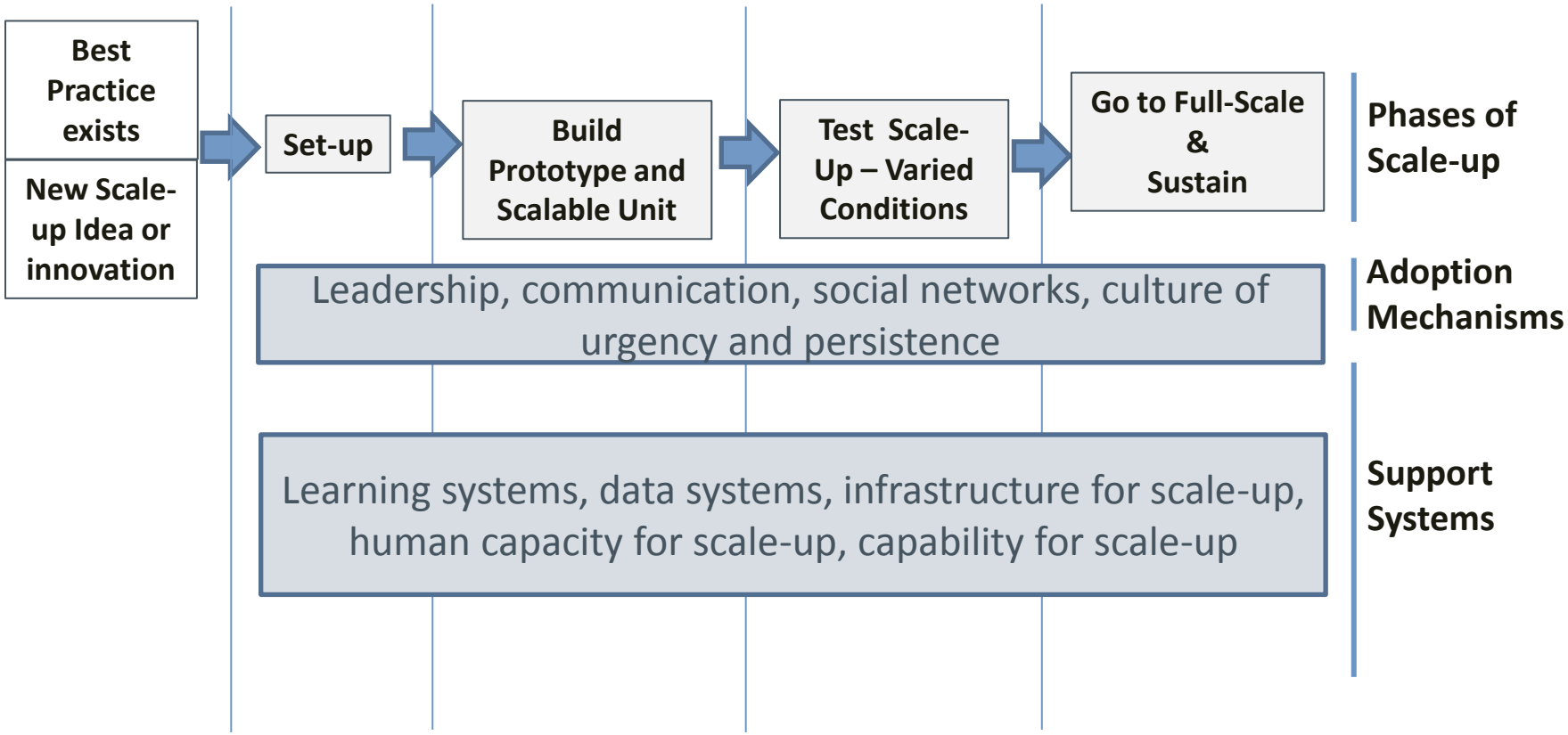
We Can Wait for Policy and Payment to Align the US Health and Health Care System and Adapt as We Go…..Or…

We Can Take Tangible Steps to Design the Elements We Will Need as Reform Progresses

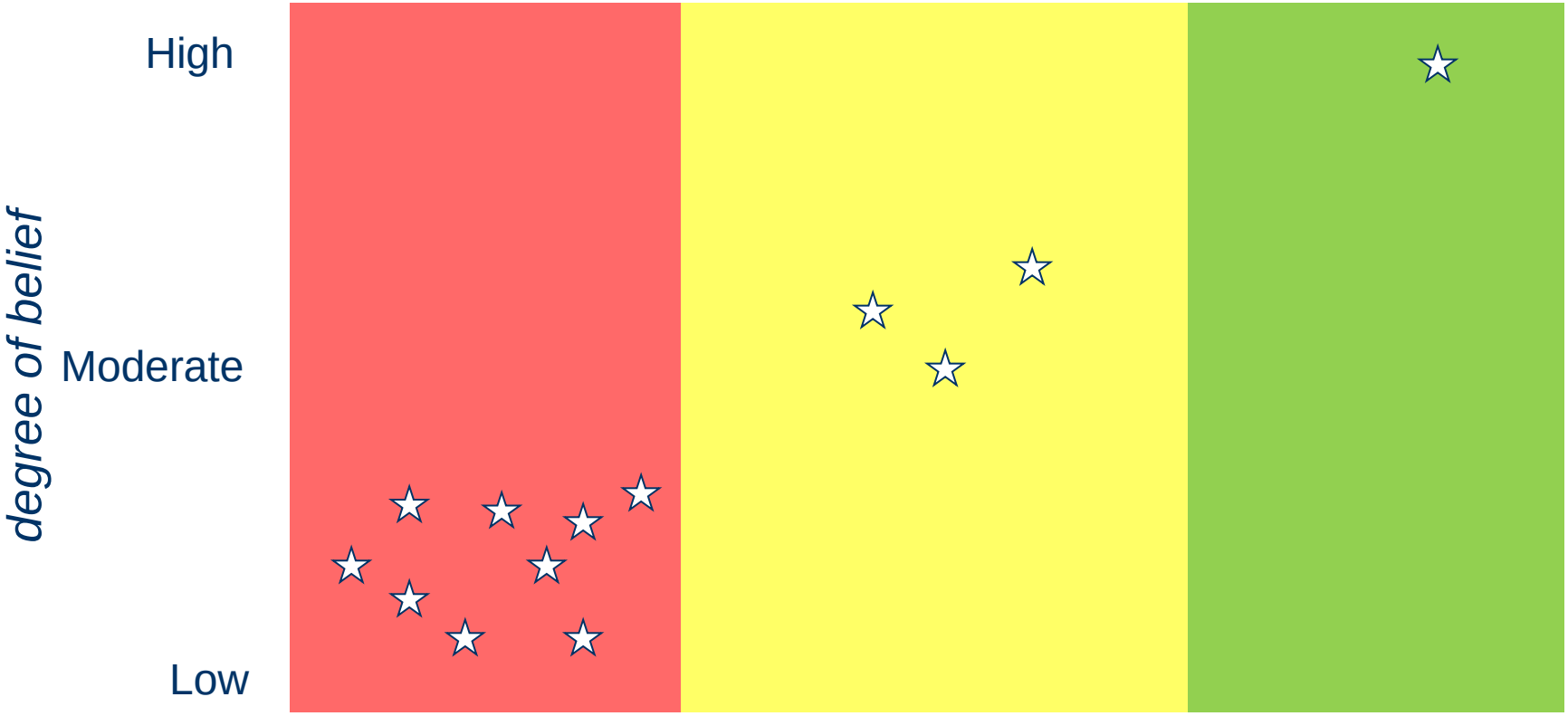
Approach # 1

Scale-up Innovations that have been carefully vetted to insure that they will work in diverse contexts and conditions through real-time evaluation-feedback loops.

Framework for Scale-Up



Degree of Belief in Change Ideas

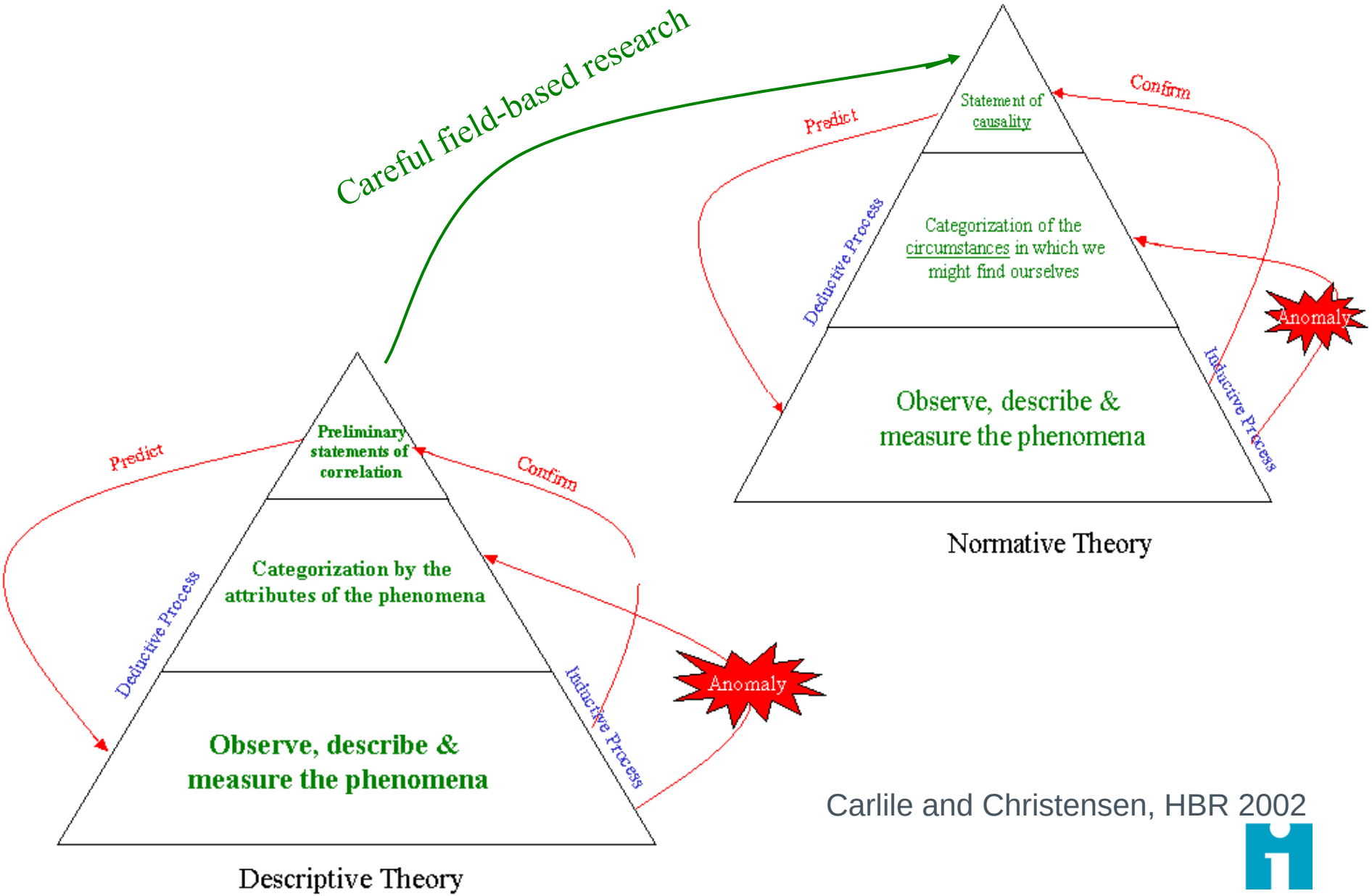


Innovation/Prototype Phase
(set design targets, develop Ideas and predictions, and draft an initial conceptual model and change package)

Pilot Phase
(test and revise/amend conceptual model and change package)

Adapt, Spread, Scale
(implement and disseminate a successful change package)

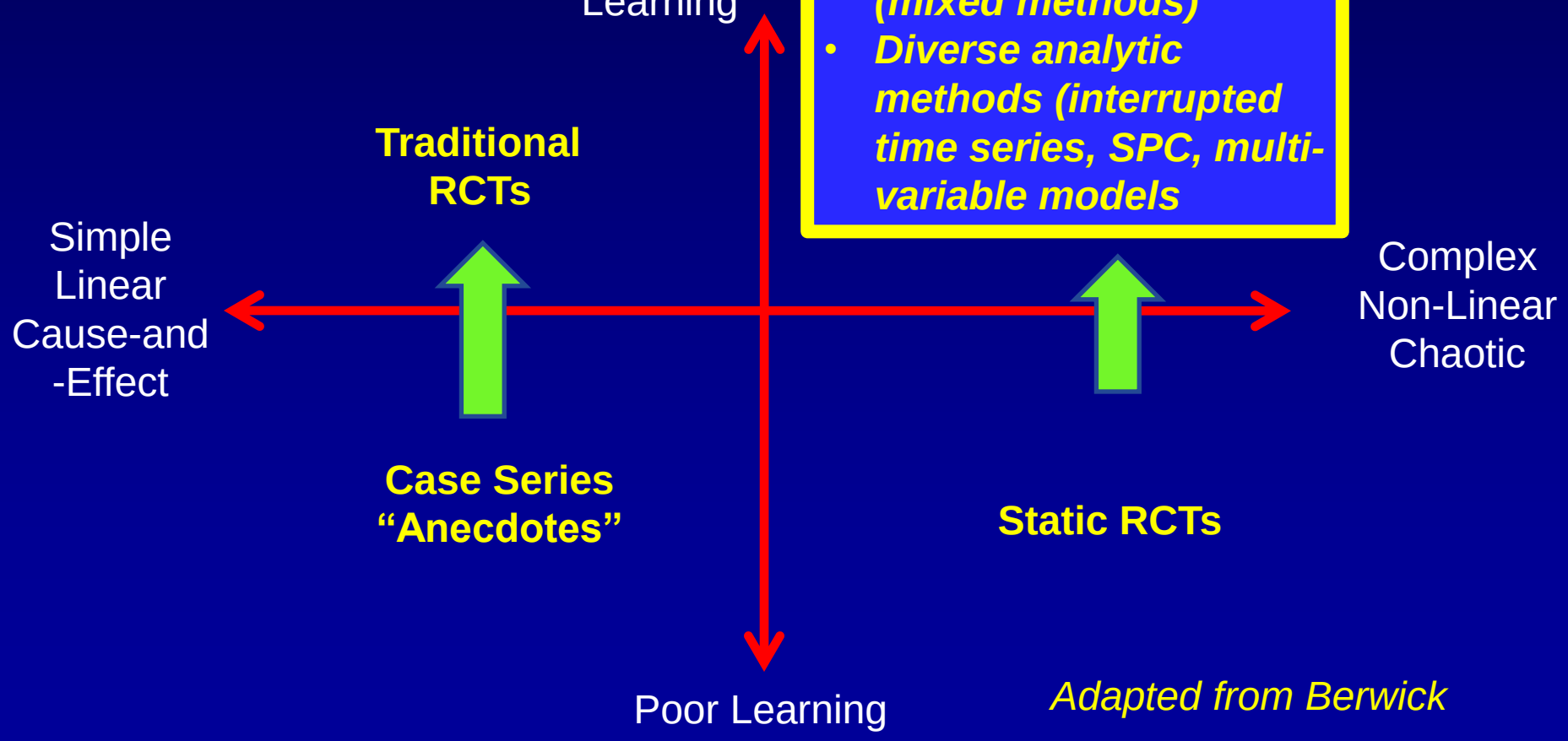
The Transition from Descriptive Theory to Normative Theory



Carlile and Christensen, HBR 2002

Rigorous Learning in Complex Systems

- ***Diverse designs (quasi-experimental and adaptive trials)***
- ***Diverse learning and evaluation methods (mixed methods)***
- ***Diverse analytic methods (interrupted time series, SPC, multi-variable models***



Adapted from Berwick

Diverse Study/Evaluation Designs

- Examples include:
  - Cluster randomized trials and meta-analytic trials
  - Bayesian and Adaptive trials
  - Pragmatic trials
  - Action and community-based participatory research
  - Quasi-experimental designs (e.g., factorial, step wedge)
  - Context-sensitive mixed methods research/Realist Evaluation
  - Observational studies with attention to exposure and follow-up (including propensity scoring, instrumental variables)
    - “Big Data” Mining and advanced analytics

Learning System Overview

Set-up Phase | Improving Performance and Learning

Use the Summaries from 4) to amend what and how communities:
1) Learn by doing and 2) Learn from each other

1) Learn by Doing

Understand community needs, and develop initial strategies and content.

Amended strategies and content

2) Learn From Each Other

Develop initial strategies for community coaching and peer to peer exchange.

Webinars, Action-focused groups, Topic-based learning groups, etc…

Peer to Peer exchange

Coaching in QI Methods

3) Learn Alongside

Establish a measurement and analysis system

Collect qualitative and quantitative data on community progress & needs

Analyze qualitative and quantitative data on community progress & needs

4) Summarize and feedback the data

Month 1 to 6

Month 7 to 24

Gareth Parry, Senior Scientist, IHI

Approach # 2

- Create standardized clinical pathways for major conditions that together comprise the majority of clinical care
  - Respect both the production system ("value stream" from the point of view of the health care system) and the consumption system ("Lean consumption" or "value stream" from the point of view of the patient)
  - Be clear about the boundaries (when the pathway begins and when it ends)
    - Start should include the decision point regarding whether or not to do a procedure, order a test, or recommend a treatment – a key step in removing unhelpful "waste" from the system
    - End point should be distant enough to assess meaningful outcomes (including patient-reported outcomes)
    - Clearly indicate who does what when and where (in process maps, these are called "swim lanes" for each category of provider)
    - Specification of a relatively homogeneous population
- Evidence review
  - Method to reach consensus (e.g., expert meeting, Delphi)
  - Which evidence is solid, which is not (evidence grading)
- Measurement framework

Analogous Approaches

- Reliability
  - Bundles
  - Checklists
- FMEA and HACCP
- Lean Consumption

Lean Consumption

- Provides patients exactly what they want and need precisely when, where, and how they want it
  - We have left it to patients to figure out the system and have trained “navigators” to help them
  - The vast majority of time is wasted (without value to the patient)
  - “Mass customization”
  - Is there a patient on your clinical pathways team?
- Case study: hip replacement

Problems and Paradoxes

- Do efforts to achieve reliable processes and care pathways stifle innovation?
- Do they nurture a learning health care system
  - Learning from variation
  - Building evidence from n=1 trials
  - The power of registries – can pathways contribute richer clinical data?
    - Not without automation

Pathway Challenges

- Tons of work to create just one
- Generally cover only a fraction of processes that need to be improved, so prioritization critical
- Analysis and amendment very time consuming
- Most EMRs do not support automated learning
- Ambiguities in evidence may not be resolved

More Care Pathway Challenges and Opportunities

- Even if all steps are solidly evidence-based and executed reliably, outcome may not move dramatically
  - Attributable effect usually lower than assumed
  - Reliability rarely is as high as needed to change outcomes
- Pathways started as nursing tools – the must be multi-disciplinary and inter-professional
  - But hard to get MDs, nurses, clinical pharmacists to communicate and round together

Challenges and Opportunities

- Clearly indicate to whom the pathway does and does not apply
  - Use cautiously in patients with do-morbidities
- Incorporate checklists at critical points in the pathway
- Build in stop checkpoints (antibiotic time out)
- Use standardized order sets liberally to drive evidence-based prescribing and testing
  - Allow exceptions, but require documentation – a key aspect of a learning healthcare system

Challenges and Opportunities

- Allow clinicians to opt out of the pathway based on their experience and judgment
  - Require documentation of the reason for deviating from the pathway
    - Foundation for a learning healthcare system
    - Protection against litigation
- Draw on guidelines from professional societies, but respect need for local adaptation and complexity of implementation
- Be realistic about what it takes to maintain clinical pathways

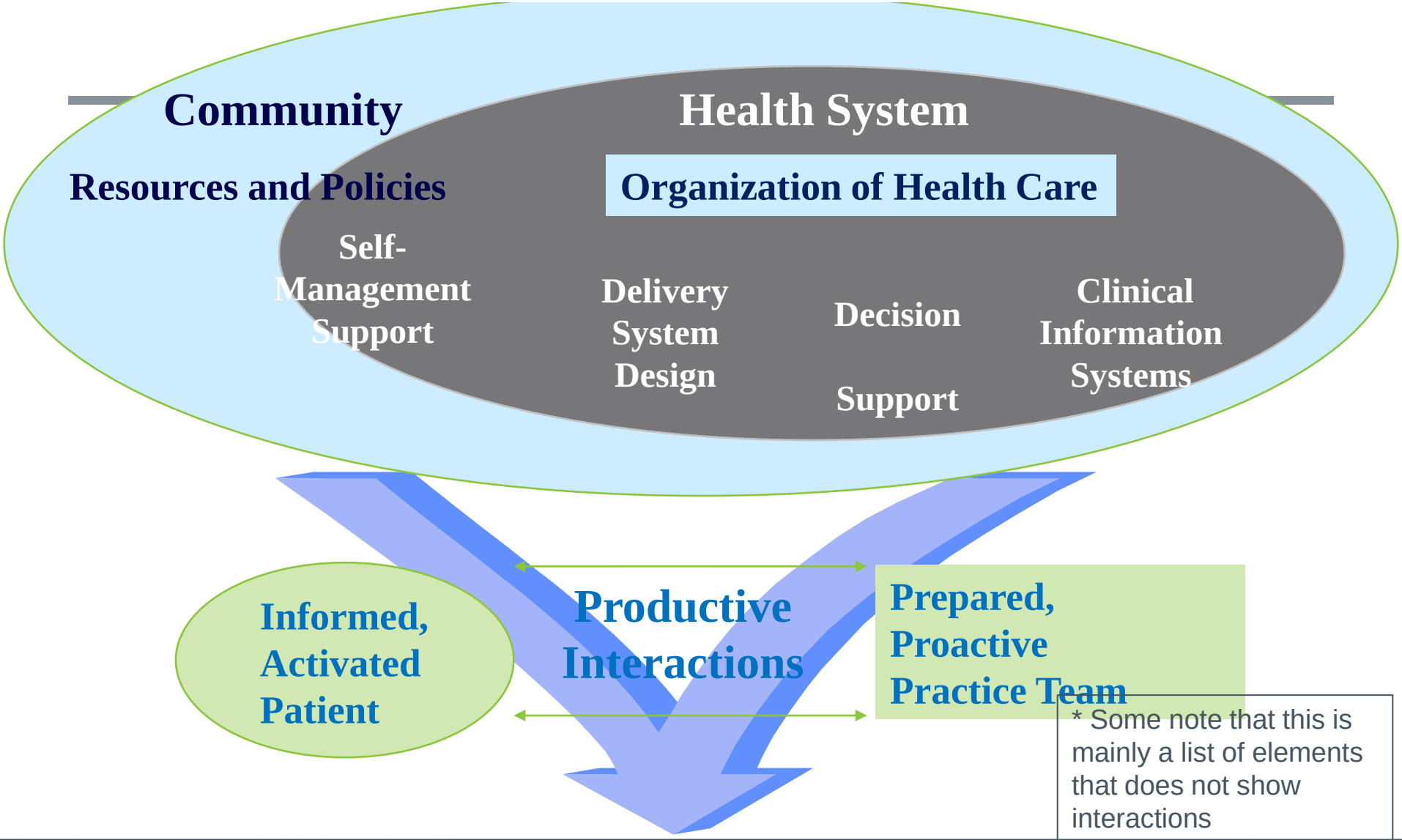
Challenges and Opportunities

- Embed quality metrics into clinical pathways so that data can be collected as part of routine work
  - Feedback data and make it visible
- Adopt and monitor “balancing measures”
  - The pneumonia treatment core metric

Approach # 3

- Understand the potential of IT and HIT to improve health and health care
  - Work with inventors and vendors to match delivery system processes with the technology
  - Be willing to adapt processes to take advantage of emerging technologies

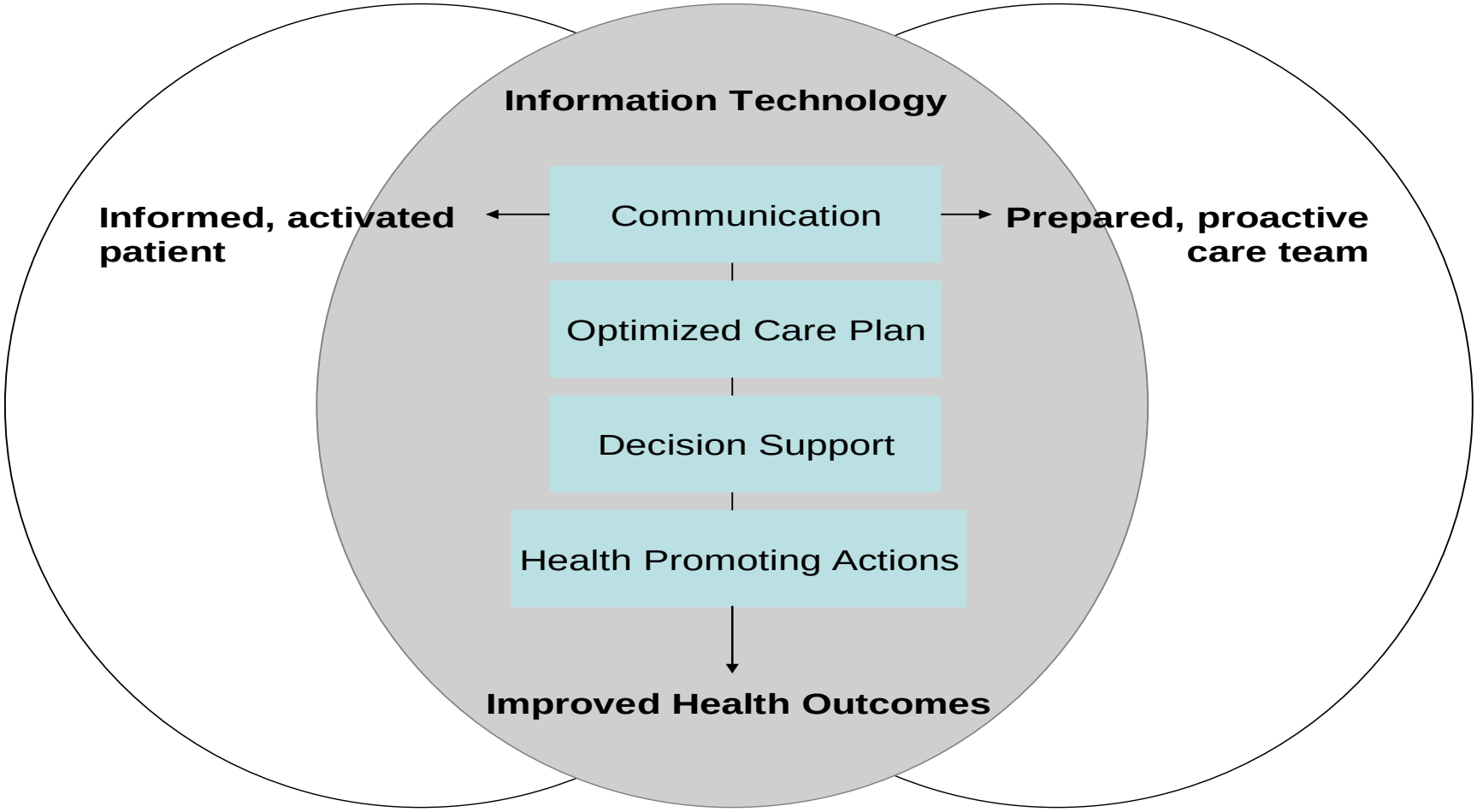
Planned Care Conceptual Model*



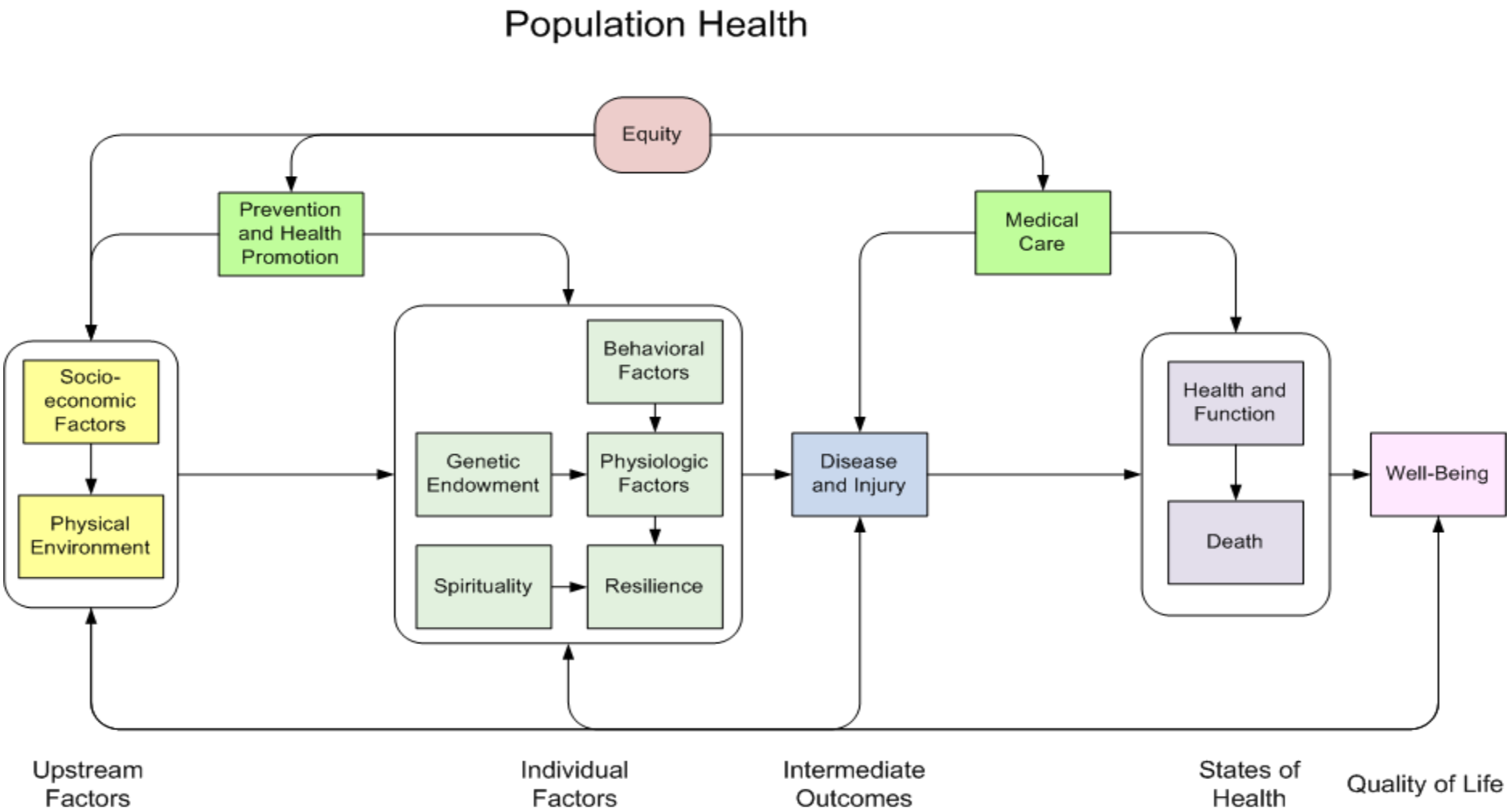
* Some note that this is mainly a list of elements that does not show interactions

Functional and Clinical Outcomes

HIT/PHR – Oriented Planned Care Model



Population Health Conceptual Model



M Stiefel 11/14/2011

“Ancient” Personal Examples of Telemedicine

- Russia surgical site infection project – 15 years ago
- LSU diabetes foot ulcer program – 10 years ago

How “Primitive” Telemedicine saved Uncle Harold

Fragmented Innovation Merely Perpetuates Fragmented Healthcare

- Mission critical: Integration of telehealth innovations with existing health and health care systems or (preferably) transformed health and health care systems
- Does connected health provide bridges, or just bridges to nowhere?
  - The AAP lambasts retail clinics (and presumably, telemedicine) because they “get in the way” of continuity of care provided by medical homes
    - But the problem is not these clinics, but the lack of connectivity to primary care
      - The Bellin way…
  - But it’s getting more complicated - can primary care receive, process and act upon multiple HIT and tech inputs?
- Policy and payment levers to promote connected health and care integration/coordination are being addressed far too slowly
- Equity challenges are troubling

Developing Evidence For What Works: Coping With The Deluge of Apps And Devices

- Novel apps and technologies are so numerous they are virtually impossible to track (13,000 apps on Apple Store)
  - App chaos? Or will the market be sense-making, enabled by frustration with large vendor EMR platforms?
  - 500 million people will use health website by 2015
- RCTs are nearly impossible to do and not a complete solution
  - Rapidly changing technology landscape outdates the study before it can be completed; financing difficult
    - Adapative Bayesian cluster RCTs may help
  - If the health care system is not readied for the technology, the results are likely to be negative – lessons from Pharos
- If the patient's wants and needs are not understood deeply (often through ethnographic research), patient-oriented technologies are likely to fail – lessons from marketing (prototypes, avatars, archetypes, scenarios)
- The same goes for the wants and needs of providers

Using Avatars To Improve MD/Nurse Discharge Communication

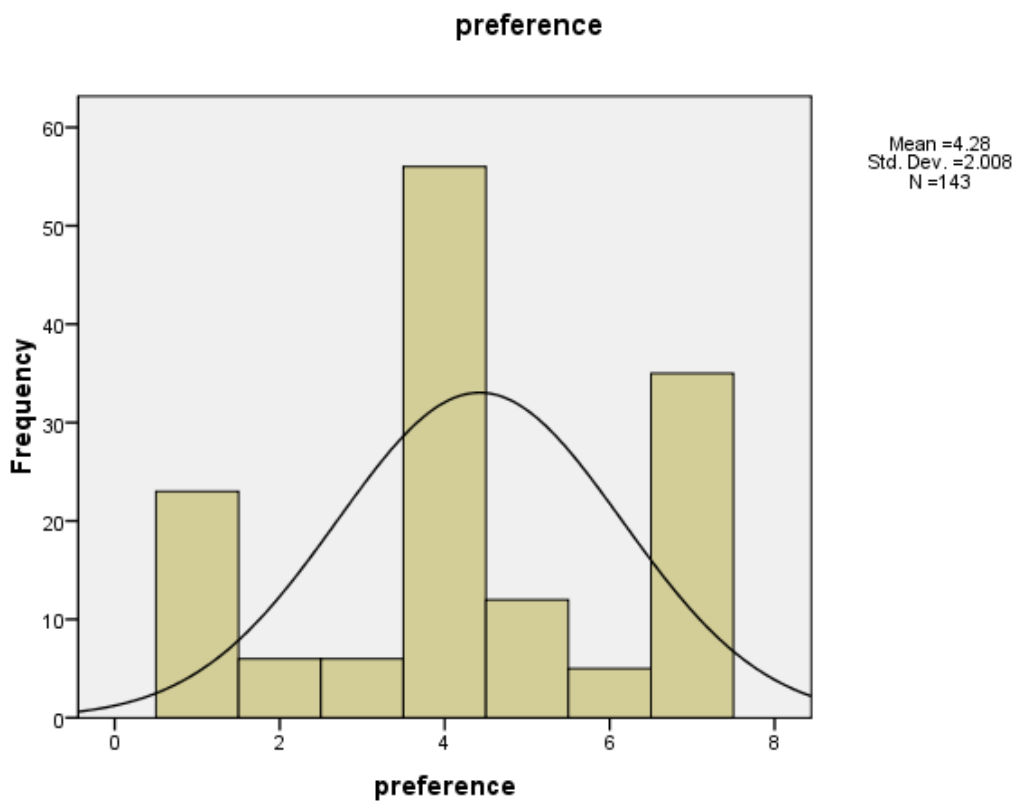
PROJECT RED
Re-Engineered Discharge

Virtual Patient Advocates

- Emulate face-to-face communication
- Develop therapeutic alliance-empathy, gaze, posture, gesture
- Teach RED
- Tailored
- Determine Competency
- Can drill down
- Print Reports
- High Risk Meds
  - Lovenox
  - Insulin

Characters: Louise (L) and Elizabeth (R)

From Whom Would You Rather Receive Discharge Instructions?



36% prefer agent
48% neutral
16% prefer doc or nurse

I prefer Louise, she's better than a doctor, she explains more, and doctors are always in a hurry."

"It was just like a nurse, actually better, because sometimes a nurse just gives you the paper and says 'Here you go.' Elizabeth explains everything."

1=definitely prefer doc, 4=neutral, 7=definitely prefer agent

What Most EMRs Do Not Do

- Support basic functions of patient-centered medical homes and “medical neighborhoods”
  - Panel management/registries
  - Team communication, handovers in real time
  - Communication during transitions of care (hospital, emergency department, nursing home, home)
    - Interoperability is not there yet, HIEs not withstanding
  - Coordination with care managers, community health workers
  - Tracking of abnormal lab tests and their resolution
  - Referral to specialists and feedback to primary care/patient
  - Patient reported outcome measurement (despite meaningful use Stage 3)
  - Integration with patient self-management apps
  - Rich clinical data mining – NLP v. standard nomenclature

Innovative Technologies

- Nanotechnology – wearable microsensors
  - ASSIST - Advanced Self-Powered Systems of Integrated Sensors and Technologies (NSF-funded, NC State and 8 other universities)
  - Biodegradable ultra-flexible sensors and drug dispenser systems
- Wellness apps – Jawbone UP, Fitbit, Nike Fuelband for exercise, sleep, nutrition
- Apple iPhone 6 HealthBook (combines sensors and health apps)
- FDA-approved remote EKG, BP. glucose, ultrasound
- Blood micro-sampling/testing (Theranos)

Innovative Technologies

- Automated patient scheduling (ZocDoc)
- Primary care – specialist referral (eReferral)
- On-line MD services (Dr. Thom, Teladoc, MDLIVE, Zipnosis, NowClinic, etc.)
- Second opinions (Cleveland Clinic, Mayo)
- Online communities to share drug side effects and other data, serve as big data source to find determinants of health behaviors
  - PatientsLikeMe Open Research Exchange
- Mobile technologies and provider-patient-researcher networks
  - Self-management and tracking
    - Down-loadable statistical process control charts for IBD, n=1 experiments, hypothesis generation (C3N)

Uncle Harold - Futurecast

- What Uncle Harold could expect today (or soon)
  - Video-enhanced apartment safety check
  - Safety alerts for falls, inactivity
  - Automated care plan – just the right service at just the right time, drawing on medical **and** community resources
    - GIS enabled links to services near Uncle Harold
  - Wearable sensing, painless biomonitoring (B-type Natriuretic Peptide (BNP))
  - Automated med adherence reminders and even detection (Proteus); automated refills

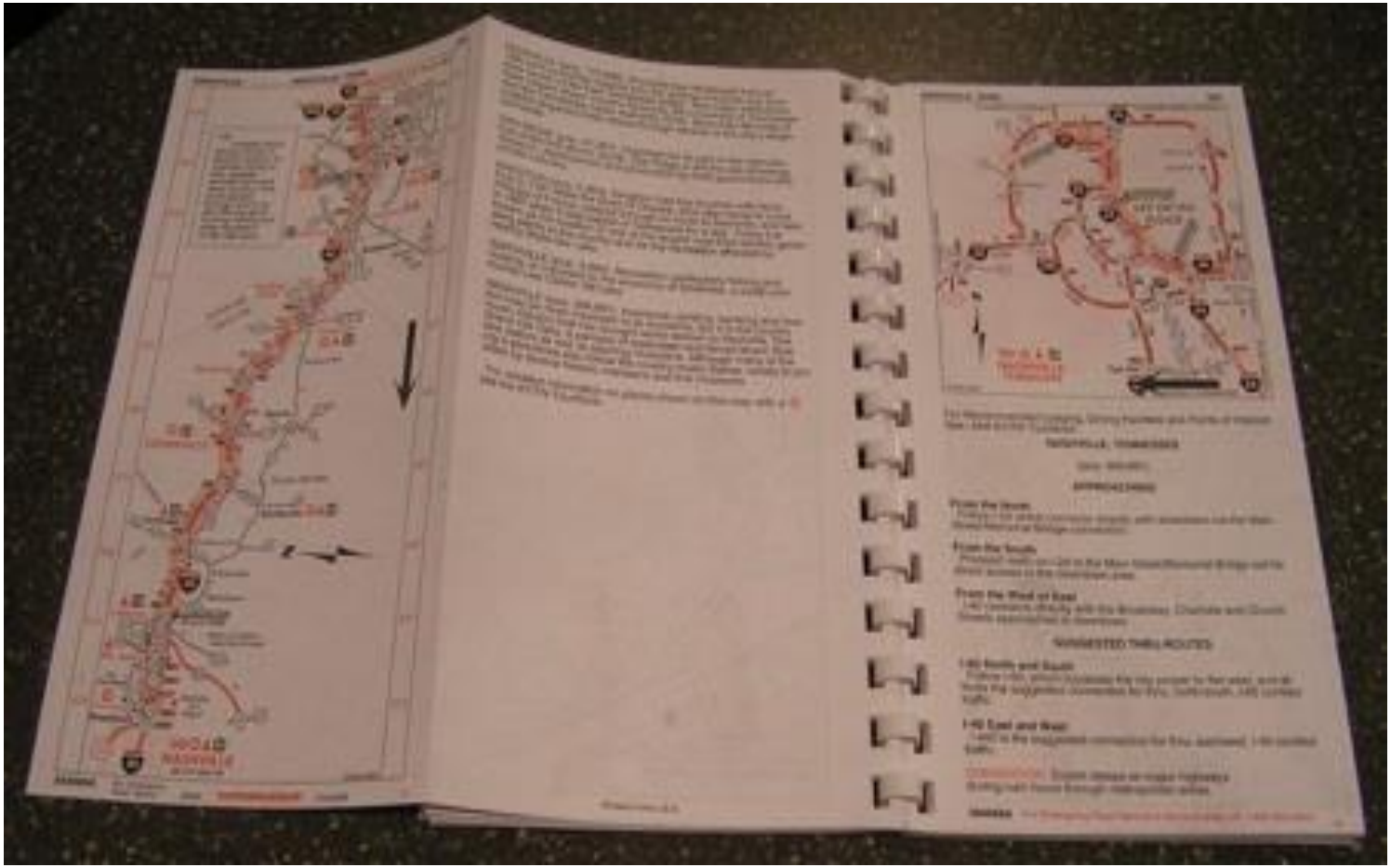
Uncle Harold - Futurecast

- Virtual video appointments and daily check-in with appropriate team provider (he does not have reliable transportation, though Village-to-Village helps)
    - Group visits
- Remote specialty consultation with cardiologist, dermatologist, ophthamologist
- TeleStroke for his embolic stroke
- Social network with other “live alone” patients
  - Social support
  - Information, tips
  - Job one – Create social and bridging capital where little or none exists
    - Chicago heat wave

mHealth on Mount Kilimanjaro

A Useful Analogy? – A Personal Itinerary for the Health Care Journey

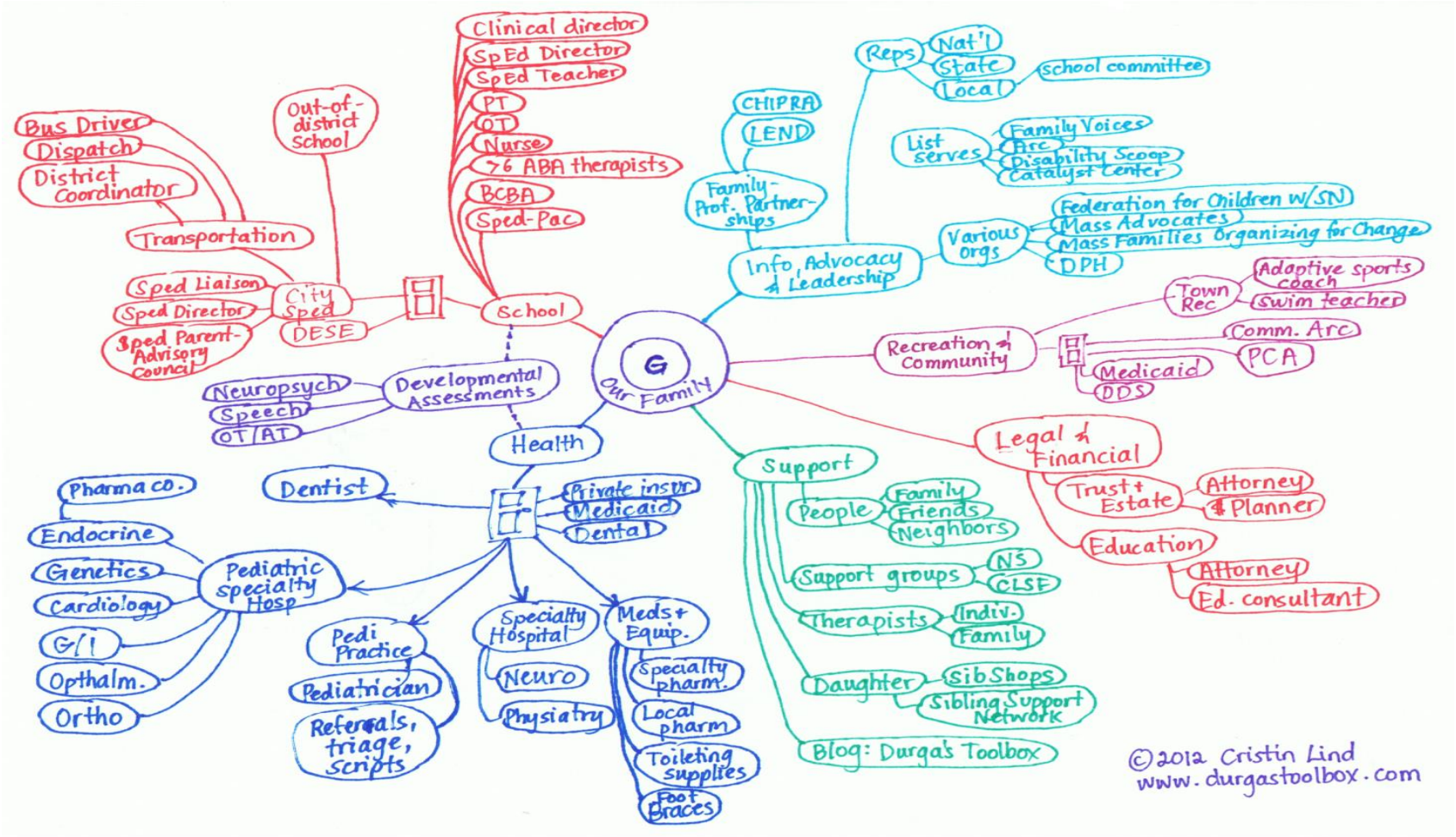
Triptik®



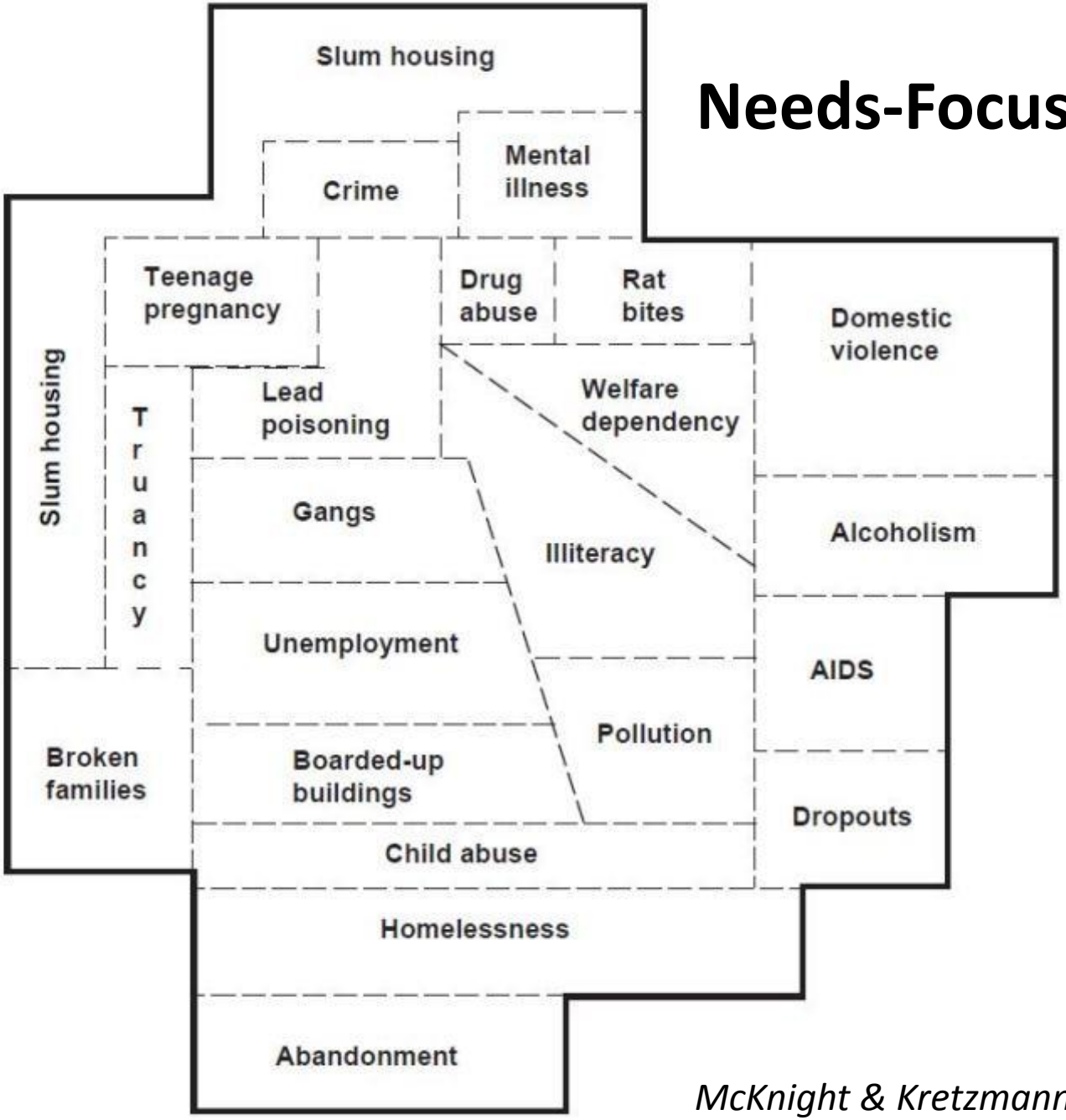
Approach # 4

- Look at improvement from the point of view of the community
  - The health care system surely can better integrate its efforts to improve community health
    - It's more than "community benefit" and "community health needs assessment" – it's a holistic view of community needs and assets
  - The community needs an "integrator," too
    - The voice of the people, not just community stakeholder spokespeople
      - Much too much fragmentation
      - The Rwanda Ministry of Health example

Community as Seen by a Patient (Child) with Complex Conditions

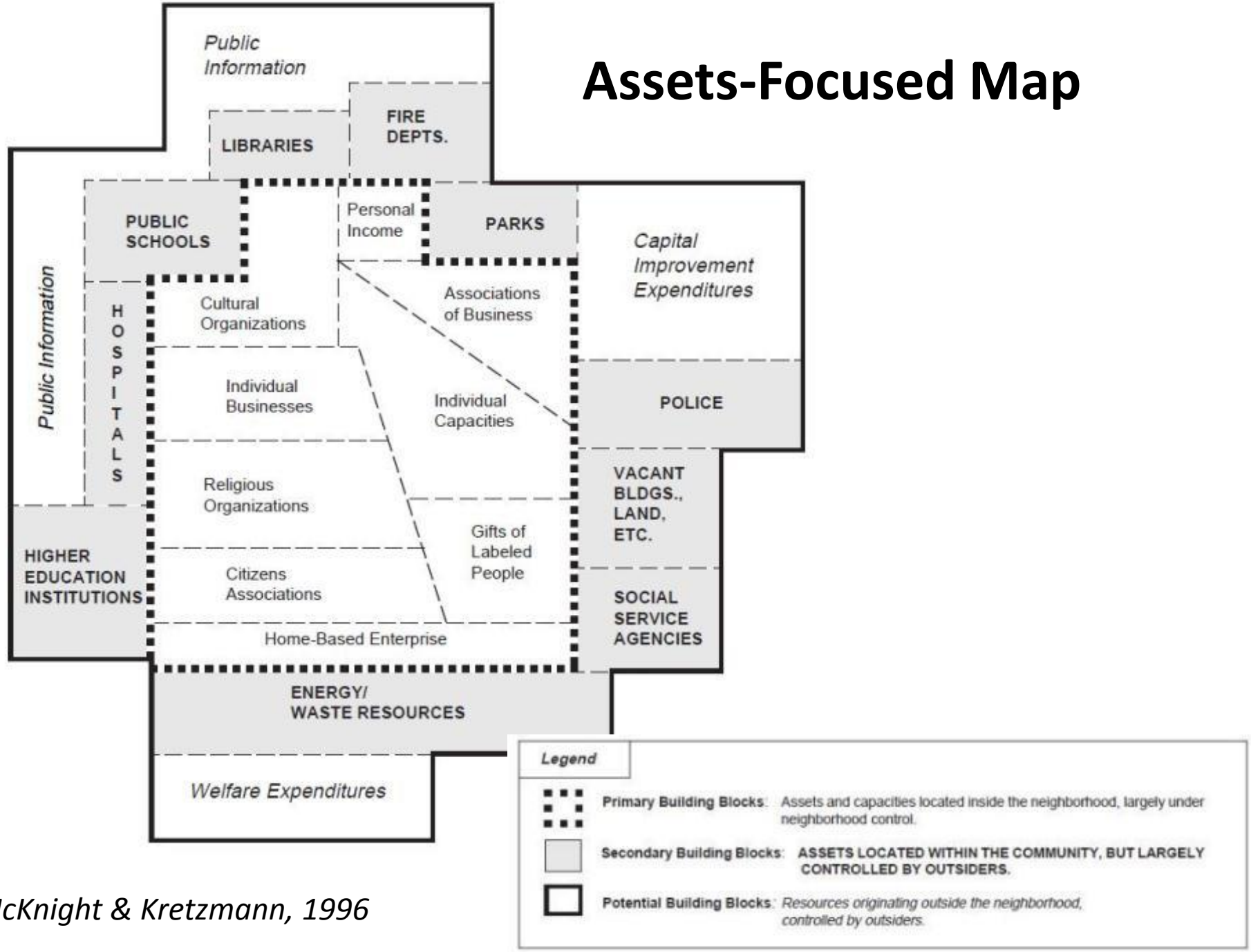


Needs-Focused Map



McKnight & Kretzmann, 1996

Assets-Focused Map



McKnight & Kretzmann, 1996

Imagine a coordinated clinical pathway, constructed from the point of view of an elderly patient (regardless of means, education, race, or ethnicity) in which the right health care and community health services were easily accessible at just the right time – the outcome being the best possible health and functional status, well-being, and dignity