


l e a n
software development

The Role of Leadership

In Software Development

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1900 – The One Best Way

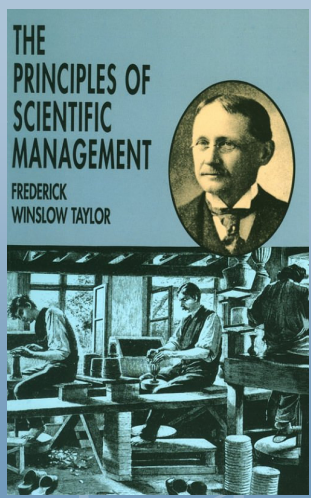
Frederick Winslow Taylor

Assumptions:


- ✓ Workers will do as little as possible
- ✓ Workers do not care about quality
- ✓ Workers are not smart enough to know the best way to do their job

Taylor's View of Efficiency

- ✓ Expert defines the best way through breaking down the job into parts and finding the best way to do each part
- ✓ Pay workers extra for following the method determined by the experts
- ✓ **Presumed Benefits:**
- ✓ Workers get higher pay
- ✓ Employers get higher profits



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1920 – Industrial Training

Charles R. Allen – New Bedford, Massachusetts

- ✓ Four Step method of Industrial Training
 - ✦ Preparation, Presentation, Application, and Testing
- ✓ On-the job training is best

1917 – War Ships were needed

- ✓ Allen: training program for shipbuilding
 - ✦ Supervisors know how to do the job
 - ✦ Supervisors need training in how to train
- ✓ 88,000 people trained in 2 years
 - ✦ Wrote the book *“The Instructor, the Man and the Job”*
 - ✦ *“If the learner hasn’t learned, the teacher hasn’t taught.”*



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1940 – Training Within Industry

Wartime Production

- ✓ Inexperienced Workforce
- ✓ Adapted Allen’s Approach
 - ✦ Train first line supervisors
 - ❖ Job Instruction – how to train workers
 - ❖ Job Methods – how to improve the way work is done
 - ❖ Job Relations – how to treat workers with respect




TWI (Training within Industry)

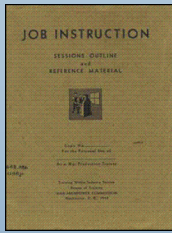
- ✓ Credited with impressive productivity
- ✓ Abandoned as unnecessary after the war
- ✓ Exported to Japan to help rebuild economy



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Job Instruction



HOW TO INSTRUCT

Practical methods to guide you in instructing a new man on a job, or a present worker on a new job or a new skill.

FIRST, here's what you must do to get ready to teach a job:

1. Decide what the learner must be taught in order to do the job efficiently, safely, economically and intelligently. — **Analysis**
2. Have the right tools, equipment, supplies and material ready.
3. Have the work place properly arranged, just as the worker will be expected to keep it.

THEN, you should **instruct** the learner by the following **four basic steps**:

Step I—Preparation (of the learner)

1. Put the learner *at ease*.
2. Find out what he already knows about the job.
3. Get him interested and desirous of learning the job.

Step II—Presentation (of the operations and knowledge)

1. *Tell, Show, Illustrate* and *Question*

in order to put over the new knowledge and operations.

2. Instruct slowly, clearly, completely and patiently, one point at a time.
3. Check, question and repeat.
4. Make sure the learner really learns.

Step III—Performance Try-out

1. Test learner by having him perform the job.
2. Ask questions beginning with *why, how, who, when or where*.
3. Observe performance, correct errors, and repeat instructions if necessary.
4. Continue until you *know he knows*.


Step IV—Follow-Up

1. Put him "on his own."
2. Check frequently to be sure he follows instructions.
3. Taper off extra supervision and close follow-up until he is qualified to work with normal supervision.

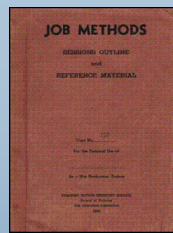
REMEMBER—If the learner hasn't learned, the teacher hasn't taught.

OFFICE OF PRODUCTION MANAGEMENT
Job Instructor Training Program
—District of New Jersey

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Job Methods



HOW TO IMPROVE JOB METHODS

JM How

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, Work-place, 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:—
 - Make the work **easier and safer**.
 - **Pre-position** materials, tools and equipment at the best places in the **proper work area**.
 - Use **gravity-fed** 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 the **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 until a **better way** is developed.
5. Give **credit** where credit is due.

Job Methods Training Program
TRAINING WITHIN INDUSTRY
War Manpower Commission
gpc 16-31488-1

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Job Relations

JOB RELATIONS
A SUPERVISOR GETS RESULTS THROUGH PEOPLE
AND
EMPLOYEE TRAINING
J.R. POPE
U. S. CIVIL SERVICE COMMISSION
APRIL 1945

A Supervisor Gets Results Through People

FOUNDATIONS FOR GOOD RELATIONS

- 1. Let Each Employee Know How He Is Getting Along**
Figure out and tell him what you expect.
Point out ways to improve.
- 2. Give Credit When Due**
Recognize extra or unusual performance.
Tell him while it's fresh.
- 3. Tell An Employee in Advance About Changes That Will Affect Him**
Tell him WHY if possible.
Get him to accept the change.
- 4. Make Best Use of Each Person's Ability**
Look for ability not now being used.
Never stand in an employee's way.

People Must Be Treated As Individuals

JOB RELATIONS TRAINING
U. S. Civil Service Commission
JR-2
April 1945 16-44302-1 GPO

HOW TO HANDLE A PROBLEM

DETERMINE OBJECTIVES

Step 1—Get the Facts
Review the record.
What policies, rules, regulations apply?
Talk with individuals concerned and get opinions and feelings.

Be sure you have the whole story.

Step 2—Weigh and Decide
Fit the facts together and consider their bearing on each other.
What possible actions are there?
Check each action against objectives weighing effect on individual, group, and production.
Select the best actions.

Don't jump to conclusions.


Step 3—Take Action
Should I handle this myself?
Who can help in handling?
Should I refer this to my supervisor?
Consider proper time and place.
Explain and get acceptance.

Don't pass the buck.

Step 4—Check Results
How soon and how often will I check?
Watch for changes in output, attitudes, and relationships.

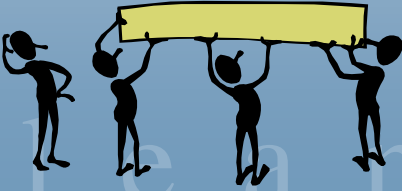
Did my action help production?
WERE OBJECTIVES ACCOMPLISHED?

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TWI Premise: The Five Skills of Good Supervisors

- 1. Knowledge of the Work**
 - ✓ The kind of information that makes one business different from all other businesses: materials, services, processes, equipment operations, etc.
- 2. Knowledge of Responsibilities**
 - ✓ The company's situation regarding policies, regulations, rules, agreements, schedules, etc.
- 3. Skill in Instructing**
 - ✓ No matter how much knowledge or skill a person has about the work itself, if they do not have skill in instructing, it will not be possible to pass that knowledge and skill to others
- 4. Skill in Improving Methods**
 - ✓ Helping to produce greater quantities of quality products in less time, by making the best use of the available people, machines, and material
- 5. Skill in Leading**
 - ✓ Supervisors must be able to work with people, because the results of a supervisor's work depends on the output of other people




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1950 – Toyota Production System

Taiichi Ohno


- ✓ Just-in-Time Flow
 - ✗ Eliminate Waste
- ✓ Stop-the-Line Culture
 - ✗ Mistake-Proof the Process
- ✓ Relentless Improvement
 - ✗ Learn Through Experiments



Taiichi Ohno
TOYOTA PRODUCTION SYSTEM
Beyond Large Scale Production




Taiichi Ohno
(1912-1990)




Taiichi Ohno's
Workplace
Management

✓ Books:
Workplace Management, 1982, (2007)
The Toyota Production System, 1988 (1978)

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Taiichi Ohno on Standard Work




There is something called standard work, but standards should be changed constantly. Instead, if you think of the standard as the best you can do, it's all over. The standard work is only a baseline for doing further kaizen. It is kai-aku [change for the worse] if things get worse than now, and it is kaizen [change for the better] if things get better than now. Standards are set arbitrarily by humans, so how can they not change?


You should not create these away from the job. See what is happening on the gemba and write it down.

From *Workplace Management*, by Taiichi Ohno, originally published in 1982, from translation by Jon Miller, Gemba Press, 2007.

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Taiichi Ohno on Establishing Standards




When creating Standard Work, it will be difficult to establish a standard if you are trying to achieve ‘the best way.’ This is a big mistake. Document exactly what you are doing now. If you make it better than it is now, it is kaizen. If not, and you establish the best possible way, the motivation for kaizen will be gone.

That is why one way of motivating people to do kaizen is to create a poor standard. But don’t make it too bad. Without some standard, you can’t say ‘We made it better’ because there is nothing to compare it to, so you must create a standard for comparison. Take that standard, and if the work is not easy to perform, give many suggestions and do kaizen.

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Taiichi Ohno: Who Decides on Standards?




We need to use the words ‘you made’ as in ‘follow the decisions you made.’ When we say ‘they were made’ people feel like it was forced upon them. When a decision is made, we need to ask who made the decision. Since you also have the authority to decide, if you decide, you must at least follow your decision, and then this will not be forced upon you at all.

But in the beginning, you must perform the Standard Work, and as you do, you should find things you don't like, and you will think of one kaizen idea after another. Then you should implement these ideas right away, and make this the new standard.

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Taiichi Ohno on Changing Standards




Years ago, I made them hang the standard work documents on the shop floor. After a year I said to a team leader, ‘The color of the paper has changed, which means you have been doing it the same way, so you have been a salary thief for the last year.’ I said ‘What do you come to work to do each day? If you are observing every day you ought to be finding things you don't like, and rewriting the standard immediately. Even if the document hanging there is from last month, this is wrong.’

At Toyota in the beginning we had the team leaders write down the dates on the standard work sheets when they hung them. This gave me a good reason to scold the team leaders, saying ‘Have you been goofing off all month?’

If it takes one or two months to create these documents, this is nonsense.


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The Toyota Production System

“Only after American carmakers had exhausted every other explanation for Toyota’s success – an undervalued yen, a docile workforce, Japanese culture, superior automation – were they finally able to admit that Toyota’s real advantage was its ability to harness the intellect of ‘ordinary’ employees.”

“Management Innovation” by Gary Hamel, *Harvard Business Review*, February, 2006



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1980 – Dr. W. Edwards Deming System of Profound Knowledge

Appreciation for the system

- ✓ A systems view was fundamental; never sub-optimize.
- ✓ Manage the relationship between suppliers, producers, and customers

Knowledge of Variation


- ✓ Most variation is “common cause variation” – inherent in the system.
 - ✗ Trying to eliminate this variation only makes things worse.
 - ✗ Systemic problems lie beyond the power of the individual worker.
 - ✗ Deadlines and slogans do nothing to address systemic problems.
- ✓ Provide leadership in changing the way the system works.

Theory of Knowledge

- ✓ Use the Scientific Method to improve systems
 - ✗ Hypothesis, Experiment, Learn, Incorporate Learning (PDCA)

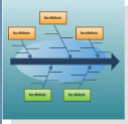
Psychology

- ✓ When it comes to people, the things that make a difference are skill, pride, expertise, confidence, and cooperation.




Prof. W. Edwards Deming

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Kaoru Ishikawa



On Management:

The fundamental principle of successful management is to allow subordinates to make full use of their ability.

Everyone who is connected with the company ... must be able feel comfortable and happy with the company, and to make use of his capabilities and realize his potential. Profit first is an old-fashioned idea that must be discarded.

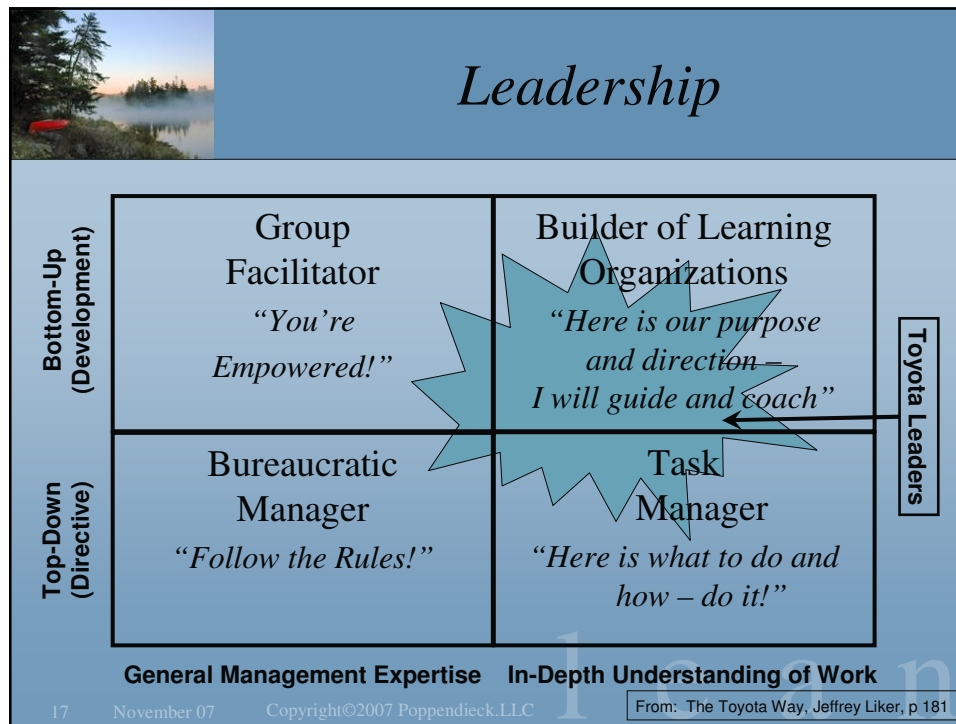
Top managers and middle managers must be bold enough to delegate as much authority as possible. That is the way to establish respect for humanity as your management philosophy.

On Standards:

Standards and regulations are imperfect. They must be reviewed and revised constantly. “If newly established standards are regulations are not revised in six months, it is proof that no one is seriously using them.”

Detailed standards and regulations are useless if they are established by headquarters staff and engineer-specialists who do not know or do not try to know the workplace and who ignore the wishes of the people who have to use them.

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Leadership

Three Models of Leadership


- ✓ Old "Dictator" Style: "Do it my way..."
- ✓ 1980s "Empowerment" Style: "Do it your way..."
- ✓ Lean Style: "Follow me...and let's figure this out together"

The leader's job at Toyota

1. Act as a teacher
2. Get each person to take the initiative to solve problems and improve his or her job.
3. Ensure that each person's job is aligned to provide value for the customer and prosperity for the company

Lean Enterprise Institute
www.lean.org
John Shook

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What is Value?

Brilliant Products
Embody a Deep Understanding of:

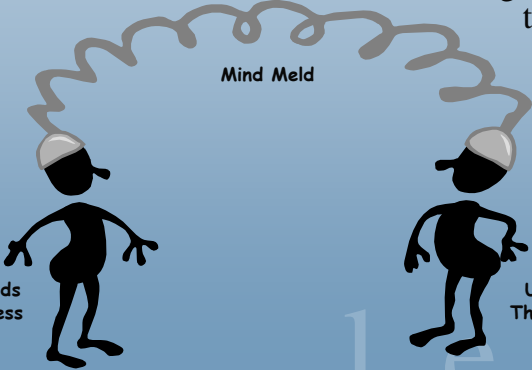
The job that customers
need done

Understands
The Business


The right technology
to do that job

Understands
The Technology

Mind Meld



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Who Decides?

Priority by Committee

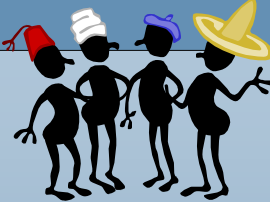

- ✓ Everyone gets a vote
- ✓ No one is responsible for the outcome

Marketing by Checklist

- ✓ We want whatever the competition has
- ✓ The best way to get a me-too product

Behind every great product is a person with:

- ✓ Great empathy for the customer
- ✓ Insight into what is technically possible
- ✓ The ability to see what is essential and what is incidental


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Product Champion

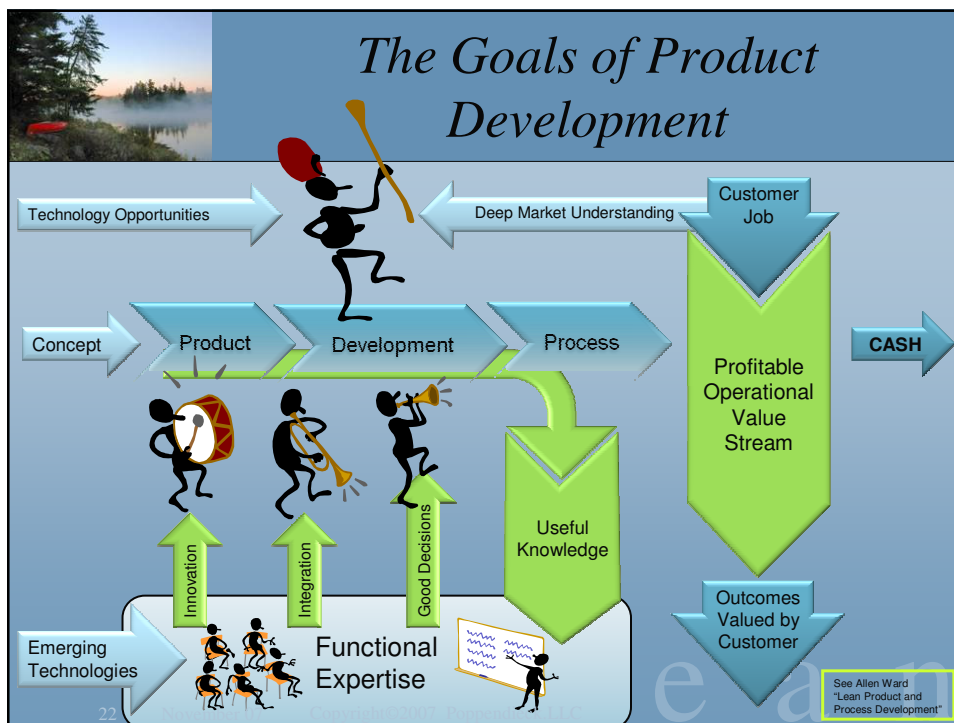
Example: Chief Engineer at Toyota


- ✓ Responsible for Business Success
- ✓ Develops Deep Customer Understanding
- ✓ Develops the Product Concept
- ✓ Creates The High Level System Design
- ✓ Sets the Schedule
- ✓ Understands what customers will value and conveys this to the engineers making day-to-day tradeoffs
- ✓ Arbitrates trade-offs when necessary
- ✓ Defends the Vision



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Leadership Roles

<p>Marketing Leader</p> <ul style="list-style-type: none"> Business Responsibility Customer Understanding Release Planning Tradeoffs <p>Technical Leader</p> <ul style="list-style-type: none"> System Architecture <ul style="list-style-type: none"> ✓ At a high level ✓ Work daily with those developing the details Technical Guidance <ul style="list-style-type: none"> ✓ Integration ✓ Tradeoffs 	C H A M P I O N	<p>Functional Leader</p> <ul style="list-style-type: none"> Preserve Knowledge <ul style="list-style-type: none"> ✓ Towering Technical Expertise Solve Problems <ul style="list-style-type: none"> ✓ Relentless Improvement Grow People <ul style="list-style-type: none"> ✓ Full Potential <p>Process Leader</p> <ul style="list-style-type: none"> New Process Coach <p>Project Leader</p> <ul style="list-style-type: none"> Funding Scheduling Tracking
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Horizontal Versus Vertical


Lean management places the horizontal flow of value in the foreground.

Lean managers think horizontally.


However...

Functions are still strong (or even stronger):

- ✓ Repositories of deep technical knowledge
- ✓ Home base for employees
- ✓ Guardians of career paths



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The Matrix Problem


How do functions avoid the dreaded “two boss” problem?

By negotiations between the value stream leader and the function head about what is needed from the function to support the product.

The employee has only one boss: the function head.




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Think Products, not Projects

- ✓ Up-front funding
- ✓ Scope fixed at onset
- ✓ Success = cost/schedule/scope
- ✓ Projects have an “end”
 - Successful Software does not

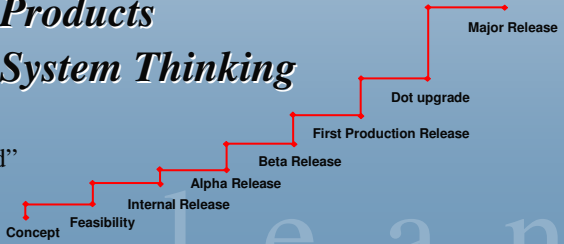
Projects



Batch Funding → **Batch Thinking**

- ✓ Incremental funding
- ✓ Scope is expected to evolve
- ✓ Success = profit/market share
- ✓ Successful Products don't “end”
- ✓ Team usually stays with the Product

Products



System Thinking

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Timebox Scheduling

Start
Concept Approval

3 Month Timebox
Architecture Review
Spike Biggest Risk

6 Month Timebox
Internal Release of Minimum Feature Set
2-3 UI's to Test
Spike Additional Risks

9 Month Timebox
Alpha Release of Minimum Feature Set
UI Finalized
Select Next Feature Set

12 Month Timebox
Beta Release of Minimum Feature Set
Alpha Release of Options for Next Feature Set

15 Months
First Production Release

Responsibility-based Planning and Control:

- ✓ Timeboxed synchronization points are scheduled
 - ✓ Purpose: Review, synchronize, make scheduled decisions.
- ✓ Skilled teams know what is expected at each synchronization point.
- ✓ The timebox is always met – without tracking!
 - ✓ Teams pull information as required to deal with dependencies
 - ✓ Functional leaders share responsibility for deadlines
 - ✓ Scope is reduced if necessary to fit the timebox

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Leadership Team

Appreciate the System

- Build a complete product
 - ✓ Not just Software
- Look at the whole picture
 - ✓ Across the Value Stream
 - ✓ For the Entire Lifecycle


What does this mean for your system?

Zara: Fashion clothing stores

- ✓ Design-to-Store in 2 weeks.
- ✓ Twice-weekly orders.
 - * Delivers globally 2 days after order
 - > On hangers, priced, ready to sell
 - > Shipping prices are not optimized!
- ✓ Manufactures in small lots
 - * Mostly at co-ops in Western Spain
 - > At Western European labor rates...

RESULTS	Zara	Industry
New Items introduced / year	11,000	3,000
Items sold at full price	85%	60-70%
Unsold Items	<10%	17-20%
% sales spent on advertising	0.3%	3-4%
% sales spent on IT	0.5%	2%


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Alignment

In order for organizations to perform brilliantly, there are two prerequisites:*

First, everyone has to agree on *what they want*,
 Second everyone has to agree on *cause and effect*.




Does everyone on the management team speak the same language?



**"The Tools of Cooperation and Change," by Clayton Christensen and others, *Harvard Business Review*, Oct 2006
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Cost Cutting

<p>Drive cost out of each department</p> <ul style="list-style-type: none"> ✓ Easy ✓ Can easily interfere with overall waste reduction 	<p>Eliminate waste between departments</p> <ul style="list-style-type: none"> ✓ Difficult ✓ May not result in the lowest department costs
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Example




Dev

Production

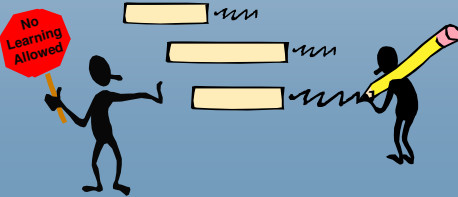
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Conformance to Plan


A Plan is a Commitment

- ✓ Predictability comes from conformance to plan.
- ✓ The plan is always right, even though it was made when we had the least information.




Planning is indispensable, but plans are useless. *

- ✓ The most predictable performance comes from maintaining options until we have the most information.




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* Dwight Eisenhower



Work Standards


The purpose of standards is to make it possible for any one to do any job.

- ✓ Standards are initiated by process groups.
- ✓ Written standards are to be followed, not changed.




The purpose of standards is to provide a baseline for the team to change.

- ✓ *If you believe that standards are writ in stone, you will fail. You have to believe that standards are there to be changed.**




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* Yoshio Shima, Director, Toyoda Machine Works



Utilization


We need full utilization of expensive resources.

- ✓ The best way to increase productivity is to keep everyone 100% assigned.
- ✓ Large queues of work help keep everyone busy.




It is impossible to move rapidly without slack.

- ✓ 100% utilization leads to thrashing and decreases overall productivity.
- ✓ Batch and queue mentality is the biggest detriment to system-wide performance.



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Finances

Balance Sheet Thinking

- What is the break-up value of the company?

“I look at the bottom line. It tells me what to do.” Roger B. Smith

*“This metric guided GM into the most catastrophic loss of market share in business history.”**

- ✓ Delay doesn't matter
- ✓ Just-in-case is wise
- ✓ Work-in-process has value
- ✓ Queues support better

**Conquering Complexity in your Business, by Michael George & Stephen Wilson, p 53

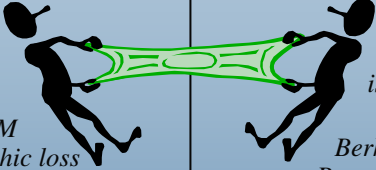
Cash Flow Thinking

- ⌚ How long does it take to convert capital into cash?


“The value of any stock, bond, or business today is determined by the cash inflows and outflows...”

Berkshire Hathaway Annual Report, 1992 (Warren Buffett)

- ✓ Delay creates waste
- ✓ Just-in-time is wiser
- ✓ Work-in-process is waste
- ✓ Queues gum up the works and slow things down



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Accountability

Span of Control

Hold people accountable for what they can **control**
 Measure at the individual level
 Fosters competition

Example

Marketing is responsible for the spec
 Architects are responsible for design
 Engineering is responsible for hardware
 Development is responsible for code
 Testing is responsible for quality




Span of Influence


Hold people accountable for what they can **influence**
 Measure at the team level
 Fosters collaboration

Example

The team includes technical and business people, and the whole team assumes responsibility for the product development and its success in the marketplace.



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Performance

Use Measurements as Levers to Improve Performance.

If you want to improve the performance of anything, the way to proceed, quite obviously, is to find the right measures and use them as levers to improve the results.


People should be able to commit to objectives and their performance should be measured by their ability to meet their targets.




Use Measurements as Data to Improve the System.

“It is hard for Americans to understand the idea that a business organization cannot improve its long term financial results by working to improve its financial results. But the only way to ensure satisfactory and stable long-term financial results is to work on improving the system from which those results emerge.”

- H. Thomas Johnson "Managing a Living System, Not a Ledger,"
 "Lean Manufacturing 2007,"
 Supplement to *Manufacturing Engineering*, SME, 8/2007



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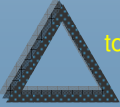
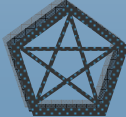
Measurement

Decomposition

- ✓ You get what you measure
- ✓ You can't measure everything
- ✓ Stuff falls between the cracks
- ✓ You add more measurements
- ✓ You get local sub-optimization

Example

- ✓ Measure Cost, Schedule, & Scope
 - ✗ Quality & Customer Satisfaction fall between the cracks
 - ✗ Measure these too!

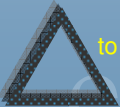

From  to  !

Aggregation

- ✓ You get what you measure
- ✓ You can't measure everything
- ✓ Stuff falls between the cracks
- ✓ You measure UP one level
- ✓ You get global optimization

Example

- ✓ Measure Cost, Schedule, & Scope
 - ✗ Quality & Customer Satisfaction fall between the cracks
 - ✗ Measure Business Case Realization instead!

From  to  !

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lean software development

Thank You!

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