Webinar

Agile Systems & Processes 106: Risk Management and Mitigation

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Agile 106 webinar slides: Agile System/Process as Risk Management
Agile 105 webinar slides: Agile System/Process Operational Awareness
Agile 104 webinar slides: Agile System/Process Engagement Quality
Agile 103 webinar slides: Agile System/Process Design Principles
Agile 102 webinar slides: Agile System/Process Design Requirements
Agile 101 webinar slides: Agile System/Process Architecture Pattern
(updated asynchronously from time-to-time)

Agile Systems & Processes 106: Risk Management and Mitigation

Abstract: To be effective, systems/processes have to mate well with their operational environments. Operational environments are not static, they react to disturbances and evolve with opportunity and risk. Inserting a system into an environment is a disturbance. Sustaining a system in a dynamic environment requires compatible evolution. The environment is the problem space the system will occupy. Understanding the requirements for a compatible-to-the-space solution is best done before system functional requirements shape an incompatible path. Given enough understanding about the problem, effective solution requirements and features becomes (almost) obvious. The problem shapes and constrains effective solution. But how do we characterize the environment as a dynamic problem space and develop solution-response requirements; and then, how do we structure a solution for risk-mitigating agility? This webinar introduces methods for dynamic problem-space characterization, and reviews companion methods for risk-mitigating solution-space agility.

Presenter Bio: Rick Dove is a leading researcher, practitioner, and educator of fundamental principles for agile enterprise, agile systems, and agile development processes. In 1991 he initiated the global interest in agility as co-PI on the seminal 21st Century Manufacturing Enterprise Strategy project at Lehigh University. Subsequently he organized and led collaborative research at the DARPA-funded Agility Forum, involving 250 organizations and 1000 participants in workshop discovery of fundamental enabling principles for agile systems and processes. He is CEO of Paradigm Shift International, specializing in agile systems research, engineering, and education; and is an adjunct professor at Stevens Institute of Technology teaching graduate courses in agile and self-organizing systems. He chairs the INCOSE working groups for Agile Systems and Systems Engineering, and for Systems Security Engineering, and is the leader of the current INCOSE Agile Systems Engineering Life Cycle Model Discovery Project. He is an INCOSE Fellow, and the author of *Response Ability – the Language, Structure, and Culture of the Agile Enterprise*.

This webinar is the final installment of a six-part series.

It includes material from prior webinars and adds some new material.

It is not a tutorial,
but rather a comprehensive overview of
tools for concept design.

Context

Technology, knowledge, expectations, competitors, and adversaries are changing fast and faster.

Q: How is system relevancy and viability sustained in this reality?

A: By using and evolving available response options.

Q: How do needed response options become available?

A: By analyzing the problem-space for response requirements and designing mitigating response capability.

Value Proposition for Agility

Faster, lower cost system development?

An appealing argument, but only a side effect (at best).

The value proposition for agility is Risk Management.

Sustainability of innovation/process/product at risk.

Risk Management includes Opportunity Management

Content

This webinar is about Systems Engineering Agility,
(not Agile Software Practices – but what is exposed applies)

- Context for this Discussion
- SE Operational Point of View for Risk Management
  - Concurrent-Stages Life Cycle Framework
  - Sense-Respond-Evolve Operational Principles
  - 3 Nested Logical-Systems Pattern Boundaries
- Problem Space Characterization Tools
  - CURVEd Operating Environment Characterization
  - Reality Factors
  - Response Situation Analysis
- Solution Space Structure and Design Tools
  - Establishing Goals and Strategy
  - Agile Architecture Pattern
  - Reusable/Reconfigurable/Scalable Design Principles
  - Design Closure and Traceability
- Wrap Up

Operational POV for SE Agility

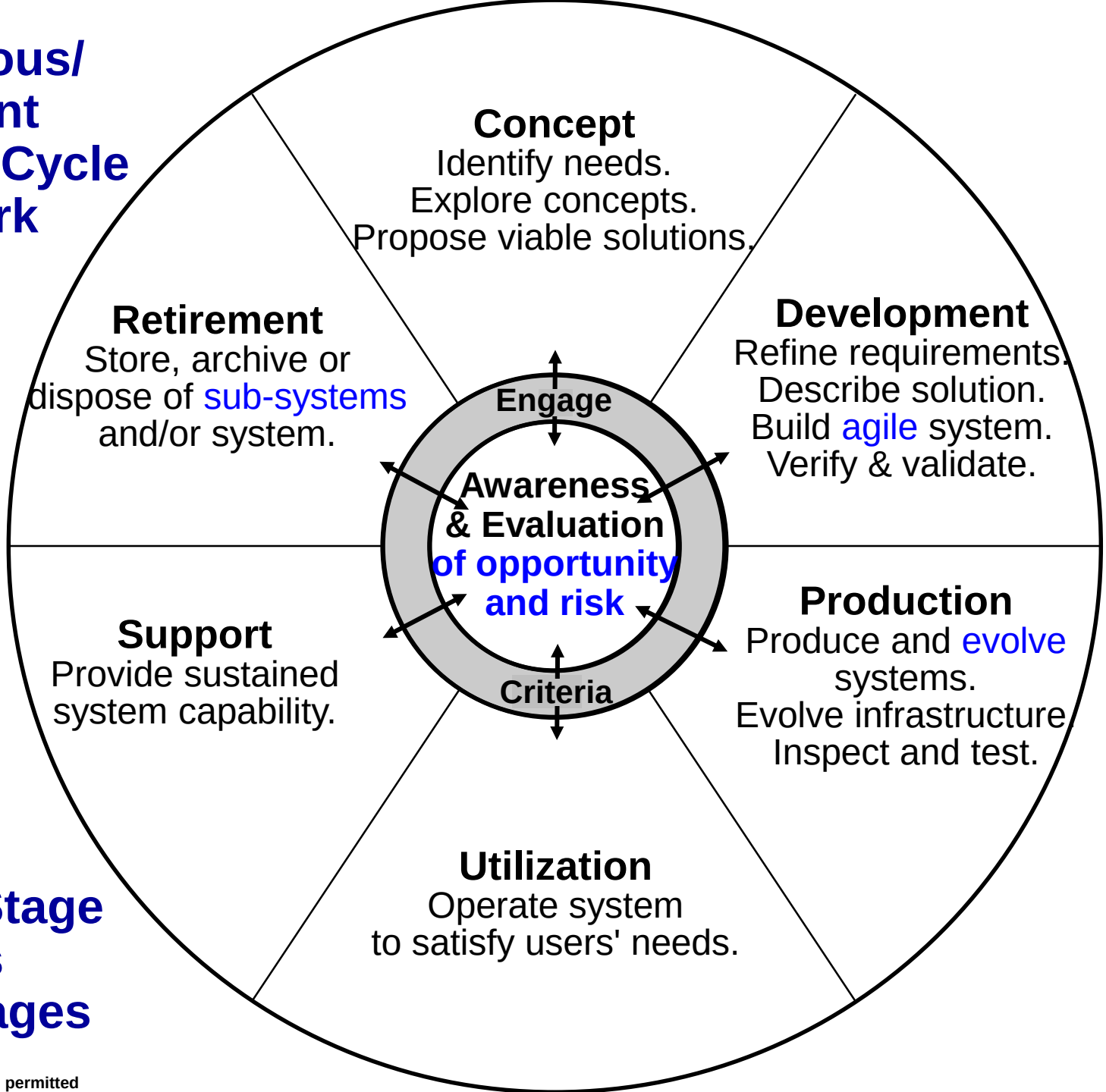
The INCOSE ASELCM Project is discovering
Agile Systems Engineering Life Cycle Model requirements

These manifest as core SE agility-enablers, not as branded practice

Three outcomes are relevant at this point in the discussion:

- **Concurrent-Stages Life Cycle Framework**
- **Sense-Respond-Evolve Operational Principles**
- **3 Nested Innovation-System Boundaries**

Asynchronous/ Concurrent Agile SE Life-Cycle Framework



Central Awareness Stage Engages All Other Stages

What's Different – What's Not?

What's Different …

The addition of the *Awareness* stage breaths life into the SE process, re-evaluating opportunity and risk constantly.

The framework does not have fixed starting and ending points. It implies and accommodates perpetual evolution beyond initial delivery, and requires that the product produced by the process is also agile.

The *Retirement* stage recognizes that subsystems and older system versions are retired frequently, as the "current" system evolves. This has implications for maintenance, disposal, and reversion processes.

What's Not …

ISO/IEC 2010, page 32, clearly accommodates asynchronous and concurrent activity in any and all stages with this clarification statement:

"…one can jump from a stage to one that does not immediately follow it, or revert to a prior stage or stages that do not immediately precede it. … one applies, at any stage, the appropriate life cycle processes, in whatever sequence is appropriate to the project, and repeatedly or recursively as appropriate."

Agility-Facilitating Operational Design Principles (SRE)

Discoveries of the INCOSE ASELCM Project

Sensing (observing, orienting)

- External awareness (proactive alertness)
- Internal awareness (proactive alertness)
- Sense making (risk & opportunity analysis, trade space analysis, …)

Responding (deciding, acting)

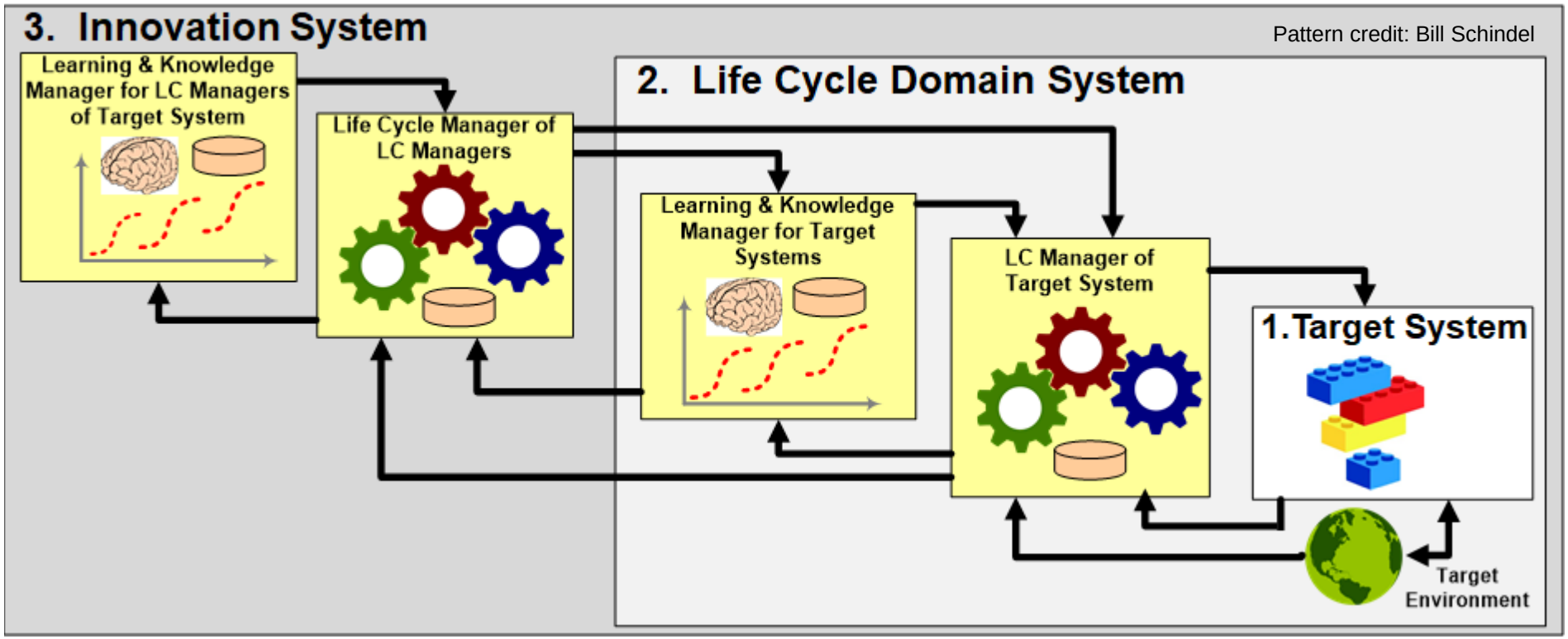
- Decision making (timely, informed)
- Action making (invoke/configure process activity for the situation)
- Action evaluation (validation & verification)

Evolving (improving above with more knowledge and better capability)

- Experimentation (variations on process ConOps)
- Evaluation (internal and external judgement)
- Memory (evolving culture, response capabilities, and ConOps)

Agile Systems Engineering Life Cycle Pattern

Systems 1, 2, and 3 Logical/Behavioral (not physical) Boundaries



- System-1 is the target system under development.
- System-2 includes the basic systems engineering development and maintenance processes, and their operational domain that produces System-1.
- System-3 is the process improvement system, called the system of innovation that learns, configures, and matures System-2.

Pipes in the pattern should function like a circulatory system, rather than a path for occasional or periodic interaction.

The Innovation System

The system of innovation – senses opportunities and risks, and has means to take advantage of opportunity and mitigate risk.

Responsible for situational awareness and appropriate evolution.

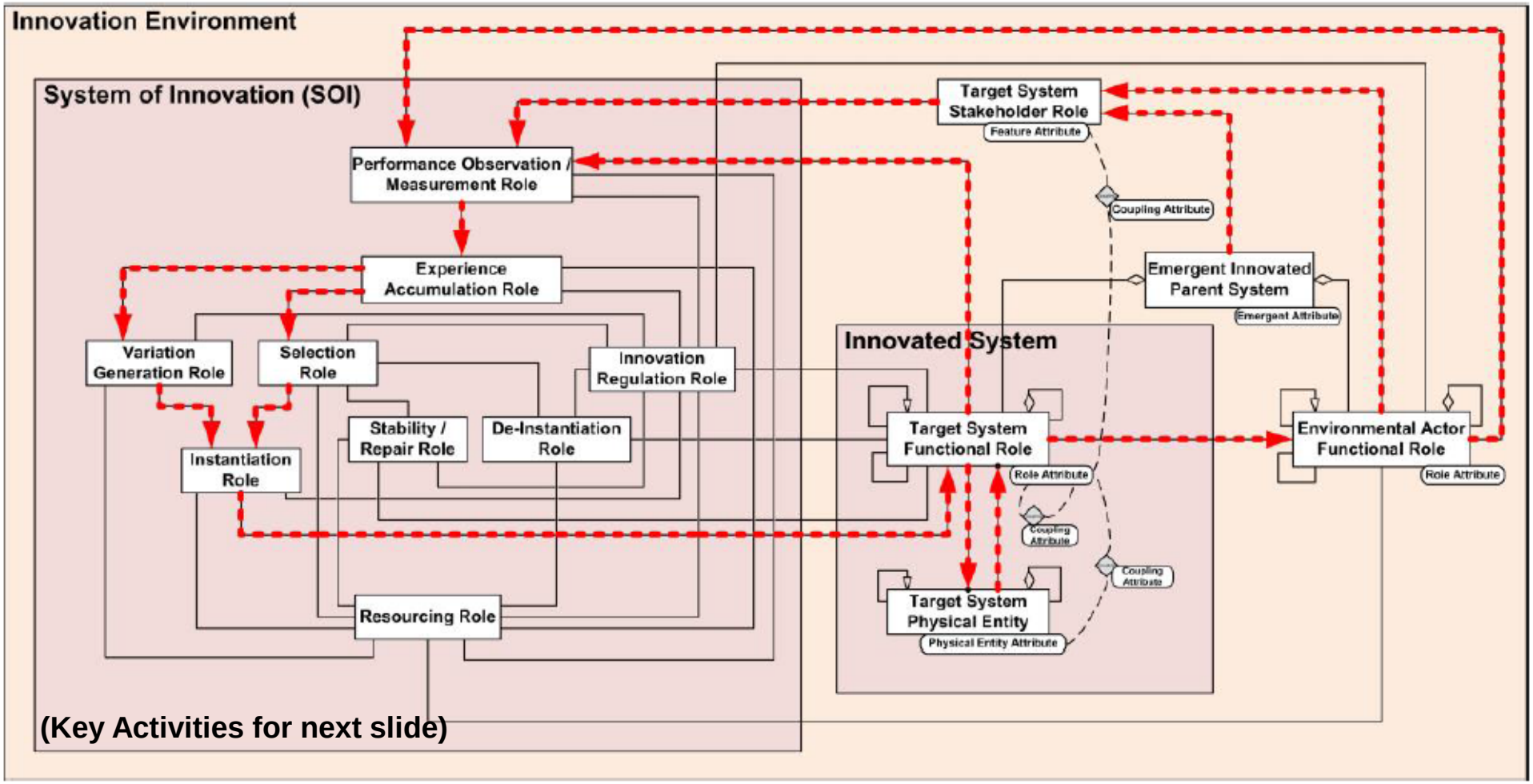
Schindel: "'Innovation' is defined here as the realization of significantly enhanced stakeholder benefit. This distinguishes innovation from invention, novelty, ideation, creativity, or similar concepts that become parts of innovation in at least some cases." (Beihoff and Schindel 2012)

Innovation in our sense here is the effective management of opportunity and risk.

The Innovation System is what provides operational agility.

Innovation Behavior Pattern

Illustrative signaling paths in innovation.
Systems of Innovation, combined with the Target Systems that they innovate, form complex adaptive systems. (Beihoff and Schindel, 2012).



Role/Activity Translation for Later Use

Awareness is split into separate external and internal activities for later design attention.

System of Innovation Activities	
External Opportunity & Risk Awareness & Measurement	Observing and measuring opportunities and risks presented by an evolving external environment.
Internal Opportunity & Risk Awareness & Measurement	Observing and measuring opportunity and risk performance of real or potential innovations.
Experience Accumulation	Accumulating information representing experience over time with real or potential innovations.
Variation Generation	Generating different configurations of potential innovations.
Instantiation	Generating real instances of innovations.
Selection	Selecting, from among a set of real or potential innovations, one or more members.
De-Instantiation	De-instantiating members of a set of real or potential innovations.
Stability / Repair	Resisting, preventing, or repairing damage to innovations.
Regulation	Regulating internal and external interactions with the System of Innovation and its environment.
Resourcing	The capability to provide internal resources or services necessary for effective performance of the System of Innovation.

Tools for Problem-Space Analysis

These tools were developed for identifying the operational response requirements for a to-be agile system/process design.

Three tools are relevant at this point in the discussion:

- **CURVE characterization of the problem space**
- **Reality Factors in the problem space**
- **Response Situation Analysis for design requirements**

The INCOSE ASELCM Project employed these tools to analyze what various agile SE processes were dealing with.

Characterizing the Problem-Space

CURVE Tool

Internal and external environmental forces that impact process and product as systems

Caprice: Unknowable situations.
Unanticipated system-environment change.

Uncertainty: Randomness with unknowable probabilities.
Kinetic and potential forces present in the system

Risk: Randomness with knowable probabilities.
Relevance of current system-dynamics understanding.

Variation: Knowable variables and associated variance ranges.
Temporal excursions on existing behavior attractor.

Evolution: Gradual successive developments.
Experimentation and natural selection at work.

Example: Agile SE Process Environment CURVE
From an ASELCM Project Case Analysis

Caprice (Unpredictability): Unknowable Situations
- ❑ Urgent pre-emptive customer needs
- ❑ Depot maintenance responsibility and capability

Uncertainty: Randomness With Unknowable Probabilities
- ❑ Initial process framework applicability and nature of tailoring needed
- ❑ Regression impacts – the effects of integrating new development with prior development
- ❑ Contract compatibility
- ❑ Management agile-process engagement commitment
- ❑ Documentation requirements compatibility
- ❑ Feature vs. capability reconciliation (amount of feature-requirements freedom)
- ❑ Employee SE-process engagement

Risk: Randomness With Knowable Probabilities
- ❑ Cultural incompatibility
- ❑ Ability to keep and attract talent
- ❑ Systems of Systems requirements changes
- ❑ External stakeholder schedule timelines (e.g. certification)

Variation: Knowable Variables And Associated Ranges
- ❑ Multiple projects competing for bottlenecks (e.g. test facilities)
- ❑ System Of Systems integration
- ❑ Subcontractors development-process compatibility

Evolution: Gradual Successive Development
- ❑ Planned modernization/sustainment increments
- ❑ Open Mission Systems and OSA evolution
- ❑ SE-process tailoring evolution
- ❑ Depot maintenance and upgrade responsibility
- ❑ Contract SE-process accommodation

Reality Factors Tool

Requirements often assume a relatively benign environment, and tend to focus on the capability and feature needs. This framework tool analyzes the external environment.

Human Behavior – Human error, whimsy, expediency, arrogance...

Organizational Behavior – Survival rules rule, nobody's in control...

Technology Pace – Accelerating vulnerability-introductions...

System Complexity – Incomprehensible, unintended consequences...

Globalization – Partners with different ethics, values, infrastructures...

Partially Agile Fads – Outsourcing, web services, cots policies & effects...

Agile Adversaries/Competitors/Customers – Distributed, collaborative, self organizing, proactive, impatient, innovative…

Notional Example: an ASELCM Project Case Analysis

Reality Factors

Human (Including Customer) Behavior – Human error, whimsy, expediency, arrogance...
- Leadership wants to please the customer without knowing the technology or organization.
- New engineers short-circuiting process ConOps for expediency and personal comfort.
- Customer doesn't stabilize requirements.

Organizational Behavior – Survival rules rule, nobody's in absolute control...
- Every program is considered Most-Important.
- Redirected team resources (cherry picking best resources for other needs).
- Availability/quantity of subject matter experts unmatched to needs.

Technology Pace – Accelerating technology and security-vulnerability introductions,...
- Customers demanding cutting edge technology.
- Broad scale commercial technology deployment increasingly satisfactory for defense needs.
- New security vulnerabilities in new technology lack precedence.

System Complexity – Incomprehensible, unintended consequences, emergence...
- Numerous simultaneous projects with numerous stakeholders per project.
- Multi-project resource contention.

Globalization – Different ethics, values, infrastructures, cultural assumptions...
- Local certification and accreditation authorities.
- Cultural differences in global marketplace.

Partially-Agile Enterprise Faddish Practices – Outsourcing, COTS policies/affects...
- COTS supply/supplier affects.
- Agile software-practice thinking dominance.
- Different degrees of agility across the different disciplines (HW, FW, SW, Systems).

Agile Customers/Competitors/Adversaries – Distributed, collaborative, impatient, ...
- Large, complex programs with accelerating market-need dates.
- Commercial products competing for defense needs.

Response Situation Analysis Tool

Response Domain		
Proactive	Creation (and Elimination)	**Proactive responses** are generally triggered internally by the application of new knowledge to generate new value. They are still proactive responses even if the values generated are not positive and even if the knowledge applied is not new – self initiation is the distinguishing feature here. A proactive response is usually one that has effect rather than mere potential; thus, it is an application of knowledge rather than the invention or possession of unapplied knowledge. Proactive response proficiency is the wellspring of leadership and innovation in system capability.
	Improvement	
	Migration	
	Modification (of Capability)	
Reactive	Correction	**Reactive responses** are generally triggered by events which demand a response: problems that must be attended to or fixed, opportunities that must be addressed. The distinguishing feature is little choice in the matter – a reaction is required. Reactive responses often address threatening competitive or environmental dynamics, new customer demands, agility deterioration/failure, legal and regulatory disasters, product failures, market restructuring, and other non-competitor generated events. Reactive response proficiency is the foundation of resilience and sustainability in system capability.
	Variation	
	Expansion (of Capacity)	
	Reconfiguration	

Notional: Response Situation Analysis

Core Issue Amalgamation from ASELCM Project Case Analyses

Domain		Response Issue
Proactive	Creation (and Elimination)	What will the system be creating or eliminating in the course of its operational activity? • Opportunity and risk awareness/knowledge • Acculturated memory • Response actions/options • Decisions to act
	Improvement	What performance will the system be expected to improve during operational life cycle? • Awareness/sensing of opportunity & risk • Effectiveness of response actions/options • Memory in acculturation, inventoried response options, and ConOps
	Migration	What major events coming down the road will require a change in the system infrastructure? • New fundamentally-different types of opportunities and risks
	Modification (Add/Sub Capability)	What modifications in employable resources might need made as the system is used? • Response action appropriate for specific response need • Personnel appropriate and available for a response action
Reactive	Correction	What can go wrong that will need an automatic systemic detection and response? • Insufficient/inadequate awareness • Wrong decisions • Ineffective response actions/options
	Variation	What process variables will need accommodation? • Effectiveness of response actions/options • Effectiveness of response evaluation
	Expansion (and Contraction of Capacity)	What elastic-capacity ranges will be needed on resources/output/activity/other? • Capacity to handle 1-? critical response actions simultaneously
	Reconfigu-ration	What types of resource relationship configurations will need changed during operation? • Elements of a response action • Response managers/engineers

Tools for Solution-Space Synthesis

Four tools are relevant at this point in the discussion:

- **ConOps Strategic Activity Web**
- **ConOps Agile Architecture Pattern**
- **Reconfigurable/Reusable/Scalable design principles**
- **Closure Matrix for design enrichment and traceability**

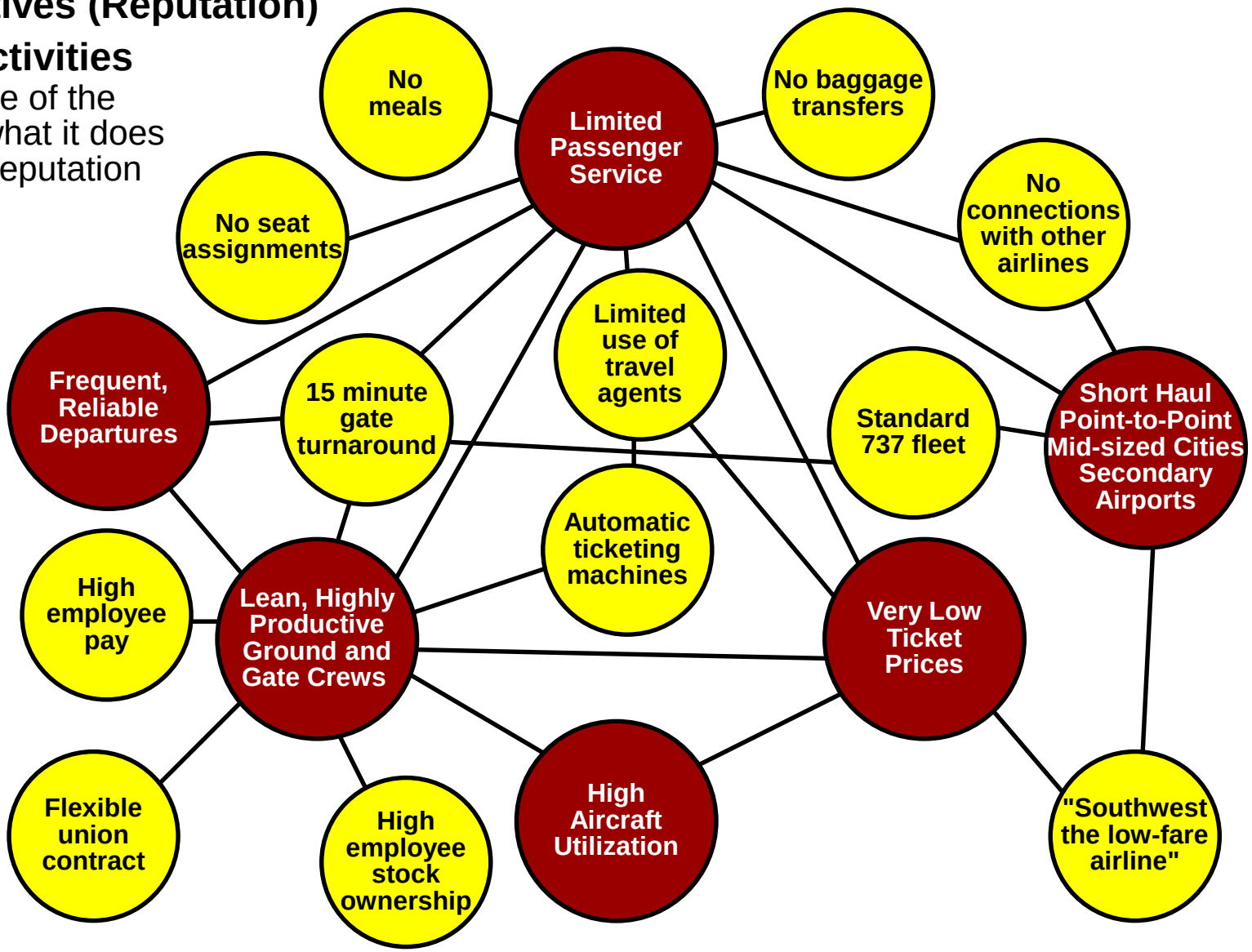
Southwest Airlines

Strategic Activity Web

Objectives (Reputation)

Key Activities

The purpose of the system is what it does = external reputation



"What is Strategy?", Michael Porter, Harvard Business Review, Nov-Dec 1996

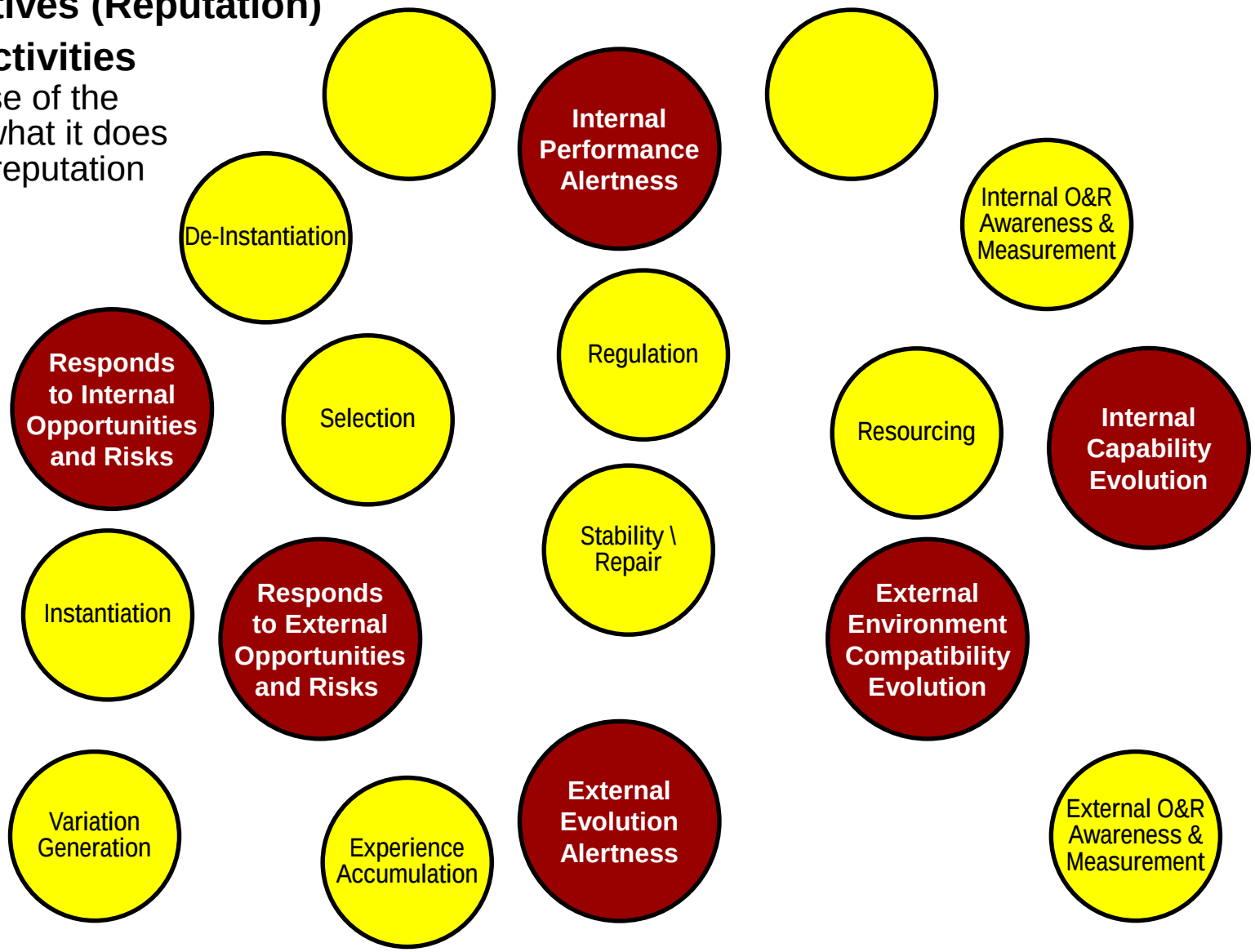
Innovation System

Strategic Activity-Web Tool

Objectives (Reputation)

Key Activities

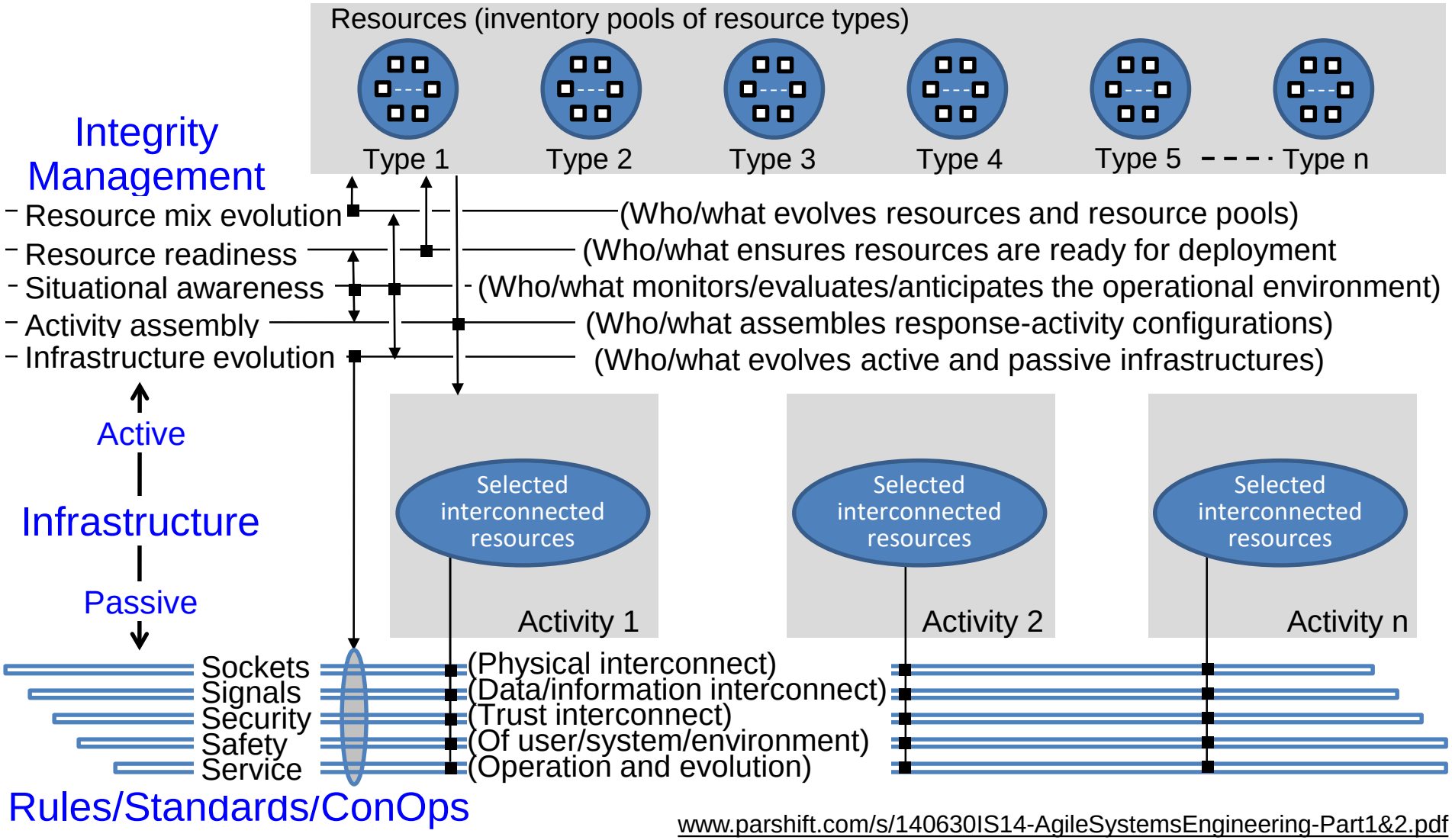
The purpose of the system is what it does = external reputation



Synergistic relationship interactions are implementation-context dependent

Agile Architecture Pattern (AAP) Tool
Drag-and-Drop, Plug-and-Play

Sustaining agility requires:
- Proactive awareness of situations needing responses
- Effective options appropriate for responses
- Assembly of timely responses



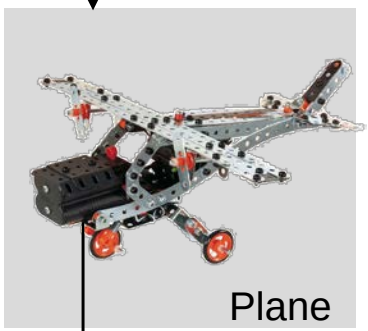
Agile Architecture Pattern (AAP) Tool
Notional Concept: System Response-Construction Kit

Details in www.parshift.com/s/140630IS14-AgileSystemsEngineering-Part1&2.pdf

Integrity Management

- Resource mix evolution
- Resource readiness
- Situational awareness
- Activity assembly
- Infrastructure evolution

Product system engineer
Retail distribution outlets
Product manager
Owner/Builder
Product manager


Plane


Helicopter


Mobile Radar

Active
Infrastructure
Passive

- Sockets
- Signals
- Security
- Safety
- Service

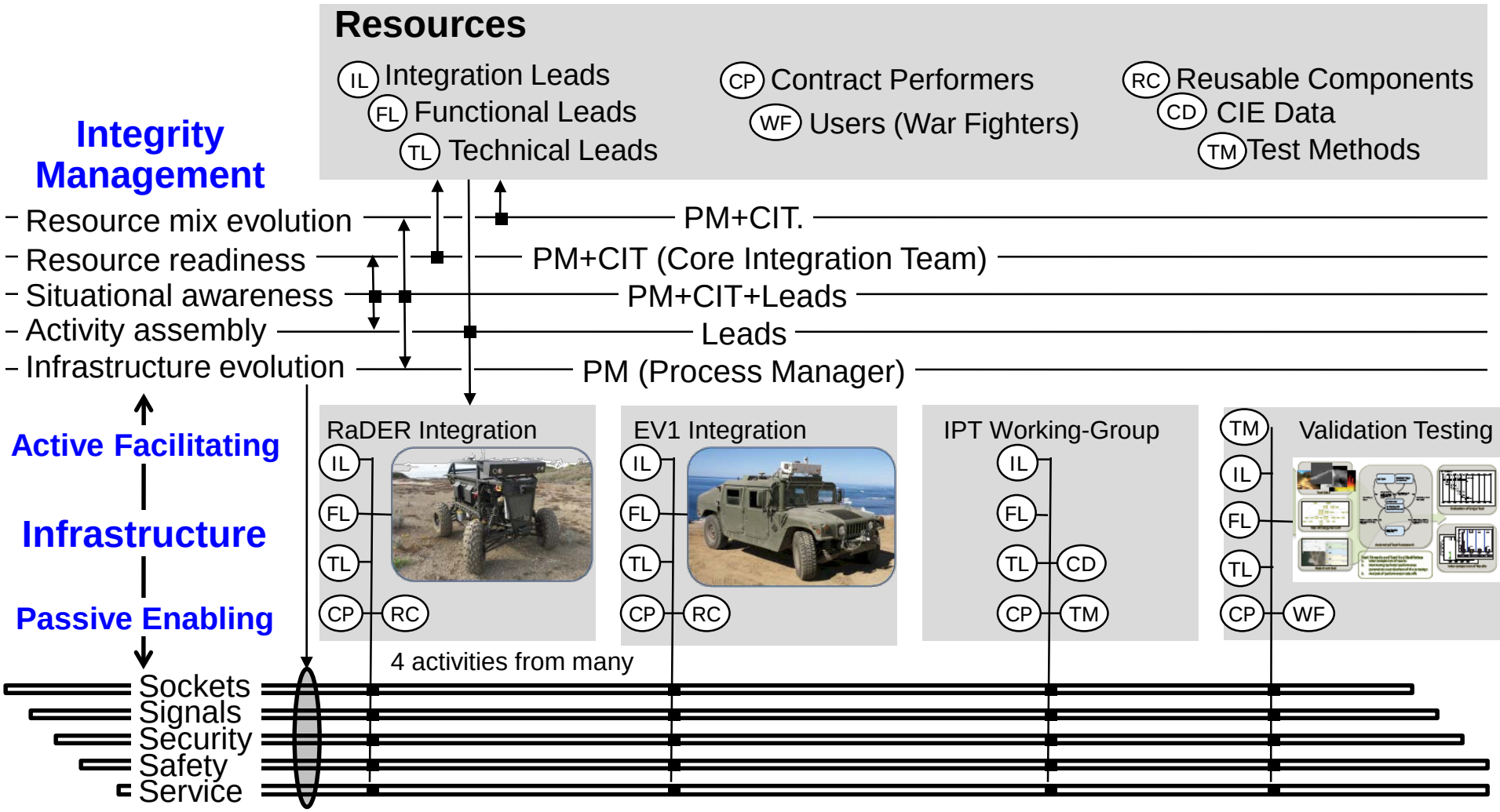
Parts interconnect standards
Construction stability
Single-source trusted parts
Harm-proofing standards
Construction rules & ConOps

Rules/Standards/ConOps

Example: SpaWar SCPac Technology Development Evolution

for multi-project autonomous off-road-vehicle HW/SW

www.parshift.com/s/ASELCM-01SSCPac.pdf

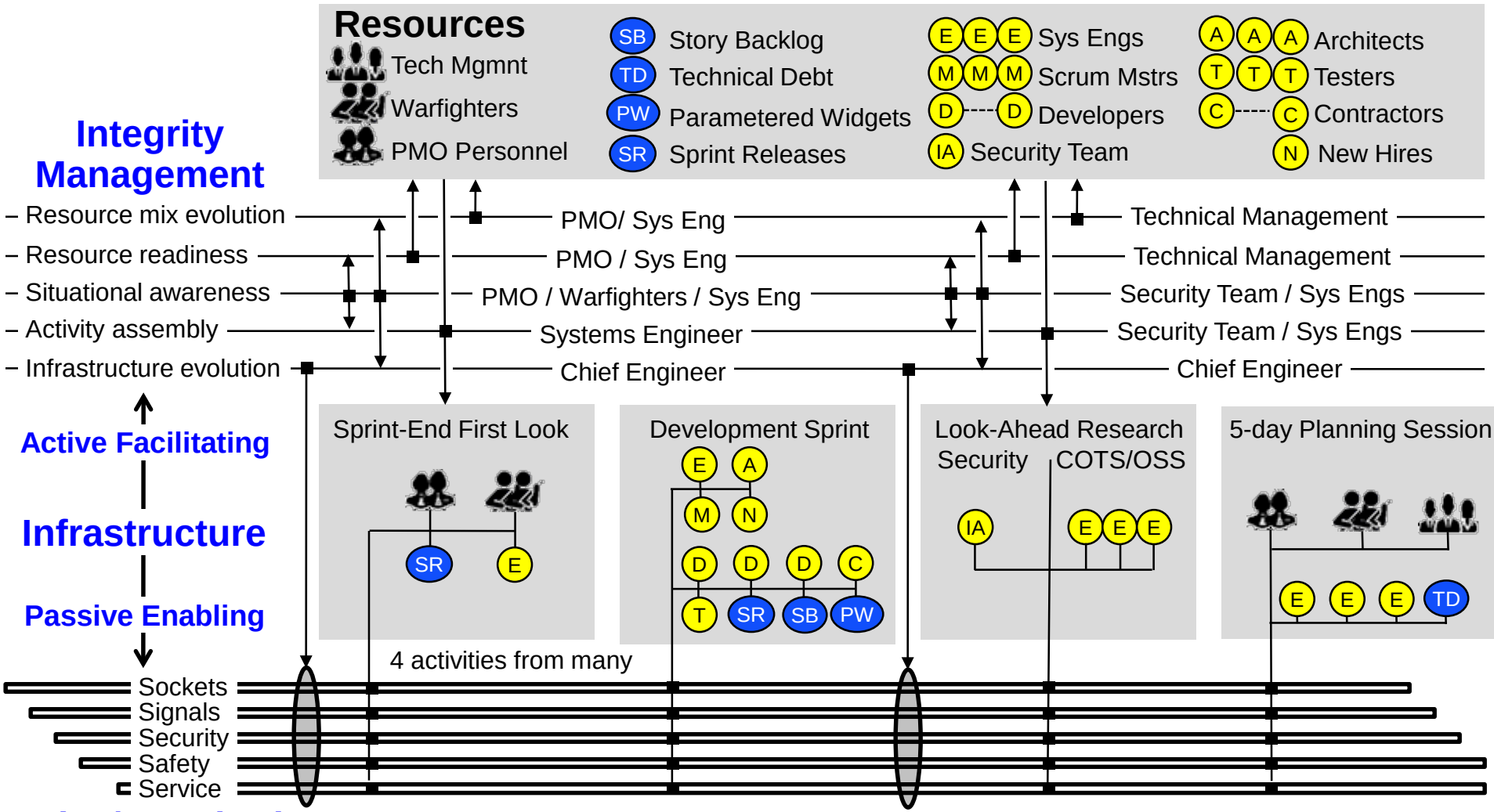


Sockets: CIE, System-1 modular architecture, roles, culture, test threads
Signals: Vision, Declarations of Intent, Config Mgmnt Plan, Integration Strategy, CIE data, decisions, engaged team feedback
Security: User agreement/NDA, Config Mgmnt Plan, CIE access controls
Safety: Open-process visibility, open communication, protected communication
Service (SE ConOps): Vision, Culture, Consciousness(CIE), Conscience, Wave, Integration Strategy/TEMP, Sys-1 and Sys-2 AAP

Example: Northrop Grumman Web Portal Evolution

for military SoS Logistics SW

www.parshift.com/s/ASELCM-03NGC.pdf



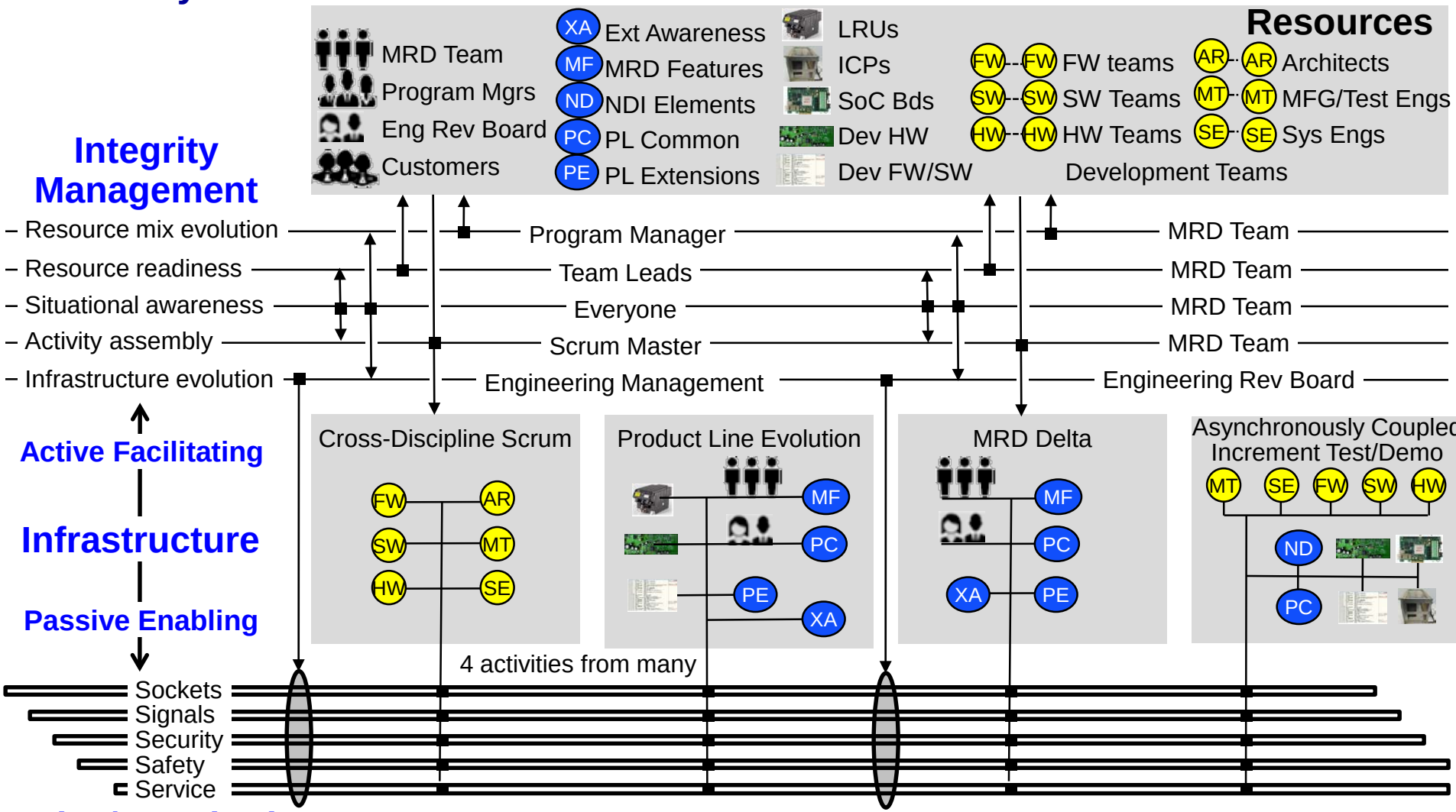
Rules/Standards

Sockets: Meeting formats, Sys-1 modular architecture, Automated build environment, User story acceptance criteria, Roles, Culture
Signals: Vision/Intent, Release themes, Spikes, User stories, Wireframes, Code, SCR, Process status/metrics, Deliverables, Behavior
Security: Governance, Leadership, Cultural oversight, QA, Metrics, CMMI level 5 oversight, Configuration management
Safety: Open-process visibility, Open no-penalty communication, On-boarding, Team user-story estimation, 40-hour work load
Service Documented accessible ConOps, Embedded environment awareness, Continuous DevOps integration, AAP for Systems 1&2

Example: Rockwell Collins Product-Line Evolution

for military radio HW/FW/SW

www.parshift.com/s/ASELCM-02RC.pdf



Rules/Standards

Sockets: PL component-interface standards, Scrums, Collaboration space
Signals: MRD, Epics, Stories, Specifications, Requirements, IMS, JIRA issues, Confluence data
Security: Program reviews, Retrospectives, Scrum ceremonies
Safety: Training, Scrum Ceremonies
Service: RC Agile process ConOps, Market requirements document, Confluence, HW development platforms

Agility-Enabling Structural Design Principles (RRS)

see INCOSE Webinar Agile 103

Reusable

- Encapsulated resources
- Facilitated interfacing
- Facilitated re-use

Reconfigurable

- Peer-peer interaction
- Deferred commitment
- Distributed control & information
- Self organization

Scalable

- Evolving infrastructure standards
- Redundancy and diversity
- Elastic capacity

Response Able Structural Design Principles – RRS Tool

Reconfigurable, Reusable, Scalable

Encapsulated Resources Modules are encapsulated independent units loosely coupled through the passive infrastructure.	**Reusable**	**Scalable**	**Evolving Infrastructure** ConOps and Resource interface and interaction standards and rules that evolve slowly.
Facilitated Interfacing (Pluggable) Resources & infrastructure have features facilitating easy module insertion/removal.			**Redundancy and Diversity** Duplicate Resources provide fail-soft & capacity options; diversity provides functional options.
Facilitated Reuse Resources are reusable and/or replicable; with supporting facilitation for finding and employing resources.			**Elastic Capacity** Resource populations & functional capacity may be increased and decreased within existing infrastructure.

Reconfigurable	
Peer-Peer Interaction Resources communicate directly on a peer-to-peer relationship; parallel rather than sequential relationships are favored.	**Distributed Control & Information** Decisions made at point of maximum knowledge; information accessible globally but kept locally.
Deferred Commitment Resource relationships are transient when possible; decisions & fixed bindings are postponed until necessary**.**	**Self-Organization** Resource relationships are self-determined; and component interaction is self-adjusting or negotiated.

Example RRS Principles – Agile ERP SE Process

www.parshift.com/s/050324Cser-FundamentalsAndSilterra.pdf

Encapsulated Resources Resources are encapsulated independent units loosely coupled through the passive infrastructure. Bus vendor, ERP app vendors, database vendor, app requirements developers, infrastructure requirements developers, infrastructure implementers.	Reusable	Scalable	**Evolving Infrastructure** ConOps and resource interface and interaction standards that evolve slowly. 3-phase implementation, 90-day phases max, no spec/requirement changes once phase begins, internal total infrastructure design responsibility, vendor total application responsibility (HW/SW)
Facilitated Interfacing (Pluggable) Resources & infrastructure have features facilitating easy resource insertion/removal. Vendor interface rules clear, agreed in advance, and managed.			**Redundancy and Diversity** Duplicate resources provide fail-soft & capacity options; diversity provides functional options. Cross-trained BSA departmental responsibilities, mixed outsource/insource resources and expertise.
Facilitated Reuse Resources are reusable and/or replicable; with supporting facilitation for finding and employing appropriate resources. BSA group, business process development system.			**Elastic Capacity** Resource populations & functional capacity may be increased and decreased widely within the existing infrastructure. Outsource implementers managed by small internal group.

Reconfigurable

Peer-Peer Interaction Resources communicate directly on a peer-to-peer relationship; parallel rather than sequential relationships are favored. All vendors are peers, BSAs have direct access to everyone.	**Distributed Control & Information** Decisions made at point of maximum knowledge; information accessible globally but kept locally. BSA business rule development autonomy, SSA infrastructure rules/design autonomy, vendor implementation autonomy.
Deferred Commitment Resource relationships are transient when possible; decisions & fixed bindings are postponed until necessary. Implementation doesn't begin until requirements are firm.	**Self-Organization** Resource relationships are self-determined; and component interaction is self-adjusting or negotiated. BSA team relationships and assignments.

Example: Closure Matrix Tool

Details: ***Response Ability***, **Chapter 7 section headed "Principle-Based design"**

(Case: An Insight Development System)

Strategic Activities		RRS Principles: Encapsulated Resources	Facilitated Interfacing	Facilitated Re-Use	Peer-Peer Interaction	Deferred Commitment	Distributed Control & Info	Self Organization	Elastic Capacity	Redundancy & Diversity	Evolving Infrastructure
Establish personal values	1										
Analyze external case for ideas	2										
Analyze local case for principles	3										
Design a business practice	4										
Package as *response ability models*	5										
Rotate student / mentor roles	6										
Review and select for quality	7										
RSA Requirements		**Principle-Based Activities, and Req's Served**									
Proactive											
Capturing hidden tacit knowledge	3567	35	356	57	3	37	6	3		3	37
Creating student interest and value	124	1	1	1	12	124		124	1	1	
Improving knowledge accuracy	367		6		3	37	6	3		3	7
Improving knowledge effectiveness	1245	45	245	45	1			12	5	2	
Migrating the knowledge focus	247	27	4	2		4	7	247		4	47
Accommodating different student types	(all)	25	6			347	2	12345	1	17	2
Injecting fresh outside knowledge	26	26	26		2		6	2			
Reactive											
Finding and fixing incorrect knowledge	367	7		7	3	3	6	3		3	7
Excising poor value knowledge	2357	7		7	3	3	2	23		35	257
Allowing flexible student schedules	34	34			34			34			
Accommodating any size group	2345	2345	234				2	25	34	234	
Reinterpret rules for new applications	23457	27		5		2	357				23457

Agile Risk Management & Mitigation Tools

"When I am working on a problem,

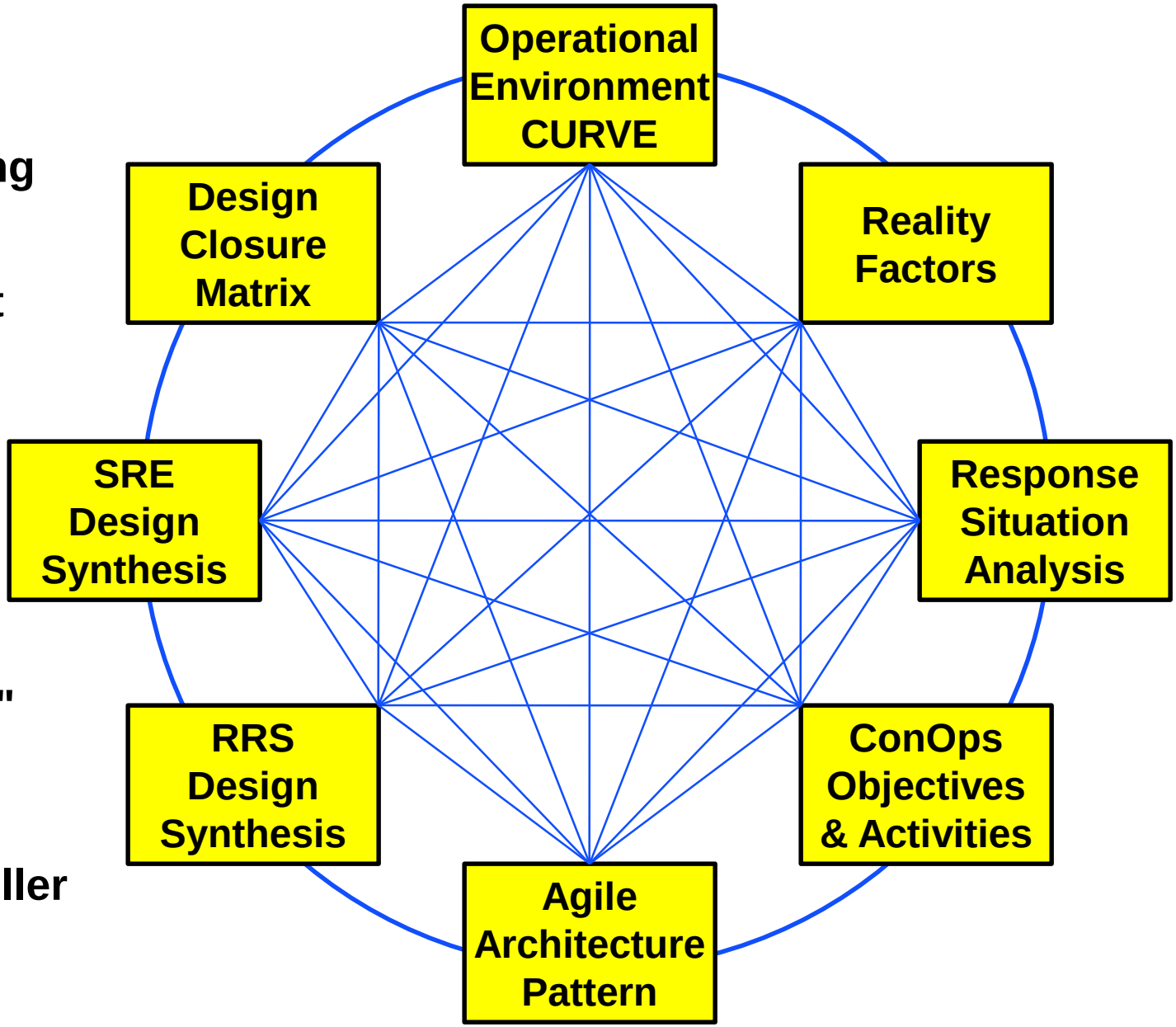
I never think about beauty,

but when I have finished,

if the solution is not beautiful,

I know it is wrong."

R. Buckminster Fuller



General References

Beihoff, Bruce C. and William D. Schindel. 2012. Systems of Innovation I: Summary Models of SOI Health and Pathologies. Proceedings INCOSE International Symposium, Rome, Italy, July 9–12, 2012. http://onlinelibrary.wiley.com/doi/10.1002/j.2334-5837.2012.tb01325.x/abstract

Dove, R. 2001. *Response Ability – The Language, Structure, and Culture of the Agile Enterprise*. Wiley.

Dove, R. 2005. Fundamental Principles for Agile Systems Engineering. Conference on Systems Engineering Research (CSER), Stevens Institute of Technology, Hoboken, NJ, 24 March. www.parshift.com/s/050324Cser-FundamentalsAndSilterra.pdf

Dove, R., R. LaBarge. 2014. Fundamentals of Agile Systems Engineering – Part 1 and Part 2. International Council on Systems Engineering, International Symposium, Las Vegas, NV, 30Jun-3Jul. www.parshift.com/s/140630IS14-AgileSystemsEngineering-Part1&2.pdf

ISO/IEC. 2010. Systems and Software Engineering — Life Cycle Management — Part 1: Guide for Life Cycle Management. ISO/IEC TR 24748-1:2010(E) first edition. Switzerland.

Schindel, William D. 2013. Systems of Innovation II: The Emergence of Purpose. Proceedings INCOSE International Symposium, Philadelphia PA, USA, June 24–27, 2013. http://onlinelibrary.wiley.com/doi/10.1002/j.2334-5837.2013.tb03069.x/abstract

Wikipedia. nd. [John Boyd's] OODA Loop. https://en.wikipedia.org/wiki/OODA_loop

ASELCM Project References

Dove, R. n.d. Agile Systems Engineering Life Cycle Fundamentals Project, Documents at https://connect.incose.org/ProgramsProjects/aselcm/Pages/Home.aspx, alternatively at www.parshift.com/ASELCM/Home.html

Dove, R., W. Schindel, and C. Scrapper. 2016. Agile Systems Engineering Process Features Collective Culture, Consciousness, and Conscience at SSC Pacific Unmanned Systems Group. Proceedings International Symposium. International Council on Systems Engineering. Edinburgh, Scotland, 18-21 July. www.parshift.com/s/ASELCM-01SSCPac.pdf

Dove, R, W. Schindel. 2017. Case study: agile SE process for centralized SoS sustainment at Northrop Grumman. Proceedings International Symposium. International Council on Systems Engineering. Adelaide, Australia, 17-20 July. www.parshift.com/s/ASELCM-03NGC.pdf

Dove, R., W. Schindel, R. Hartney. 2017. Case Study: Agile Hardware/Firmware/Software Product Line Engineering at Rockwell Collins. Proceedings 11th Annual IEEE International Systems Conference. Montreal, Quebec, Canada, 24-27 April. www.parshift.com/s/ASELCM-02RC.pdf

Dove, R., W. Schindel. 2017. Case Study: Transition to Scaled-Agile Systems Engineering at Lockheed Martin's Integrated Fighter Group. Working paper. www.parshift.com/s/ASELCM-04LMC.pdf

Dove, R. 2017. Agility in Systems Engineering – Findings from Recent Studies. Working paper, 15-April. www.parshift.com/s/ASELCM170415-AgilityInSE-Findings.pdf

Schindel, W. and R. Dove. 2016. Introduction to the Agile Systems Engineering Life Cycle MBSE Pattern. Proceedings International Symposium. International Council on Systems Engineering. Edinburgh, Scotland, 18-21 July. www.parshift.com/s/160718IS16-IntroToTheAgileSystemsEngineeringLifeCycleMBSEPattern.pdf

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