Enterprise Integration: When is More Better?
The Use of Industrial Engineering and Management Tools in Healthcare

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May 24, 2011

- Research Background and Motivation
  - Complexity of Healthcare
  - Enterprise Systems

- Toward a Theory of Enterprise Integration

- Empirical Example: The U.S. Military Enterprise and Post-Traumatic Stress

- Conclusions and Next Steps

"That's where you're wrong! It is rocket science."

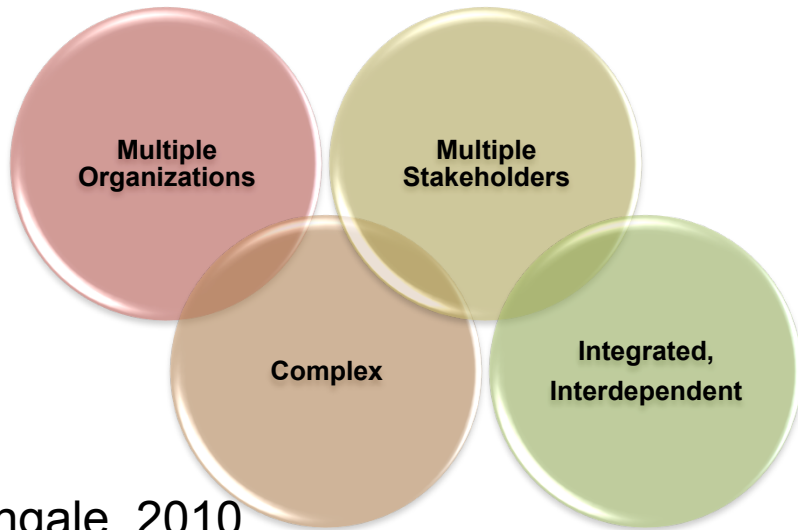Payer, Supplier, Insurer, Interest Groups

OR, Labs, Radiology, Primary Care, Pharmacy, IP, Billing, Collections

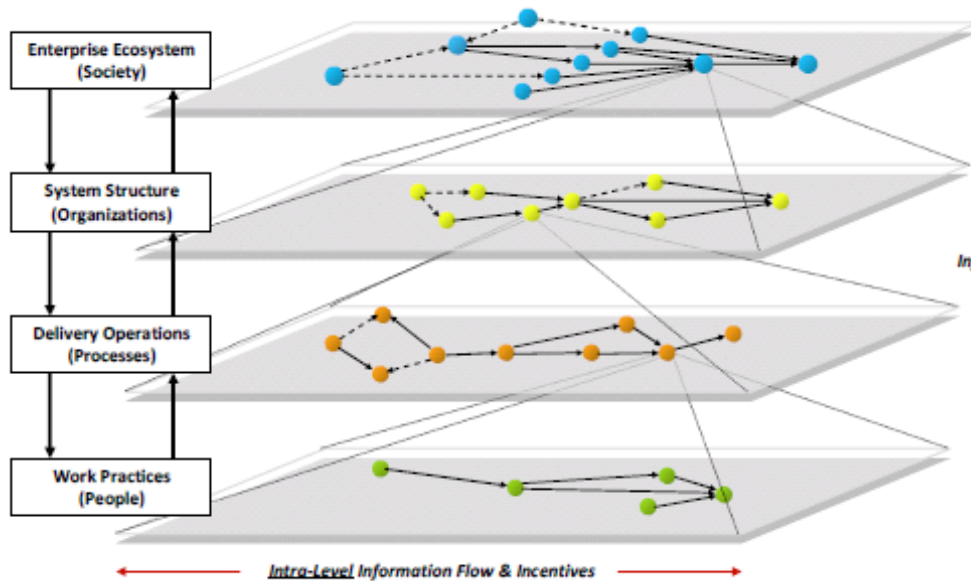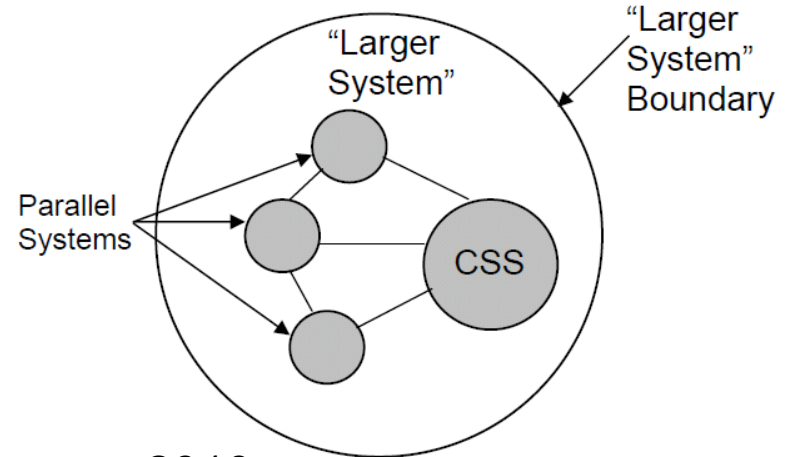Physician, Nurse, Residents, Cleaning, Supply Technician
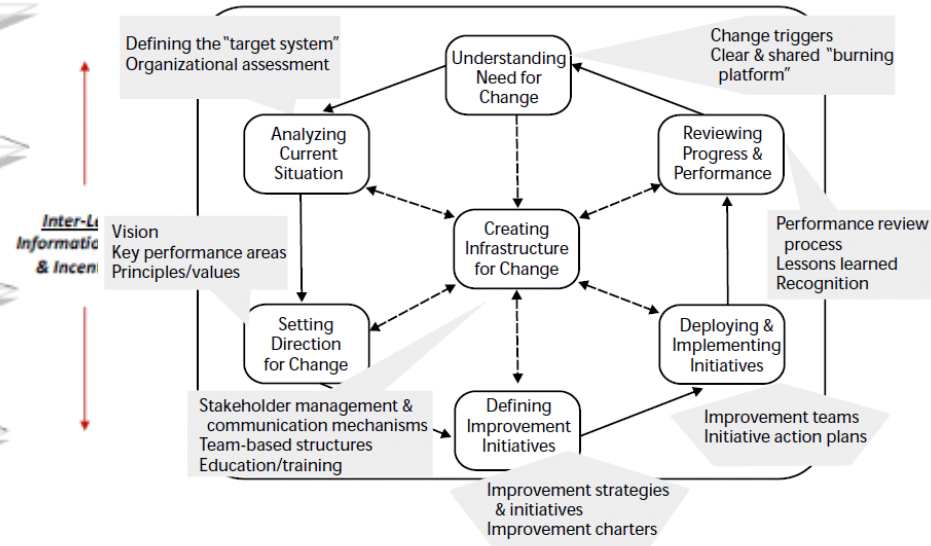
Background: Enterprise Systems

Multiple Organizations

Multiple Stakeholders

Complex

Integrated, Interdependent

Nightingale, 2010

"Larger System"

"Larger System" Boundary

Parallel Systems

CSS

Sussman, 2010

Enterprise Ecosystem (Society)

System Structure (Organizations)

Delivery Operations (Processes)

Work Practices (People)

Inter-Level Information & Incentives

Intra-Level Information Flow & Incentives

Rouse et al., 2009

Defining the "target system" Organizational assessment

Change triggers Clear & shared "burning platform"

Understanding Need for Change

Analyzing Current Situation

Reviewing Progress & Performance

Creating Infrastructure for Change

Performance review process Lessons learned Recognition

Vision Key performance areas Principles/values

Setting Direction for Change

Deploying & Implementing Initiatives

Stakeholder management & communication mechanisms Team-based structures Education/training

Defining Improvement Initiatives

Improvement teams Initiative action plans

Improvement strategies & initiatives Improvement charters

Van Aken et al., 2003

Research Motivation and Contributions

Increased complexity = more differentiation

Varying effects of hierarchy, coordination, social networks

More Integration= Better Performance?

Lack of systematic, empirical research

- Empirical examination of multiple dimensions of integration

- Understanding the varying impact of integration on technical and social system outcomes

- Contribution to Lean Theory

Toward a Theory of Integration Climate

Dictionary Definition:

[in-ti-**grey**-shuhn]

noun

1. an act or instance of combining into an integral whole.
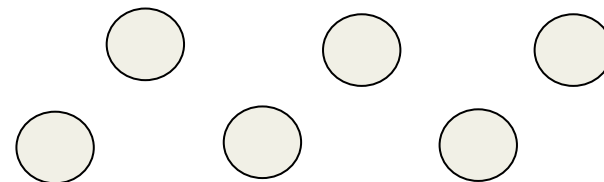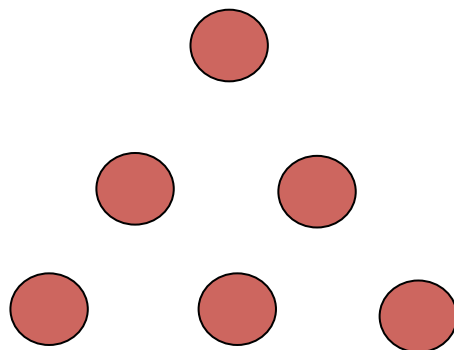
Latin integrātiō renewal

Research Definition:

Shared perceptions of the employees *across an enterprise* about the extent to which there is an emphasis within the department on incorporating and *working collectively with other enterprise units*
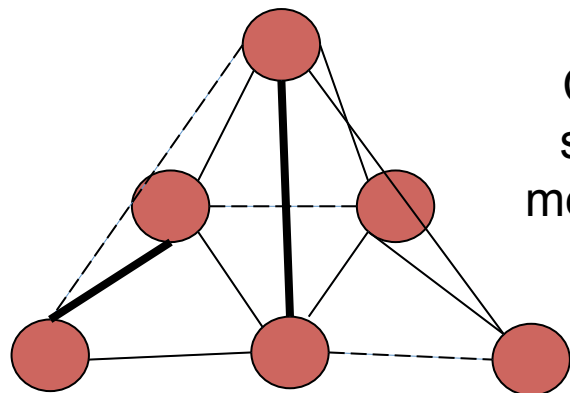
Three Dimensions of Integration Climate

Centralization: *Structure and Control*
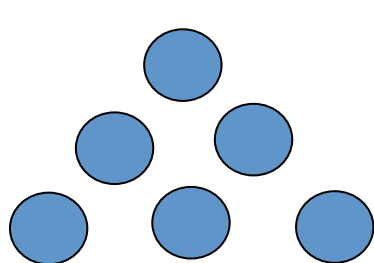
Coordination:
Formal Connections

Cross-unit standards, meetings, PM

Cooperation:
Informal Networks
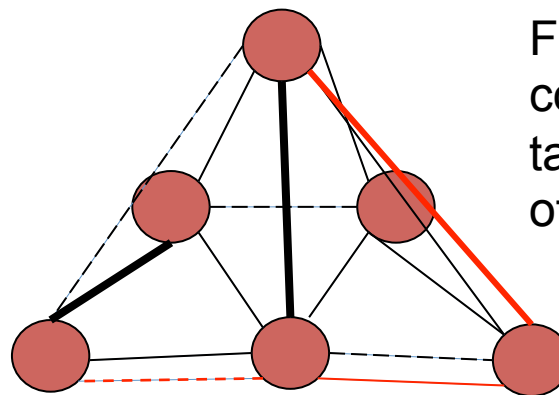
Feeling comfortable talking to other units

Three Dimensions of Integration Climate

	Centralization	Coordination	Cooperation	Opportunities
Interorganizational Networks (Provan and Milward, 1995)	**+** Measured by Authority and Control	Not included	Not included	Did not explain causality between network and performance
Relational Coordination (Gittell and Weiss, 2004)	Not included	**+** Measured by cross-functional activities (e.g., meetings, rewards, PM)	**+** Communication	No social system performance outcomes
Optimal Structure (Davis, Eisenhardt, and Bingham, 2009)	**+/_** Depends on Environment	**_** Strategy of Simple Rules	Not included	Not Empirical

Research Model

Enterprise level

Enterprise Characteristics
Goal Interdependence

Enterprise Integration Climate
Centralization
Coordination
Cooperation

Enterprise Performance
Efficiency
Quality
Learning

Unit Performance
Efficiency
Quality
Learning

Demographics
- **Age/Gender**
- **Experience**
- **Job Role**
- **Clinical v. Non-Clinical**

Unit level

Unit Characteristics
- **Efficiency Climate**
- **Quality Climate**
- **Learning Climate**
- **Innovation Climate**
- **Psychological Safety/Voice**
- **Autonomy**
- **External Perspective**
- **Resources**

Empirical Example: The U.S. Military Enterprise and Post-Traumatic Stress

Challenge:

Develop innovative recommendations for transforming the military enterprise to better manage post-traumatic stress, and related conditions, in support of our warriors and their families

PTSD: A Significant Pathology of War

- Challenges with Access to and Quality of Care
- Challenges with Culture and Stigma
- Consideration of Families

5% to 20% prevalence

Over $2 Billion Invested

Over 125 psychological health programs

Resources: RAND, 2008 Invisible Wounds of War
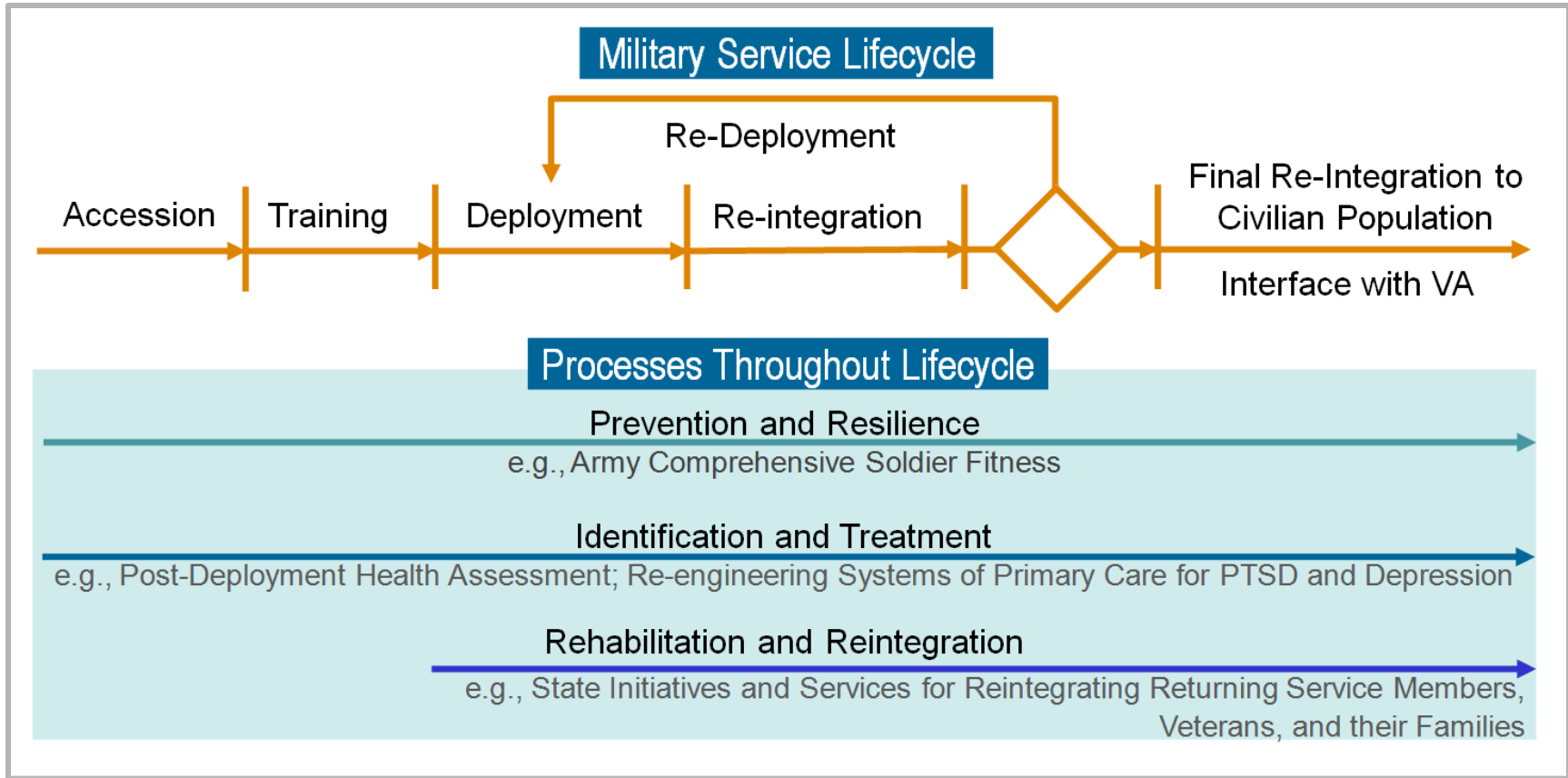
Holistic approach to the observation of occupational stress-related processes cross the military service lifecycle that relate both to service members and their families

PTSI/Military Health Motivation

Improve Enterprise Performance:

- Efficiency → Dec. Per Capita Cost, Fewer Redundant Programs
- Quality → Inc. Population Health, Access to Care
- Learning → MHS as a Learning Organization

- Each organization inhabits different climates/environments
- Rules/Procedures at multiple levels → differentiation
- Explicit cooperation incentives at the local or enterprise level may not exist

Service Chief of Staff

Line Organizations

Service Surgeon General

F Org

Community Organizations

Health Affairs

TRICARE Organizations
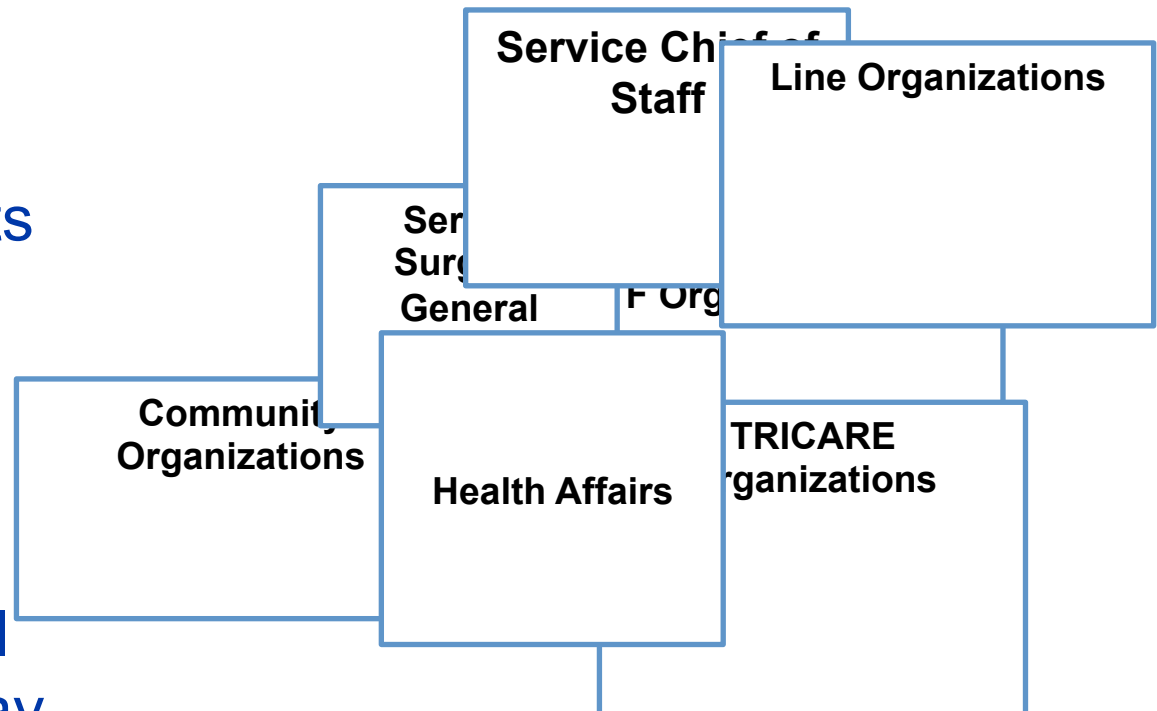
Sites	Titles of Informants	Number of Informants	Site Description	Size of MTF Facility and Other Information
Lambda	Base Commander Base Vice Commander MTF Deputy Commander Psychologists Airman and Family Services Personnel Wing Commander Wing Chaplain Resilience Training Personnel	14	Air Force Base	Medium: 900 Personnel Local patient population enrolled: Up to 40,000 Family Psychological Health Not Provided On-Site
Delta	MTF Commander Flight Medicine Psychologists Family Advocacy Wing Commander Wing Chaplain Resilience Training Personnel	18	Air Force Base	Small
Nu	MTF Commander Psychologists, Neurologists Trauma Teams Interdisciplinary Care Teams	16	Naval Hospital	Large

Site 1 Findings

Examples of Successful Formal Coordination

- "Involving a person from Airman and Family Readiness will be our way of keeping the continuity of the [Resilience Training] program."

- "The Community Action Information Board (CAIB) and the Integrated Delivery System (IDS) work to make decisions about implementing the [resilience training program]."

Supporting Mechanisms

- Centralization 8%
- Cooperation 25%
- Coordination 67%
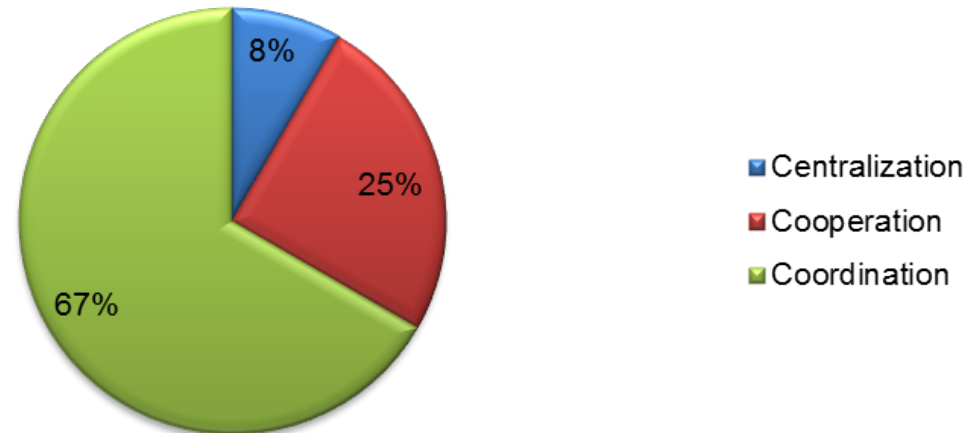
Examples of Successful Informal Cooperation

"The [resilience training program] started because of a personal relationship between Army and Air Force leaders; the Army presented the program to us and we decided to adapt it for us."

Opportunity for Improved Centralization for better understanding of Resourcing needs:

"This [PDHA/PDHRA assessment] policy was mandated by Congress and...this tends to drive appointments. However, we are unable to have the resources to do this and everything else that we were already doing; everything has a cost. In our case, this ends up cutting into beneficiary care, which gets pushed out to purchased care."

Inhibiting Mechanisms for Integration

- Centralization — 18%
- Cooperation — 46%
- Coordination — 36%
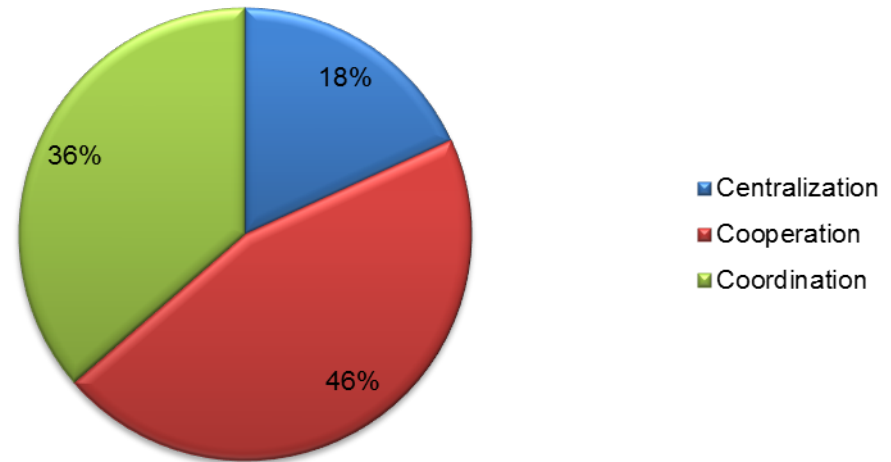
Opportunity for Improved Informal Cooperation:
"I understand that my airmen, especially the younger ones, are afraid to talk to me, so we have an anonymous blog. It seems like a successful idea that was very affordable. How do you share these types of ideas? Sharing is limited."

Site 1 Performance

- Access to Care Metrics indicate a lack of Coordination to Achieve Balance of Resources Between Acute and Wellness visits

ATC by Primary Care and Mental Health Clinic									
ATC by Clinic	Jul-10	Aug-10	Sep-10	Oct-10	Nov-10	Dec-10	Jan-11	Feb-11	
ACUTE									**ACUTE**
Internal Med	64%	64%	47%	58%	71%	60%	63%	86%	Internal Med
Pediatrics	75%	23%	51%	84%	44%	53%	87%	93%	Pediatrics
Family Health	21%	27%	16%	33%	44%	42%	66%	88%	Family Health
Flight Med	100%	95%	99%	100%	94%	100%	97%	94%	Flight Med
ROUTINE									**ROUTINE**
Internal Med	85%	88%	88%	74%	84%	99%	99%	98%	Internal Med
Pediatrics	95%	82%	84%	98%	61%	86%	93%	93%	Pediatrics
Family Health	54%	55%	44%	56%	78%	80%	79%	92%	Family Health
Flight Med	100%	96%	100%	100%	100%	100%	100%	100%	Flight Med
Mental Health	98%	98%	91%	93%	92%	96%	93%	95%	Mental Health
WELL									**WELL**
Internal Med	100%	99%	100%	100%	90%	100%	100%	93%	Internal Med
Pediatrics	100%	95%	97%	94%	94%	100%	100%	98%	Pediatrics
Family Health	100%	98%	99%	100%	100%	100%	100%	94%	Family Health
Flight Med	100%	94%	100%	100%	100%	100%	100%	96%	Flight Med

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Varying Views of Integration to Efficiency
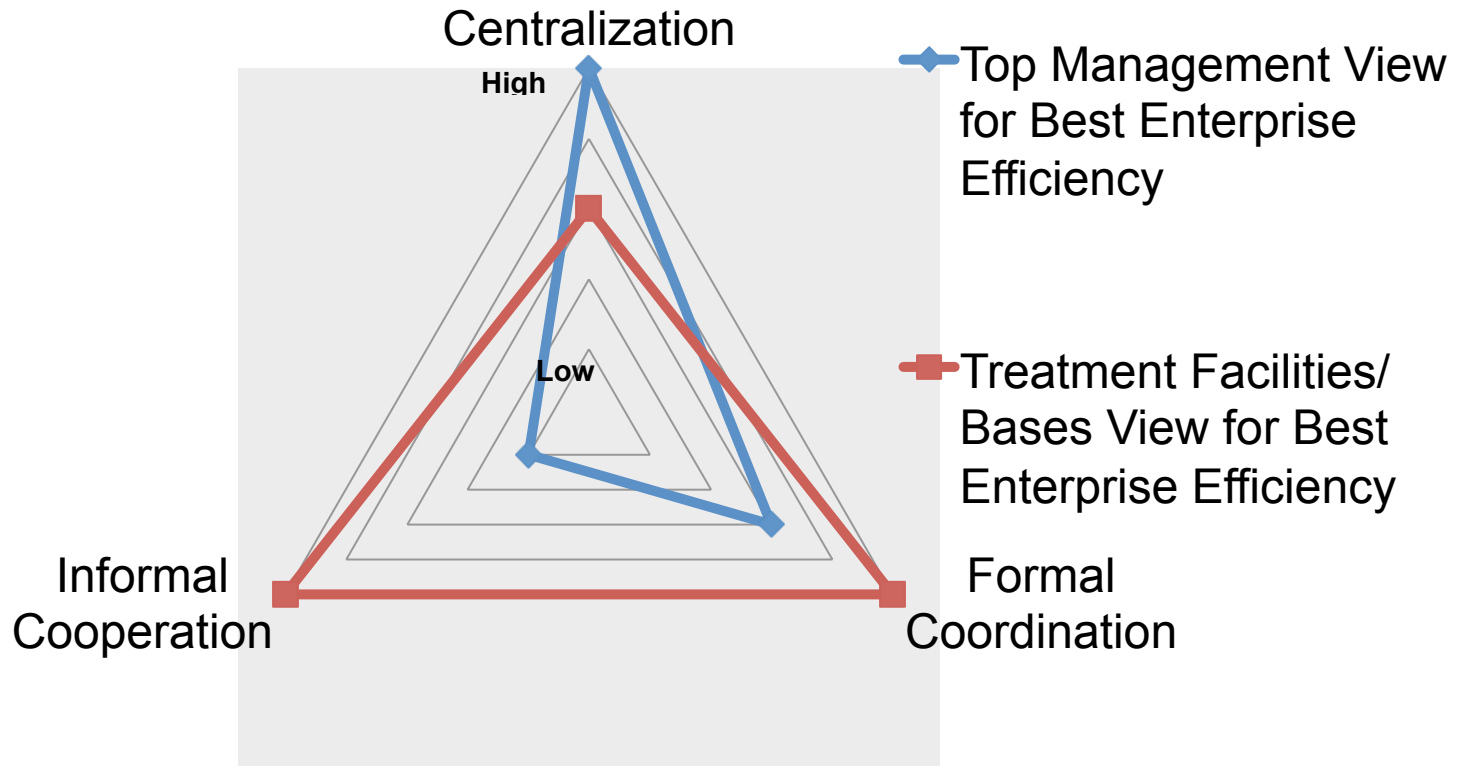
Potentially Contradicting Solutions for Different Performance Dimensions
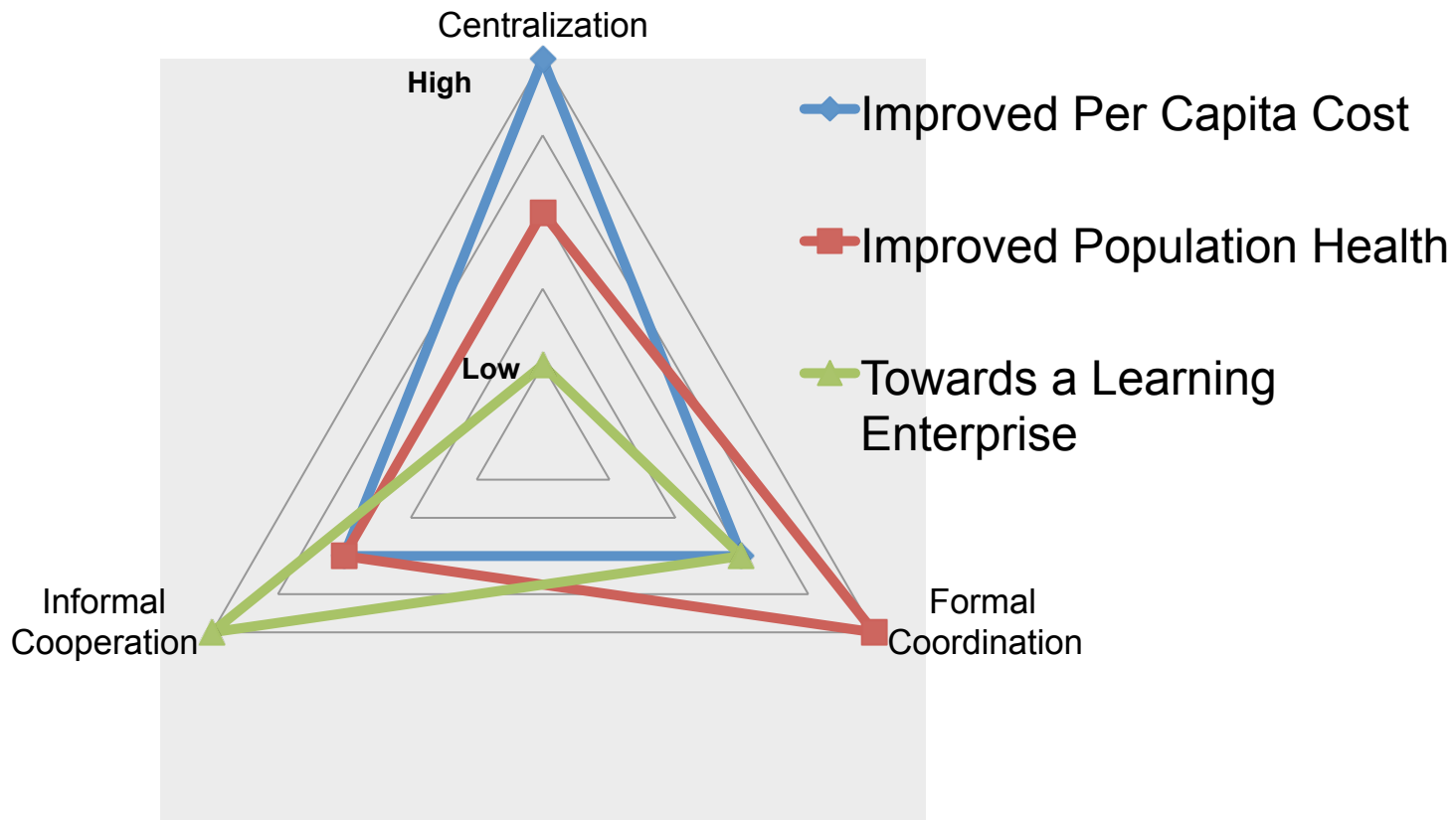
Potential Impact of Integration Interventions Between Two Organizations

Example Current State

Mental Health Clinic → 0X%* → Unit with Resilience Program

Unit with Resilience Program → 0.5Y%* → Mental Health Clinic
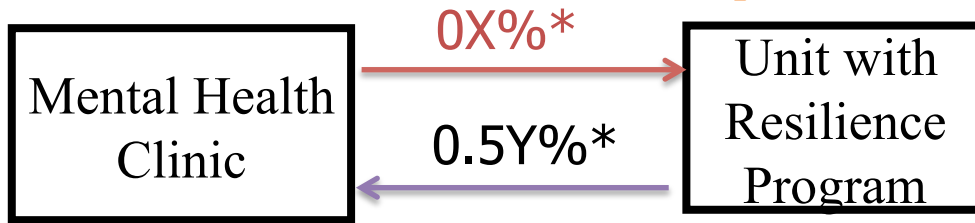
*Values represent percentage referral rate between organizations, with 1X% and 1Y% being ideal.

I1: Coordination through Cross-Org. Meetings

Mental Health Clinic → 0.5X% → Unit with Resilience Program

Unit with Resilience Program → 2Y% → Mental Health Clinic
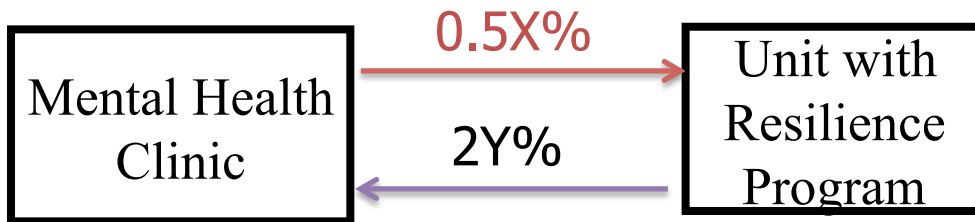
Impact on Per Capita Cost	Impact on Population Health	Impact on Enterprise Learning
Inc.	Inc.	Dec.

I2: Cooperation Encouraged by Management and Doctrine

Mental Health Clinic → 1X% → Unit with Resilience Program

Unit with Resilience Program → 1Y% → Mental Health Clinic
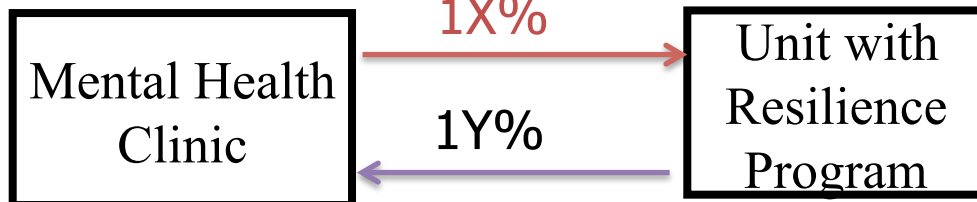
Impact on Per Capita Cost	Impact on Population Health	Impact on Enterprise Learning
Dec.	Inc.	Inc.

Data Collection: June 2011-August 2011

Final Report: December 2011 (papers and conference presentations will be derived from this report)

Analysis: August 2011-October 2011

- These propositions will be tested via measurement tools for the activities implemented and performances
- We will analyze the data and establish quantify relationships between integrative activities and performance
- Phase II will include testing integration interventions

Please respond to the statements in the table below *answering each question with a value of 0-5*:

0-Not relevant   1- Not at all   2-Slightly   3-Somewhat   4-Moderately   5-A great deal

	Group 1: Unit 1	Group 1: Unit 2	Group 1: Unit 3	Group 2: Unit 4	Group 3: Unit 5	Group 4: Unit 6	Group N: Unit N
To what extent is your unit controlled by the decisions that are made in the following units?							
To what extent do these units have authority over your unit?							

Note: Upon progressing to a subsequent page your previous answers will be saved. You can then close the survey and resume at a later time.

- More integration may not always be better

- Complementary view of integration dimensions and their impact on performance

- Questionnaires designed and to be administered during Summer 2011

MIT Lean Advancement Initiative Research Team

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Thank you

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Backup

Potential Integration Solution
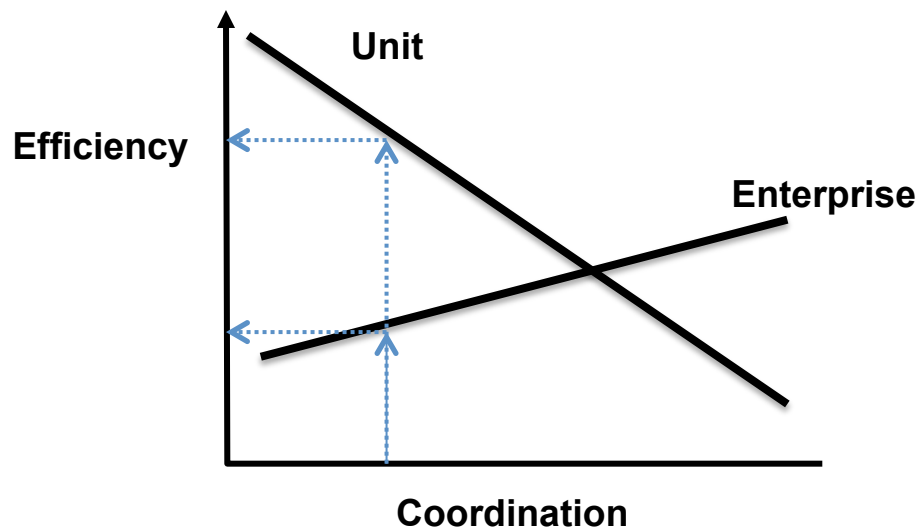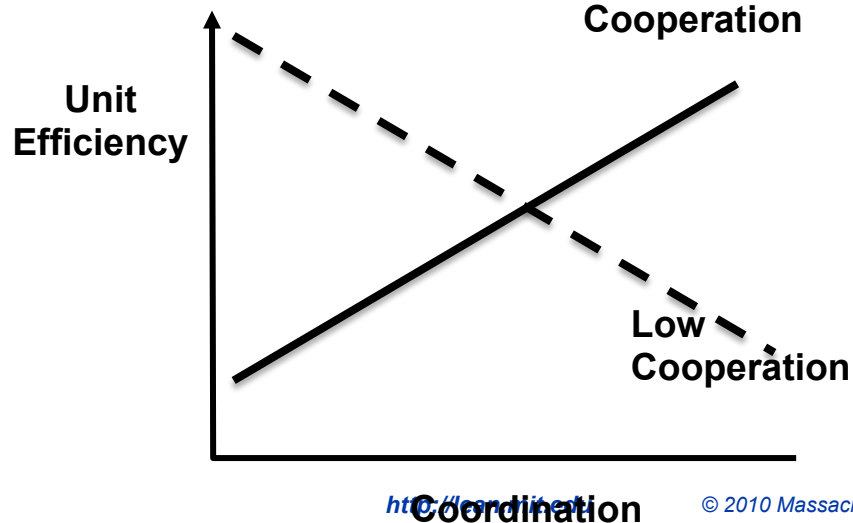
LAI will perform an enterprise analysis of the PTSD process.

Three Phases:

1. Current state analysis

2. Model creation and validation

3. Future scenario planning and recommendations

Four Areas of Interest

- Stakeholder Analysis
- Enterprise Organizations and Processes
- Performance Measurement Systems
- Resources and Outcomes

Research Activities

Literature review

Triangulation

Gathering available data

Interviews and site visits

Value

Identify stakeholders and specify value

Value Stream

Identify the enterprise value stream and the enterprise level processes

Flow

Make value flow continuously across all enterprise processes

Pull

Let stakeholders pull value and engage in value exchange

Perfection

Pursue perfection across the enterprise

LAI MIT Enterprise Transformation Roadmap

STRATEGIC CYCLE

Determine Strategic Imperative
- Articulate the Case for Transformation & Convey Urgency
- Focus on Stakeholder Value
- Leverage Transformation Gains

Pursue & Sustain Enterprise Transformation

Engage Leadership in Transformation
- Cultivate Enterprise Thinking
- Obtain Executive Buy-In
- Establish Executive Transformation Council

A Committed Leadership Team

Strategic Implications of Transformation

Nurture Transformation & Embed Enterprise Thinking
- Monitor & Measure the Outcomes
- Nurture Transformation
- Embed Enterprise Thinking
- Capture & Diffuse Lessons Learned
- Synchronize Strategic, Planning & Execution Cycles

Long-Term Corrective Action

PLANNING CYCLE

Understand Current State
- Perform Stakeholder Analysis
- Analyze Processes & Interactions
- Perform Enterprise Maturity Assessment
- Assess Current Performance Measurement System

Capabilities & Deficiencies Identified

Implementation Results

Implement & Coordinate Transformation Plan
- Communicate Transformation Plan
- Commit Resources
- Provide Education & Training
- Implement Projects and Track Progress

Short-Term Corrective Action

Envision & Design Future Enterprise
- Create Vision of Future State
- Perform Gap Analysis Between Current and Future States
- Architect "To-Be" Enterprise

Enterprise Vision

EXECUTION CYCLE

Transformation Plan

Create Transformation Plan
- Identify Improvement Focus Areas
- Determine Impact on Enterprise Performance
- Prioritize, Select and Sequence Project Areas
- Develop and Synchronize Detailed Implementation Plans

Alignment Requirements Identified

Align Enterprise Structure and Behaviors
- Reconcile Systems, Policies & Vision
- Align Performance Measurement System
- Align Incentives
- Empower Change Agents

Enterprise Boundaries

Secretary of Defense / Deputy Secretary of Defense

- USD Personnel and Readiness
  - Health Affairs
  - Readiness
  - Military Community and Family Policy
  - Military Personnel Policy

- Chairman, Joint Chiefs of Staff
  - Secretary of the Army*
    - Army Chief of Staff
      - Army Surgeon General
        - MTF Commanders
  - Secretary of the Navy*
    - Chief of Naval Operations
    - Commandant Marine Corps
      - Navy Surgeon General
        - MTF Commanders
  - Secretary of the Air Force*
    - AF Chief of Staff
      - AF Surgeon General
        - MTF Commanders

Health Affairs:
- Force Health Protection and Readiness
  - R&D
- TMA
  - TRICARE Support Office
    - Contractors
    - Providers
  - TRICARE Regional Offices
    - Contractors
    - Providers

Legend:
- (Dark blue) The organizations represented in interviews/focus groups; over 100 individuals conducted from 7/10-4/11
- (Light blue) Indicates next round of interviews

* includes Reserve

FFRDC — Community Organizations — Veterans Affairs

PTSI/Military Health Motivation

```
┌──────────┐      ┌──────────┐      ┌──────────┐
│   MTF    │ ◄►   │Purchased │ ◄►   │Community │
│          │      │   Care   │      │   Care   │
└────┬─────┘      └────┬─────┘      └────┬─────┘
     │                 │                 │
  ┌──┴─────┐        ┌──┴─────┐        ┌──┴─────┐
  │Between │        │Between │        │e.g.,   │
  │ Units  │        │ Units  │        │Military│
  └────────┘        └────────┘        │OneSource│
                                      └────────┘
  ┌────────┐        ┌────────┐
  │Within  │        │Within  │
  │ Unit   │        │ Unit   │
  └────────┘        └────────┘
```

- Mechanisms that may support integration, e.g., Case managers and Behavioral Health within Primary care programs

Seven Principles of Enterprise Thinking

1. Adopt a holistic approach to enterprise transformation.

2. Identify relevant stakeholders and determine their value propositions.

3. Focus on enterprise effectiveness before efficiency.

4. Address internal and external enterprise interdependencies.

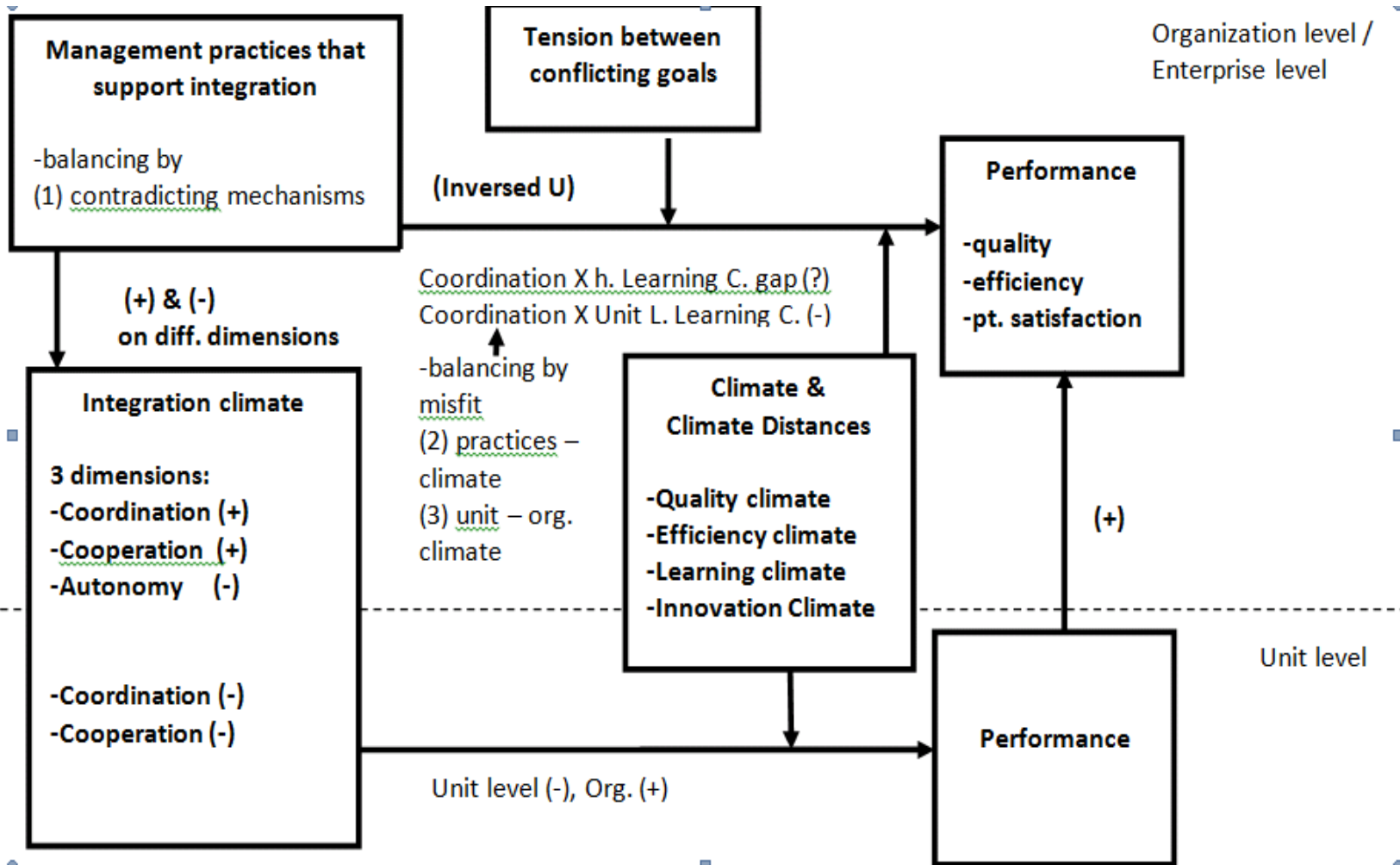**5.** Ensure stability and flow within and across the enterprise.

**6.** Cultivate leadership to support and drive enterprise behaviors.

7. Emphasize organizational learning.

LAI MIT — ENABLING ENTERPRISE EXCELLENCE

Organization level / Enterprise level

Management practices that support integration

-balancing by
(1) contradicting mechanisms

(Inversed U)

Tension between conflicting goals

(+) & (-) on diff. dimensions

Coordination X h. Learning C. gap (?)
Coordination X Unit L. Learning C. (-)

-balancing by misfit
(2) practices – climate
(3) unit – org. climate

Performance

-quality
-efficiency
-pt. satisfaction

Integration climate

3 dimensions:
-Coordination (+)
-Cooperation (+)
-Autonomy (-)

-Coordination (-)
-Cooperation (-)

Climate & Climate Distances

-Quality climate
-Efficiency climate
-Learning climate
-Innovation Climate

(+)

Unit level

Unit level (-), Org. (+)

Performance

"Simply stated, the US does not have a health care system."
William Brody, *President of Johns Hopkins University, 2007*
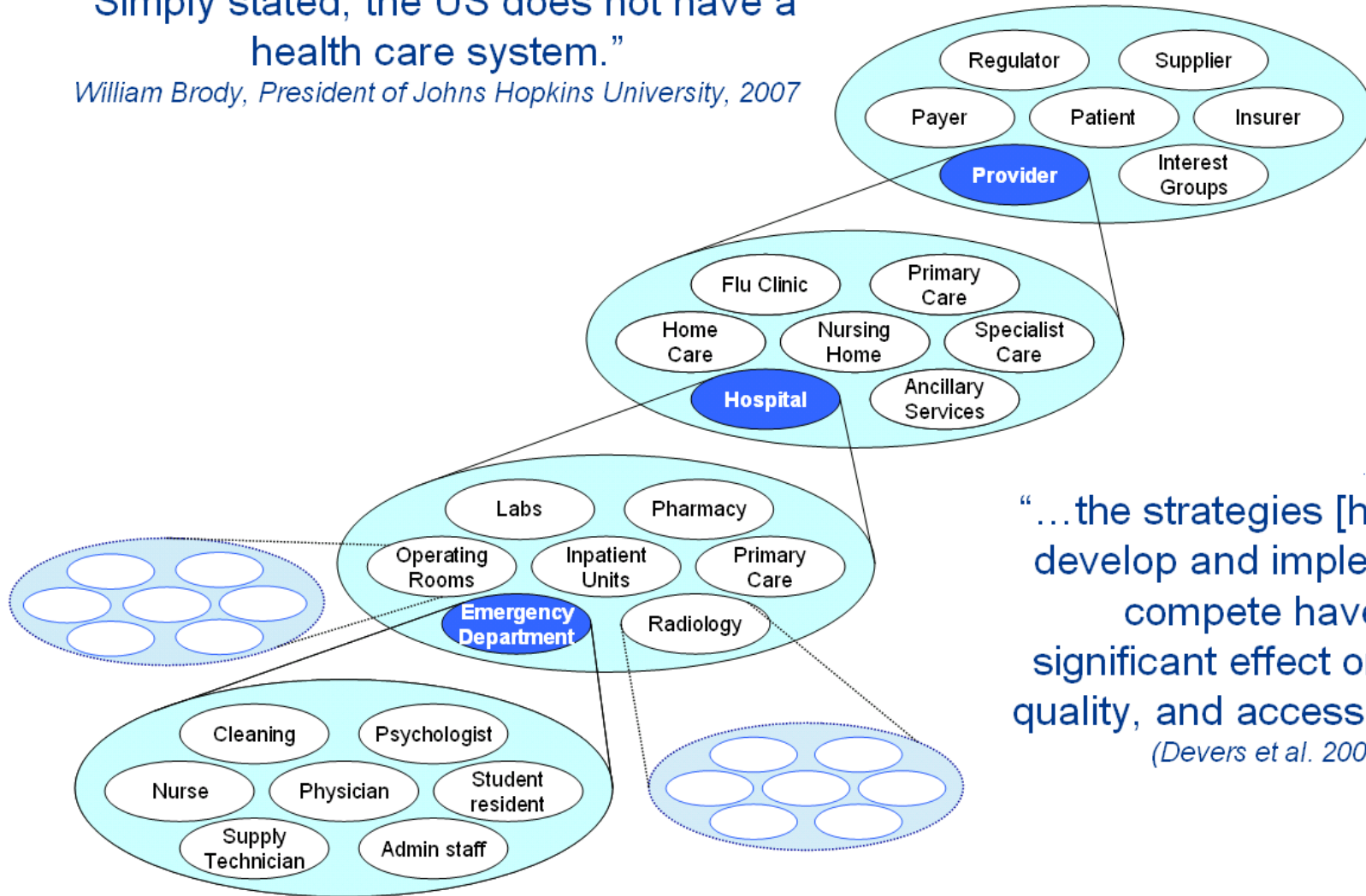
"...the strategies [hospitals] develop and implement to compete have a significant effect on costs, quality, and access to care."
(Devers et al. 2003)