Measure and Match

Mitigating “Mismatch” Risk

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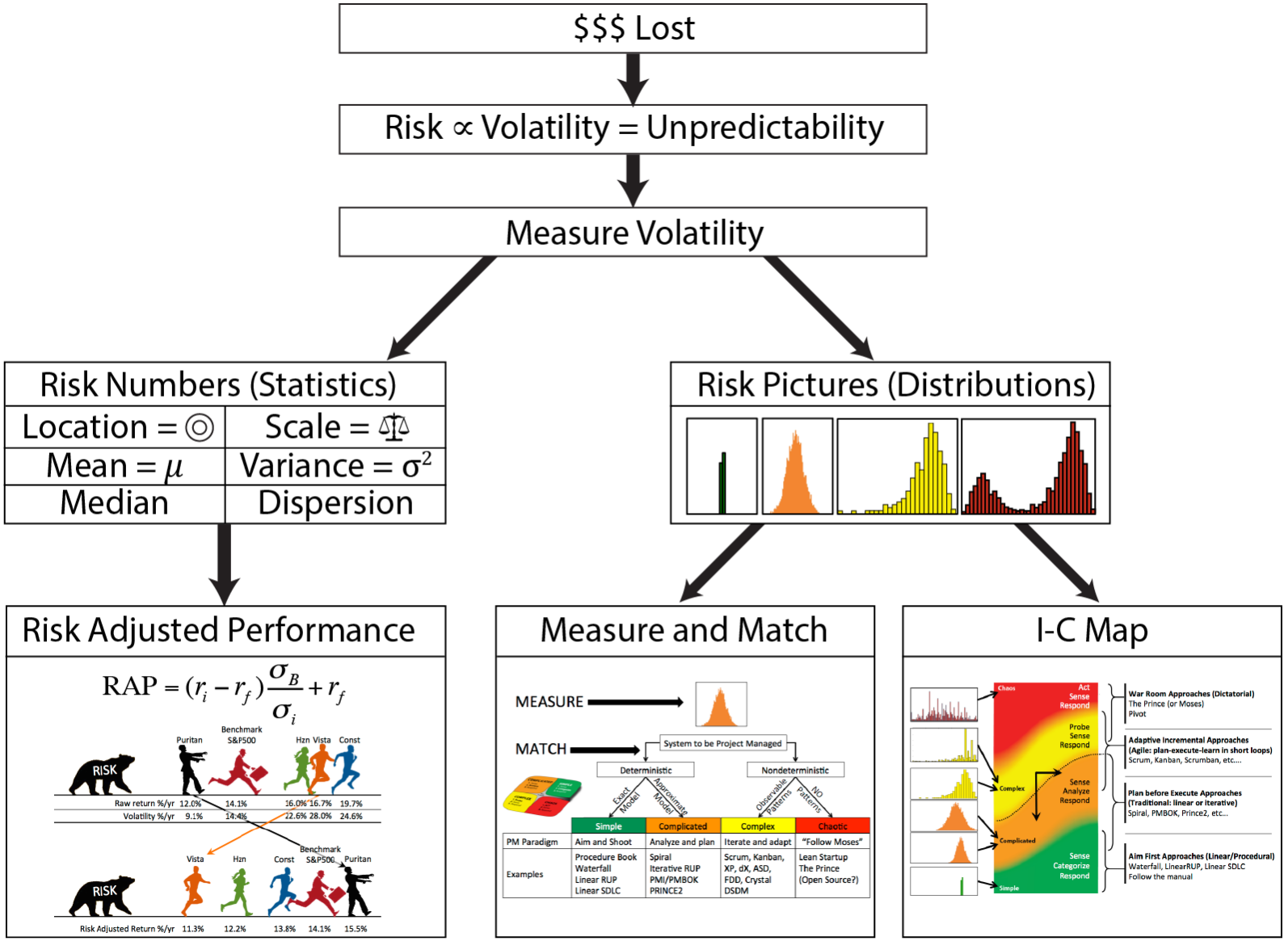
Are Projects Like Investment Portfolios?

Do the Wall St. Shuffle…

- Are projects like investments?
  - Investment funds or SPDRs
  - Individual Stocks
  - Bonds
  - Options
- Turns out many are!
- Implications
  - Risk Management Tools
  - Portfolio Management Tools
  - Learn from Wall Street's mistakes!!!

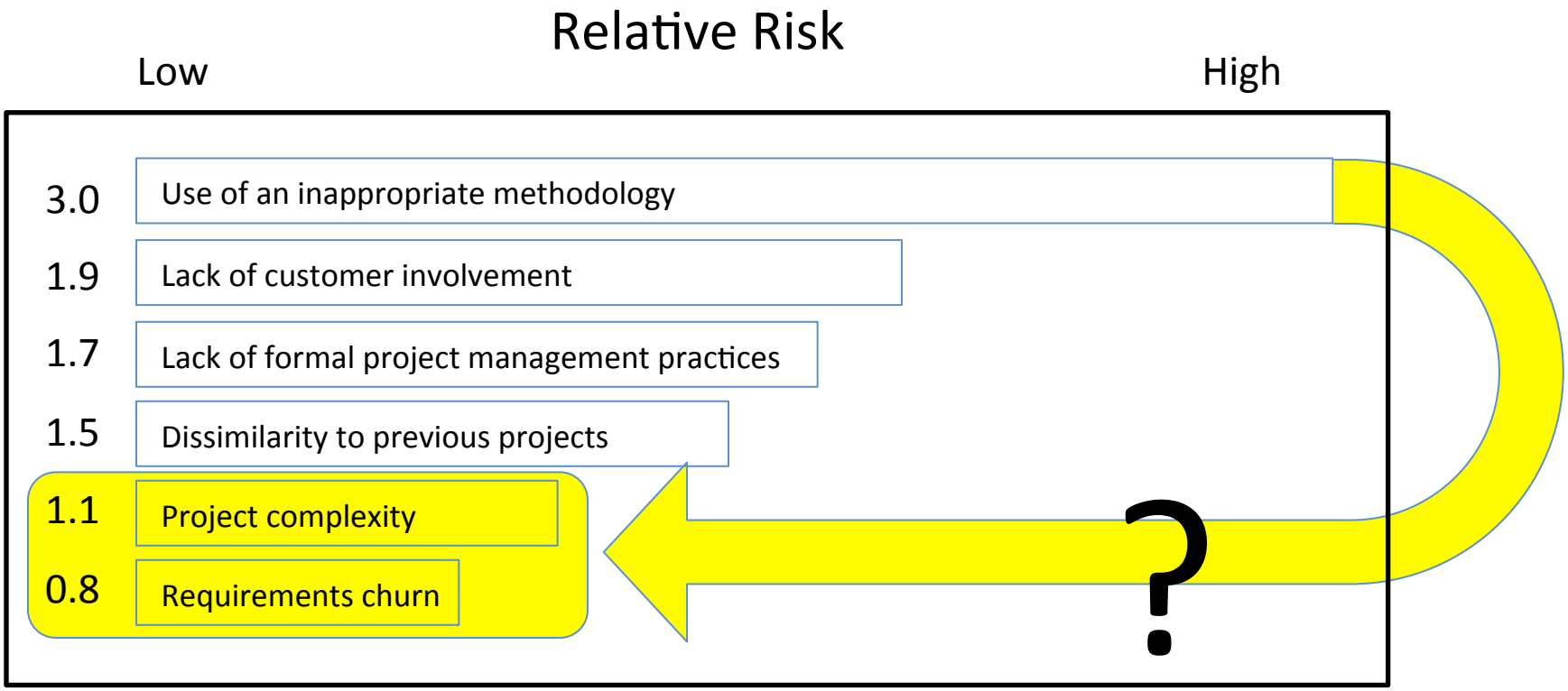
Project Portfolio Tool Suite

The Big Picture



The Curious Case of Relative Risks

To Every Requirement - Churn, Churn, Churn…

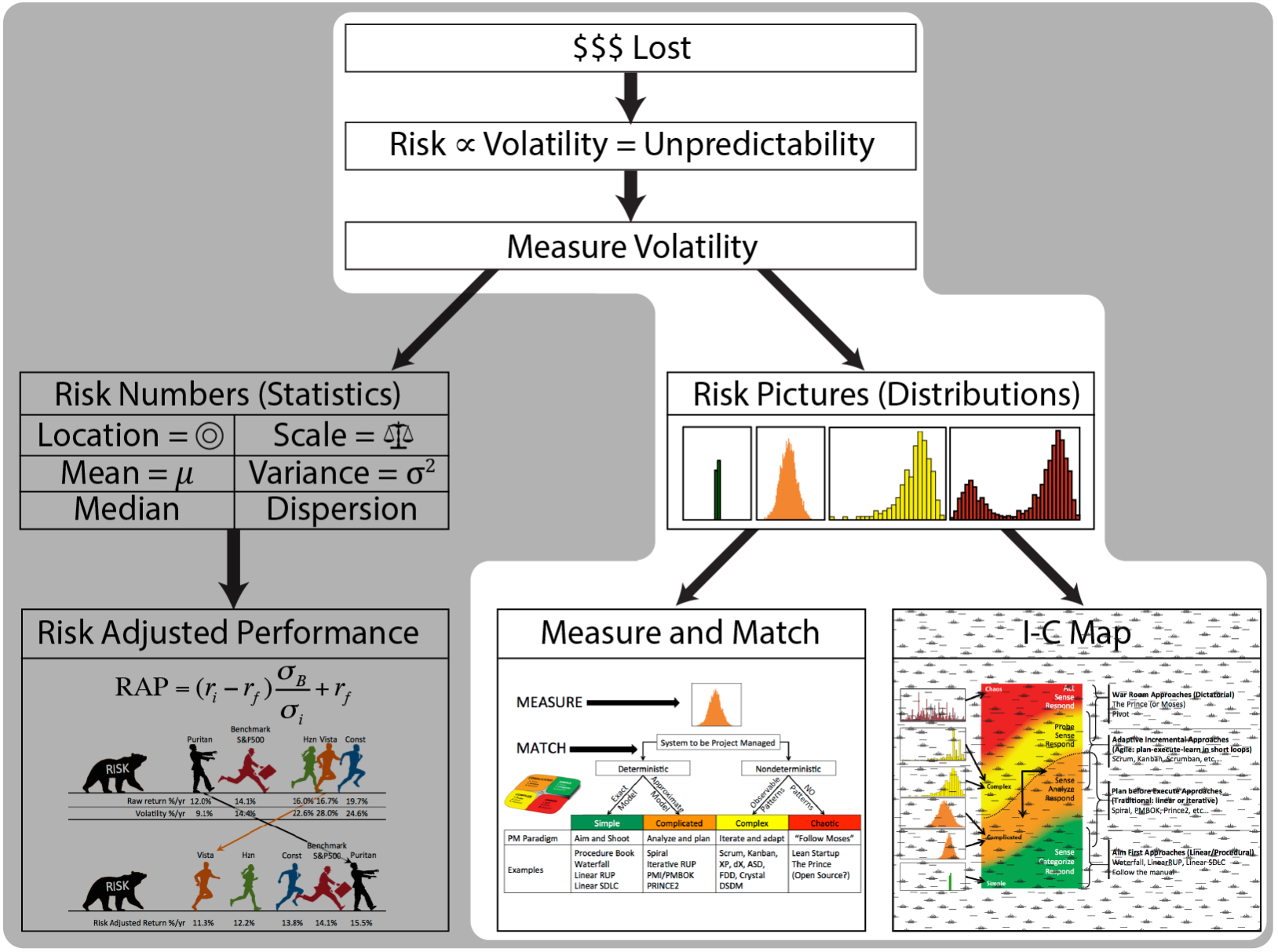


Tiwana and Keil (2004). "The One-Minute Risk Assessment Tool". *Communications of the ACM,* 47(11) 73-77.

Management approach mismatch ➡ Compromised risk management

Today: Measure And Match

(With A Touch of the I-C Map)



Outline

- Why is Risk $\propto$ Volatility?
- Families of Risk *a la* the Cynefin Framework
- Project Frameworks *a la* the Cynefin Framework
- Measure and Match: The Recipe

Optional, if we have time

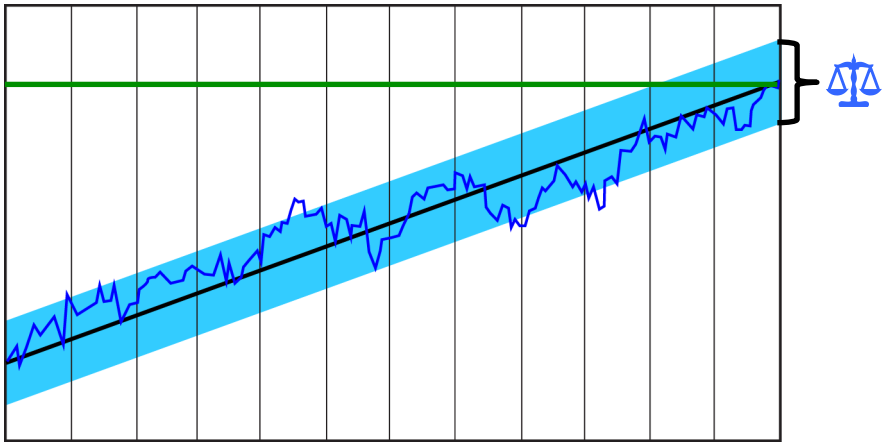
- Portfolio Perspectives
- I-C Map

Why is Risk ∝ Volatility

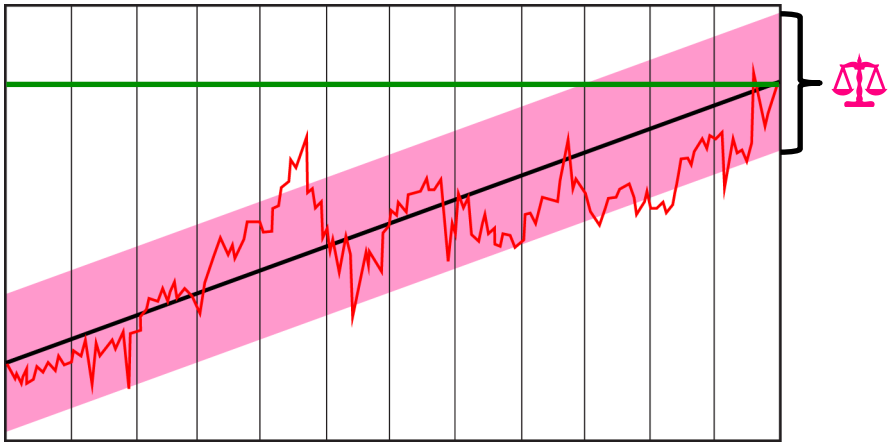
Stock Example

Single Stocks, Price v. Time

Low Volatility



High Volatility



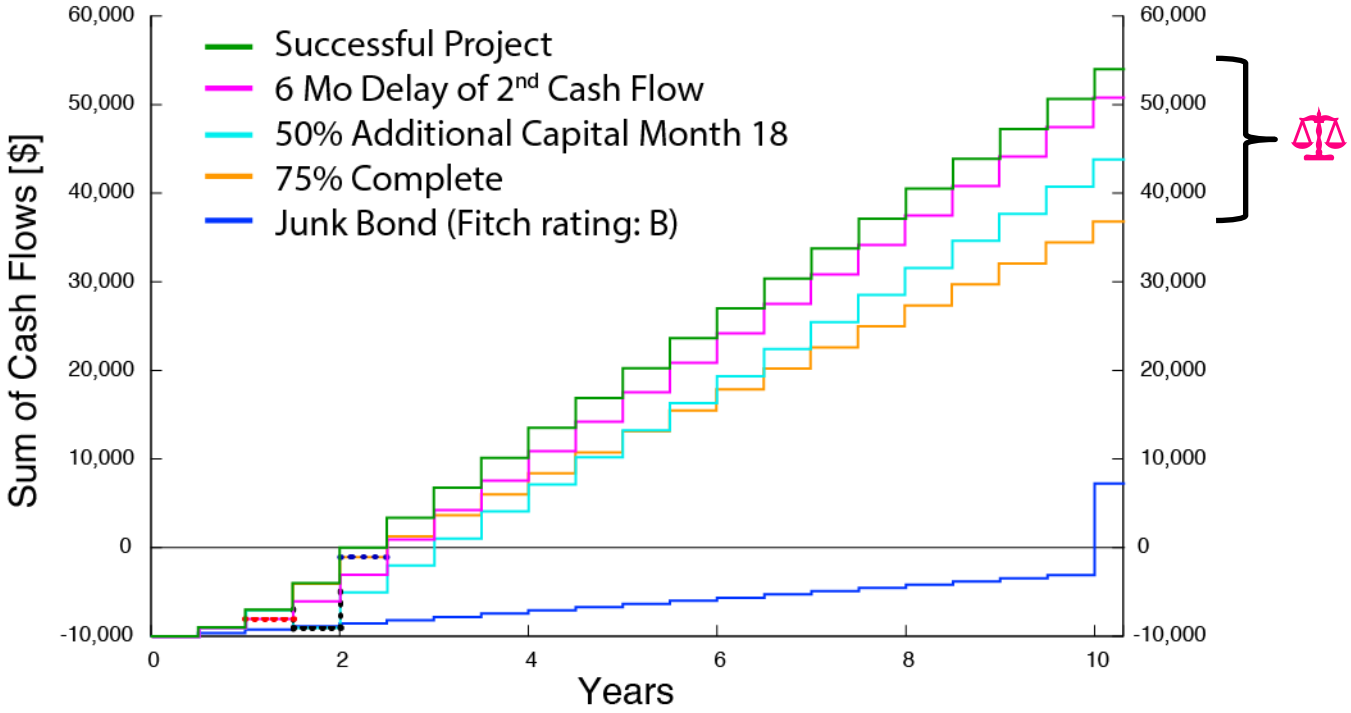
Say you need to sell on Feb 29th

- ⚖ Low volatility = more certain of best and worst, but less exciting
- ⚖ High volatility = less certain, but possibility of bigger gain (or loss!)

Why is Risk ∝ Volatility

Project Example

Two Yr Project, 10 Yr ROI

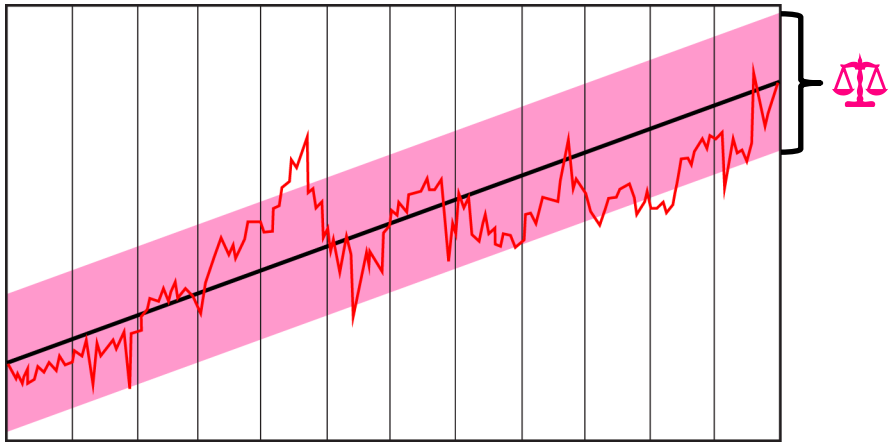


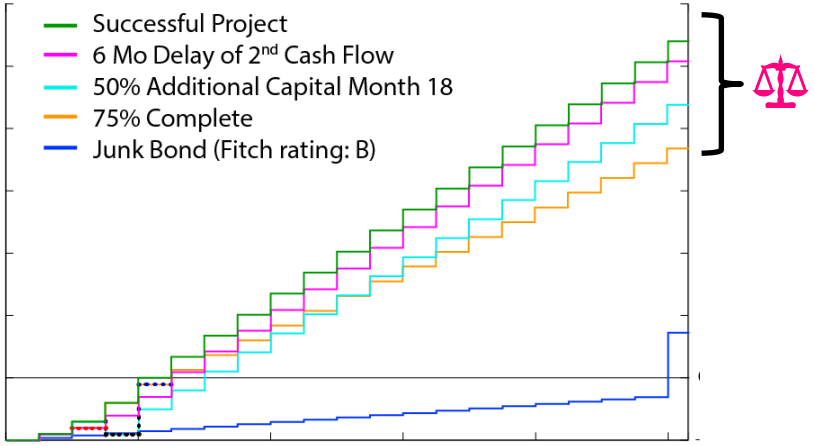
Notes: No inflation, no risk, benchmark data obtained on 2 May 2013

Various Challenges Introduce Unpredictability

Why is Risk ∝ Volatility = Unpredictability

Are They Really Different?





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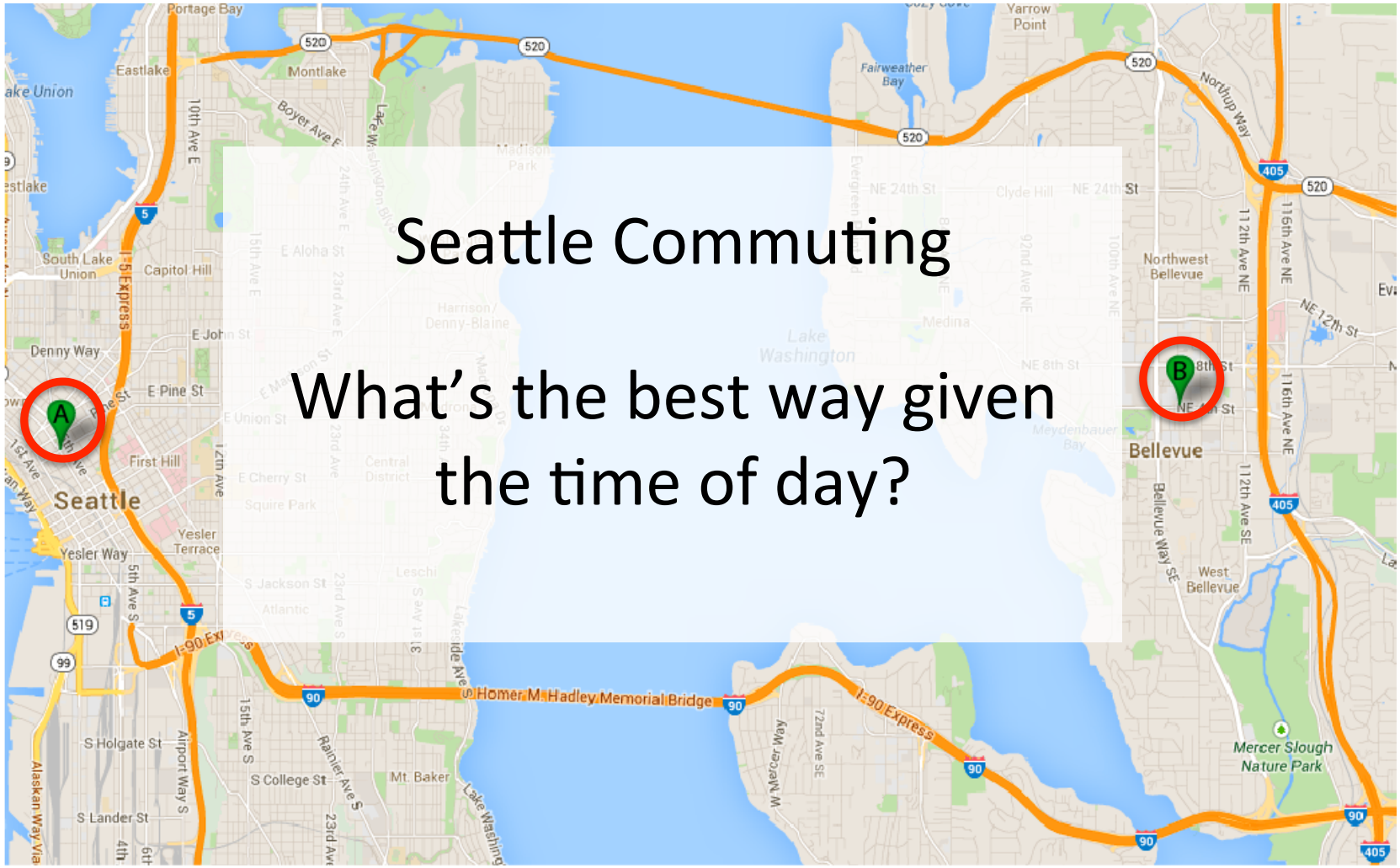
Cynefin & The Seattle Commute

Our Unpaid Taxes At Work!

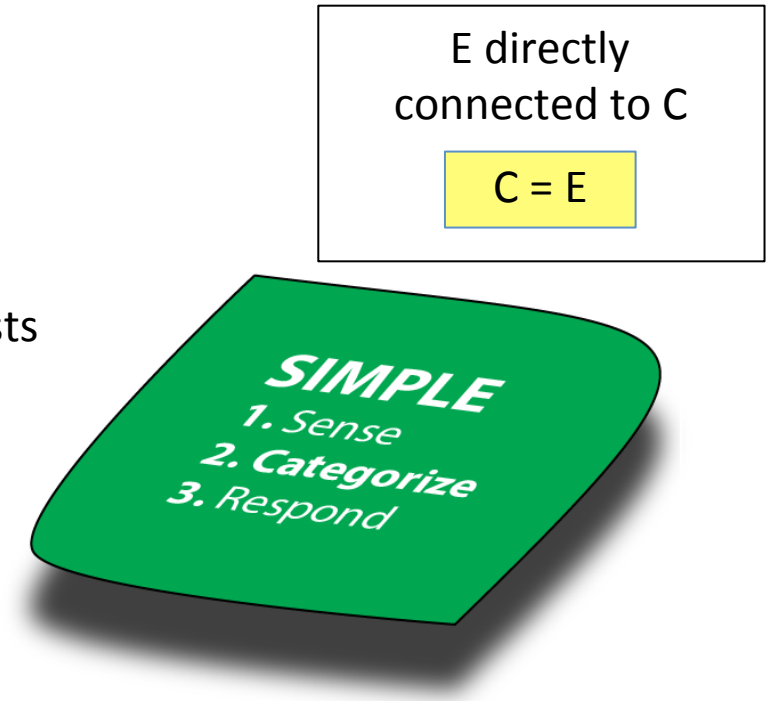


Cynefin In Terms of Cause And Effect

The 6:00 am Commute Involves a SIMPLE Decision

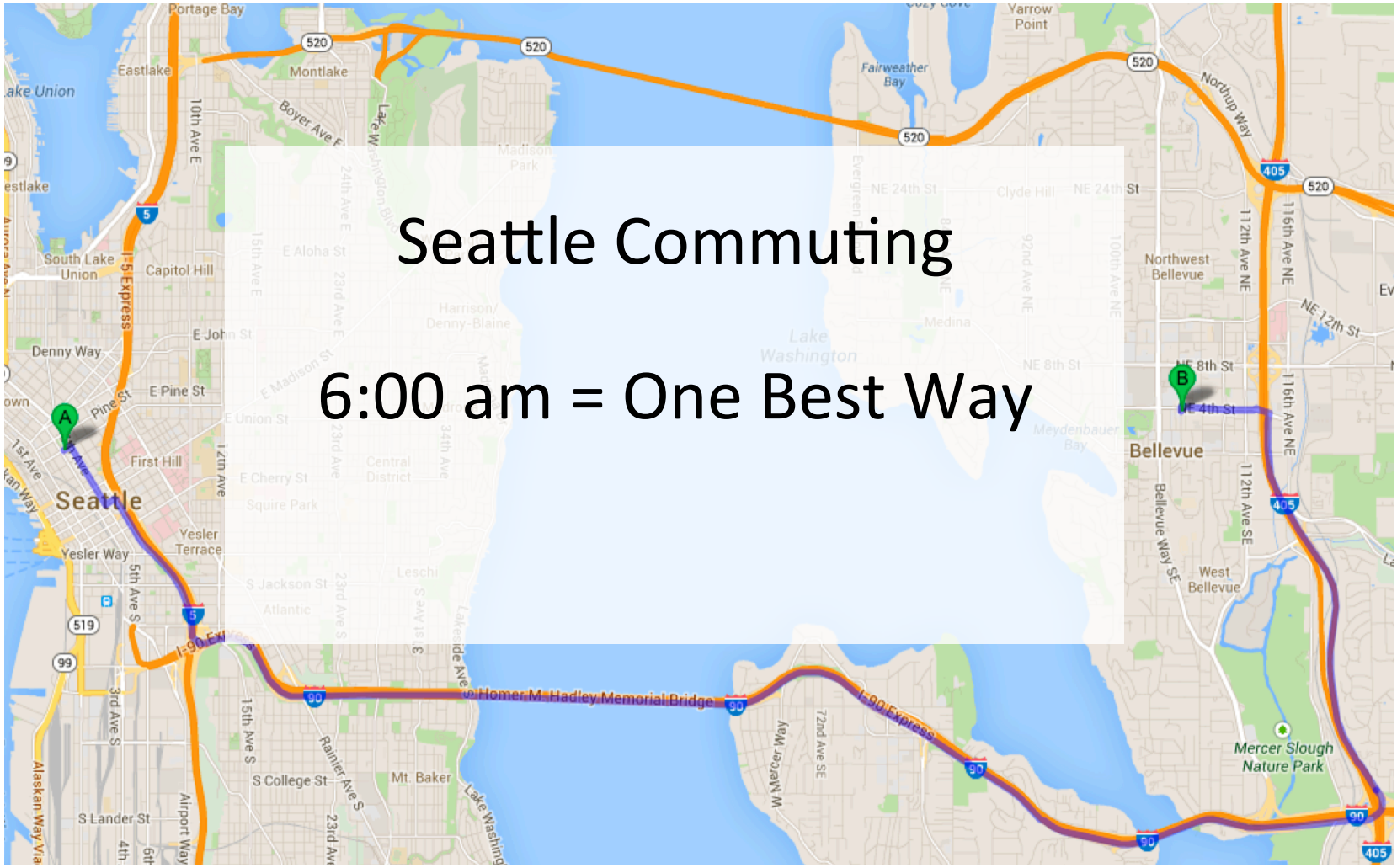
The "Cynefin Framework"

Pronounced "Cu-*nev*-in"
Welsh: of or from multiple origins and pasts



Cynefin & The Seattle Commute

Commuting Is Easy, Just Don't Sleep!



Cynefin In Terms of Cause And Effect

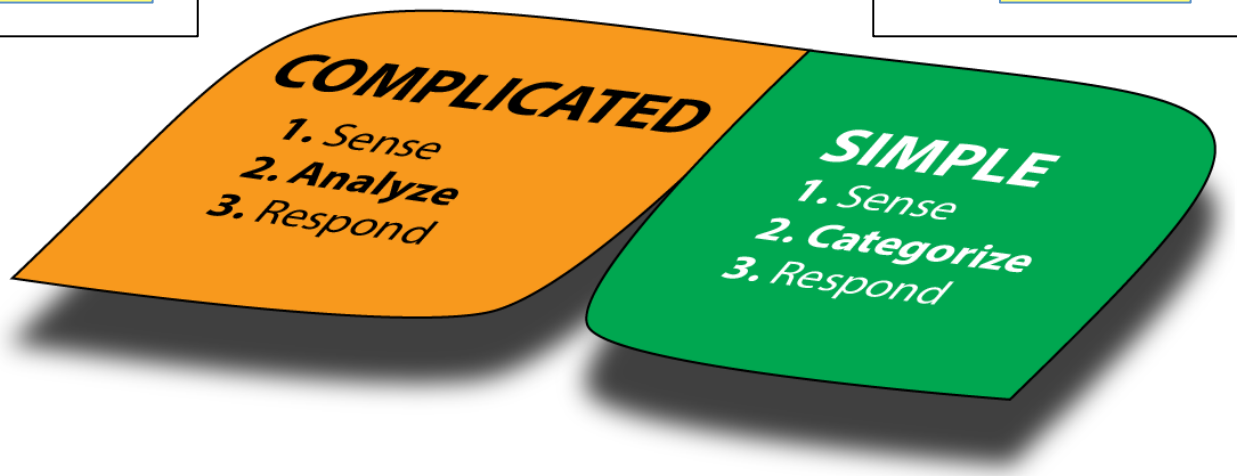
The 7:00 am Commute Involves a COMPLICATED Decision

E indirectly connected to C

C - - - - - - - - - -> E

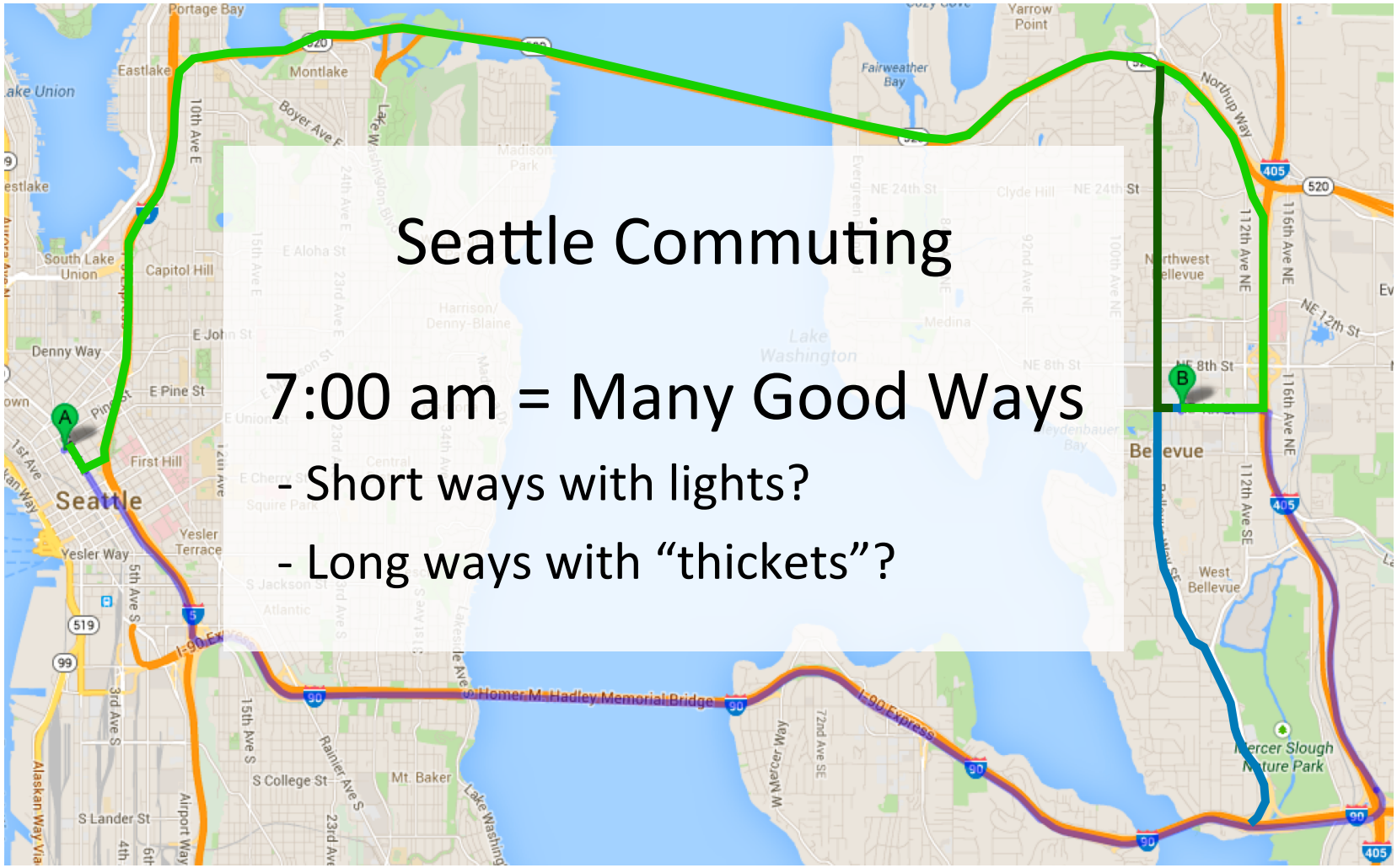
E directly connected to C

C = E



Cynefin In Terms of Cause And Effect

"Oh You Take The Low Road and I'll Take The High Road…"



Cynefin In Terms of Cause And Effect

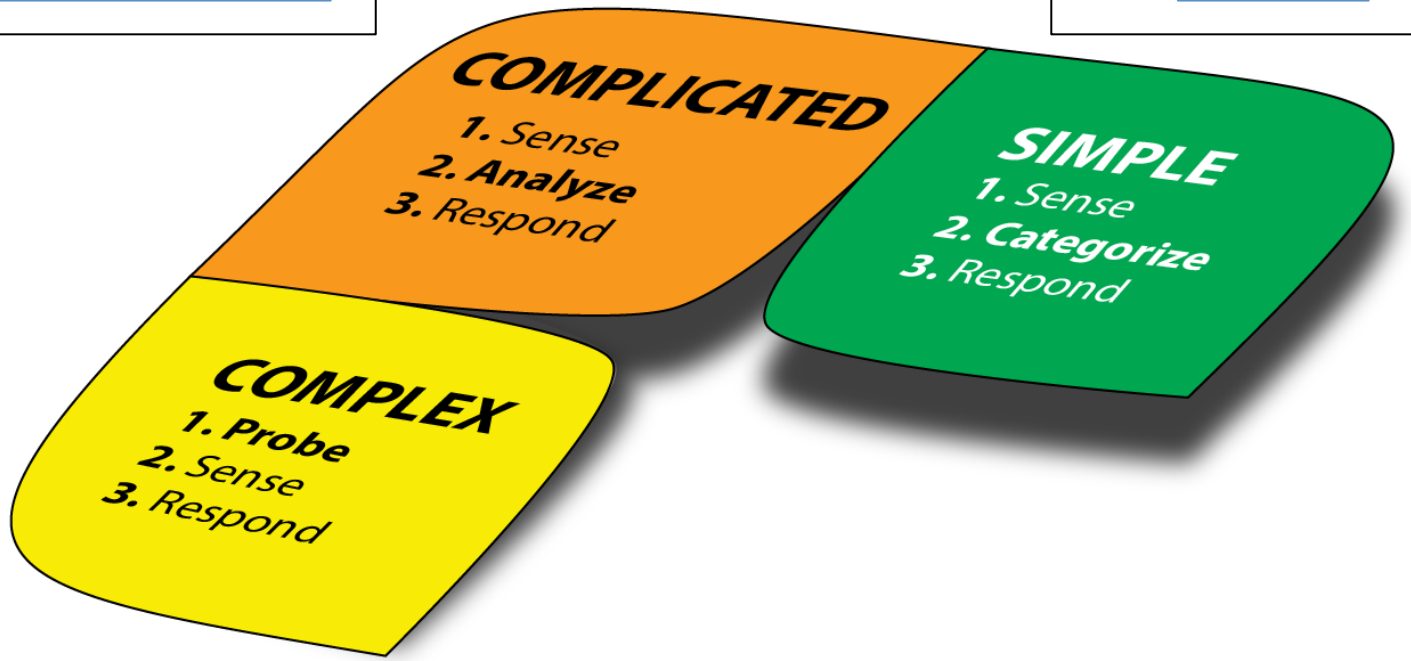
The 8:00 am Commute Involves a COMPLICATED Decision

E indirectly connected to C

C - - - - - - - - -> E

E directly connected to C

C = E



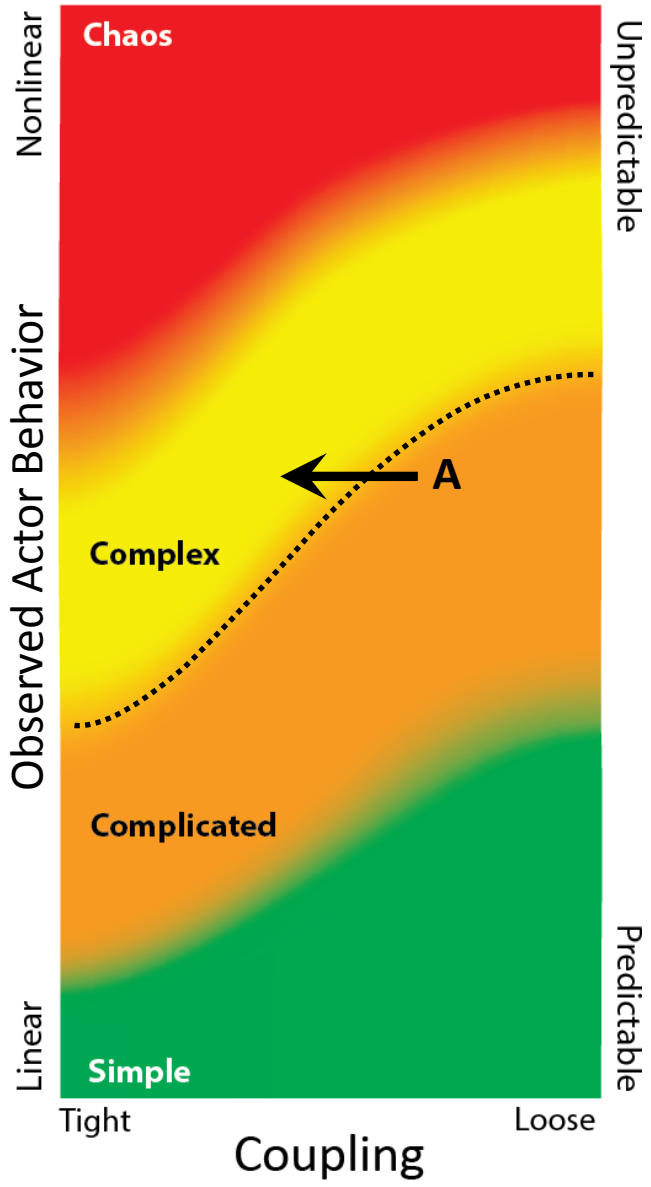
E intertwined with C

Cynefin In Terms of Cause And Effect

Pattern: Unless There's A Blinding Sun, I90 Usually Faster

Complexity And Emergent Phenomena

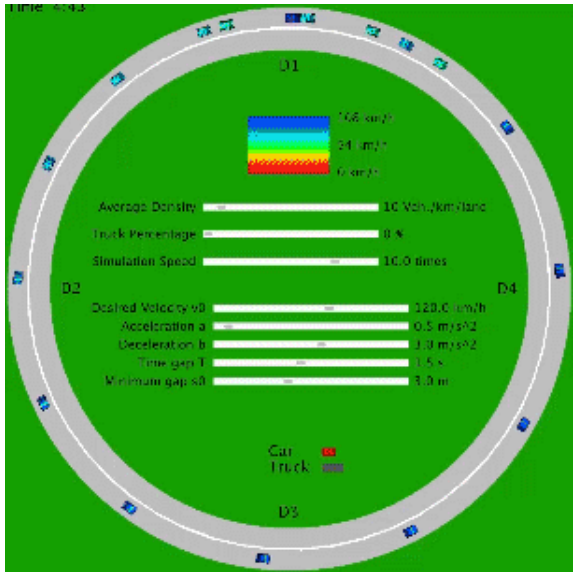
Passing Into Complexity Via An Invisible Critical Point



Example phantom traffic jam on ring road

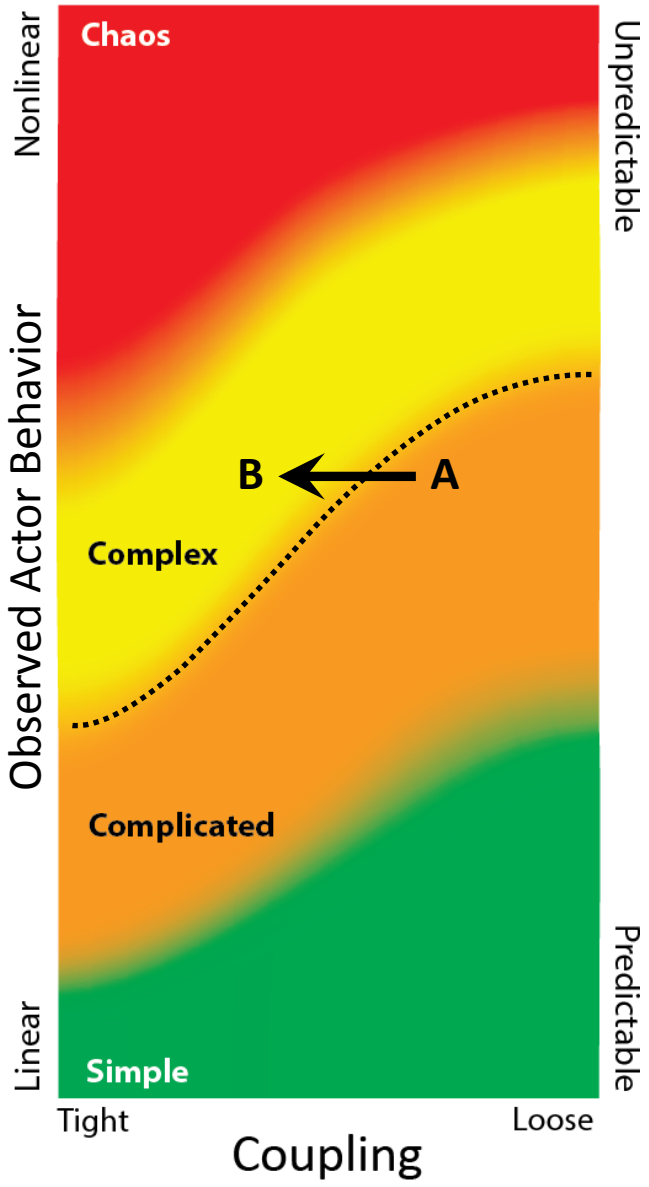
← +1 car

A - Heavy but moving, random bunching dissolves away



Complexity And Emergent Phenomena

Passing Into Complexity Via An Invisible Critical Point



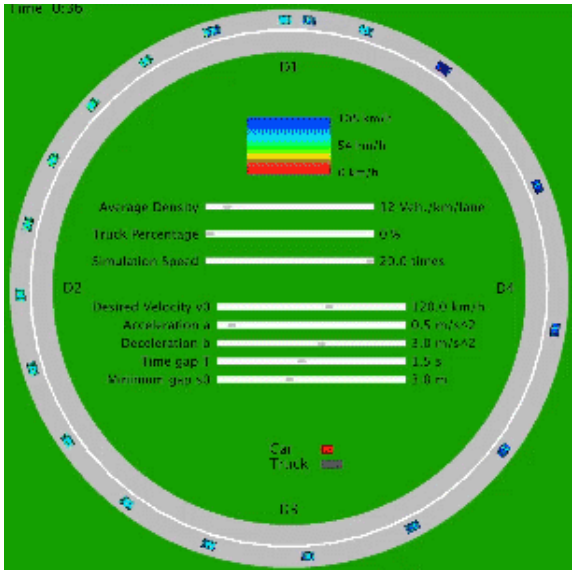
Example phantom traffic jam on ring road

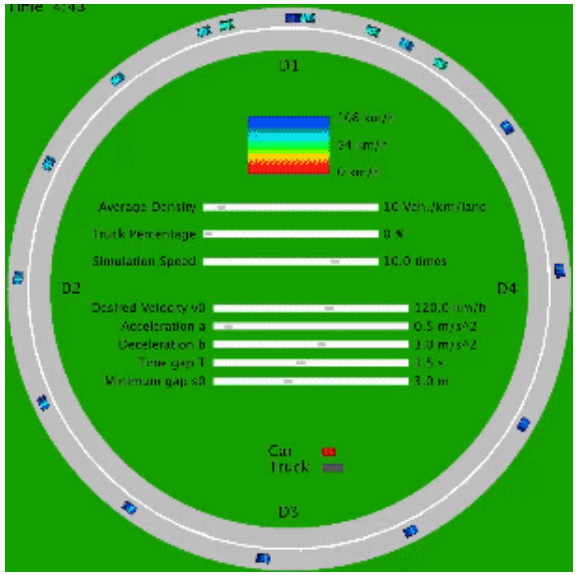
B - Heavy but moving, random bunching becomes traffic jam

←

+1 car

A - Heavy but moving, random bunching dissolves away





Cynefin In Terms of Cause And Effect

The 8:30 am Commute Has No Right Answer

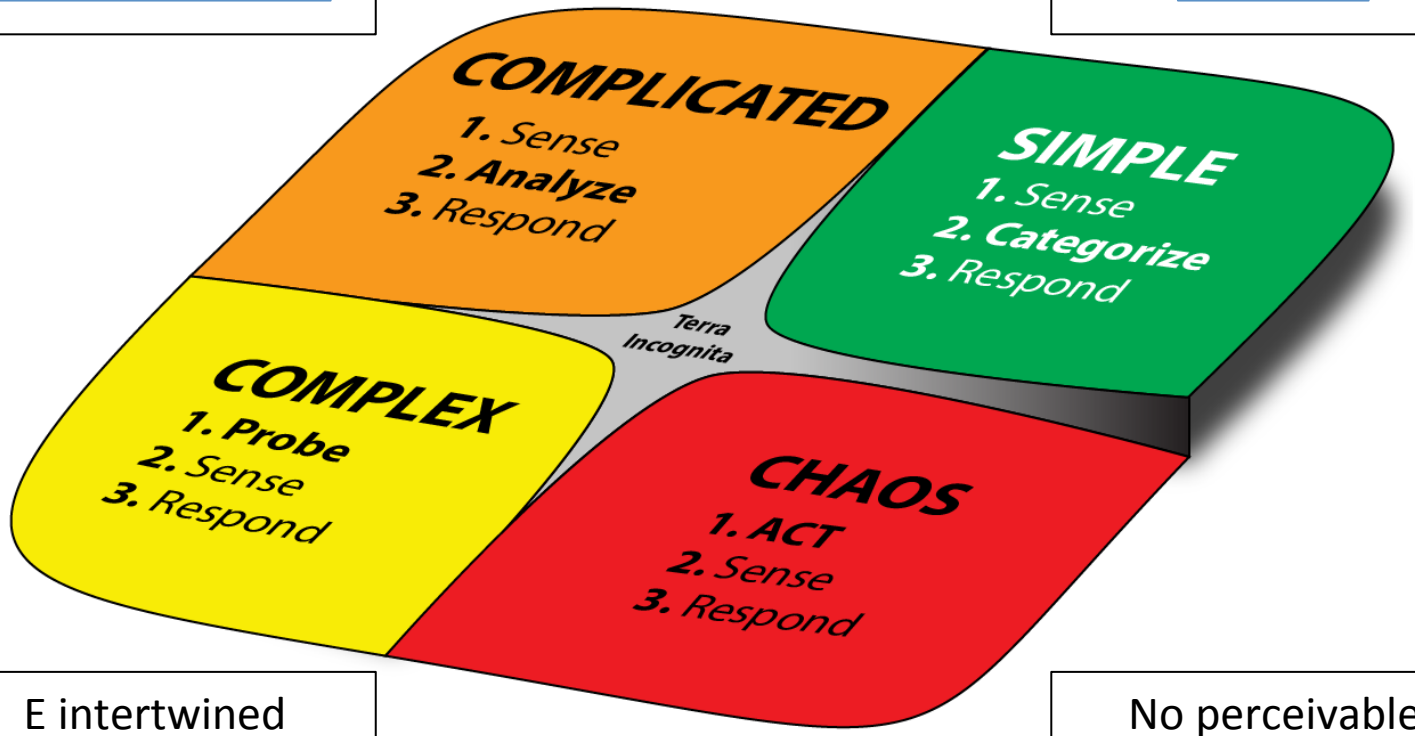
E indirectly connected to C

C - - - - - - - - -> E

Deterministic

E directly connected to C

C = E



E intertwined with C

C E

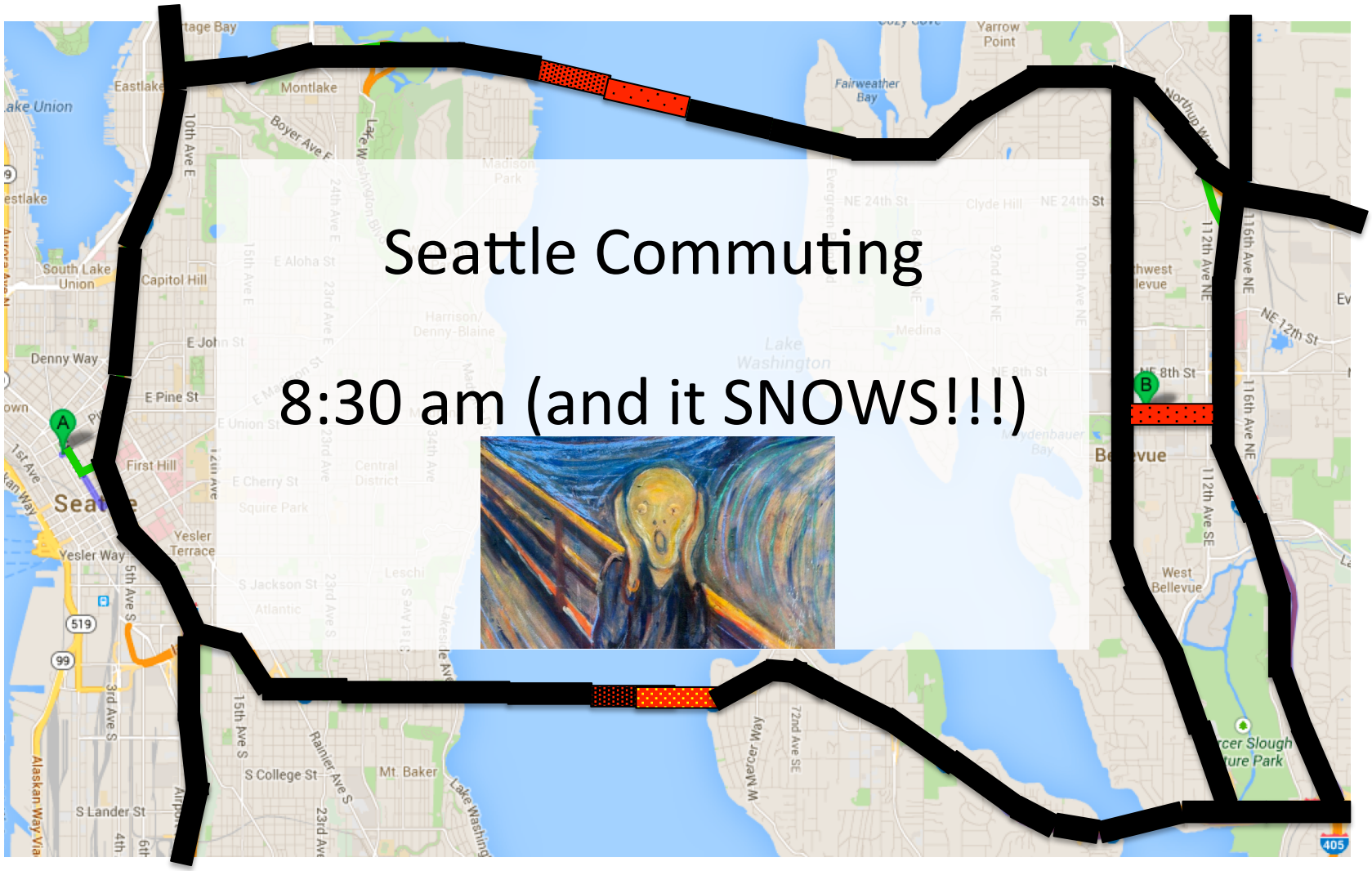
Nondeterministic

No perceivable relationship

C ≠ E

Cynefin In Terms of Cause And Effect

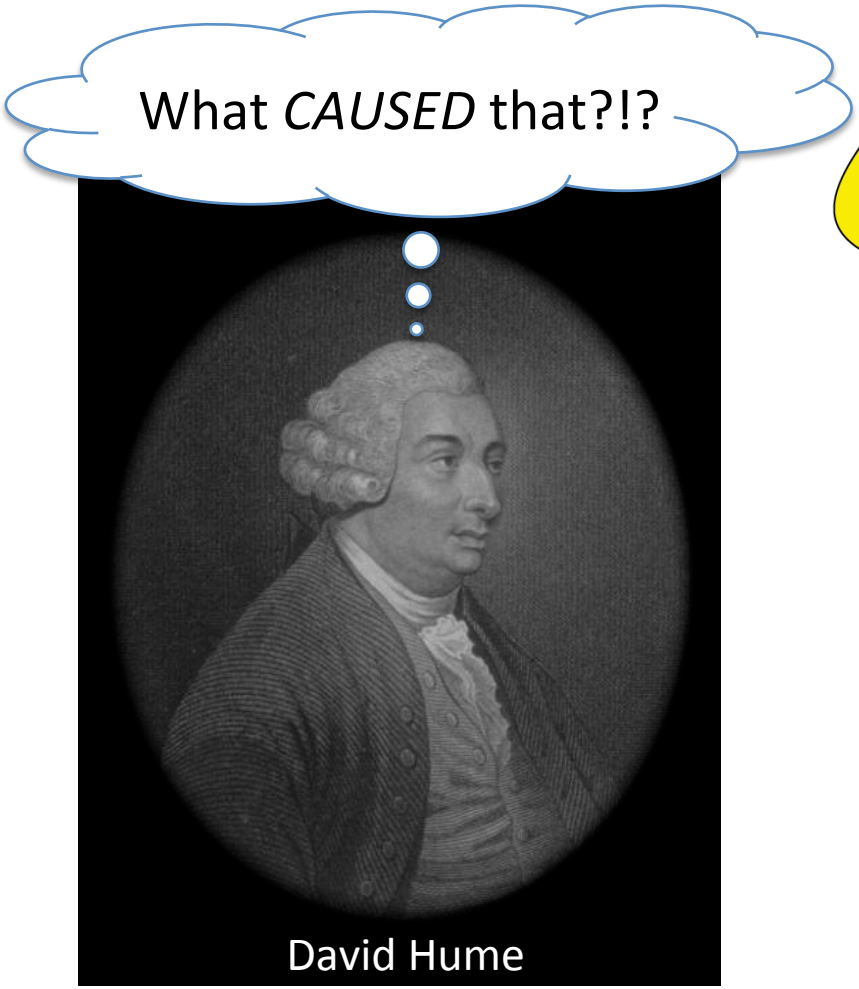
Damn, This Traffic Jam; It Hurt's My Soul To Go This Slow…

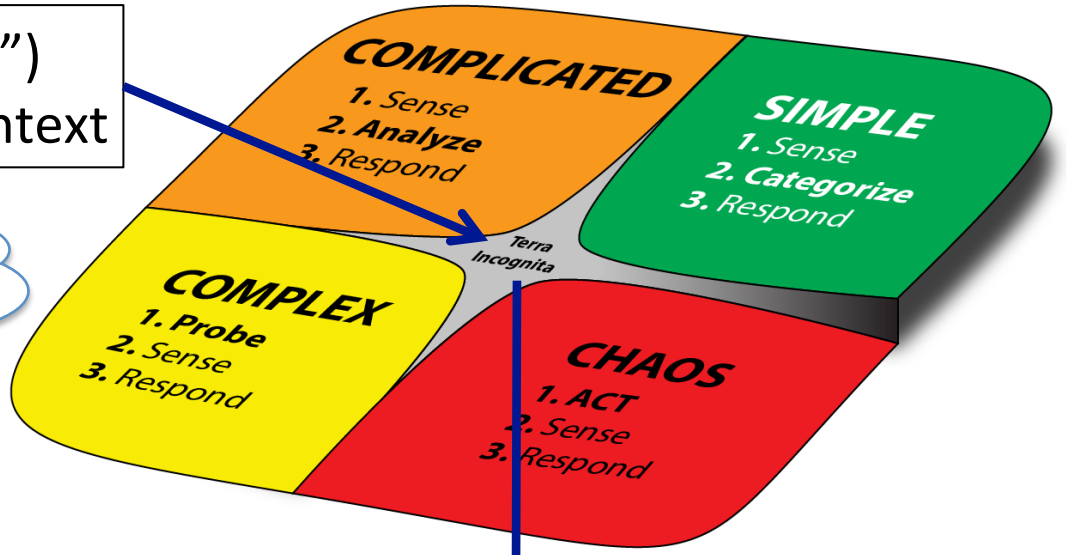


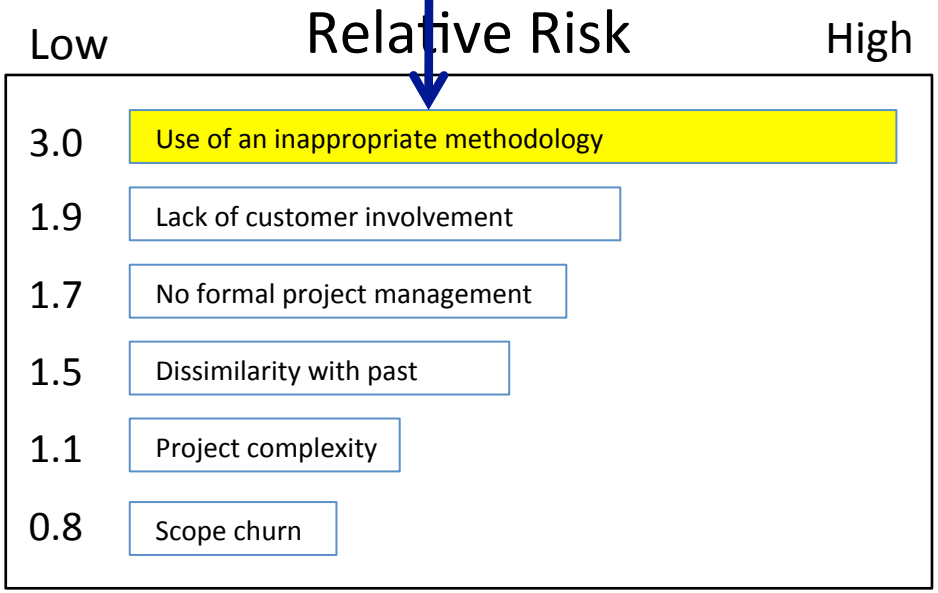
Mis-Match Risk

Risk-Aware Management Framework

Terra Incognita ("Unknown Land")
Not knowing one's operating context







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Optional, if we have time

- Portfolio Perspectives
- I-C Map

Project Approach Selection

How Do We *TALK ABOUT* Project Management Frameworks?

John's Soap Box

The Terminology Tar Pit

- Has "Agile" joined the Meaningless Word Club?
  - Architecture
  - Scrum
  - SOA
  - Big Data
- Embrace the "Saint-Exupéry Test"

  Perfection has not been achieved when nothing more can be added, but when nothing more can be removed

Project Approach Selection

How Do We Classify Project Management Frameworks?

- Anatomy of Project Management Framework
  - Work Description - "What does done look like?"
  - Activity Model - How people collaborate to get something done
    - Roles: who does what
    - Orchestration: what happens, when
  - Practices: how activities are done (& with what tools)

Project Approach Selection

Agile Practices (Adapted from Greg Smith)

Preconditions
1.1 Project Portal
1.2 Scrum Master Checklist
1.3 Elevator Statement
1.4 Focus Matrix
1.5 Project Charter

Value Description/Analysis
2.1 Elaboration Meetings
2.2 Features/Epics
2.3 User Stories
2.4 Product Backlog
2.5 Project Framework
2.6 SWAG Estimates

Envisioning/Meta Concerns
3.1 Architectural Diagrams
3.2 Code Design Documents
3.3 Risk List
3.4 Staffing Plan

Release Planning
4.1 Release Planning Meeting/Release Plan
4.2 Ideal Day Estimation
4.3 Planning Poker
4.4 Story Point Estimation
4.5 Requirements Prioritization
4.6 Requirements Modeling
4.7 Interaction Flows
4.8 Wireframes for Entire Project
4.9 UI Designs for Next Sprint
4.10 User Research Plan
4.11 Test Strategy
4.12 Architectural Spikes/ Spike Solutions
4.13 Gold Standard Stories

Sprint Planning
5.1 Story Design and JAD Sessions
5.2 Story Acceptance Criteria
5.3 Definition of "Complete" by User Story
5.4 Task Identification
5.5 Task Estimates
5.6 Burn Down Reports
5.7 Task Dependencies
5.8 Team Availability
5.9 Build Schedule

Development
6.1 Unit Tests
6.2 Functional Test Cases
6.3 Test Driven Development (TDD)
6.4 Pair Programming
6.5 Daily Standup Meeting
6.6 Refactoring
6.7 Collective Code Ownership
6.8 Daily Builds/ Automated Builds
6.9 Continuous Integration
6.10 Code Reviews
6.11 Deferred Bug Logging
6.12 Issue Tracking/ Bug Tracking
6.13 Smoke Testing
6.14 Integration Testing
6.15 Exploratory Testing
6.16 Project Demo
6.17 Retrospective

Team Models
7.1 Small Team
7.2 Cross-Functional Team
7.3 Self-Organizing Team
7.4 Co-location Seating/ Common Workspace
7.5 On-site Business Owner
7.6 Scrum Master
7.7 Sustainable Pace
7.8 Scrum of Scrums

Pick one from each = 1,909,440 Combinations!

Project Approach Selection

The Academics Are Not Helping

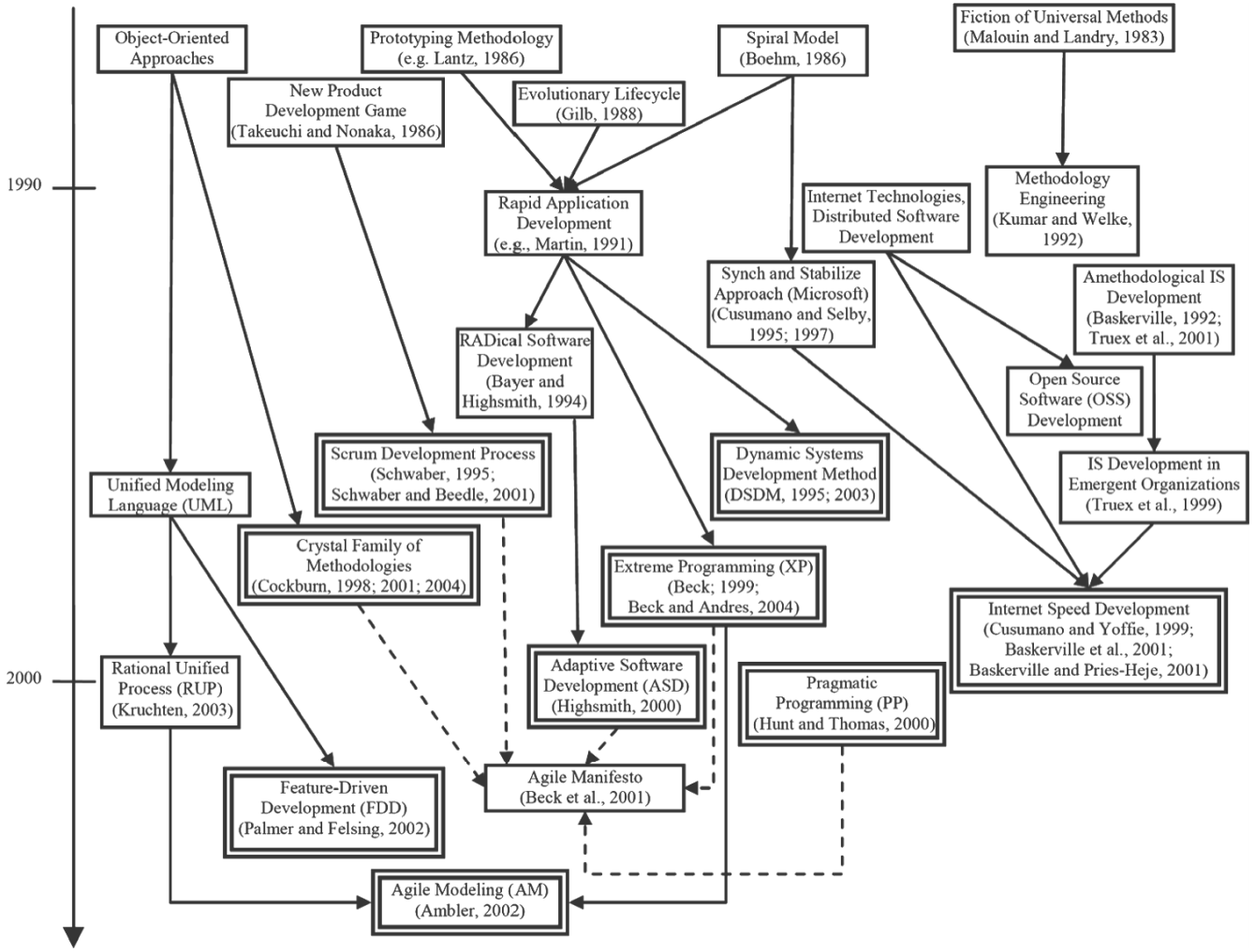


Fig. 2. The evolution map of agile methodologies—adapted from Abrahamsson et al. [2003].

R. Ramsin and R. F. Paige (2008). Process-Centered Review of Object Oriented Software Development Methodologies, *ACM Computing Surveys*, **40**(1), Article 3.

Project Approach Selection

How Do We Classify Project Management Frameworks?

A Proposed Saint-Exupéry Test for Requirements

Adequate Estimation Accuracy

- "Adequate" defined by business context
- Estimate Expiration Date > Work Completion Date

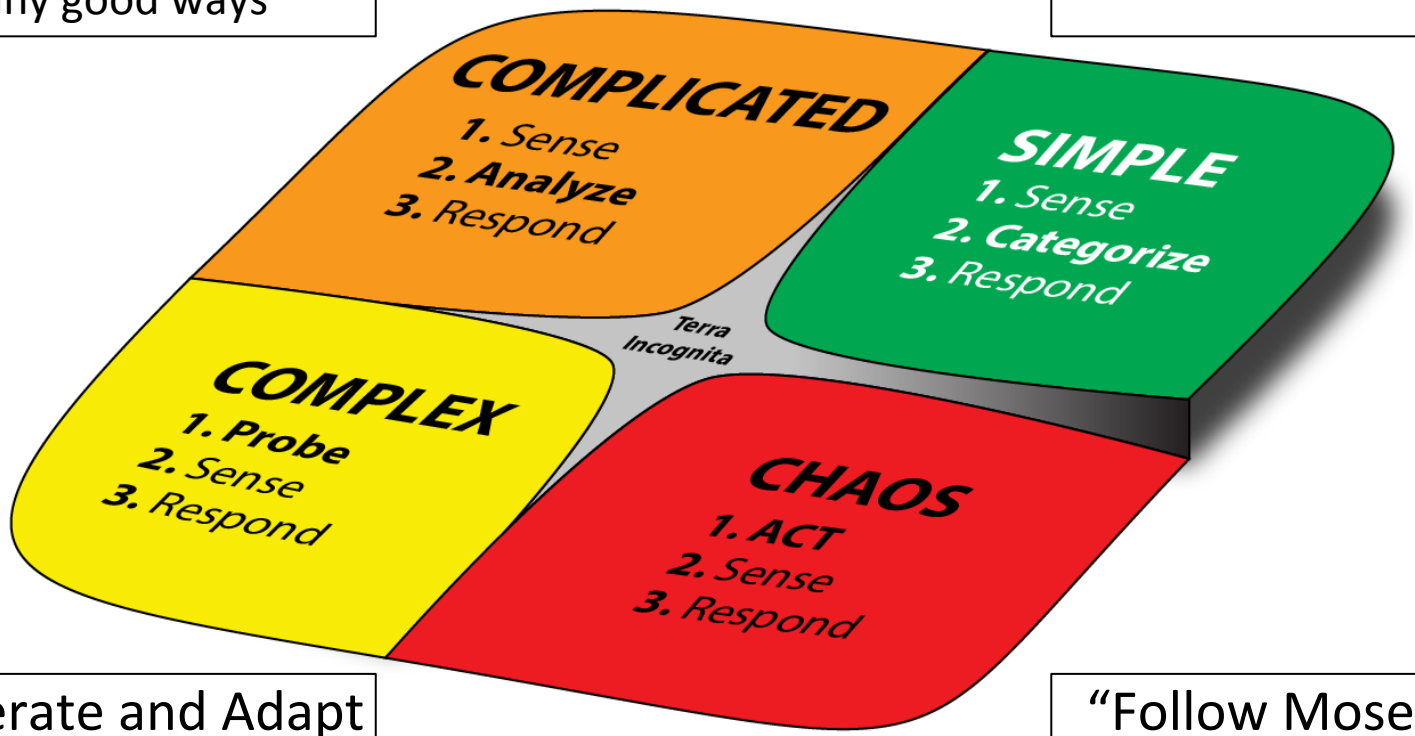
Perhaps this will fly?

Cynefin Action Prototypes

Risk-Aware Management Framework

Plan and Shoot	Aim then Shoot
Analyze before action to identify one of many good ways	Categorize to choose the one best way

Deterministic

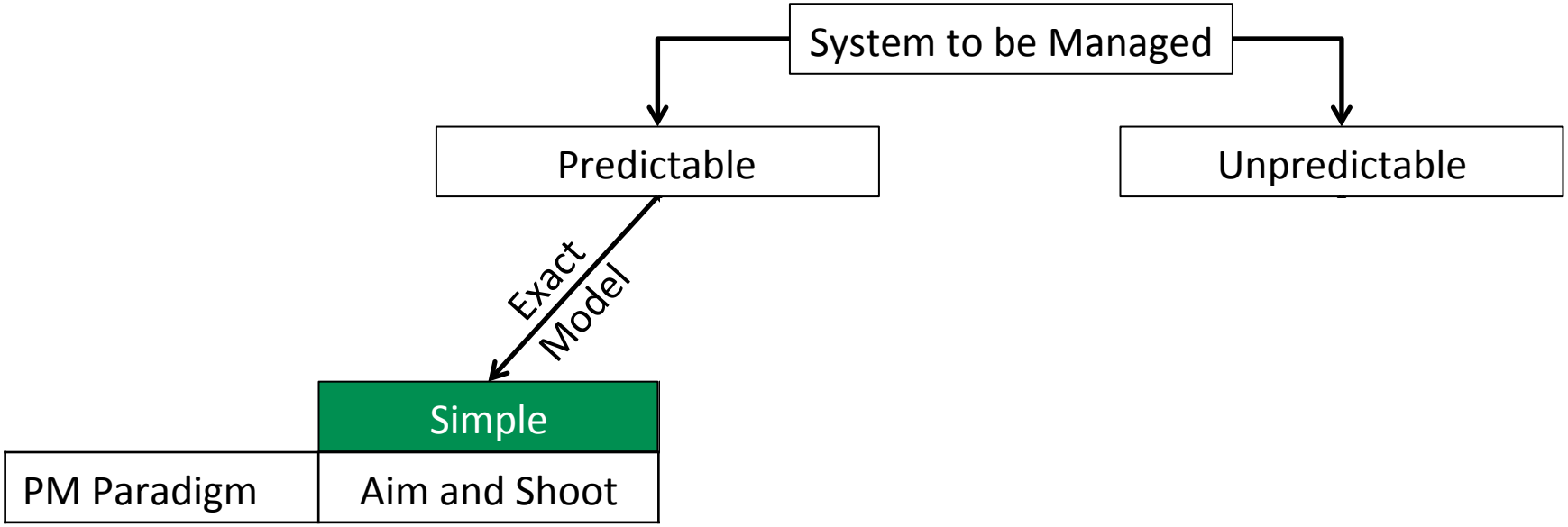


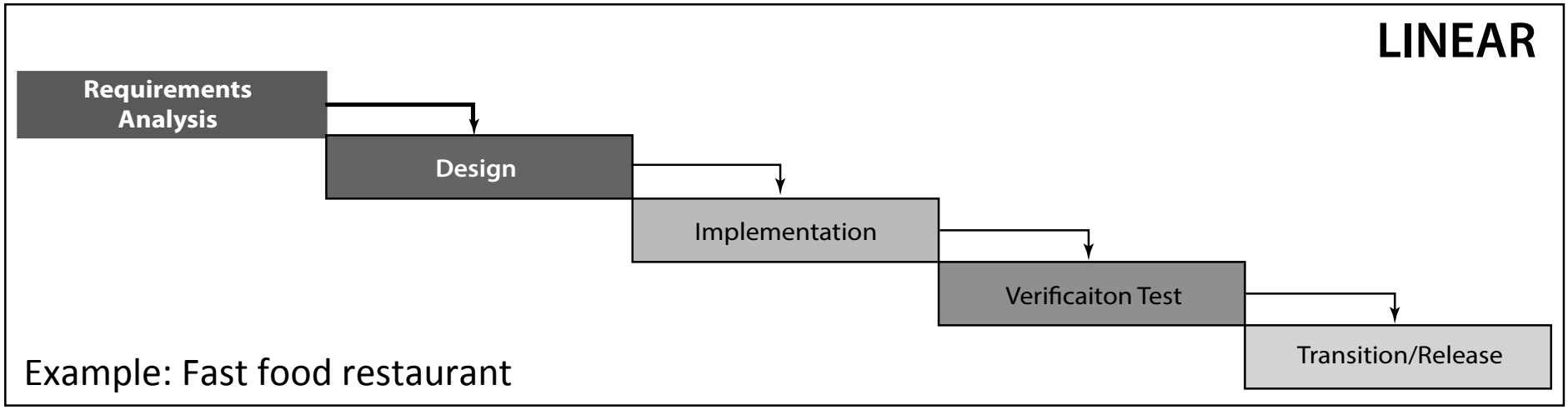
Iterate and Adapt	"Follow Moses"
Place many small risk limited bets. Learn useful patterns	Act to exit context: If startup then pivot Else war room

Nondeterministic

Project Approach Classification

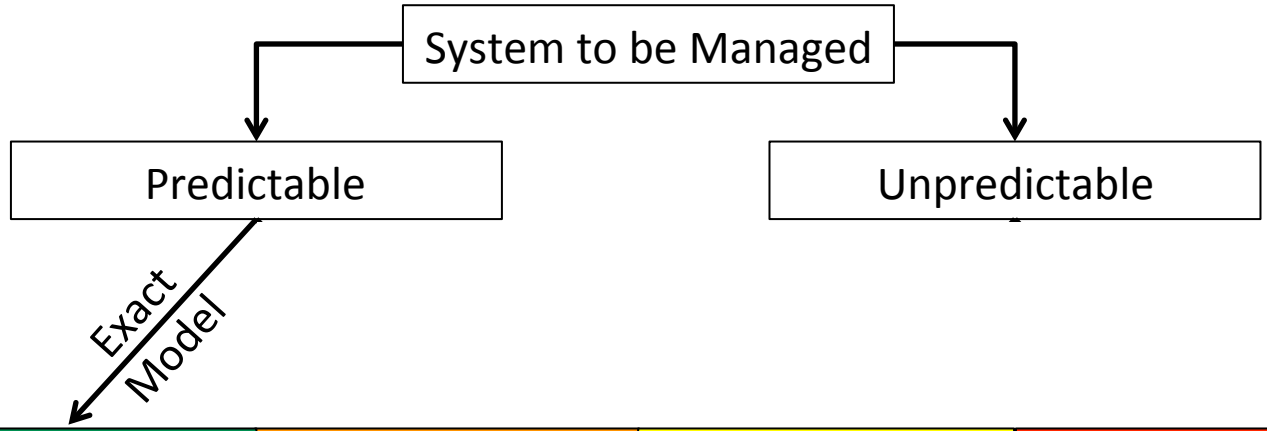
Cynefin Simple: Sense-***Categorize***-Respond





Project Approach Classification

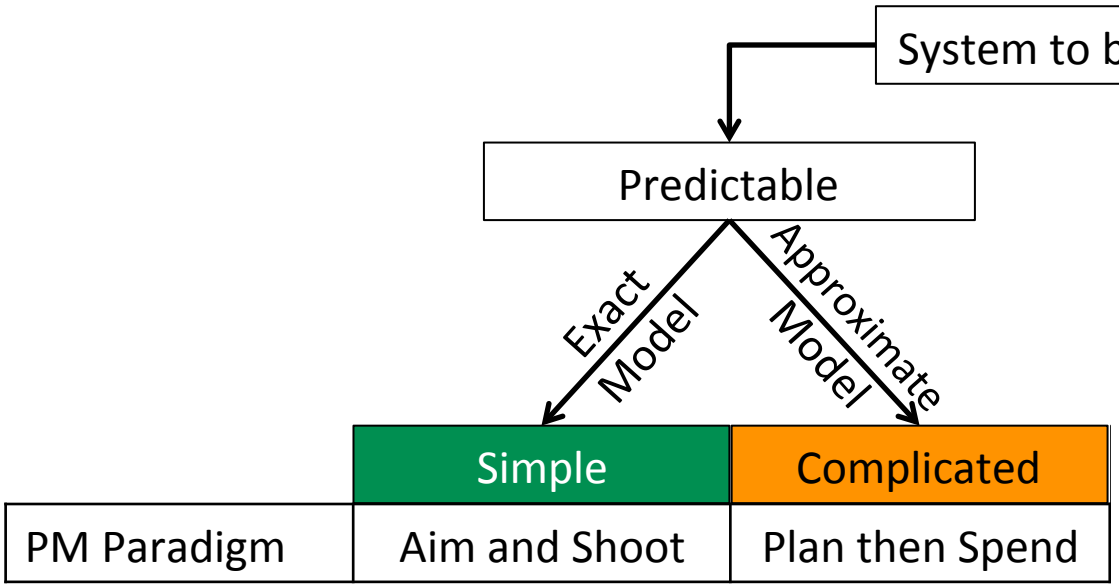
Cynefin Simple

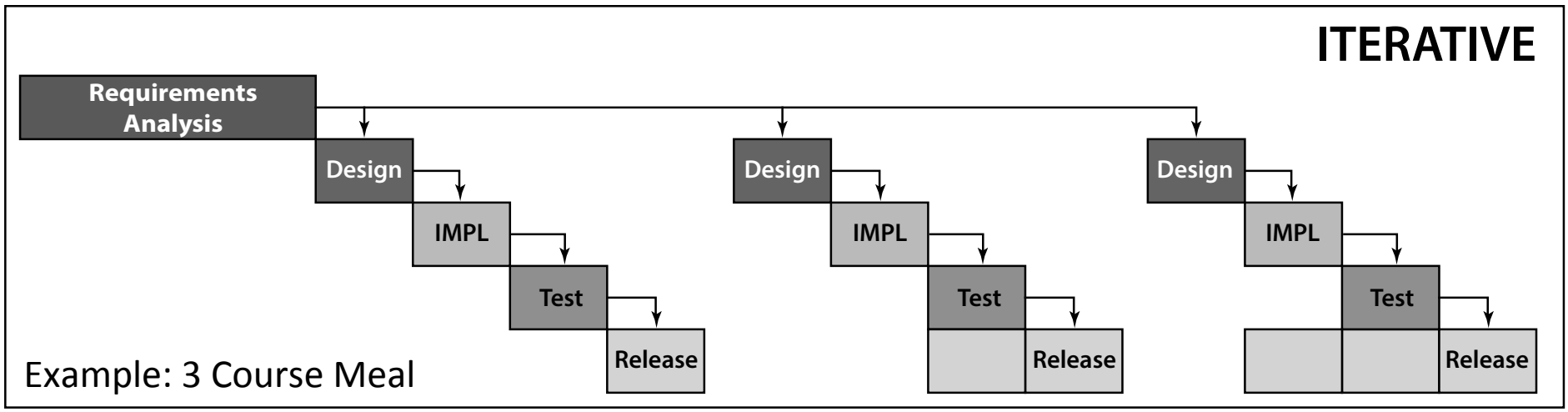


	Simple	Complicated	Complex	Chaotic
PM Paradigm	Aim and Shoot	Analyze and plan	Iterate and adapt	"Follow Moses"
Examples	Procedure Book Waterfall Linear RUP Linear SDLC			

Project Approach Classification

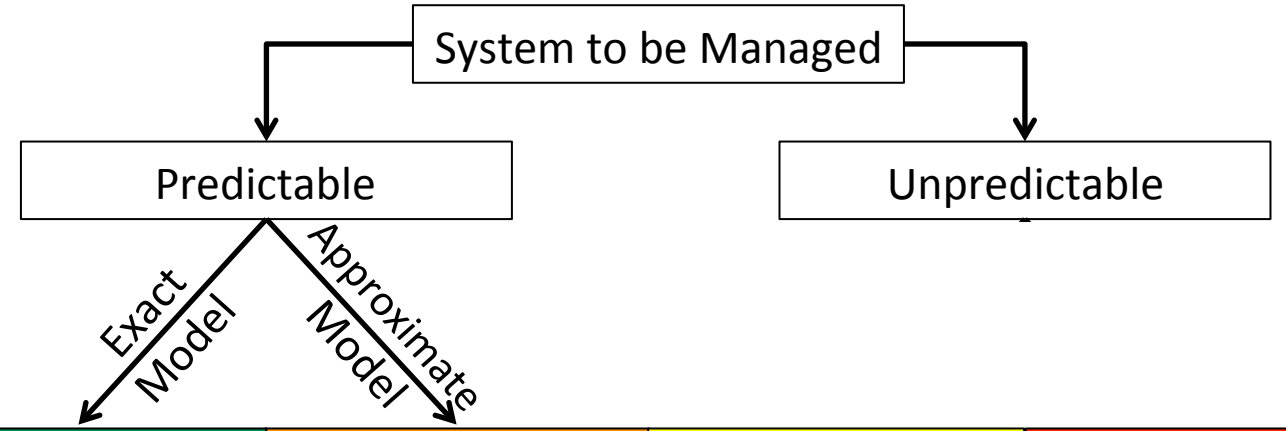
Cynefin Complicated: Sense-***Analyze***-Respond





Project Approach Classification

Cynefin Complicated



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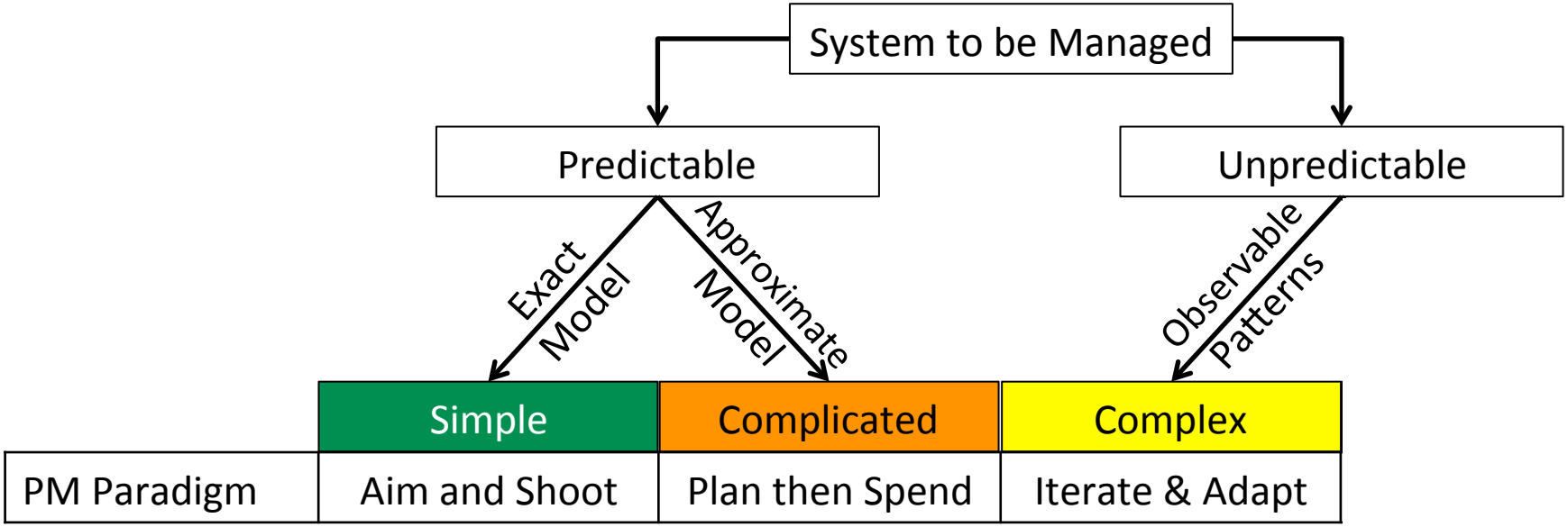
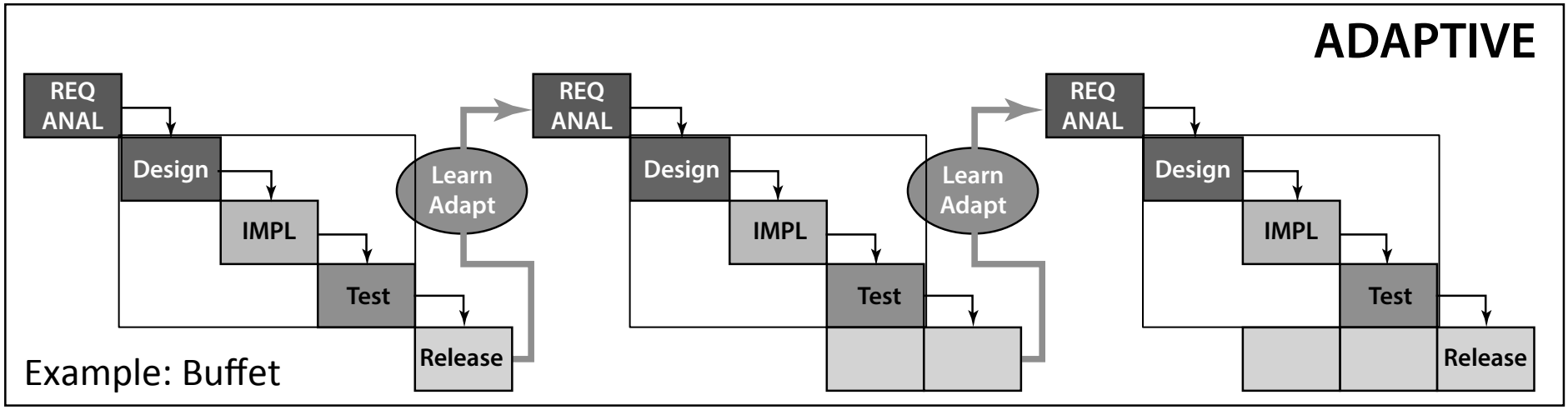
Project Approach Classification

Cynefin Complex: ***Probe***-Sense-Respond





Project Approach Classification

How Do We Classify Project Management Frameworks?

Recalling the Agile Manifesto

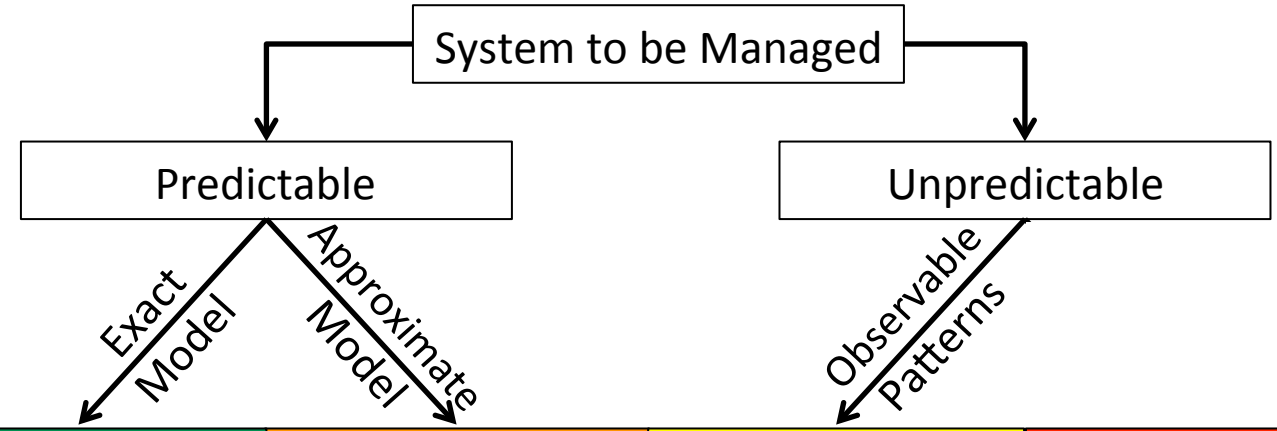
– Aided & abetted by the academics….

Manifesto Signatory	"Agile Heritage"
Alistair Cockburn	Crystal
Ari van Bennekum	DSDM
Jon Kern	FDD
Ron Jeffries	XP
Jeff Sutherland	Scrum*
Jim Highsmith	ASD
Source: http://agilemanifesto.org/authors.html	

* Technically, Scrum is work flow management practice

Project Approach Classification

Cynefin Complex



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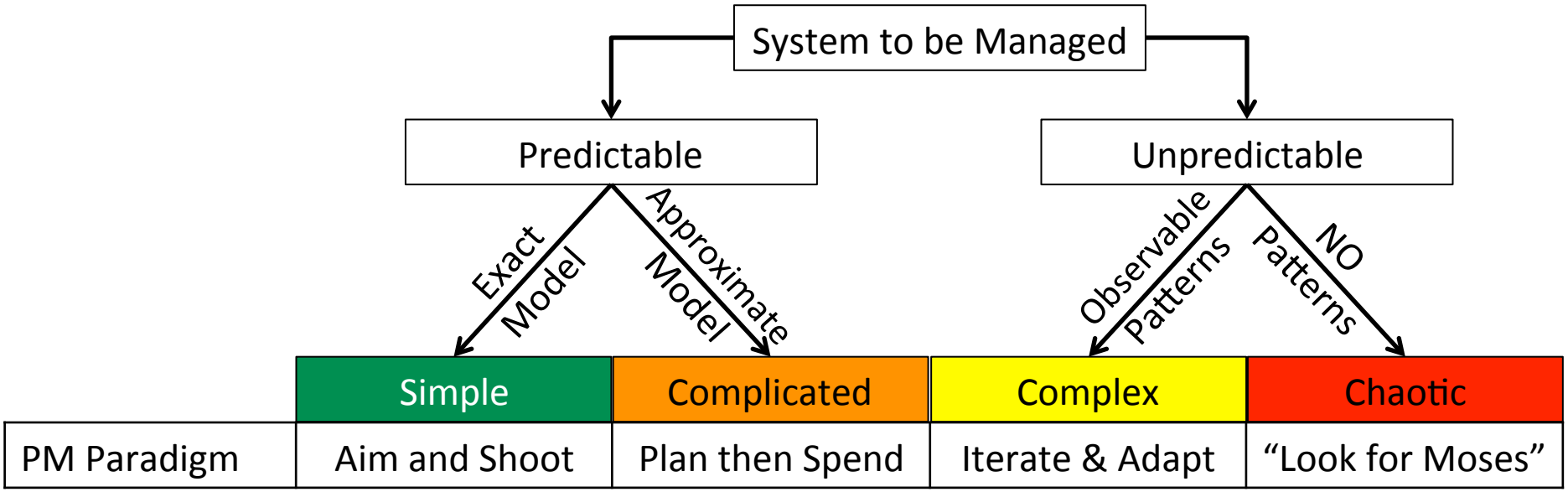
Examples	Procedure Book Waterfall Linear RUP Linear SDLC	Spiral Iterative RUP PMI/PMBOK PRINCE2	Scrum, Kanban, XP, dX, ASD, FDD, Crystal DSDM	

Project Approach Classification

Cynefin Chaos: ***ACT***-Sense-Respond

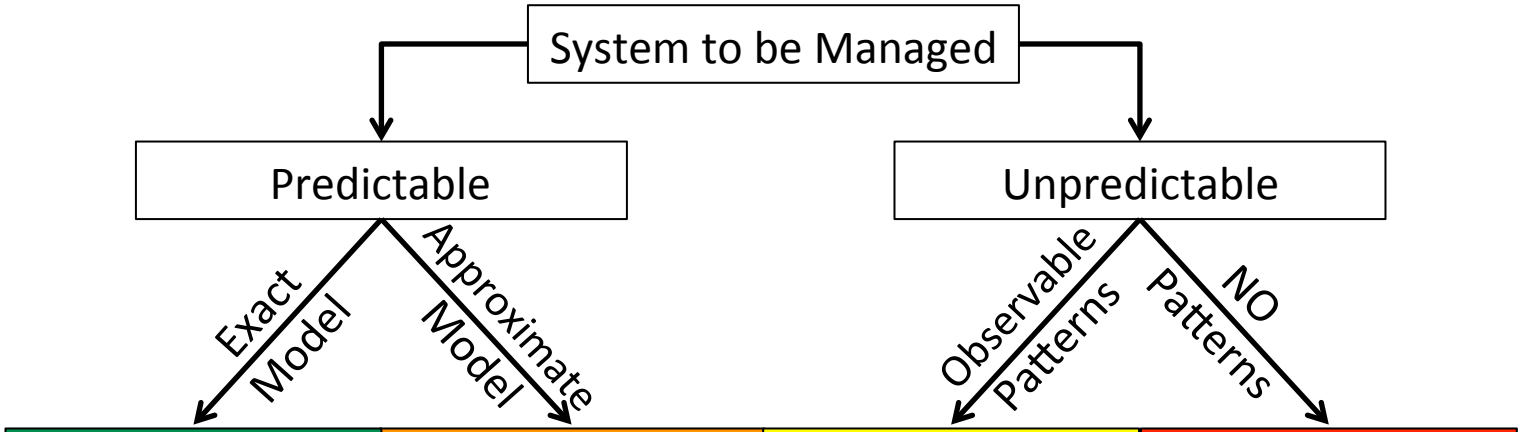


Example: Wilderness Survival

Is *THIS* food?

Project Approach Classification

Projects Classified by Cynefin Match



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Project Approach Selection

How Do We Measure Project Cause & Effect?

Adequate Estimation Accuracy

- "Adequate" defined by business context
  - Estimate Expiration Date > Work Completion Date

- Quantified Estimation Accuracy

$$Relative\,Estimation\,Error\ [\%] = 100\,\frac{Est - Actual}{Est}$$

- Units can be
  - Money
  - Effort Hours
- Quantities can be
  - Story
  - Use Case (Scenario)
  - Milestone

Project Approach Selection

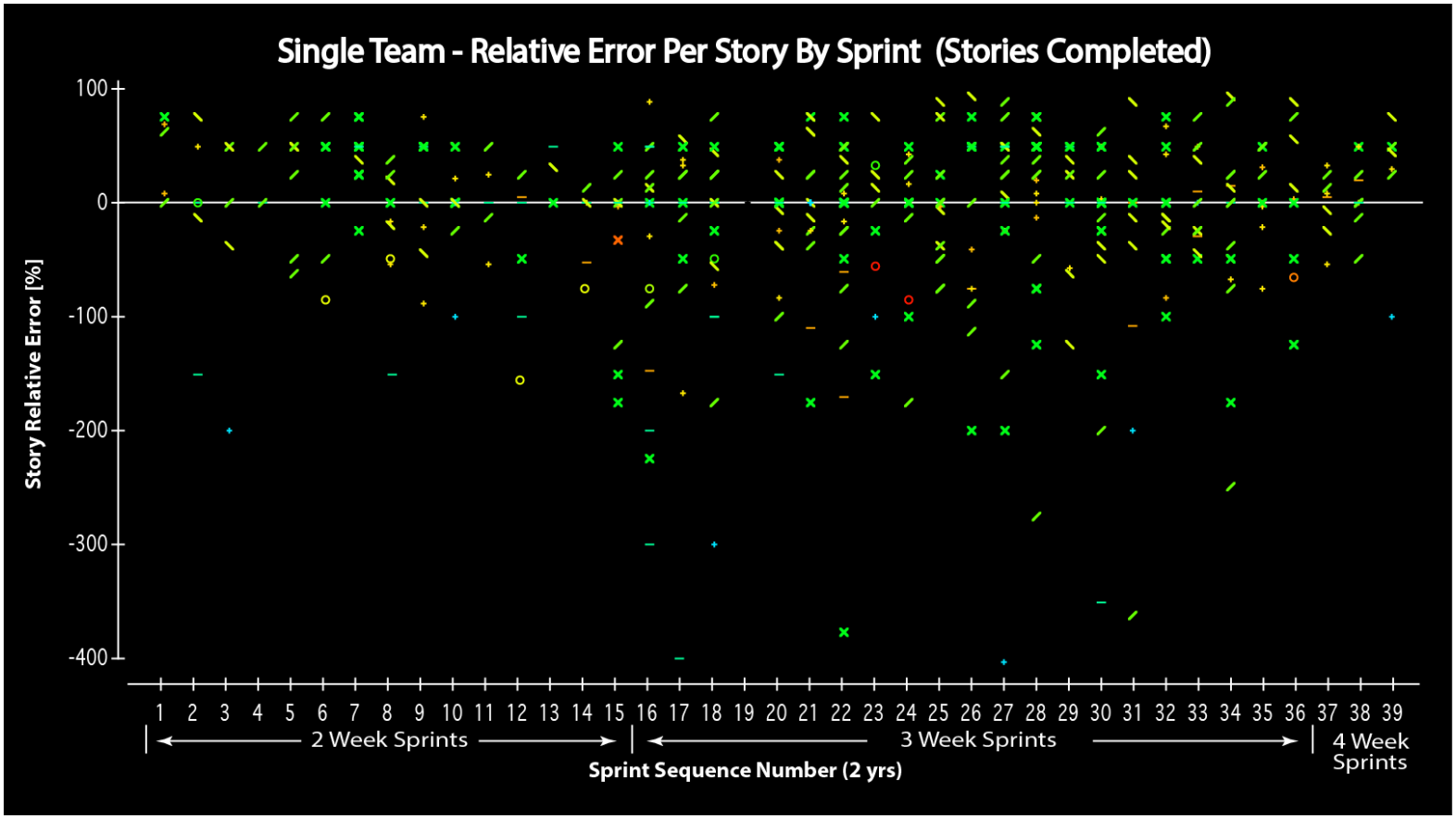
One Metric To Rule Them All And In The Business Bind Them

- Estimation Error
  - ***Independent* of Project Framework**
  - Emphasis on *OUTCOME*, not compliance
- Consistently good estimation requires
  - Accurate/testable picture of "Done" (requirements)
  - Choosing appropriate methods and practices
  - Mastery of chosen practices (predictable competence)
  - *Knowledge* how system behaves when changed
- Change these to reduce estimation error

Project Approach Selection

Measure Relative Errors

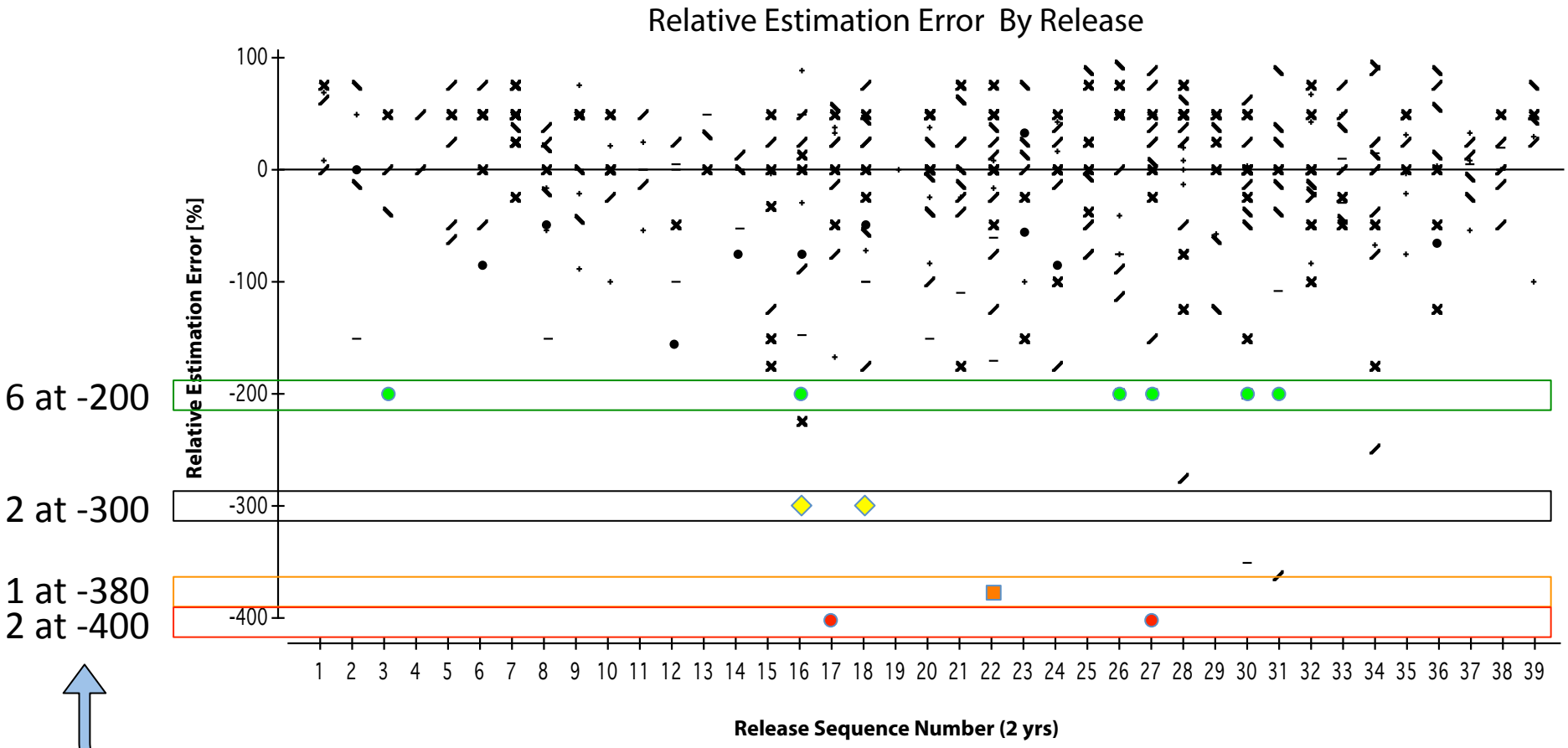
1. Collect estimates & actuals, compute RelErr



Project Approach Selection

Summarize Relative Errors

2. Count errors according to their size



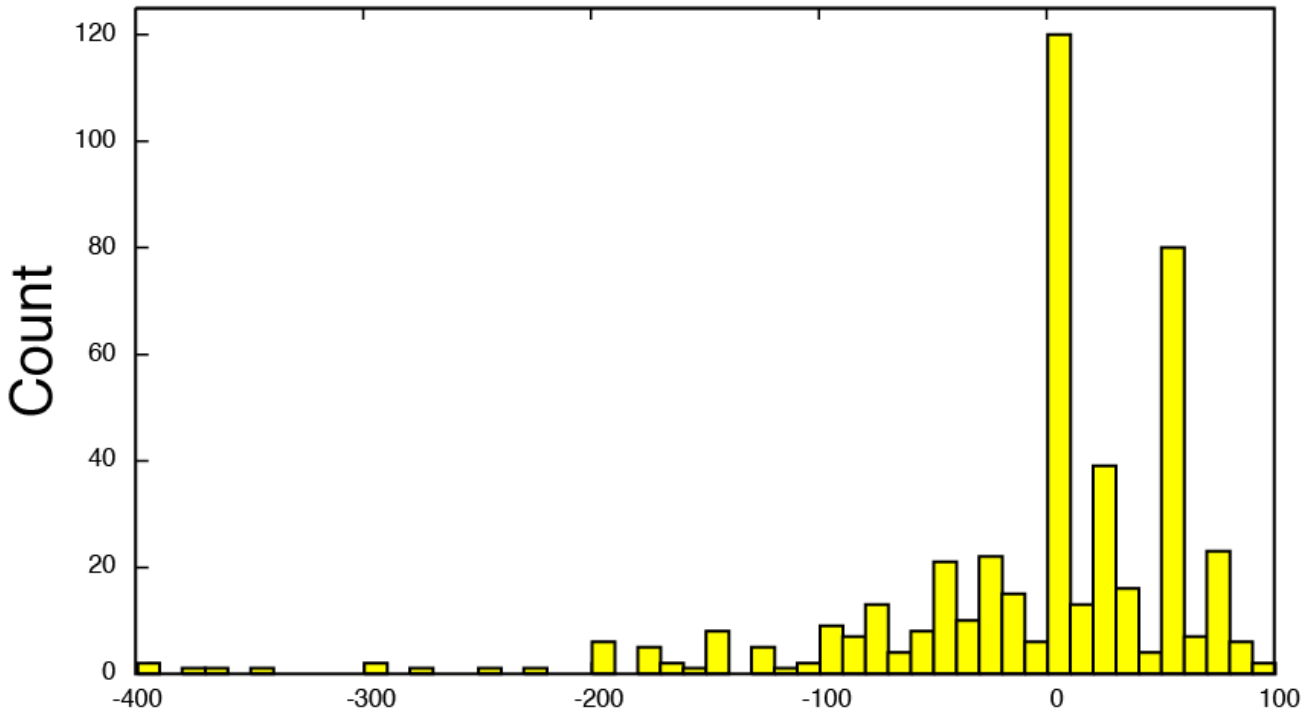
Make a Bar Chart of the counts

Project Approach Selection

Summarize Relative Errors

2. A Bar Chart of counts by size

   Called a “Histogram”

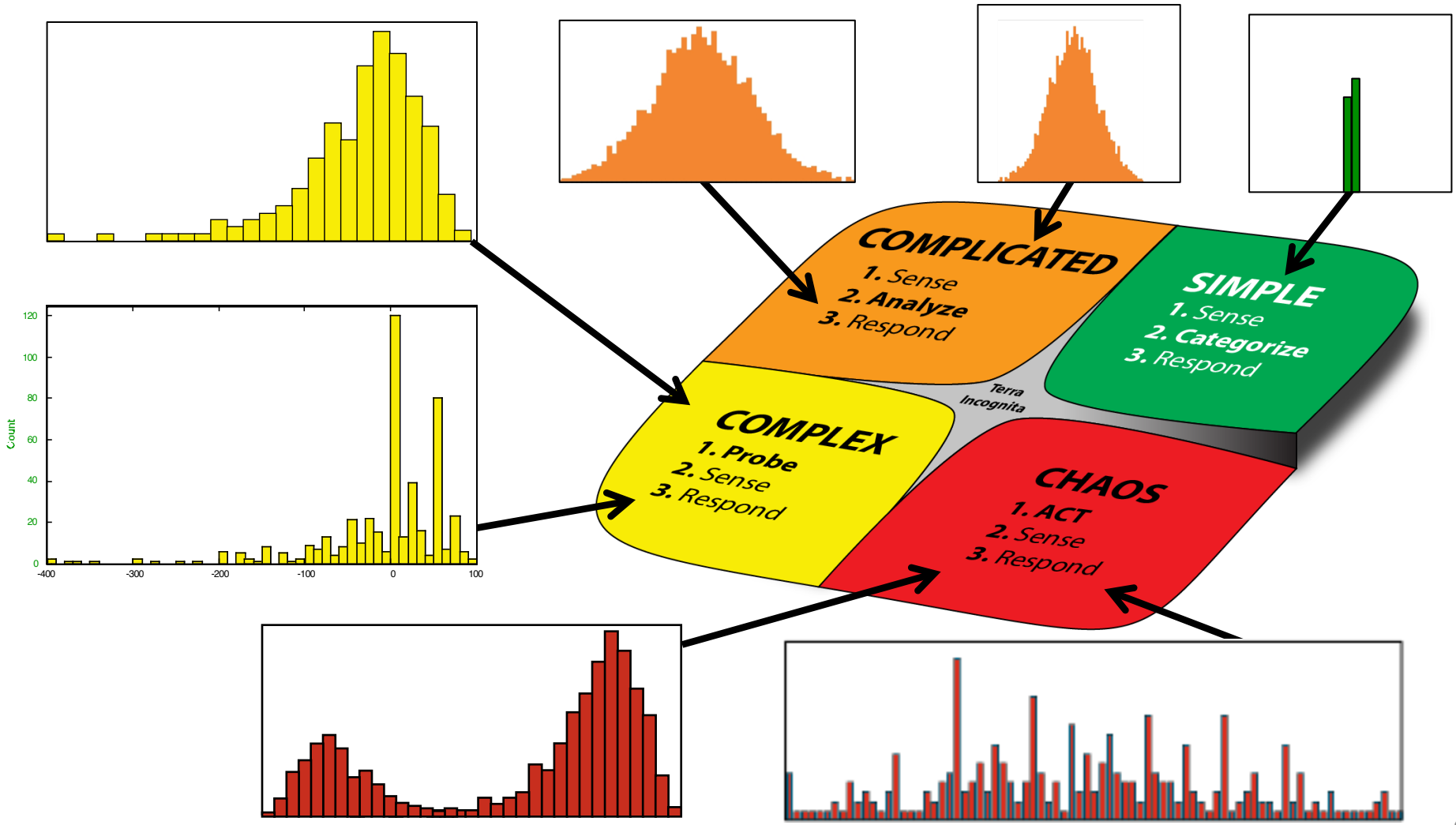


Notes: 465 User Stories; Single Scrum Team; 39 sprints in 2 yrs

Project Approach Selection

Match "Sense Making Pictures" to Cynefin Domain

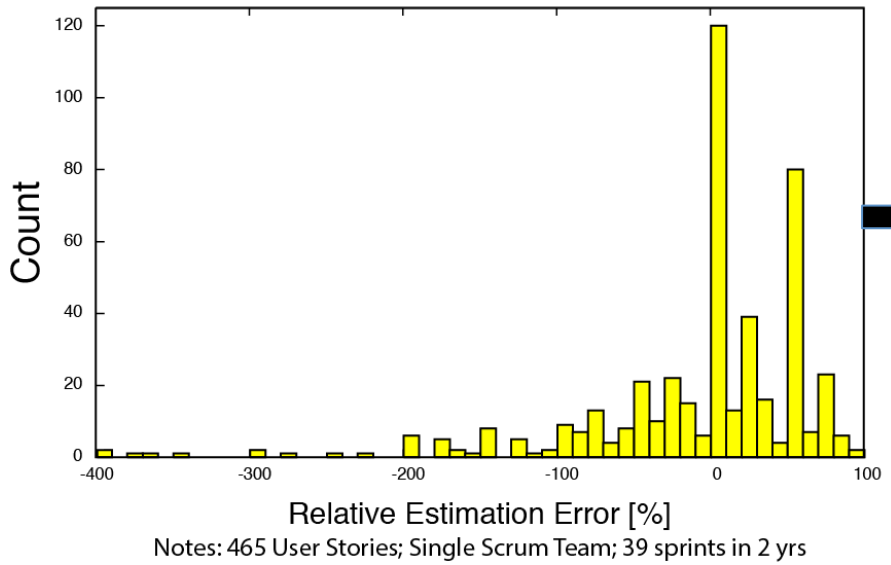
3. Match "Predictability Picture" to Cynefin



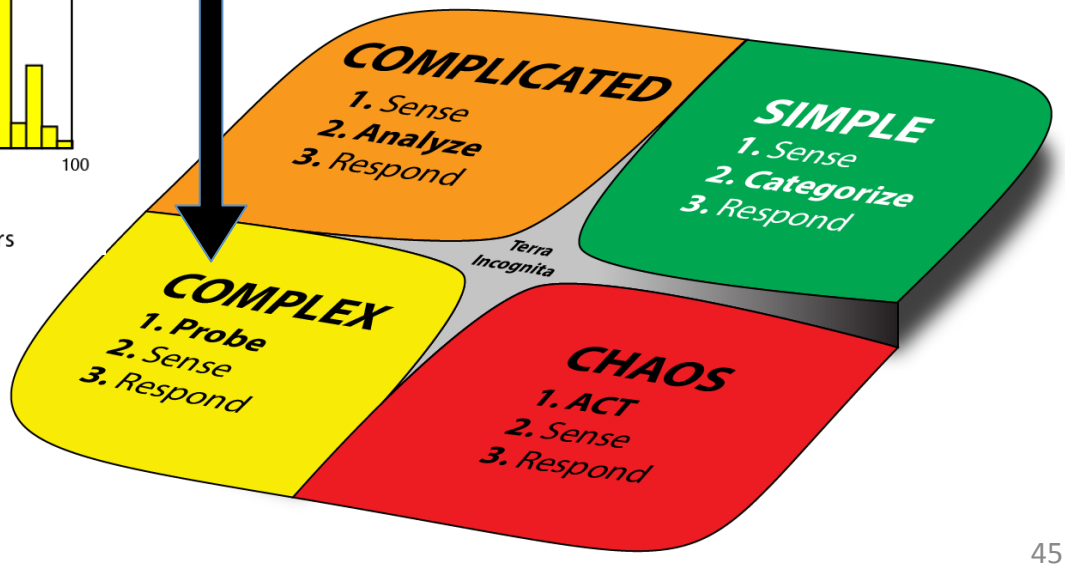
Project Approach Selection

Match "Sense Making Pictures" to Cynefin Domain

3. Match "Predictability Picture" to Cynefin

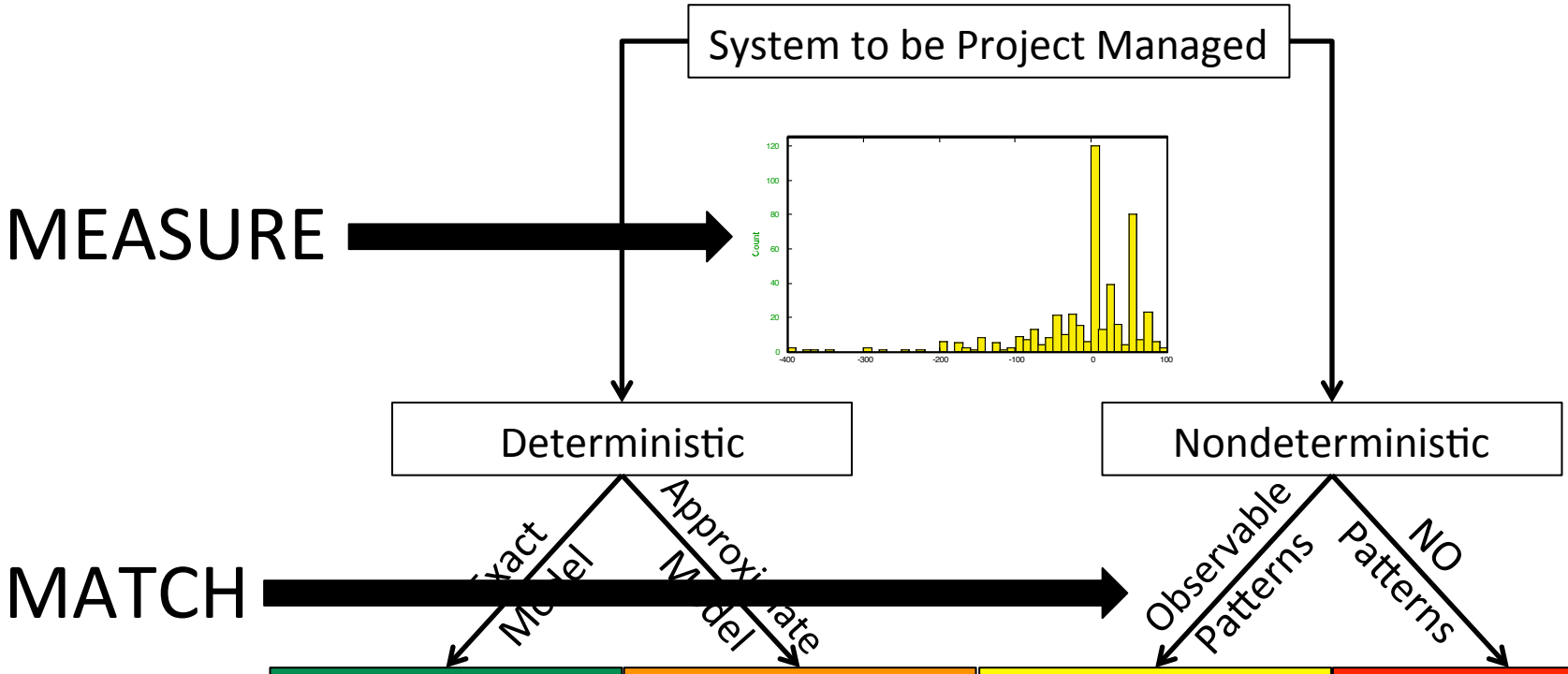


You are here!



Project Approach Selection

Cynefin Contexts and Project Frameworks



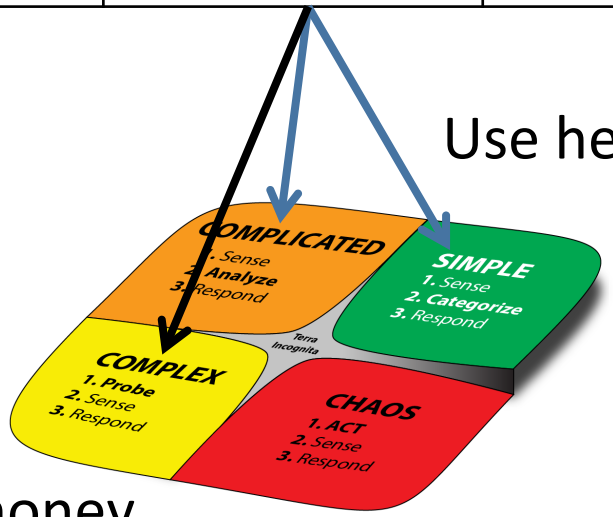
	Simple	Complicated	Complex	Chaotic
PM Paradigm	Aim and Shoot	Analyze and plan	Iterate and adapt	"Follow Moses"
Examples	Procedure Book Waterfall Linear RUP Linear SDLC	Spiral Iterative RUP PMI/PMBOK PRINCE2	Scrum, Kanban, XP, dX, ASD, FDD, Crystal DSDM	Lean Startup The Prince (Open Source?)

Project Approach Selection

Cynefin Contexts and Project Frameworks

Mismatch Risk Illustrated

	Simple	Complicated	Complex	Chaotic
PM Paradigm	Aim and Shoot	Analyze and plan	Iterate and adapt	"Follow Moses"
Examples	Waterfall Linear RUP Linear SDLC	Spiral Iterative RUP PMI/PMBOK PRINCE2	Scrum, Kanban, XP, dX, ASD, FDD, Crystal DSDM	Lean Startup The Prince (Open Source?)



Use here and save money

Use here will cost you money

Project Approach Selection

Observations and Comments

John's Soap Box

Once size can't fit all

- Need four things
  - Project framework for deterministic environments
  - Project framework for nondeterministic
  - Test for environmental classification
    - Measure and Match perhaps?
  - Portfolio of practices to facilitate adaption

Project Approach Selection

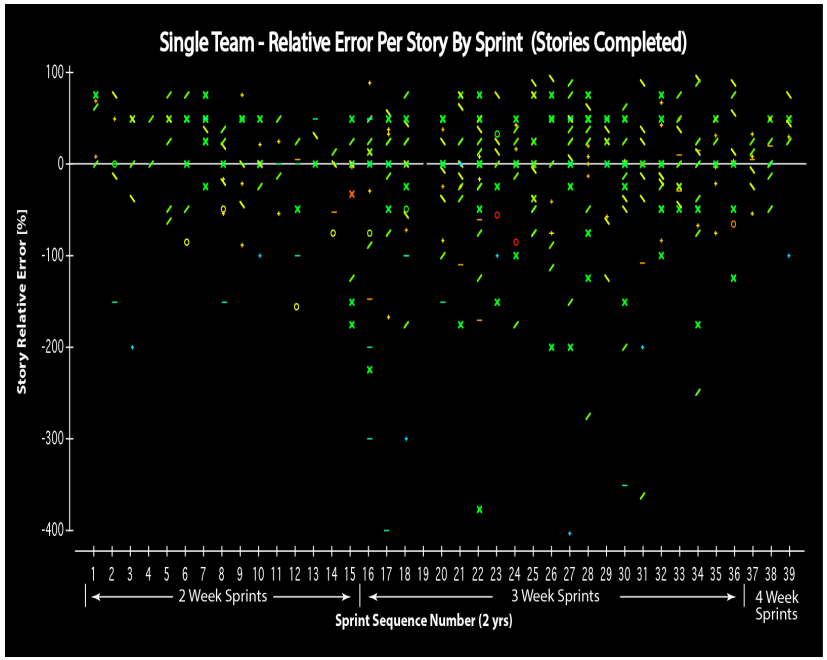
Observations and Comments

John's Soap Box

Lean concepts versus estimation volatility

- Core Lean Principles

Term	Aspect	Activity
Muri	Load	Plan work correctly; avoid overburdening of people or equipment
Mura	Flow	Create a regular pace (for the team) by avoiding unevenness in work load
Muda	Waste	Avoid waste, especially activities that don't generate value



- Is even flow possible in Complex Systems?

Project Approach Selection

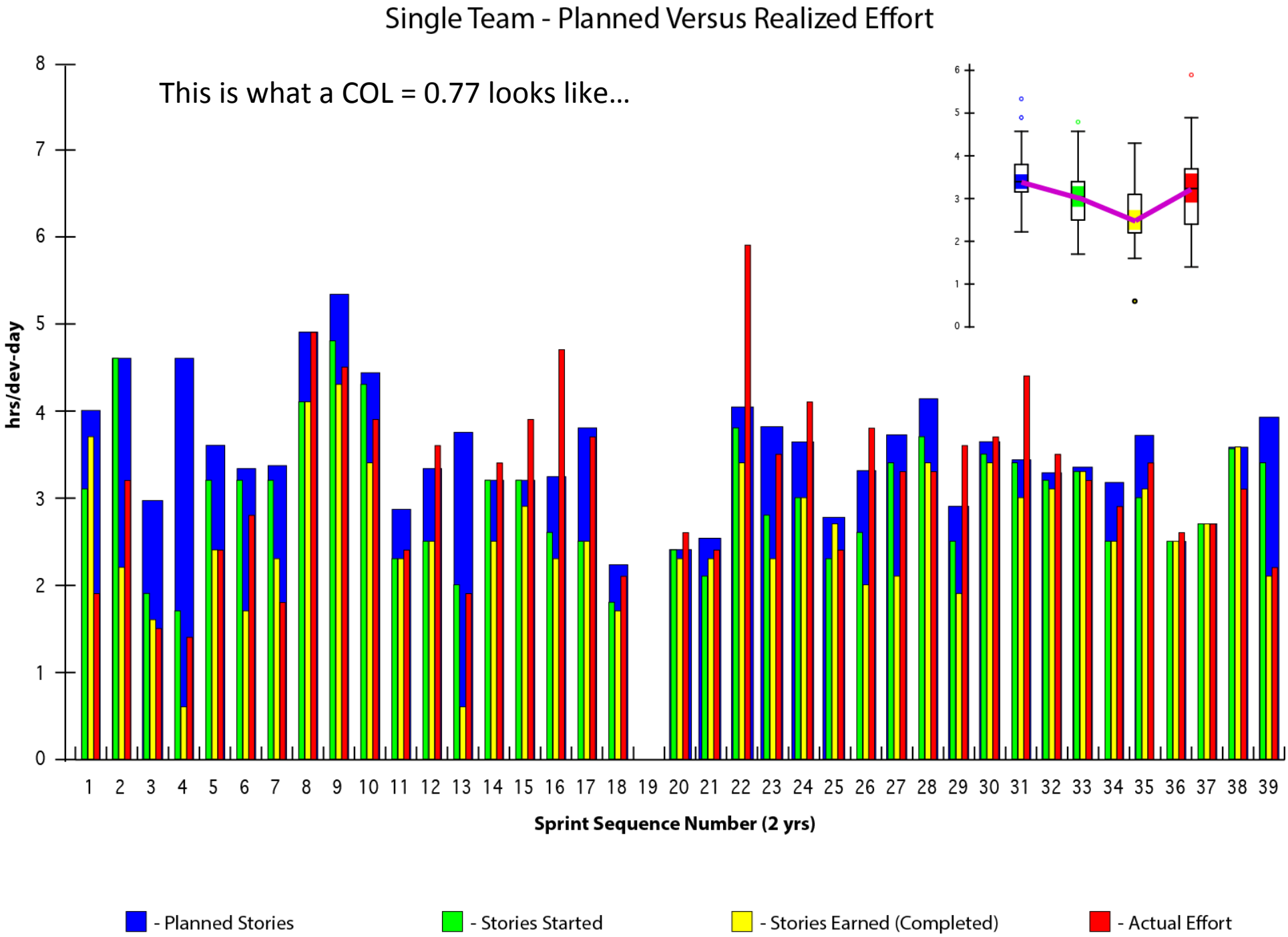
Observations and Comments

Meet the Coefficient of Luck

- Deviation = Estimation Err = δ = Predicted– Actual
- When errors cancel we are lucky, to measure how much luck plays a role, we define the Coefficient of Luck

$$COL = 1 - \left| \frac{\sum_{i=2}^{N} \delta_i}{\sum_{i=2}^{N} |\delta_i|} \right| \quad for\, i \geq 2\, else\, 0$$

  - If COL = 0.0, no errors canceled
  - The closer to 1.0, the more errors canceled out
- Of possible interest: Luca Santillo (2006). *Error Propagation in Software Measurement and Estimation*. Available on line.


Single Team - Planned Versus Realized Effort
This is what a COL = 0.77 looks like…
hrs/dev-day
0
1
2
3
4
5
6
7
8
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39
Sprint Sequence Number (2 yrs)
- Planned Stories
- Stories Started
- Stories Earned (Completed)
- Actual Effort

Project Approach Selection

Observations and Comments

Learning: The Universal Practice

John's Soap Box

- Be ruthless about learning from outcomes
  - Always predict outcome and compare with result
  - Learn from the comparison
  - Systematically experiment with everything
    - TDD can add huge value to Spiral or RUP
    - COTS config can go Agile less some coding practices
    - Why not sprints and demos for Infrastructure projects

Outline

- ✓ Why is Risk ∝ Volatility?
- ✓ Families of Risk *a la* the Cynefin Framework
- ✓ Project Frameworks *a la* the Cynefin Framework
- ✓ Measure and Match: The Recipe

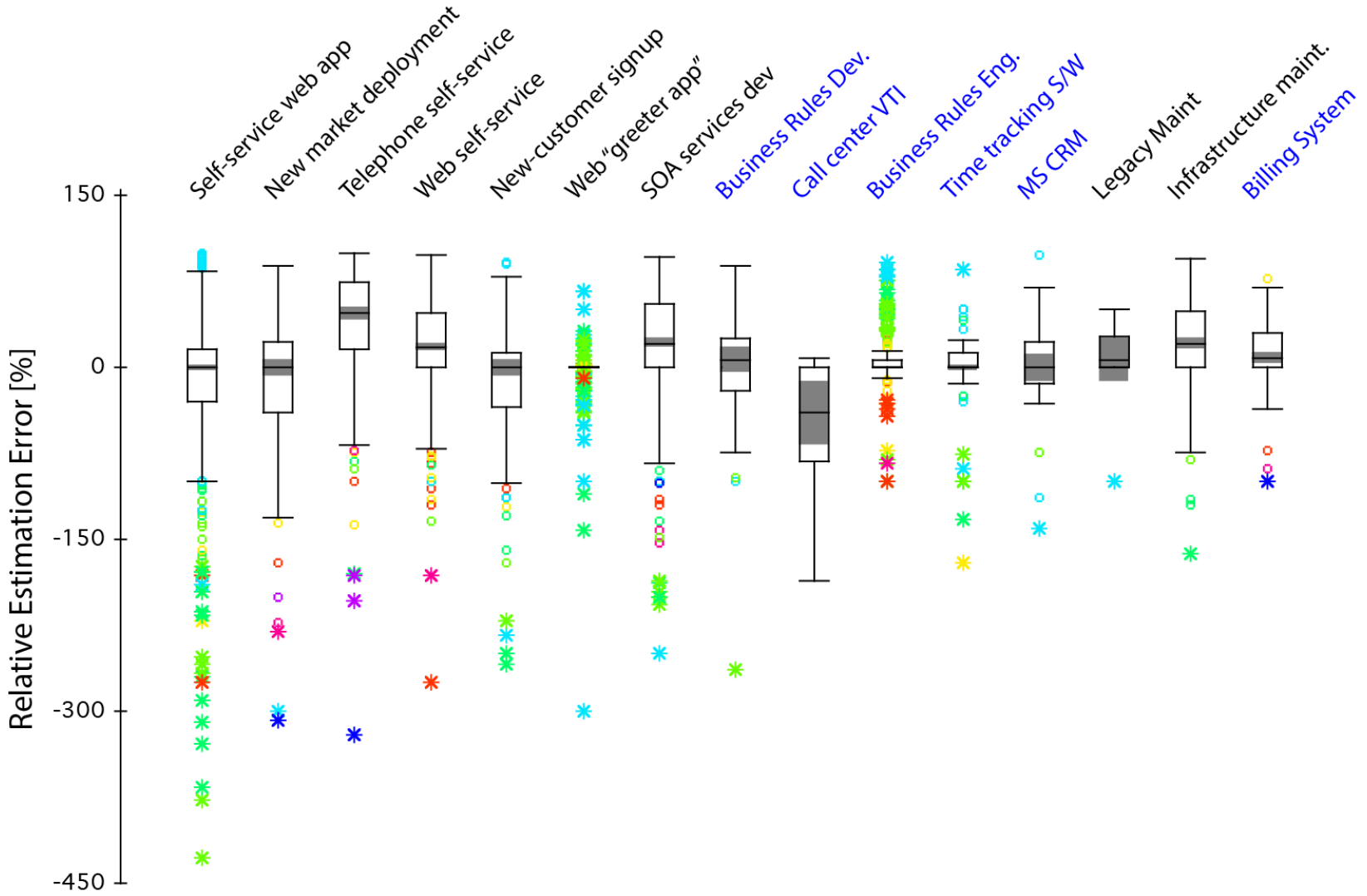
Optional, if we have time

- Portfolio Perspectives
- I-C Map

Portfolio Perspectives

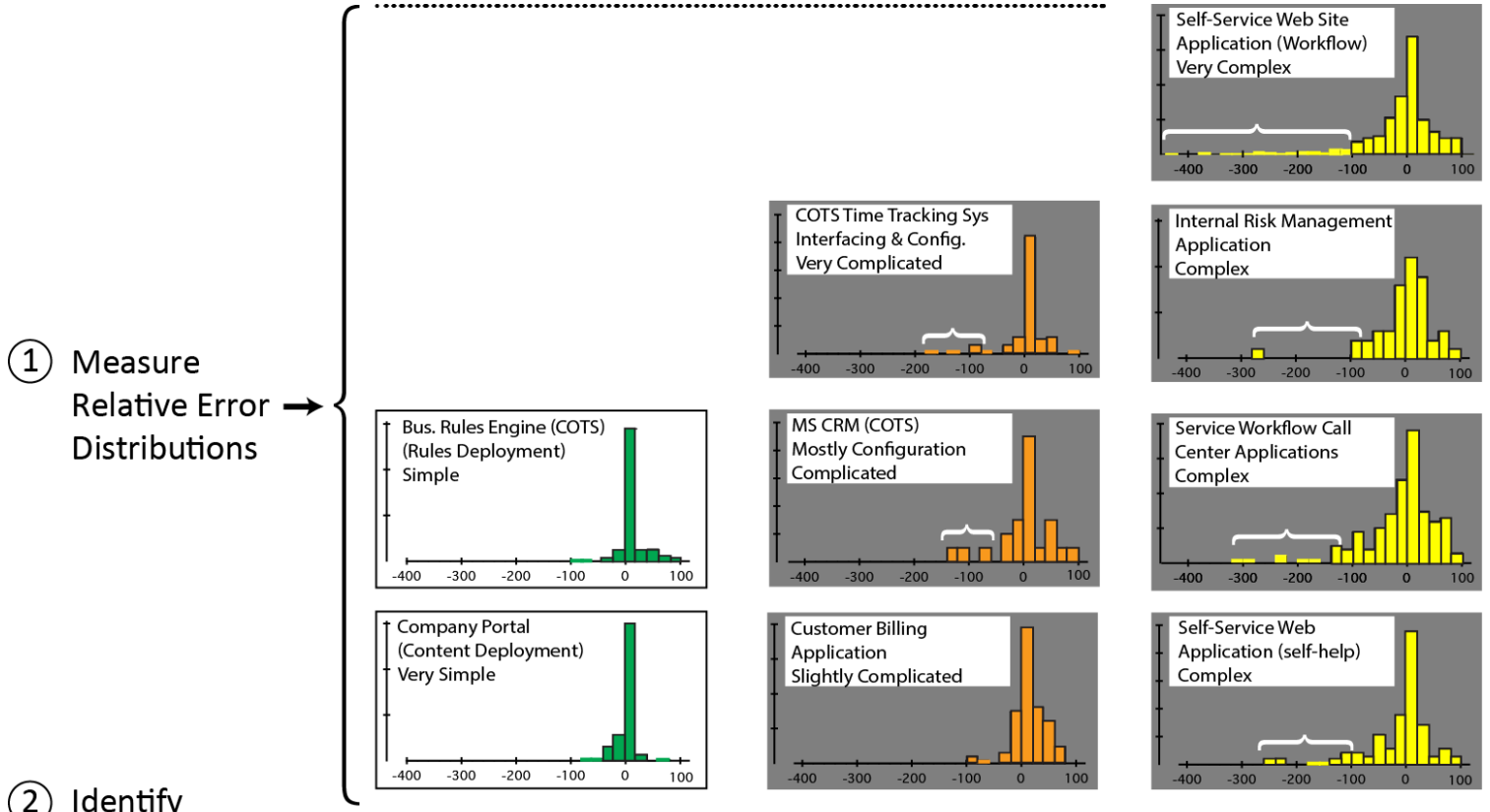
Volatility Risk Inventory

Complexity Often Localized



Portfolio Perspectives

Measure and Match Applied Across A Project Portfolio



① Measure Relative Error Distributions →

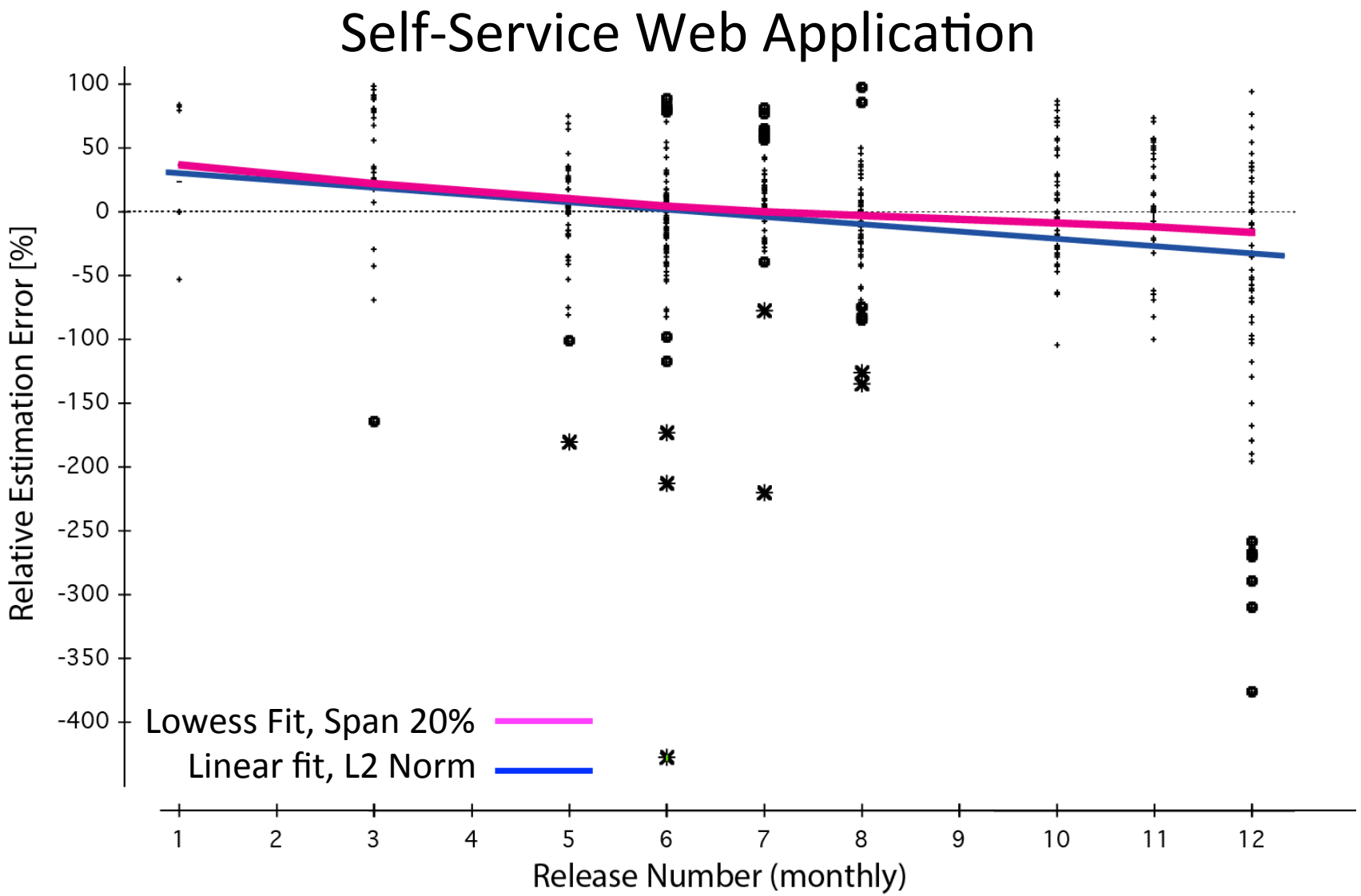
② Identify Cynefin Context and Matching Action Prototype →

③ Select Project Managment Framework →

Simple	Complicated	Complex
Aim and Shoot	Analyze and Plan	Iterate and Adapt
Procedure Book, Waterfall, Linear RUP, Linear SDLC,	Spiral, Iterative RUP, PMI/PMBOK, PRINCE2	Scrum, Kanban, XP, dX, ASD, FDD, Crystal, DSDM

Portfolio Perspectives

Manage Volatility: Monitor Estimation Accuracy Over Time



Portfolio Perspectives

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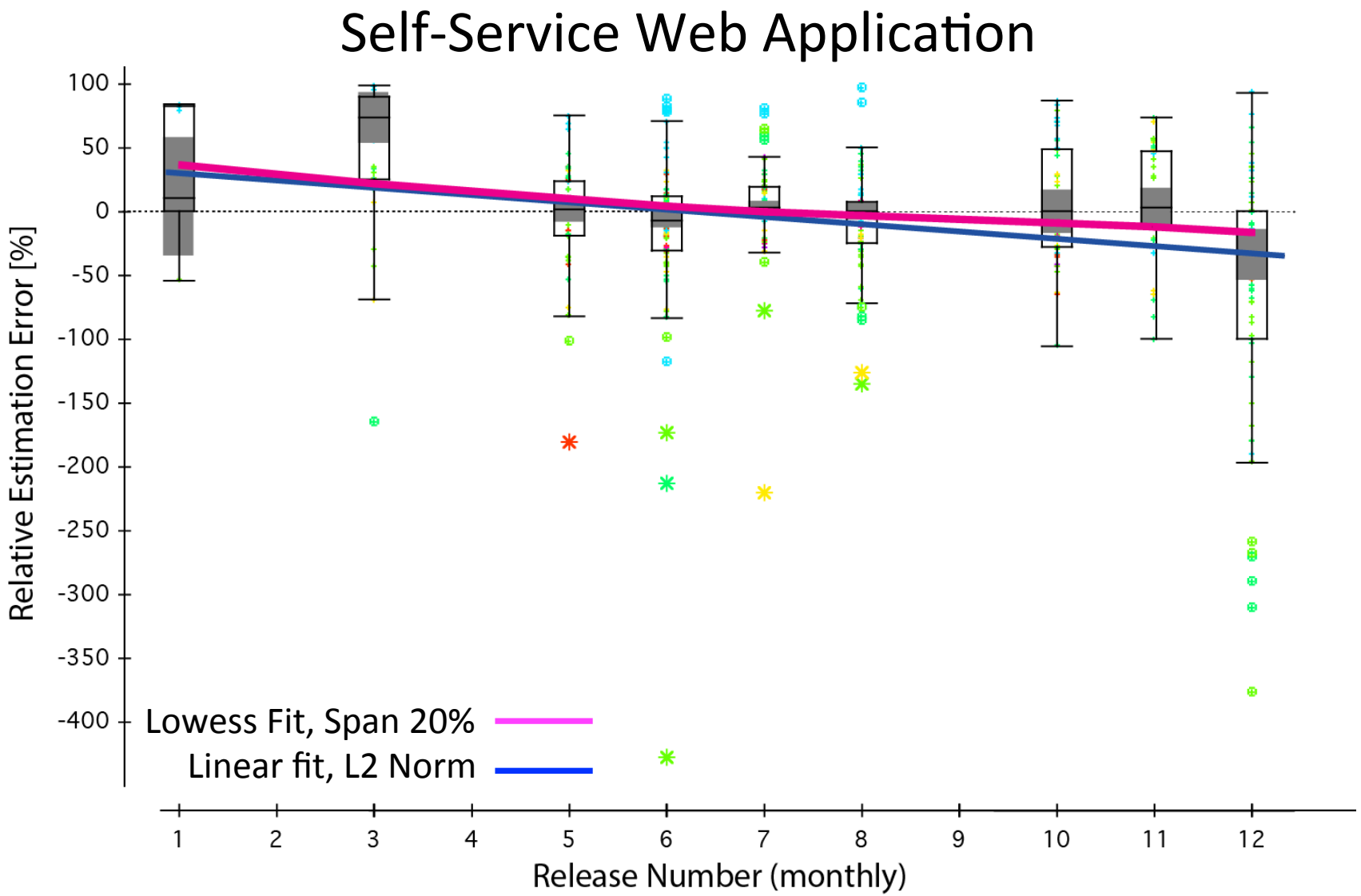
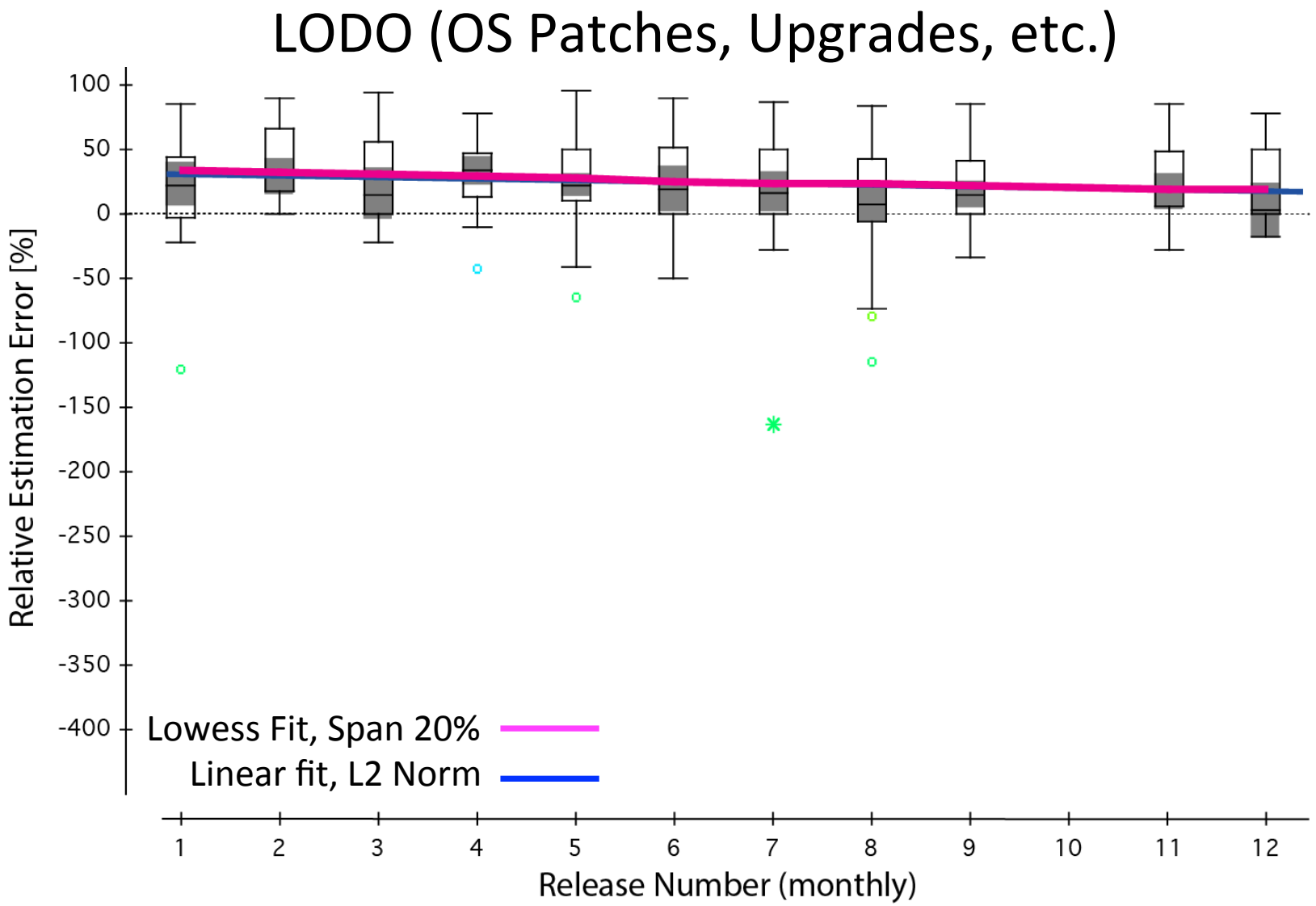


Portfolio Perspectives

Manage Volatility: Monitor Estimation Accuracy Over Time



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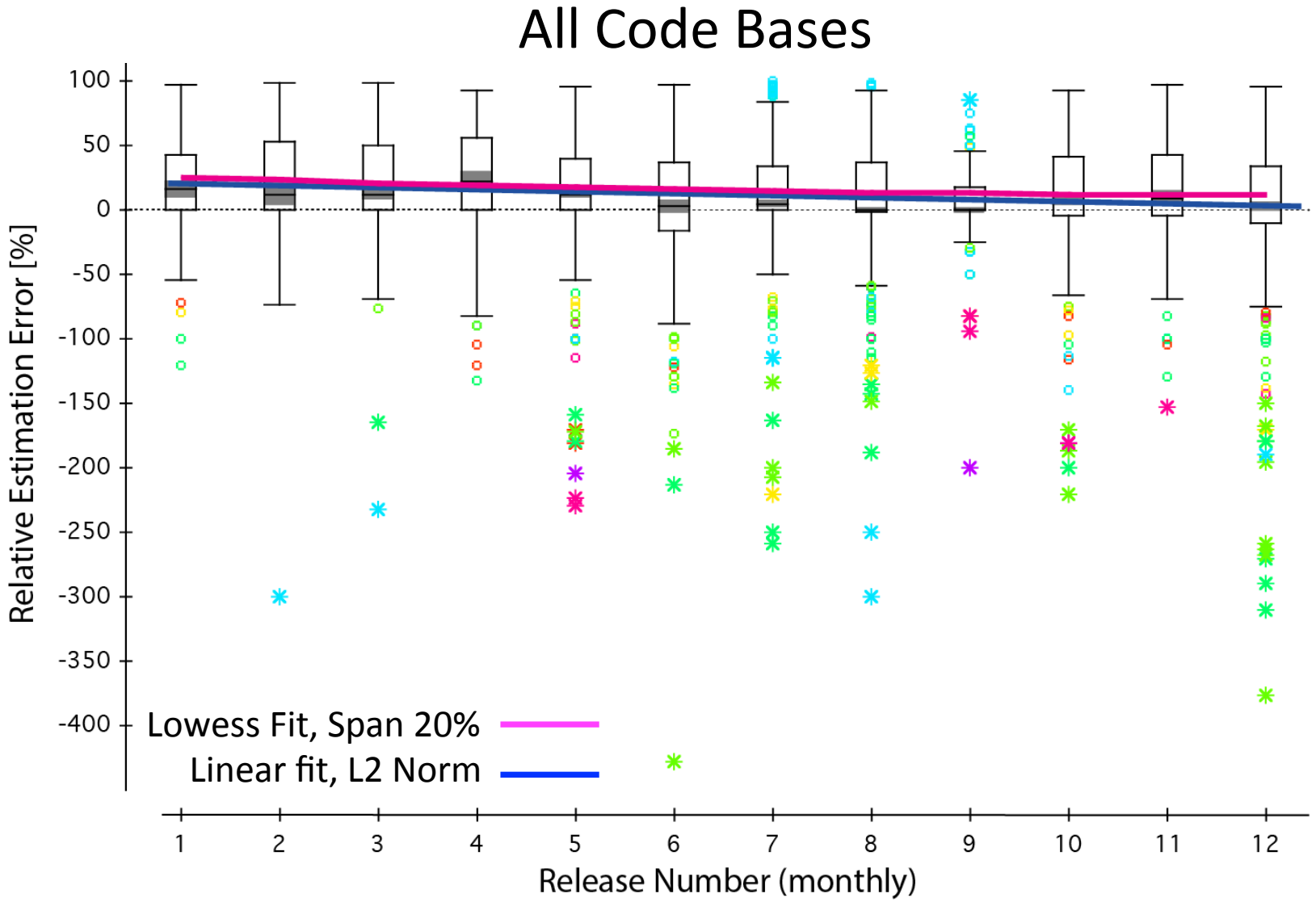

Outline

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Optional, if we have time

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- I-C Map

A Model For Complexity

Volatility Reduction

Most organizations are coupled network of actors

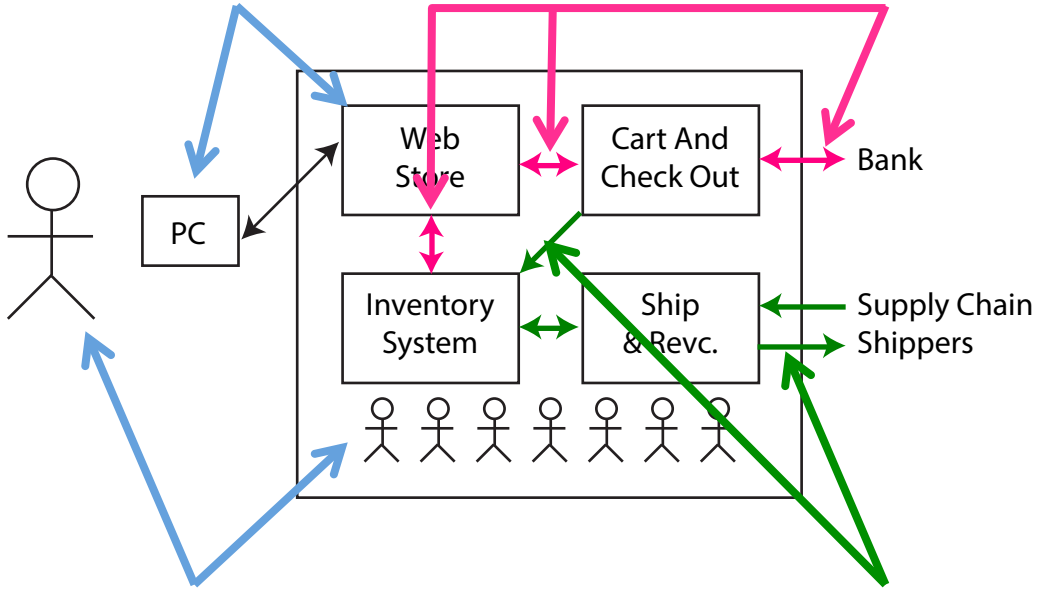
Process flows are specific network traversals

Actors perform activities

Flows connect actors

Non-Human Actors

Tight coupling

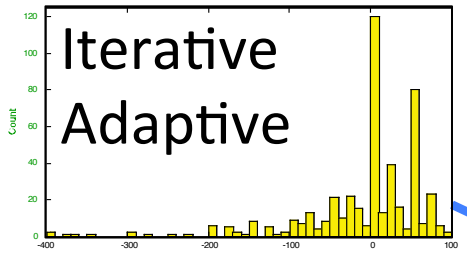


Human Actors

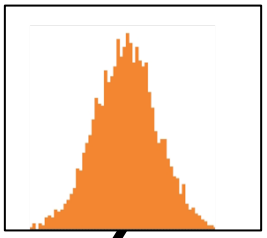
Loose coupling

A Model For Complexity

Reminder: Use Measure and Match



Analyze and Plan



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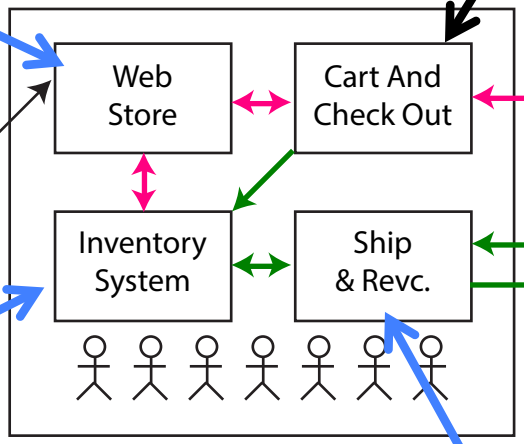
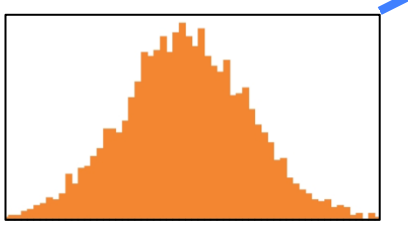
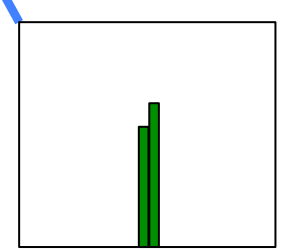
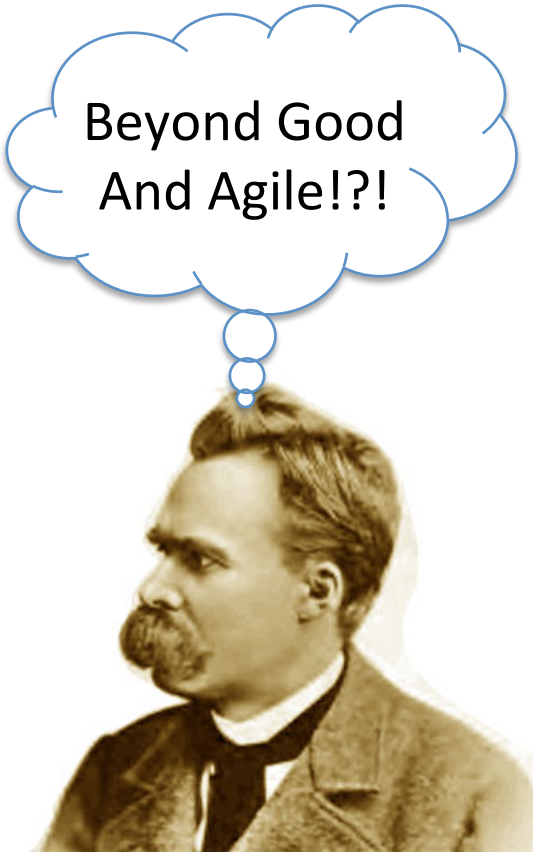




Follow Procedure Manual





A Model For Complexity

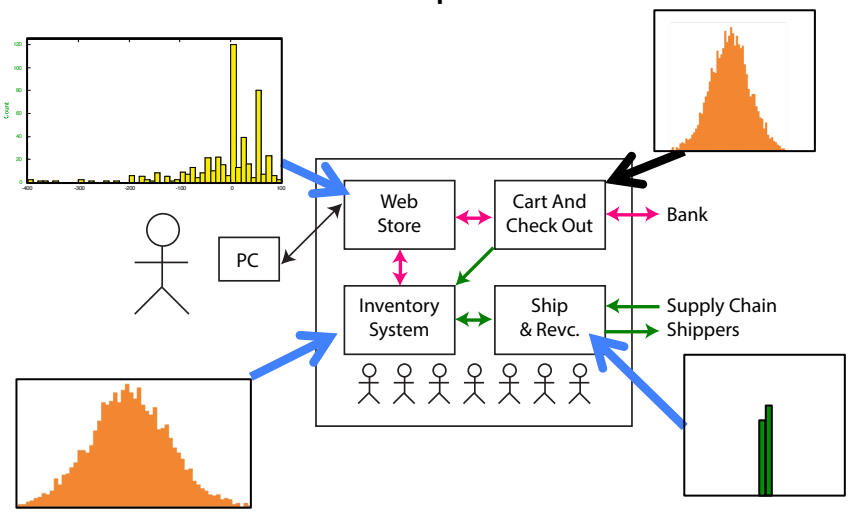
Volatility Reduction

- From business school
  - High Risk Organizations
    - "Normal Accident Theory" (Charles Perrow)
  - High Reliability Organizations
    - "Just Culture", (Sidney Dekker)
    - "Managing the Unexpected" (Weick and Sutcliffe)
- From Complexity Sciences
  - Many…

Cynefin Colored Interaction-Coupling Map

Volatility Reduction

Business as an Coupled Actor-Network



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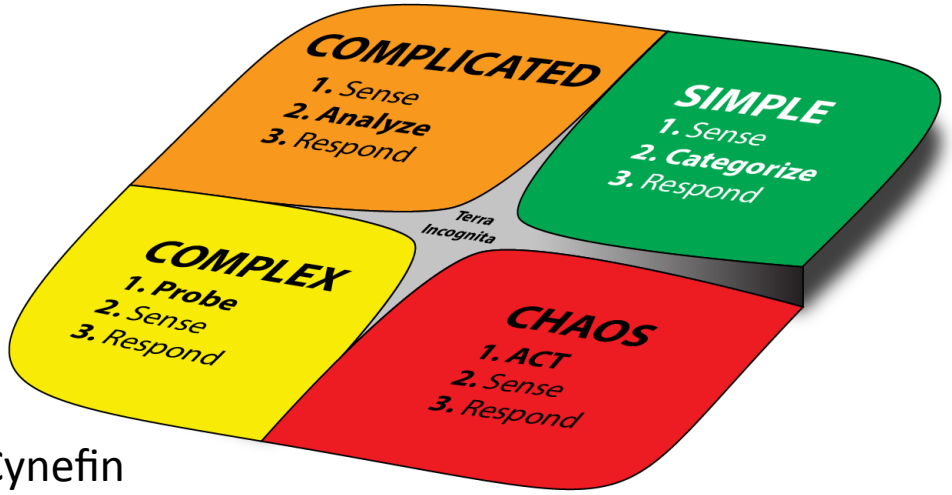
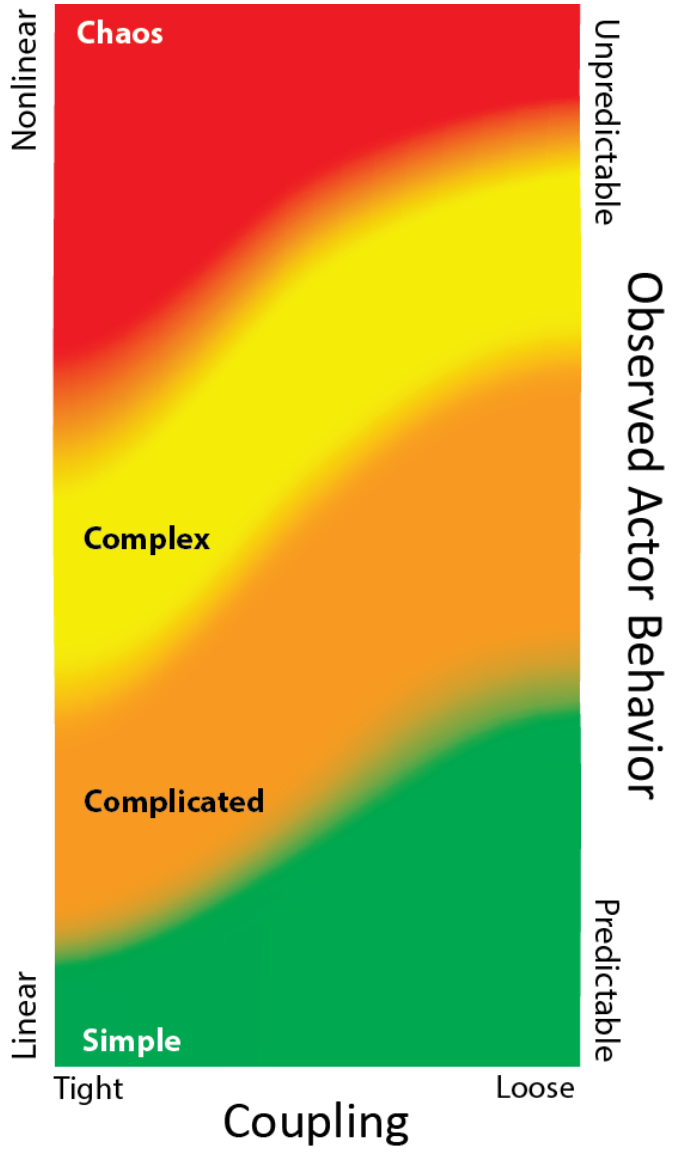


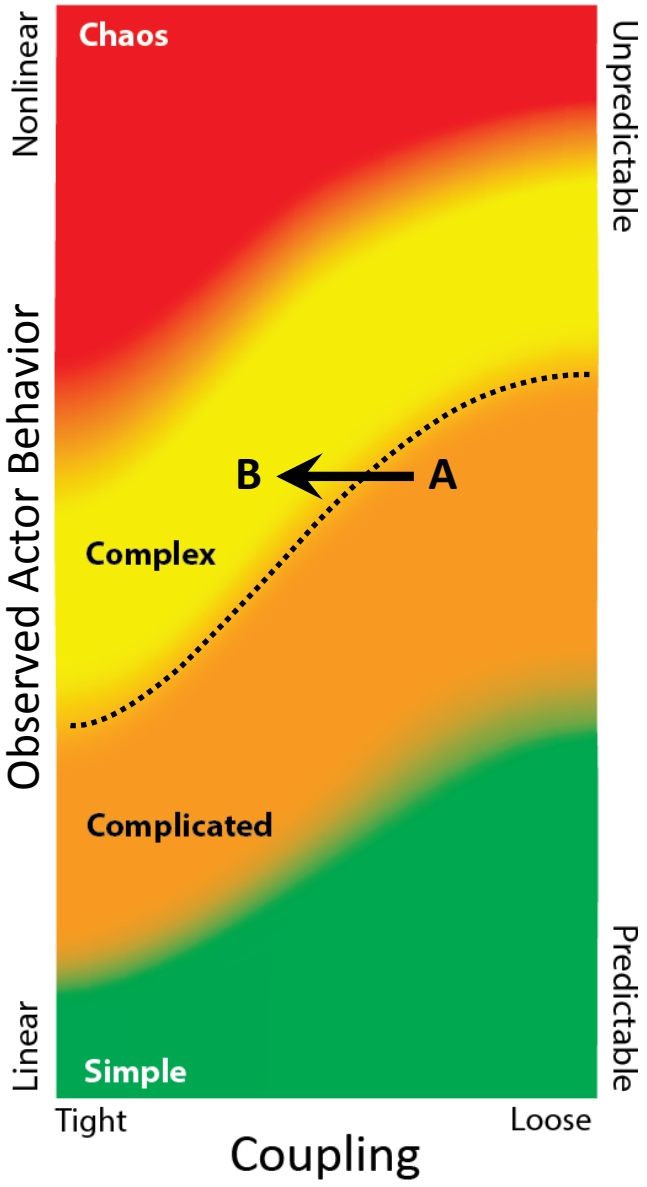
Cynefin

=



Frog-In-The-Pot Trap

Passing Into Complexity Via An Invisible Critical Point



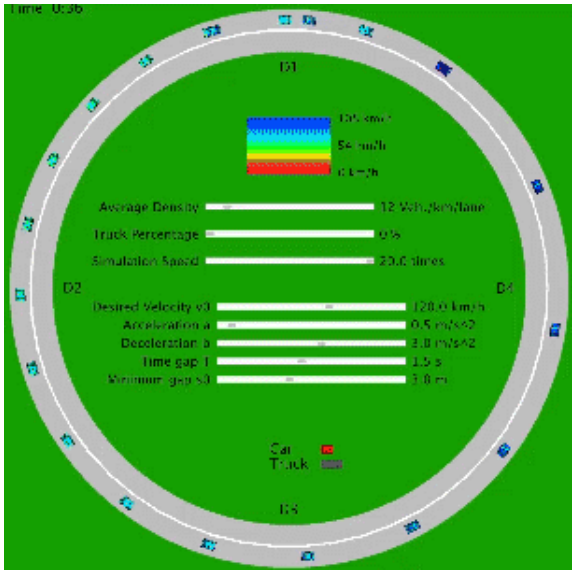
Example phantom traffic jam on ring road

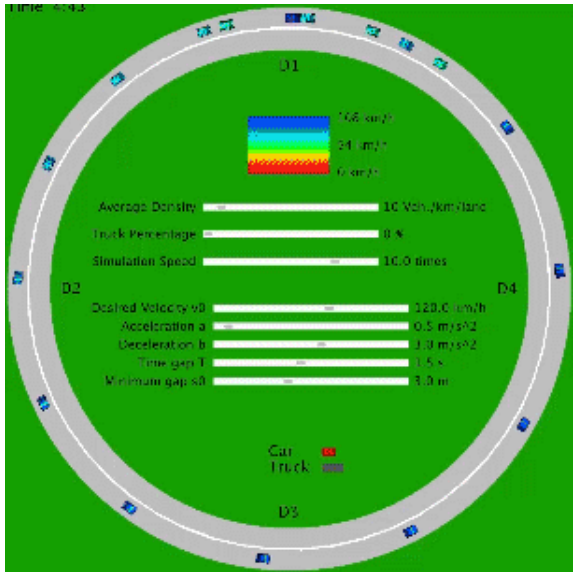
B - Heavy but moving, random bunching becomes traffic jam

←

+1 car

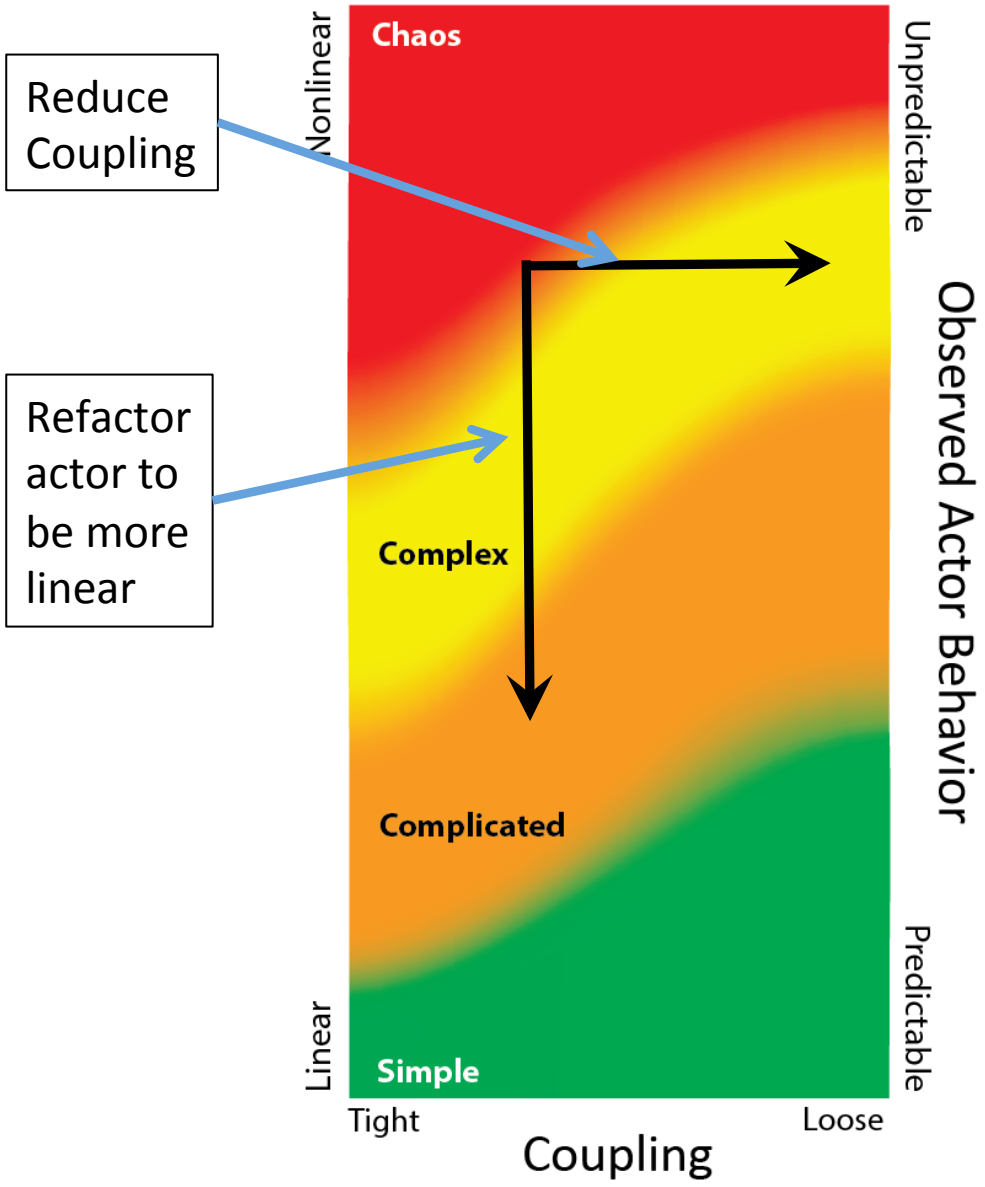
A - Heavy but moving, random bunching dissolves away





Volatility Reduction

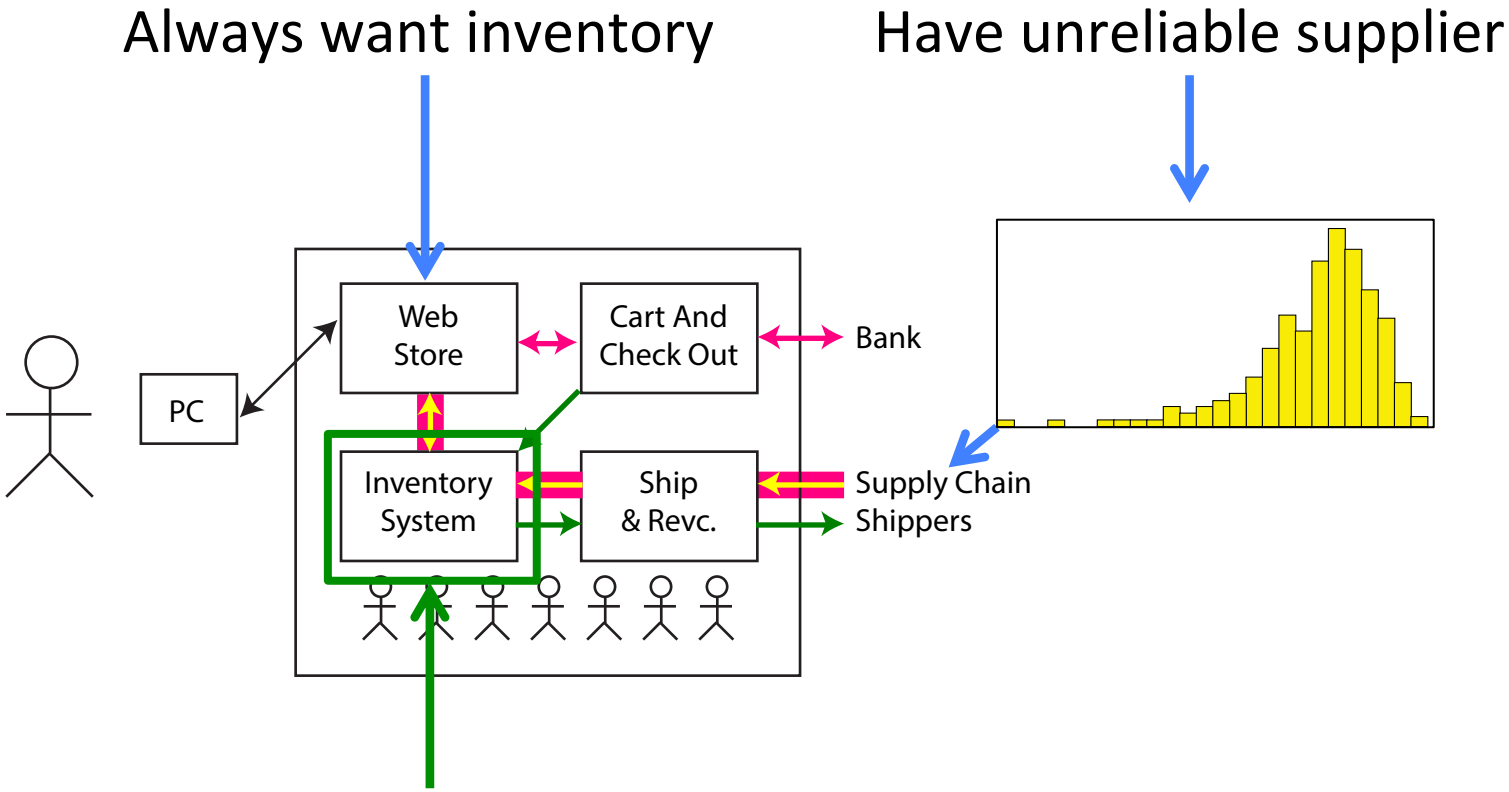
Manage Volatility: Monitor and Interpret



Volatility Reduction

Manage Volatility: Reduce Coupling

Loosen Coupling to Isolate Volatility



A larger inventory (anti-Lean, gasp!) loosens coupling

Volatility Reduction

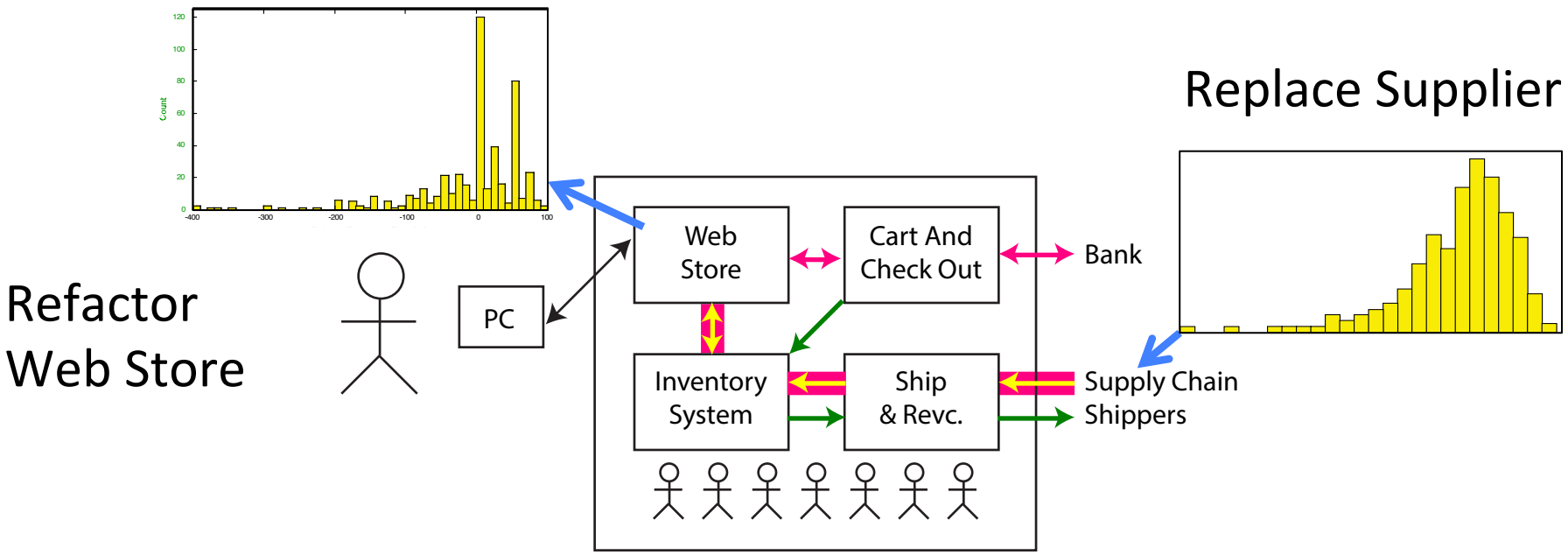
Manage Volatility: Reduce Coupling

- Loose coupling: isolate bad behavior
- Ways to implement
  - Increase size of queues
  - Load leveling (a lean practice)
  - Increase system granularity
    - Creates new queues

Volatility Reduction

Manage Volatility: Refactor Non-Linearity Away

Refactor or Replace Volatile Components



Volatility Reduction

Manage Volatility: Refactor Non-Linearity Away

- Refactoring: change how something is done

- Ways to reduce volatility
  - Improve human understandability
    - Simplify (so more easily understood)
    - Remove duplication
  - Simplify control (logic, business rules, …)
  - Decompose one large to many small
  - Change method/algorithm

Outline

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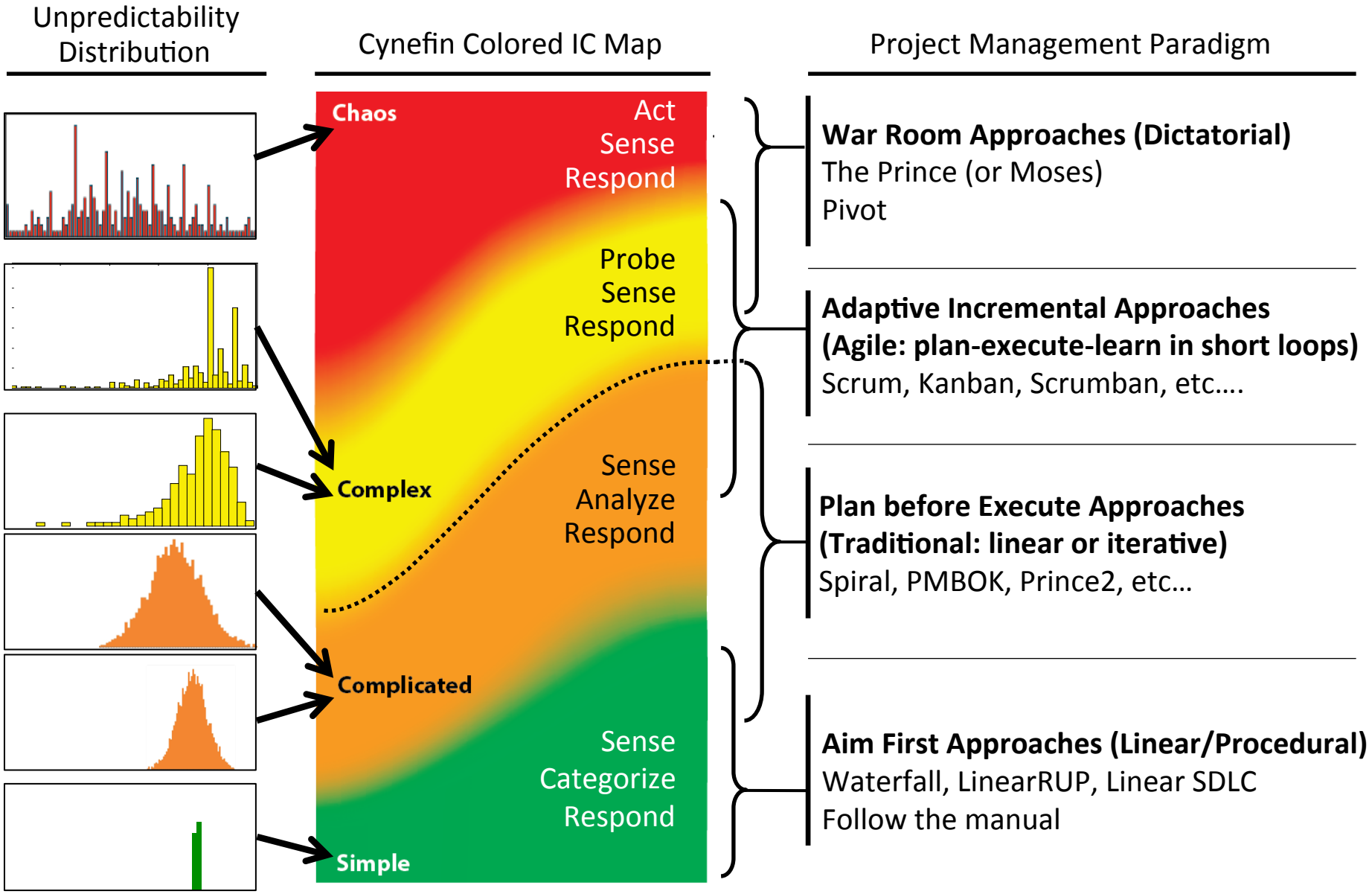
Optional, if we have time

- ✓ Portfolio Perspectives
- ✓ I-C Map

Sense-Making And The IC-Map

Volatility Reduction



Are Projects Like Investment Portfolios?

Do the Wall St. Shuffle…

- ✓ Are projects like investments?
  - ✓ Investment funds or SPDRs
  - ✓ Individual Stocks
  - ✓ Bonds
  - ✓ Options
- ✓ Turns out many are!
- ✓ Implications
  - ✓ Risk Management Tools
  - ✓ Portfolio Management Tools
  - ✓ Learn from Wall Street's mistakes!!!

Questions?