

Adaptive Software Development

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"Fire, fire, fire, fire, aim again, fire, fire, fire--there is no time for 'ready'."

-- Gary Hamel, Leading the Revolution

Ready, ready, ready, ready, aim, aim, aim... fire.

-- Traditional "heavy" project management & software development practices

The Path through the Quagmire of the Future

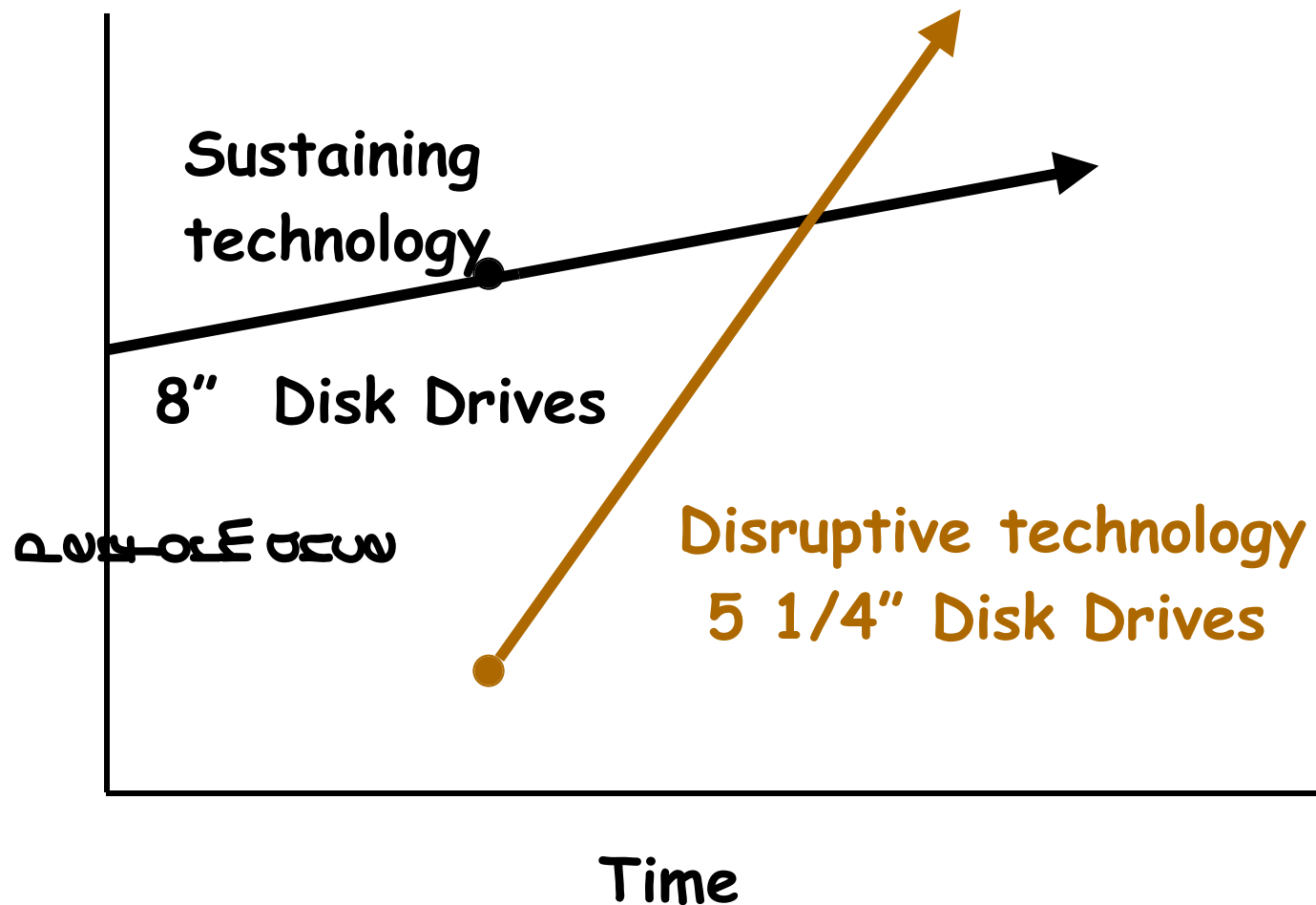
RADICAL INNOVATION

LIFECYCLE

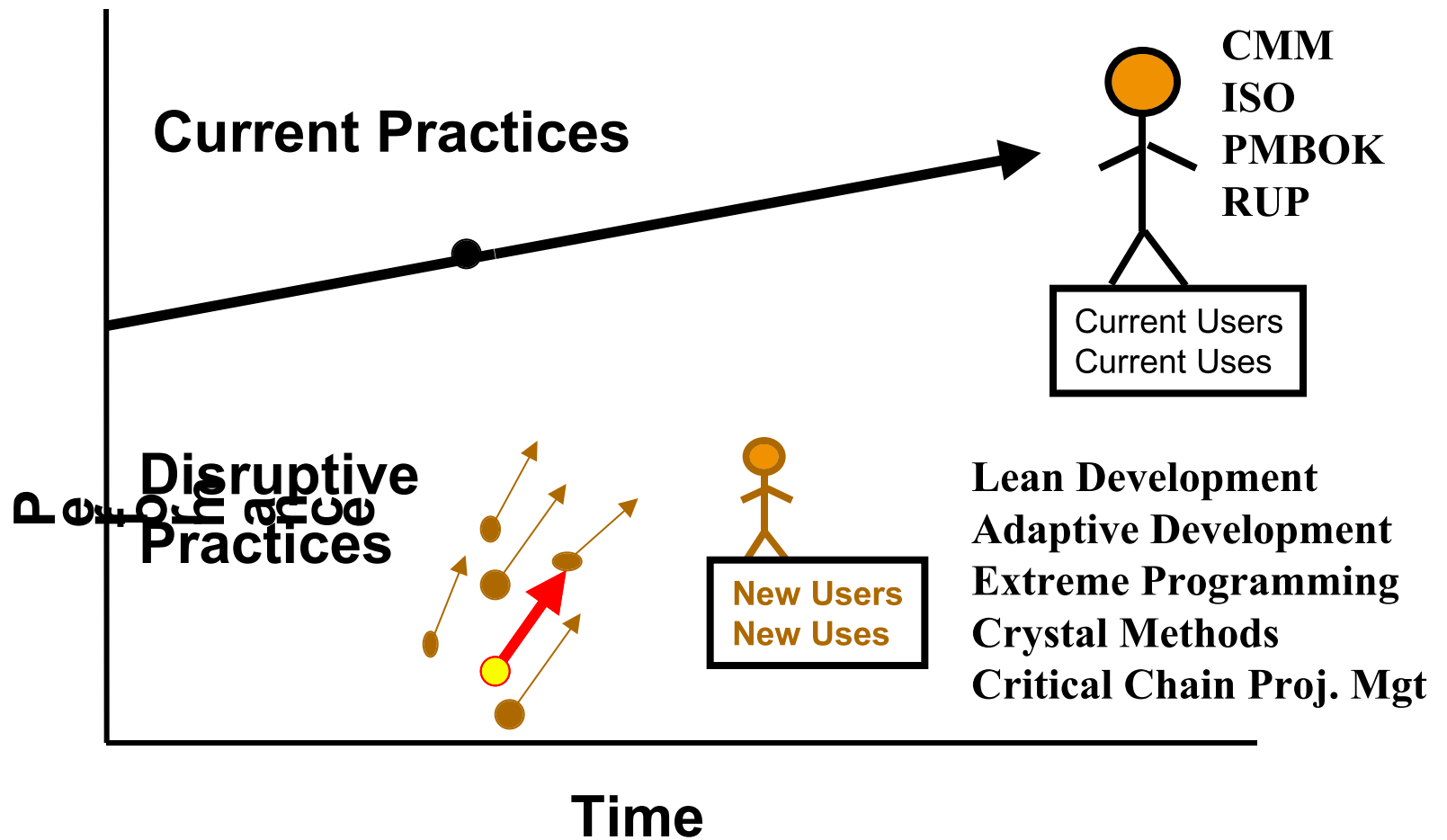
COLLABORATION

HARNESSING CHANGE

Why Even Good Managers Fail



Disruptive Practices



The Diabolical Challenge of Modern Software Development

To rapidly complete large projects that are both research-like and mission-critical in a turbulent business and technology environment.

Exciting Features

Rapid delivery

High quality

High change

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Why is this so hard?

It requires three traditionally incompatible behaviors from the same organization:

- **Innovation**
- **Discipline**
- **Adaptability**

Telecom development manager, "You can rant and rave all you want about software quality (or lack there of), but the marketing guys run the world and they want market share now...period, end of discussion. My job is to deliver on time on budget, with the 'appropriate' quality metrics."

Radical Innovation

- Business Models, Products, Practices
- Incremental innovation--cutting costs by 15%
- Radical innovation--cutting costs by 90%
- e-Business should be about Radical Innovation
- e-Projects without Radical Innovation are just Projects

"Radical innovation is the competitive advantage for the new millenium."

-- Gary Hamel, Leading the Revolution

Project Data with a Twist

Data from 210 projects, 1997-99, variety of industries:

- Schedule: 83 (40%) late by avg of 67%
- Cost: 30% over budget by 127%
- Project: 11 mths; Reqmts volatility- 22%
- 98 (47%) - couldn't find original numbers

Data from QSM Associates: Michael Mah

Complex (extreme) Problems

- **Complicated (increasing SIZE)**

- objects
- people
- connections

- **Complex**

- innovation
- speed
- change
- uncertainty

OPTIMIZATION

vs.

ADAPTATION

Disruptive and Innovative

- **Extreme Programming - Kent Beck +**
- **Crystal Method - Alistair Cockburn**
- **Lean Development - Bob Charette**
- **SCRUM-K. Schwaber, J. Sutherland**
- **Adaptive Software Dev - Jim Highsmith**

“I predict that Kent Beck and his XP movement will be as much a symbol of our times as Watts Humphry and the CMM were a symbol of the eighties and early nineties.” - Tom DeMarco, Cutter Report on Light Methodologies

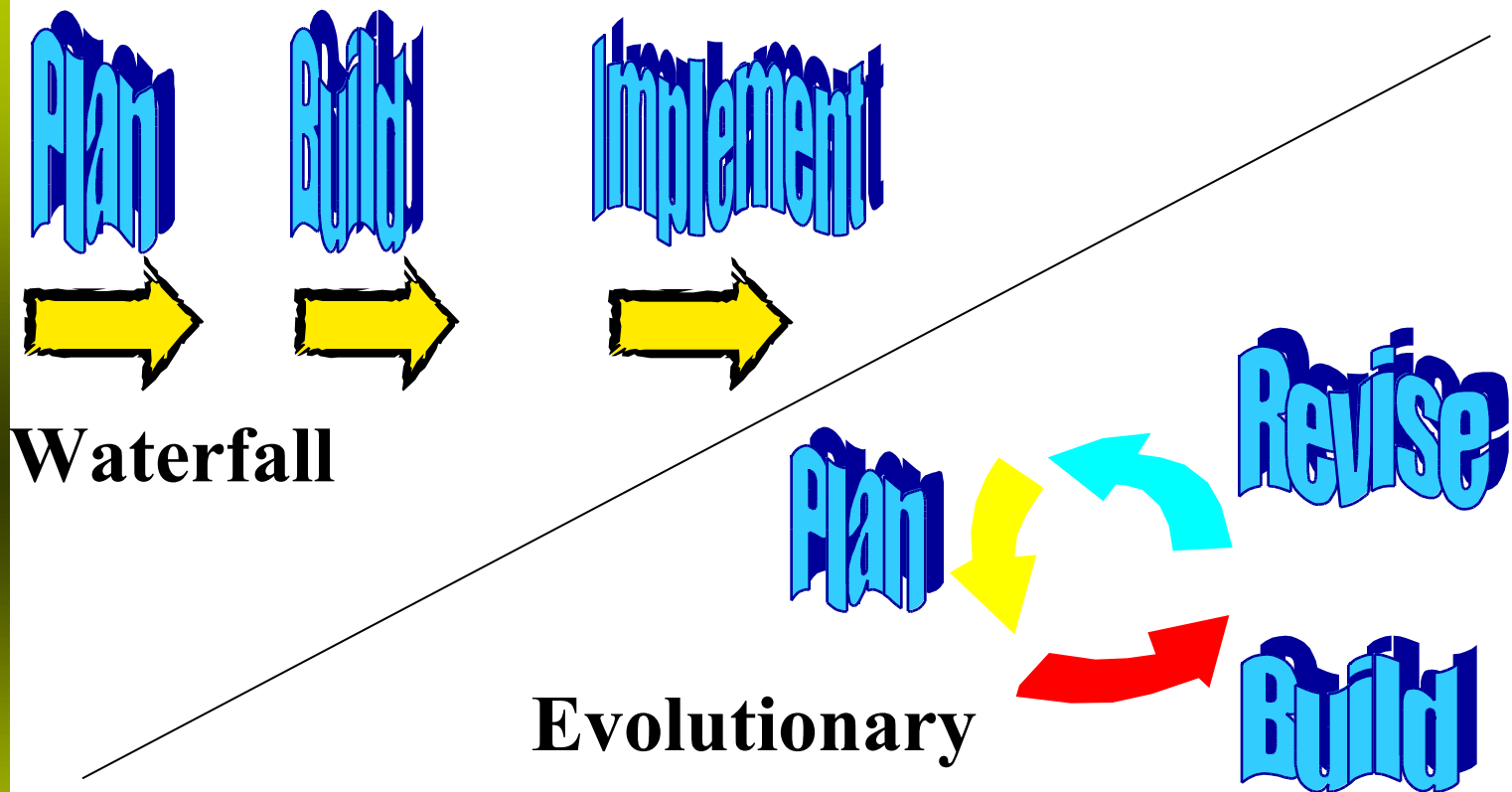
Core Principles of Light Methodologies

- **Customer Value--Focus on results**
- **Tacit knowledge--Focus on individual skills**
- **Collaboration--Focus on innovation through group interaction**
- **Adaptation--Focus on exploration & harnessing change**
- **Minimalism--Focus on simplicity**

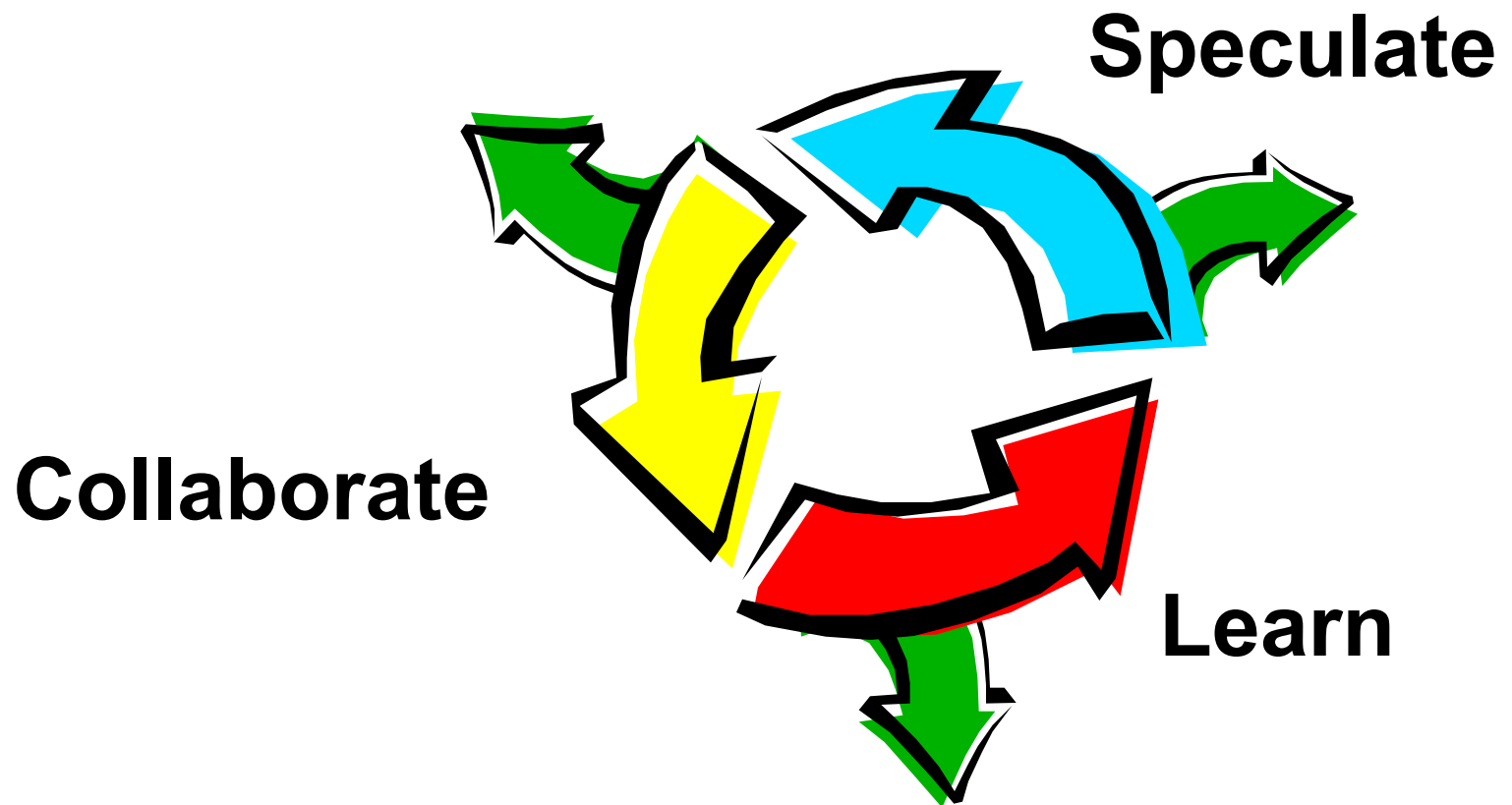
Adaptive Software Development

- **Disruptive Development Model**
 - Adaptive Life Cycle
- **Disruptive Science**
 - Complex Adaptive Systems
- **Disruptive Management**
 - Leadership-Collaboration

Traditional Life Cycles

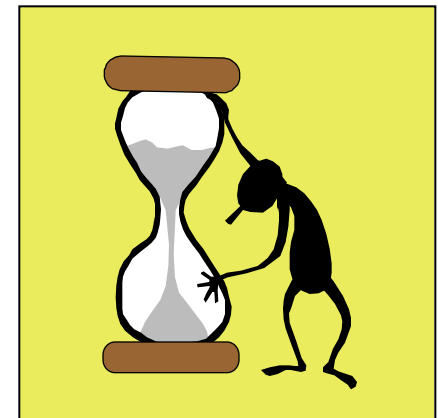


The Adaptive Life Cycle

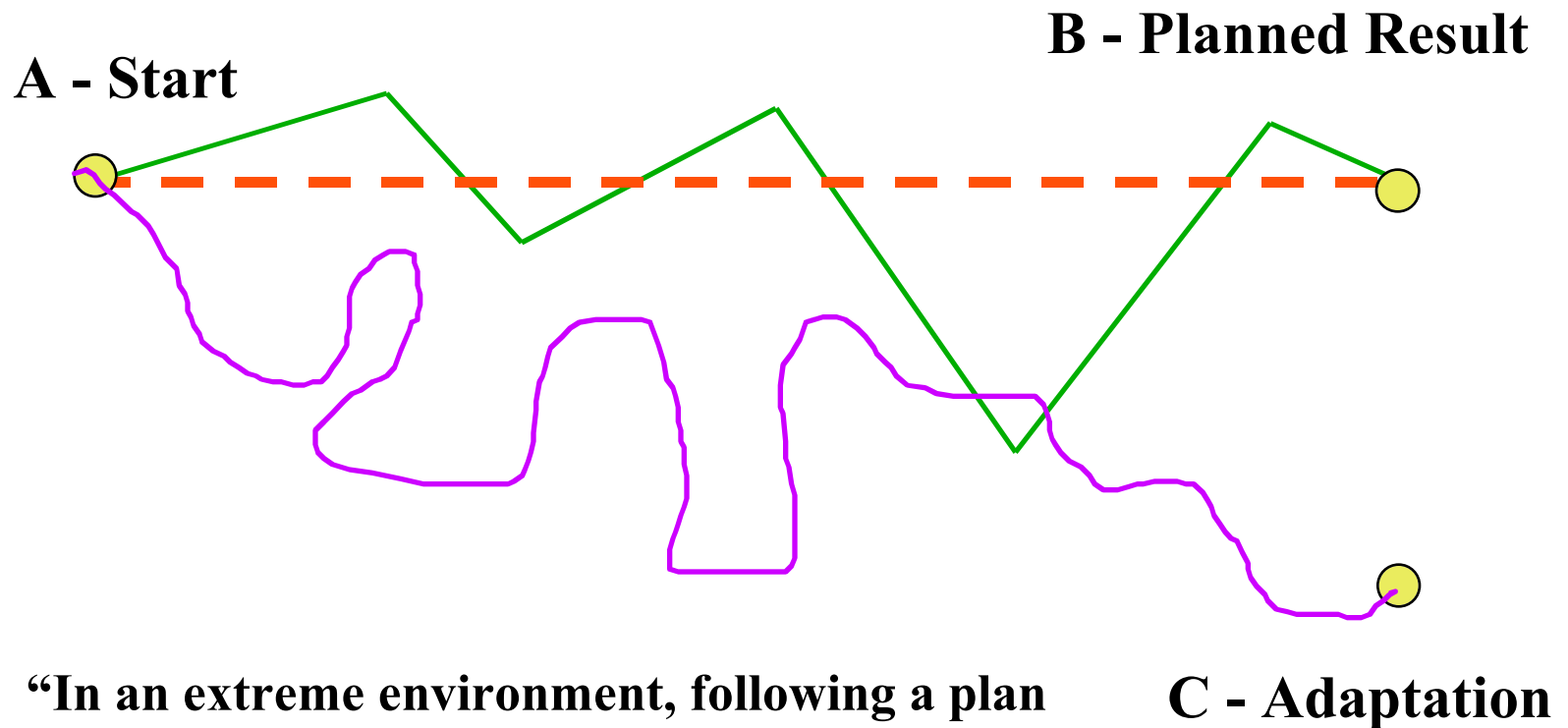


Characteristics of Adaptive Cycles

- **Mission-Directed**
- Iterative (exploratory)
- Feature/Component-Driven
- **Timeboxed**
- **Risk-Driven**
- **Change-Tolerant**



SPECULATE-Collaborate-Learn

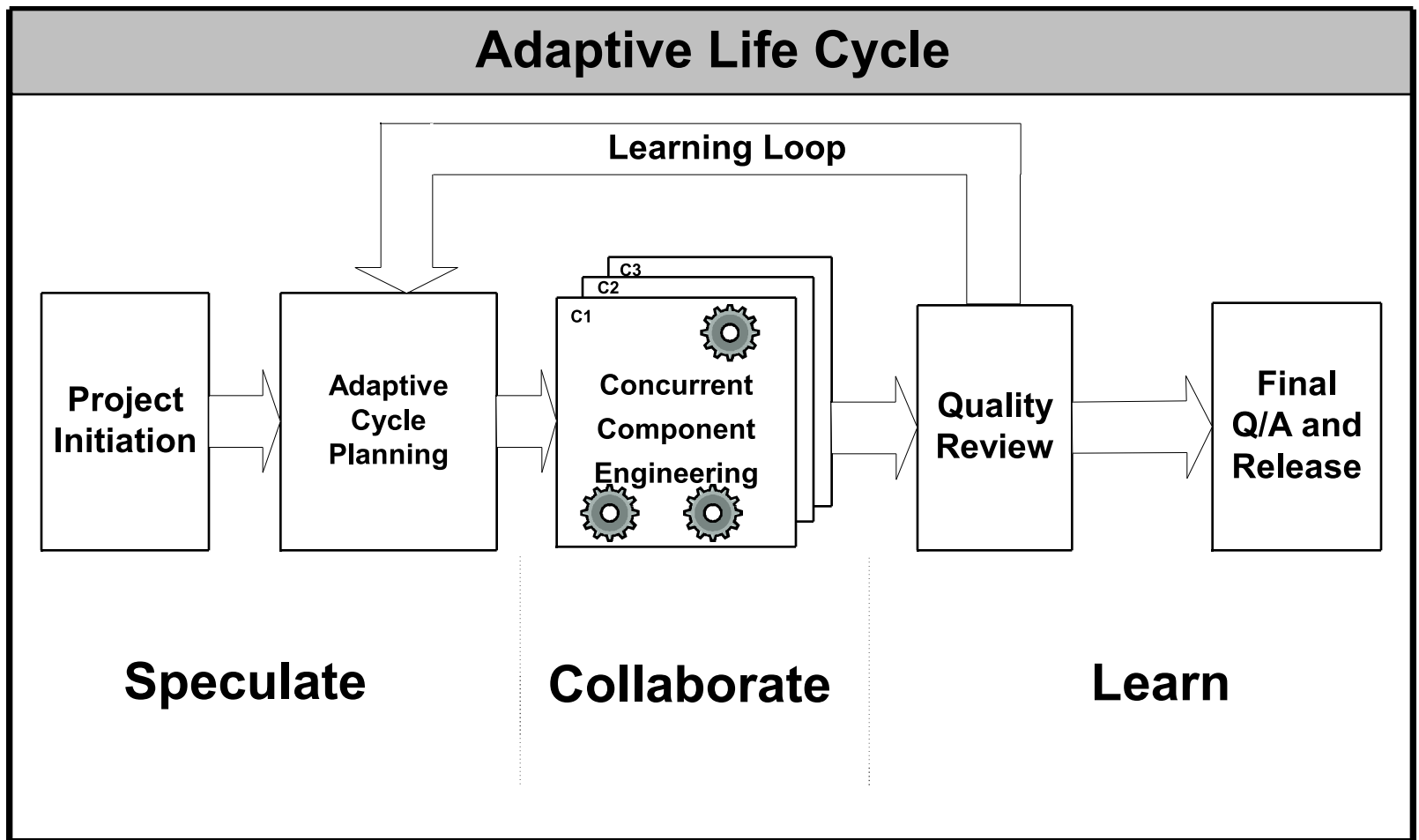


“In an extreme environment, following a plan produces the product you intended, just not the product you need.”

Envision-Explore, not Plan-Do

- **“Do It Right the First Time”**
- **Sends the wrong message**
 - we can't be uncertain
 - we can't experiment
 - we can't learn from mistakes
 - we can't deviate from plan
- **“Don't worry about getting it right the first time, get it right the last time.”**

The Adaptive Life Cycle



Cycle Objective Statement

Project Data Sheet

Project Data Sheet				
Project Name:	Project Leader:			
Project Start Date:	Executive Sponsor:			
Clients:	Client Benefits:			
Project Objective Statement:				
Performance/Quality Attributes:				
Focus Matrix:				
Scope	Excell	Improve	Accept	Target
Schedule				
Deliver				
Resource				
Features: (Ability to Statements)	Architecture:			
Major Milestones:				
1.	Date			
2.				
3.				
4.				
Issues/Risks:				
© 1992-97 Knowledge Structures, Inc.				

Feature List

<p>Conan Athletic Club:</p> <p>Ability to Statements:</p> <ul style="list-style-type: none"> • Generate invoices • Generate month-end reports • Prepare accounts payable checks • Process incoming supplies • Provide credit reporting • Record membership information • Send membership reminders • Schedule racquetball courts • Schedule basketball courts • Send mailings to members
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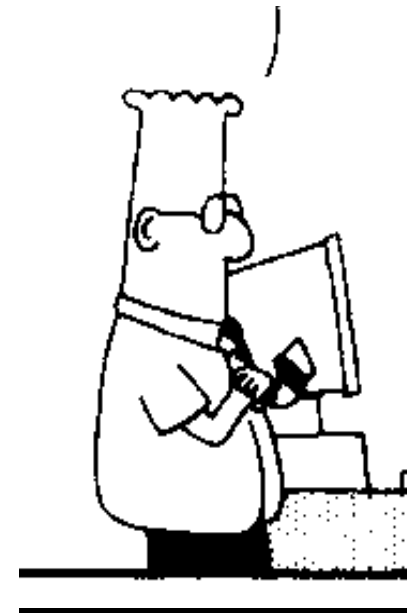
Risk Analysis

<p>Conan Athletic Club:</p> <p>Ability to Statements:</p> <ul style="list-style-type: none"> • Risk Area 1: -lkasdjfkjsifaksdj as;dlijf sadkfj • Risk Area 2: -alsk;fjds :alksdjflkerwoiwuer askdI • Risk Area 3: -jasdfj eioue a;ldfj rieou re akdsj
--

	C1	C2	C3	C4
Cycle Delivery Dates	1-Jun	1-Jul	1-Aug	1-Sep
Primary Features				
Order Entry	x	x		
Order Pricing		x		
Warehouse Picking		x	x	
Partial Order Ship			x	
Calculate Reorders			x	
System Interfaces			x	
Pricing Error Handling			x	
Security & Control				x
Technology Components				
Install Visual Basic	x			
Install Comm Lines			x	
Support Components		x		
Client/Server Arch		x		
Develop Conversion Pln			x	
High-level Data Model	x			

Speculate-Collaborate-LEARN

People are Idiots!



**“The greatest risk we face is overestimating
our own understanding.”**

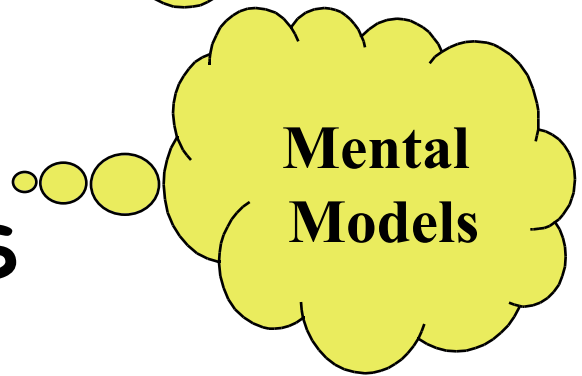
Learning Comes in Two Flavors

- Learning about THINGS



C++, JAVA

- Learning about OURSELVES



Mental Models

“Mental Models are the images, and assumptions which we carry in our minds of ourselves, and every aspect of the world. ... and all of these mental maps, by definition, are flawed in some way.” --Peter Senge

Learning Practices

Customer, product, team

- **Customer Focus Groups**
- **Peer Reviews**
- **Postmortems**
- **After Action Reports**
- **Communities of Practice**
- **Pair Programming (XP)**

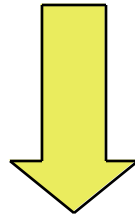
Speculate-COLLABORATE-Learn

	Deliverables	Decisions	Knowledge
Interpersonal			
Cultural			
Structural			

“The act of collaboration is an act of shared creation and/or discovery.”
Michael Schrage, *No More Teams*

Cultural Collaboration

Command-Control



Leadership-Collaboration

Command Control is too slow:

Can't process information fast enough

Can't make decisions fast enough

Dee Hock--former CEO Visa

**“Simple, clear purpose and principles
give rise to complex, intelligent
behavior.”**

**“Complex rules and regulations
give rise to simple, stupid
behavior.”**

Leadership-Collaboration

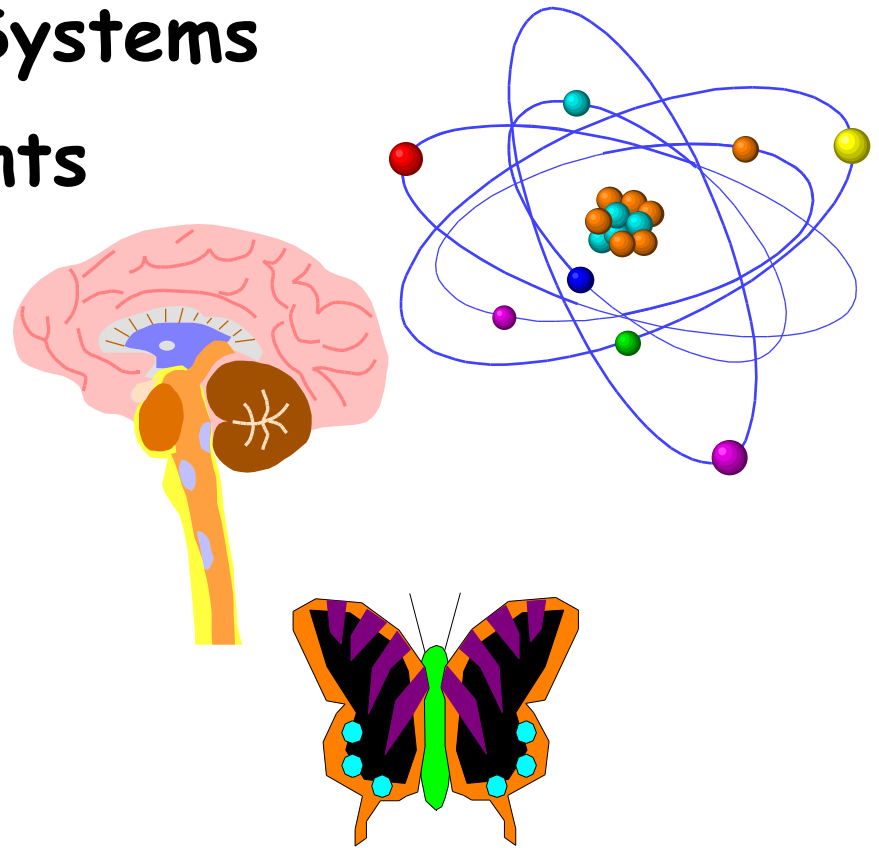
- Establish a Vision and Purpose
- Define acceptable boundary conditions
- Encourage innovation and collaboration
- Share Power (decision making)
 - Leader enables teams
 - Teams enable leaders
- Macro-management, not micro-management



A New Science for a New Era

Complex Adaptive Systems

- Independent Agents
- Self-organizing
- Emergent

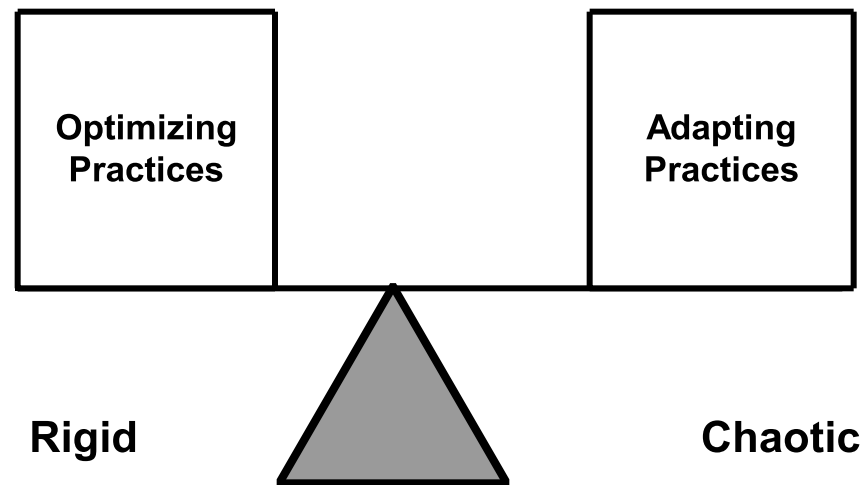


Why is this science important?

“Thinking of businesses as complex adaptive systems is one of the most important ideas of the decade. It is about sense making.”

- Tom Petzinger, Wall Street Journal

The Zone of Creative Adaptability

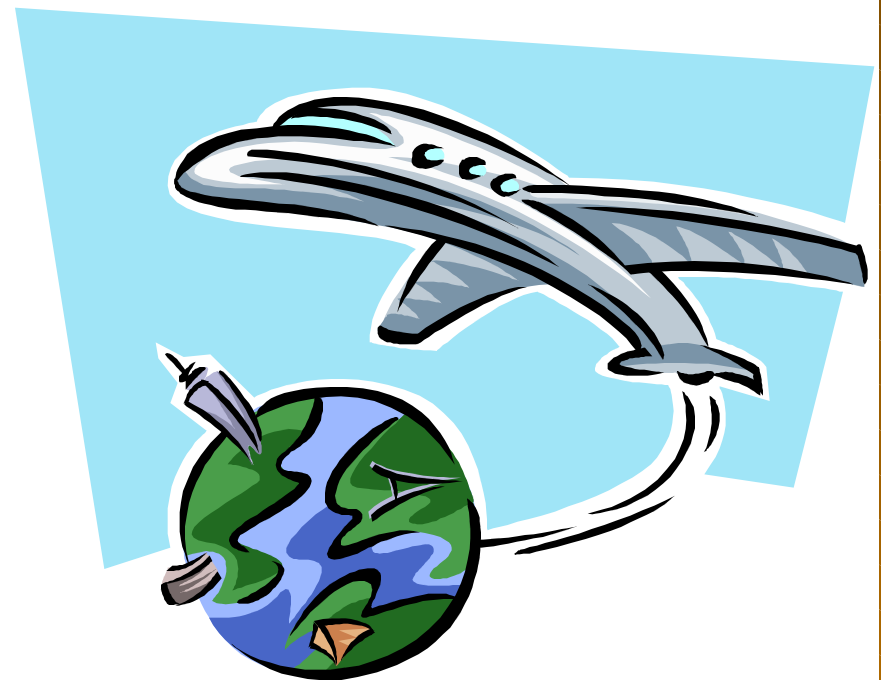


Poised at the Edge

Innovation, creativity, effective decisions, emerge at the “Edge of Chaos,” a narrow band perched between order and chaos.

Inertia and Adaptability

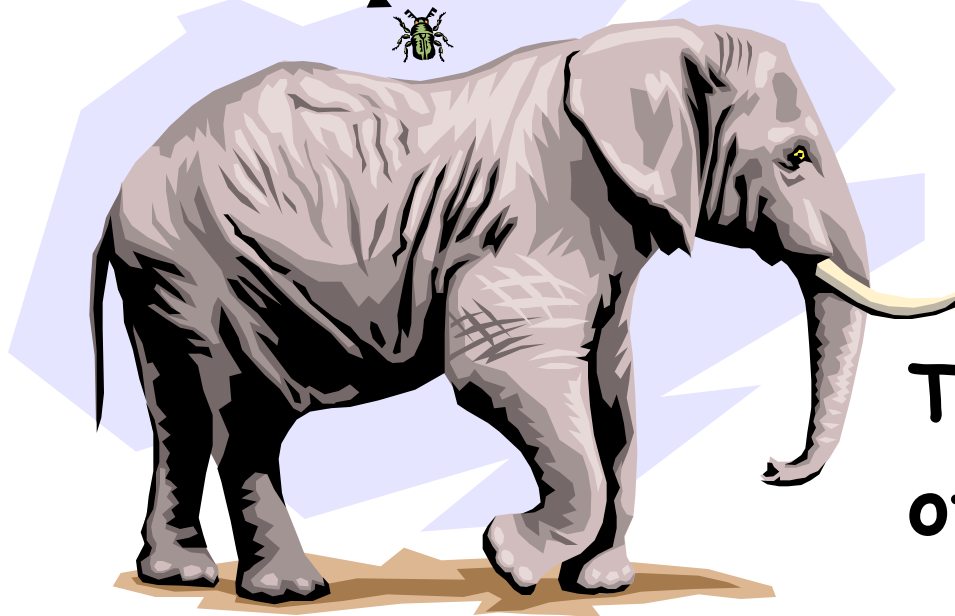
To adapt quickly,
inertia needs to be
kept low.



Harnessing Change

Flea

I am in control!



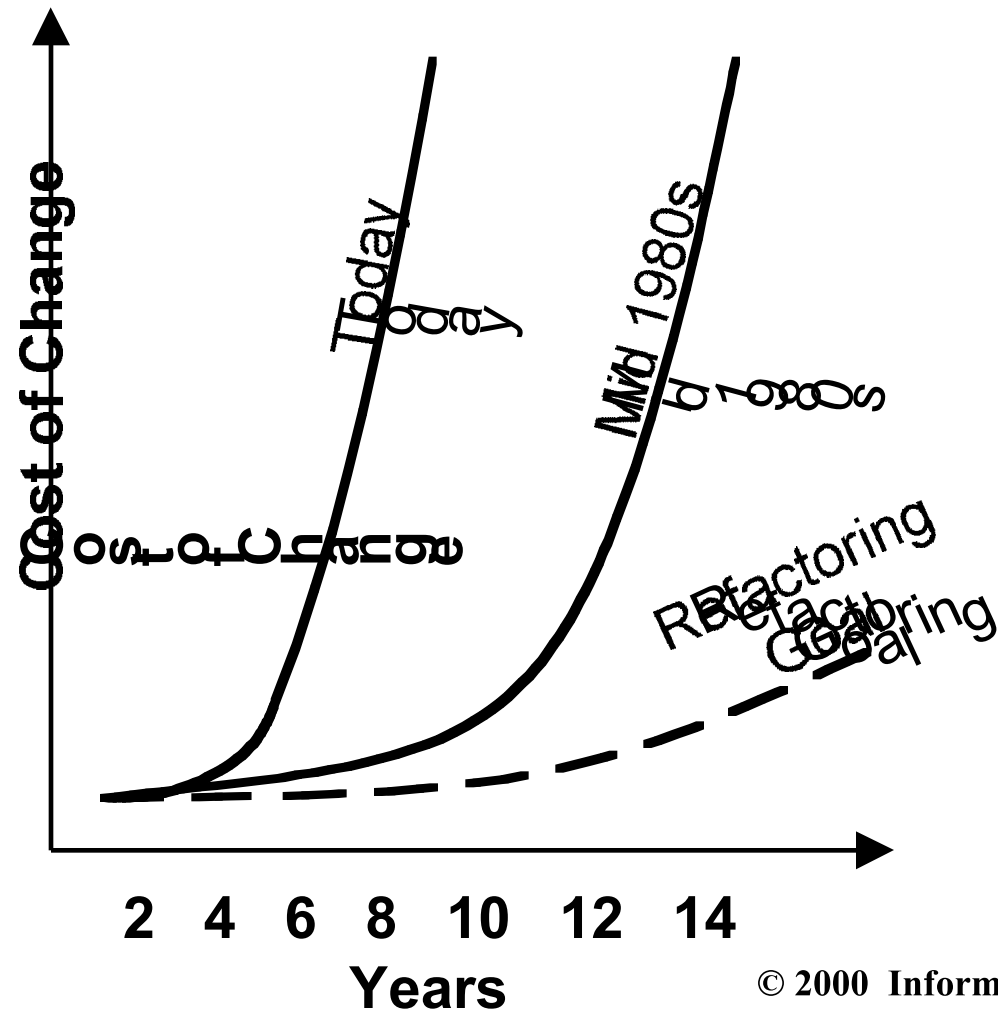
The magnitude
of change

Harnessing Change

- **Change is a competitive advantage**
- **"Rework" is a virtue**
- **Lighter beats Heavier**

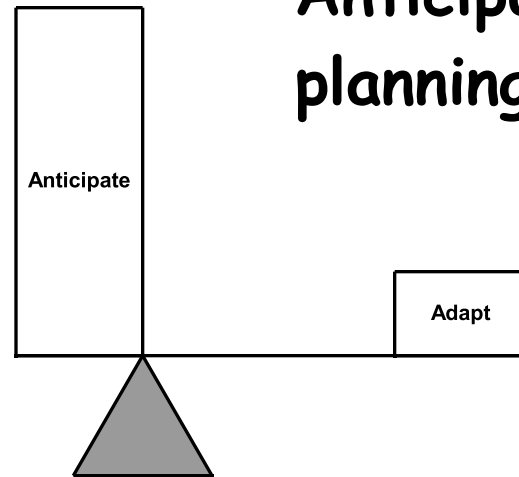


Impact of Change

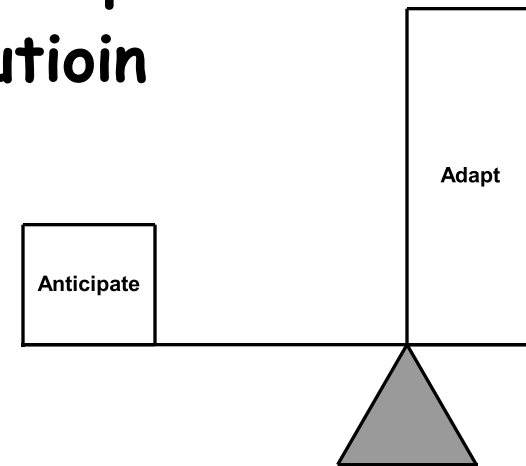


Dealing with Uncertainty

Anticipation: Presumptive planning, Overcaution



Lower -- Rate of Change -- Higher



Lower -- Rate of Change -- Higher

**“Rework” does not mean a broken process.
Rework is how we deal with change.**

Rework: Friend or Foe

- **Change can arise from**
 - #1 Broken Practice
 - #2 Turbulent Environment
- **Strategies**
 - #1 Fix the practice--eliminate rework
 - #2 Get better at "rework"
- **XP Strategy**
 - Simplicity
 - Continuous Testing

This is Documentation

Xenopus laevis is a unique resource for two critical vertebrate biological areas: early embryonic development and cell biology. In the former, *X. laevis* has led the way in establishing the mechanisms of early fate decisions, patterning of the basic body plan, and organogenesis. Contributions in cell biology and biochemistry include seminal work on chromosome replication, chromatin and nuclear assembly, cell cycle components, cytoskeletal elements, and signaling pathways.

-- National Institute of Health Xenopus Initiative

Light vs. Heavy Methods

- **Documentation is not Understanding (tacit)**
 - One Study of Typical Requirements Documents: 15% Complete, 7% Correct, Not cost effective to increase (Source: Elemer Magaziner)
- **Formality is not Discipline**
- **Process is not Skill**

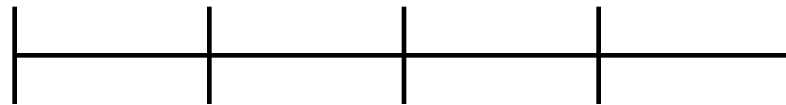
Understanding is the Goal

“We believe it is time for firms to shift their attention to the more human aspects--from access to attention, from velocity to viscosity, from documents to discussions.”
-- Thomas Davenport & Laurence Prusak, *Working Knowledge: How Organizations Manage What They Know*

- **Attention-Use**
- **Viscosity-Richness**

Traditional Light/Heavy Debate

**Traditional View:
1 dimensional balance**



Light

Heavy

Optimizing

Process, Documentation, Formality

What to do next

- Analyze the complexity of your projects
- Examine your organization's culture
- Understand principles of Light Methods
- Improve performance by evolving your own "methodology" based on balancing:
 - Your problem, Your culture, Light Practices

Remember, methodology is a framework for thinking, not a prescription for action.

There is no Unified Thinking Tool.

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The Business of Ideas

“Our businesses are only as successful as our ideas. If our ideas are out of date, the behaviors they drive will be out of date.”

-- Howard Sherman & Ron Schultz, *Open Boundaries: Creating Business Innovation Through Complexity*.

Why Light Methods?

Radical Innovation

“Companies fail to create the future not because they fail to predict it but because they fail to imagine it.”
--Gary Hamel, *Leading the Revolution*

Community

“People, and Relationships, are the new bottom line of business, not simply for humanistic reasons, but as a way to promote adaptability and business success.” -- Roger Lewin and Birute Regine, *The Soul at Work: Embracing Complexity Science for Business Success*