International Council on Systems Engineering
A better world through a systems approach

Welcome to the INCOSE Webinar Series

Wednesday, 17 September 2025 – Webinar 184

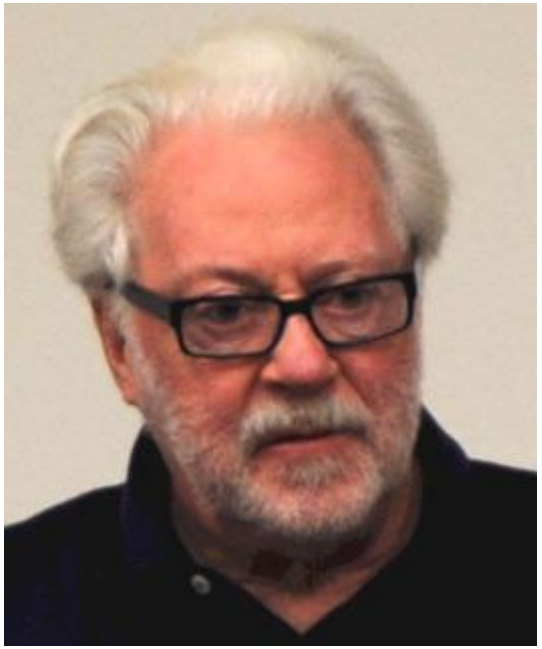
incose.org

Thank you to our Webinar Sponsors!

Interested in being a Sponsor of the INCOSE Webinar Series? Please contact us at sponsorship@incose.net

INCOSE Webinar 184:

Agile SE Strategies – Systems Thinking in Practice



Presented by

Rick Dove

About the INCOSE Webinar Series

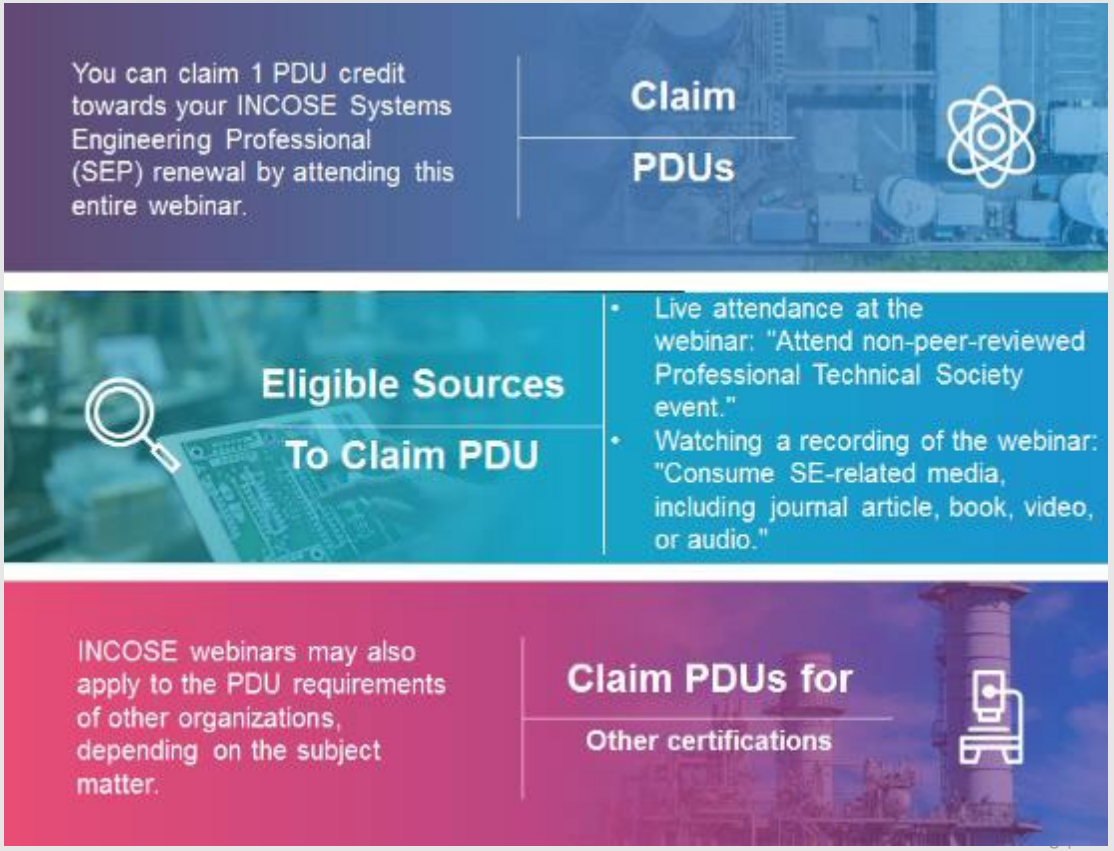
- Piloted in 2008
- A virtual offering aimed to provide relevant technical information and topics on systems engineering, on a regular basis and on an easy to access platform
- Held once a month (normally on the 3rd Wednesday)

Questions? Comments? Suggestions?
Email us at webinars@incose.net!

Webinars & SEP PDU* Credits

More information can be found on [Renewing Certification (incose.org)]

*PDU – Professional Development Unit



This Webinar is being recorded.

The full recording and slide deck will be made available to all INCOSE members and CAB Associates within 10-12 business days from original air date in the Professional Development Portal (PDP).

Questions? Comments? Suggestions?
Email us at webinars@incose.net!

Webinar

Agility Strategies 302:
Agile SE Strategies – Systems Thinking in Practice

17-Sep-2025

Rick Dove
Chair: INCOSE WG for Agile Systems & Systems Engineering

Agile 302 webinar slides: Agility Strategies – Systems Thinking in Practice
Agile 301 webinar slides: Agility Strategies Purpose and Values
Agile 206 webinar slides: Agile SE … It's Not Your Father's Oldsmobile
Agile 205 webinar slides: Agile SE in the Future of Systems Engineering
Agile 204 webinar slides: Agile SE Life Cycle Model
Agile 203 webinar slides: Agile SE Agility as a System
Agile 202 webinar slides: Agile SE Continuous Integration
Agile 201 webinar slides: Agile SE Problem Space Requirements
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)

Abstract

**John Boyd's OODA loop, explained as he intended,
is examined as systems thinking in practice,
as a framework for agility in action, and
in relationship to the eight strategic aspects
outlined in INCOSE's SE Agility Primer.**

John Boyd's OODA Loop

… is not about
aircraft dogfights, engaging in battles, or competing in markets.

Boyd's OODA Loop is a fundamental reference architecture
of how cognitive entities
interact with dynamic, uncertain environments.

Mythinformation

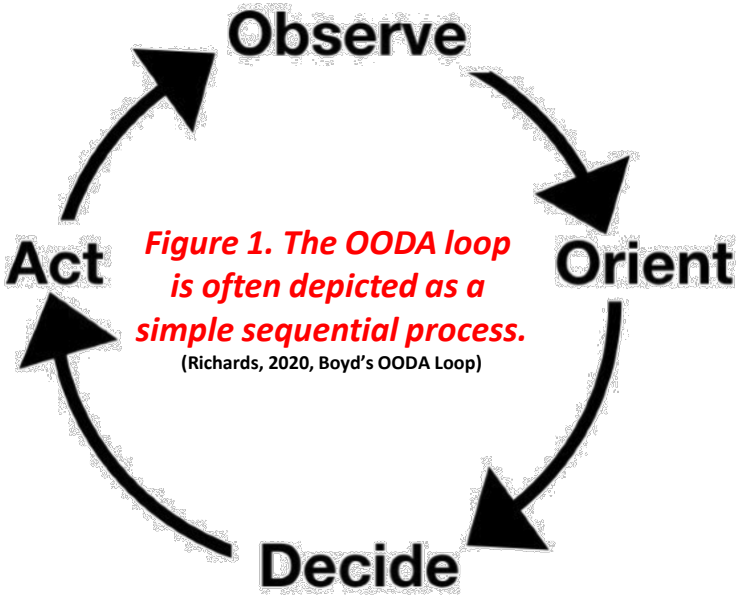


Figure 1. The OODA loop is often depicted as a simple sequential process.
(Richards, 2020, Boyd's OODA Loop)

"Boyd never drew the OODA "loop" as depicted in Figure 1, nor did he ever describe it as a sequential process in any of his works on competitive strategy. (Chet Richards, 2020, Boyd's OODA Loop)

"Observation, orientation and action are continuous processes, and decisions are made occasionally in consequences of them. There is no OODA loop. (Jim Storr, British Officer)

Systems Thinking

… is sensemaking activity
that explores the effect of relationships
among entities.

It builds models
to represent how these entities are connected to each other,
with beliefs of what those connections enable and constrain
as holistic system behavior.

Agility

Grace,

Efficiency,

Effectiveness

of Engagement

Agility manifests as
a quality of engagement
with a situation.

Systems Engineering Agility Primer (Just a Visual)

Adaptable Modular Architectures

Needs: Facilitated product and process experimentation, modification, and evolution.

Behaviors: Composable and reconfigurable product and process designs from variations of reusable assets.

Discussion: One fixed process approach won't fit all projects, so an appropriate process should be easy to compose and evolve according to context and usage experience. Variations of reusable assets are built over time as features are modified for different contextual usage.

A hallmark of agile systems engineering is iterative incremental development, which modifies work in process as suitability is repetitively evaluated. The agility of the process depends upon the agility of the product so both process and product can be easily changed.

Composable reconfigurable constructions

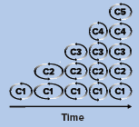
Iterative Incremental Development

Needs: Minimize rework, maximize quality, facilitate innovation.

Behaviors: Incremental loops of building, evaluating, correcting, and improving capabilities.

Discussion: Generally increments create capabilities and iterations add and augment features to improve capabilities.

- Increment cycles are beneficially timed to coordinate events such as integrated testing and evaluation, capability deployment, experimental deployment, or release to production.
- Increments may have constant or variable cadence to accommodate management standards or operational dynamics.
- Iteration cycles are beneficially timed to minimize rework cost as a project learns experimentally and empirically.



Iterative capability improvements (looping) and incremental capability additions (successive development periods).

Common-Mission Teaming

Needs: Coherent collective pursuit of a common mission.

Behaviors: Engaged collaboration, cooperation, and teaming among all relevant stakeholders.

Discussion: Collaboration, cooperation, and teaming are not synonymous, and need individual support attention. Collaboration is an act of relevant information exchange among individuals, cooperation is an act of optimal give and take among individuals, and teaming is an act of collective endeavor toward a common purpose.

Tightly integrated coherent operation.

Continual Integration & Test

Needs: Early revelation of system integration issues.

Behaviors: Integrated test and demonstration of work-in-process.

Discussion: Discovering integration issues late in development activities can impact cost and schedule with major rework. Synchronizing multiple domain engineering activities via continual integration and test provides faster and clearer insight into potential system integration issues.

Iteratively evolving self-driving technology integration platform.

Attentive Situational Awareness

Needs: Timely knowledge of emergent risks and opportunities.

Behaviors: Active monitoring and evaluation of relevant internal and external operational-environment factors.

Discussion: Are things being done right (internal awareness) and are the right things being done (external awareness)? Having the agile capability for timely and cost-effective change does little good if you don't know when that ability should be exercised. Situational awareness can be enhanced with systemic methods and mechanisms.

Air traffic control – alert, in-the-moment, constant attention

Attentive Decision Making

Needs: Timely corrective and improvement actions.

Behaviors: Systemic linkage of situational awareness to decisive action.

Discussion: Empower decision making at the point of most knowledge. As a counter example, technical debt (a term for knowing something needs correction or improvement but postponing action) is situational awareness without a causal link to prompt action.

Attentive decisions change wrong tires that would take toll every lap

Shared-Knowledge Management

Needs: Accelerated mutual learning and single source of truth for internal and external stakeholders.

Behaviors: Facilitated communication, collaboration, and knowledge curation.

Discussion: There are two kinds of knowledge to consider. Short time frame operational knowledge: what happened, what's happening, what's planned to happen. Long time frame curated knowledge: what do we know of reusable relevance, e.g., digital artifacts, lessons learned, and proven practices.

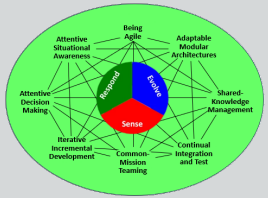
Information containers of any kind, available to all, and typically digital.

Being Agile

Needs: Attentive operational response to evolving knowledge and dynamic environments.

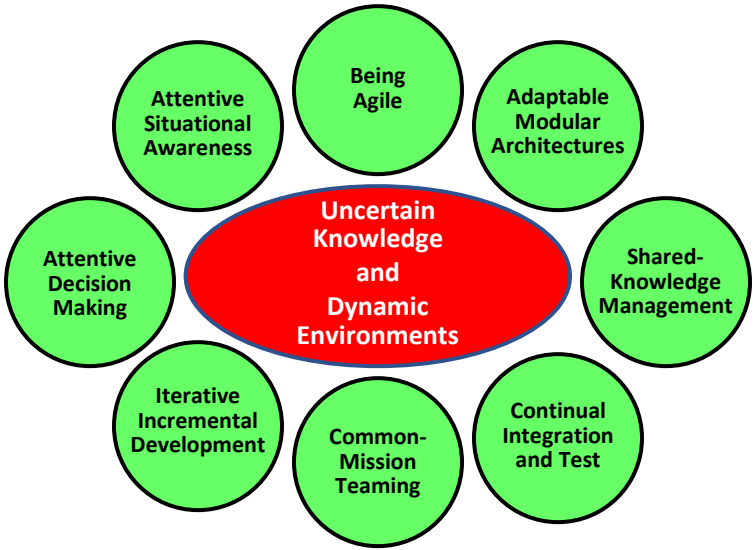
Behaviors: Sensing, responding, evolving.

Discussion: Agile systems engineering is not about doing Agile, it is about being agile. Being agile is a behavior, not a procedure—a behavior sensitive to threats and opportunities in the operational environment, decisive when faced with threat or opportunity, and driven to improve these capabilities. Deciding how to implement any of the core aspects, even this one, should be done with sense-respond-evolve principles in mind as aspect objectives.



Agility emerges from synergistic relationships among aspects.

Strategic Aspects – Behavior Lens



Aspect	Behavior
Adaptable Modular Architectures	Composable and reconfigurable designs from evolving variations of reusable assets
Iterative Incremental Development	Incremental loops of building, evaluating, correcting, and improving capabilities
Attentive Situational Awareness	Active monitoring and evaluation of relevant internal and external environment factors
Attentive Decision Making	Systemic linkage of situational awareness to decisive action
Common-Mission Teaming	Engaged collaboration, cooperation, and teaming among all relevant stakeholders
Shared-Knowledge Management	Facilitated communication, collaboration, and knowledge curation
Continual Integration & Test	Integrated test and demonstration of work-in-process
Being Agile	Sense-respond-evolve engagement with a dynamic environment

What Will Happen Next

1. **Examine Boyd's OODA Loop in an SE Agility context.**
2. **Choose places in the Loop to employ each Aspect.**
3. **Articulate a role each Aspect might play in its chosen position.**

The purpose is to explore broader perspectives on relationships as a means to appreciate and improve Aspect design.

**“The OODA Loop, as envisioned by Boyd,
is a cyclic process, a continuum of decision-making
that mirrors the very rhythm of life and conflict.**

**At its foundation lies the principle of agility –
the swift, fluid, and adaptive nature of thought and action
that underpins successful strategies in any confrontational or competitive scenario.”**

(Douglas Youvan. 2024. Navigating the OODA Loop)

**“The OODA Loop, as envisioned by Boyd,
is a cyclic process, a continuum of decision-making
that mirrors the very rhythm of life and conflict.**

**At its foundation lies the principle of agility –
the swift, fluid, and adaptive nature of thought and action
that underpins successful strategies in any confrontational or competitive scenario.”**

(Douglas Youvan. 2024. Navigating the OODA Loop)

**Agile Systems Engineering
is in confrontation
with a dynamic, uncertain environment**

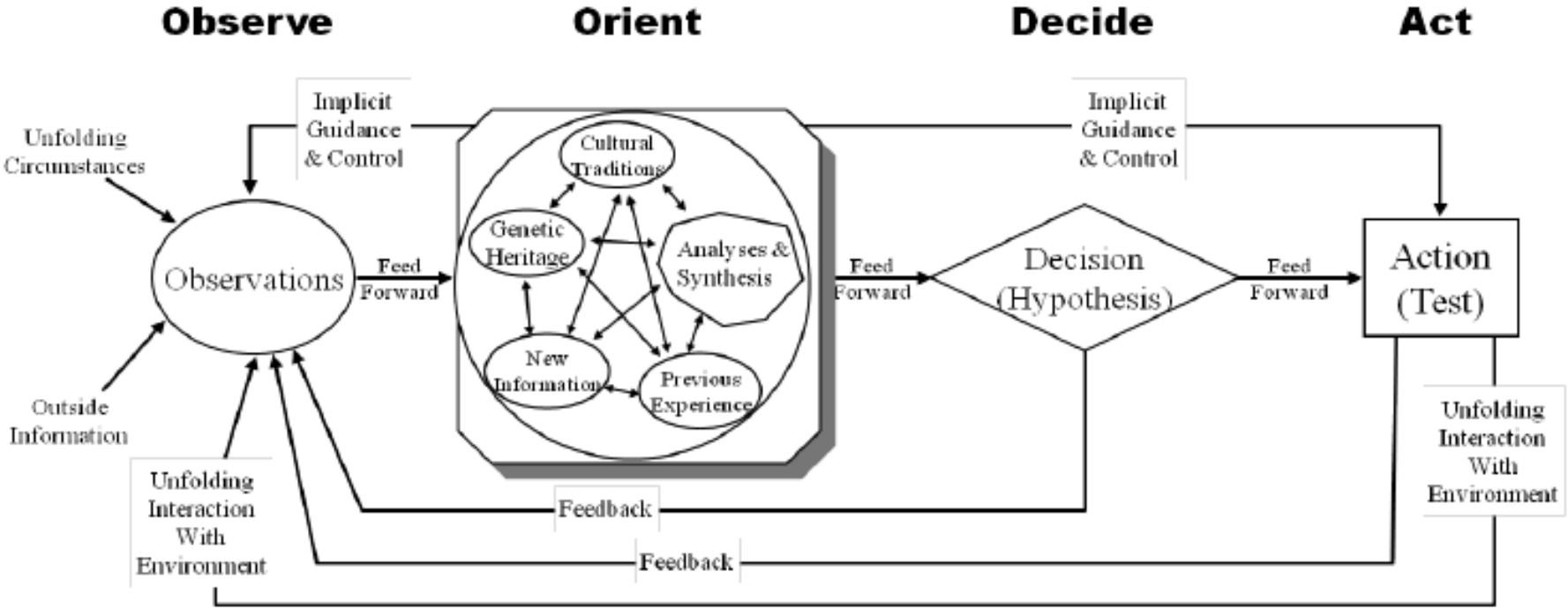
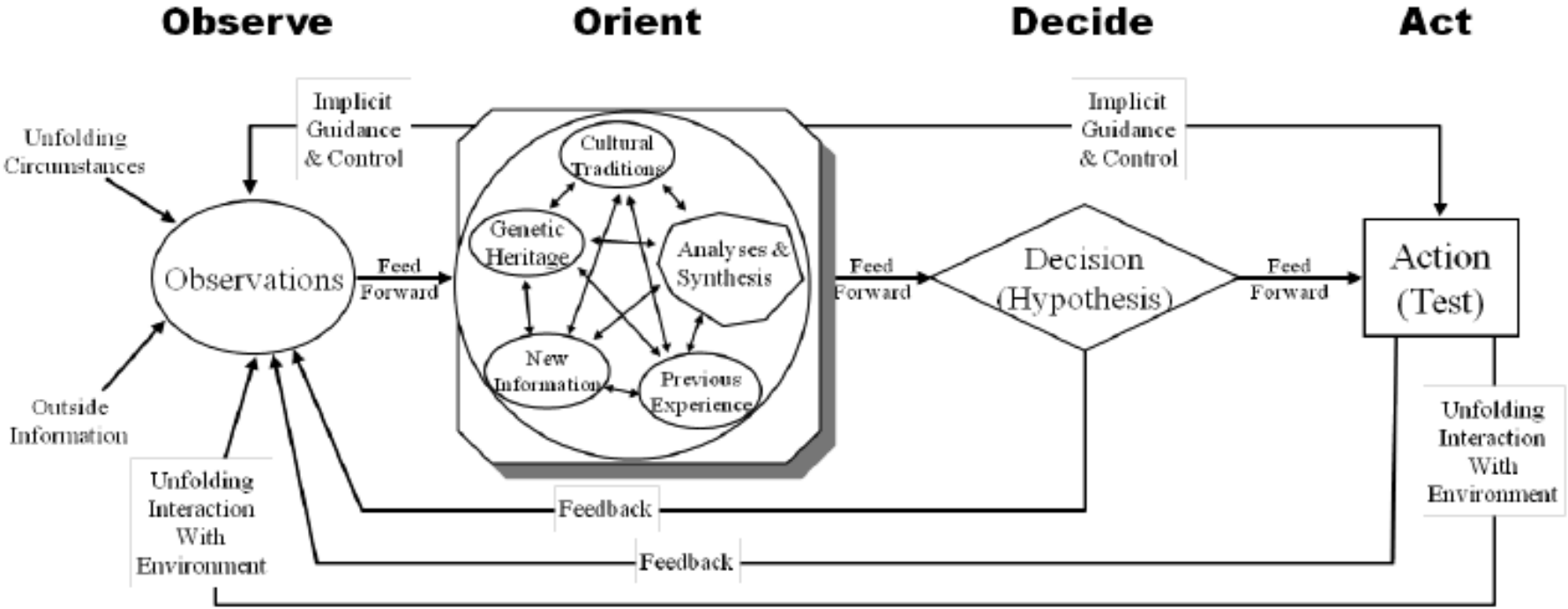


Figure 2. The only OODA "loop" that Boyd actually drew.

"… an OODA loop illustrates a scheme for obtaining inputs for certain processes and generating actions."

(Chet Richards,2020, Boyd's OODA Loop)



Orient consists of data and reasoning
Analysis & Synthesis is where thinking happens – provides alternatives for Decision and implications of Observations
Implicit Guidance & Control (right side) is if-then Action link, no decision involved
Implicit Guidance & Control (left side) is filter (bias, expectations, et al.) on what is observable
Observations is the perception (input) to situational awareness (perception-comprehension-projection)
Decision is choice and timing (not analysis and synthesis) as an Hypothesis (guess) in need of validation
Action is a Test – an experiment in need of evaluation and validation

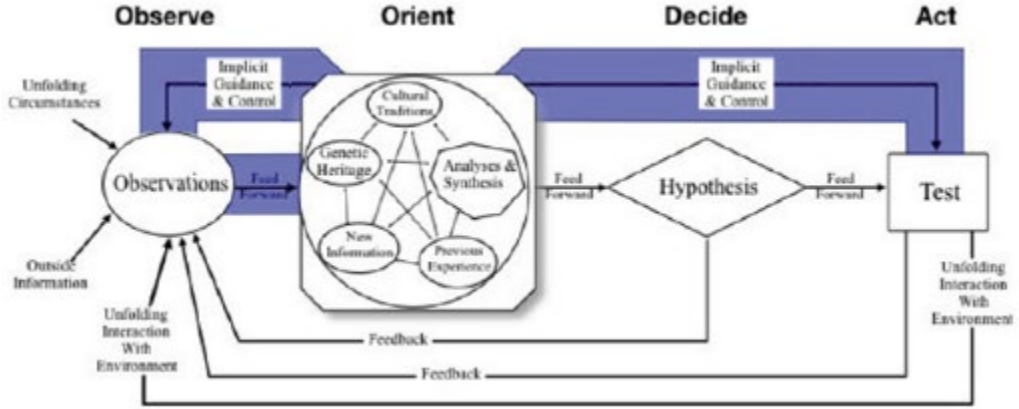


Figure 4. Most actions—our repertoire—flow from orientation (no decision necessary).

Orientation also filters observations—we don't sense what we don't expect.

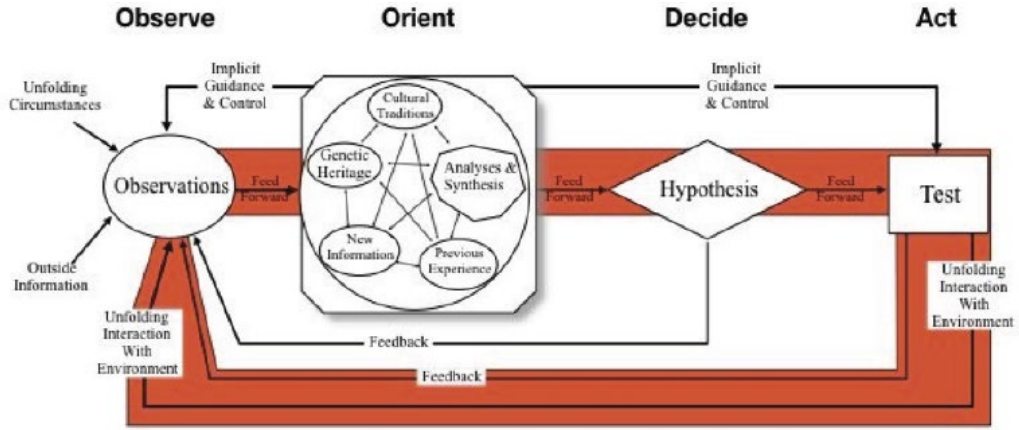
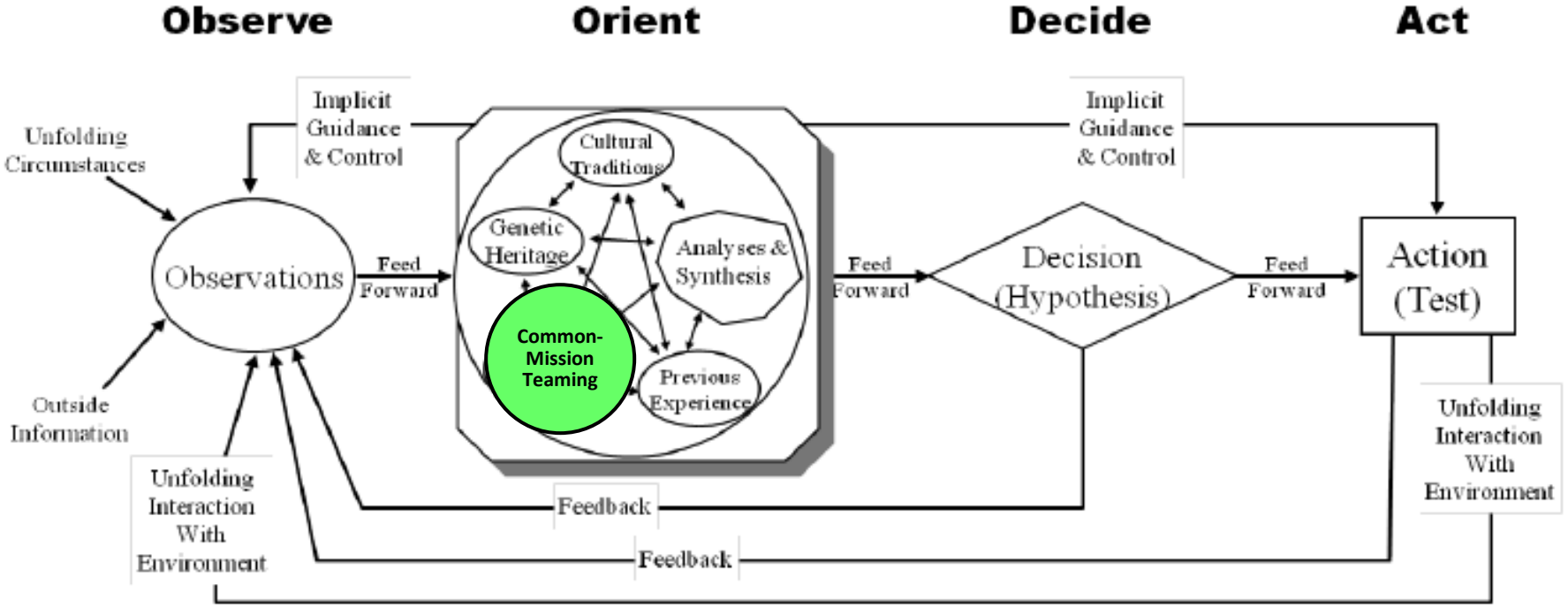
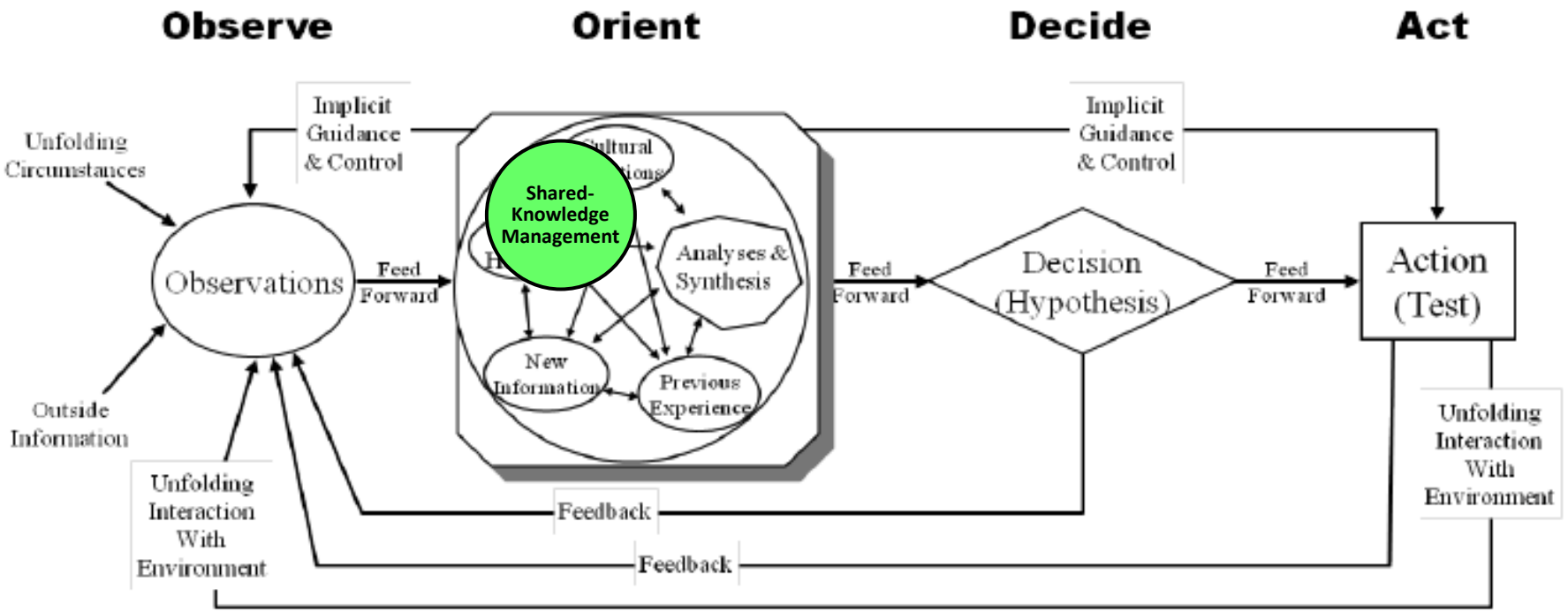


Figure 5. The "learning loop."

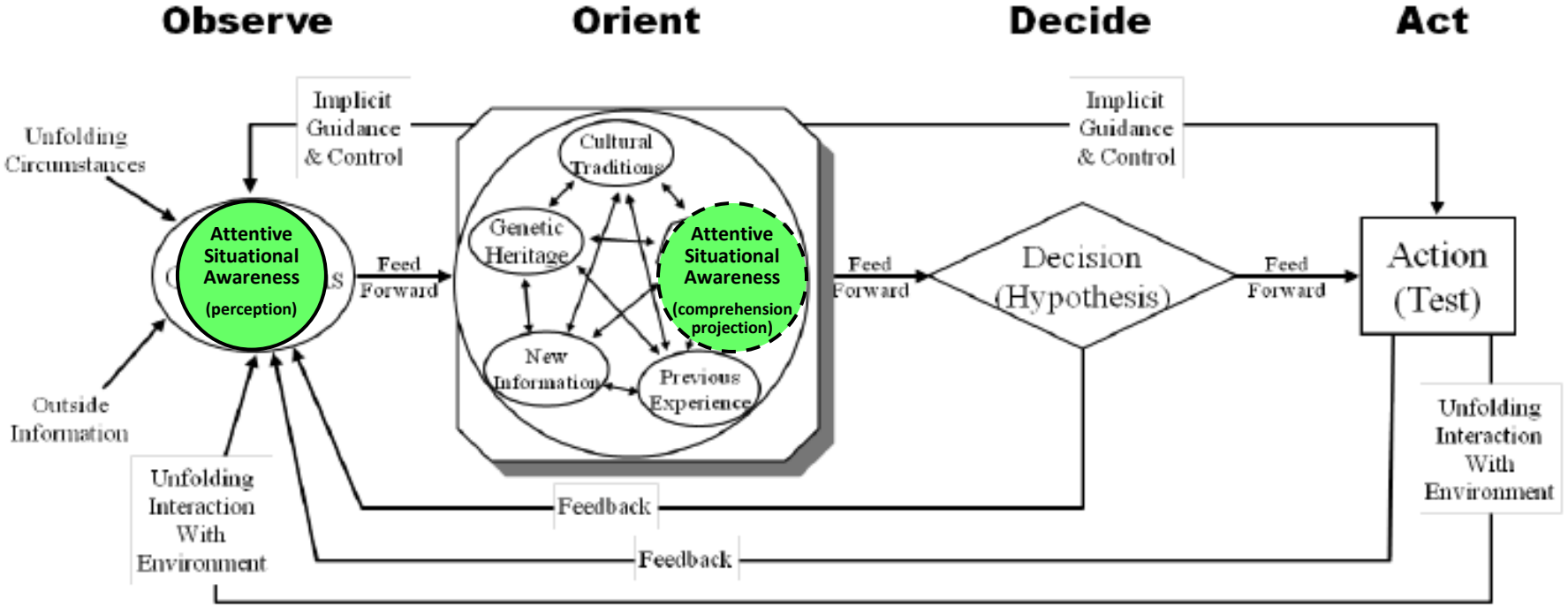
Learning manifests in the orientation area, where a repertoire of knowledge evolves



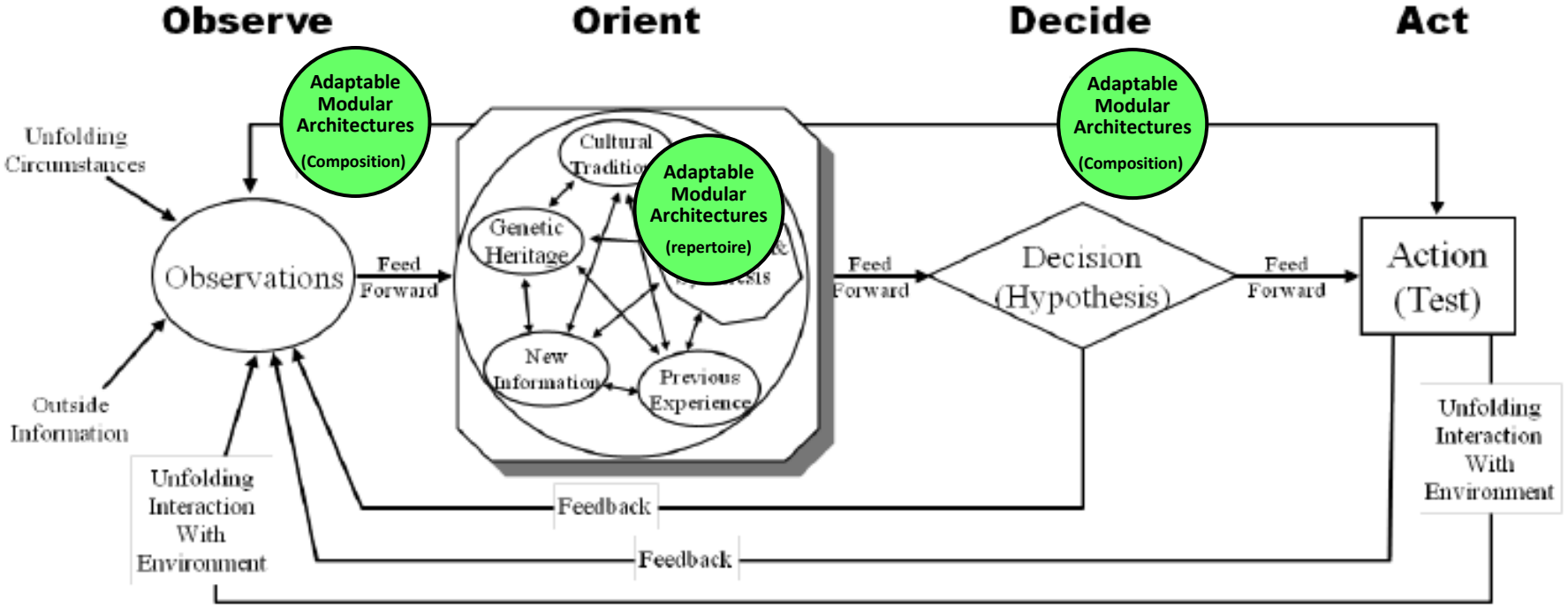
- **Behavior Lens: Engaged collaboration, cooperation, and teaming among all relevant stakeholders**
- **OODA Lens: Provides the context foundation of Orientation**



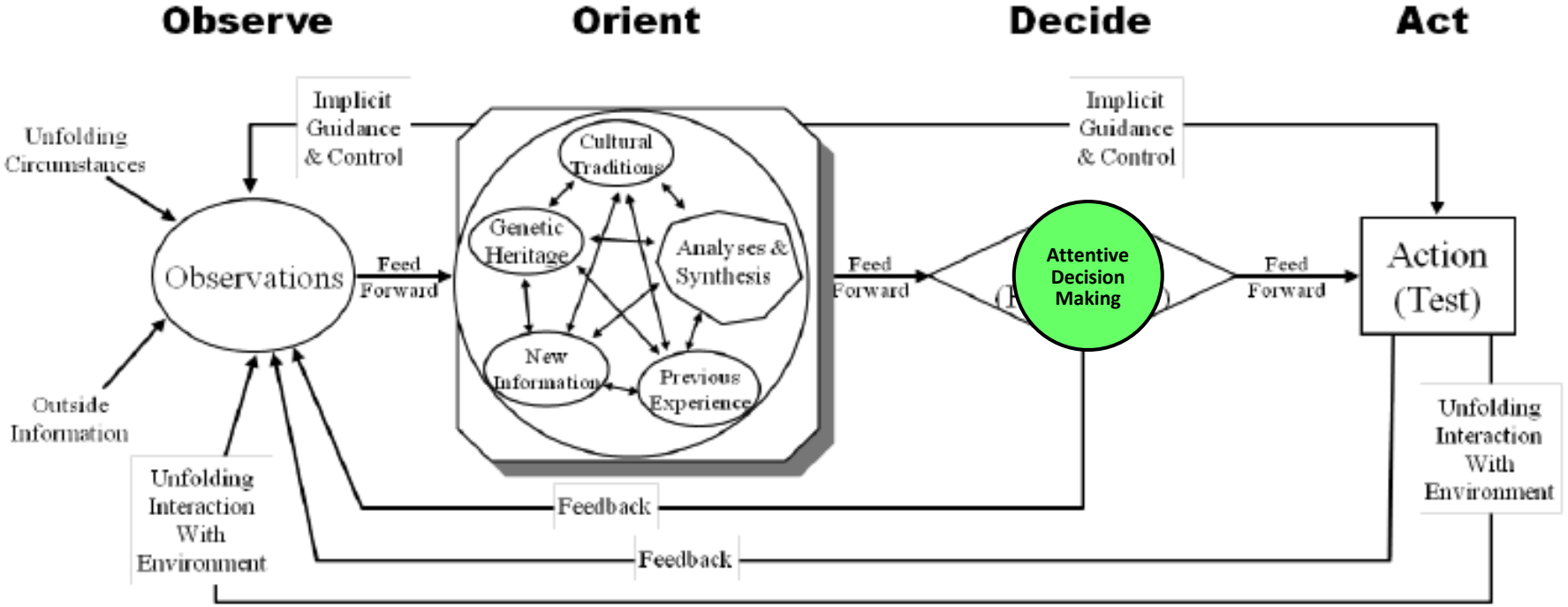
- **Behavior Lens: Facilitated communication, collaboration, and knowledge curation**
- **OODA Lens: Provides the content foundation of Orientation**



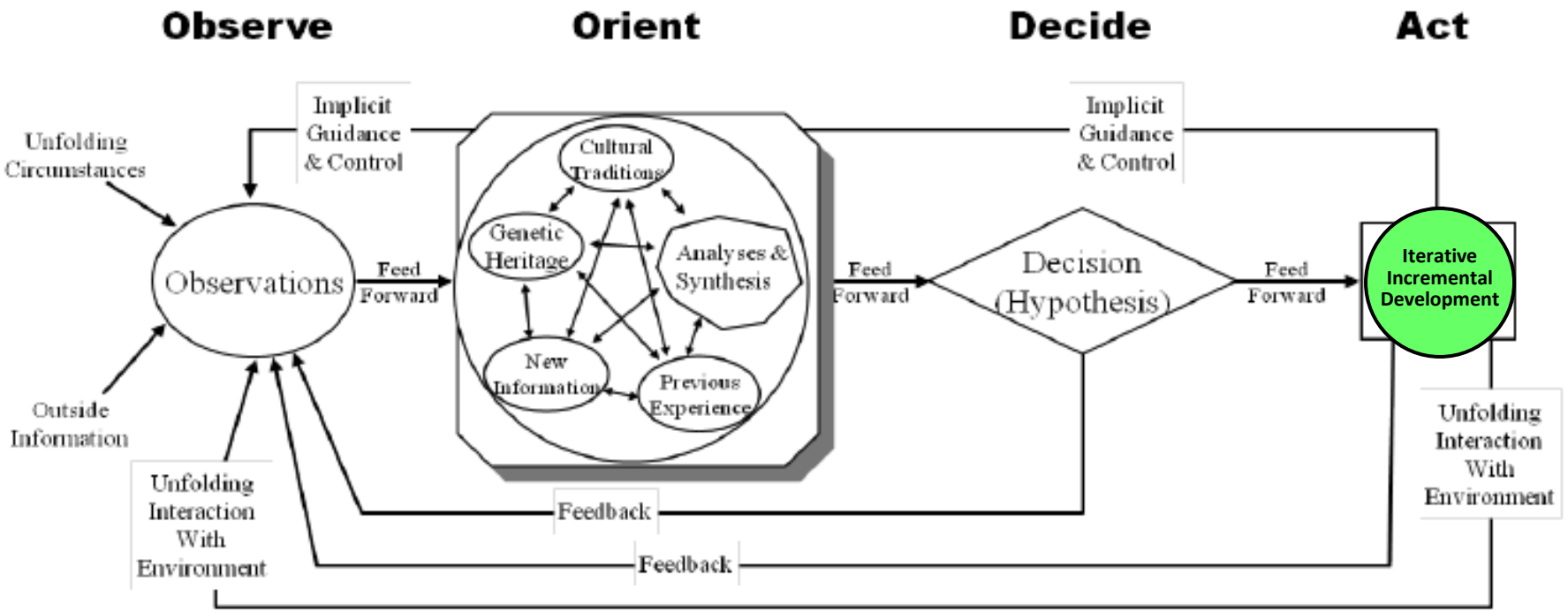
- **Behavior Lens: Active monitoring and evaluation of relevant internal and external environment factors**
- **OODA Lens: Looks for known interests and senses anomalous developments (perception focus)**



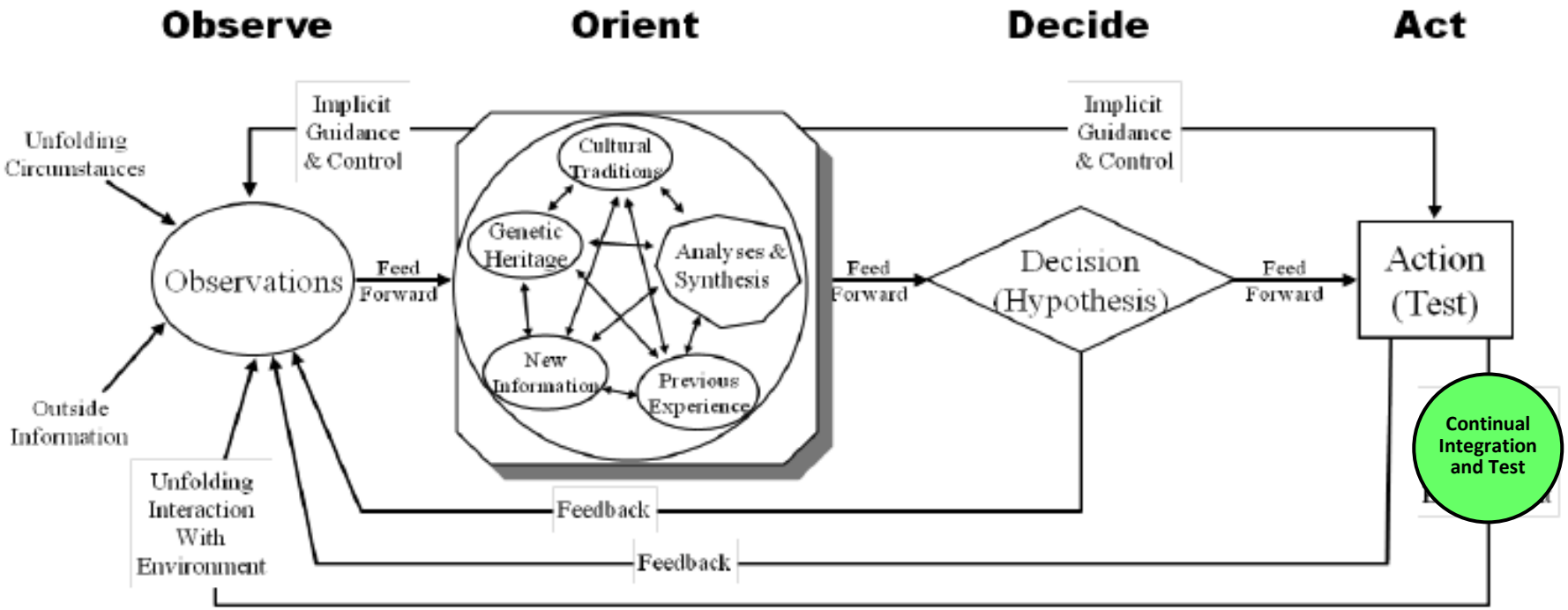
- **Behavior Lens: Composable and reconfigurable designs from evolving variations of reusable assets**
- **OODA Lens: Develops and evolves repertoires of reusable knowledge, sensors, and actions**



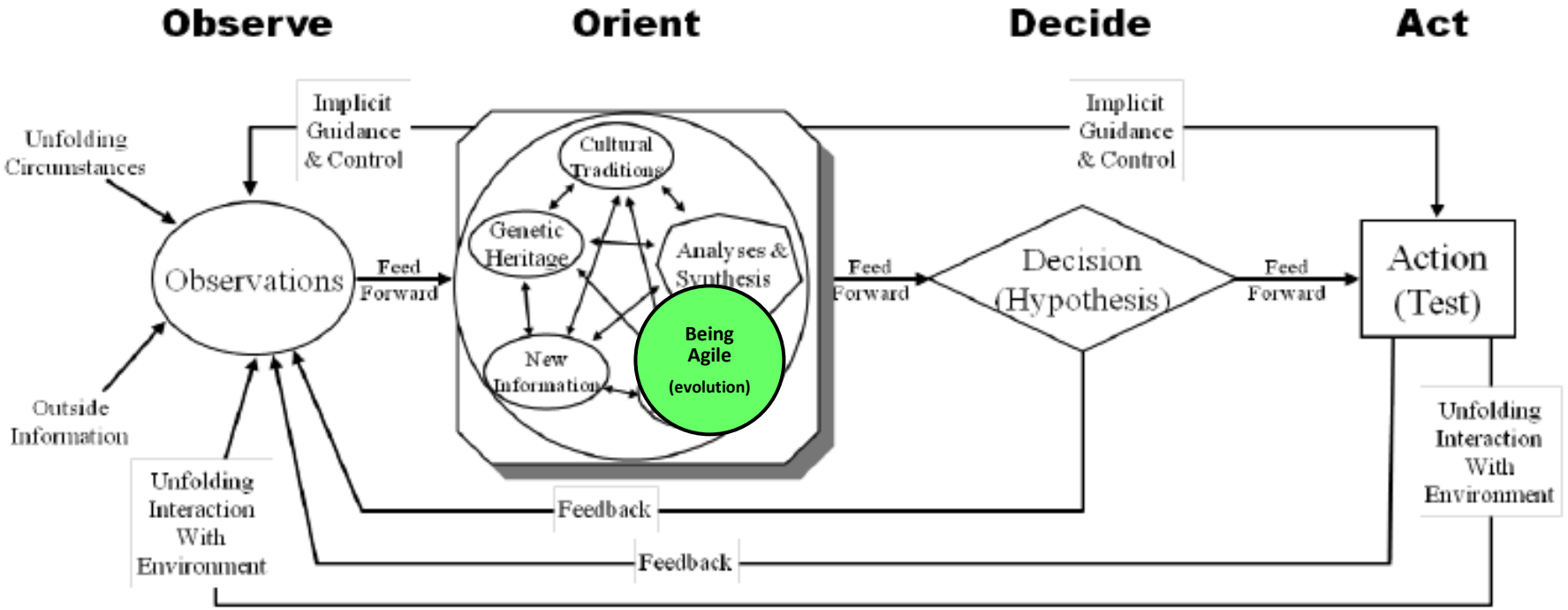
- **Behavior Lens: Systemic linkage of situational awareness to decisive action**
- **OODA Lens: Instantiates (initially) and validates (continually) IG&C Actions**



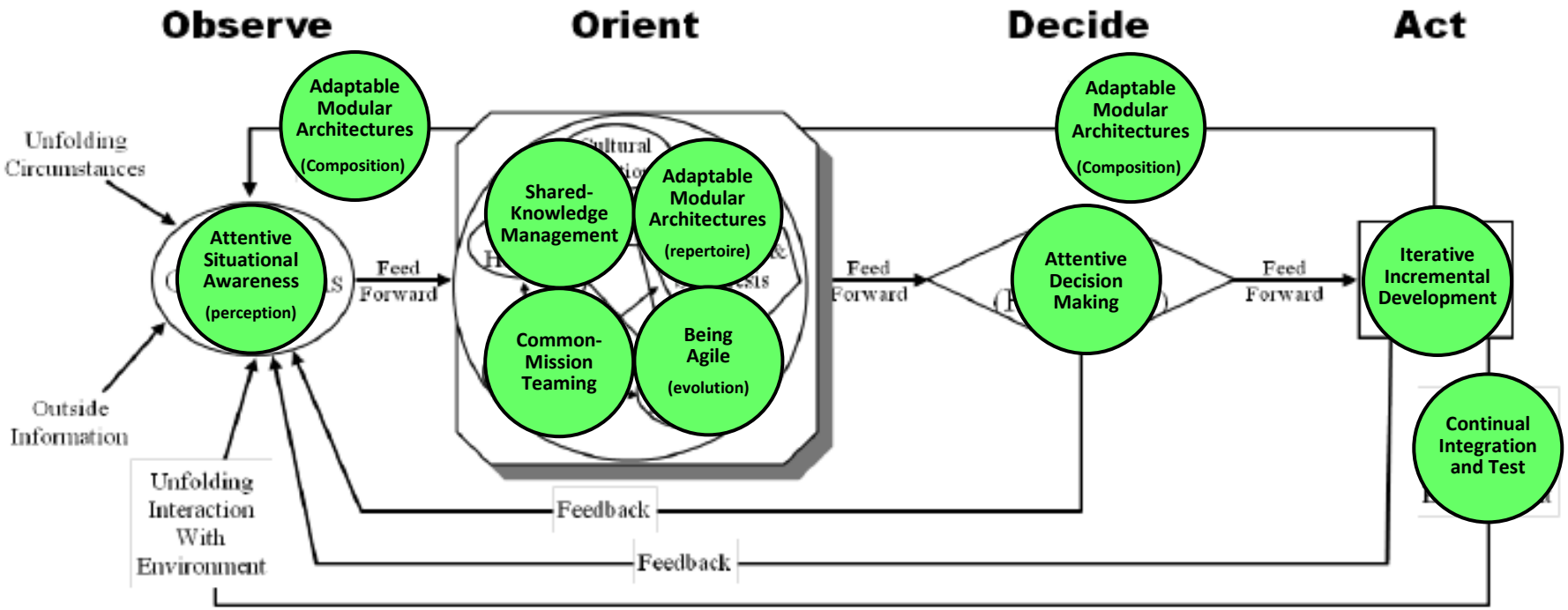
- **Behavior Lens: Incremental loops of building, evaluating, correcting, and improving capabilities**
- **OODA lens: Develops new repertoires of reusable knowledge, sensors, and actions**



- **Behavior Lens: Integrated test and demonstration of work-in-process**
- **OODA Lens: Deploys Actions into a confrontation with the operational environment**



- **Behavior Lens: Sense-respond-evolve engagement with a dynamic environment**
- **OODA Lens: Orchestrates regeneration/evolution of Orient foundation**



OODA is focused on evolving
Orient's orchestration effectiveness
at outmaneuvering confrontational dynamics.

It is a learning machine preparing for perpetual confrontation.

Bifocal Lens

Aspect	Behavior Lens	OODA Lens
Adaptable Modular Architectures	Composable and reconfigurable designs from evolving variations of reusable assets	Provides reusable repertoire of knowledge, IG&C sensors, and IG&C Actions
Iterative Incremental Development	Incremental loops of building, evaluating, correcting, and improving capabilities	Develops new repertoires of reusable knowledge, sensors, and actions
Attentive Situational Awareness	Active monitoring and evaluation of relevant internal and external environment factors	Looks for known interests and senses anomalous developments
Attentive Decision Making	Systemic linkage of situational awareness to decisive action	Instantiates (initially) and validates (continually) IG&C Actions
Common-Mission Teaming	Engaged collaboration, cooperation, and teaming among all relevant stakeholders	Provides the context foundation of Orientation
Shared-Knowledge Management	Facilitated communication, collaboration, and knowledge curation	Provides the content foundation of Orientation
Continual Integration & Test	Integrated test and demonstration of work-in-process	Deploys Actions into a confrontation with the operational environment
Being Agile	Sense-respond-evolve engagement with a dynamic environment	Orchestrates regeneration/evolution of OODA performance

Some Things I Learned

OODA Exercise Revelations … for me:

- **OODA is focused on evolving Orient's orchestration effectiveness at outmaneuvering confrontational dynamics – a perpetual learning machine.**
- **Seeing Common-Mission Teaming as the context foundation of Orientation helps me understand why and how to tune for that purpose.**
- **Seeing Shared-Knowledge Management as the content foundation of Orientation helps me understand why and how to tune for that purpose.**
- **Seeing Adaptable Modular Architectures as repertoires for reusable knowledge, sensors, and automatic responses helps me tune for that purpose.**
- **Observations needs to know what to look for, and construct/install/evolve sensors for these things of interest.**
- **IG&C automation (responses and sensors) needs perpetual revalidation.**

Richards, C. (2012). Boyd's OODA Loop (It's Not What You Think)

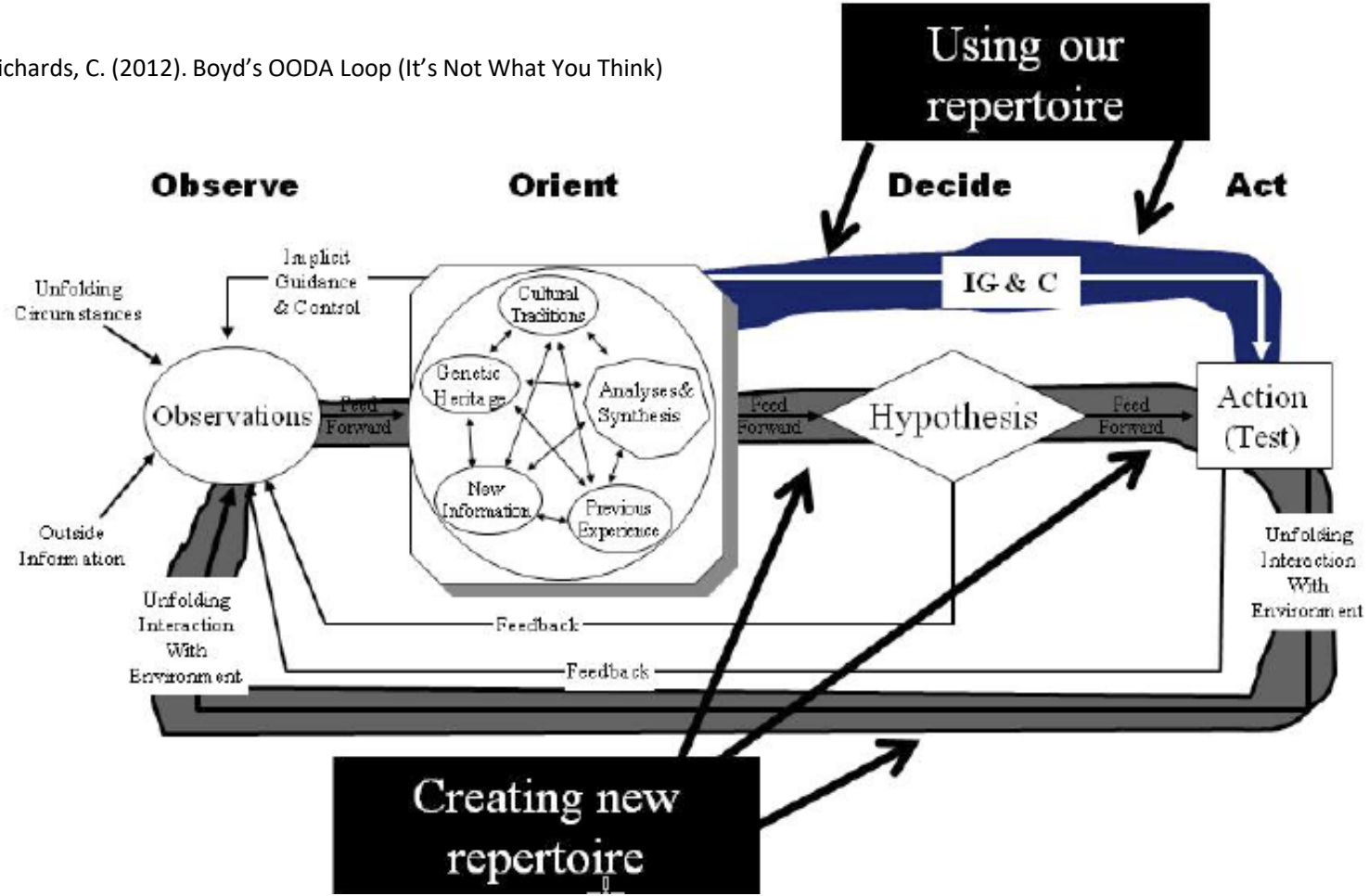


Figure 3. Keep your brain engaged, always.

Everyone Does OODA-Looping

Boyd's OODA Loop is a fundamental reference architecture of how cognitive entities interact with dynamic, uncertain environments.

Take Away:

OODA-looping is necessary, but not sufficient, for being agile.

Purpose and performance matter.

References

Dove, R., Lunney, K., Orosz, M., Yokell, M. (2023). Agile Systems Engineering – Eight Core Aspects
www.researchgate.net/publication/373092973

Richards, C. (2012). Boyd's OODA Loop (It's Not What You Think)
https://www.agileleanhouse.com/lib/lib/Topics/OODALoop/Boyds_OODA_Loop_Its_Not_What_You_Think_I%20(1).pdf

Richards, C. (2020). Boyd's OODA Loop. Necesse 2020, Vol 5, Issue 1, 142-165
https://fhs.brage.unit.no/fhs-xmlui/bitstream/handle/11250/2683228/Boyds%20OODA%20Loop%20Necesse%20vol%205%20nr%201.pdf

Osinga, F. (2005). Science, Strategy and War – The Strategic Theory of John Boyd.
http://www.projectwhitehorse.com/pdfs/ScienceStrategyWar_Osinga.pdf

Youvan, D. C. (2024). Navigating the OODA Loop: Multidisciplinary Perspectives and Strategies.
https://www.researchgate.net/publication/377531529

Full Series

Agile 302 webinar slides: Agile SE Strategies – Systems Thinking in Practice
Agile 301 webinar slides: Agile SE Strategies – Purpose, & Values
Agile 206 webinar slides: Agile SE … It's Not Your Father's Oldsmobile
Agile 205 webinar slides: Agile SE in the Future of Systems Engineering
Agile 204 webinar slides: Agile SE Life Cycle Model
Agile 203 webinar slides: Agile SE Agility as a System
Agile 202 webinar slides: Agile SE Continuous Integration
Agile 201 webinar slides: Agile SE Problem Space Requirements
Agile 106 webinar slides: Agile System/Process Risk Management & Mitigation
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)

Original webinars with recordings at:
INCOSE Professional Development Portal

Webinar ID: Webinar 184 Dove 17 September 2025 Agile SE Strategies – Systems Thinking in Practice
Webinar ID: Webinar 176 Dove 02 October 2024 Agile SE Strategies 301
Webinar ID: Webinar 167 Dove 20 September 2023 Agile SE Processes 206
Webinar ID: Webinar 161 Dove 21 September 2022 Agile SE Processes 205
Webinar ID: Webinar 153 Dove 15 September 2021 Agile SE Processes 204
Webinar ID: Webinar 143 Dove 16 September 2020 Agile SE Processes 203
Webinar ID: Webinar 131 Dove 18 September 2019 Agile SE Processes 202
Webinar ID: Webinar 116 Dove 19 September 2018 Agile SE Processes 201
Webinar ID: Webinar 104 Dove 20 September 2017 Agile Systems & Processes 106
Webinar ID: Webinar 092 Dove 28 September 2016 Agile Systems & Processes 105
Webinar ID: Webinar 082 Dove 16 September 2015 Agile Systems & Processes 104
Webinar ID: Webinar 067 Dove 17 September 2014 Agile Systems & Processes 103
Webinar ID: Webinar 056 Dove 18 September 2013 Agile Systems & Processes 102
Webinar ID: Webinar 045 Dove 19 September 2012 Agile Systems & Processes 101

Quick Reminders

- All the previous webinars are now located in the Professional Development Portal (PDP).
- Attending a Webinar does count as 1 PDU credit towards your SEP renewal

Thank you to our Webinar Sponsors!

Interested in being a Sponsor of the INCOSE Webinar Series? Please contact us at sponsorship@incose.net

INCOSE.org