

EXECUTER VICTUSTM

Rudimentary Application of Beer's Viable System Model to Shipbuilding (Part 1 of 2)

Jon E. Hitchcock, PhD
May 20, 2018



PREFACE:

Admittedly, I undertook the acquisition of Beer's text and the associated exercise only after attempting miserably a read of Espejo and Harnden's "The Viable System Model..." Even after all my training it left me a little dazed and confused. Fortunately this was not the case with Beer's original work although I started with the practical text and will work up to his works informally known as the "The Brain" and "The Heart" at a later time.

Stafford Beer's, "Diagnosing the System for Organizations" recommends that the reader conduct exercises throughout the book. The enclosed is the elementary breakdown of the highest levels of a generic shipbuilding entity through progress of the first half of the book. The poignant points of the text in combination with considerations from many years of trading are what have been captured, not necessarily a strict extraction of the lessons or theories in the book.

The second half of the book, with the associated exercises, promises to be as interesting as the first as it brings in many elements of controllers and ethos of the leadership, which touch upon on my interests that led to Beer's work weeks ago.

I must remark on Beer's writing in that though it uses dated and possibly unfamiliar terminology compared to recent literature, his ability to convey importance and the significance of the ramifications from the points made is exceptional.

If anyone believes they see any particular organization represented, I can assure everyone this is not the case as the essential nature of most shipbuilding organizations can be viewed on the internet with associated presentations of their facilities and workstations. All labels are generic and the enterprise has been simplified to a single entity without attempting to work out the details of a multi-site enterprise, which could be an effort at some future time.

The investigation content here is offered as a framework for dialogue among any and all interested in complex manufacturing industries and especially for those in the world of shipbuilding. I realize it is simplistic, but until now I have found now public domain content from which to address many of the principles and topics identified in this exercise. Please feel free to comment and correspond if you have the inclination.

It is also acknowledged that while Beer's concepts about transducance were meant for management data and communication within the system, the have been more globally applied to the transformation of any input-output, whether tangible or intangible, as their theoretical applicability appeared to fit.

"Education is a lifelong journey."

Sincere regards,

Jon E. Hitchcock, PhD
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PRINCIPLE ONE - ORGANIZATION

Principle One – “Managerial operational and environmental varieties, diffusing through an institutional system, TEND TO EQUATE; they should be designed to do so with minimum damage to people and cost.”

(In other words the first responsibility of Executive Leadership is to understand the system and accept accountability for its balance because if properly balanced the system can achieve equilibrium (i.e. profitability, value added, etc.) and survive, if not the system shall eventually fail and die.)

The forces and challenges applied to an organization will result in a response whether to life and equilibrium in sufficiency or to entrenchment into temporal survival defensive postures if its center of identity and leadership sense lethal threats whether short or long term.

Constraints:

1. The design of system elements must be designed to produce an understood and specified criteria with inputs and specified resultant outputs to ensure productive outcomes.

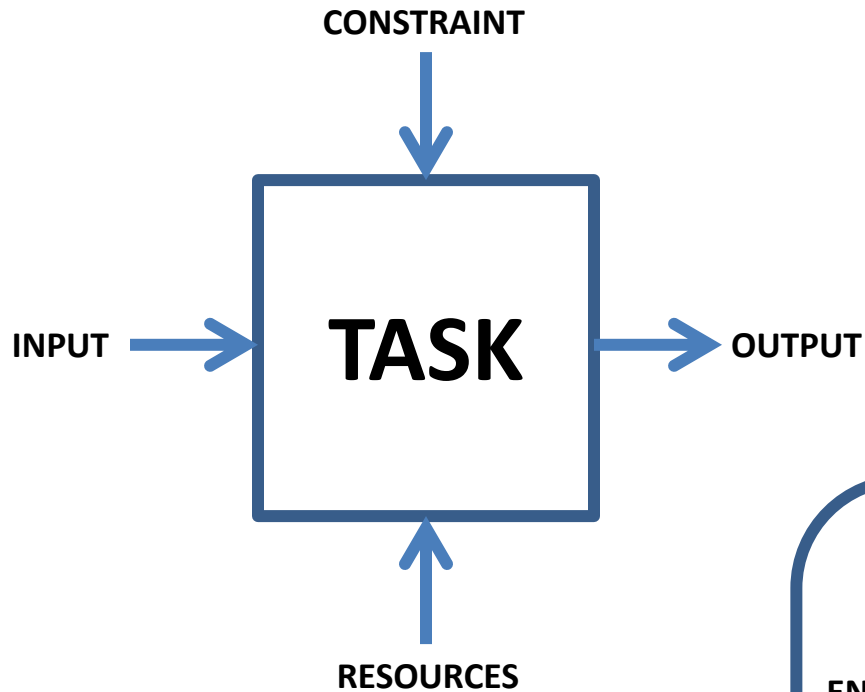
(In other words, management must specify in some detail the required mandatory organizational element, competencies, capacity and success criteria for the system to operate; otherwise there is great risk that the system may operate but eventually fail.)

2. The Management subsystem must be valued comparably with the necessary operations and reporting & control subsystems at the level requisite to keep the system in balance.

(In other words, it matters exceptionally that the management systems are maintained at levels of quality, competency and capacity of the organization or rather it doesn't matter the excellence of the operations and systems available to an enterprise if the management systems are dysfunctional.)

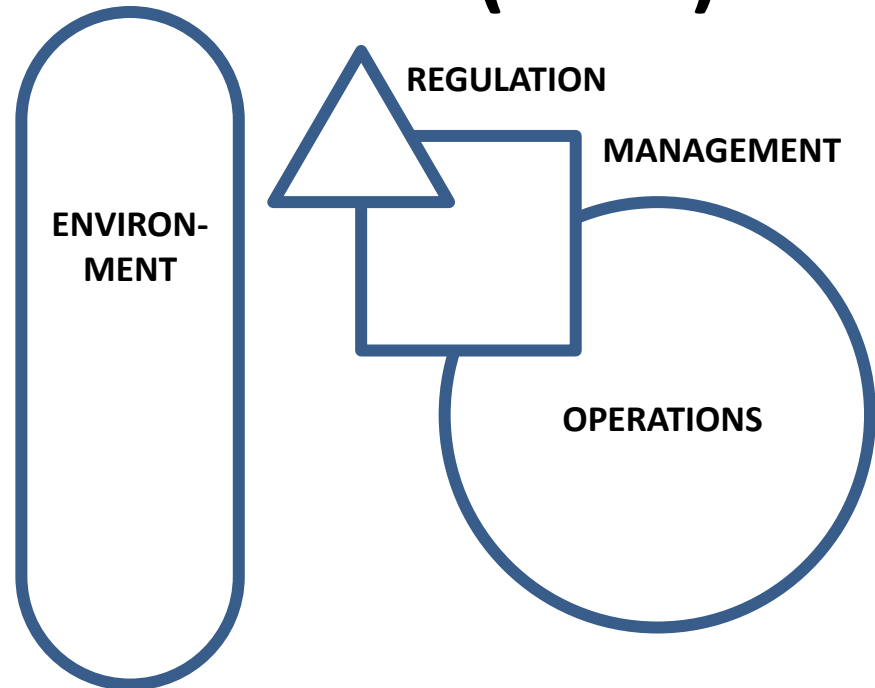
Beers first principle applies to the requisite capability and accountability required of Management in the design of the organization and ensure its survival.

PRINCIPLE ONE – ORGANIZATION ELEMENATARY DIAGRAMS

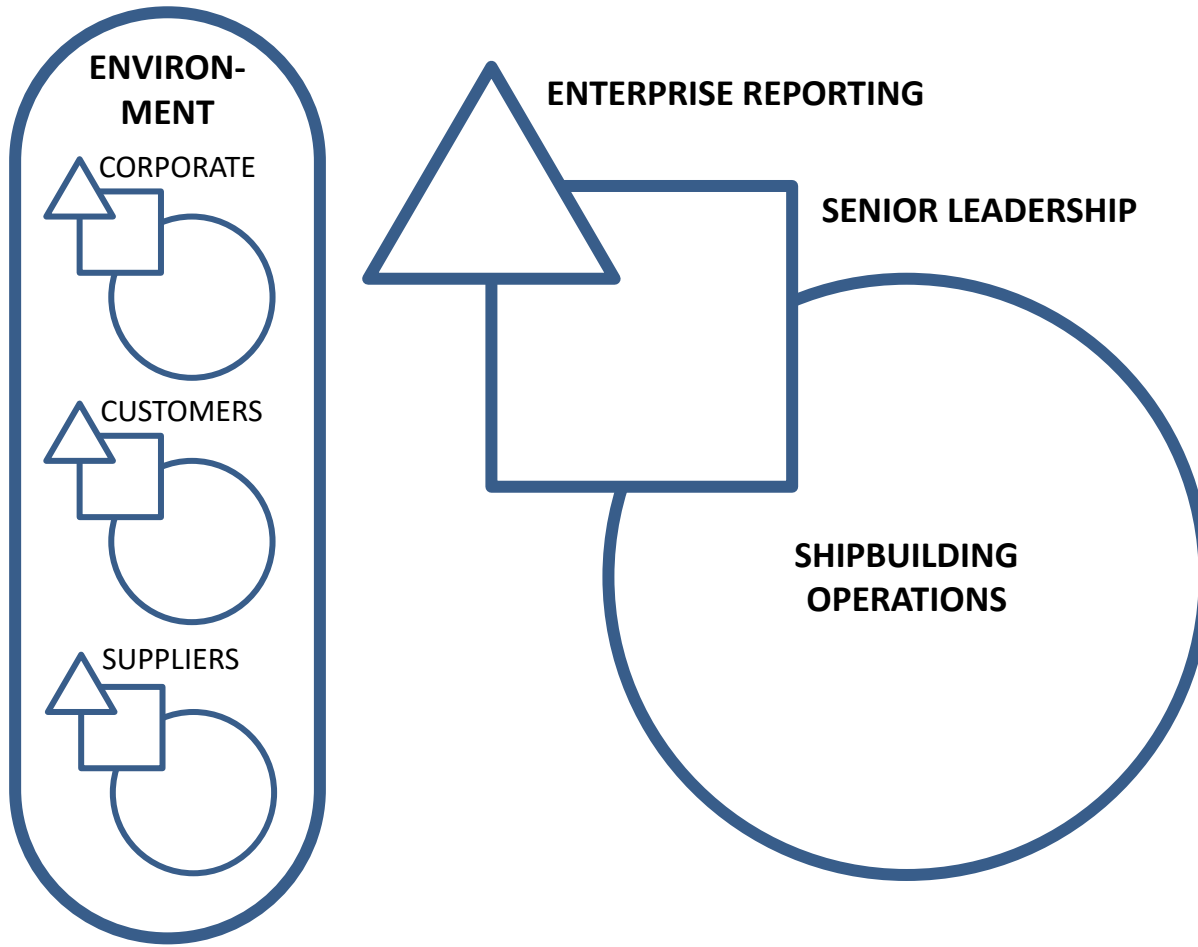


**Integrated
DEFinition
(IDEF)**

**Viable
Systems Model
(VSM)**

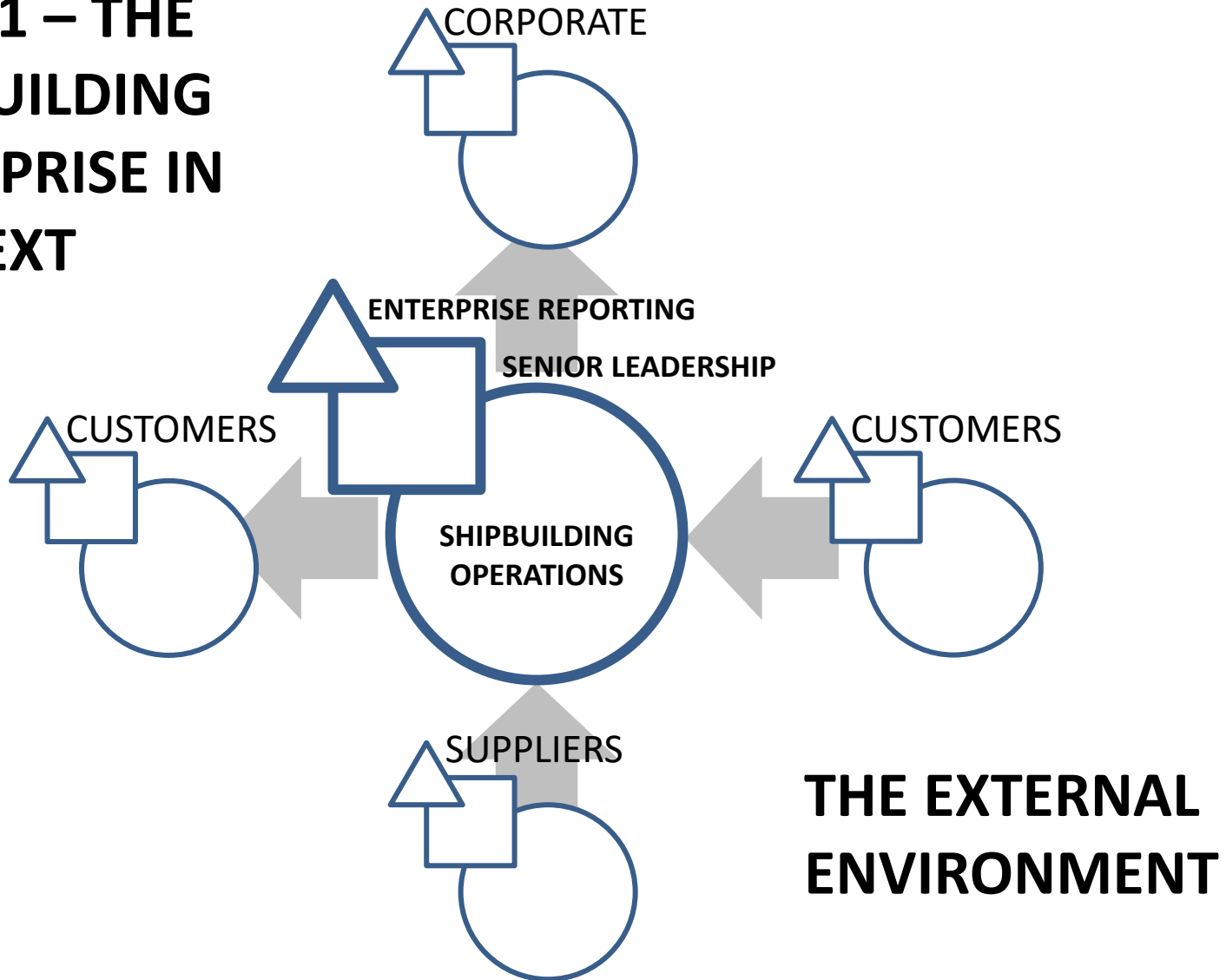


PRINCIPLE ONE – ORGANIZATION: SHIPBUILDING



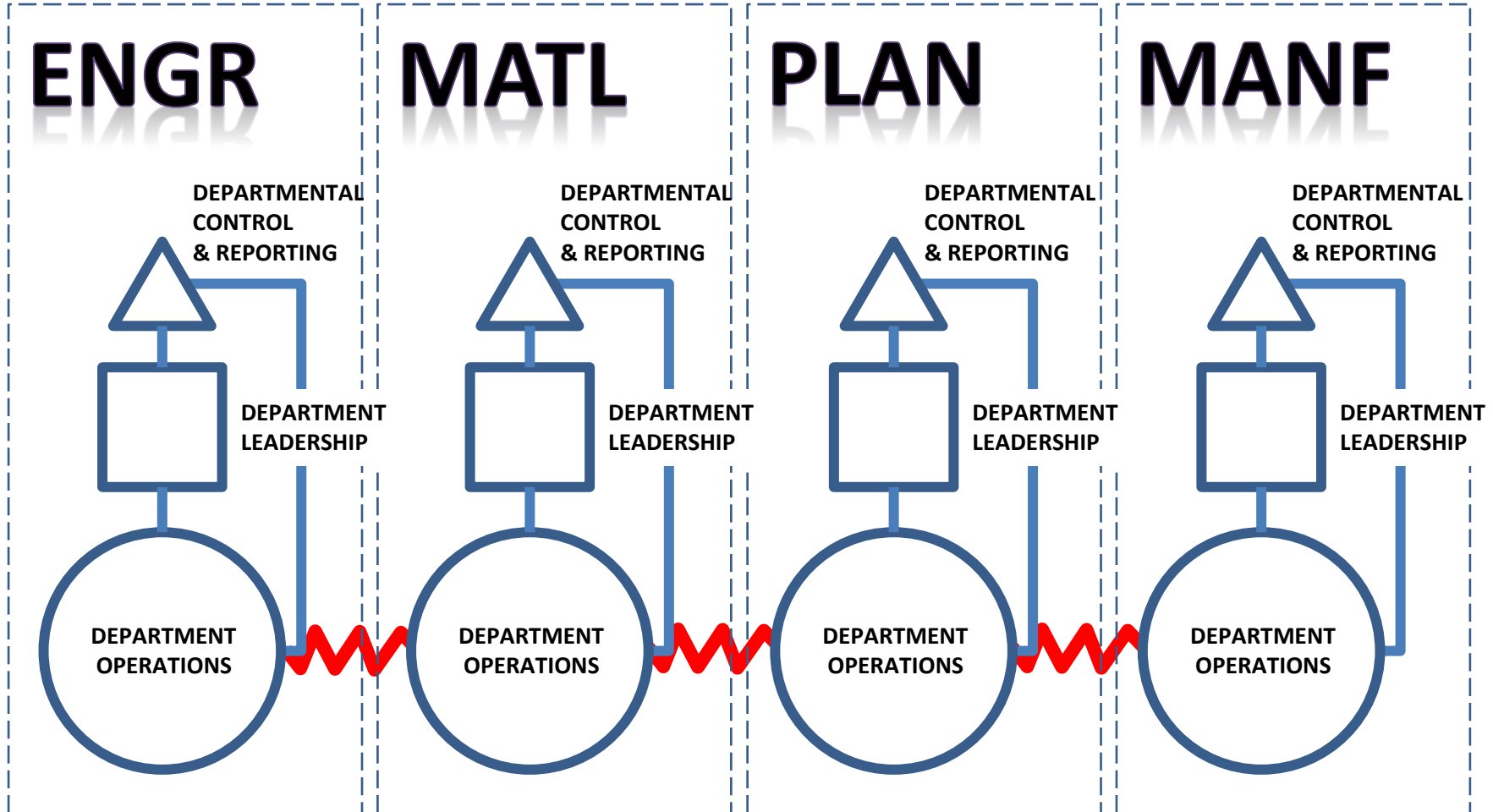
PRINCIPLE ONE - ORGANIZATION

LEVEL 1 – THE SHIPBUILDING ENTERPRISE IN CONTEXT

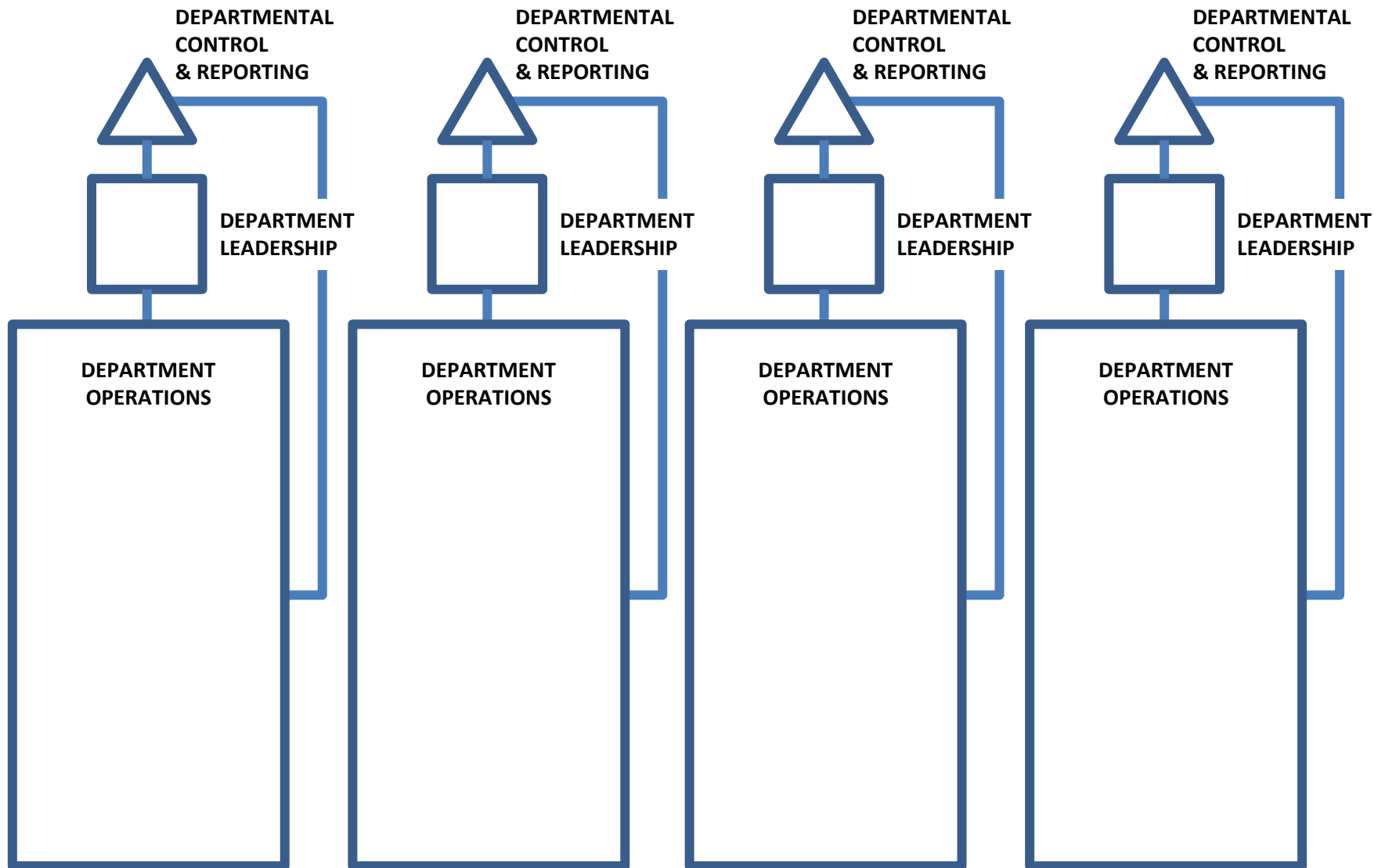


PRINCIPLE ONE - ORGANIZATION

LEVEL 1 – THE SHIPBUILDING ENTERPRISE BASIC FUNCTIONS THAT MUST BE RELIABLY CONDUCTED



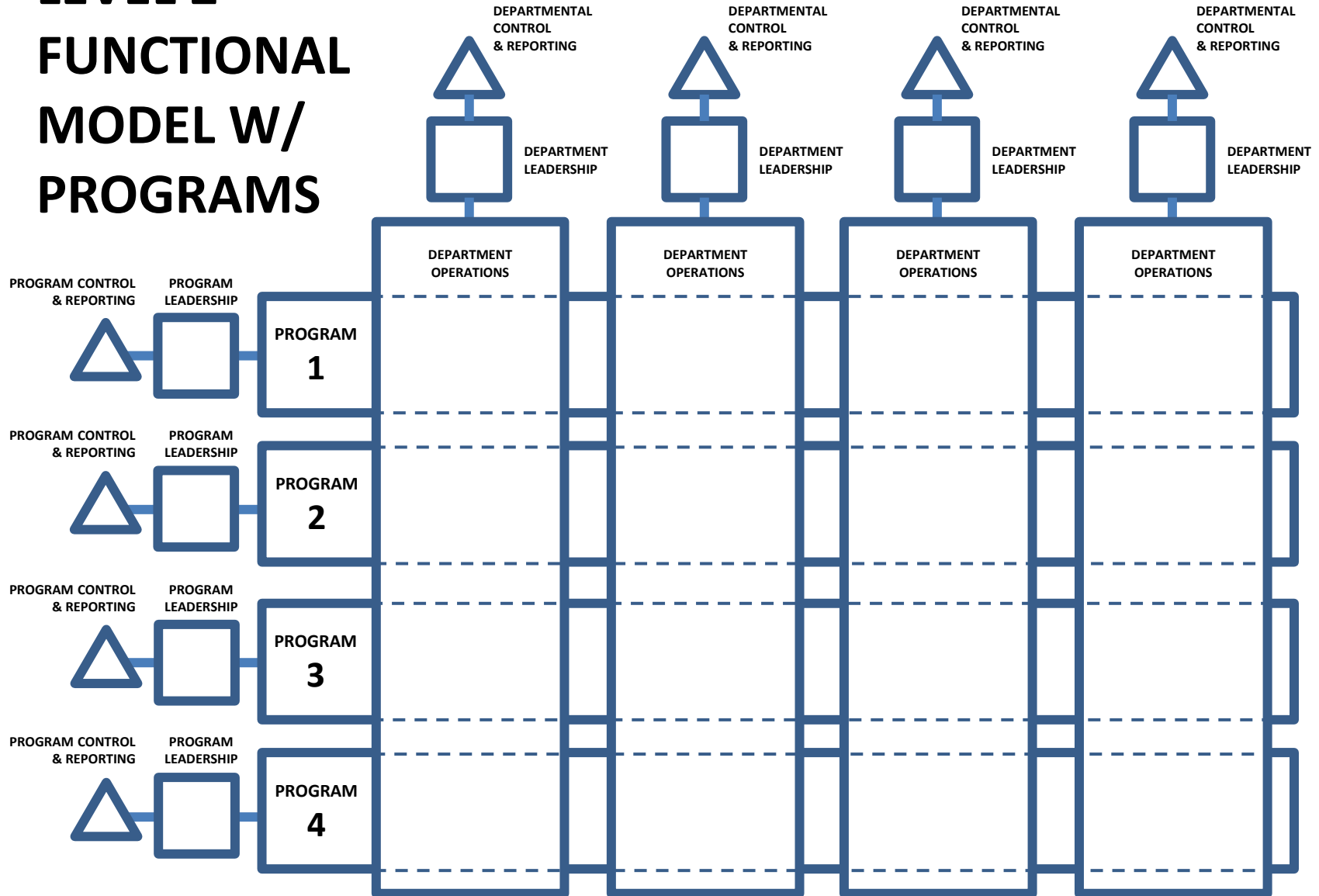
PRINCIPLE ONE - ORGANIZATION



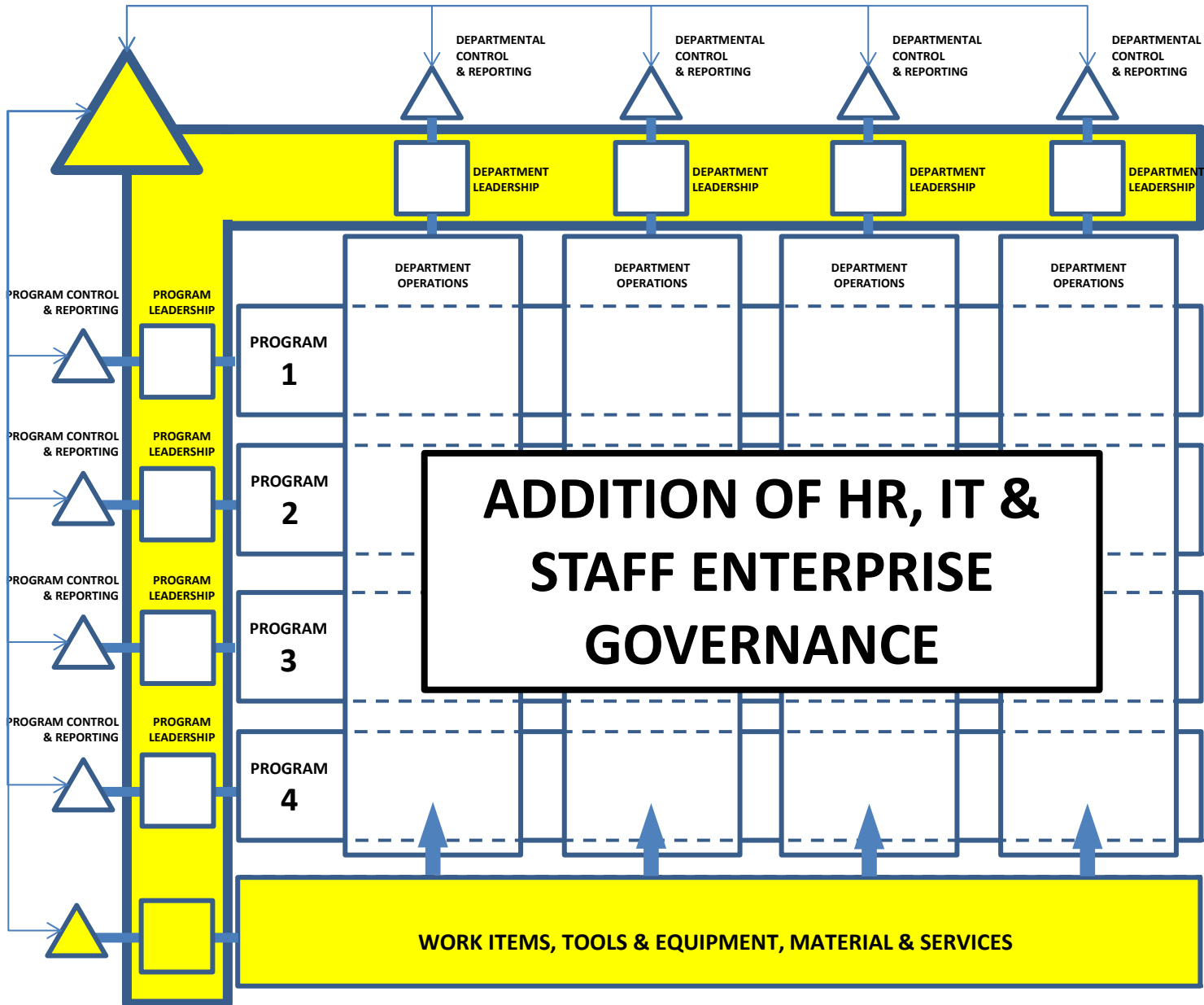
SHIPBUILDING FUNCTIONAL MODEL MODIFICATION

PRINCIPLE ONE - ORGANIZATION

LEVEL 2 FUNCTIONAL MODEL W/ PROGRAMS

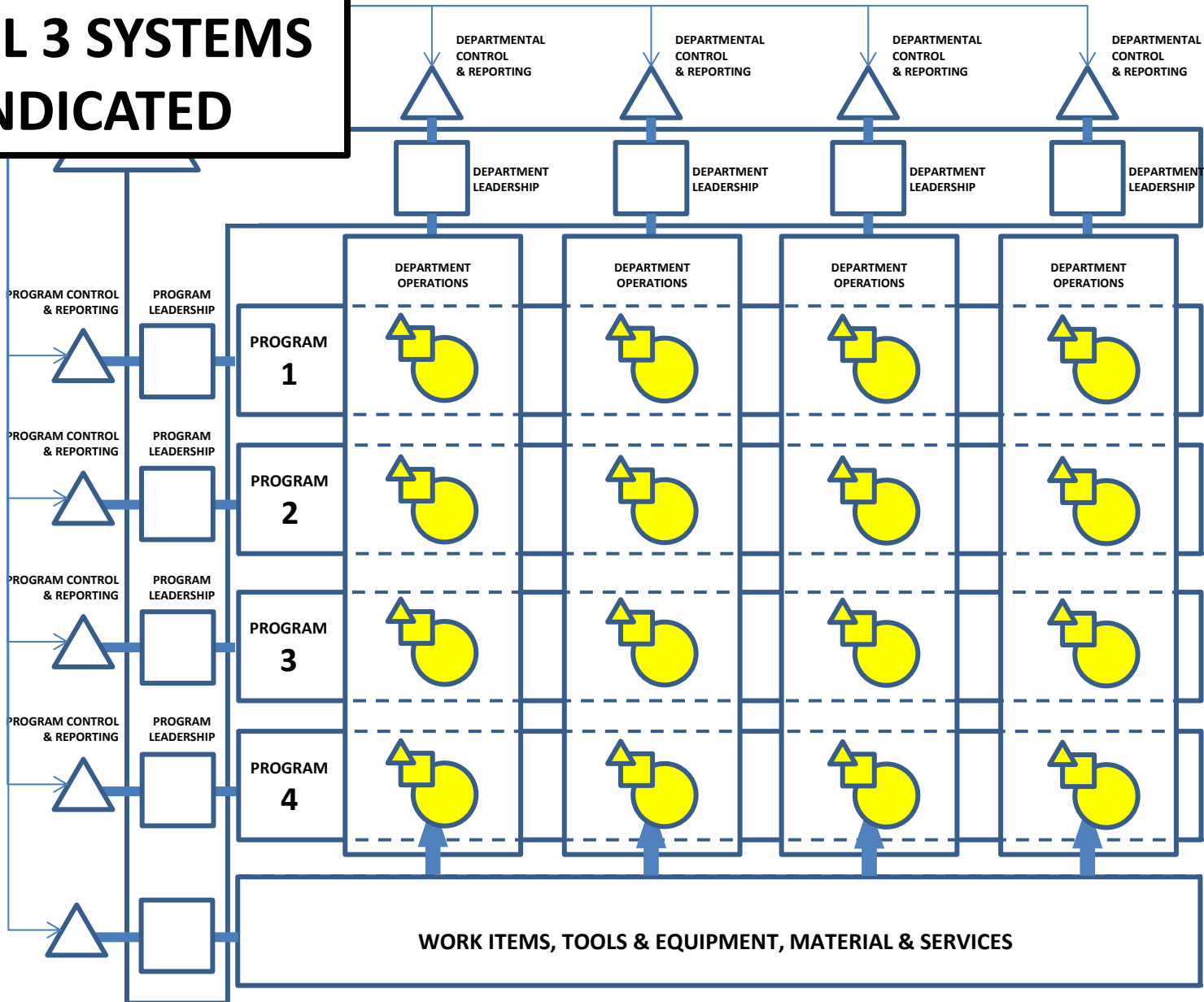


PRINCIPLE ONE - ORGANIZATION

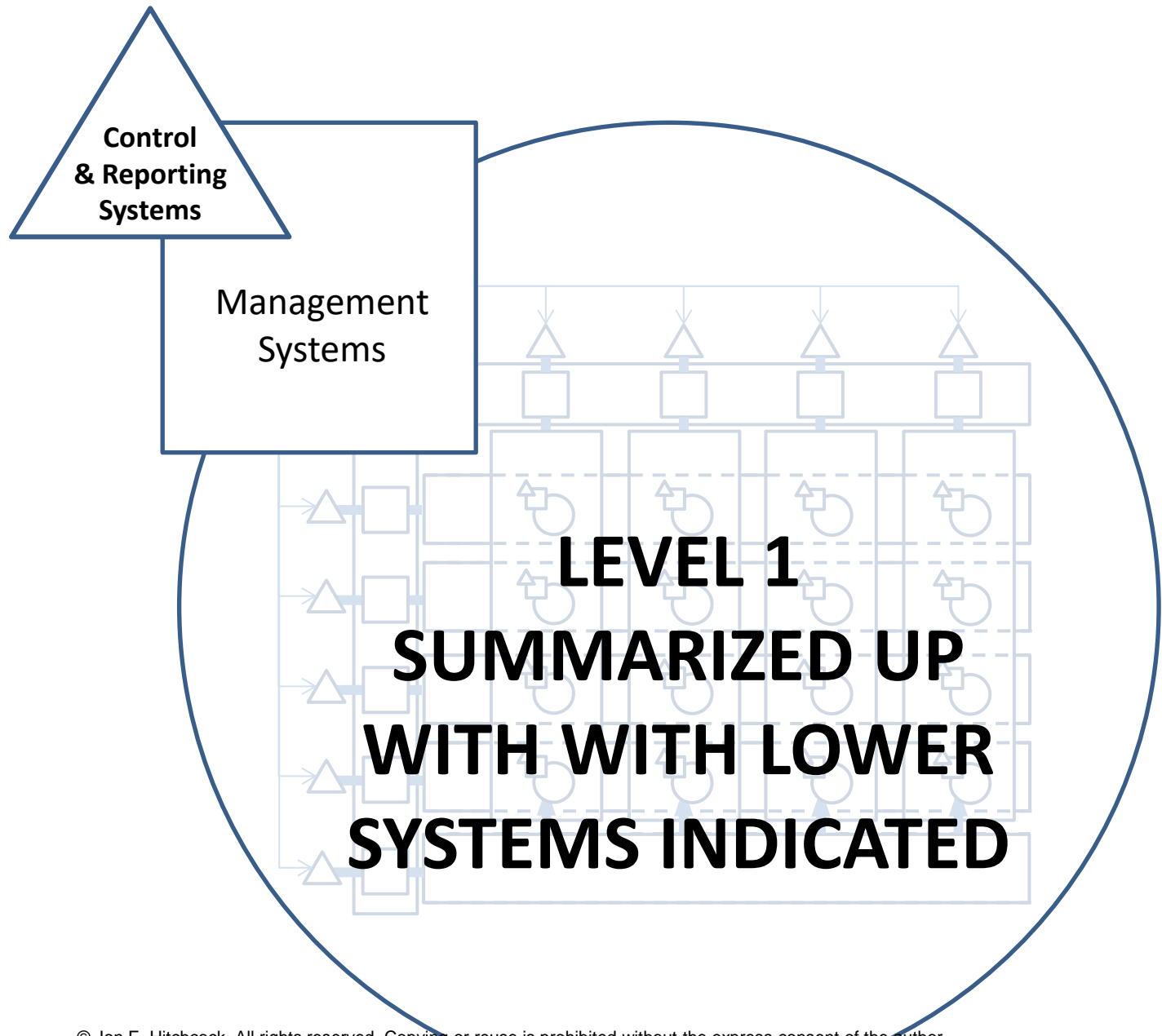


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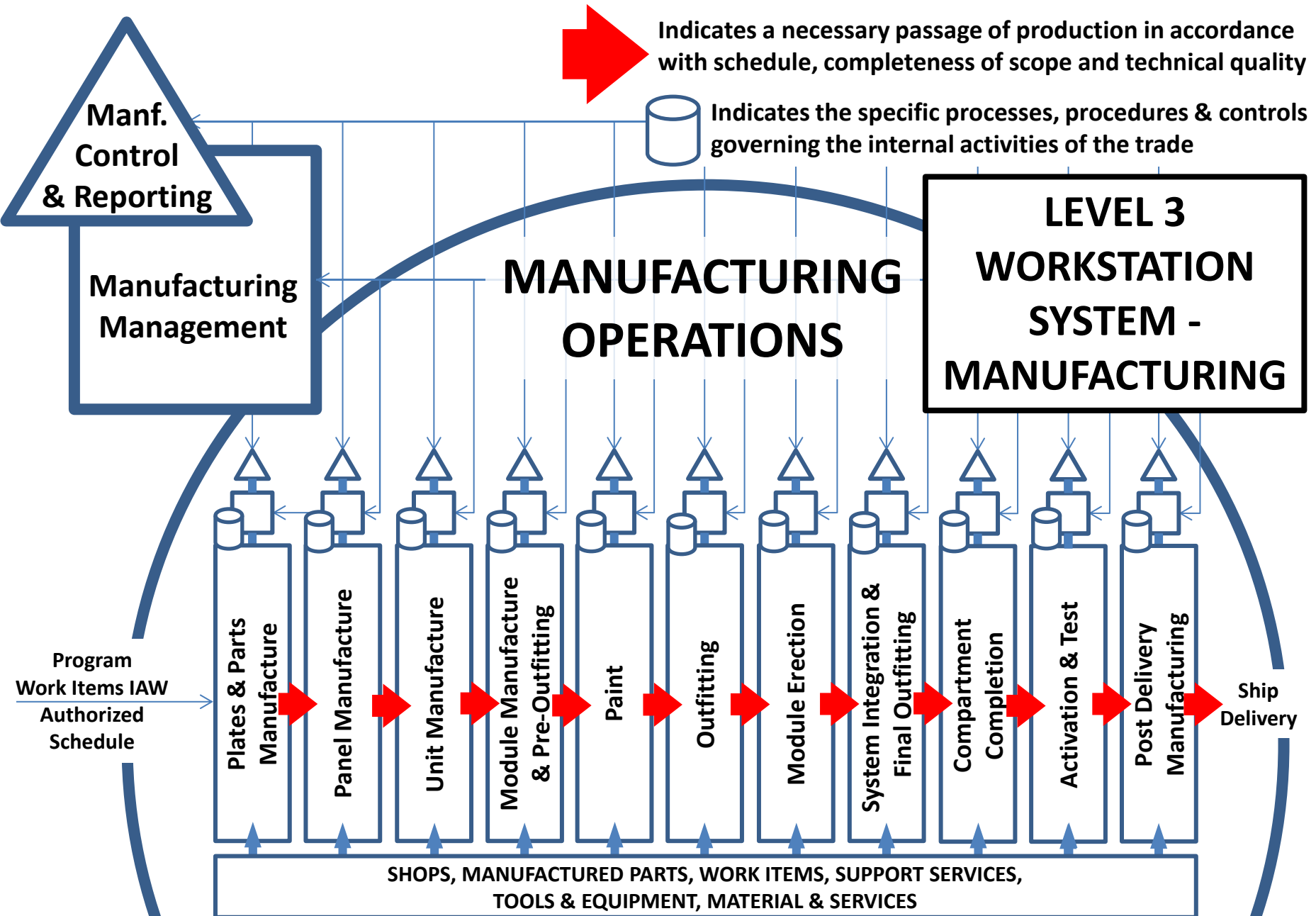
LEVEL 3 SYSTEMS INDICATED



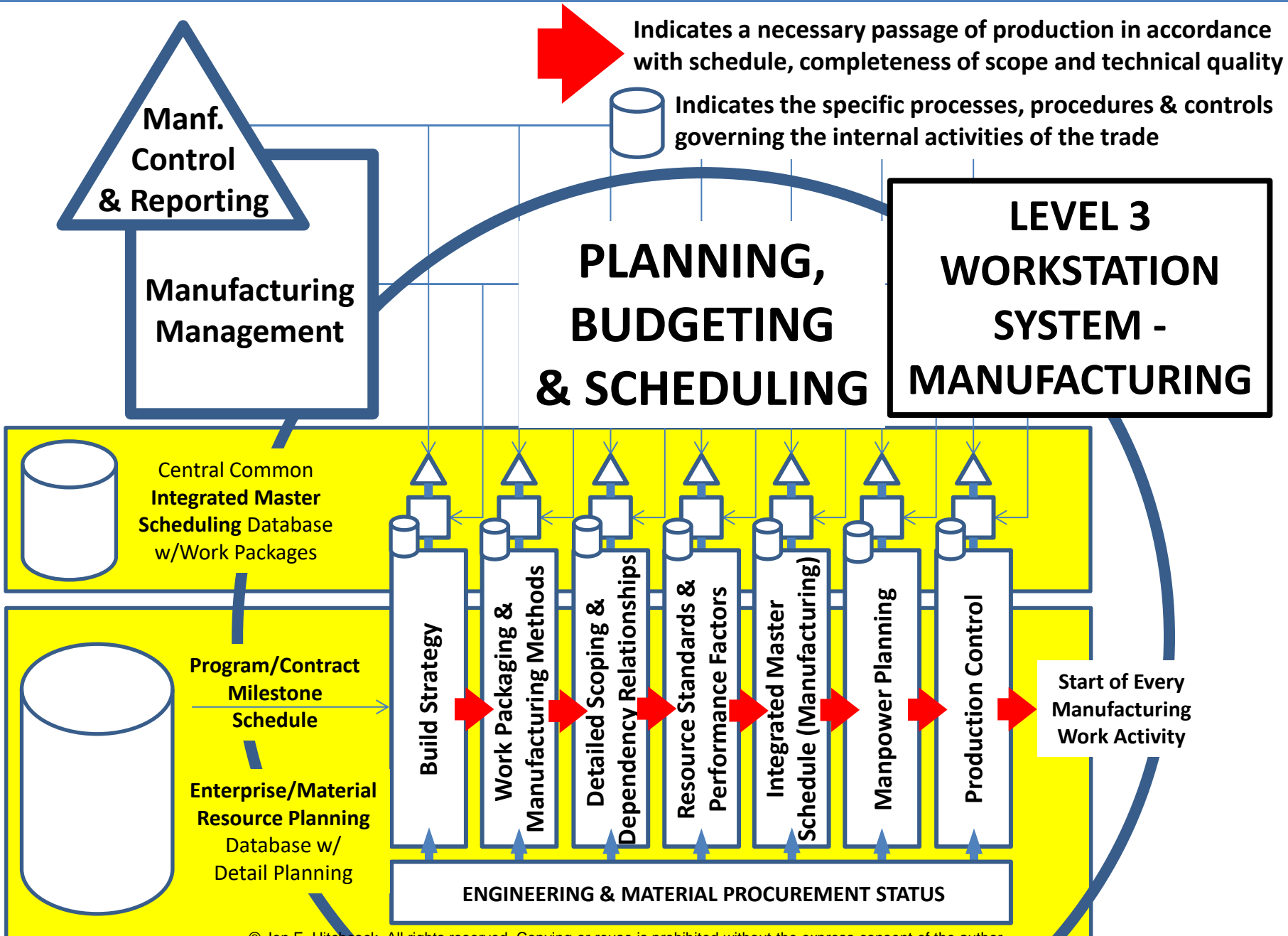
PRINCIPLE ONE - ORGANIZATION



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PRINCIPLE ONE - ORGANIZATION

SUMMARY IMPLICATIONS OF PRINCIPLE ONE

1. The leadership of a complex system must seek the absolute truth with regard to its viability.
2. The leadership of a complex system must fully understand all the elements of a system in order to ensure the effective 1) operational design, 2) management competency and capacity and 3) controls and reporting of the system to sustain viability
3. The leadership of a complex system must adequately resource a complex system with the necessary management and controls and not impose “Star Chamber” emergent demands upon the system outside of its designed capacity and margins to absorb emergent tasks.

Organizational design is the first competency of and
measure of accountability for leadership.

PRINCIPLE TWO - COGNITION

Principle Two – “The four directional channels carrying information between the management unit, the operation, and the environment must each have a higher capacity to transmit a given amount of information relevant to variety selections in a given time than the originating subsystem has to generate it in that time.”

(In other words, data/product variations must in all communications/transfers must be limited and designed so that it can be analyzed, understood and action taken upon it in such a manner to be effective before the next wave of data is conveyed upon the community.)

System Transduction Capacity can be achieved through human resources, technological systems, quality of input material, tools and equipment and facilities.

Constraint:

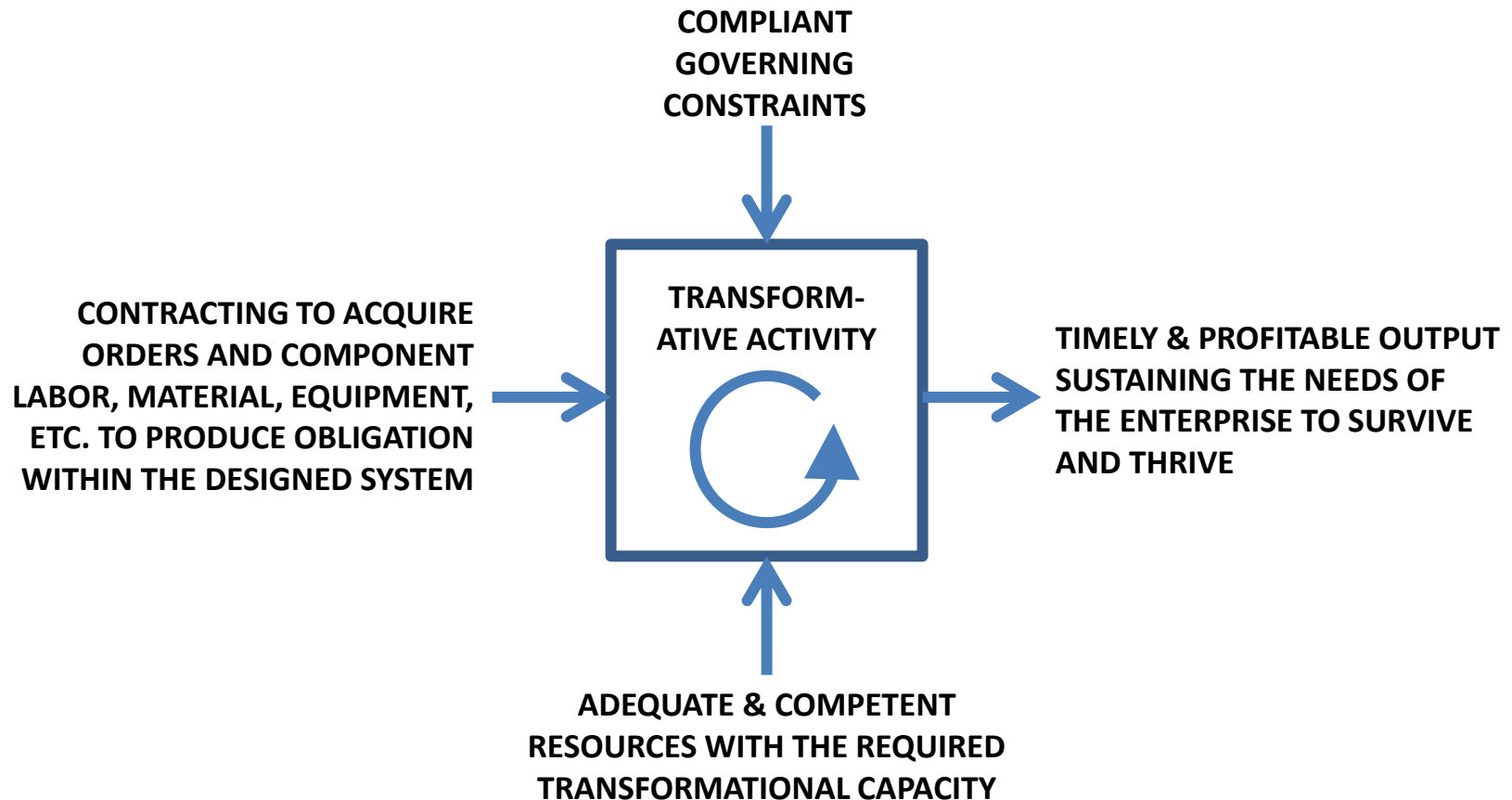
1. The management of the System-in-Focus, called the Senior Management, is IN PRINCIPLE unable to entertain (*all*) the variety generated by any one (never mind all) of its independent autonomous subsidiary viable systems that constitute System One.

(In other words, all systems are governed by the “Cognitive Limits” theorem and must make well crafted decisions to determine the necessary data from which to operate the system effectively; looking at the wrong data or if the data is not absolutely true and reflective of system status, the entire system could be at risk.)

A certain level of independence and autonomy with precise agreements on controls and reporting are required for the leadership of subsystems to be accountable.

PRINCIPLE TWO - COGNITION

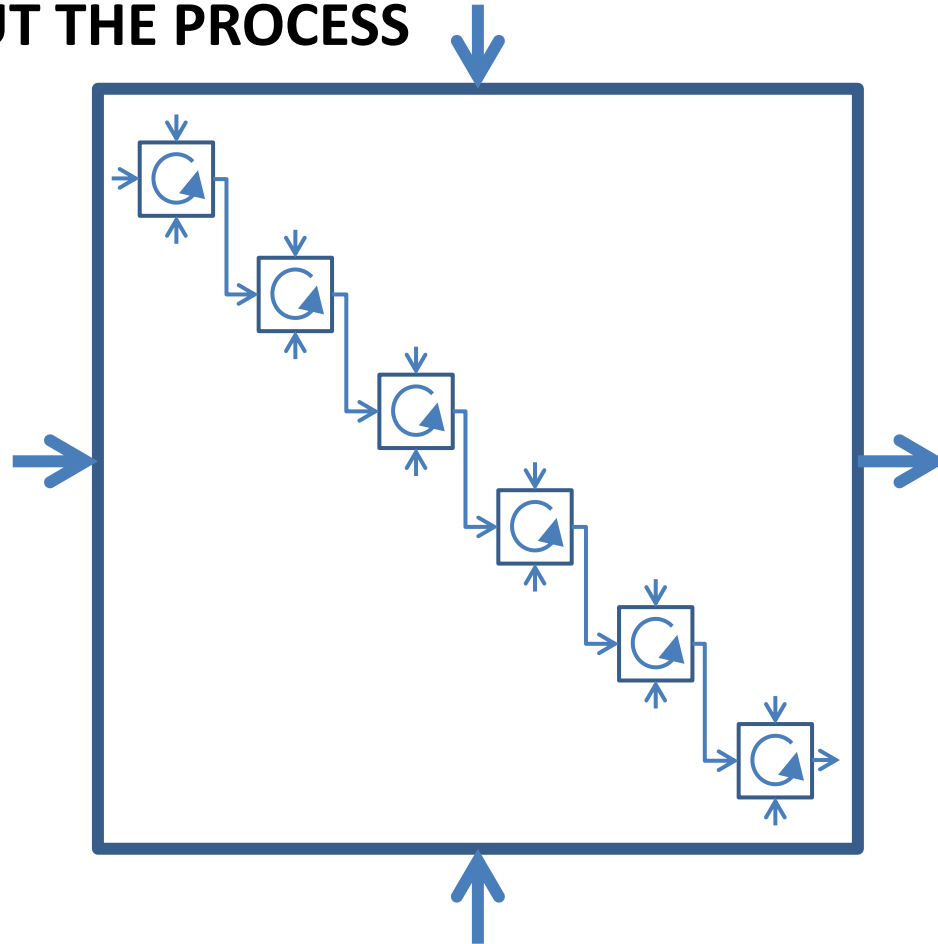
MUST HAVES FOR THE TOP LEVEL SYSTEM TO SURVIVE: 1) QUALITY, 2) COST/PRICE & 3) SCHEDULE



Systems Engineering processes are required as much for the enterprise as for the products being produced.

PRINCIPLE TWO - COGNITION

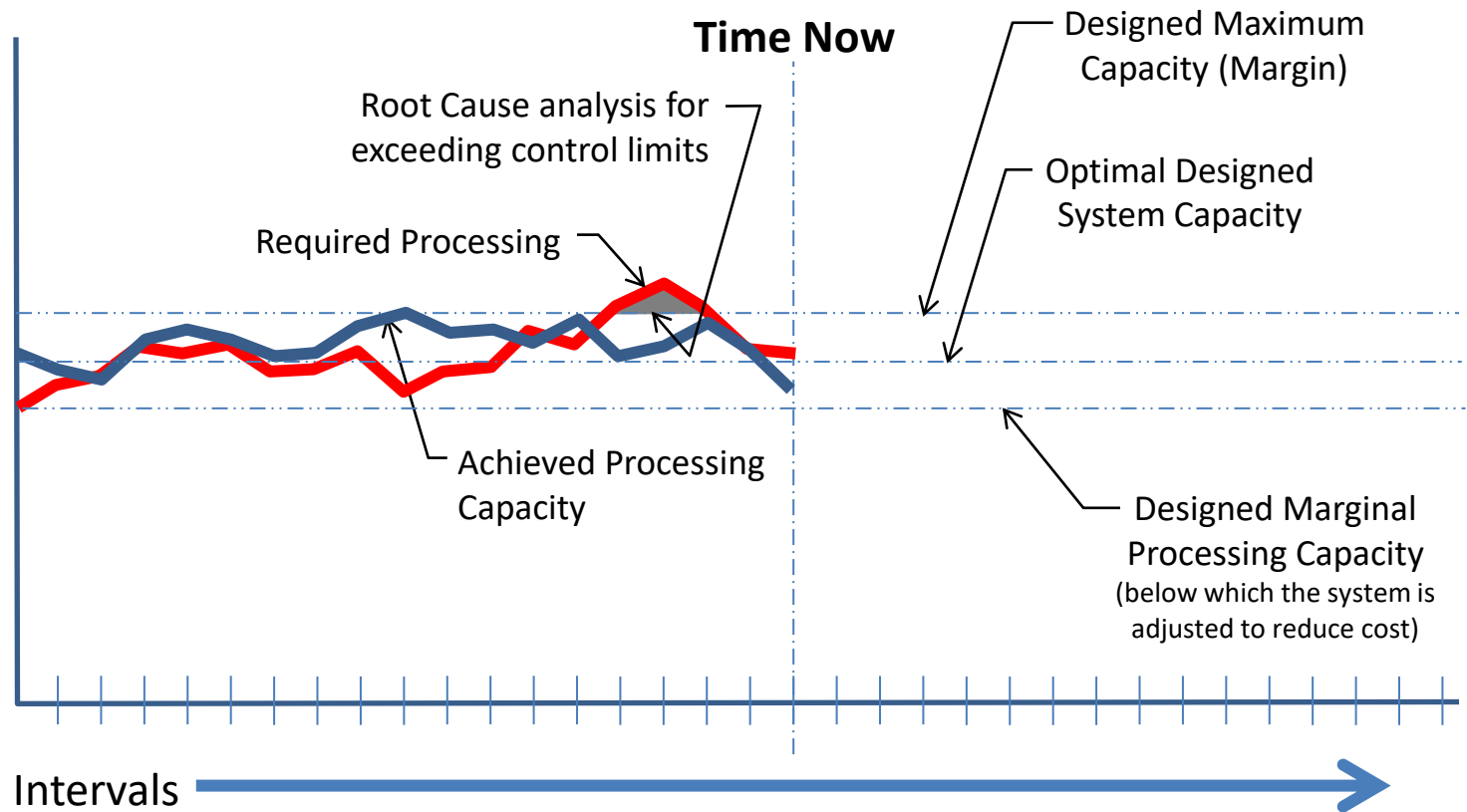
EVERY SUBSYSTEM AND PROCESS MUST BE DESIGNED WITH THE REQUISITE CAPABILITY TO SUSTAIN EQUILIBRIUM THROUGHOUT THE PROCESS



Ignorance, incompetence, or worse – intentional falsification of subsystem requirements and capabilities will doom the system to eventual extinction even if there is a good show until the inevitable time.

PRINCIPLE TWO - COGNITION

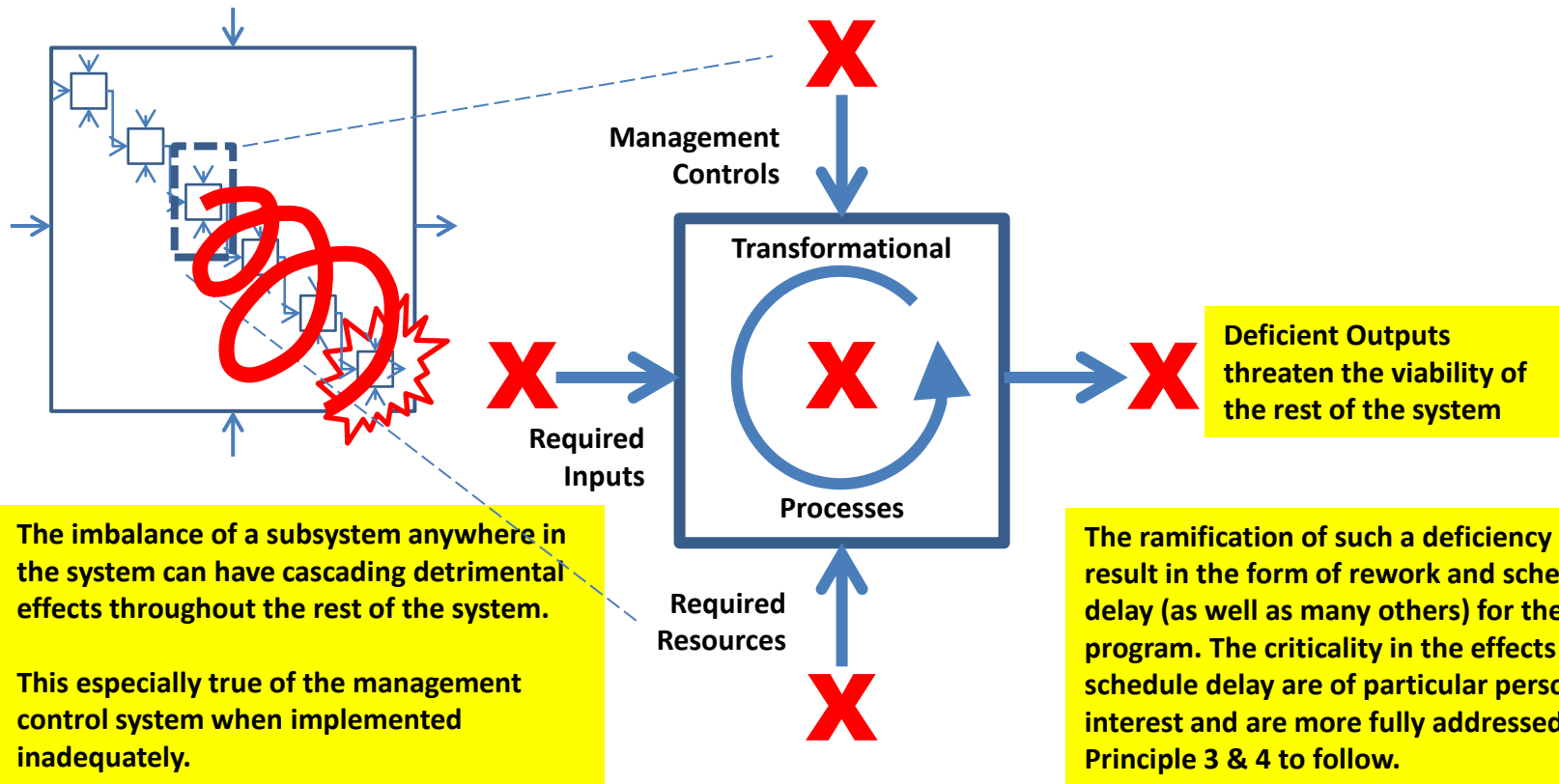
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PRINCIPLE TWO - COGNITION

SUMMARY IMPLICATIONS OF PRINCIPLE TWO

1. The requisite quality of the essential elements of transduction, whether data into requisite information or material/parts into downstream tangible product, must to be clear and effective:
 - Personnel
 - Processes
 - Technological Systems
 - Material, Parts and Equipment
 - Tools and Equipment
 - Support Services
 - Facilities and Infrastructure
2. The sustainment of adequate capacity through the combination of elements for each subsystem to maintain the necessary rates of processing to maintain equilibrium is essential.
3. Over resourcing or investment in any element will damage and drive cost, while the under resourcing of any element will damage personnel and put the system at risk.

Two major priorities emerge for Leaders and Managers: 1) Do not drive unnecessary cost into the system or 2) damage the system of human resources.

PRINCIPLE THREE - TRANSDUCTION

Principle Three – Wherever the information carried on a channel capable of distinguishing a given variety crosses a boundary, it undergoes a transduction; the variety of the transduction must be at least equivalent to the variety of the channel.

(In other words Transduction processing (or transformation) capacity must remain at levels necessary to process all required messaging and products to ensure the control of timing/schedule variances are controlled to remain within the designed levels of the system.)

System Transduction Capacity can be achieved through human resources, technological systems, quality of input material, tools and equipment and facilities.

Constraint:

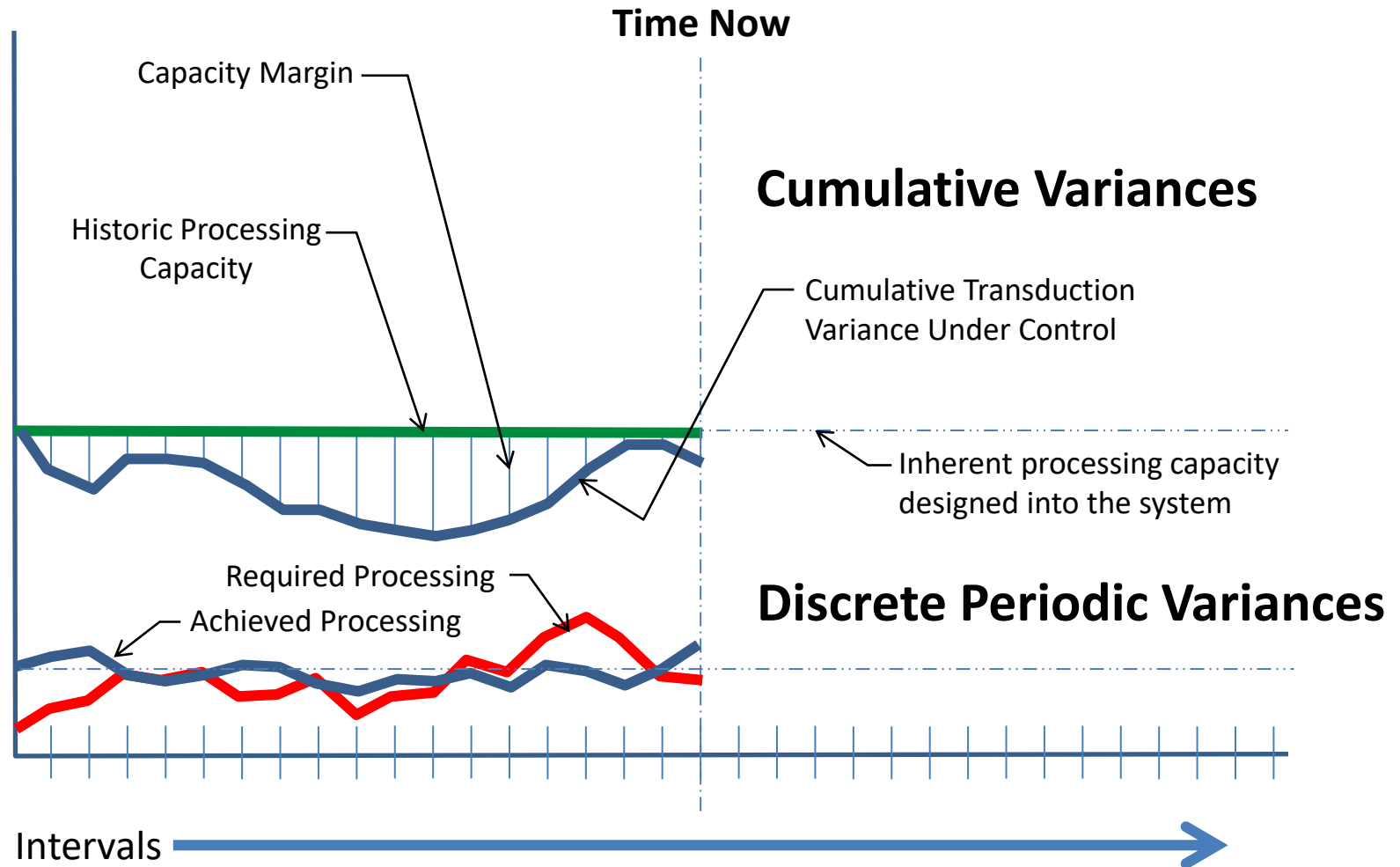
1. Senior Management, having agreed to this designed accountability ... must not often exercise its prerogative to conduct “star-chamber” investigations – or confidence will be forfeit and autonomy denatured.

(In other words, management must not impose reporting and other activities that exceed the marginal capacity inherently designed within the system; requirements in excess of the inherent capacity of the system must be raised to avoid detrimental impacts to the system)

Beers applied transduction to communication, yet the principle can be applied to any signal or product that must cross a work station boundary.

PRINCIPLE THREE – PROPERLY BALANCED TRANSDUCTION

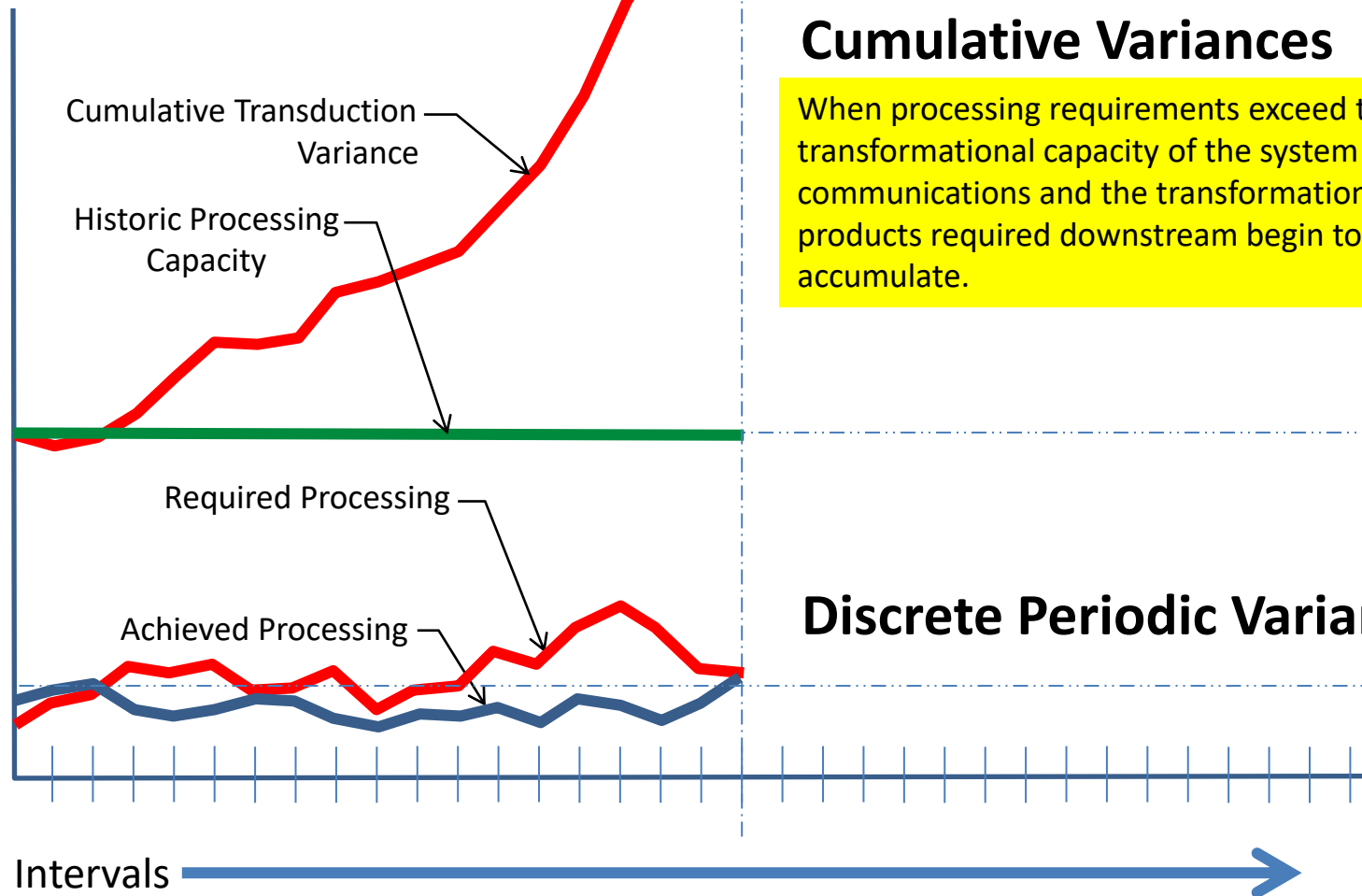
Transduction/Transformation processing capacity must remain at levels necessary to process all required messaging and products to ensure the control of timing/schedule variances are controlled to remain within the designed levels of the system.



PRINCIPLE THREE – IMBALANCED TRANSDUCTION

A single or small number of instances of dysfunction can be adjusted by adaptations in other areas of the system to accommodate the weakness(es).

Time Now



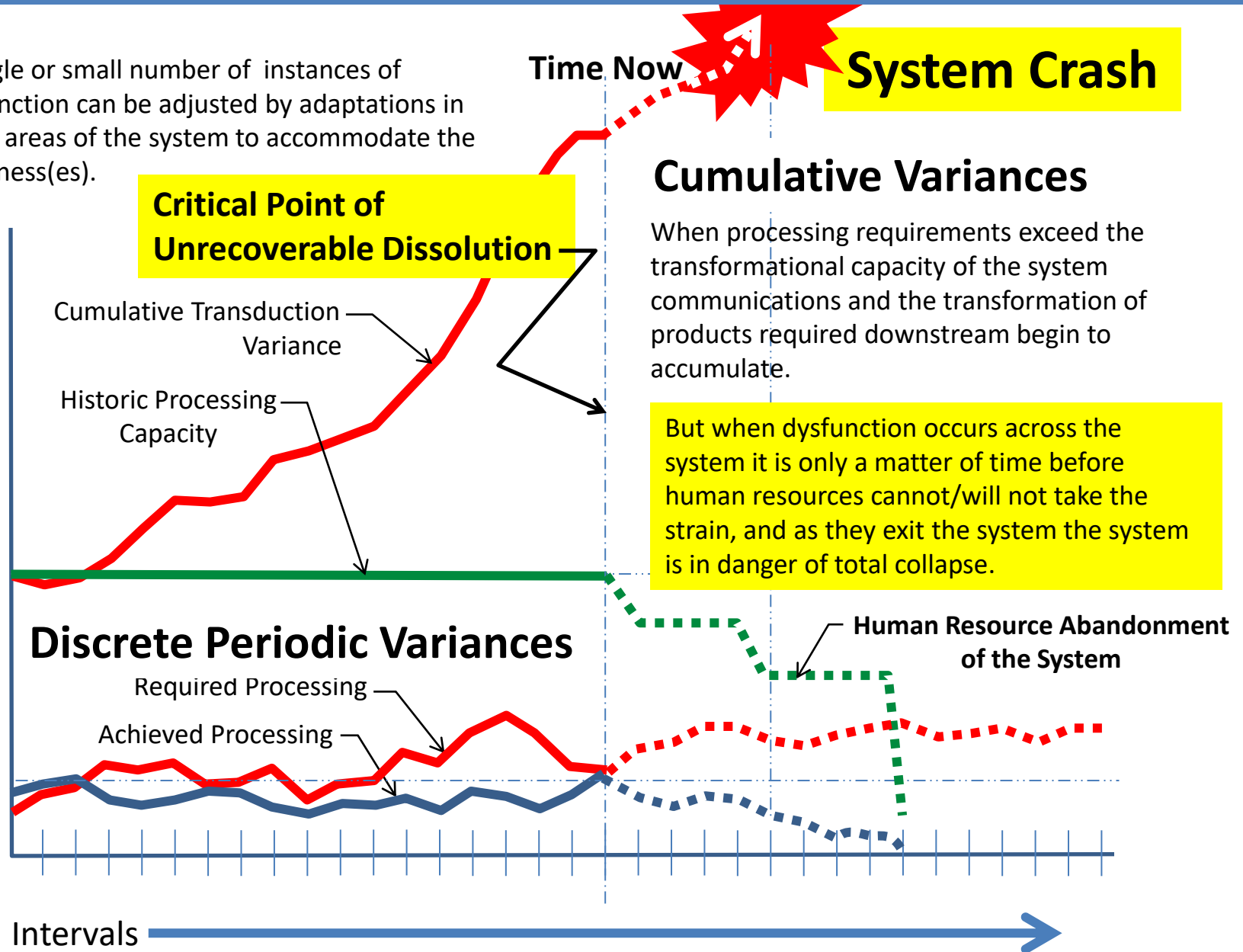
Cumulative Variances

When processing requirements exceed the transformational capacity of the system communications and the transformation of products required downstream begin to accumulate.

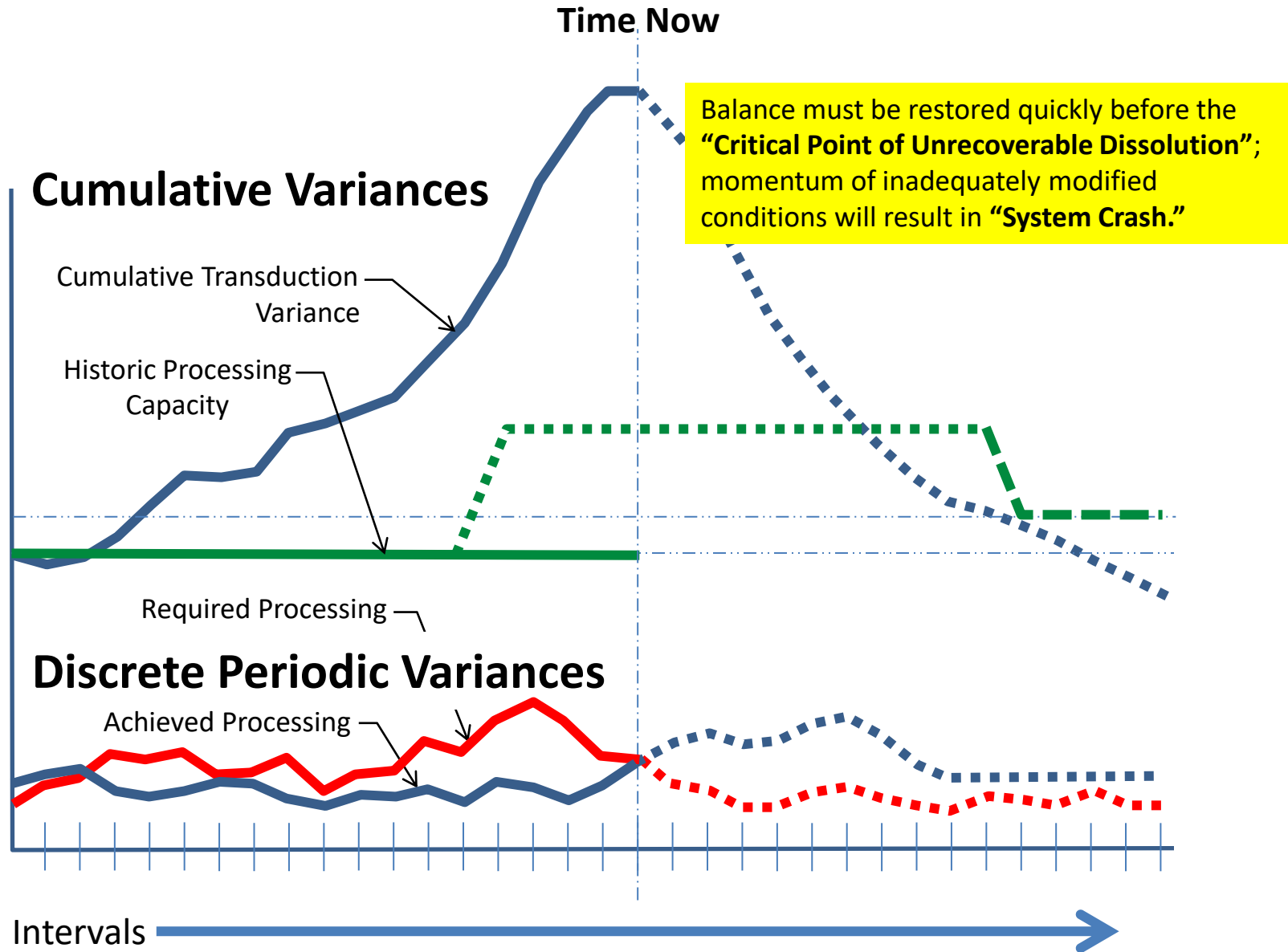
Discrete Periodic Variances

PRINCIPLE THREE – HUMAN RESOURCE CONSIDERATION

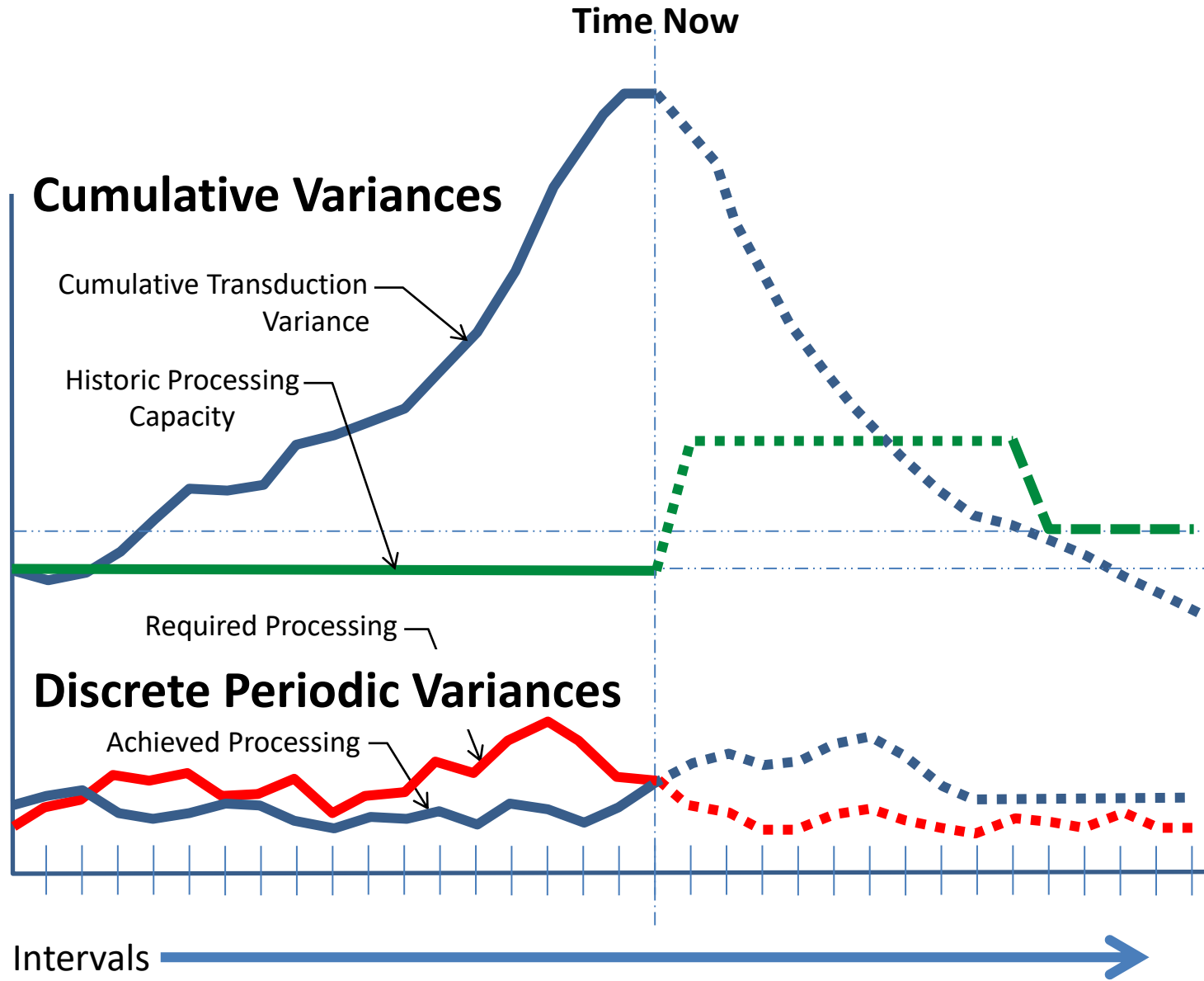
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PRINCIPLE 4 & CONCLUSION

Principle Four – The operation of the first three principles must be cyclically maintained through time without hiatus or lags.

SUMMARY IMPLICATIONS OF PRINCIPLE THREE

1. An enterprise is dependent upon the knowledge, capabilities and capacity of its leadership.
2. A properly designed system will have a balanced valuation and provision for the operation, management and system of reporting and controls.
3. A measure of independence and autonomy is required to achieve accountability within the system.
4. System operations shall be understood and processes implemented consistent with its resources, technology and capacities to enable that enable min-max control limits to prompt remedial action to reduce cost or ensure the human system is not damaged.

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