

2007 TWI Summit

Why Standard Work is not Standard: TWI Provides the Answer

June 5, 2007

Jim Huntzinger

Jim Huntzinger – Background and Experience

- Background**
 - B.S. in Mechanical Engineering Technology from Purdue University, 1988
 - M.S. in Engineering Management from Milwaukee School of Engineering, 2005
 - Began career as a manufacturing engineer with Aisin Seiki, a Toyota Group company and manufacturer of automotive components
 - Extensive experience in engineering, operations, and Toyota Production System
- Experience**
 - Transplant and plant start-up for a Toyota Group company in North America
 - Eight years of lean implementation with World's largest air-cooled engine manufacturer
 - Nine years of working with manufacturers on lean transformation and implementation ranging from small private companies to large global corporations
 - Extensive research into the history of TPS/Lean and its development and impact on industry

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Answer these Questions...

- With the kaizen workshop having been part of the industrial landscape for nearly twenty years, firms still find a gap in realizing the capability to sustain the gains made in both their improvement and standard work efforts.
 - *How does Toyota continually achieve, sustain, and evolve their improvements and standard work?*
- TWI has played a significant role in the development of Standard Work within Toyota and it continues this role within Toyota's ability to sustain improvements.
 - *How has TWI evolved within Toyota and remains alive and well, and embedded within their system and every day function?*
- Virtually no firm has been able to sustain their improvements; let alone spread an improvement culture throughout their organization.
 - *What role must leadership play?*

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Key Points

- Learning
- Where did TWI come from?
- Flow
- Problem Solving
- Embedding TWI in People
- Embedding TWI in the System
- Embedding TWI in Leadership
- Embedding TWI in Standard Work

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No Silver Bullet: Only *Learning*

...let us also rejoice in our sufferings, because we know that suffering produces perseverance; perseverance, character; and character, hope. And hope does not disappoint us...

Guideposts, *The Guideposts Parallel Bible* (Carmel, NY: Guideposts), New International, Romans 5:3-5, p. 2860.

From a Lean Perspective that means.....

Tacit and Intrinsic Learning

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Tacit and Intrinsic Learning

- Through repeated data collection on the shop floor as participant and observer with experienced members of Toyota's operations management Consulting Division [Japan] and the Toyota Supplier Support Center [North America], I discerned consistent patterns in what were considered good applications of 'TPS thinking' and what were not. These patterns existed in the design, performance, and improvement of individual activities and of systems of activities. I termed these patterns 'Rules-in-Use' because they were so strong, **it appeared as if people had rules to guide their decisions, yet the rules themselves were never articulated.**

— Steven J. Spear, January 7, 2002, "Just-in-Time in practice at Toyota: Rules-in-Use for building self-diagnostic, adaptive work-systems," Working paper: 02-043, p. 7.

- ***Folks this is Culture!***
- The Rules-in-Use *represent the fundamental essence of TPS*

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TWI and Toyota and You

You will not become lean by doing TWI, *but* you will not become lean without doing TWI.

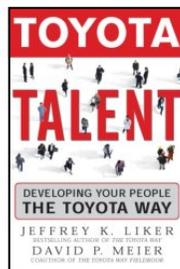


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Who is *Learning*: PEOPLE

"You can dream, create, design and build the most wonderful place in the world...but it requires people to make the dream a reality."



Walt Disney



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Lean By Doing

One must learn by doing the thing; for though you think you know it you have no certainty, until you try.

Sophocles, 445 B.C. Listed in the front of Walter Dietz's book, *Learn By Doing: The Story of Training Within Industry 1940 – 1970*

Sakichi was an inventor who believed that invention only achieved its goal through practical application.

Satoshi Hino on Sakichi Toyoda from...

Satoshi Hino, 2006, *Inside the Mind of Toyota: Management Principles for Enduring Growth*, (Japanese edition originally published in 2002 as, *Toyota Keiei Shisutemu no Kenkyū*), (New York, NY: Productivity Press), p. 4.

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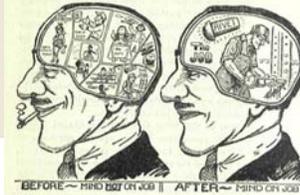


Sustainability? (Why Standard Work is *not* Standard)

- Continuous improvement of what?
 - Kaizen and Kaizen Workshops have been around for nearly 20 years
- Many improvements made
 - But *overall* (System) *improvement* has been minimal
 - No one has achieved a level close to Toyota
- Teams and Team work
 - Do we really understand how to apply this?
- Leadership and Culture
 - Does leadership understand: Can they do it themselves?
 - Getting your hands dirty
- TWI
 - Philosophy (mind-set)
 - Tools (skills)

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Charles Allen: The Father of TWI



- **The Instructor, The Man, and The Job**

- Allen devoted nearly 400 pages to detailing his 4-Step method for developing and delivering good instructing for industrial work
- [Think Toyota] This book deals with three factors in efficient production – the instructor, the man, and the job. **The instructor, because it is through effective instruction that we can secure efficiency in training. The man, because when properly trained he does the best work. The job, because production efficiency comes from well instructed men doing good jobs.**

Charles R. Allen, 1919, *The Instructor, The Man, and The Job: A handbook for Instructors of Industrial and Vocational Subjects*, (Philadelphia and London: J.B. Lippincott Company), p. 3.

- **The Foreman and His Job**

- [Again – think Toyota] This book does not undertake to tell foremen how to discharge their duty; it does take up a number of points affecting the foreman's job that a large number of foremen have thought worth careful consideration and discussion in conferences. It therefore deals with **three of the most important factors in production, supervision** [Job Relations], **cost control** [Job Methods], **and instruction** [Job Instruction].

Charles R. Allen, 1922, *The Foreman and His Job*, (Philadelphia and London: J.B. Lippincott Company), p. 3.

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The 4-Step Method

- TWI is simply applied Scientific Method!

Steps	Johann Herbart	Charles Allen	TWI			PDCA (Shewart/Deming Cycle)	Scientific Method
			Job Instruction	Job Methods	Job Relations		
1	Prepare the pupils to be ready for the new lesson	Preparation	Prepare the Worker	Breakdown the Job	Get the Facts	Plan – observe data and reality; decide on a problem; define it	Observation and Description
2	Present the new lesson	Presentation	Present the Operation	Question Every Detail	Weigh and Decide	Do – Analyze the problem; propose a countermeasure	Formulation of an Hypothesis
3	Associate the new lesson with ideas studied earlier	Application	Try Out Performance	Develop New Method	Take Action	Check – Try the countermeasure; check the results	Use the Hypothesis to make Predictions
4	Use examples to illustrate the lesson's major points	Testing (or Inspection)	Follow Up	Apply New Method	Check Results	Act – if successful, standardize change; if not, start the cycle over	Test the Predictions by Experiments
5	Test pupils to ensure they had learned the new lesson						

- **Scientific Method**

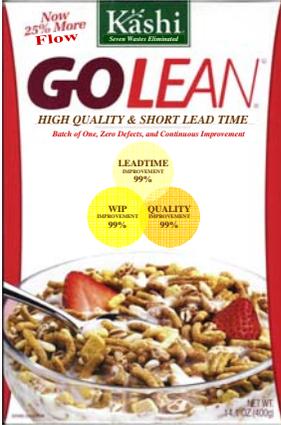
- Conclusions must be based on evidence, not opinion
- Fact-based/Data driven
- Facts/data can be experience/experiments; that is, **Practice – or Learn By Doing**

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What is the 1 x 1 Mindset?

- More than just applying some different tools!
 - Just like truly changing your health is a life style/philosophy change
 - You don't become healthy by just eating something different for breakfast for a while
 - You must change *every* aspect of your life!
- Change in Thinking (Book title: *Lean Thinking*)
- Change in Life Style
- Change in Business Life Philosophy
- Change in Action
- Change in Habits
- Change in What you Do Each and Every Day!

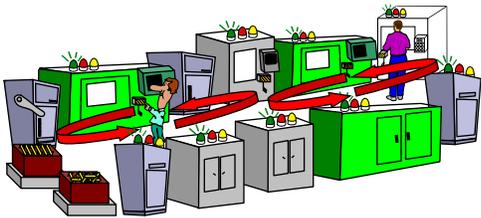


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What is the 1 x 1 Mindset?

- Flow
- One-Piece Flow
- 1 x 1 manufacturing
- Flow manufacturing
- Continuous Flow
- Batch Size of 1
- Kaizen (LEARN BY DOING!)
 - Implementing flow where it currently does not exist
 - Implementing *countermeasures* where flow breaks down via *Scientific Method* (PDCA/Problem Solving)
 - It **MUST** be learned via action; making changes in the Gemba; with 1 x1 "Thinking/Mindset" ever present



A Change in Thinking **It's All about FLOW**

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BRASS

BRASS

Methods - Job Data

Important Step - Job

Job Methods

Point - Important

Instruction - Job M

Method - Key Point

Program Develop

Breakdown - Scienti

Relations - Progr

Job Breakdown

Job Relations

Important Step - Job

Multiple Eff

Continuous Improv

Learn By Doing - Mul

Pattern - Continuo

It's all about Flow

- Producing one piece at a time following the sequence and rules of the Takt Time
- A Change in Thinking!
- Systems are designed for *flow*
 - *Not scale* (speed & volume)
 - Economies of Scale are Dead

It is all about....

Product or Service
Need/Want

Flow!

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Applied Problem Solving

- The other side of the coin
 - Side 1: It's All About **Flow**
 - Side 2: Problem-Solving
- The 4-Step Method is applied **Problem Solving**
- The Link between the two sides of the coin...

PEOPLE

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Methods - Job Data

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Job Important

Structure - Job M

Method - Key Point

Program Develop

Breakdown - Schedul

Relations - Progr

Job Breakdown

Job Relations

Important Step - Job

Job Multiple C/P

Continuous Improv

Program by Design - Multi

Pattern - Continuan

People

- TWI becomes part of PDCA in action on the frontline of an operation
- The Toyota culture cultivates workers to solve as many problems as they can as often as they can
- *Many organizations say we can do what we do because we are Disney. We believe we are Disney because of what we do.*
 - Substitute Toyota for Disney!
 - (*The Disney Keys to Excellence*, Disney Institute, April 20, 2006, Middlebury, IN. Comment from program leader during the program.)
- Skill proceeds Teamwork
 - (Teamwork does not proceed skills)



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Learning to Lead is in the DNA

- “the explicit specification of how work is going to be done *before it is performed* – is coupled with testing work *as it is being done.*”
 - (Spear, May 2004, “*Learning to Lead at Toyota*,” HBR, p. 79.)
- Managers should coach, not fix
 - Workers and low-level managers constantly solving problems
 - The more senior the manager, the less likely he is to be solving problems himself
 - Toyota managers act as enablers, they position themselves as a teacher and coach
 - (Spear, May 2004, “*Learning to Lead at Toyota*,” HBR, p. 85.)
- Executive management
 - “The result...is a high-degree of sophisticated problem solving at all levels of the organization.”
 - (Spear, May 2004, “*Learning to Lead at Toyota*,” HBR, p. 86.)



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Key Point

Program Development

Breakdown - Scientific

Relations - Program

Job Breakdown

Job Relations

Important Step - Job Methods

Multiple Effects

Continuous Improvement

By Doing - Multiple

Patterns - Continuous

Learning to Lead is in the DNA

- “the efforts of a senior manager...should be aimed not at making direct improvements but at producing a cadre of excellent group leaders who learn through continuous experimentation.”
 - (Spear, May 2004, “Learning to Lead at Toyota,” HBR, p. 86.)
- System paradox – activities, connections and flows are rigidly scripted, yet at the same time operations are enormously flexible and adaptive.
 - (Spear, 1999, “Decoding the DNA of the Toyota Production System,” HBR, p. 97.)
- “Toyota’s managers recognize that the devil is in the details; that’s why they ensure that all work is highly specified as to content, sequence, timing, and outcome.”
 - Think of the *observation* involved with developing a Job Breakdown Sheet
 - (Spear, 1999, “Decoding the DNA of the Toyota Production System,” HBR, p. 98.)



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BRASS

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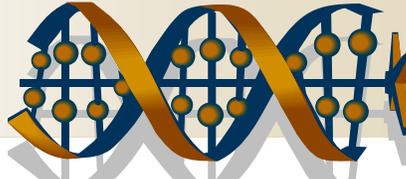
Learning to Lead is in the DNA

- “For people to consistently make effective changes, they **must know how** to change and **who is responsible** for making the changes.” (Emphasis added)
 - (Spear, 1999, “Decoding the DNA of the Toyota Production System,” HBR, p. 102.)
- “Toyota **explicitly** teaches people **how to** improve, **not expecting** them to learn strictly from personal experience.” (Emphasis added)
 - (Spear, 1999, “Decoding the DNA of the Toyota Production System,” HBR, p. 102.)
- “Any improvement...must be made in accordance with the scientific method, under the guidance of a teacher, and at the lowest possible organizational level.”
 - (Spear, 1999, “Decoding the DNA of the Toyota Production System,” HBR, p. 102.)



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TWI in the DNA



“Rule-5 defines another role for people in supervisory positions, beyond that defined by Rule-4. By Rule-4, one critical role of a person in the managerial hierarchy is to **teach** those at the level immediately below them. By Rule-5, they are also responsible for managing the **‘interfaces’ between the people** immediately below them in the hierarchy and for managing and **improving the flow-paths** over which their group produces and delivers goods, services, and information. In this way, Rule-5 has a **significant impact on the structure and dynamics of TPS organizations.**”

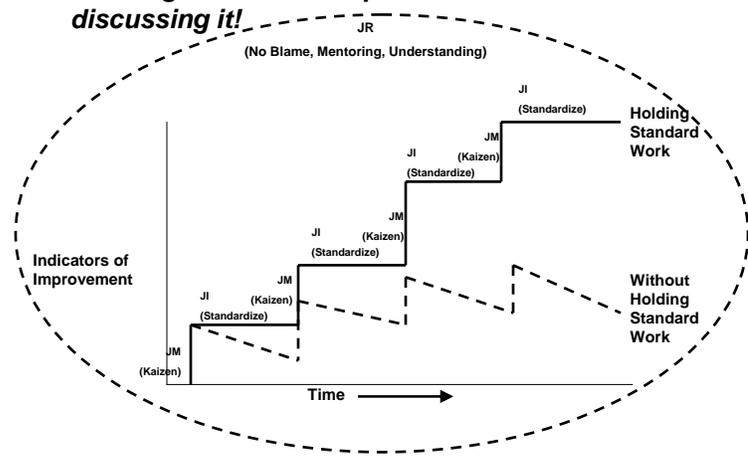
(Spear, 1999, “The Toyota Production System: An Example of managing Complex Social/Technical Systems,” PhD Thesis, Harvard University, p. 97.)

- Explaining TWI, standard work, kaizen, & leadership in the context of Ohno was trying to accomplish.
 - Job Instruction
 - Job Relations
 - Job Methods
 - TWI as a foundation to *Learning*

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Embedding TWI in the DNA

- Spear’s Rule 5 is the manifestation of TWI
- ***Creating Teams that Improve and Sustain without ever discussing it!***



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NUMMI Plant: Bringing TWI to North America

- John Shook's encounter with TWI when working for Toyota to transfer their Manufacturing Operations to North America



"To my amazement, the program Toyota was going to great expense to "transfer" to NUMMI was exactly that which the Americans had taught the Japanese decades before."

John Shook, "Bringing the Toyota Production System to the United States: A Personal Perspective," in Jeffrey Liker (ed.), 1997, *Becoming Lean* (Portland, OR: Productivity Press), p. 69.

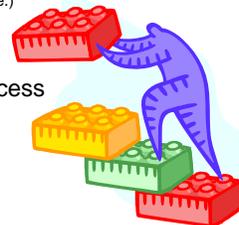
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Just How Embedded TWI is within Toyota: Learning from John Shook

- "lead[ing] the organization as if you have no power."
- "The leaders' job is to develop his or her people," in the "spirit of lean mentorship."
- The leader's job is to develop his or her people, not just get the job done...and the spirit of that is captured in the statement, *if the learner hasn't learned, the teacher hasn't taught.*"
- "good Toyota leaders don't jump to conclusions or solutions; they first try to size up the situation, [and] say 'where do we stand?'"
 - This is a caution point from Job Relations
 - And is preceded by the JR Steps 3 & 4: *Get the Facts* and *Weigh and Decide*

(Jim Womack and John Shook, October 19, 2006, Webinar: "Lean Management and the Role of Lean Leadership," Cambridge, MA: Lean Enterprise Institute.)

- Key components of JM formed the basis of Toyota's Standardized Work and Kaizen
- The JR course influenced Toyota's team process and the role of the Team Leader



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Continuous Improv
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Action - Continuan



Job Relations

- Helped supervisors improve their ability to work with people and promoted teamwork
- Job Relations emphasizes that people must be treated as individuals
- Supervisors are given foundations for developing and maintaining good relations *to prevent problems from arising*
- When problems do occur they are resolved more effectively by teaching supervisors...
 - how to get the facts,
 - weigh them and make the decision,
 - take action,
 - and check results



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Job Instruction

- Supervisors not skilled in instruction, no matter how knowledgeable or skilled themselves, *cannot effectively pass it on to others*
- The objective of JI is to help supervisors develop a well-trained workforce resulting in less scrap and rework, fewer accidents, and less tool and equipment damage
- Supervisors are taught how to effectively break down a job for instruction, and identify the *important steps and key points, then...*
 - prepare the operator to learn,
 - give a proper demonstration,
 - Have the operator try out the performance,
 - and tapering off coaching while continuing to follow-up



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Job Methods

- Taught supervisors to improve the job without help from engineers or managers, and only using resources at hand and their operators
- The aim of the JM Training program is to help produce greater quantities of quality products in less time by making the best use of the people, machines, and materials now available
- Supervisors are taught how to break down jobs into their constituent operations by...
 - listing all the details of the present method,
 - question details by asking specific questions,
 - develop new methods, by eliminating, combining, and rearranging these details,
 - and apply the new method



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Rosie the Riveter

- “Confidence and resourcefulness in how to proceed, not standardized solutions and rules, are developed. These enable supervisors to get good teamwork, to give better service, and to get out more production.” - *Job Methods: Sessions Outline and Reference Material*, 1943, p. 2
- The confidence that Rosie has in her face is the confidence that comes from good training through TWI



Rose Will Monroe. She was a riveter building B-29 and B-24 planes at the Willow Run Aircraft Factory in Ypsilanti, Michigan when she was asked to star in a promotional film about the war effort

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Toyota Supplier Support Center: Toyota and the TWI Connection

Hajime Ohba – Head of the Toyota
Supplier Support Center, TSSC

- Toyota modified TWI and learned important things from it
- Overall TWI was very helpful to establish the foundation in Gemba
- Toyota studied it very thoroughly to build up a foundation of basic ability of Gemba
- It became “one” of Toyota’s strengths in the Gemba



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Toyota Motor Corporation: Training Department

Isao “Ike” Kato – Retired from Toyota after
35 years and known as the *father of*
standardized work and kaizen courses.

It is not really a question of importance; it is a question of sequence. I don't think you can do a good job of implementing standardized work or several other elements of TPS without the JI skill set in place. I have observed quite a few companies struggle with implementing standardized work, kaizen, and other items. Often the short term gains companies obtain fall away over time. One direct reason why is that no proper plan was ever put in place to train people to the new method and the JI technique provides the exact skill set required to do this work. I can't see how standardized work can function without JI in place underneath to support it in the long run.

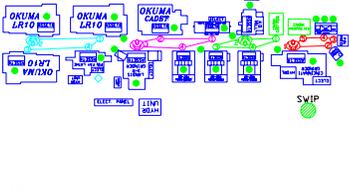


Source: http://artoflean.com/documents/pdfs/Mr_Kato_Interview_on_TWI_and_TPS.pdf

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Kaizen in Context

- Ohno puts JM into Toyota's Context
 - Direct ties to customer demand/needs – *Meeting Takt Time*
 - Continually implementing FLOW – *Value Stream (Flow & Pull)*
 - Continually improving FLOW – *Kaizen (Pursuit of Perfection)*
- Scientific Method
 - PDCA cycle
 - Scientific method
 - Develop a thesis (idea for improvement)
 - Conduct experiment
 - Review results
 - Implement if successful




SOURCE: Courtesy of Toyota Motor Corporation, Toyota City, Japan.



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Training Within Industry, TWI

- **Proven** Shopfloor Tools and Skills
- **Foundational** Element to the Toyota Way
- **Essential** Methods to deploy Management Strategy at the Shopfloor level
- **Transcends** – TWI manifests both Techniques (Method) & Philosophy (Thinking) which transcends through and organization at all levels – through **People!**

Managing Toward Perfection

A Toyota View:

“We get brilliant results from average people managing brilliant processes.”

“We observe that our competitors often get average (or worse) results from brilliant people managing broken processes.”

(John Shook & Jim Womack)

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Questions/Comments/Discussion?

Thank You!

Jim Huntzinger

TWI

Change Your Thinking!

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