

TPS Lean and Scrum

How they are developed and influenced one another

Kiro Harada
Attractor Inc.





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Kiro HARADA

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Domain Modeler
SCM Consultant**

Twitter: @haradakiro



बोधिसेन

Bodhisena visited Japan in 736 A.C.







“The principal object of management should be to secure
the maximum prosperity for the **employer**,
coupled with
the maximum property for each **employee**”

“The important object of both the workmen and the management should be the **training** and **development** of each individual in the establishment, so that he can do (at his fastest pace and with the maximum of efficiency) the highest class of work for which his natural abilities fit him.”

Scientific Management

improving **economic efficiency**, especially labor productivity by applying **science** to the engineering of processes and to management.



Frederik Taylor

When we started thinking about **Productivity**?

- ✦ We've been doing try and errors all the time.
- ✦ When did we start thinking about improving?

In early 1900's,

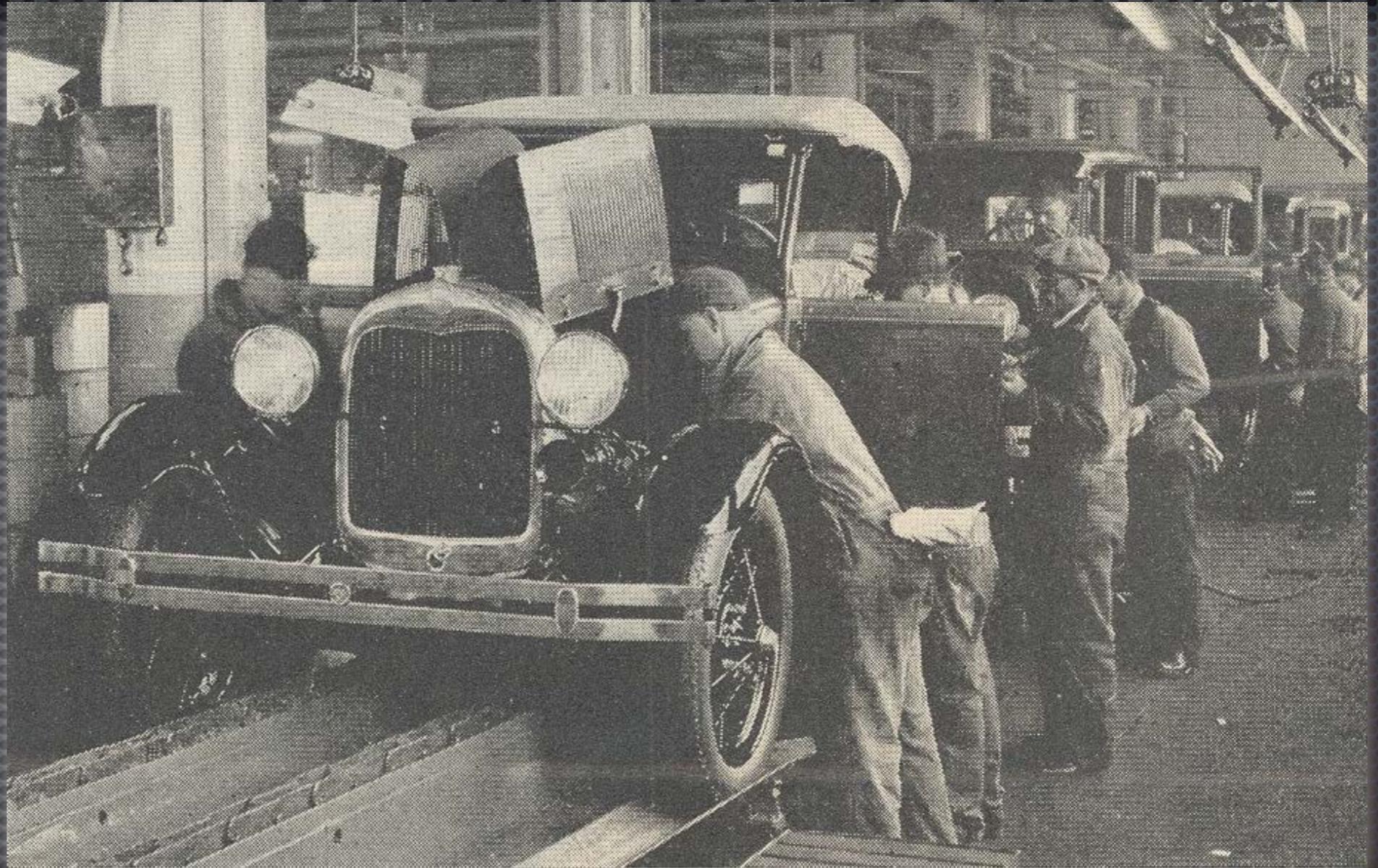
We decided to specialize more to improve productivity:

Thinkers and **Doers**

Managers and Workers

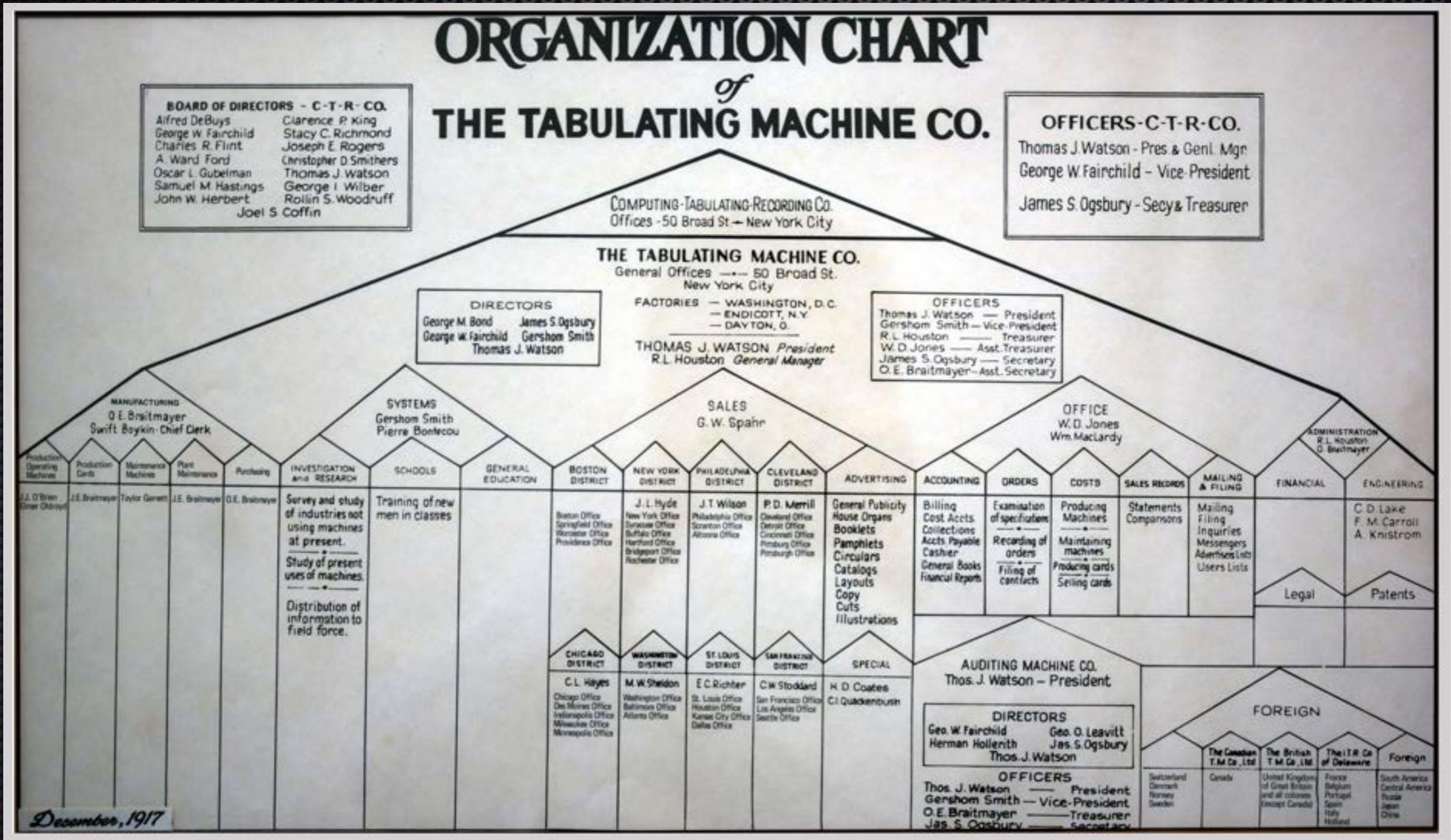


Manufacturing Line

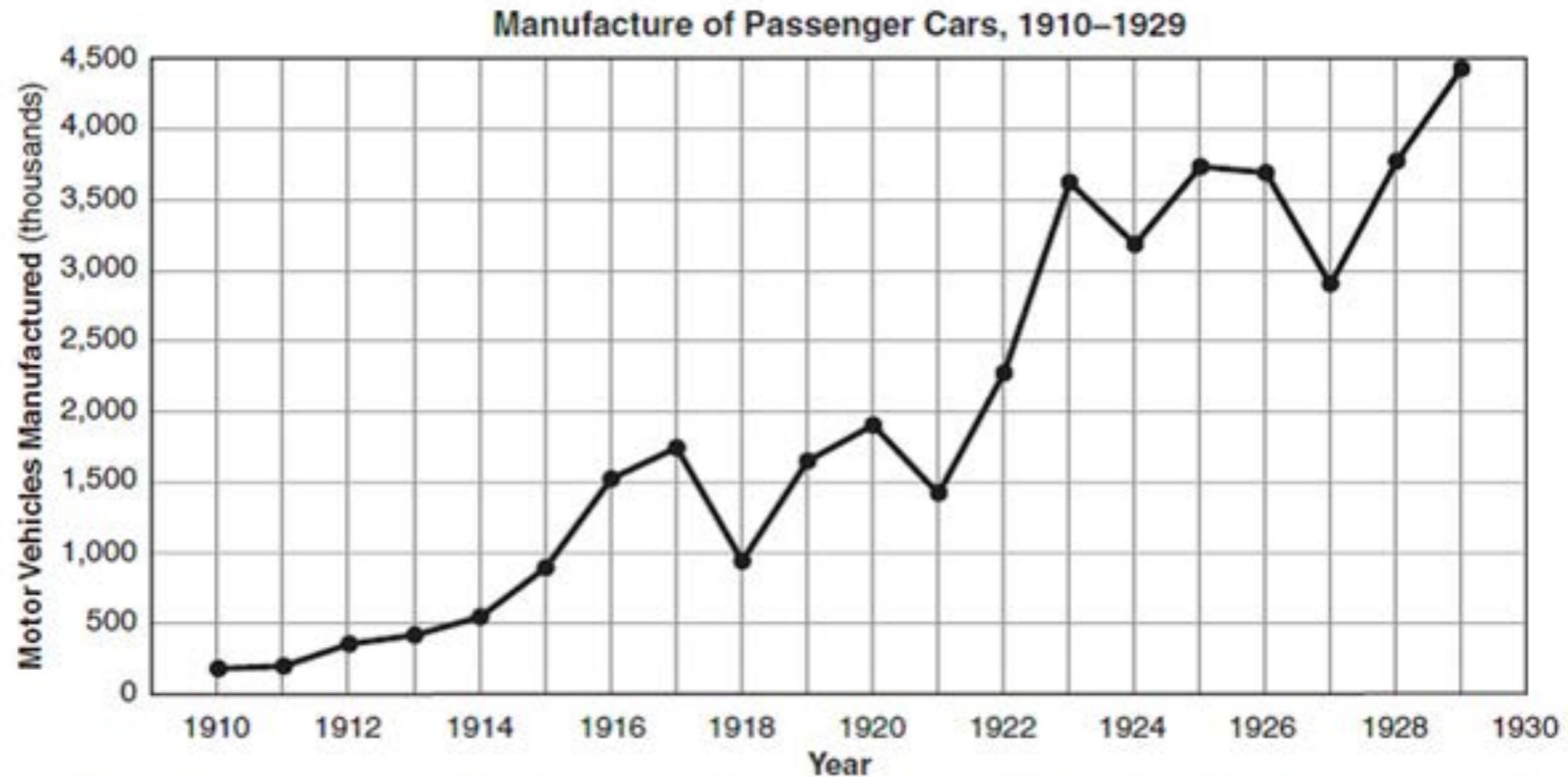


A **Manager** for Managers?

Management Hierarchy



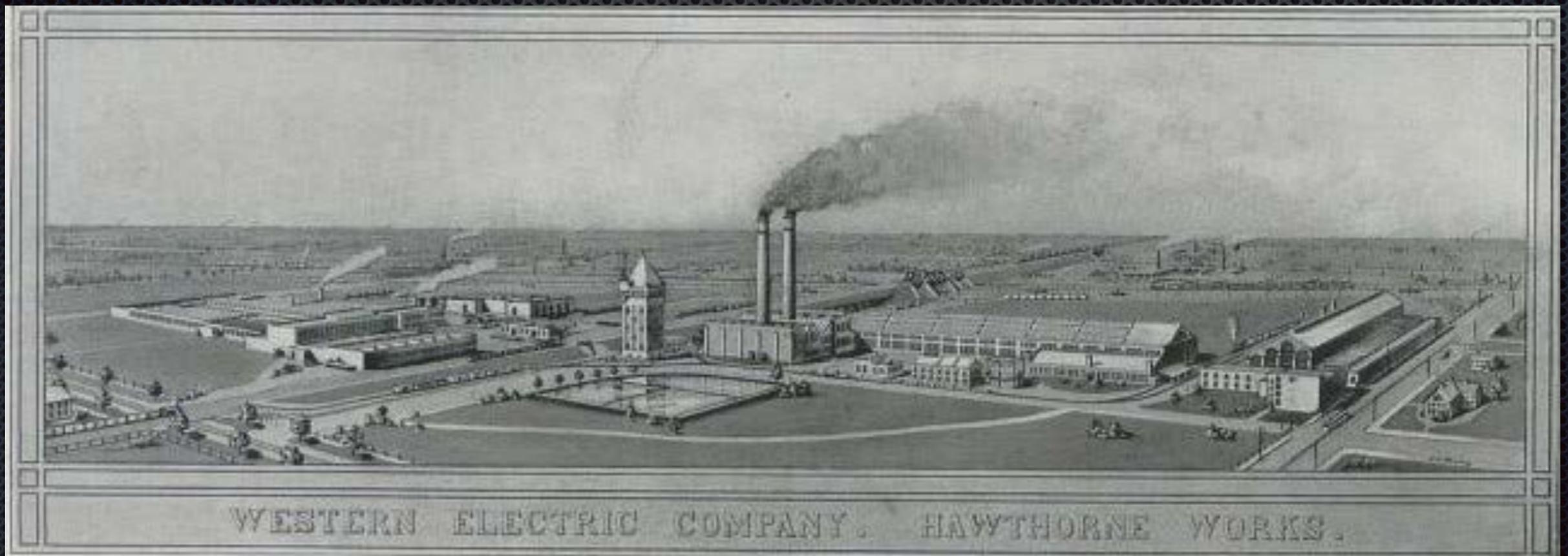
and it worked GREAT!



Source: *Historical Statistics of the United States, Colonial Times to 1970, Part 2*, U. S. Department of Commerce (adapted)

Hawthorne Experiment

(1924-1932)

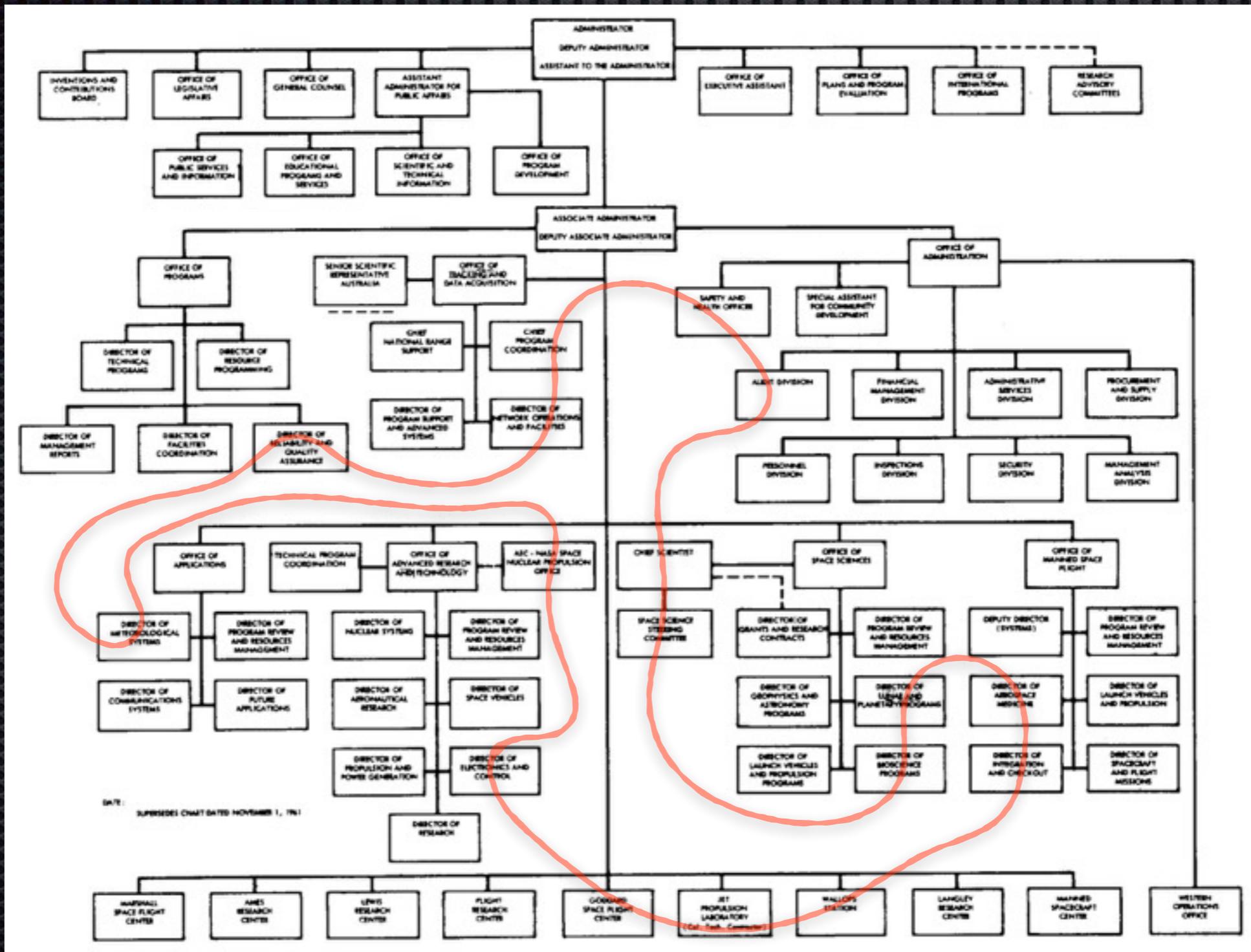


WESTERN ELECTRIC COMPANY. HAWTHORNE WORKS.

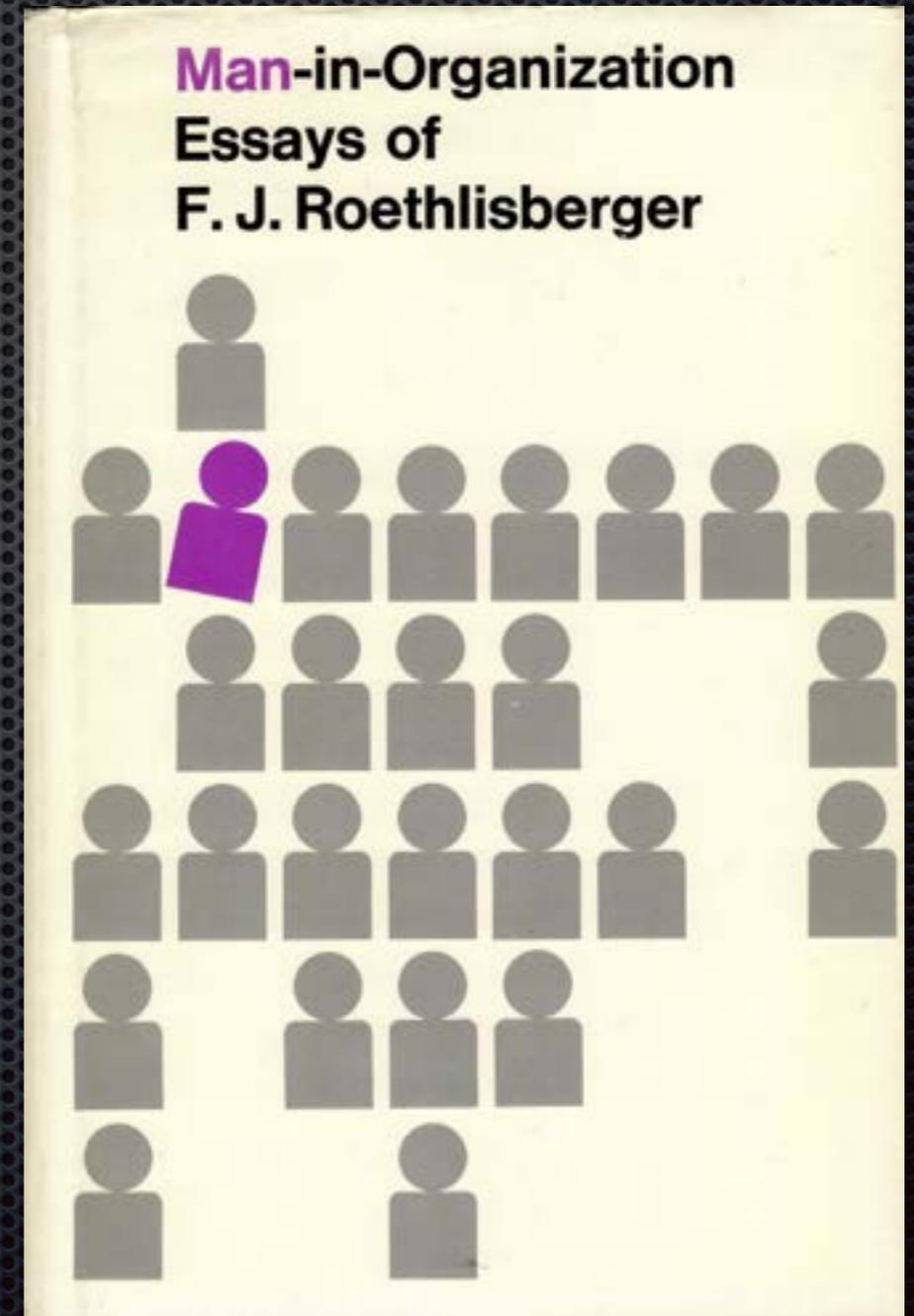
What causes Productivity?



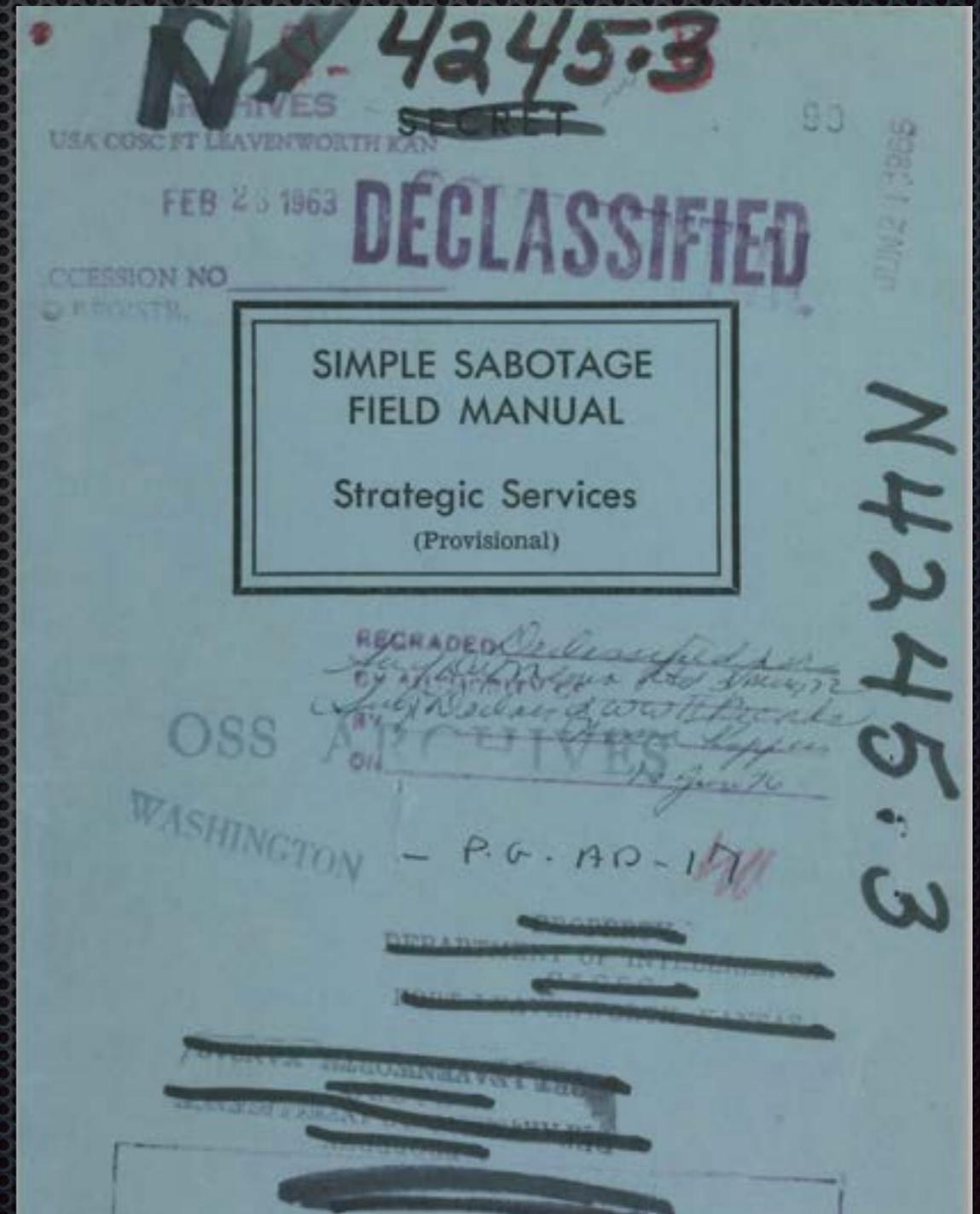
Informal Organization



Origin of Human Relationship Theory



Organizational Sabotage



“The great majority of workmen still believe that if they were to work at their best speed they would be doing a great injustice to the whole trade by throwing a lot of men out of work.”

The principles of scientific management - Frederick Taylor

Self-Management

- When did we start thinking of *Autonomy*?

Toyoda Type G Automatic Loom (1924)



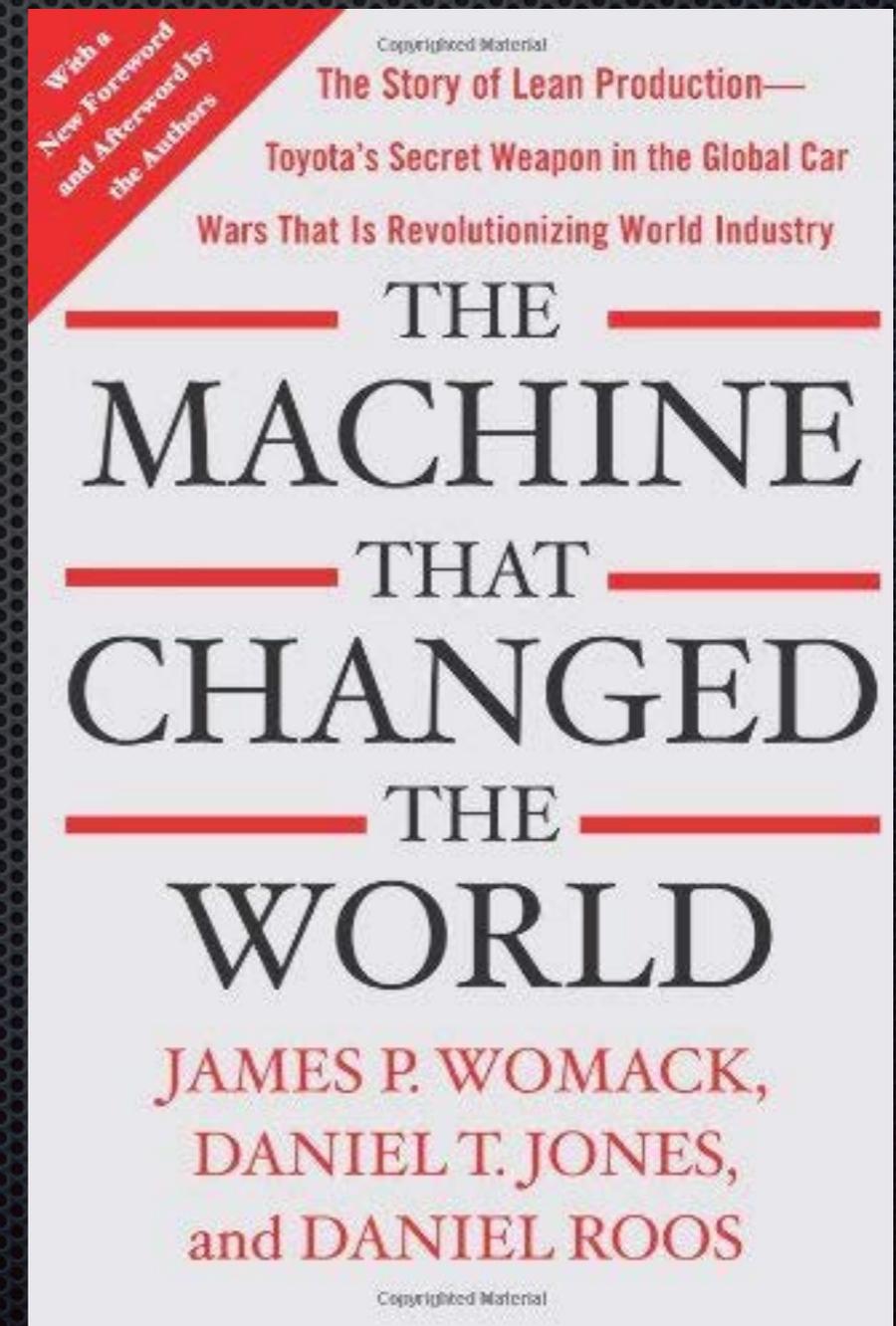
This loom was special:

- ✦ It automatically stops when a thread is broken.
 - ✦ It only produces good product.
- ✦ An operator could manage 60 looms of this kind.
 - ✦ A traditional loom needed an operator each.

The Machine that Changed the World (1990)

Toyota's Secret Weapon
in the Global Car Wars

Based on IMVP Phase 2 study
(1984-1990)



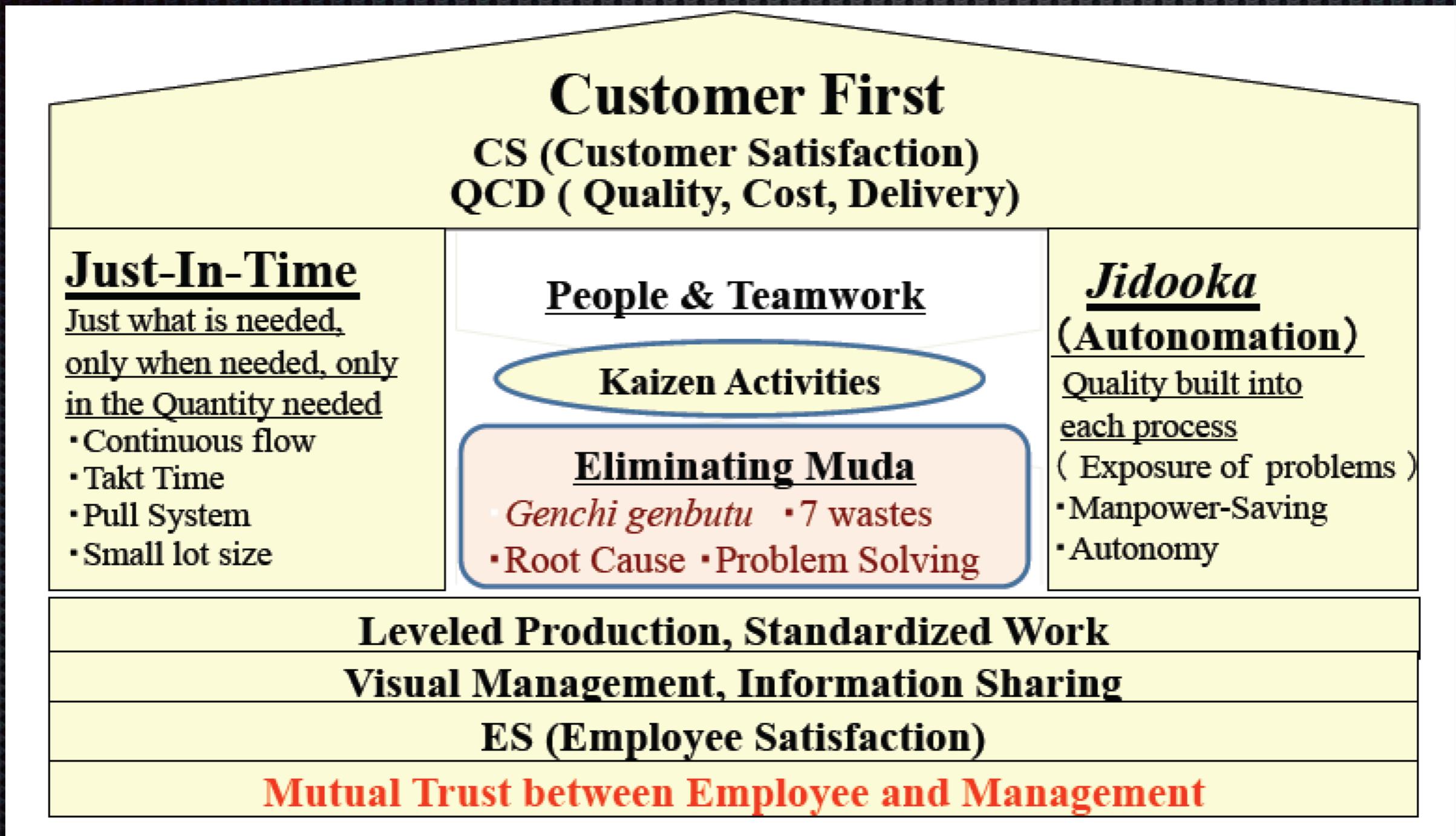
Lean Manufacturing

the expenditure of resources in any aspect other than the direct creation of value for the end customer to be wasteful, and thus a target for elimination.

7 Wastes - Muda 無駄

- ✦ Transportation
- ✦ Inventory
- ✦ Motion
- ✦ Waiting
- ✦ Over-Processing
- ✦ Over-Production
- ✦ Defects

Toyota Production System



Multi-skilled Worker

多能工訓練計画表

完全習得
 大進捗中
 完全未習得

職種名 HIC
 職長名 山崎
 作成者 山崎
 作成年月日 2013.11.20
 1 / 1

No.	作業者名	工程No.														現在 (2013.11.30)	目標 (2014.1.31)	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14			
		印刷	マウント	リフロー	洗浄	目視検査	修正	半日付	部品検査	キョア	原印	外観検査	クイバ	電点検査	梱包			
1	小原	●	●	●	●	●	◐	◐	○	○	○	○	○	○	○	○	5勝7敗 2引分	12勝2敗
2	笹塚	○	○	○	◐	●	●	●	●	●	○	○	○	○	○	○	6勝7敗 1引分	12勝2敗
3	佐藤	○	○	○	○	○	◐	◐	◐	●	●	●	●	○	○	○	4勝7敗 3引分	9勝5敗
4	折藤	○	○	○	○	○	◐	●	●	●	●	●	●	●	◐	○	7勝5敗 2引分	11勝3敗
5	加藤	○	○	○	○	○	○	○	○	○	○	○	●	●	●	○	3勝11敗	7勝7敗
6	山本	○	○	○	○	●	●	●	◐	○	○	○	○	○	○	○	3勝10敗 1引分	6勝8敗
		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○		
		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○		

Skill Map with Training Plans

TPS is not really about

Manufacturing,

rather more about

Developing People

How **TPS** was born...

Toyoda Type G Automatic Loom (1924)



Toyota was almost **bankrupt**
in 1950's.

A major labor dispute resulted in resignation of most executives including the founder Kiichiro Toyoda.

They had no money to buy extra machines, lines, parts and hire **managers**.

TWI Program in WWII (Training Within Industry)

(1940 - 1945)



TO MAKE YOUR WORK EASIER AND SAFER

USE THE THREE "J's"

BETTER WAY

HOW TO IMPROVE JOB METHODS

A practical plan to help you produce **GREATER QUANTITIES OF QUALITY PRODUCTS IN LESS TIME**, by making the best use of the **Manpower, Machines and Materials**, now available.

Step I—BREAK DOWN the job

1. List all details of the job exactly as done by the Present Method.
2. Be sure details include all:
 - Material Handling.
 - Machine Work.
 - Hand Work.

Step II—QUESTION every detail

1. Use these types of questions:
 - WHY is it necessary?
 - WHAT is its purpose?
 - WHERE should it be done?
 - WHEN should it be done?
 - WHO is best qualified to do it?
 - HOW is the "best way" to do it?
2. Also question the:
 - Materials, Machines, Equipment, Tools, Product Design, Layout, Workplace, Safety, Housekeeping.

Step III—DEVELOP the new method

1. ELIMINATE unnecessary details.
2. COMBINE details when practical.
3. REARRANGE for better sequence.
4. SIMPLIFY all necessary details.

To make the work easier and safer:

- Pre-position materials, tools and equipment at the best places in the proper work area.
- Use gravity-feed hoppers and drop-delivery chutes.
- Let both hands do useful work.
- Use jigs and fixtures instead of hands for holding work.

5. Work out your idea with others.
6. Write up your proposed new method.

Step IV—APPLY the new method

1. Sell your proposal to your "boss."
2. Sell the new method to the operators.
3. Get final approval of all concerned on Safety, Quality, Quantity, Cost.
4. Put the new method to work. Use it well if a better way is developed.
5. Give credit where credit is due.

JOB METHODS PROGRAM
Dept. of Safety & Personnel
THE PULLMAN COMPANY

JOB METHODS

HOW TO HANDLE A PROBLEM

DETERMINE OBJECTIVES

- 1—GET THE FACTS
 - Review the record.
 - Find out what rules and plant customs apply.
 - Talk with individuals concerned.
 - Get opinions and feelings.
 - Be sure you have the whole story.
- 2—WEIGH AND DECIDE
 - Fit the facts together.
 - Consider their bearing on each other.
 - What possible actions are there?
 - Check practices and policies.
 - Consider objective and effect on individual, group, and production.
 - Don't jump to conclusions.
- 3—TAKE ACTION
 - Are you going to handle this yourself?
 - Do you need help in handling?
 - Should you refer this to your supervisor?
 - Watch the timing of your action.
 - Don't pass the buck.
- 4—CHECK RESULTS
 - How soon will you follow up?
 - How often will you need to check?
 - Watch for changes in output, attitudes, and relationships.
 - Did your action help production?

Confidence To Proceed

JOB RELATIONS

A SUPERVISOR GETS RESULTS THROUGH PEOPLE

Foundations for Good Relations

- Let each worker know how he is getting along.
 - Figure out what you expect of him.
 - Point out ways to improve.
 - Give credit when due.
 - Look for extra or unusual performance.
 - Tell him while "it's hot."
 - Tell people in advance about changes that will affect them.
 - Tell them WHY if possible.
 - Get them to accept the change.
 - Make best use of each person's ability.
 - Look for ability not now being used.
 - Never stand in a man's way.
- People Must Be Treated as Individuals

JOB RELATIONS TRAINING
Dept. of Safety & Personnel
THE PULLMAN COMPANY

JOB RELATIONS

Submitted by—S. F. Eastin,
Supervisor of Training,
Shreveport, Louisiana

HOW TO INSTRUCT

Step 1—Prepare the Worker

- Put him at ease.
- State the job and find out what he already knows about it.
- Get him interested in learning job.
- Place in correct position.

Step 2—Present the Operation

- Tell, show, and illustrate one **IMPORTANT STEP** at a time.
- Stress each **KEY POINT**.
- Instruct clearly, completely, and patiently, but no more than he can master.

Step 3—Try Out Performance

- Have him do the job—correct errors.
- Have him explain each **KEY POINT** to you as he does the job again.
- Make sure he understands.
- Continue until **YOU** know **HE** knows.

Step 4—Follow Up

- Put him on his own. Designate to whom he goes for help.
- Check frequently. Encourage questions.
- Tease off extra coaching and close follow-up.

*If Worker Hasn't Learned,
the Instructor Hasn't Taught*

Know How

HOW TO GET READY TO INSTRUCT

Have a Time Table—

- how much skill you expect him to have, by what date.

Break Down the Job—

- list important steps.
- pick out the key points. (Safety is always a key point.)

Have Everything Ready—

- the right equipment, materials, and supplies.

Have the Workplace

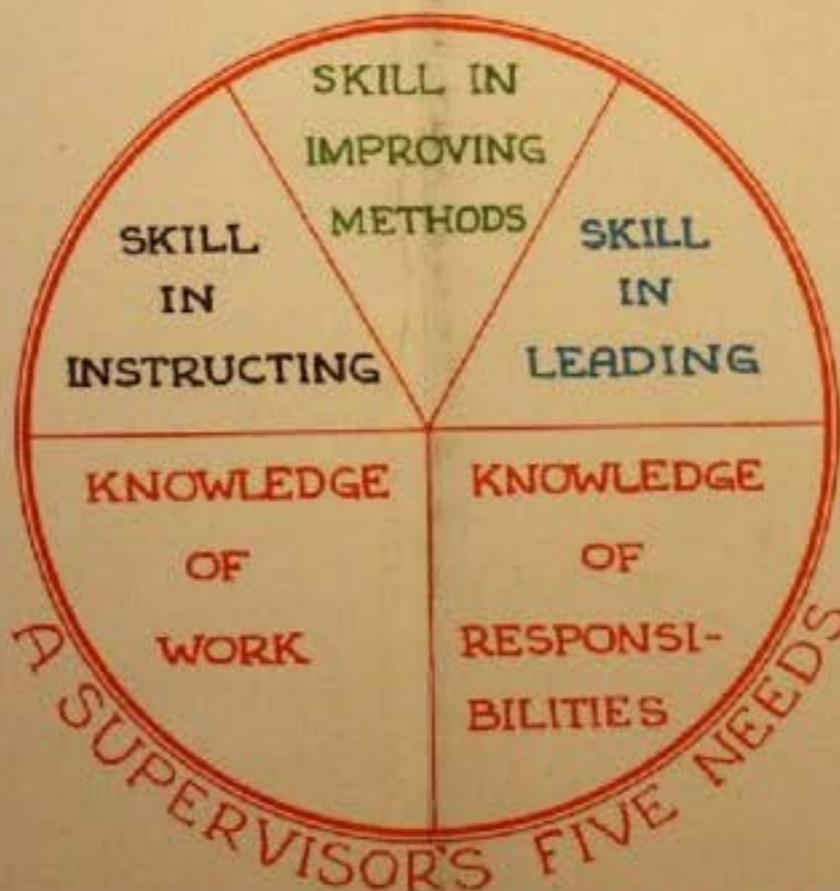
- Properly Arranged—just as the worker will be expected to keep it.

JOB INSTRUCTION TRAINING
Dept. of Safety & Personnel
THE PULLMAN COMPANY

KEEP THIS CARD HANDY

JOB INSTRUCTION

THE PULLMAN COMPANY
DEPT. OF SAFETY AND PERSONNEL



BETTER SERVICE THROUGH SKILLED SUPERVISION

To make your work

Easier and Safer

TWI was introduced
in Japan

NUMMI (Now Tesla Factory)

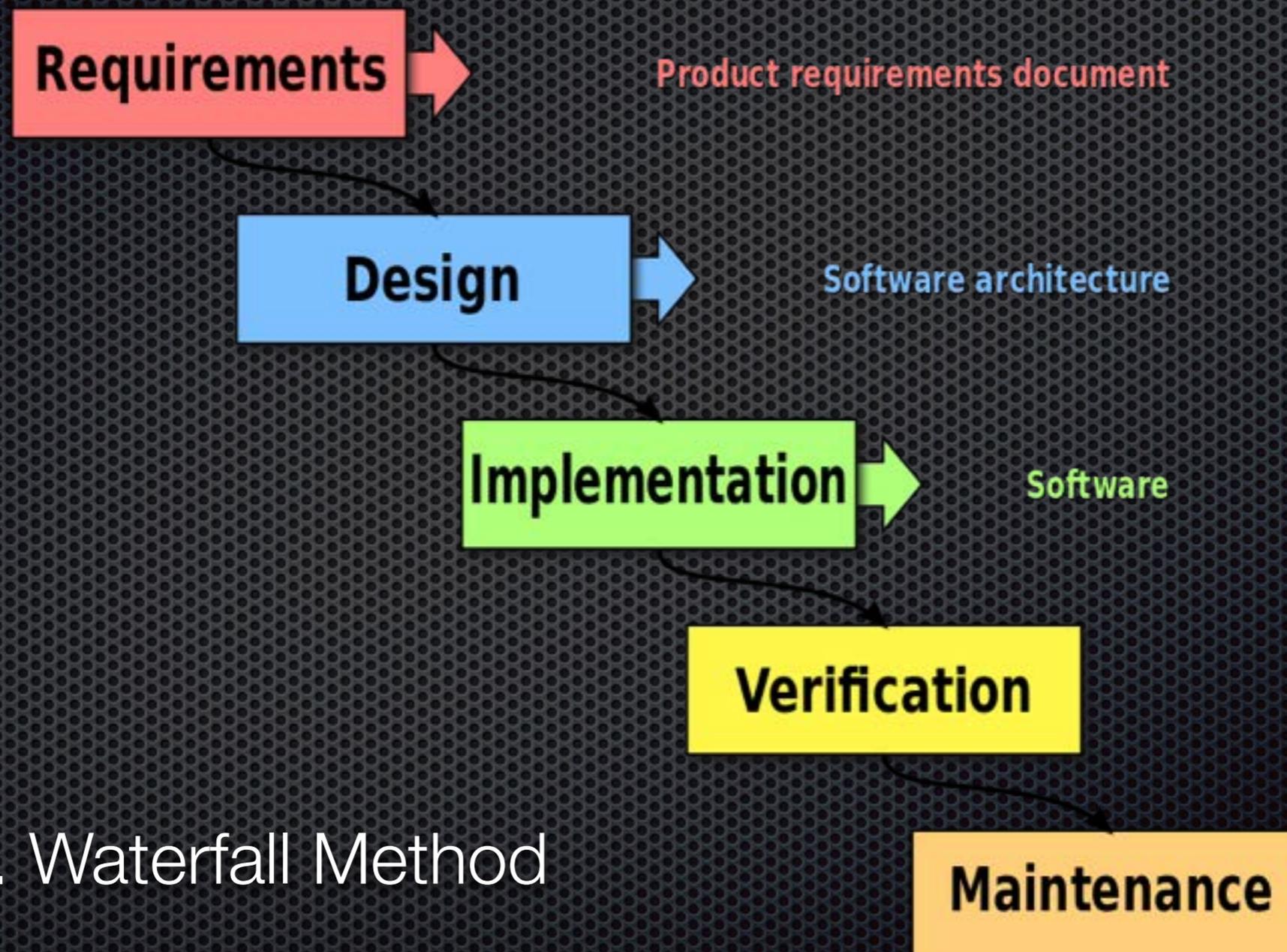


New Profession: Programmer



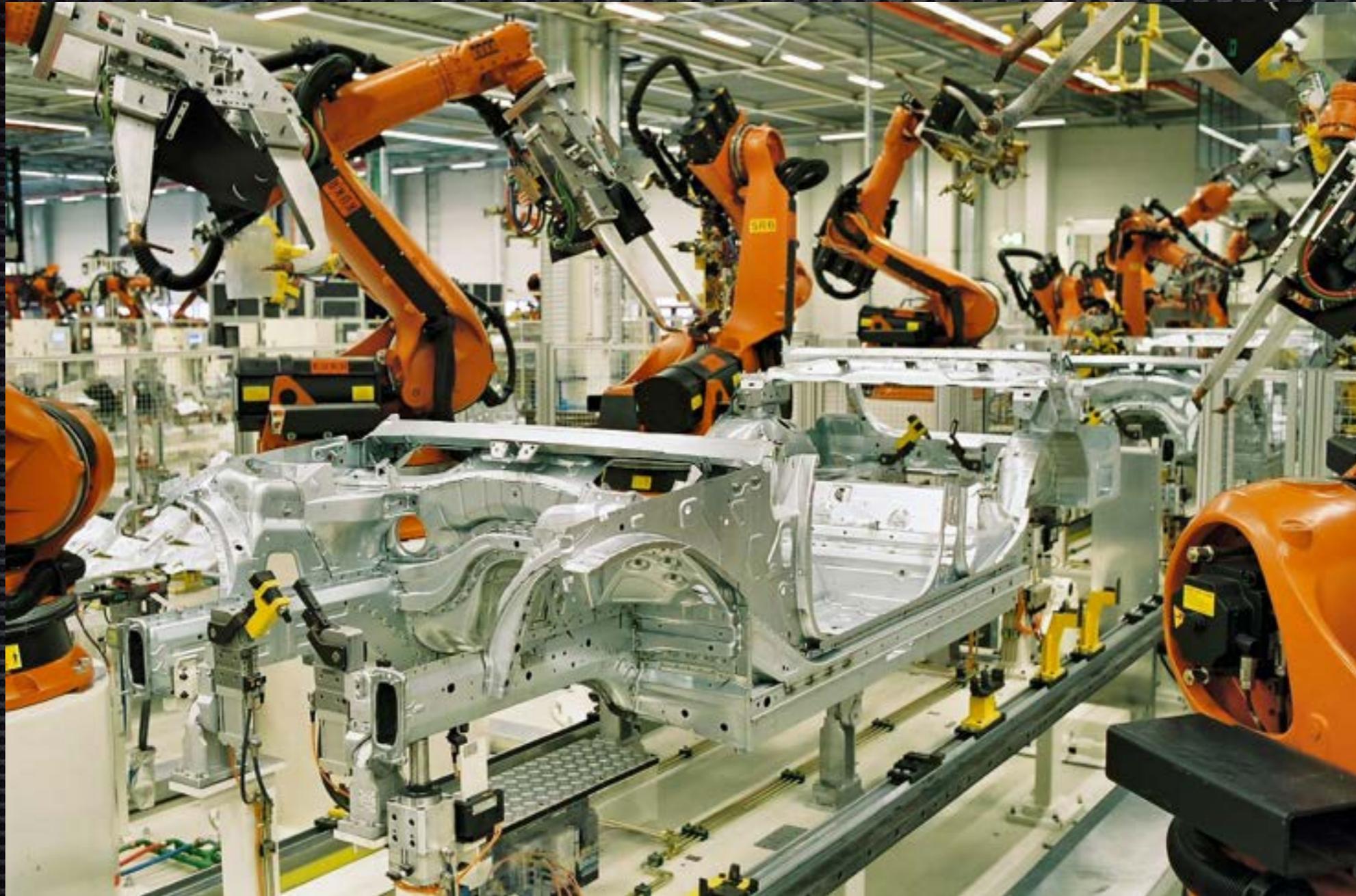
Ada Lovelace

Management the Development of Large Software Systems

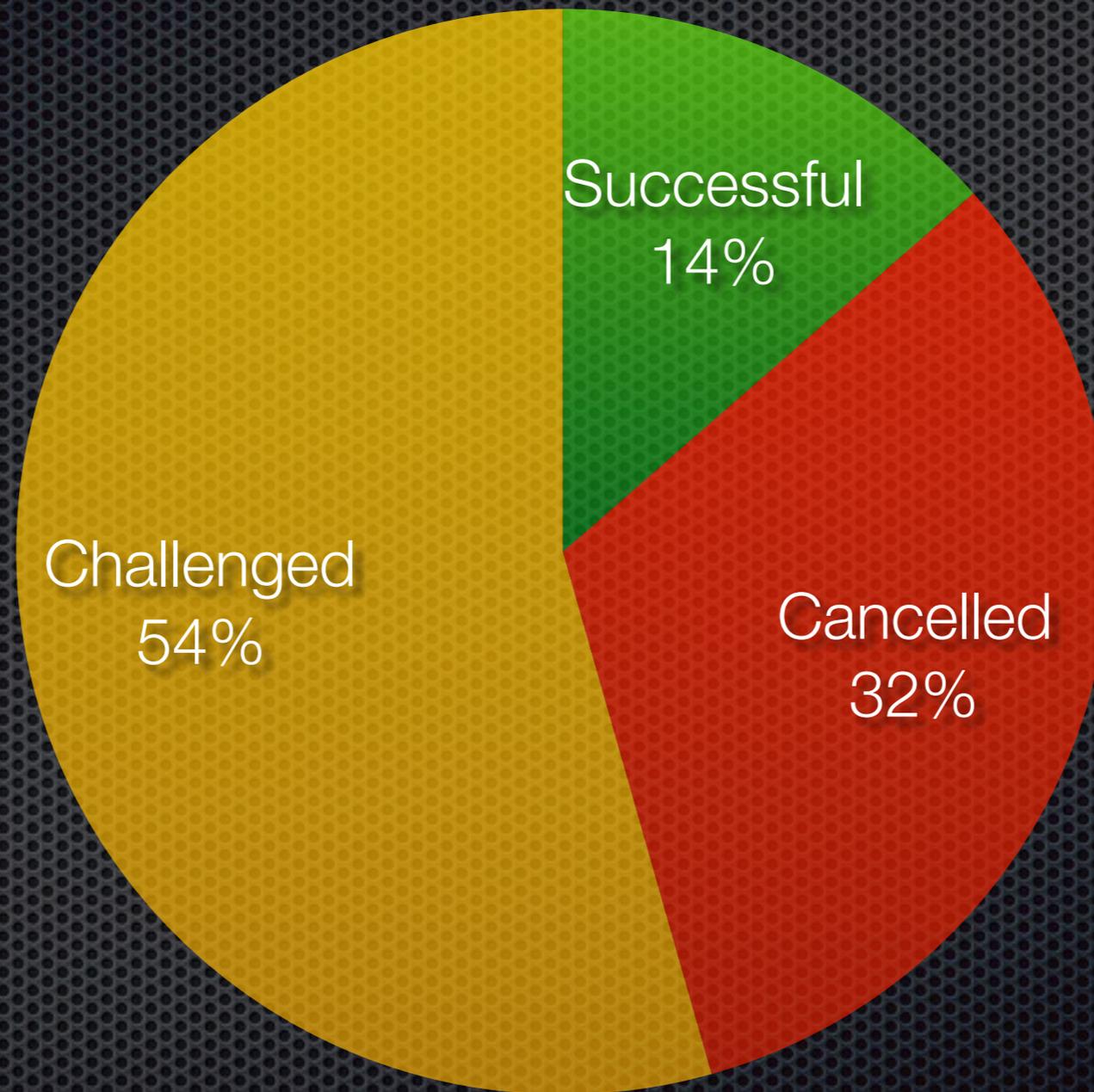


- ✦ a.k.a. Waterfall Method

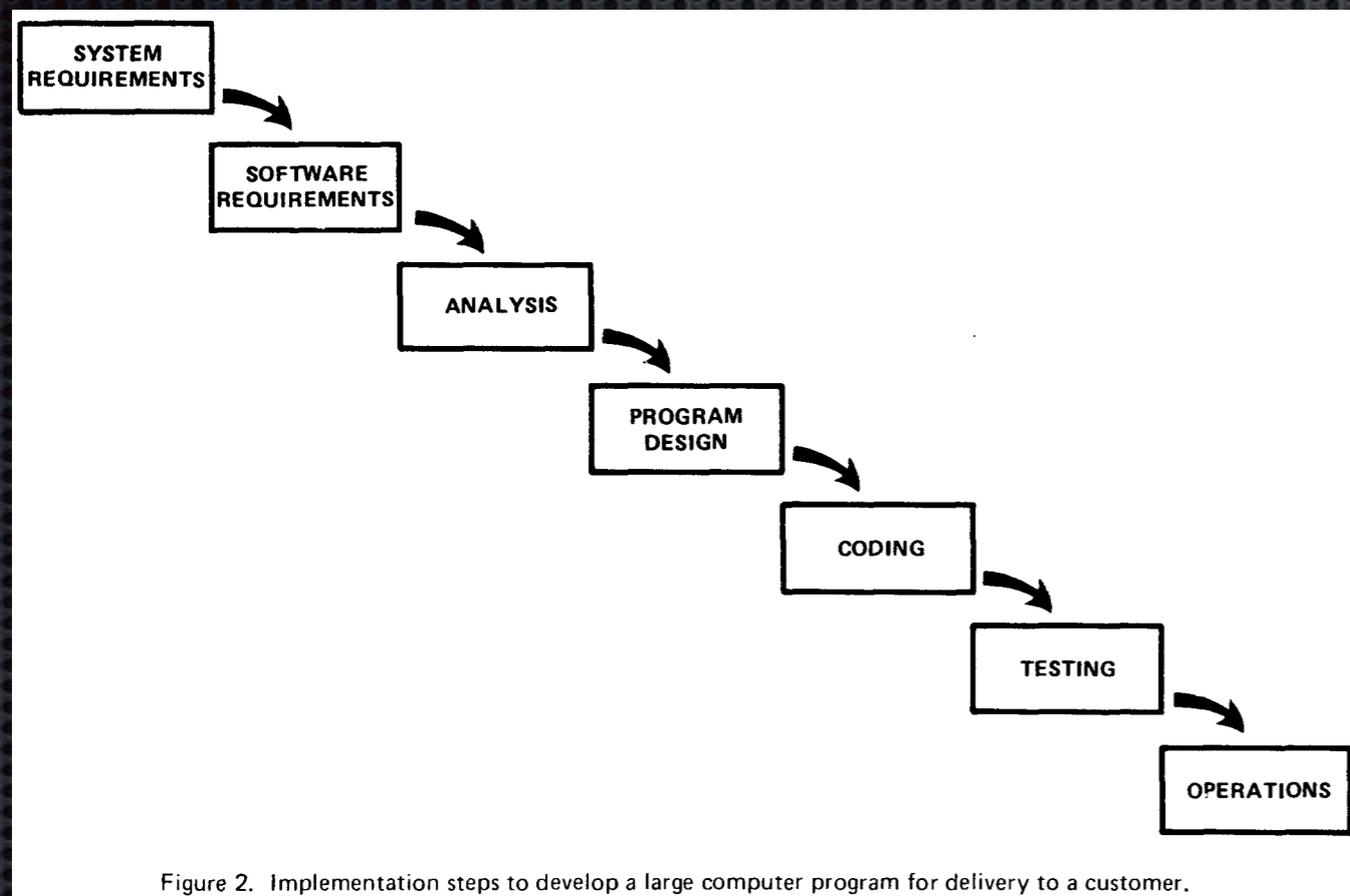
We'd tried to run Software Dev
just like Manufacturing Factories



but did **not** work

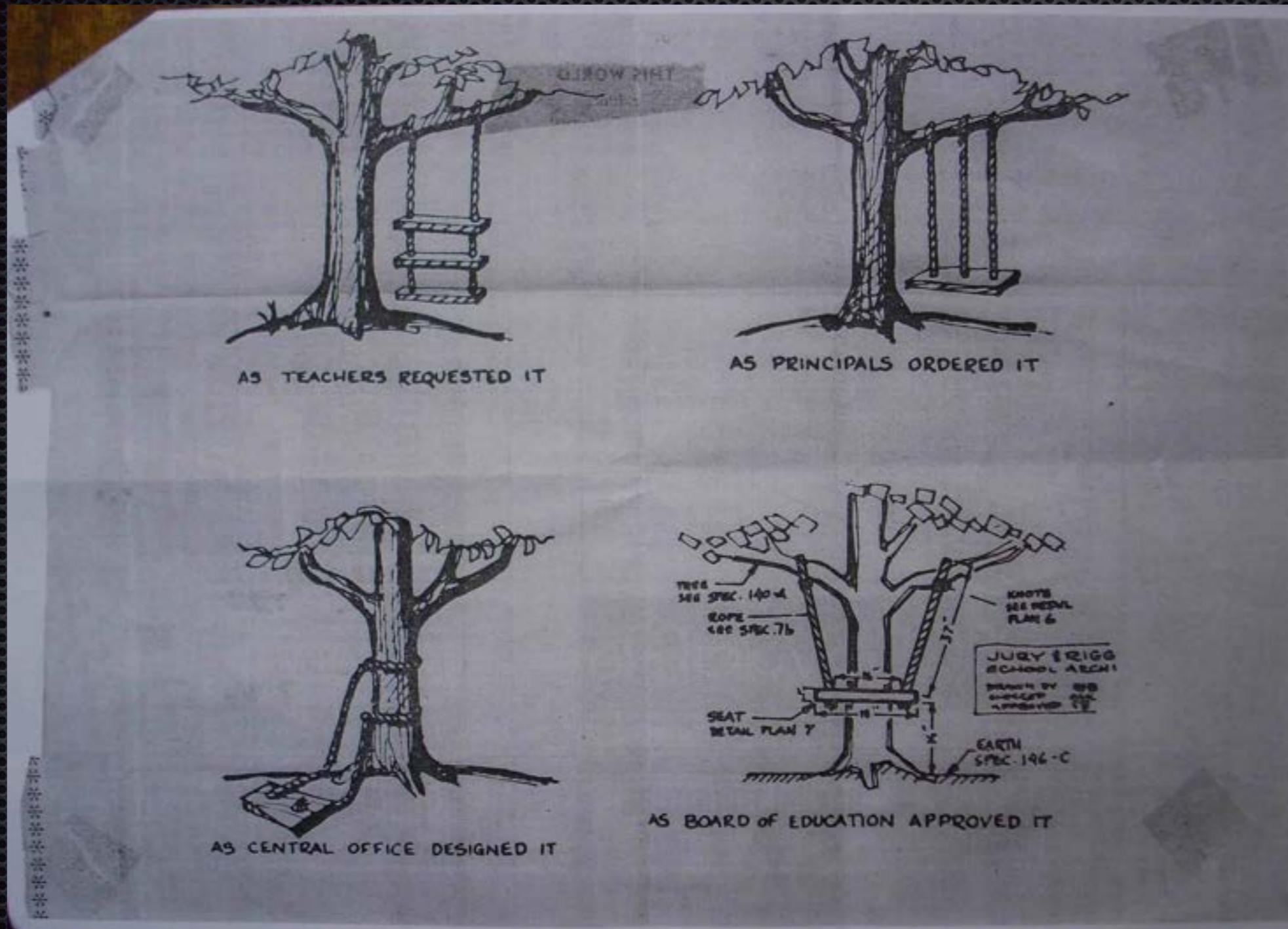


See what Winston Royce actually said:

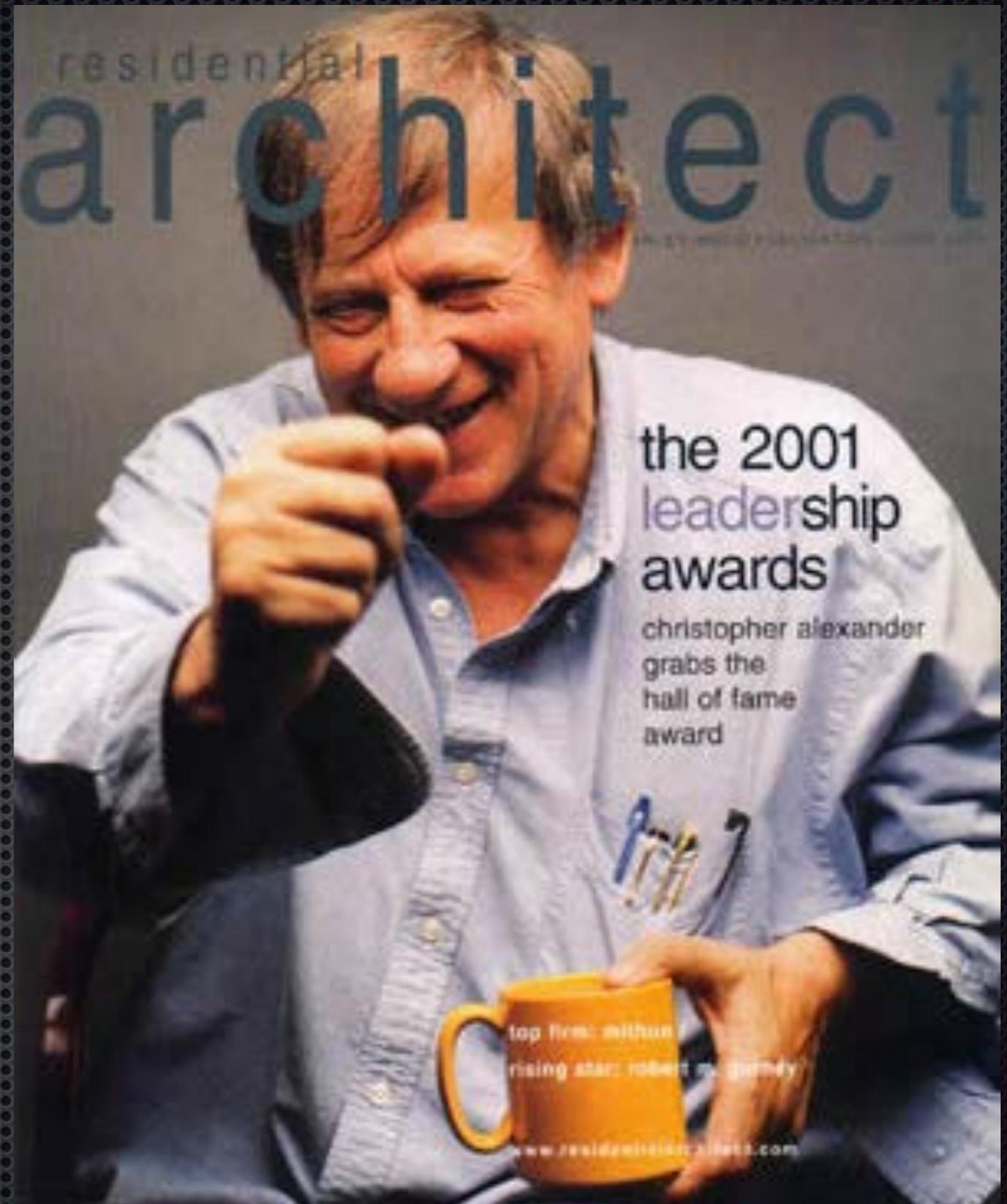


I believe in this concept, but the implementation described above is risky and invites failure.

Software Crisis



Christopher Alexander



A Pattern Language (1977)

A Pattern Language

Towns · Buildings · Construction



Christopher Alexander

Sara Ishikawa · Murray Silverstein

WITH

Max Jacobson · Ingrid Fiksdahl-King

Shlomo Angel

The Timeless Way
of Building
(1979)

The
Timeless Way of
Building



Christopher Alexander

"At the core... is the idea that people should **design for themselves** their own houses, streets and communities. This idea... comes simply from the observation that most of the wonderful places of the world were not made by architects but **by the people**".

Christopher Alexander et al.,

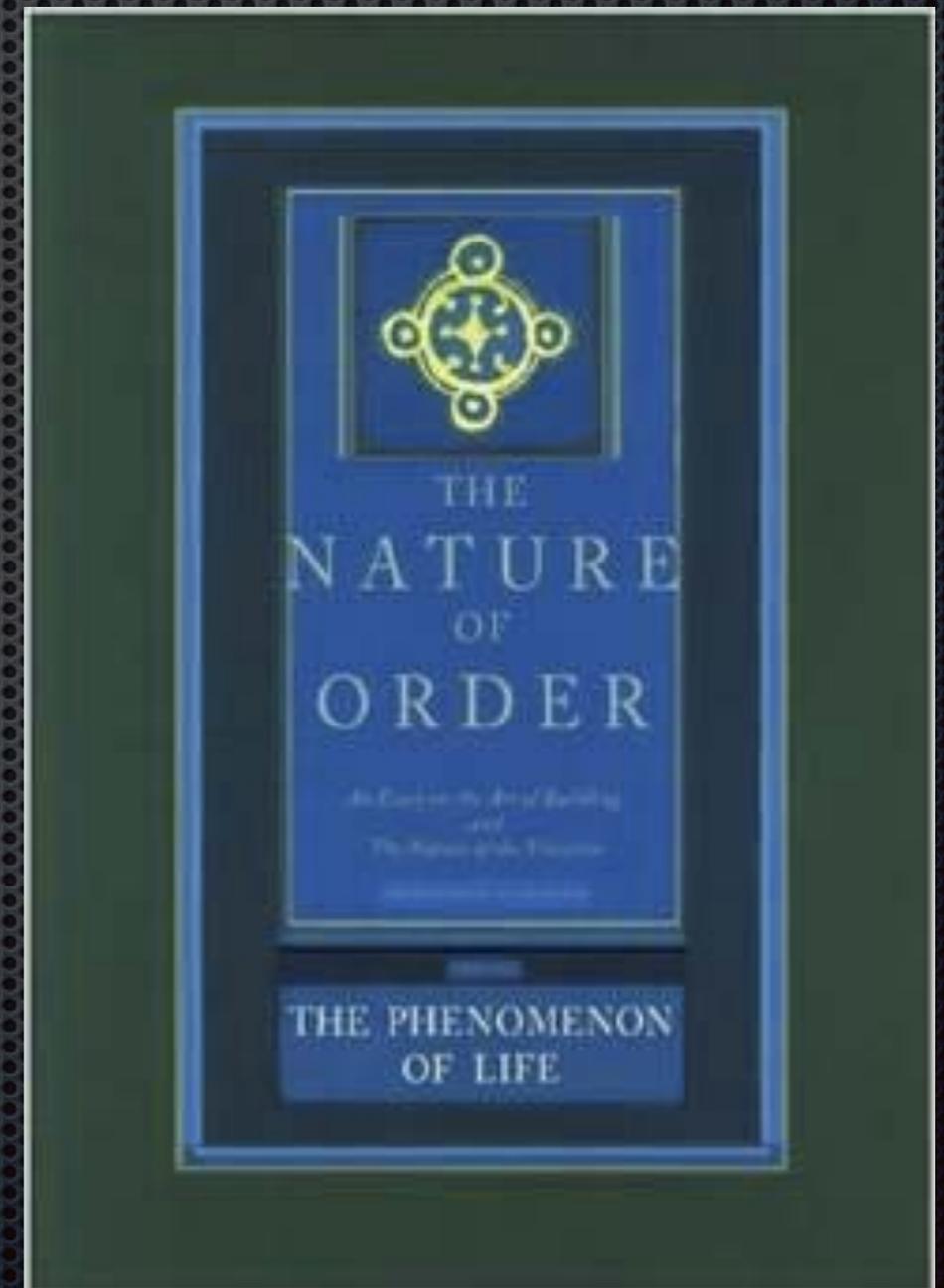
A Pattern Language, front bookflap

Pattern Language

Eishin Gakuen Campus



Nature of Order (2004)



Pattern Language for Software Development?

(1993)



Wiki Wiki Web



[Wiki Wiki Web](#)

This website and the software it runs on were created by [WardCunningham](#) for the [PortlandPatternRepository](#). It is home to an [InformalHistoryOfProgrammingIdeas](#) as well as a large volume of material recording related discourses and collaboration between its readers.

The content is written by the users -- people like you and me. Anyone can change any page or create new pages. Read the [TextFormattingRules](#) to find out how, and then go to the [WikiWikiSandbox](#) to try it yourself. Please use the [WikiWikiSandbox](#) if you want to experiment with how editing works. If you make a page you don't want to keep, just replace its text with the word "delete".

This website is the first ever "wiki", where content can be edited by any person. All other wikis, including Wikipedia and Wikiquote and Wiktionary, are descended from it. Wikipedia is now the fifth most visited website according to Alexa (Rank).

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ScrumPLoP 2015

ScrumPLoP is a PLoP® conference. It will be a gathering of experienced Scrum practitioners, assembled with the goal of contributing to the body of pattern literature with proven practices. If you don't yet know what a PLoP conference is, read about what a [PLoP is here](#). Visit the [ScrumPLoP Official Site](#).



TOP NEWS: Eduardo Fernandez's new book "Security Patterns in Practice: Designing Se..."

DESIGN PATTERN BOOKS

The Design Patterns Book Series showcases many patterns from PLoP conferences and leading experts in the patterns field.



DESIGN PATTERNS RESOURCES

Design Pattern Definition

A pattern language defines a collection of patterns and the rules to combine them into an architectural style.

Design Patterns Catalog

A collection of pattern resources on the web. [Sign up for an account to add your](#)

PLOP CONFERENCE NEWS

EduPloP 2015

March 27 - 31, 2015

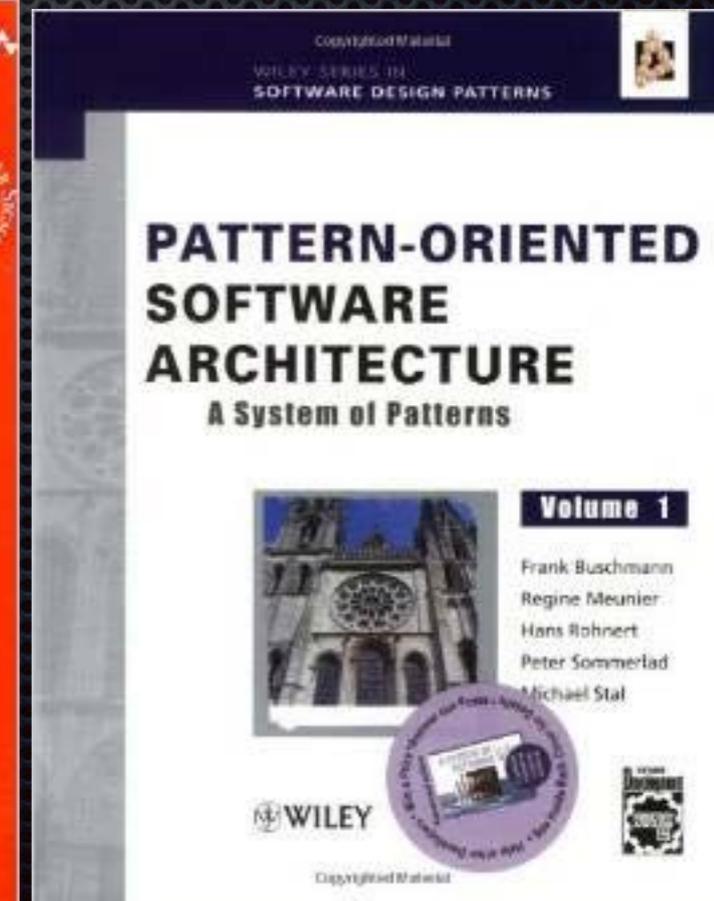
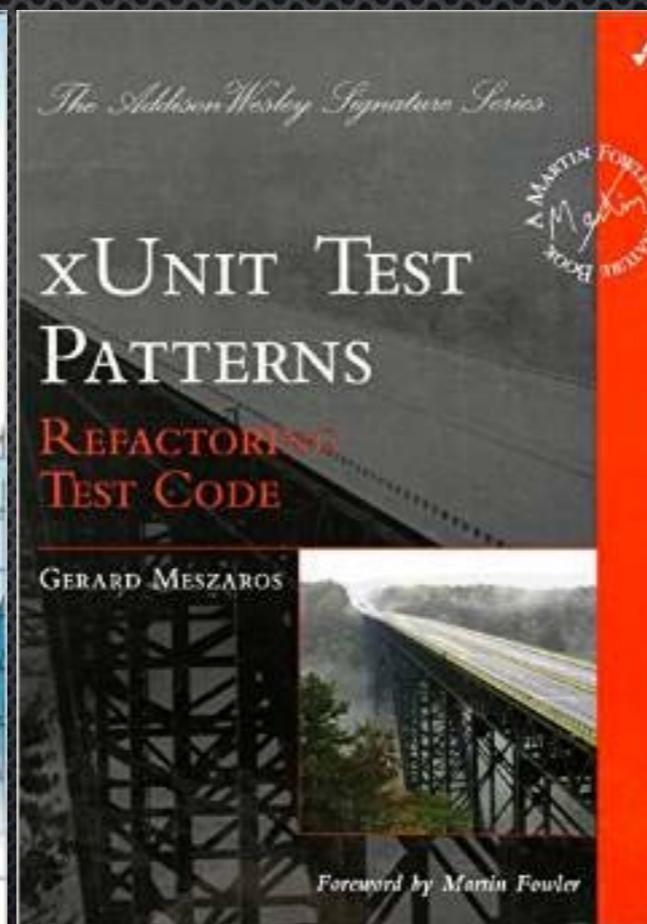
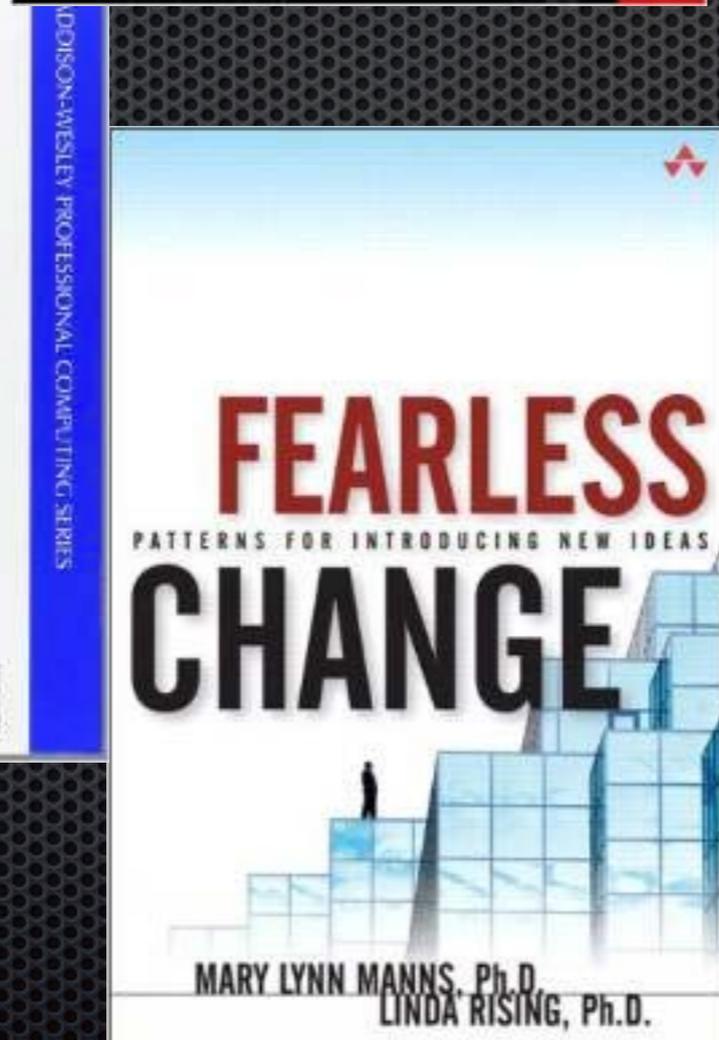
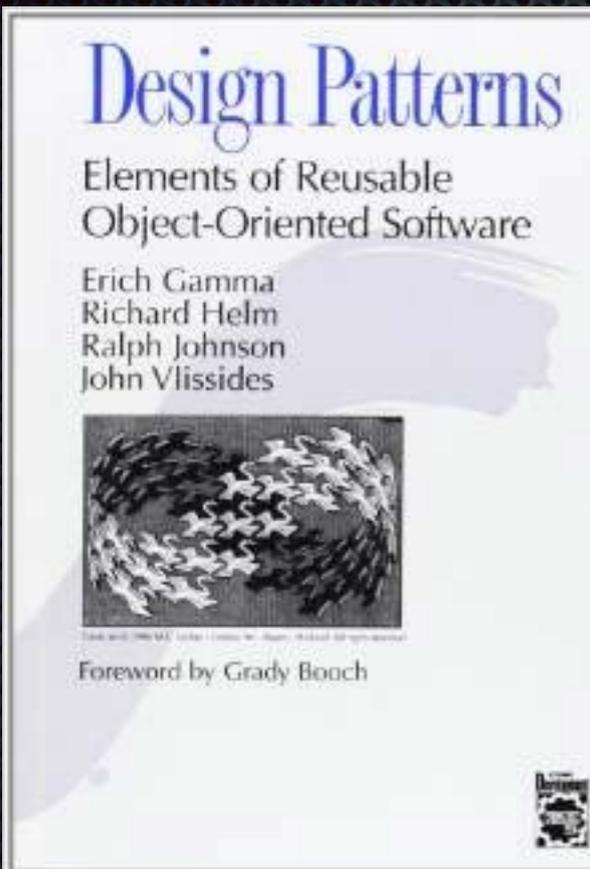
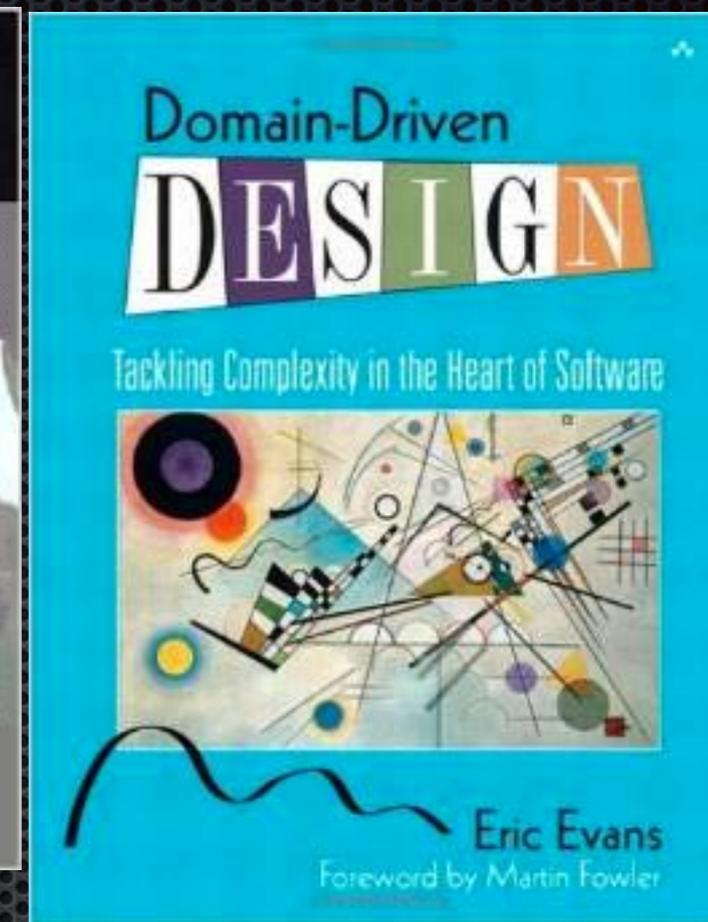
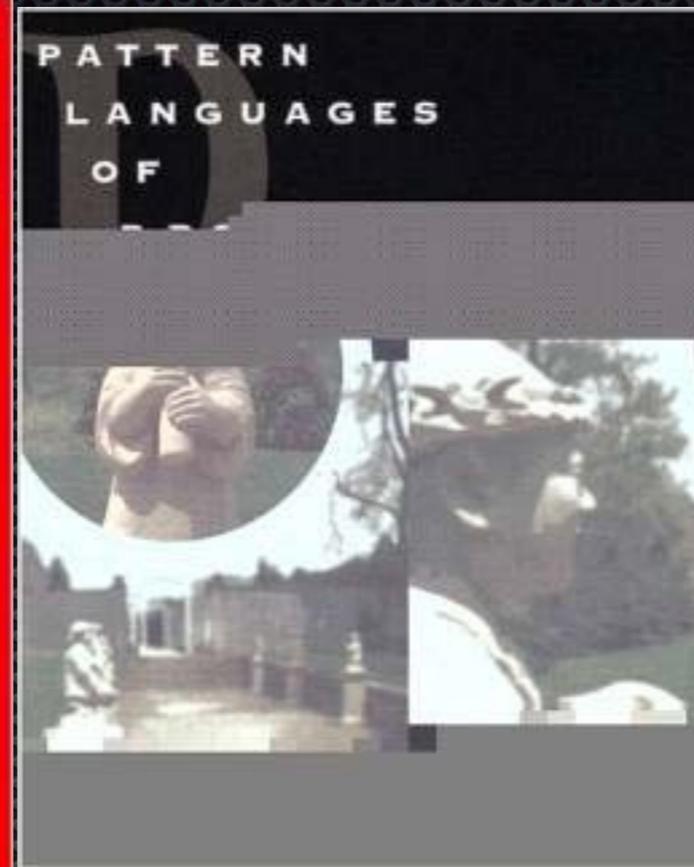
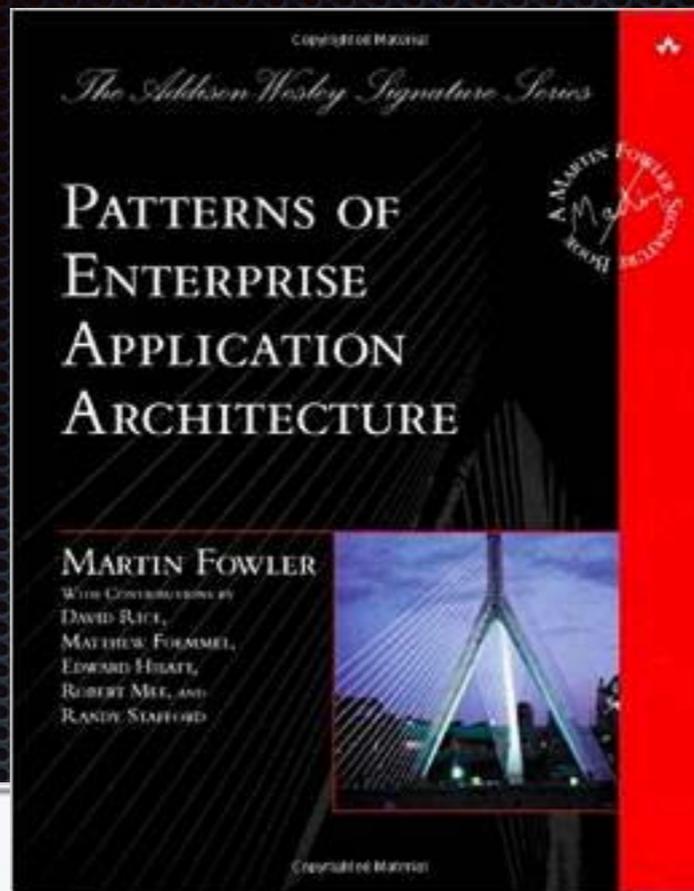
Viking PLoP 2015

May 14 - 17, 2015

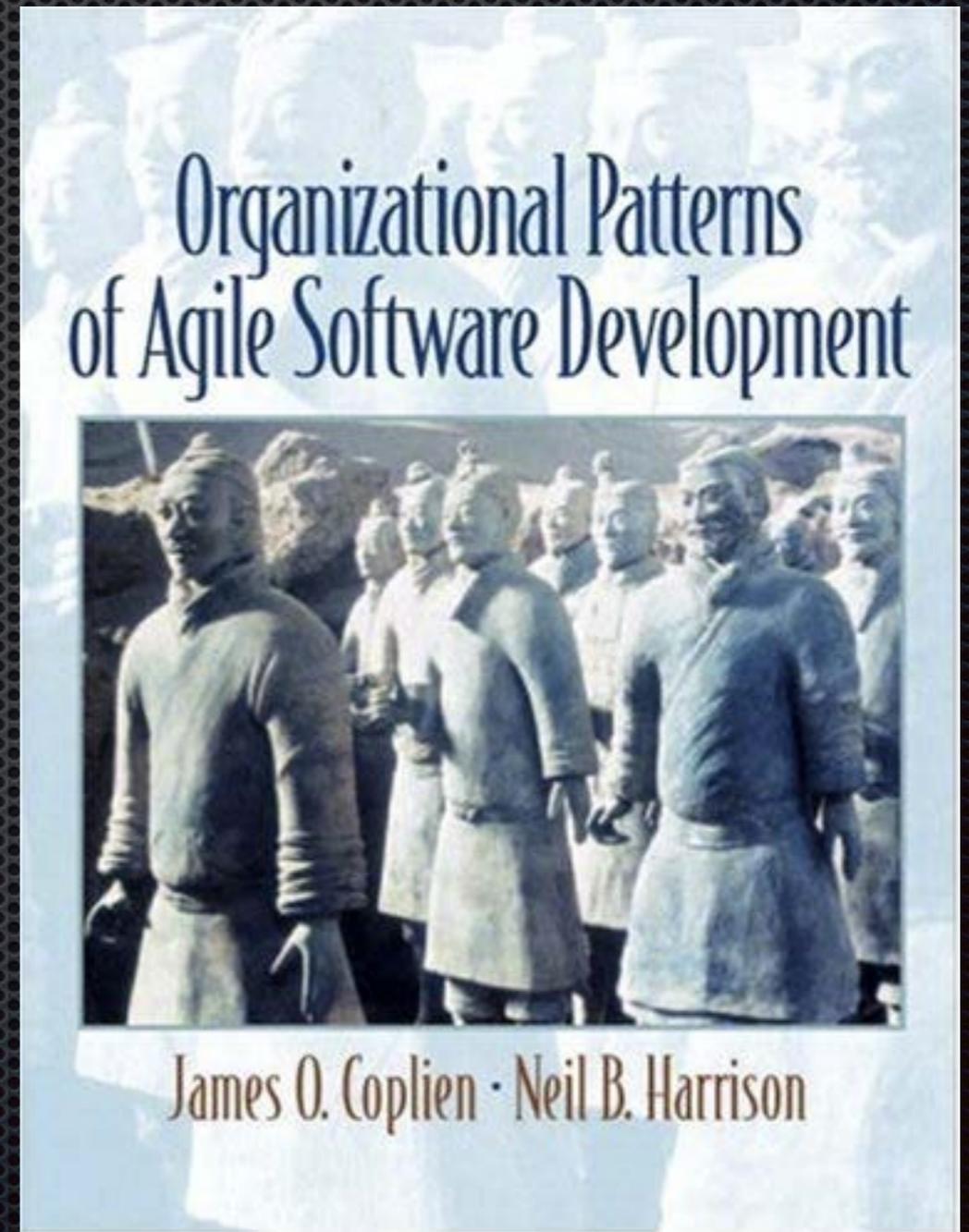
ScrumPLoP 2015

Pattern Language of Programs





Organizational Patterns

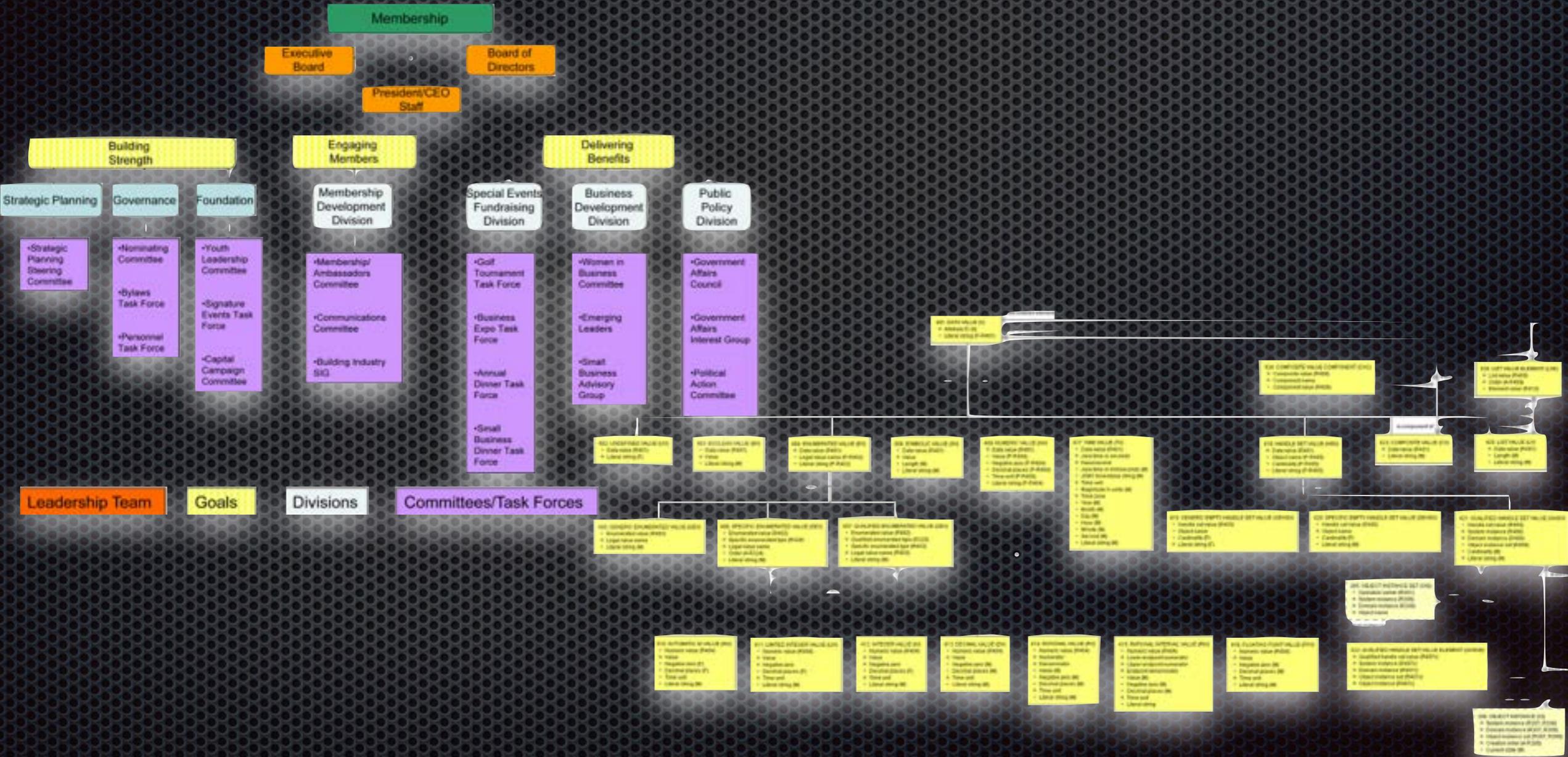


Conway's Law

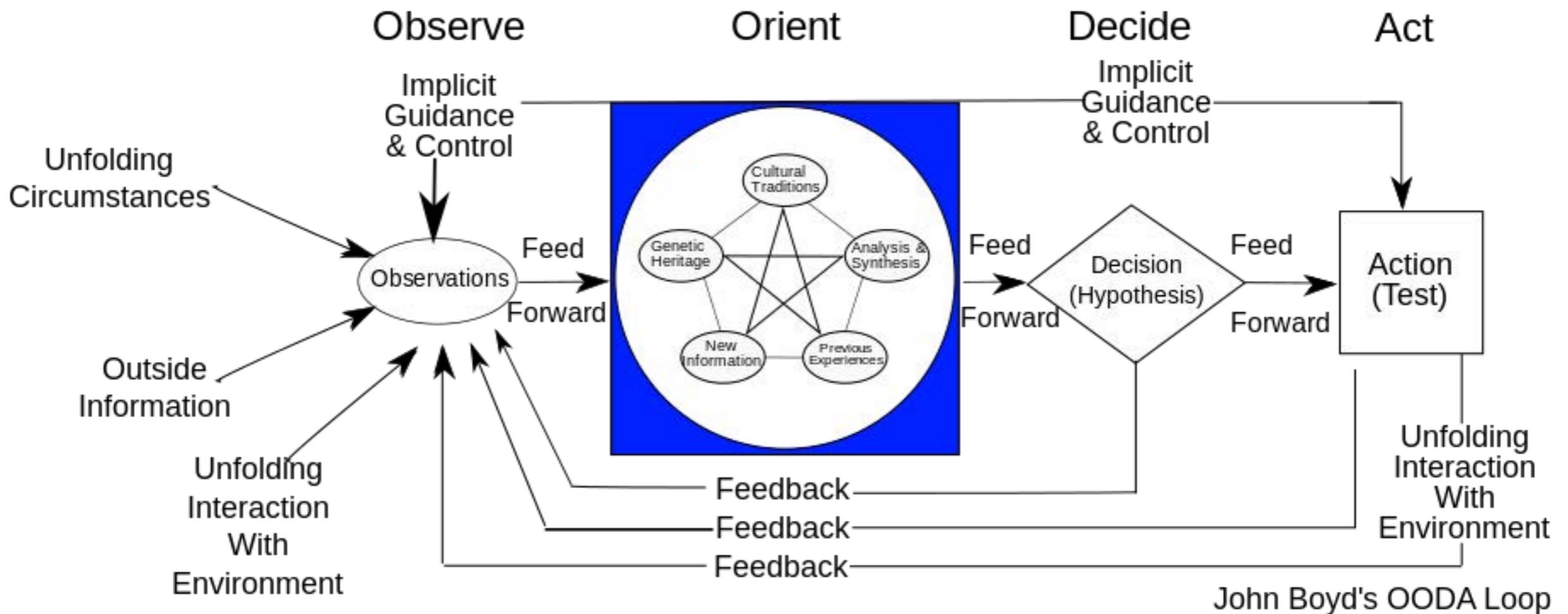
Any organization that designs a system (defined broadly) will produce a design whose structure is a copy of the organization's **communication structure**.

—M. Conway

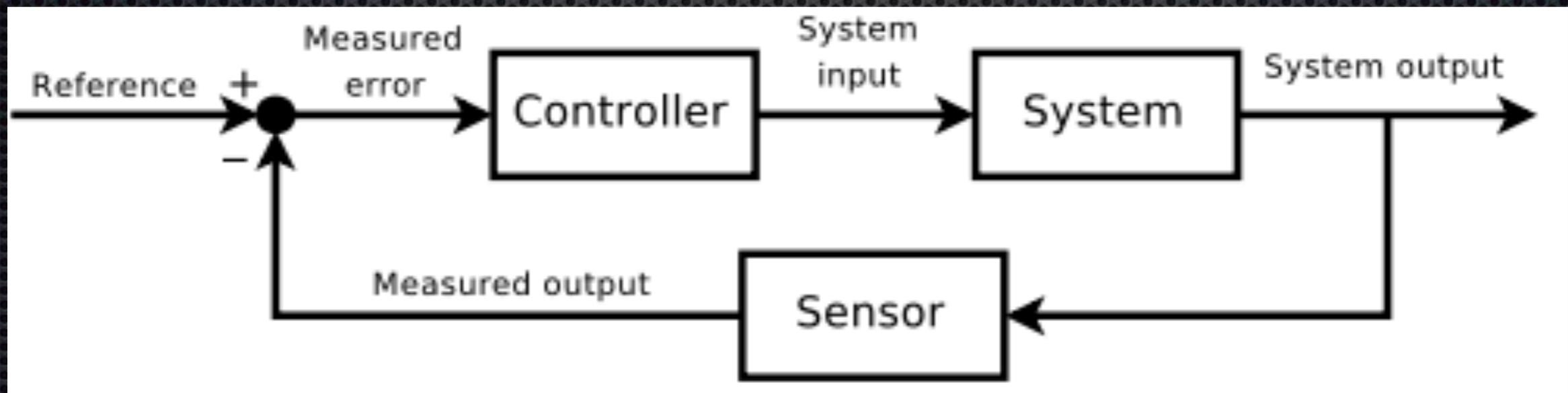
Organization Architecture and Product Architecture



OODA Loop (1976)



Control Theory



Empirical Process



New New Product Development Game (1986)

EXHIBIT 1

Sequential (A) vs. overlapping (B and C) phases of development

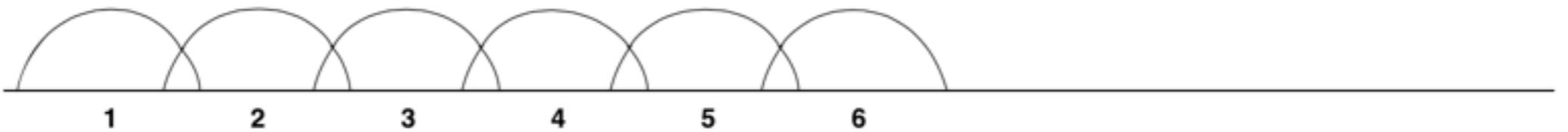
Type A

Phase



Type B

Phase

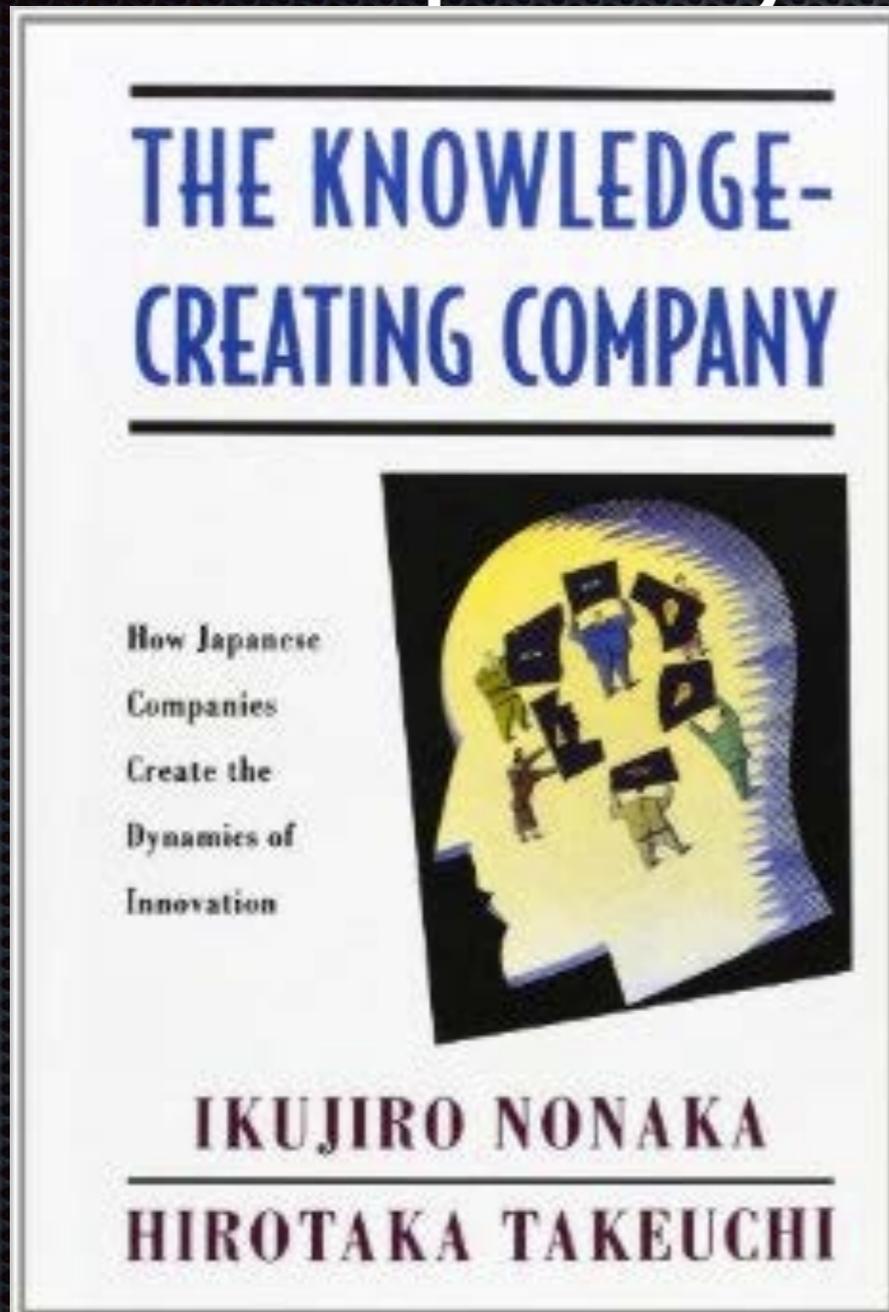


Type C

Phase

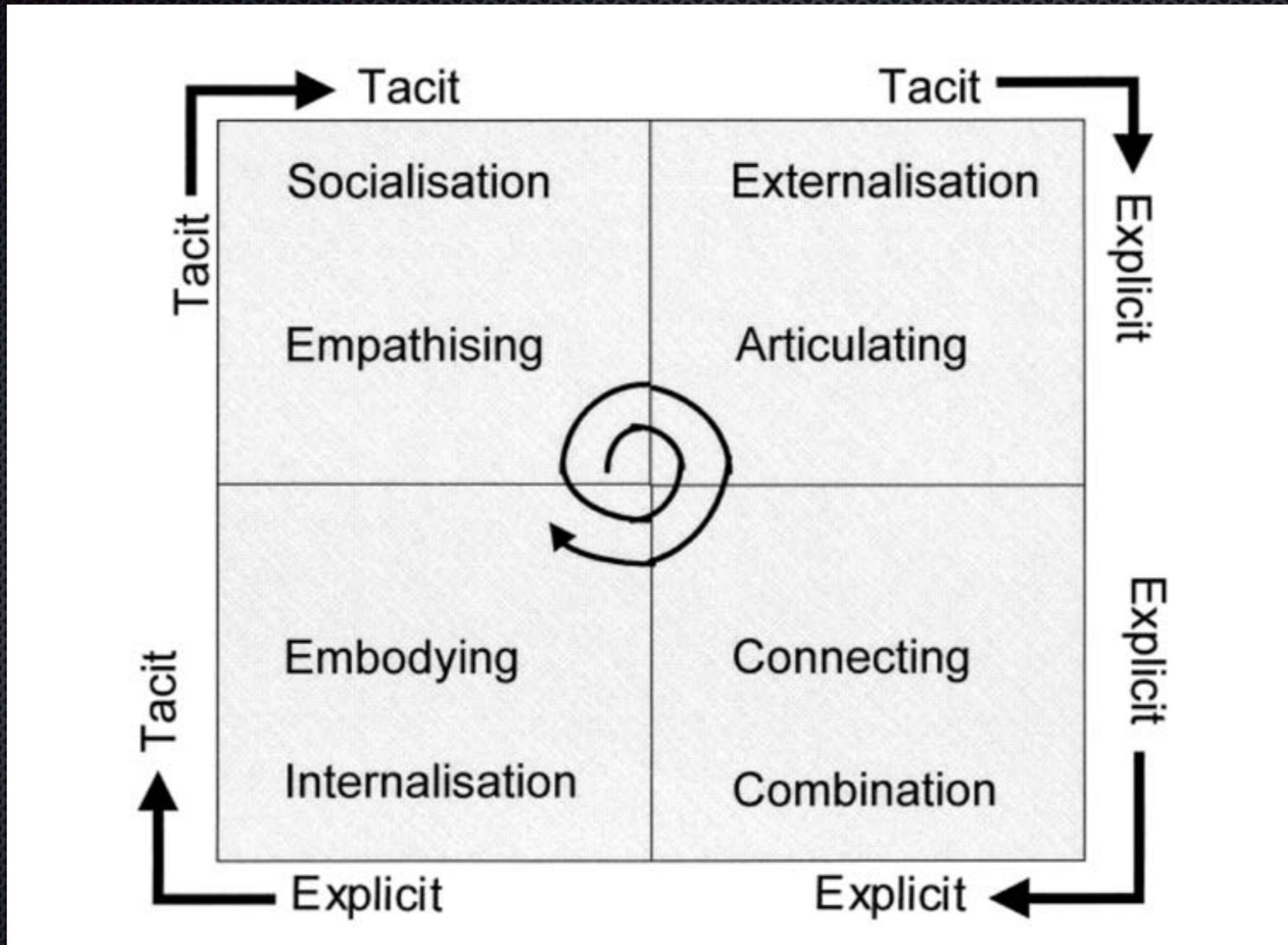


Knowledge Creating Company (1995)



- How Japanese Companies Create the Dynamics of Innovation

SECI Process



Community (as Ba)



Improve ~~Productivity~~ Quality by Stopping Specialization

- ✦ People are naturally multi-skilled.
- ✦ Swarm of People
- ✦ Kaizen Mind

Scrum

- 1990's
 - EASEL Company (Jeff Sutherland)
 - ADM Company (Ken Schwaber)
- 1995
 - OOPSLA Paper
- 2002
 - Agile Project Management with Scrum (Ken and Mike Beedle)

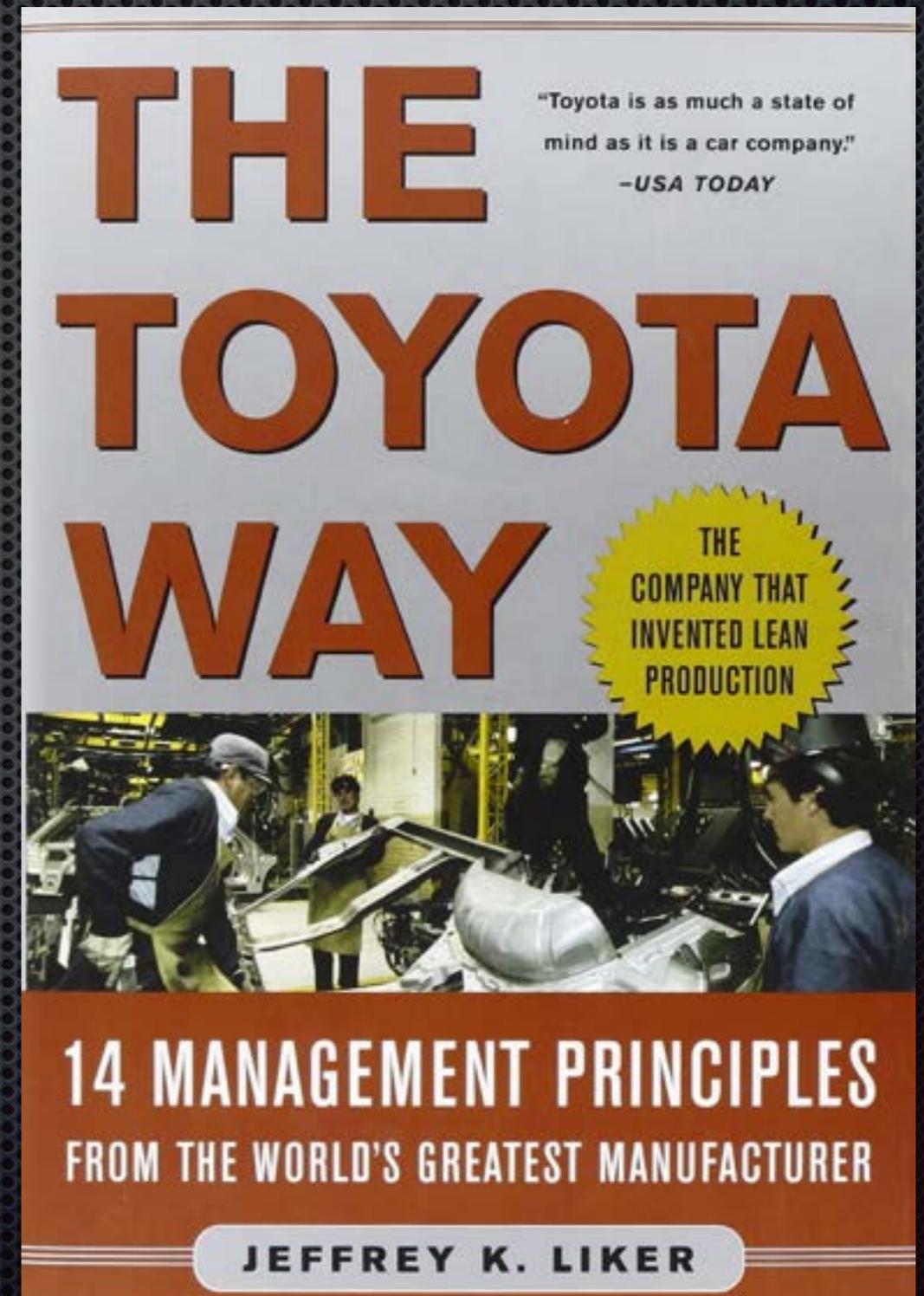
Agile Manifesto

We are uncovering better ways of developing software by doing it and helping others do it. Through this work we have come to value:

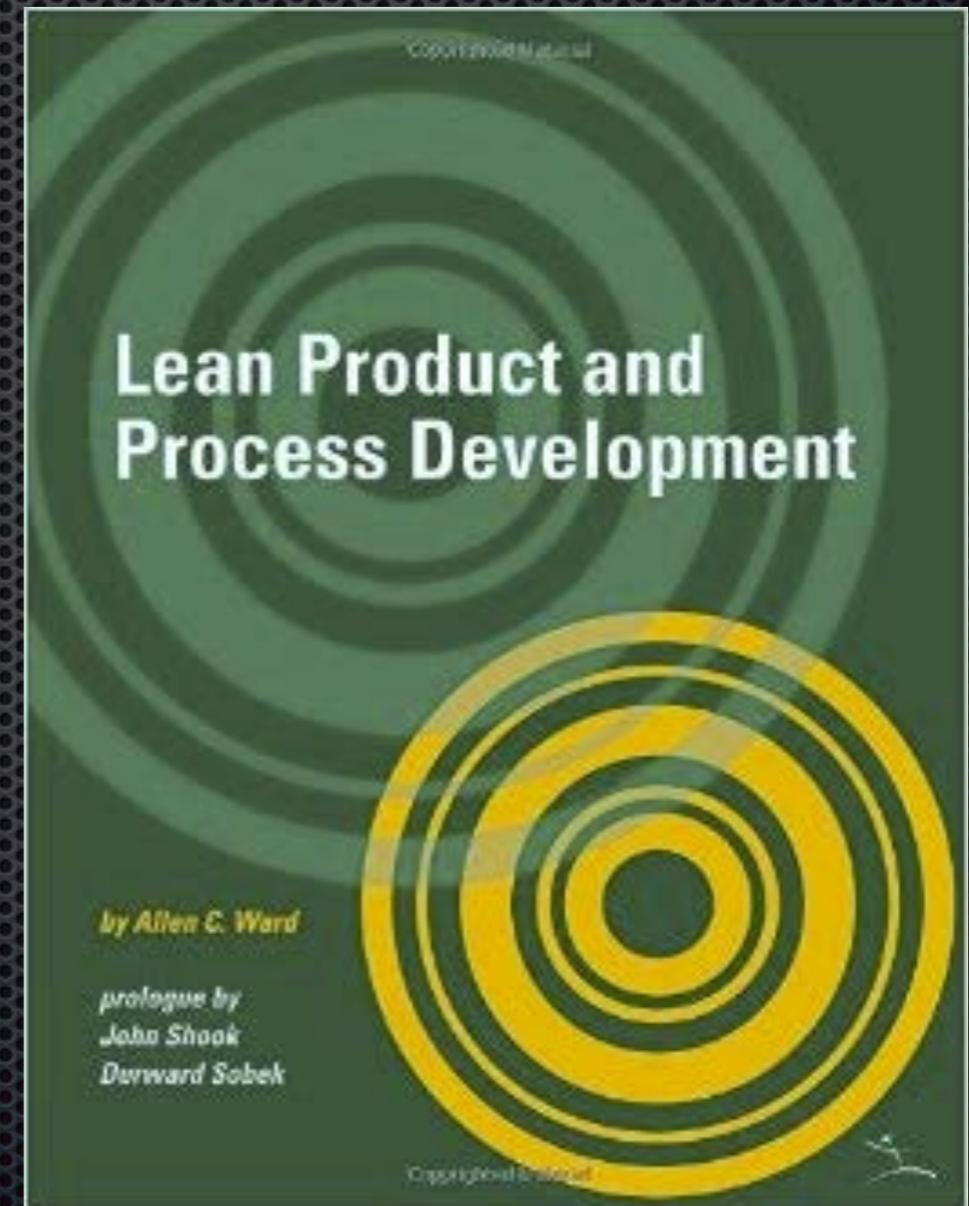
- Individuals and interactions over processes and tools
- Working software over comprehensive documentation
- Customer collaboration over contract negotiation
- Responding to change over following a plan

That is, while there is value in the items on the right, we value the items on the left more.

The Toyota Way (2003)



Lean Product and Process Development (2007)



Lean Product & Process Development

- ✦ Creation of **Re-usable Knowledge**
- ✦ **Set-Based** Concurrent Engineering
- ✦ **Teams** of Responsible Experts
- ✦ **Cadence** and Pull
- ✦ **Visual** Management
- ✦ **Entrepreneurial** System Designer (ESD)

ScrumP_{LoP} (2010-)

Scrum Pattern Community

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Stora Nyteboda,
Sweden

Sitemap

5

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Mark your calendars for 24 May — 29 May, 2015, when we'll come together at [Quinta da Pacheca](#) near Porto, for the seventh ScrumP_{LoP}.

- The [ScrumP_{LoP} Mission](#)
- [Call for Participation](#): What are patterns and pattern languages all about, and what does one do at a PLoP?
- [Submission Guidelines](#): How do I write a pattern?
- [Logistics, Cost, Registration, etc.](#)
- [Program](#)
- [Attendee roster](#)
- [About PLoPs](#): The community where patterns grow
- The venue is Quinta da Pacheca near Porto — a beautiful place in the middle of the port wine region of Portugal. It is about 75 minutes by car (1hour 50 minutes by train) from Porto. The price per attendee will be about €1000, which includes food and lodging. (Our menu and wine selection will affect price.)
- [Calendar](#)
- **[TO THE PATTERNS](#)** 
- [Works in progress](#) (authors working on drafts go here)
 - ScrumP_{LoP} [Product Backlog](#)



Jeff Sutherland @ [Scrum, Inc](#): A Pattern Language for Hyperproductivity

Jeff Sutherland, the inventor of Scrum, is a charter member of the Scrum Patterns group. He is the author of most of these Scrum PLoP® patterns — patterns he teaches to get teams off to a good start, and to get great teams to a hyperproductive state:

- How do you get started? ([Stable Teams](#))
- How do you successfully pull backlog items into a Sprint? ([Yesterday's Weather](#))
- How do you get stuff done? ([Swarming: One-Piece Continuous Flow](#))
- How do you deal with interruptions during the Sprint? ([Illegitimus non Interruptus](#))
- How do get defect free at the end of the Sprint? ([Daily Clean Code](#))
- How do you deal with surprises? ([Emergency Procedure](#))
- How do you ensure you continuously improve? ([Scrumming the Scrum](#))
- How do you get teams to have fun? ([Happiness Metric](#))
- How do you get hyperproductive? ([Teams that finish early accelerate faster](#))

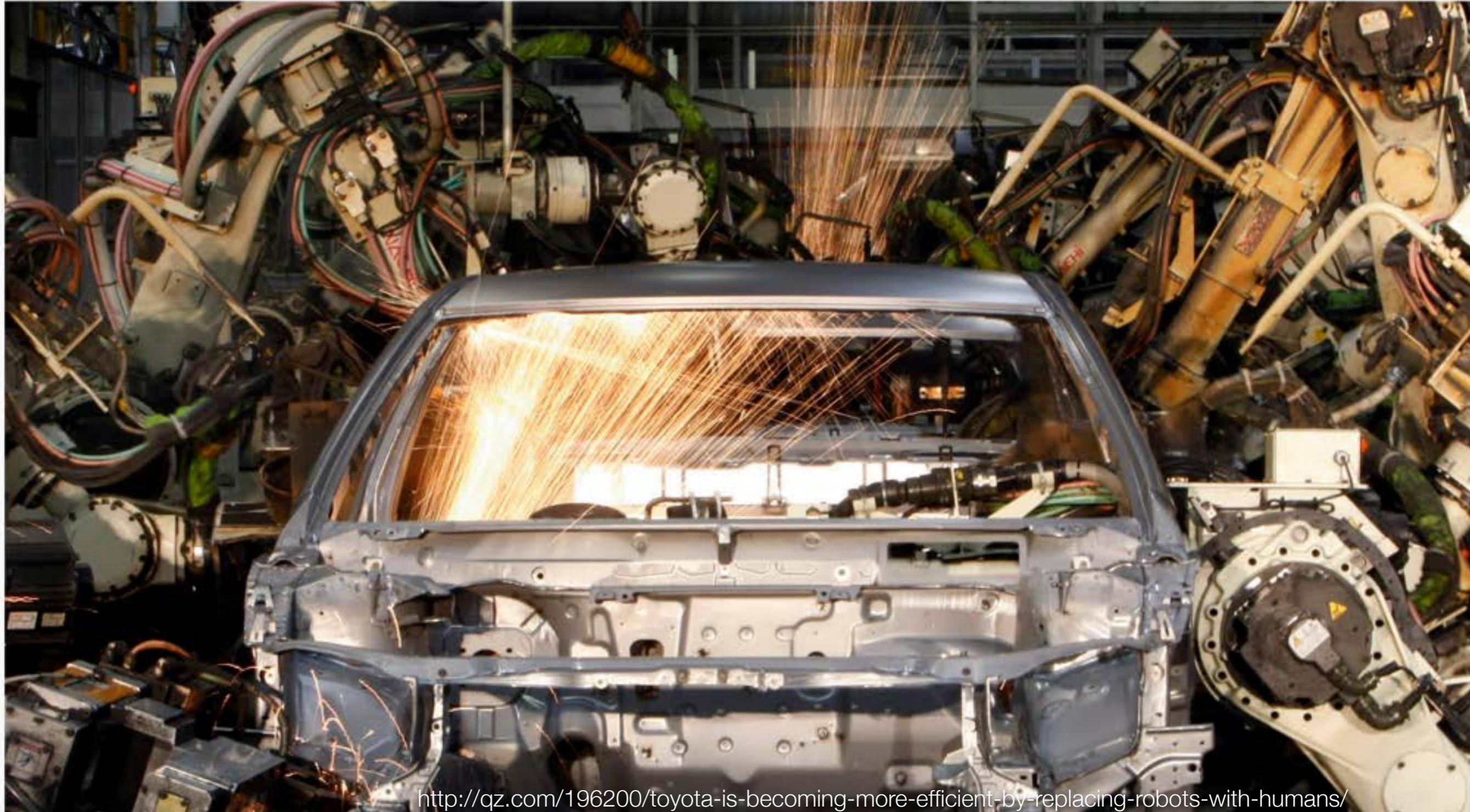
Jeff presented these at [Agile 2013](#).







Toyota is becoming more efficient by replacing robots with humans



Scrum

- ✦ Scrum has been developed through struggle to find better ways.
- ✦ Scrum is not a method or process to tell you the right answer.
- ✦ Scrum is a tool to help you collaborate to find the better ways.



Continuing Future

- ✦ Scrum encourages you to:
 - ✦ keep learning from others and keep practicing.
 - ✦ keep helping others to learn.
 - ✦ keep creating **re-usable knowledge** to improve your product, your process, your organization, your team and yourself, to have them more **generative** and **lively**.
- ✦ This is how scrum is developed and evolved and will be.