

Artful Process and Business Innovation

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Copenhagen Business School, September 22, 2005

Agenda

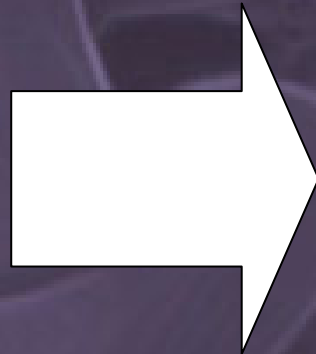
- Outline of the ongoing research project
- Problem and motivation
- Working through the framework
 - Determinants and Structure

BREAK

- Management Implications

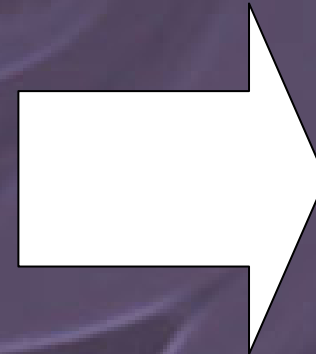
Determinants

Determinants of process structure (e.g., production task costs, demand for output novelty)



Structure

Process Structure (Ad hoc, Sequential, Iterative)



Management Implications

Management Approach

- Process Design
- Mgmt Control
- Mgmt of Variation
- Risk Mgmt
- Knowledge Mgmt
- Motivating/ leadership

Project Phases


- Phase 1: Field research in a regional theatre company
 - Interviews, observation, case study
- Phase 2: Framework development
 - Theory papers
- Phase 3: Generalization and framework refinement
 - Interviews, additional case studies

Research Precursors

- **Dysfunctional Measurement/Control**
 - Ridgway, 1956; March and Simon, 1958; Blau, 1963; Ouchi, 1979; Holmstrom and Milgrom, 1991
- **Methodology debates in product development**
 - Beck and Boehm, 2003; Highsmith, 2001
- **Social psychology of creativity**
 - Amabile, 1996; Simonton, 1999
- **Production/Ops Management**
 - Hayes and Wheelwright, 1979
- **Emergent Strategy**
 - Mintzberg and McHugh, 1985; Eisenhardt and Tabrizi, 1995



Problem and Motivation



“The future belongs to those
who know how to create new
things.”

Something an insurance company executive said to me...

“Chunk it, routinize it, digitize it, automate it, and send it offshore.”



DISCOVERY

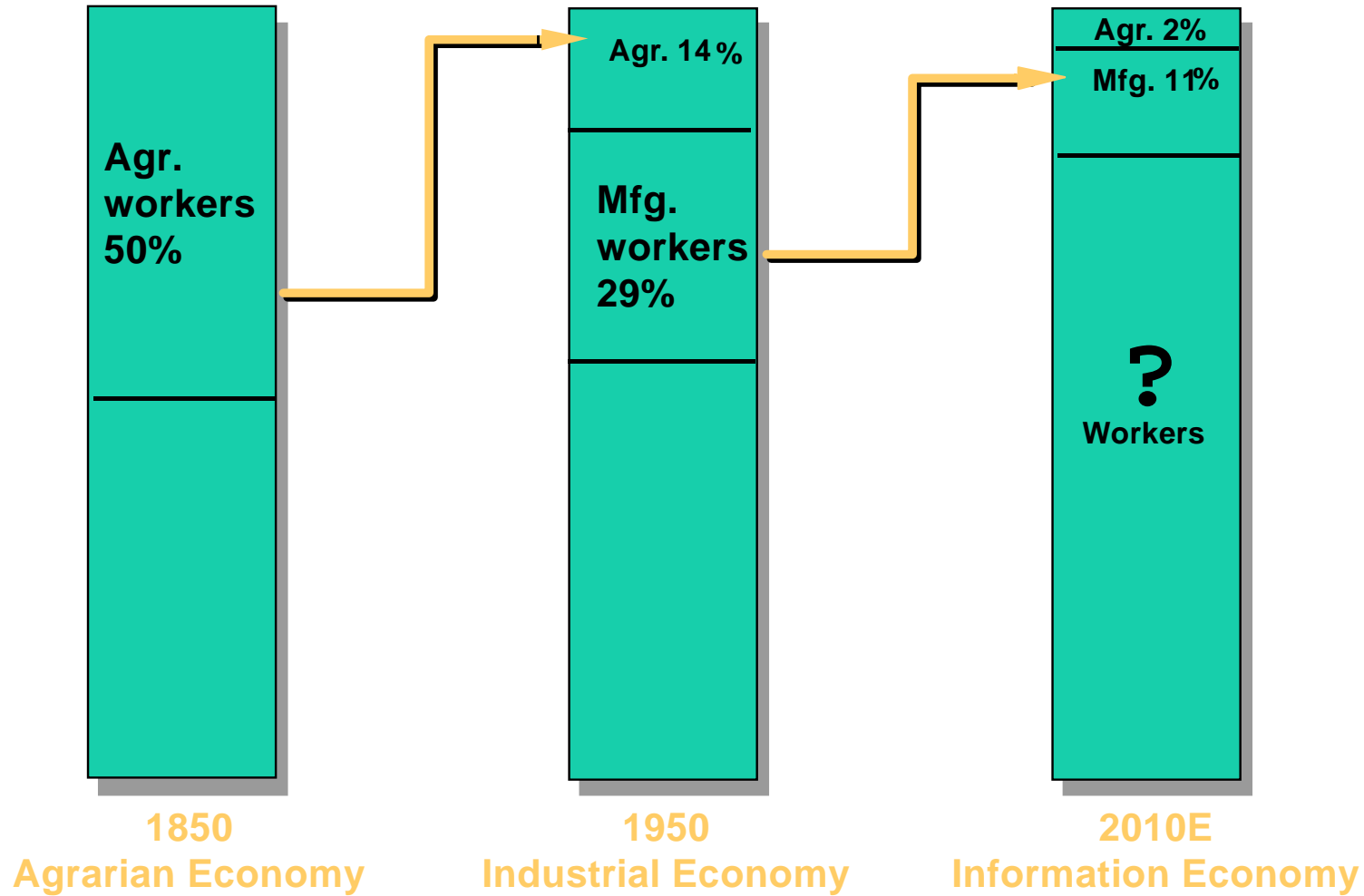
A COMPANY THAT WILL GO TO THE ENDS OF THE EARTH FOR ITS PEOPLE
WILL FIND IT CAN HIRE THEM FOR ABOUT 10% OF THE COST OF AMERICANS.

www.despair.com

“The future belongs to those who know how to create *new* things.”

New products, services, strategies, processes, markets...not about routinization or automation, at least not in the traditional sense.

Agrarian to industrial to information economy



“The future belongs to those who know how to create new things.”

It would be surprising, at this stage in the development of the information economy, if managers fully understood how to manage this new kind of work

We have “industrial age” reflexes and want to do what we already know how to do, not what we’re still learning how to do...

WSJ - “Human Element: Drug Industry’s Big Push Into Technology Falls Short”

- “In 1991, Schering-Plough scientists were looking for a drug that would block a certain cholesterol-producing enzyme in the body. They noticed in a test on hamsters that one molecule, while failing to block that enzyme, nonetheless lowered cholesterol. If a robot had tested the molecule, it would have caught the failure but missed the serendipitous side effect...scientists stumbled onto a new approach for reducing cholesterol.”

Industrial reflexes clash with the need to innovate...

The Road to Mecca at PLTC

- “One of the characters was setting a table—plates, cutlery, glasses with stems—while conversing with another character. At a tense moment, the actor setting the table bumped a glass with the back of her hand, causing it to fall...this could have been very disruptive...but she incorporated it into the performance. The chair had a cushion, so the glass bounced. She caught it mid-bounce and froze...as if the whole thing were a reaction to what had just been said...she made it part of her work.”

Project Management Advice: “Prevent Scope Creep”

- “Scope Creep is the expression used by project managers under pressure to deliver in excess of what was originally agreed. Scope creep results from a failure to establish the clear requirements of business users...scope of the original plan can start to move - and continue to move. If the project manager is not alert ... the requirements will constantly change...the project spends years on delivering nothing... continually reviewing and altering direction.”

Product Design at IDEO

- “Fail often to succeed sooner.”
- “If a picture is worth a thousand words, a prototype is worth ten thousand.”
 - Expect to discover things in the process
 - “You learn as much from a model that’s wrong as you do from one that’s right.”
- “If at first an idea does not sound absurd, there is no hope for it.”
- “It’s inconceivable that the head guy in any organization will know all the answers.”

Source: “IDEO Product Development,” Stefan Thomke and Ashok Nimgade, HBS case 600-143

Toyota Production System

- “Toyota Production System principles reflected two assumptions about production environments. First, true need would deviate from a production plan unpredictably, no matter how meticulously that plan was prepared...Second, problems would crop up constantly on the shop floor, making deviations from planned operating conditions inevitable...”

Source: “Toyota Motor Manufacturing, USA, Inc.,” Kazuhiro Mishina and Kazunori Takeda, HBS case 693-019, 1995.

Emergence as a Side Phenomenon or Problem

- **Implicit (industrial) assumptions:**
 - *Drug research:* We can pre-program drug discovery to a degree adequate for success
 - *Scope creep in project management:* Emergent needs are a defect of process design or project management
- *Implication:* If you experience unanticipated events, you probably didn't plan well enough...



versus...

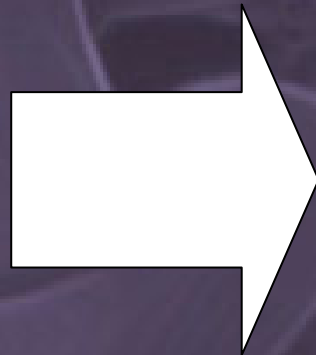
Emergence as Opportunity or Inevitable Reality...

- Implicit assumptions:
 - The most value arises from how you handle events or circumstances you did not or cannot anticipate
 - Getting a different outcome requires doing something different (i.e., innovation cannot be pre-programmed)

Value arises out of *found innovation* or *serendipitous insight*...

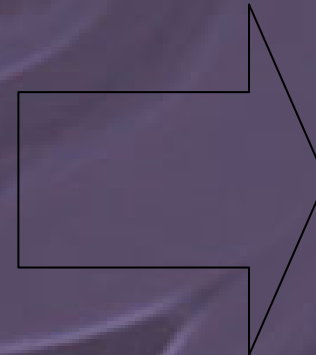
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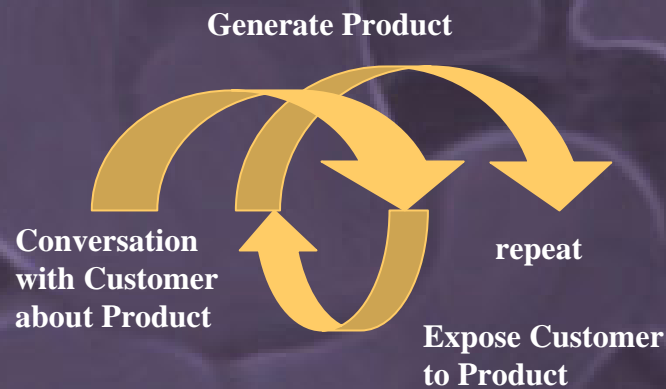
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The “Shape” of Reliable Innovation

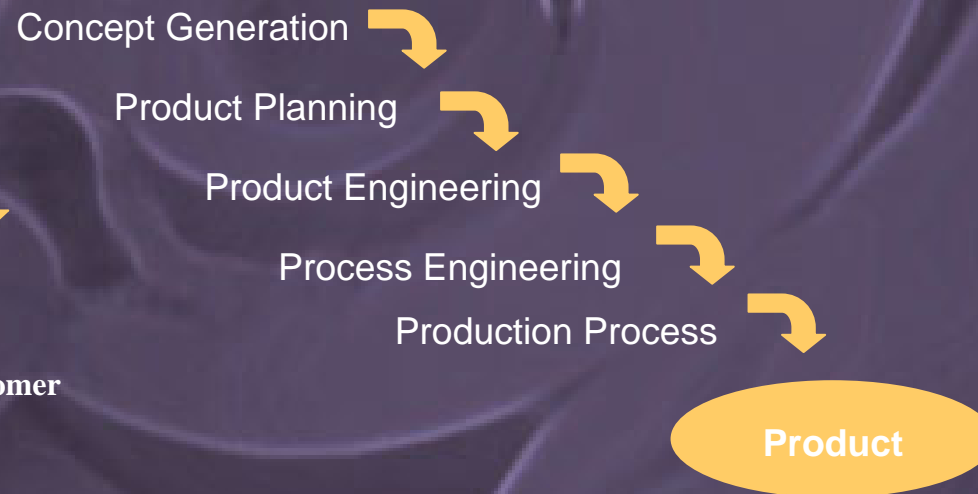
Iterative...



Software Development at
Trilogy

Building the right thing

Not Sequential...



Clark and Fujimoto's
Description of the Automaking
Process

versus building the thing right

“Artful” vs. “Industrial Making”

- Artful Making
 - Managing when you don’t (or can’t) know where you are going
 - Exploration and production are combined
 - Iterative
 - Learn more from doing than from a lot of planning
- Industrial Making
 - Managing when you *do* know where you are going
 - Separates exploration and production into separate phases
 - Sequential
 - Extensive analyzing and planning before doing

The Prerequisite Cost Conditions for Artful Making

- Cheap and rapid iteration
 - Low Reconfiguration Cost
 - The cost of changing a process
 - Analogous to “retooling cost” in a factory setting
 - Usually high in industrial settings
 - Often lower in knowledge work settings (easy to retool ideas)
 - Low Exploration Cost
 - The cost of trying something that doesn’t work out
 - Analogous to “scrap cost” in a factory setting
 - Usually high in industrial settings
 - Sometime high, sometimes low in knowledge work
- High Demand for Innovation

These conditions are not always met (of course)...

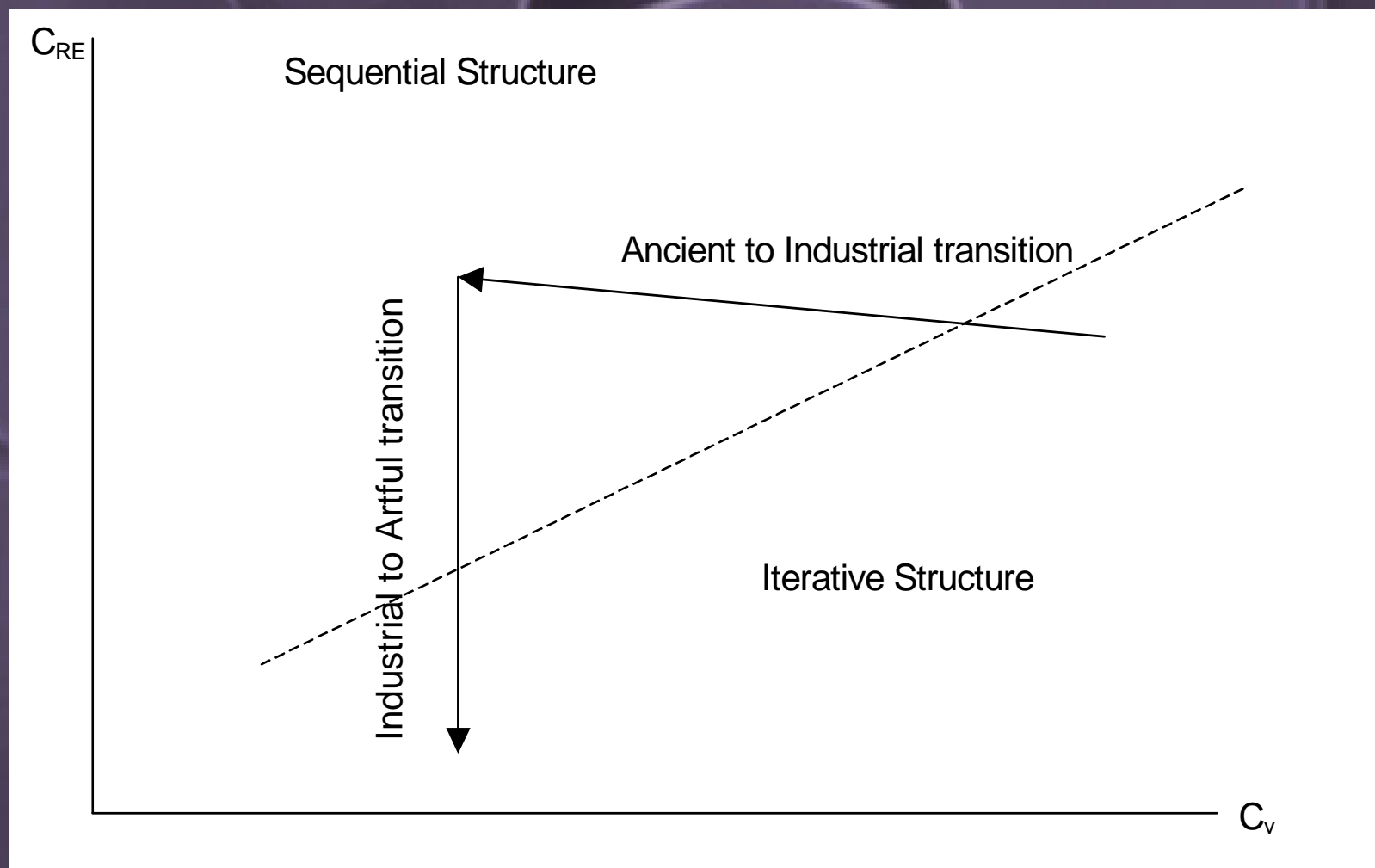
A Historical Perspective

- Ancient Making
 - Everything made for a purpose
 - High reconfiguration and exploration costs, plus high variable cost
 - High costs mean certain transactions cannot occur
- Industrial Making
 - Solves problem of high reconfiguration and exploration costs by a radical means -- *don't change the process*
 - Separate development and production, make items identical, spread development costs over a large number of units -- reduce variable cost dramatically
 - Many more transactions can occur, huge amount of wealth created
- Artful Making
 - Inherently low reconfiguration and exploration costs (or can be made low through application of technology)
 - *The problem industrial making solves is not present for artful work!*
 - *No need to structure artful work industrially!*

The Future of IT Value Creation?

- Innovation is often made possible by enabling technology that drives down the cost of iteration
 - Prototyping technologies
 - Version control, change control, rapid build
- Not end-to-end automation to enforce process consistency
- JCR Licklider (1960)
 - “About 85% of my ‘thinking’ time was spent getting into a position to think...”
- Revenue side versus cost side value creation
- Less transactional, more interactive technologies

A Historical Pattern?



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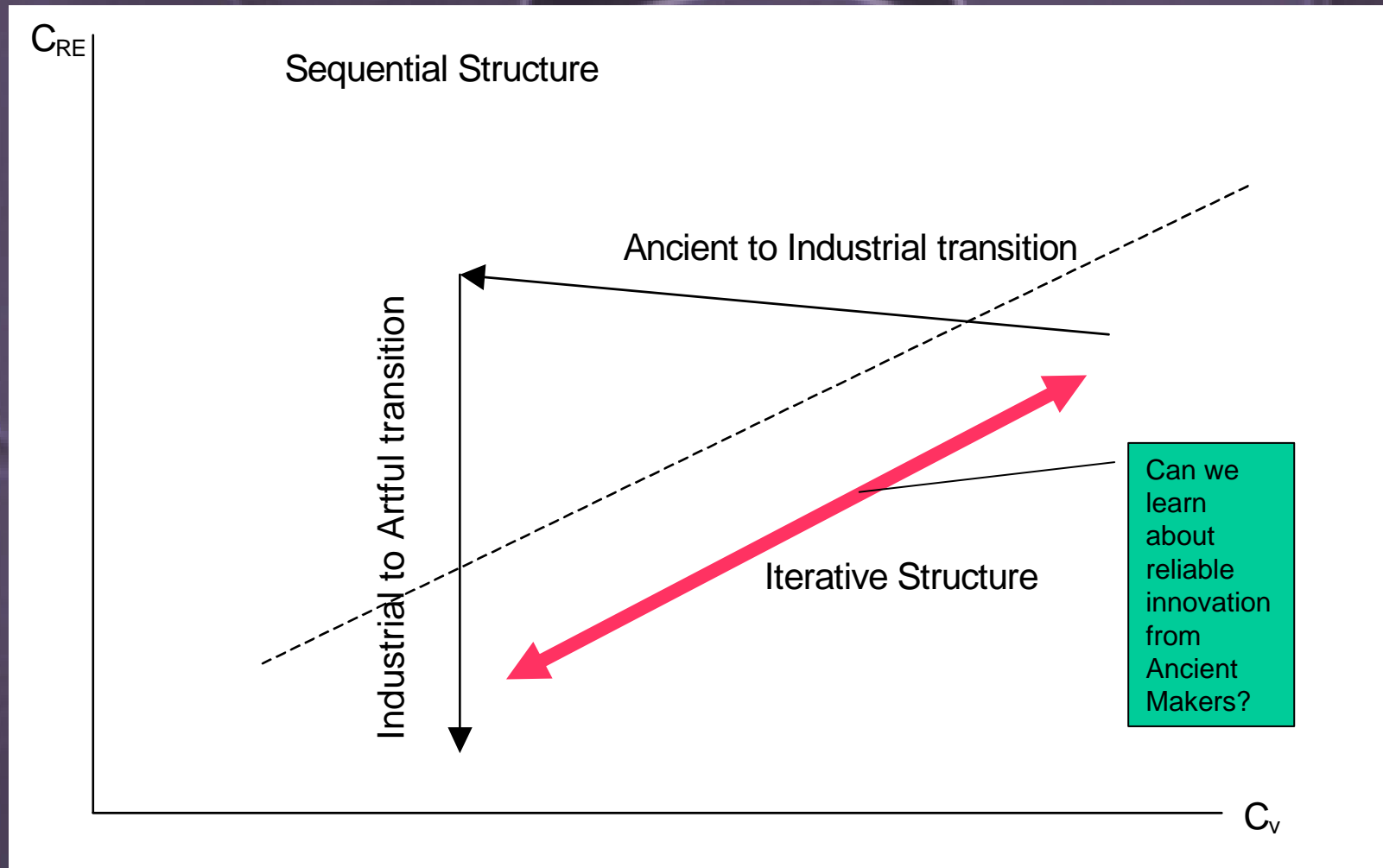
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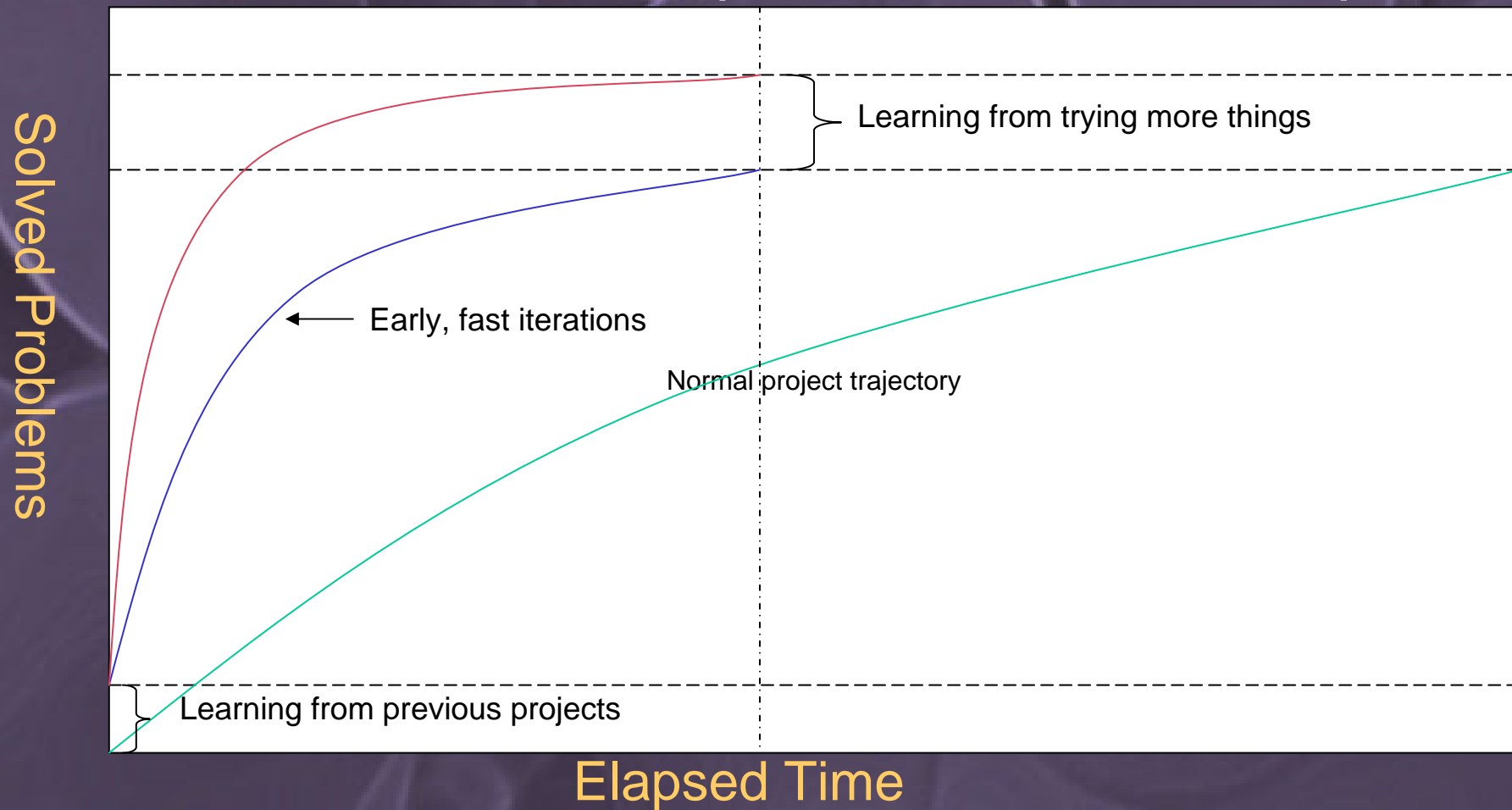
Managing Iterative Process for Reliable Innovation



Emergence and Iteration

- “It’s like Picasso’s *Guernica*. He did tons of elaborate color sketches and renderings that are works of art themselves. He did all of that exploration, and then did a black and white painting. Sometimes the process requires you to throw yourself out there, really explore all the colors, all the emotion, then strip it all away to what’s essential.”
-- David Bradley, PLTC
- “Strategies grow like weeds in a garden...sometimes it is more important to let patterns emerge than to force artificial consistency...to manage this process is not to preconceive strategies, but to recognize their emergence and intervene when appropriate” -- Mintzberg and McHugh

Solving Problems Earlier Through Front-Loaded Processes (Thomke 2003)



Emergence and Iteration

QuickTime™ and a
Video decompressor
are needed to see this picture.

Control Through Release

- As opposed to *control through restraint*
 - The George Abbott or Neal Patterson approach
 - Compliance mechanisms
- Managing people who can do things you cannot
- Achieving freedom from tension (release)
- Focus

At the People's Light, a 2.5 hour play finishes within about 30 seconds of the same time from night to night...

Managing Talented People

- “It’s the real deep technical guys that are tough...This may be the most difficult issue we face...they tend to be your most precious commodity—and your worst nightmare. You have no idea what they’re doing. They sit there with 42 little windows open on their 17-inch monitor. [But] when [your business shifts] you’ll often find the seed for the shift in that group because they’re not really paying attention to you all along anyway. They were worried about some way-out-there trend. They’ll see it and there will be something there. [The key to] how to manage change is in that group of folks you don’t have a lot of control over.”

– Robert D. Austin and Patrick D. Larkey, “Performance Based Incentives in Knowledge Work: Are Agency Models Relevant?” *Int. J. Business Performance Management*, Vol. 2, Nos. 1/2/3, 2000, p. 57.

Control Through Release

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Openness to Random Inputs

- Processes based on replication are usually buffered against external shocks
 - McDonald's French fries
 - Unexpected inputs or demand patterns are a problem
 - Cybertech
 - Digital Endpoint
- Processes based on reconceiving are not buffered against external shocks but spend much time preparing for them
 - Polonius, Hamlet and Ophelia
 - Apollo mission control
 - This is a primary purpose of rehearsal
 - To practice dealing with the unforeseeable
 - To free workers of preconceived expectations about outcomes

Openness to Random Inputs

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Industrial Making Replicates; Artful Making “Reconceives”

Replicating	Reconceiving
Produces pre-specified outcomes	Produces outcomes that were not pre-specified
Design and manufacturing are separate, sequential phases; the process for producing the pre-specified desired outcome is also designed in advance	Design and manufacturing are part of each other; the process that produces a desired outcome is the same process by which the desired outcome is discovered
Produces a finite and discrete number of outcomes (e.g., a car in red, green, or blue)	Can produce an infinite number of unique outcomes, including “in-between” outcomes (e.g., a car that is “a little darker green than that”)
Making processes are buffered against variation	Making processes seek out and are driven by variation
Well-defined notion of final outcome	Ongoing adjustment of outcome; notion of a “final product” problematic

Artful Making and “Failure”

- Computers are good at seeing patterns, better than we are. They can connect things that seem unrelated to each other, scanning the night sky or the stained blotches of 50,000 proteins on an electrophoretic gel or the numbers generated by all the world's stock markets, and find relationships that matter. We do something like this with our brains, but we do it differently; *we get things wrong*. We use information ... for leading to thoughts that really are unrelated, unconnected, patternless, and sometimes therefore quite new. If the human brain had not possessed this special gift, we would still be sharpening bones, muttering to ourselves, unable to make up a poem or even whistle.
 - Lewis Thomas. *The Youngest Science; Notes of a Medicine-Watcher*, The Viking Press: New York, 1983, pp. 89-90. Emphasis added.

Lee Devin: “To call a necessary step on the way to something important a ‘failure’ merely tortures language”

Artful Making and Failure

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Knowledge Management

- Collecting
- Not the same as “reuse”
 - Don’t necessarily get used (or even consulted) exactly as recorded
 - Building the history of an innovation
- IDEO’s “Tech Box”

Knowledge Management

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Motivation

- Restlessness
- Relentless pursuit of something different
- Predictable is “boring”

Motivation

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MOTIVATION

IF A PRETTY POSTER AND A CUTE SAYING ARE ALL IT TAKES TO MOTIVATE YOU,
YOU PROBABLY HAVE A VERY EASY JOB. THE KIND ROBOTS WILL BE DOING SOON.

www.despair.com

Are we educating young people in the right way...?



raustin@hbs.edu

For more information on this subject:
Artful Making by Rob Austin and Lee Devin

