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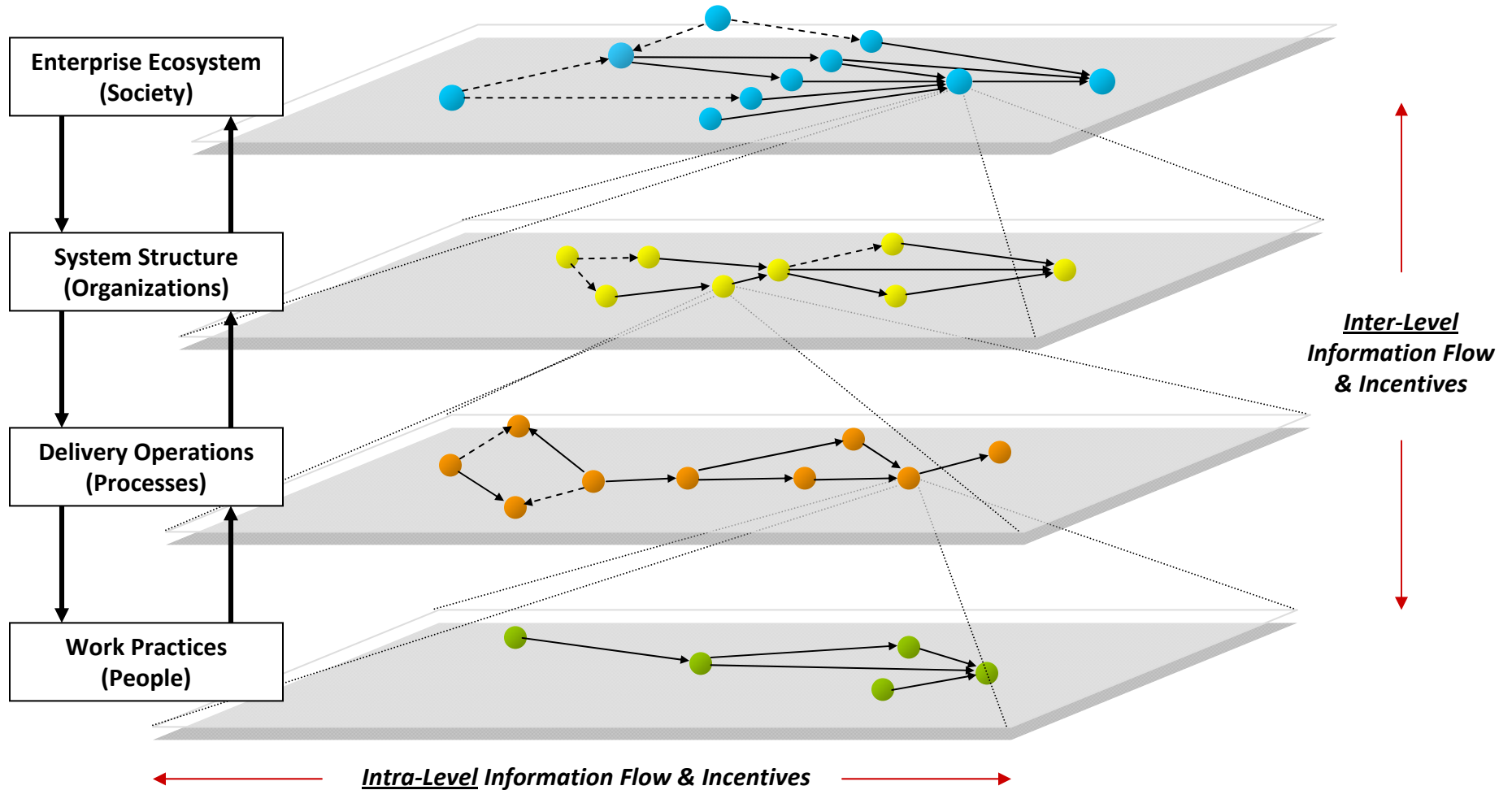
Knowledge and Skills for Enterprise Transformation.

Models of Complex Enterprise Networks

W.B. Rouse, L.F. McGinnis, R.C. Basole, D.A. Bodner & W.C. Kessler
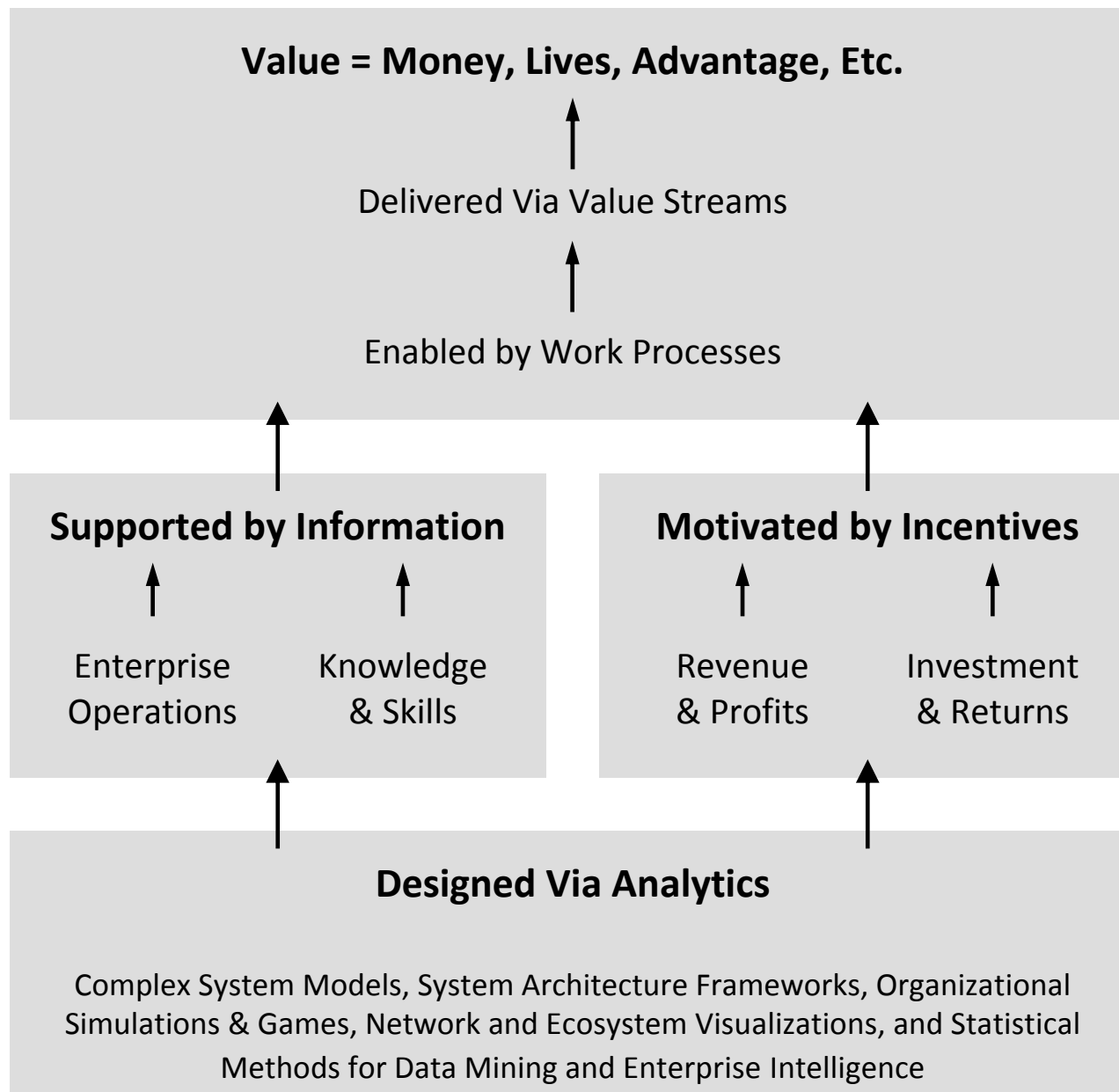
Overview

- Hierarchical Enterprise Network
- Value-Driven Nature of Enterprises
- Representation
    - Transformations
    - Flows
    - Controls
    - Forces
- Modeling Hierarchy
- Domain Contrasts
    - Mfg vs. Healthcare
- Enterprise Transformation
- Conclusions

Network Hierarchy

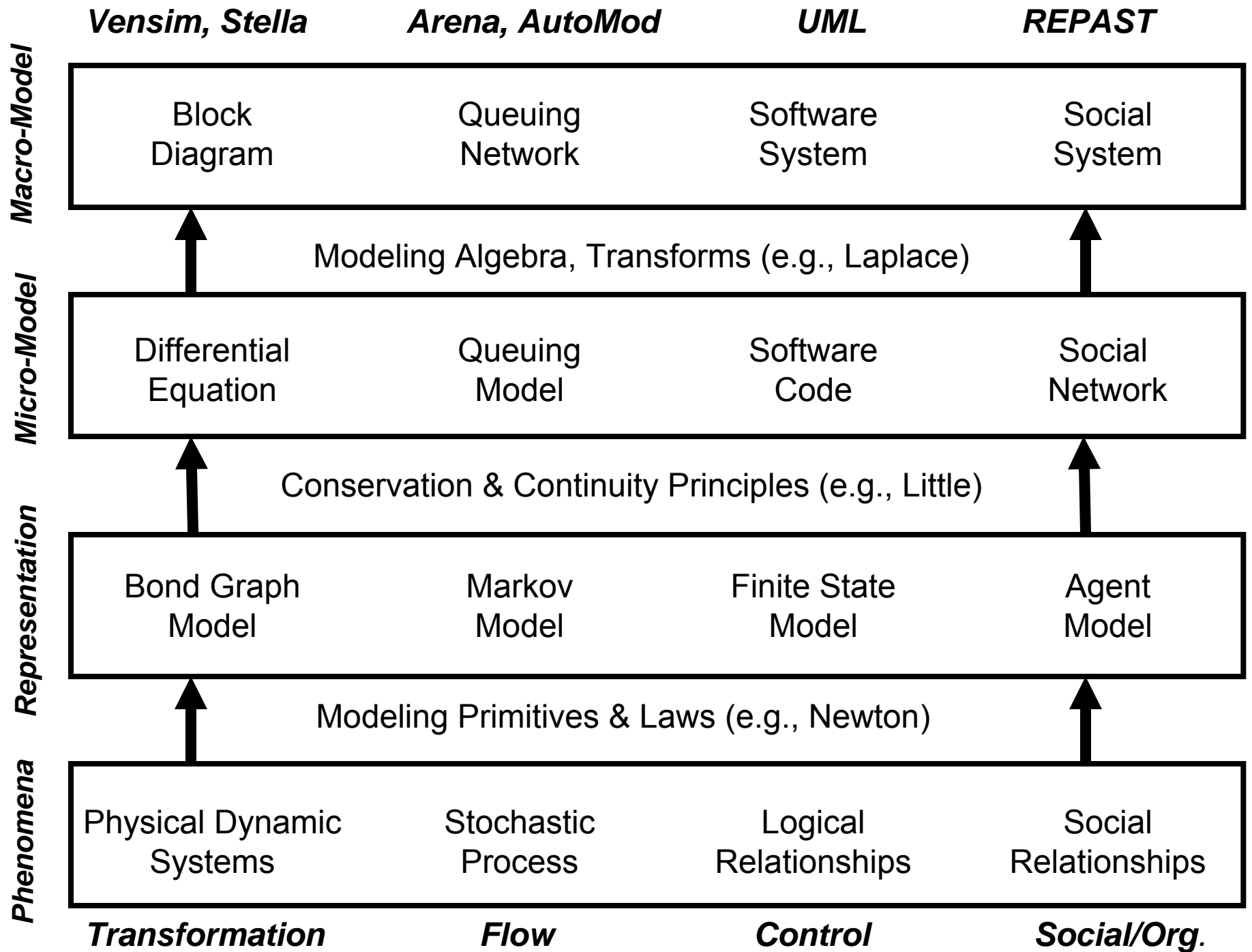Enterprise Ecosystem (Society)

System Structure (Organizations)

Delivery Operations (Processes)

Work Practices (People)

Inter-Level Information Flow & Incentives

Intra-Level Information Flow & Incentives

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Value-Driven Nature of Enterprises

Value = Money, Lives, Advantage, Etc.

↑

Delivered Via Value Streams

↑

Enabled by Work Processes

↑

Supported by Information

↑   ↑

Enterprise   Knowledge
Operations   & Skills

↑

Motivated by Incentives

↑   ↑

Revenue   Investment
& Profits   & Returns

↑

Designed Via Analytics

Complex System Models, System Architecture Frameworks, Organizational Simulations & Games, Network and Ecosystem Visualizations, and Statistical Methods for Data Mining and Enterprise Intelligence

Representation

- <u>Transformations</u> in Nodes
  - Conversion of materials into products
  - Conversion of person into customer

- <u>Flows</u> Between Network Nodes
  - Components, assemblies, subsystems
  - Customers, patients

- <u>Controls</u> of Transformation and Flows
  - Information, e.g., work in process, inventory
  - Money, e.g., receivables, payables, assets

- <u>Forces</u> of Social/Organizational Networks
  - Reporting relationships
  - Who knows what, does what, and with whom

	Vensim, Stella	*Arena, AutoMod*	*UML*	*REPAST*
Macro-Model	Block Diagram	Queuing Network	Software System	Social System
	↑	Modeling Algebra, Transforms (e.g., Laplace)		↑
Micro-Model	Differential Equation	Queuing Model	Software Code	Social Network
	↑	Conservation & Continuity Principles (e.g., Little)		↑
Representation	Bond Graph Model	Markov Model	Finite State Model	Agent Model
	↑	Modeling Primitives & Laws (e.g., Newton)		↑
Phenomena	Physical Dynamic Systems	Stochastic Process	Logical Relationships	Social Relationships
	Transformation	*Flow*	*Control*	*Social/Org.*

Domain Contrasts

- Knowledge of the (Near Term) Future
- Work Process Variability
- Expectations of Customers
- Ability to Buffer Against Variability
- Variability of Cost to Produce
- Traceability from Performance to Result
- Connection Between Cost and Revenue
- Duration of Production Process

Mfg vs. Healthcare

- Patients have more variability than most products, at the very least in terms of size, age, race, etc., but also in terms of disease characteristics at particular points in time, as well as lifestyle choices and their evolving consequences.

- As a result, health care networks have more branching than manufacturing, especially unplanned branching due to evolving discovery of patient-specific patterns of symptoms.

- The nodes of specialists, tests, and treatments are somewhat standardized, but patients' paths are not, resulting in considerable variability of flows among transformation nodes.

- Primary care is intended to serve the role of managing the paths of patients, but the fragmentation of the enterprise severely limits the possibility for control to align time-varying demands and processing capacities.

Enterprise Transformation

- ## Four Case Studies of Fundamental Change
  - LM Aero (LMT): Merger of Siblings
  - Newell (NWL): Focus on Mass Retailers
  - Reebok (RBK): Brand Resuscitation
  - UPS (UPS): Beyond GDP Growth

- ## Analysis of Case Studies

- ## Observations on Results

- ## Implications for Modeling

Note: The first three cases are drawn from Chapters 18-20 of *Enterprise Transformation*; the fourth is drawn from HBS and UVA published cases and personal experiences with the company.
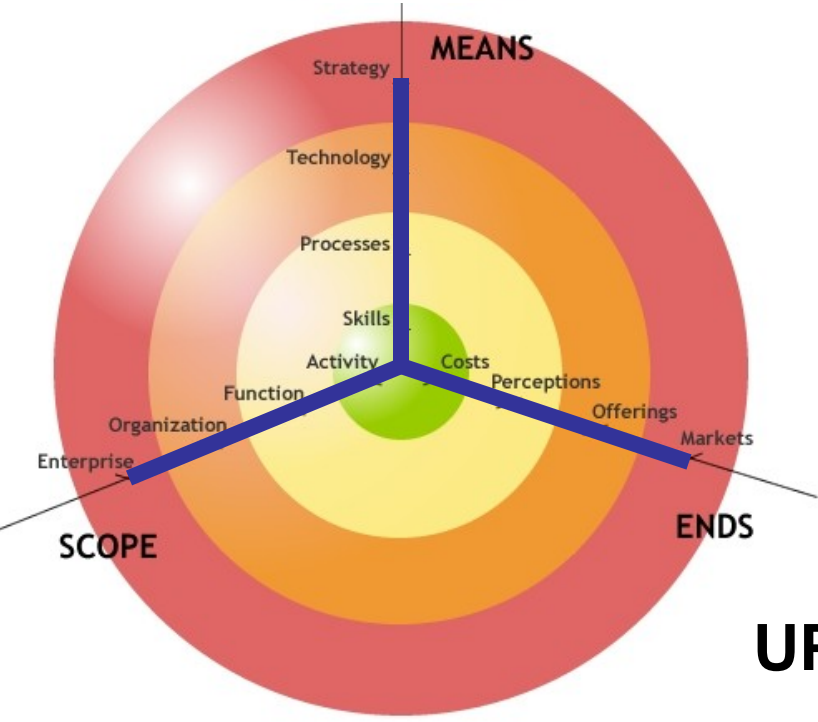
LMT
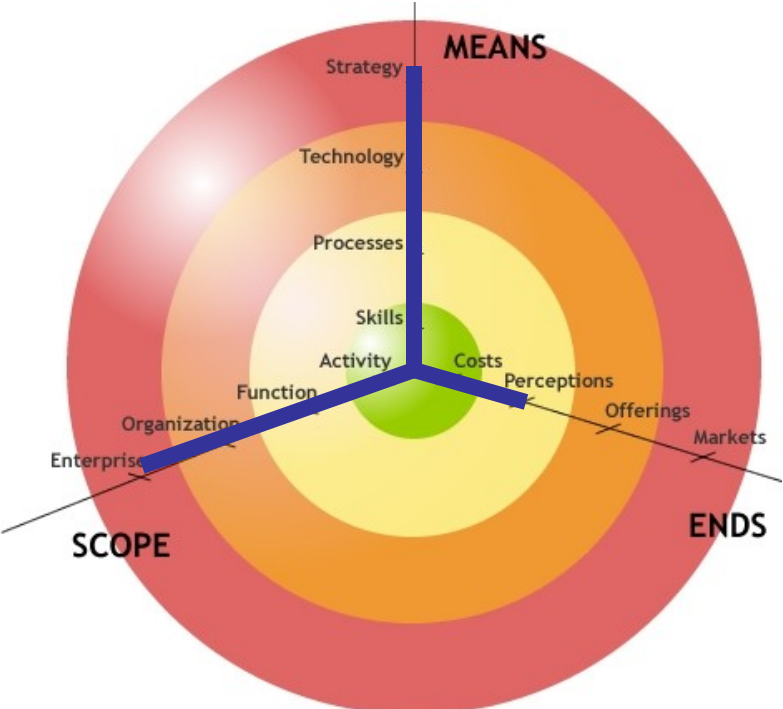
NWL
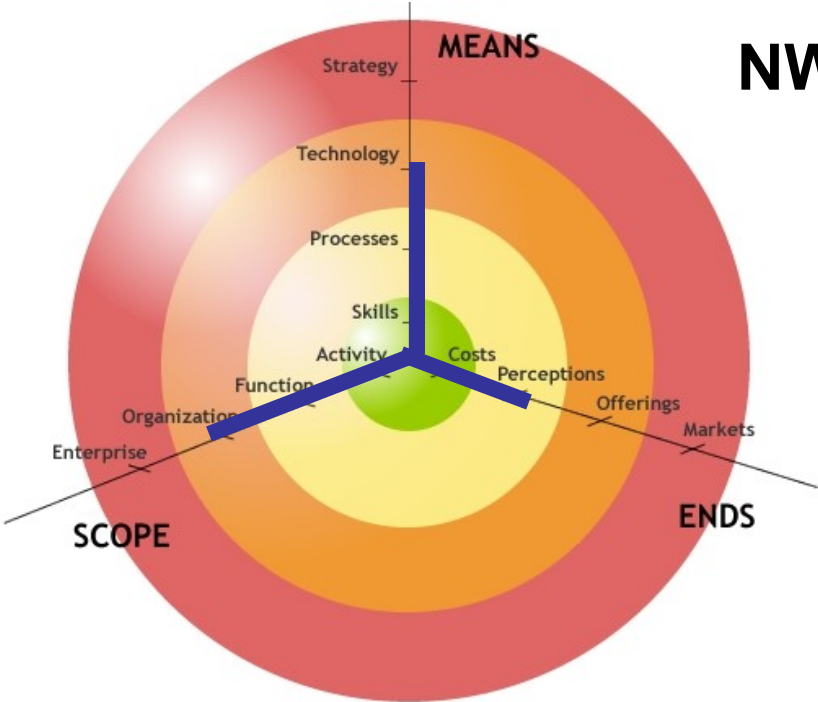
RBK
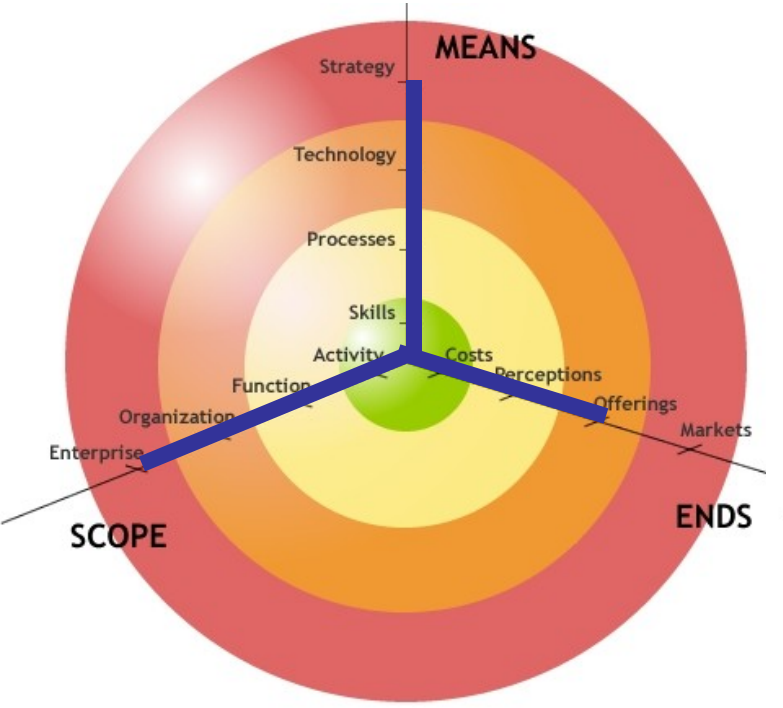
UPS

Analysis of Case Studies

Competencies (18)

Executive (20%)
- Leadership
- Vision
- Strategy
- Acquisitions

Analytical (60%)
- Financial mgt
- Industrial engr.
- Product mgt
- Reengineering
- Supply chain mgt.
- Change meth.
- Org. design
- Planning
- Market research

People (20%)
- Culture & change
- Marketing
- Collaboration
- Communications
- HR & training

Initiatives/Tasks (125)

Analysis of Cases
- Driver(s) of Transformation
- Approach to Transformation
- Elements of Transformation
  - Δ1 = Focus on Customer
  - Δ2 = Increase Oper. Efficiency
  - Δ3 = Change Enter. Culture
  - Δ4 = Execution

Real Cases (4)

Transformation Cases
- Lockheed Martin
- Newell Rubbermaid
- Reebok
- UPS

Observations

- Executive competencies are central to seeing where markets are going, deciding on the ends, and formulating high-level imperatives

- Analytical competencies are central to formulating, designing and evaluating the means to achieving imperatives

- People competencies are central to motivating and supporting stakeholders to invent, implement and execute the means

Implications

- Modeling hierarchy can readily support analytical competencies
  - Integration of multiple modeling paradigms remains a challenge
- Modeling hierarchy can support some elements of the people competencies but not all
  - Some people issues act as "forces" on the enterprise network and modeling of such phenomena is still rudimentary
- Modeling hierarchy can support some elements of the executive competencies but not all
  - Leadership and vision, or their lack, are difficult to predict and subject to fundamental attribution errors – see "Car Wars"

Conclusions

- Information and incentives are the factors that dominate an enterprise's abilities to fundamentally change the nature of the value provided and the ways in which this value is provided.

- Understanding the transformations, flows, controls, and social/organizational nature of the "as is" and "to be" enterprise are central to orchestrating the changes needed.

- Full application of the modeling hierarchy to fundamental change of complex organizational systems is very much a work in progress.

Summary

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