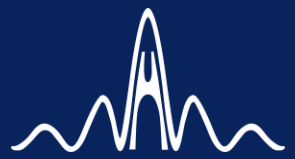

LEVERAGING DECISION PATTERNS TO TAME COMPLEXITY AND ACCELERATE SOLUTION DELIVERY

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My journey

Systematic Thinking

- Learned & mastered four fundamental human thinking processes
- Trained and consulted project teams
- Foundations for systems engineering practices
- Pattern of questions that implies a structured information model

Systems Engineering

- Wrote SE processes for defense contractor
- Developed & taught SE courses
- Extended RM tools to support systematic thinking information model
- Jump-started & coached projects
- Recognized cross-domain patterns

Decision Patterns

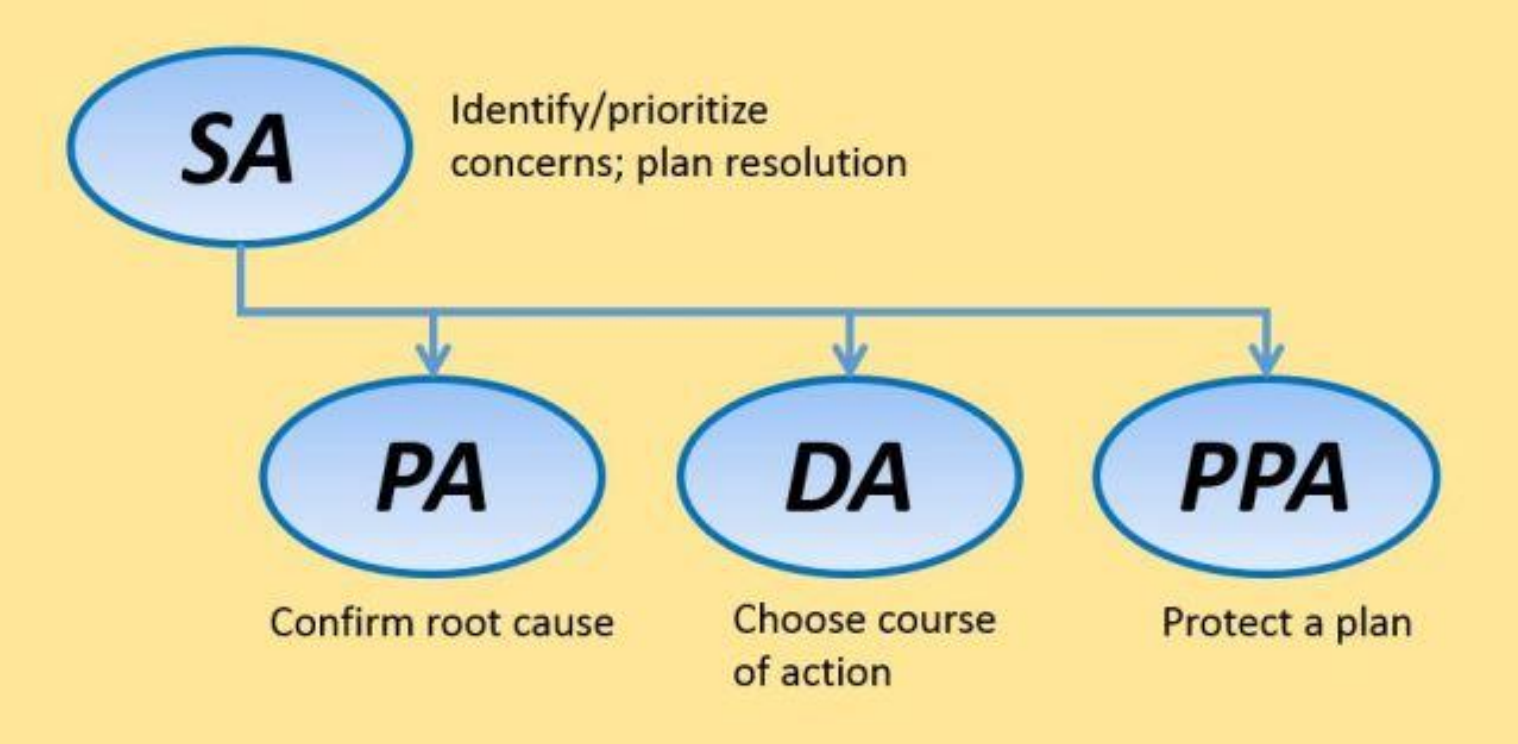
- Launched Decision Management consulting business
- Formalized decision patterns and associated services
- Led development of SE tools built around decisions
- 150+ projects with over 40 organizations

Decision to Everything Traceability

- Information model & methods refinements
- MBSE tool extensions & new viewpoints
- University research & courseware
- Decisions as integrative mechanism for SE; foundation for a richer Digital Thread and resulting insights

Lifelong learning

Systematic Thinking



SA: **Situation Appraisal**
PA: **Problem Analysis**
DA: **Decision Analysis**
PPA: **Potential Problem Analysis**

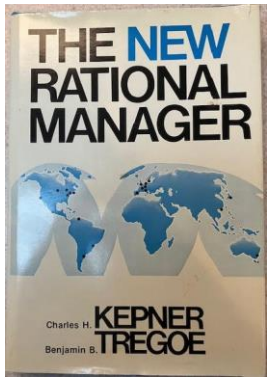
ASSERTIONS:

- All job concerns may be resolved by the use of a combination of 4 human thinking patterns, derived by observation across domains.
- These Rational Processes are accomplished through a pattern of domain-independent questions and associated answers.

IMPLICATIONS:

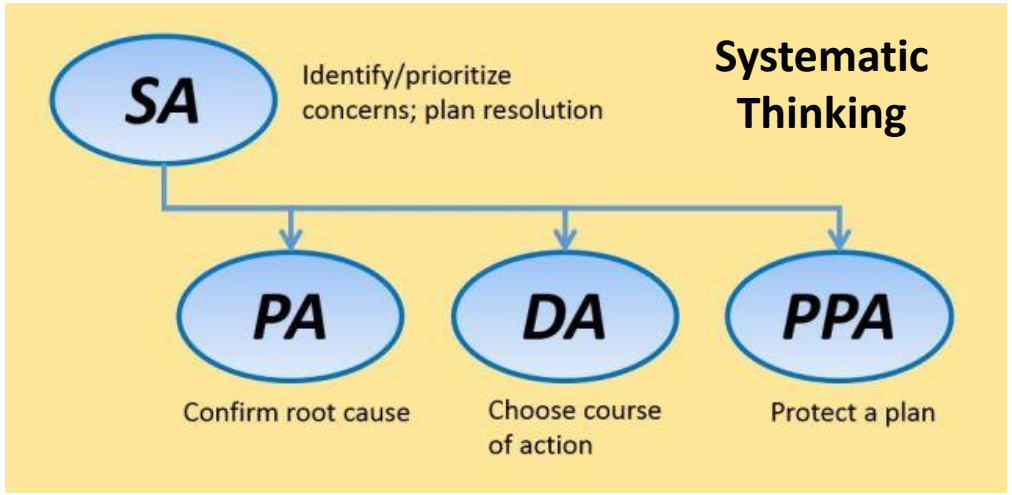
- The answers to these questions may be captured in a structured information model.
- Mastery of these 4 thinking patterns increases the likelihood of success for any endeavor in which thinking quality and efficiency are drivers.
- Mastery is accelerated by frequent cycles of learning with each thinking pattern

Source:
Kepner, C. and Tregoe, B. 1981. The New Rational Manager, Kepner-Tregoe, Inc., Princeton, NJ (US).



Situation Patterns

Building Blocks



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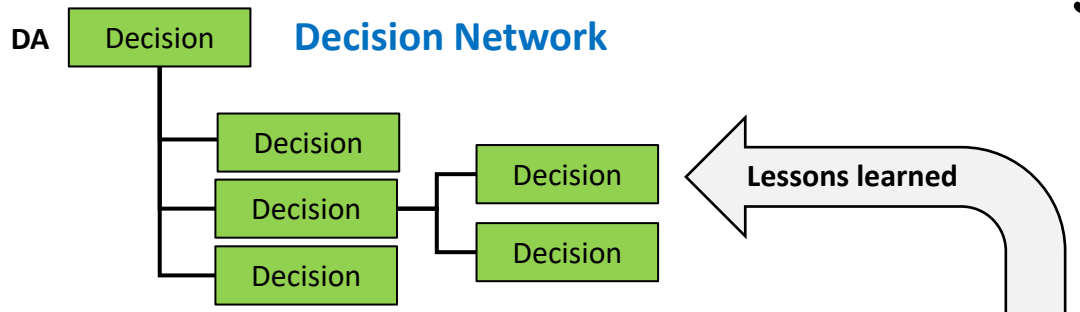
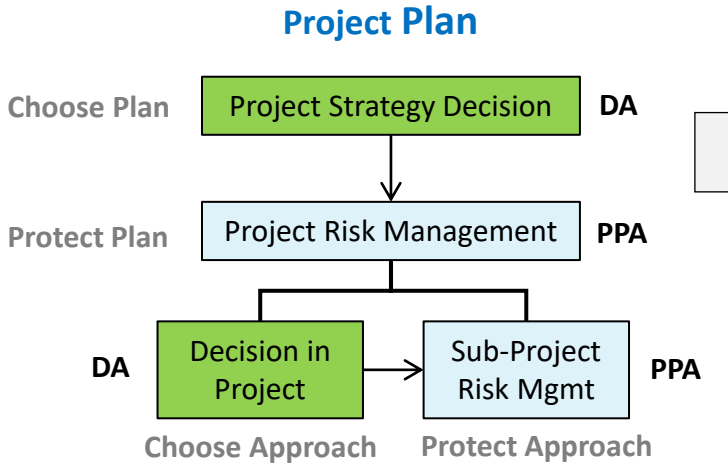
Domain-specific Models

Understanding of Causality/Behavior

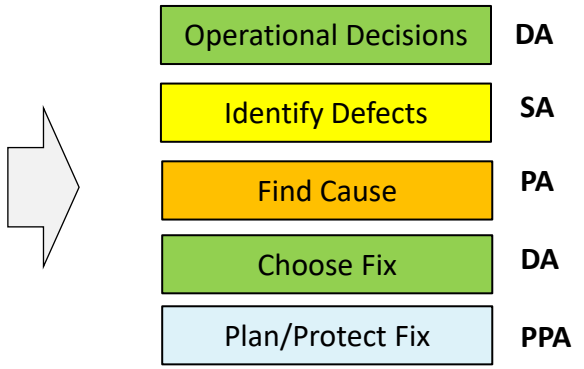
Situations



Decisions conceive the future
Essential component of strategy & design



Projects create new capabilities
Non-recurring effort to implement decisions



Run the business/process
Leverage capability to create value
Sustain capability as needed

Definitions matter (sometimes serendipitously)

PROBLEM:

An issue for which there is a deviation between what should be happening and what actually is happening, for which the cause is unknown and for which cause must be known to take effective action

- Framed as a problem statement: Fuzzy display image, Excessive vibration, Cracked fuselage, etc.
- The SE term, *problem domain*, is seldom about these kinds of problems. Stakeholders simply want a new solution that better meets their overall needs.
- Problem (Root Cause) Analysis may be performed as part of system verification when failures occur

DECISION:

A fundamental question/issue that demands an answer/solution.

- Framed as a decision statement: Choose Solution Concept, Technology, Architecture, etc.
- Which? How?
- Conceives and evaluates courses of action; Selects (commits resources to realize) among these alternatives.
- Not = ~~*the alternative chosen.*~~
- IMPLICATION: The problem domain for any strategy or design effort may be decomposed into a hierarchy comprised of multiple, well-framed, loosely coupled decisions.

There is a pattern of decisions

Behind every:

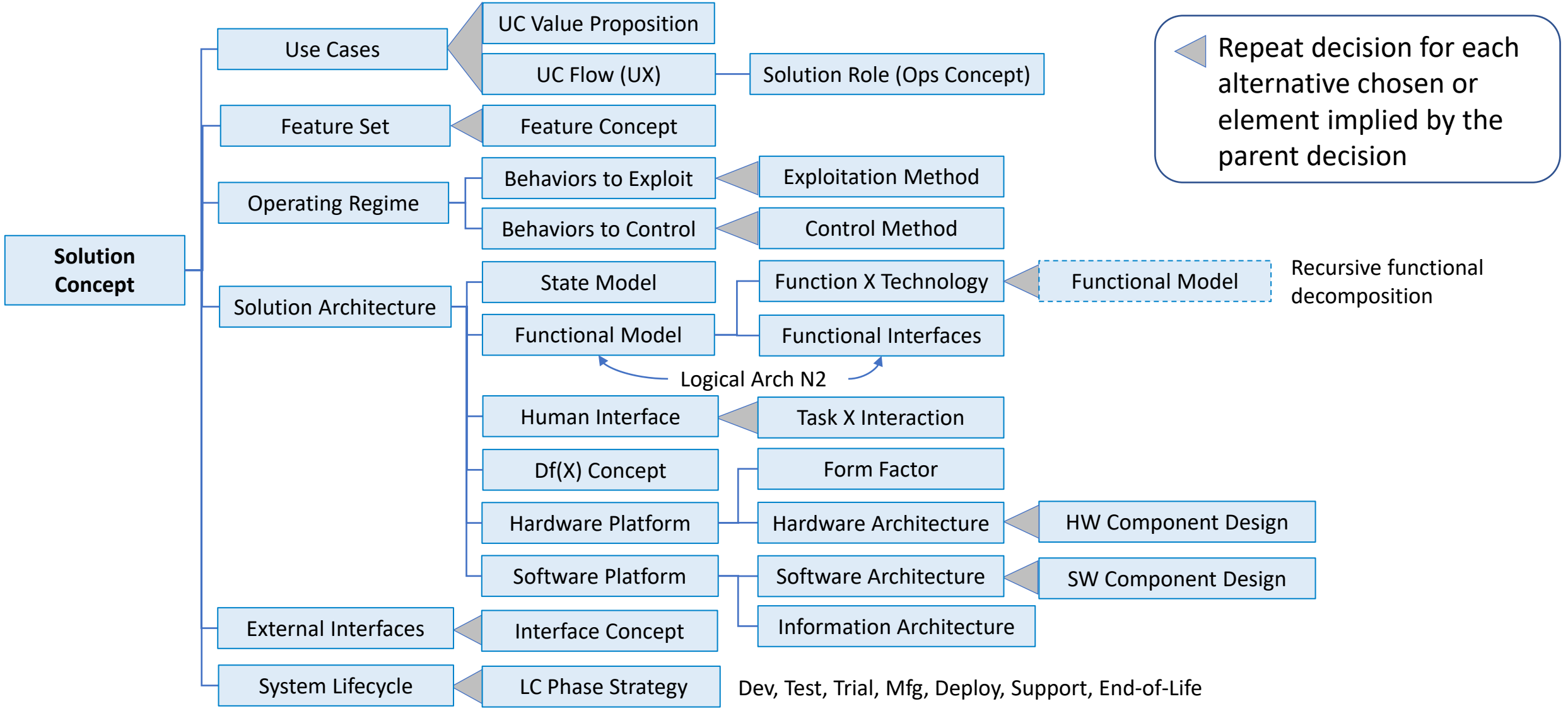
- Strategy
- Design/Architecture
- Life

Decisions create your future
Take control!

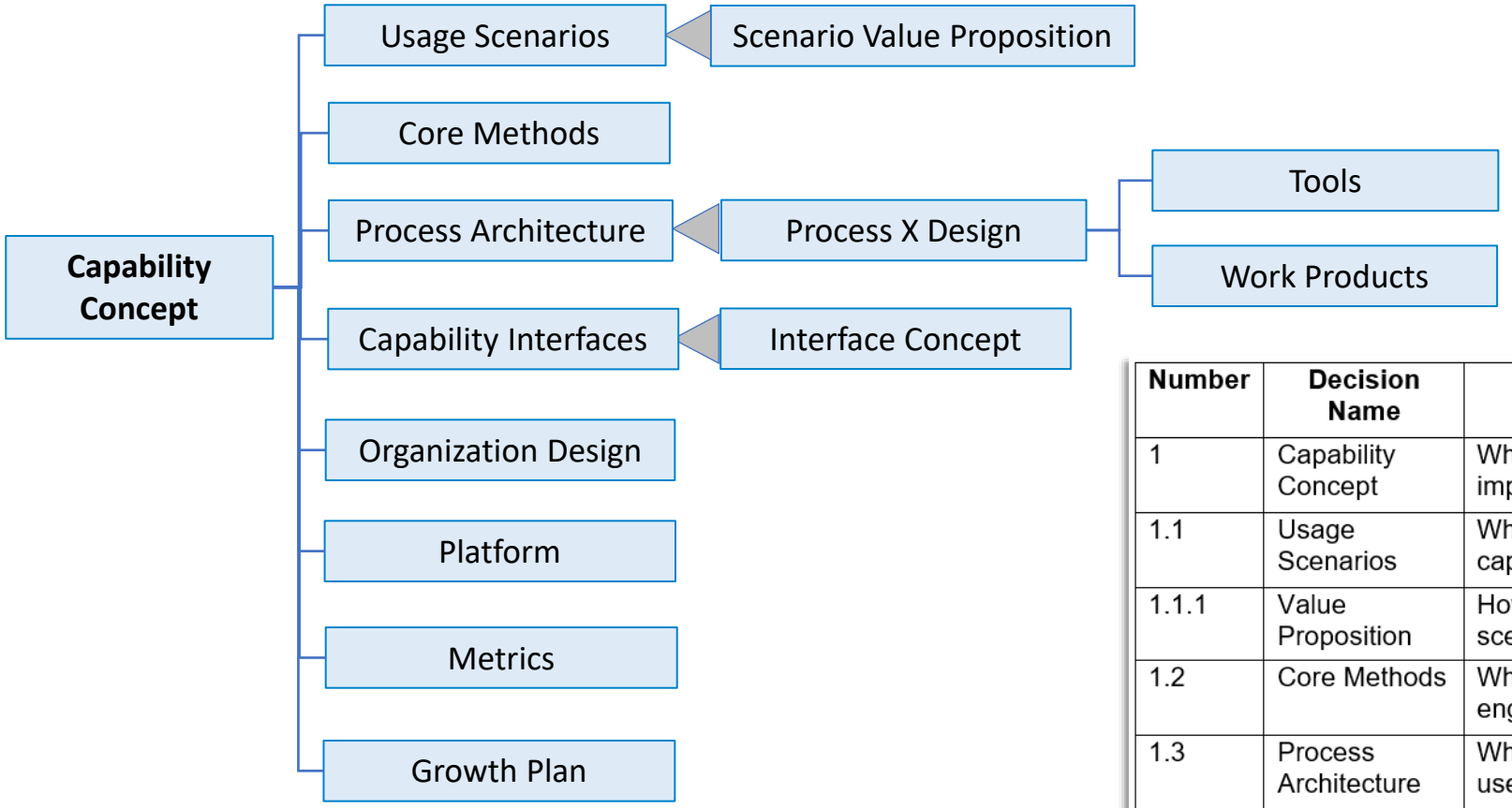
Exposing these decisions gives you a unique set of controls:

- Decision Breakdown Structure (DBS) to tame complexity
- Innovation Framework to visualize new possibilities
- Evaluation Framework to guide and capture your analysis
- Roadmap to fast-forward and align your plans proactively

Product / System Design Decision Pattern



Process Capability Design Decision Pattern



Simplified pattern for business, management or technical processes, such as:

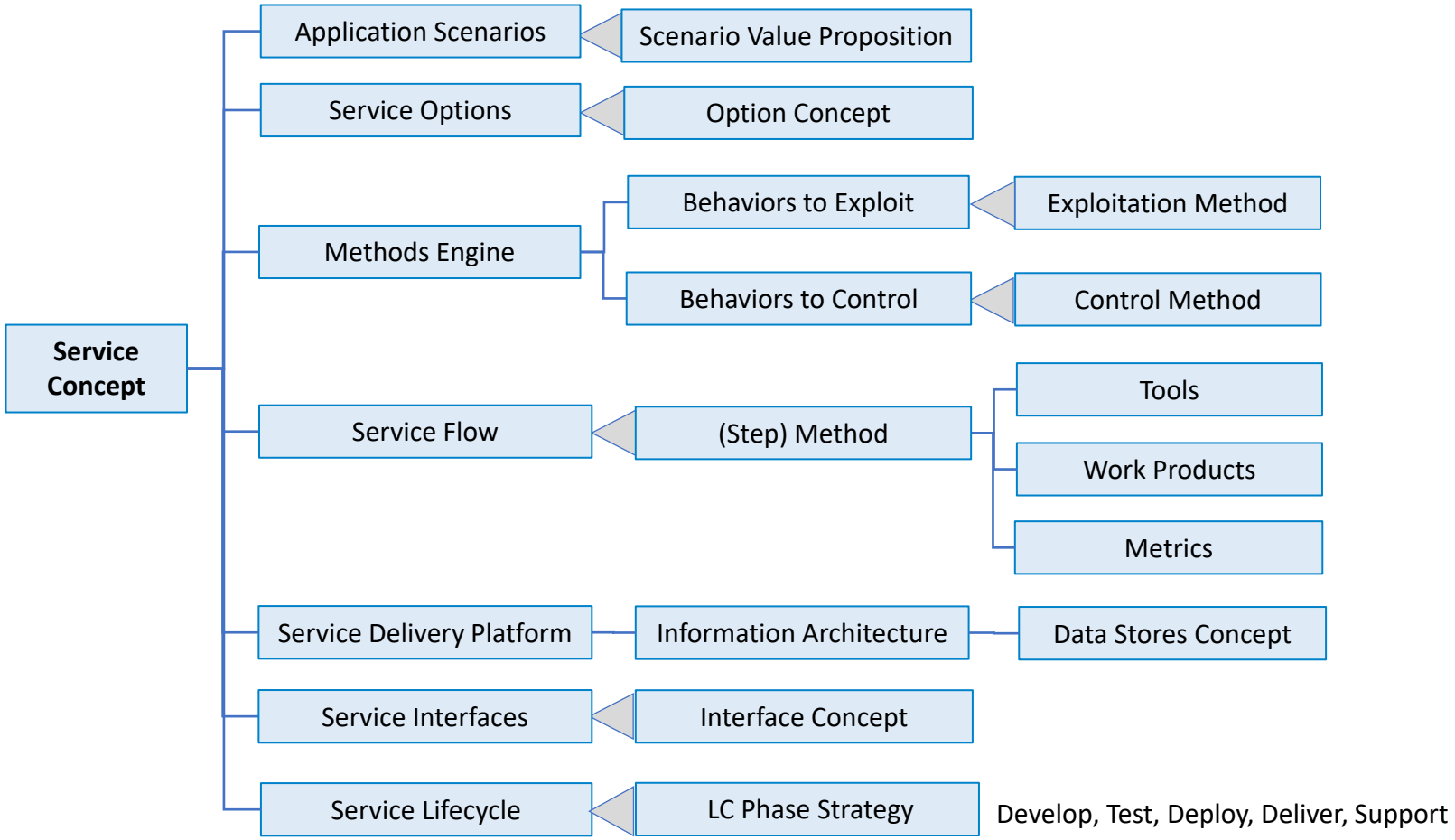
- Technology Roadmapping
- Requirements Management
- System Design
- Manufacturing Operations Management

Number	Decision Name	Decision Description	Decision Class
1	Capability Concept	What is the top-level architecture, design or implementation concept for this capability?	Single Answer
1.1	Usage Scenarios	Where (in which situation, scenarios) will we apply this capability?	Multiple Answer
1.1.1	Value Proposition	How will this capability offer unique value in this usage scenario?	Single Answer
1.2	Core Methods	What methods or combination of methods provide the engine for this capability?	Multiple Answer
1.3	Process Architecture	What process architecture, framework or flow will we use to deploy this capability?	Multi-part Answer
1.3.1	Process Design	How will this part of our process operate?	Single Answer

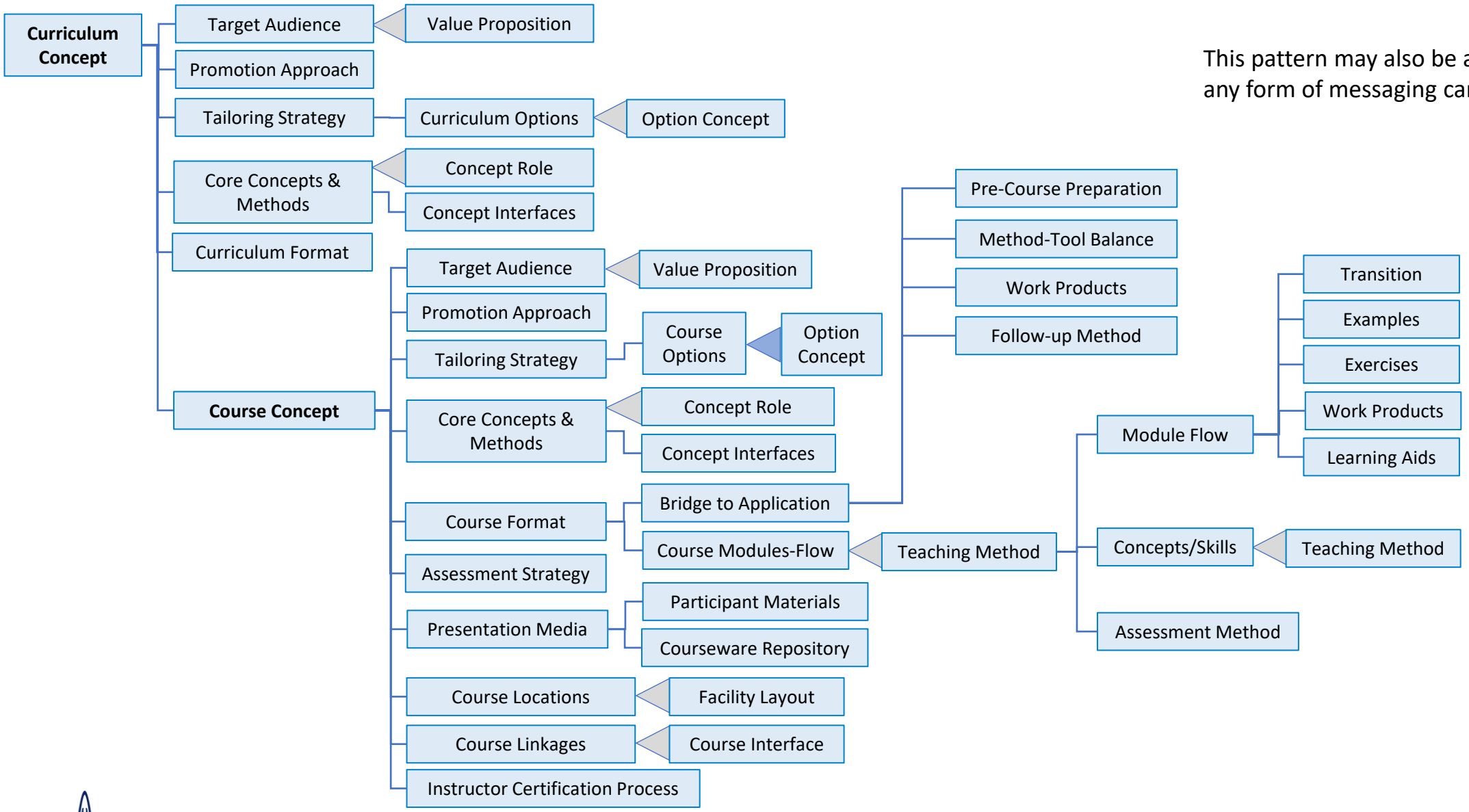
Decision Class governs the “fan-out” of the decision model:

- Single Answer (Technology)
- Multiple Answer (Portfolio)
- Multi-part Answer (Architecture)

Service Design Decision Pattern

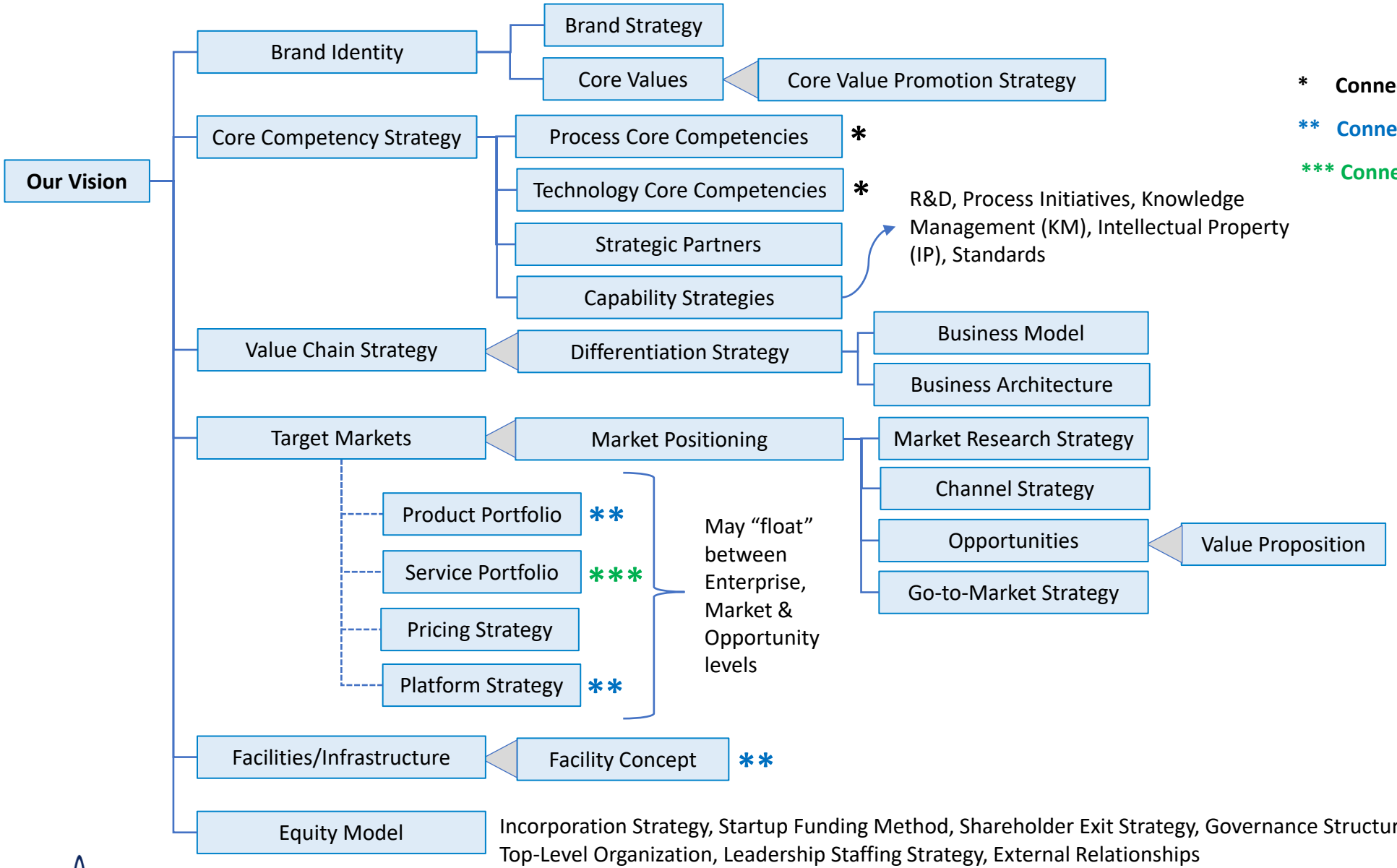


Curriculum/Courseware Design Decision Pattern



This pattern may also be applied to any form of messaging campaign

Enterprise Strategy Decision Pattern

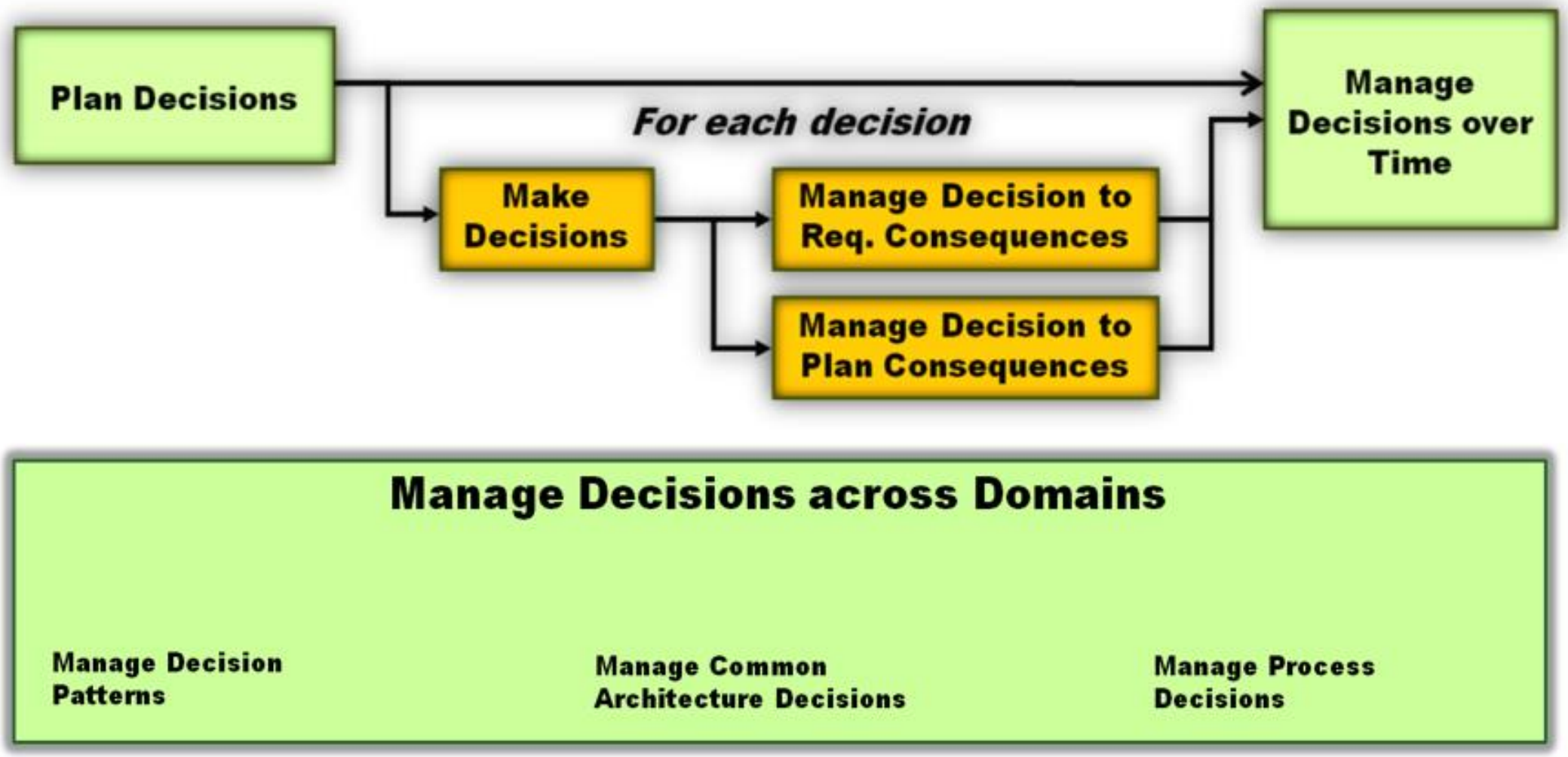


* **Connects to Process Capability Design pattern**

** **Connects to System/Product Design pattern**

*** **Connects to Service Design pattern**

Decision Management Methodology



Decision Pattern Benefits

MECE+ framing of the entire problem domain

- Mutually Exclusive
- Collectively Exhaustive
- Optimally Decomposed
  - Loosely coupled, right-sized, well-framed proven decisions (simple questions)
  - Decomposition/branching logic “built-in”
  - Shared mental model = enterprise asset

Proven criteria pattern - creates knowledge “pull” from stakeholders

Prioritizes brainpower and resources; rationalize other project tasks

Speed - Enables parallel thinking with cross-decision alignment mechanism

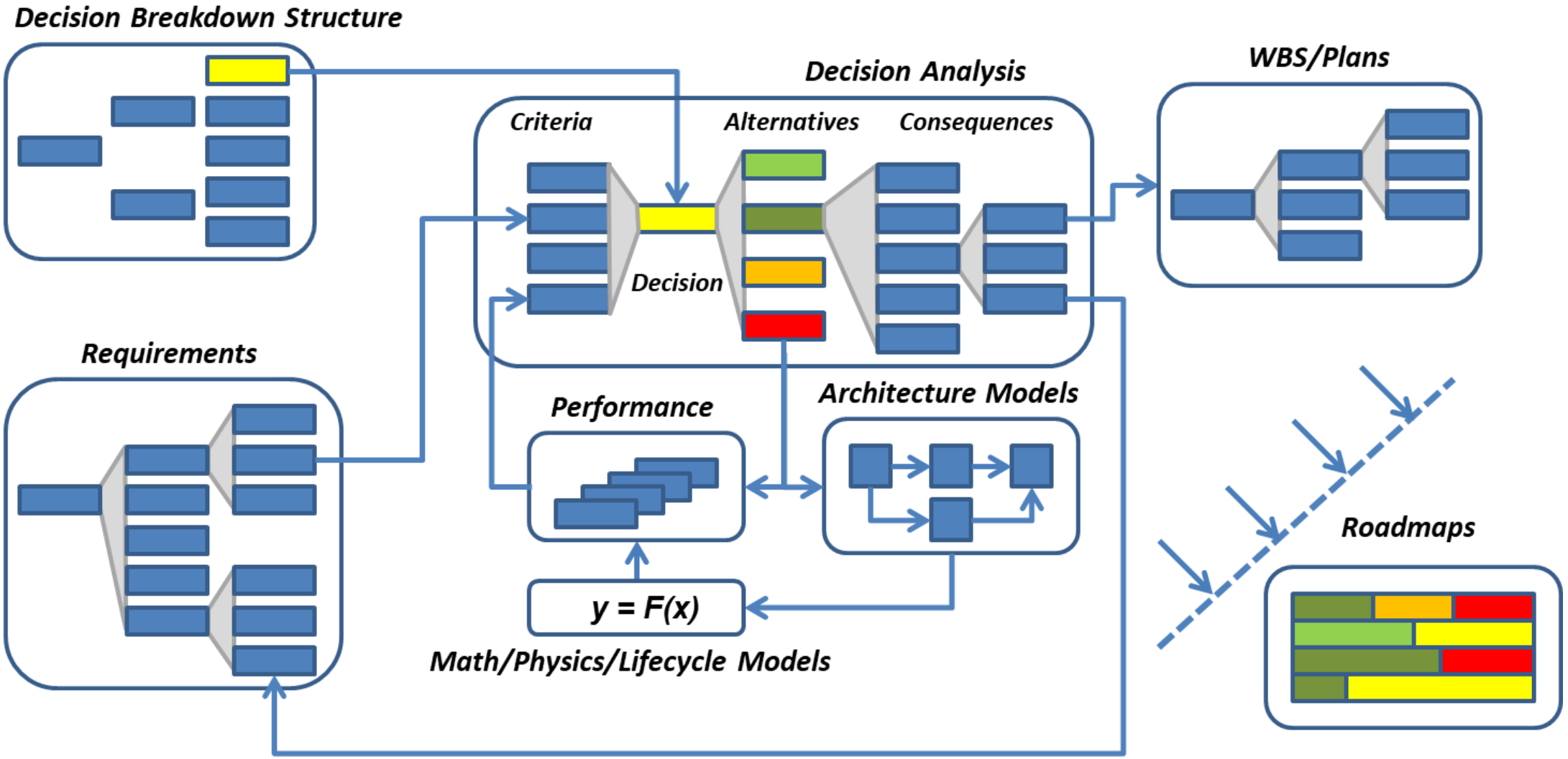
Enables flexible team structure aimed at decision quality, efficiency & buy-in

Rapid skills improvement - Each decision is a cycle of learning

Support change management and future releases - richer Digital Thread

May be used for forward or reverse engineering, innovation and roadmapping

Decision-Centric SE Information Model



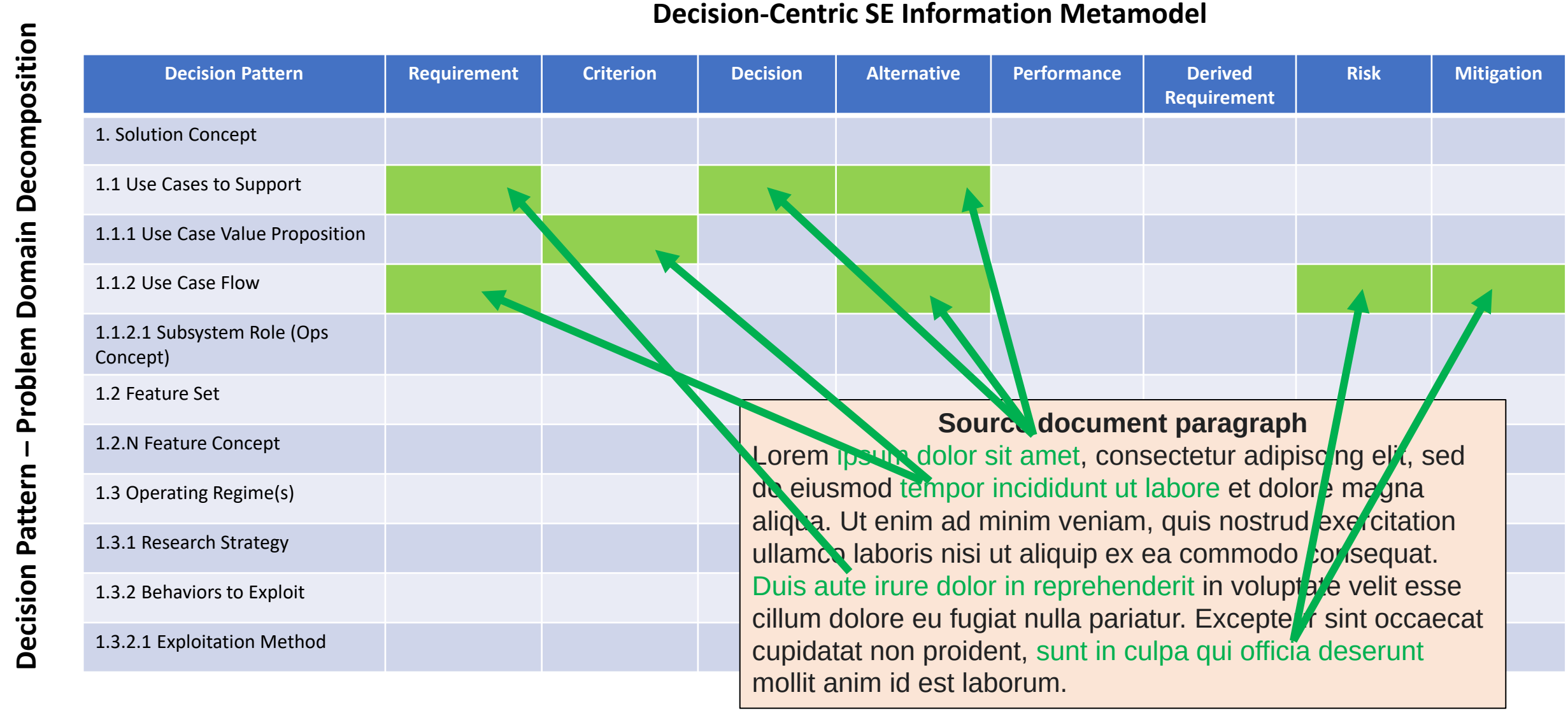
A richer digital thread

Essential skill: Two-dimensional mapping process

Decision Pattern – Problem Domain Decomposition

Decision-Centric SE Information Metamodel

Decision Pattern	Requirement	Criterion	Decision	Alternative	Performance	Derived Requirement	Risk	Mitigation
1. Solution Concept								
1.1 Use Cases to Support								
1.1.1 Use Case Value Proposition								
1.1.2 Use Case Flow								
1.1.2.1 Subsystem Role (Ops Concept)								
1.2 Feature Set								
1.2.N Feature Concept								
1.3 Operating Regime(s)								
1.3.1 Research Strategy								
1.3.2 Behaviors to Exploit								
1.3.2.1 Exploitation Method								



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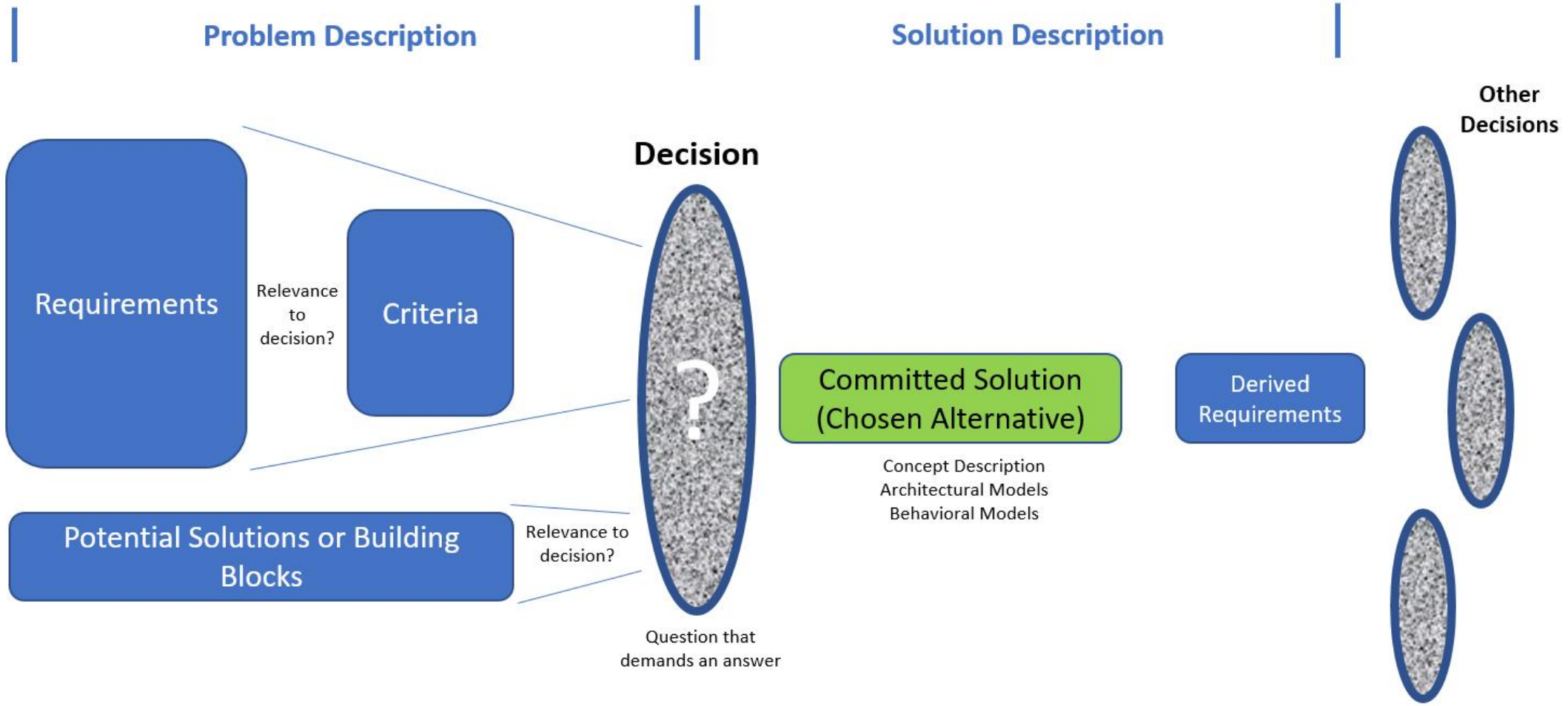
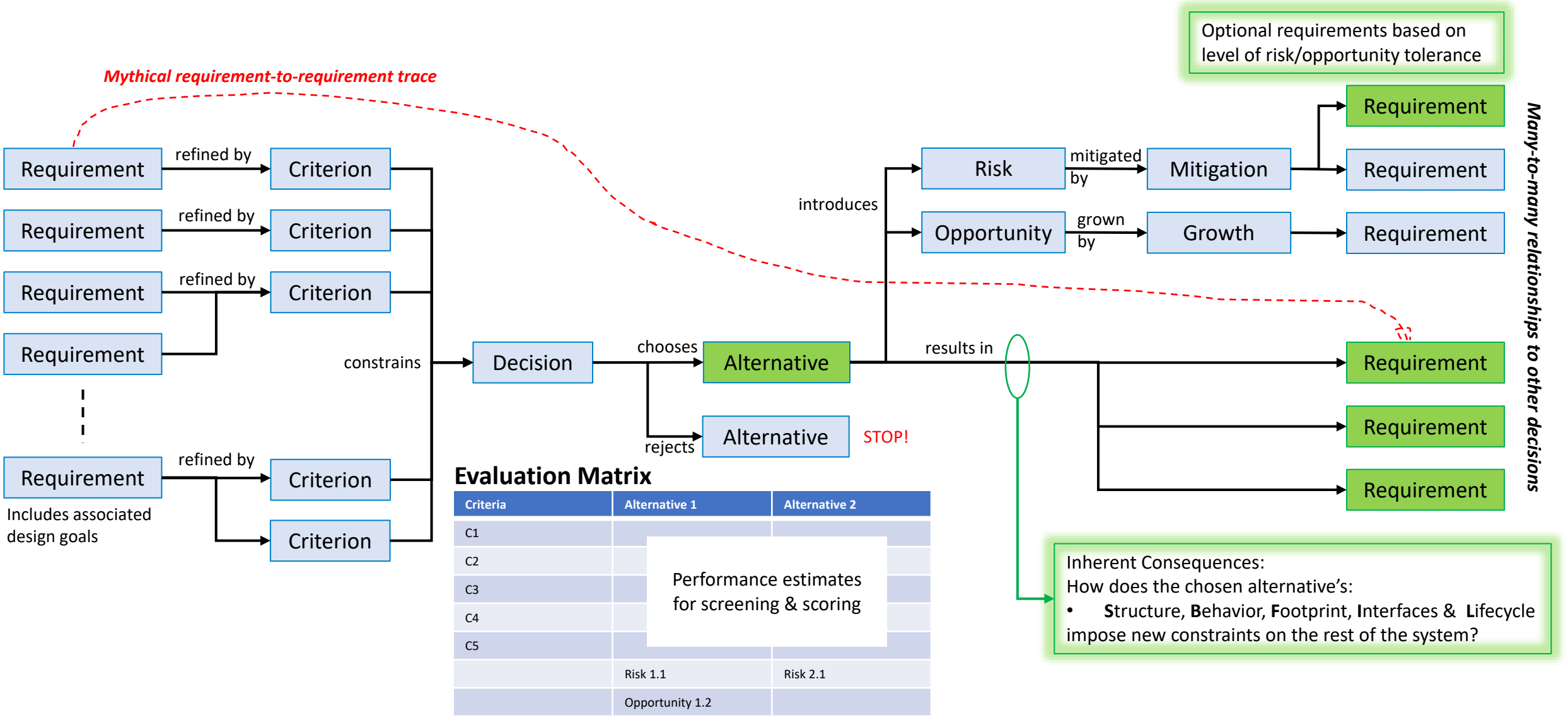
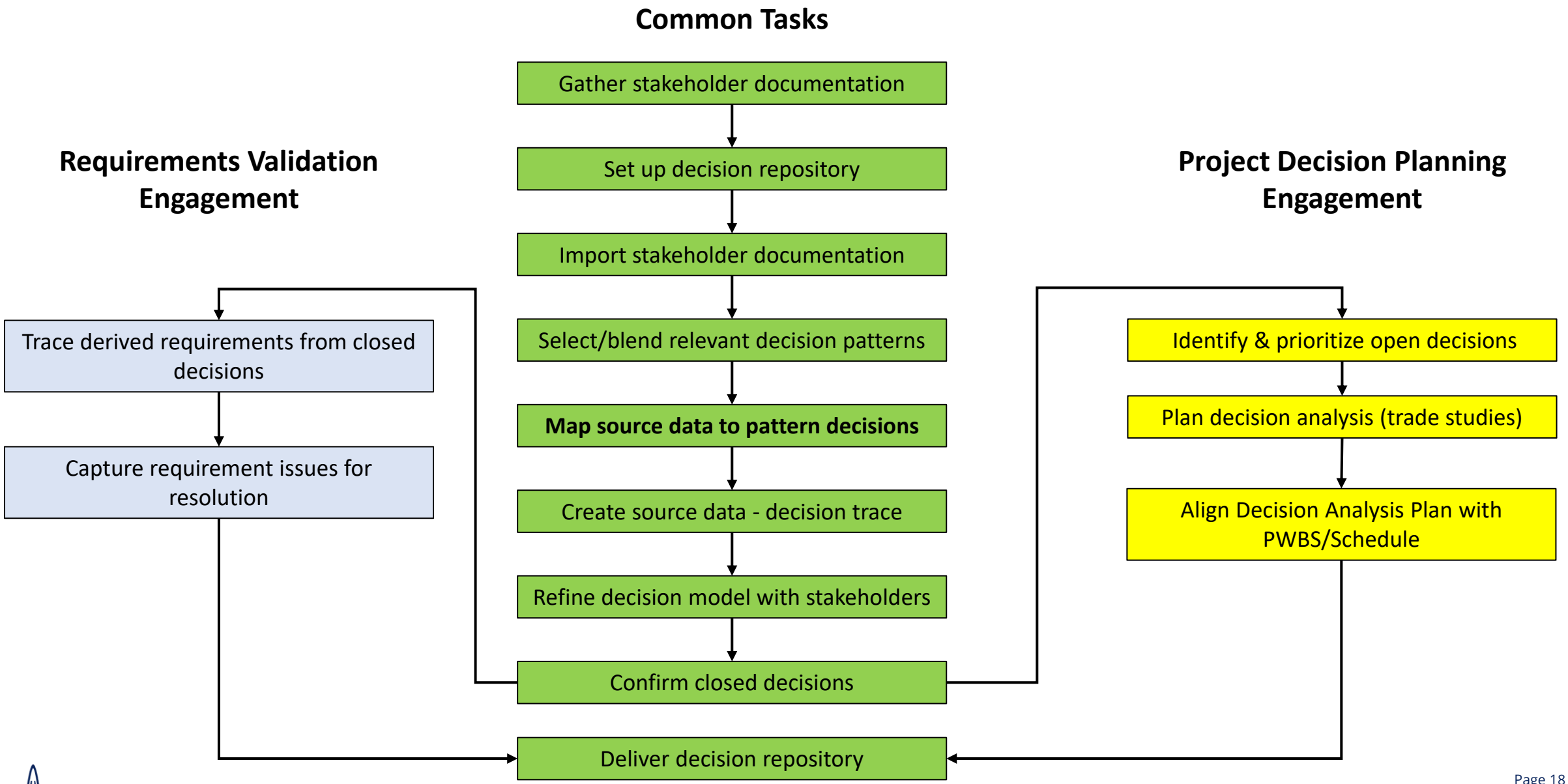
Recursive Use of the Decision Pattern



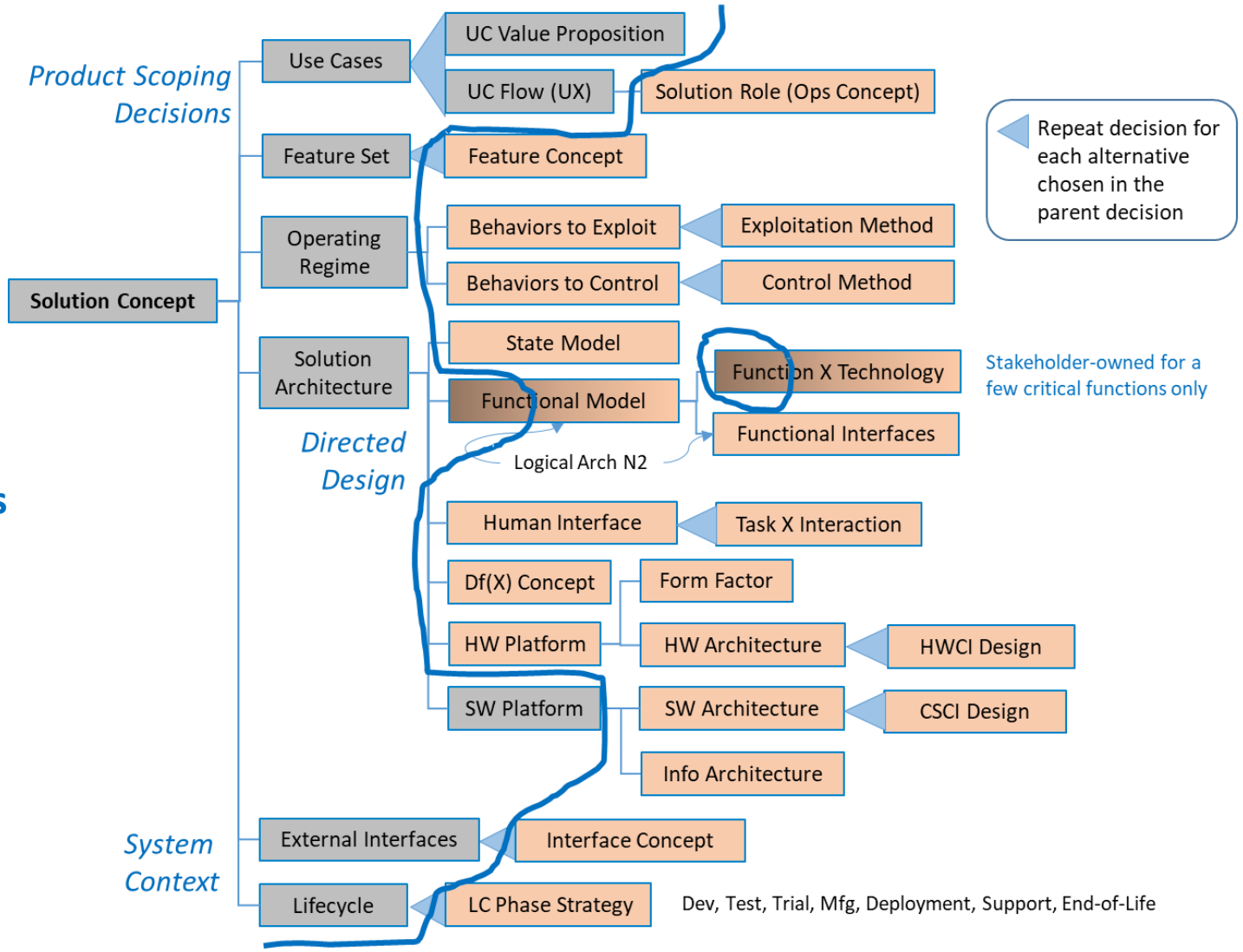
Requirement – Decision – Requirement (R-D-R) Traceability Model



Decision Pattern Engagements



One Model with Many Uses



Validate Requirements from "Closed" Decisions

Plan Decision-Making for "Open" Decisions

Discover Decision "Frontier"

For More Information

Recent articles in PPI's SyEN monthly newsjournal

- Introduction to Decision Patterns - SyEN December 2021 Edition
- Decision Patterns – So What? - SyEN April 2022 Edition
- Reverse Engineering Stakeholder Decisions from Their Requirements – SyEN June 2022 Edition

PPI Decision Pattern Services page

- https://www.ppi-int.com/project-decision-jump-start-services/

INCOSE papers:

- Mendonza, P. and Fitch, J.A. 2012. "Decision Management (DM) as the engine for scalable, cross-domain Systems Engineering". Paper presented at 22nd Annual International Symposium of the International Council on Systems Engineering, Rome, Italy, 9-12 July.
- Mendonza, P. and Fitch, J.A. 2013. "Integrating System Models around Decisions". Paper presented at 23nd Annual International Symposium of the International Council on Systems Engineering, Philadelphia, PA (US), 24-26 June.

Numerous ancient blog posts:

- www.decisiondriven.wordpress.com

Questions?

Feel free to email me later as questions arise:

jfitch@ppi-int.com