

Discovering Profound Insights into Operational Excellence



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September 29, 2020



Quality Management
Division
Excellence Through Quality™

How will “Managing for Quality” change?

- Session 1 Making Quality-Based Executive Decisions
- Session 2 Leading Transformation – Managing Improvement
- Session 3 Designing Quality as an Inclusive Business System
- Session 4 Conducting Executive Inquiry and Formulating Strategy
- Session 5 Understanding Japanese-Style Strategy Management
- Session 6 Organizational Learning – Triple-Loop Experience
- Session 7 Managerial Engineering – Designing Future Firms
- Session 8 Understanding the Financial Component of Quality
- Session 9 Reflecting on Strategic Implications of Attractive Quality
- Session 10 Discovering Profound Insights of Operational Excellence**
- Session 11 Defining Quality to Apply to Everyone, Everywhere
- Session 12 Managing for Quality Amidst Digital Turbulence

Abstract of Session #10:

Operational Excellence (OpEx) delivers excellent performance through execution of improvement strategies combining statistical methods and efficiency tools (referred to as lean production) that are characterized as the Toyota Management System. This webinar describes operation of the Toyota way and its blending of statistical and operational techniques to create flow across work environments which eliminates situations that create waste from lags, losses, or friction. The three categories of waste will be described and illustrated using examples of how muri, mura, and muda waste can be recognized. The webinar closes by describing an exercise that organizations should perform: “name your own waste!”

Learning Objectives for Session #10:

Learning Objective 1: Discover the Toyota Management System

The Toyota Management System is much more extensive and involved than the Toyota Production System and its methods are integrated across all business functions and operations.

Learning Objective 2: Understand Daily Management System Operations

The Daily Management System is the “heart” of Operational Excellence in any productive system. Discovering how it operates at an “atomic” level is a critical success factor for obtaining control of the productive system.

Learning Objective 3: Eliminating Waste and Loss from Operations

Learning to see the waste in a system is the first step toward eliminating it. However, if the waste you are looking for is not defined in a way to clearly identify it, then it may become the waste that is “invisible” to workers but is detected by customers as defects. How can management make waste to be more visible? The answer is by naming it something workers can know!

Discovering Profound Insights into Operational Excellence

Part 1:

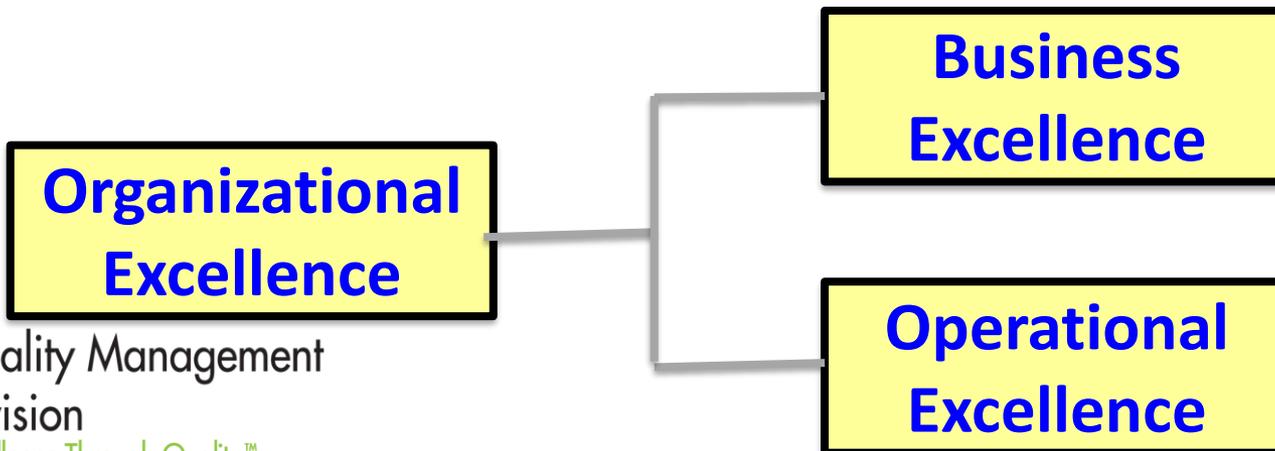
Setting the Context for OpEx Thinking

In “Pursuit of Excellence” – the challenge:

What is the meaning of excellence and how does it shift with levels of managerial responsibility in organizations?

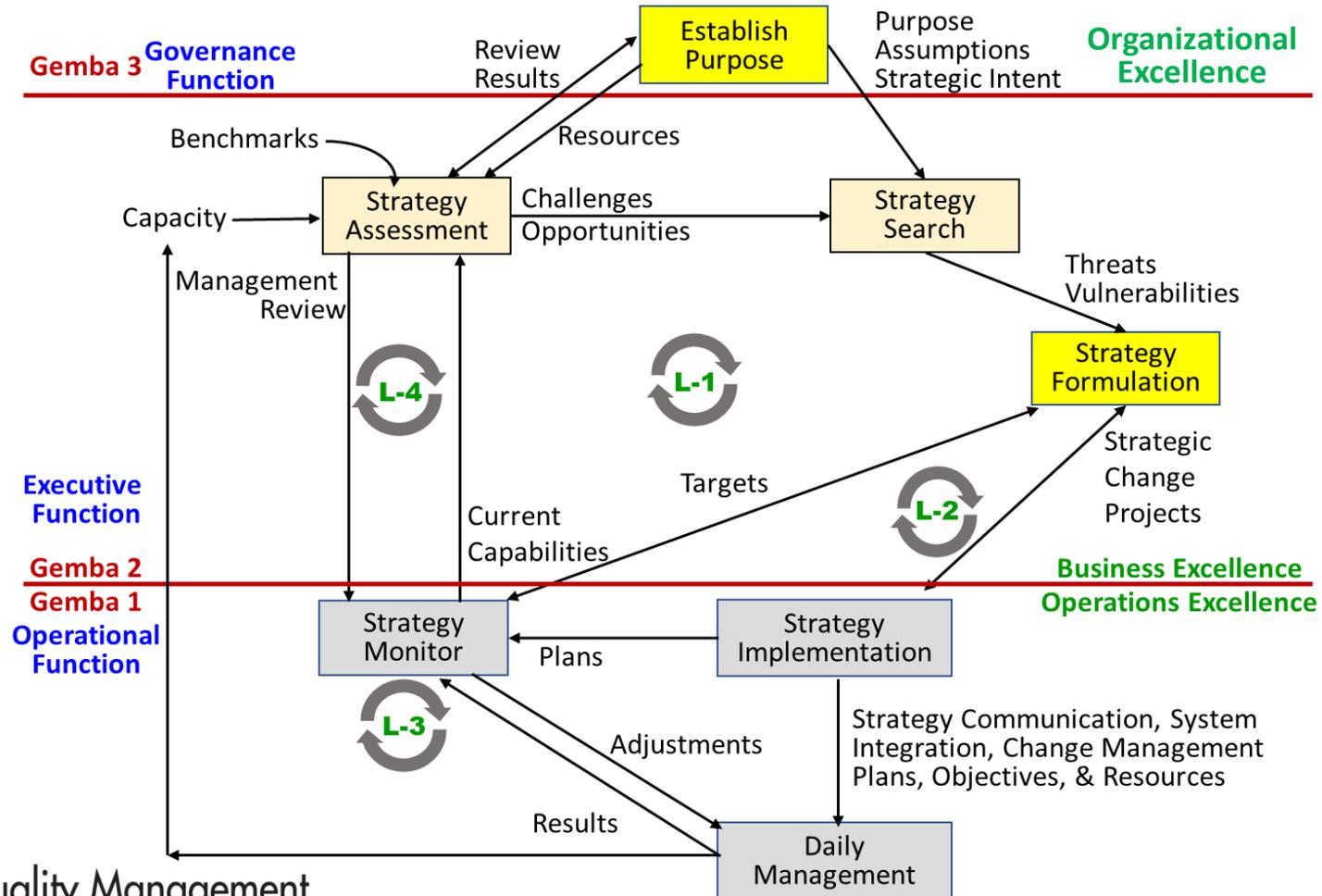
Excellence: a quality of extreme value or exceptional merit.

- **Organizational Excellence:** Sustainability of the organization.
Delivery of long-term Business and Operational Excellence.
- **Business Excellence:** Consistency of performance results.
Delivery of predictable stability in key performance outcomes.
- **Operational Excellence:** Persistence of process performance.
Delivery of consistently predictable excellent process results.



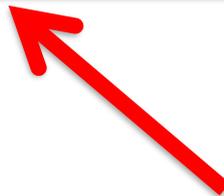
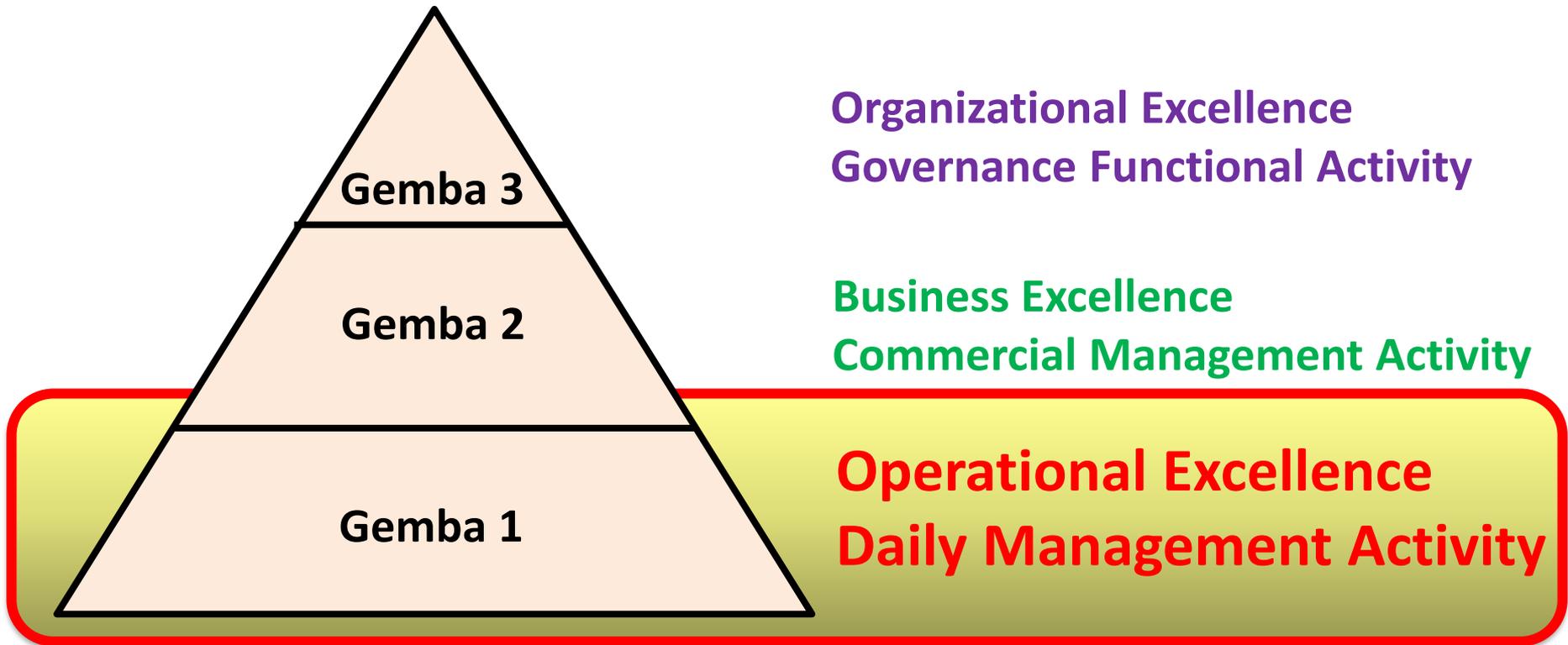
Designing Organizations for Excellence:

Strategy Management manages both Operational and Business Excellence.



Seeking excellence in a three Gemba structure:

How does responsibility for pursuing excellence change in the gemba?



Focus of this Webinar

Scientific perspective to studying quality:

“Do not seek to follow in the footsteps of the old masters, seek instead what these masters sought.”

~ Matsu Basho (1644-1694)

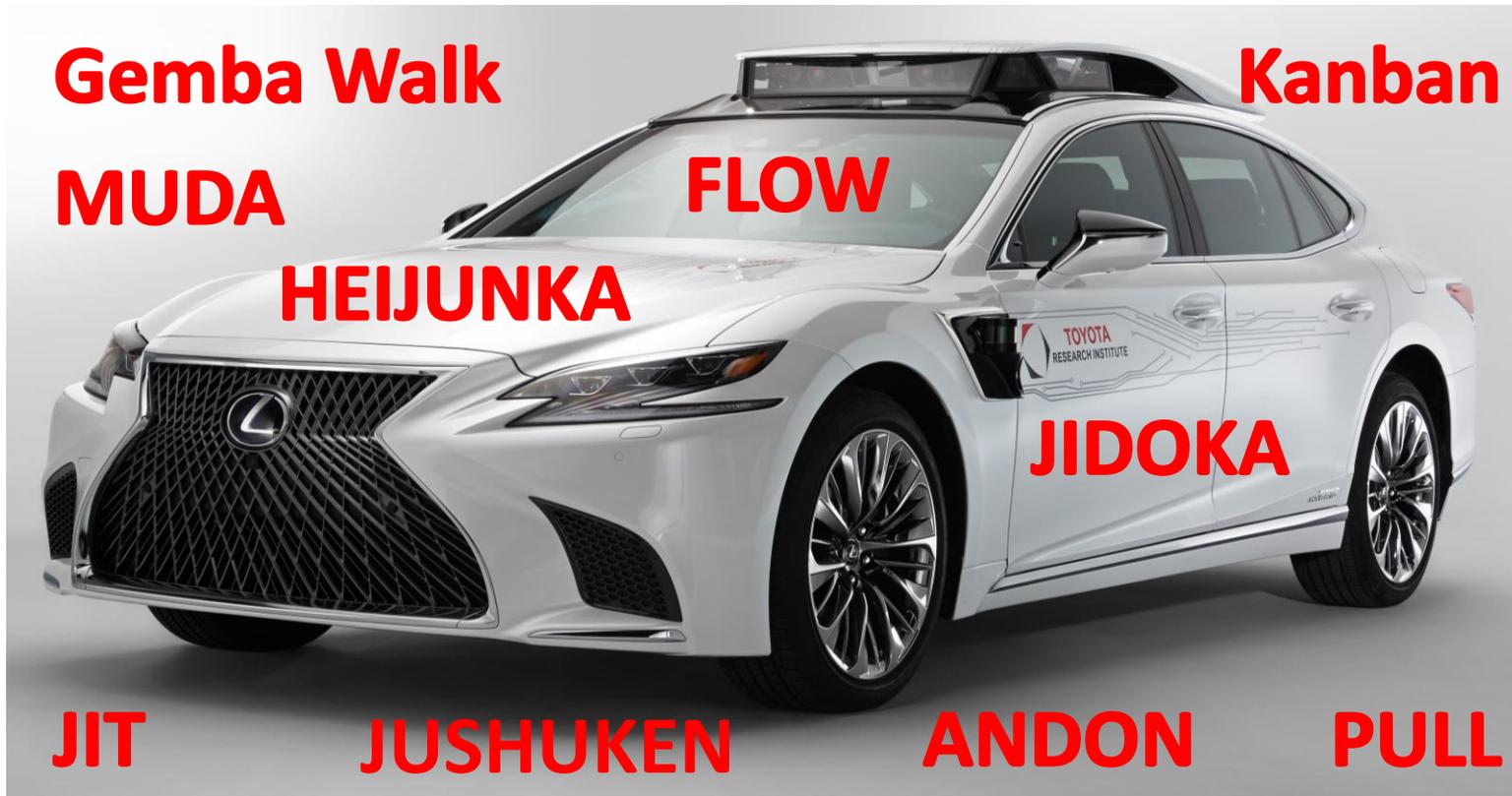
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Part 2:

Understanding Operational Excellence

Examining the depths of Toyota's system:

So, you think you have a comprehensive understanding of the TPS?

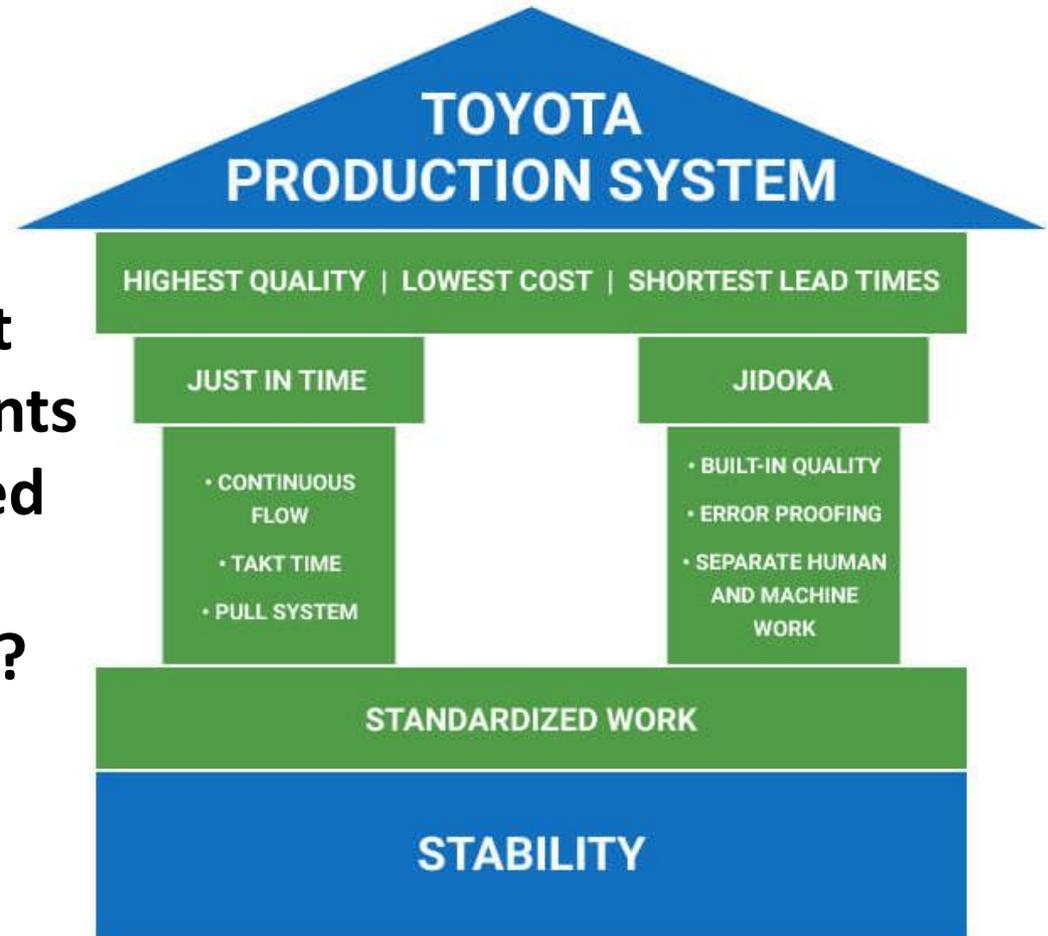


Have you seen the TPS House of Toyota?

Is this the best diagram to describe how the Toyota really operates?



What is the “glue” that holds all these components together as an integrated system for delivering Operational Excellence?



This only scratches the surface of the Toyota Way!

Taiichi Ohno's advice for studying Toyota:

Learning must be integrated within the context of the overall system.

“To understand means to be able to do.”

“Knowledge is something that you buy with money. Wisdom is something that you acquire by doing.”

“Visualize what you do, manage the flow.”

“Let the flow manage processes, and not let management manage the flow.”

“The key to the Toyota Way and what makes Toyota stand out is not any of the individual elements ... But what is important is having all the elements together as a system. It must be practiced every day in a very consistent manner, not in spurts.”

~ Taiichi Ohno

Operational Excellence at Toyota

Part 1: Toyota Management System

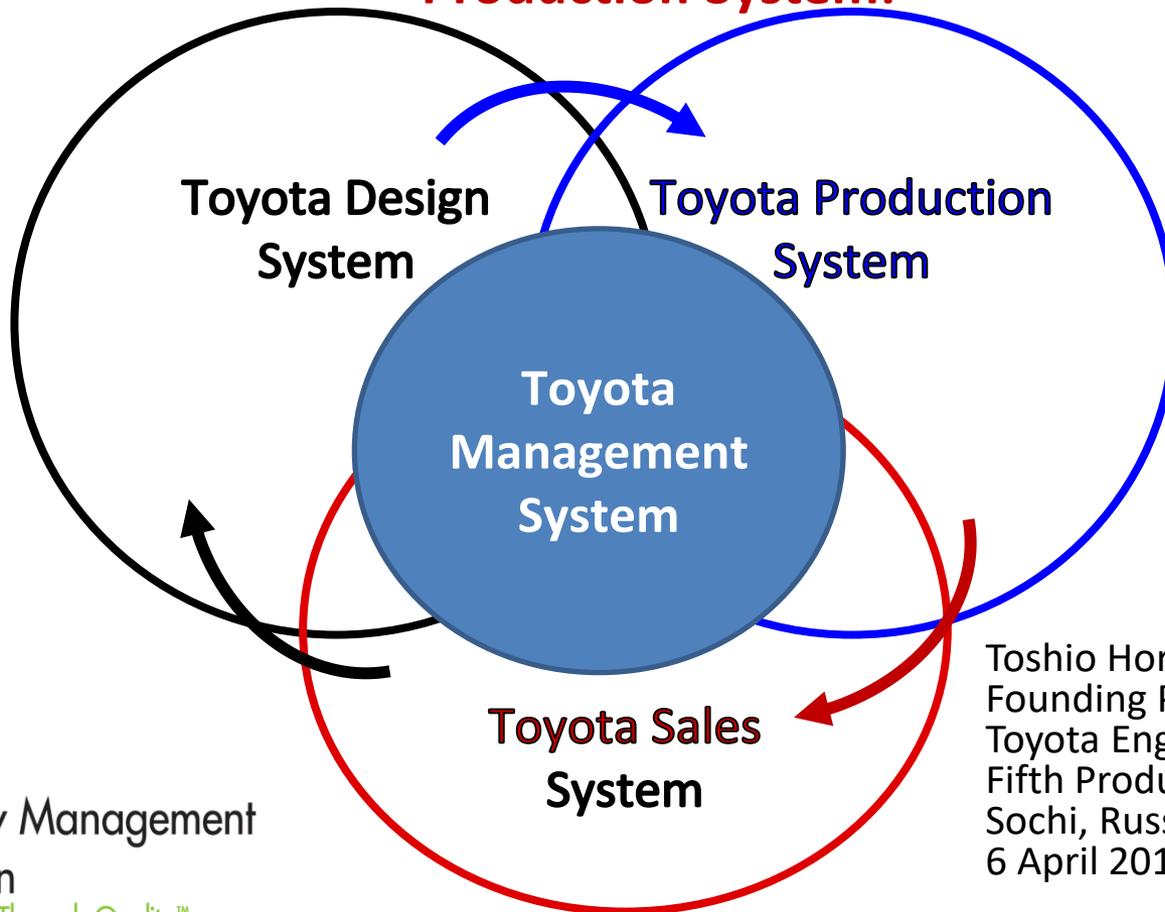
Linking TPS to the Toyota Management System:

TPS is not a stand-alone operating system that delivers profit to Toyota!



TOYOTA

The Toyota Management System (TMS) is much more extensive than the Toyota Production System:



Toshio Horikiri
Founding President
Toyota Engineering Corporation
Fifth Production Systems Summit
Sochi, Russia
6 April 2017



ASQ

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* Courtesy of Toshio Horikiri, Toyota Engineering Corporation

How Toyota Management System works:

Management System Objectives

Effectiveness means being able to respond to external change while achieving a company's objectives in an efficient, waste-free manner.

Toyota has a unified system of business management for promoting its pursuit of perfection in effectiveness based on sub-systems for:

Quality Assurance

- Assure that the quality of the product promotes satisfaction, reliability and economy for the consumer.

GOAL

Waste Reduction

Cost Assurance

- Assure that the cost to develop and perform activities attain the profit goals at introduction of a product and throughout its life cycle.

GOAL

Cost Reduction

Cycle time is the PROXY performance measure for both quality and cost!

How does the Toyota Way really operate?

Reducing the Toyota Management System to its core principles:

What is the way that the Toyota Management System actually works? How does it operate in reality. There are four rules governing the daily management of Toyota:

1. All work shall be highly specified as to content, sequence, timing and outcome.

The Daily Management System!

2. Every customer-supplier connection must be direct, and there must be an unambiguous yes-or-no way to send requests and receive responses.

Clear Communication Channels!

3. The pathway for every product and service must be simple and direct.

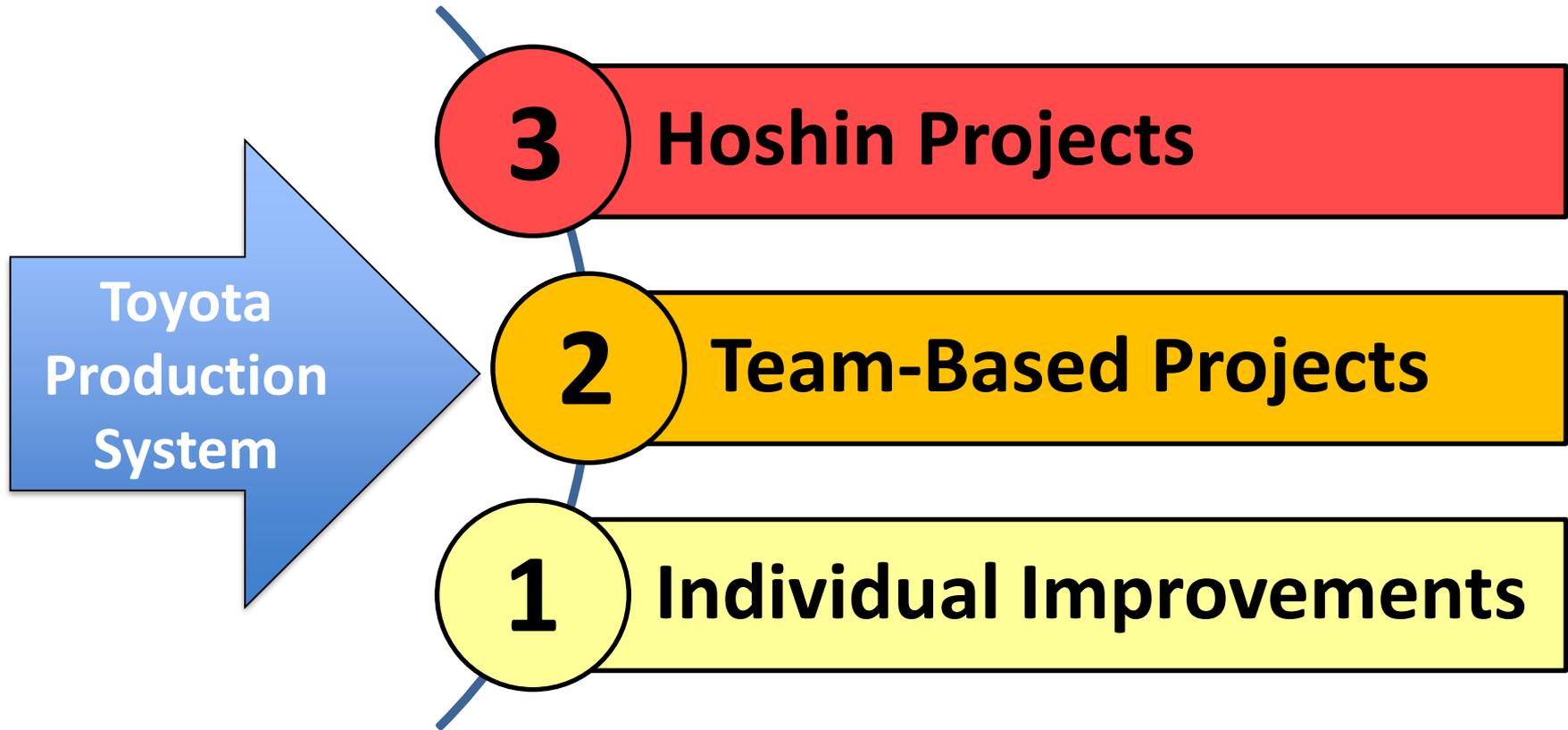
Managing the Flow of Activities!

4. Any improvement must be made in accordance with the scientific method, under the guidance of a teacher, at the lowest possible level in the organization.

Structured Team Problem Solving!

OpEx Improves the Daily Management System:

Improvement of daily work occurs applying three distinct mechanisms:



“All improvement happens one project at a time and in no other way.”

~ Joseph M. Juran

Operational Excellence at Toyota

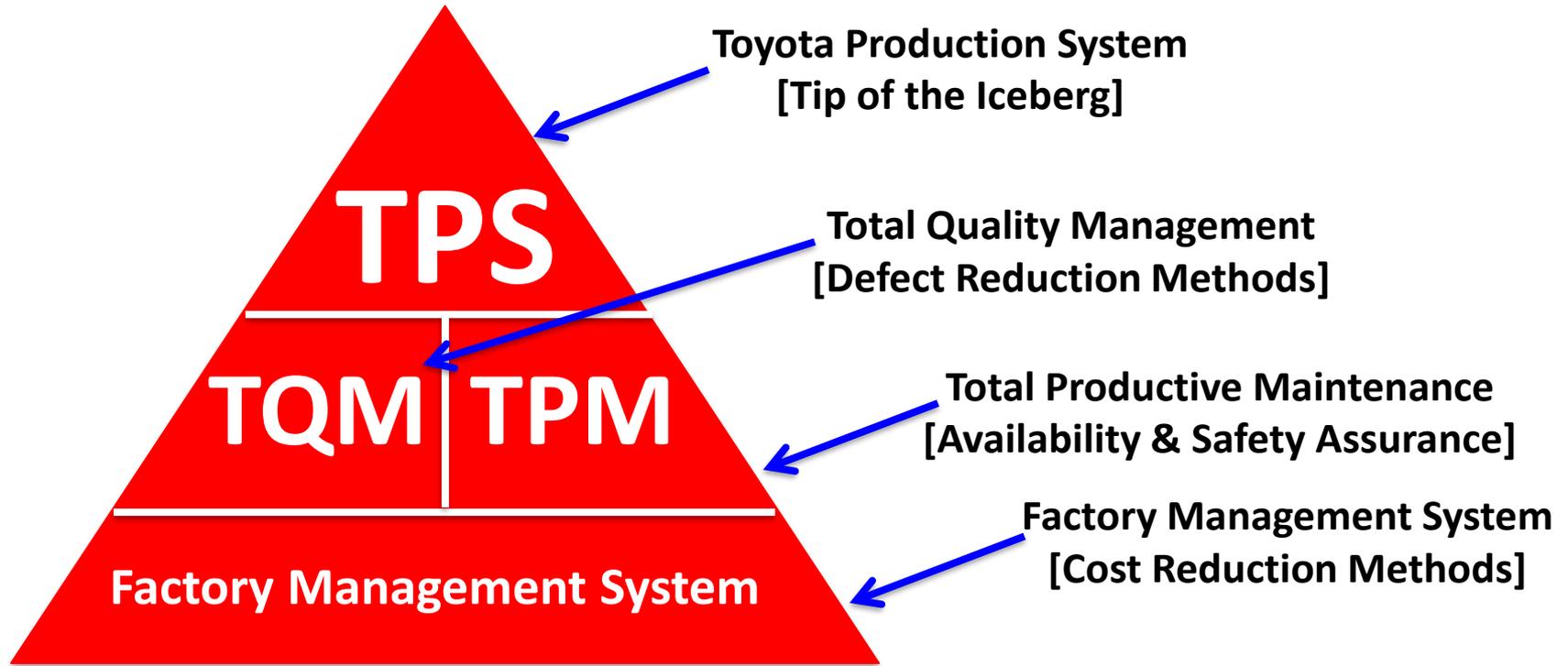
Part 2: Daily Management System

What is a daily management system?

All commercial value is created in a Daily Management System.

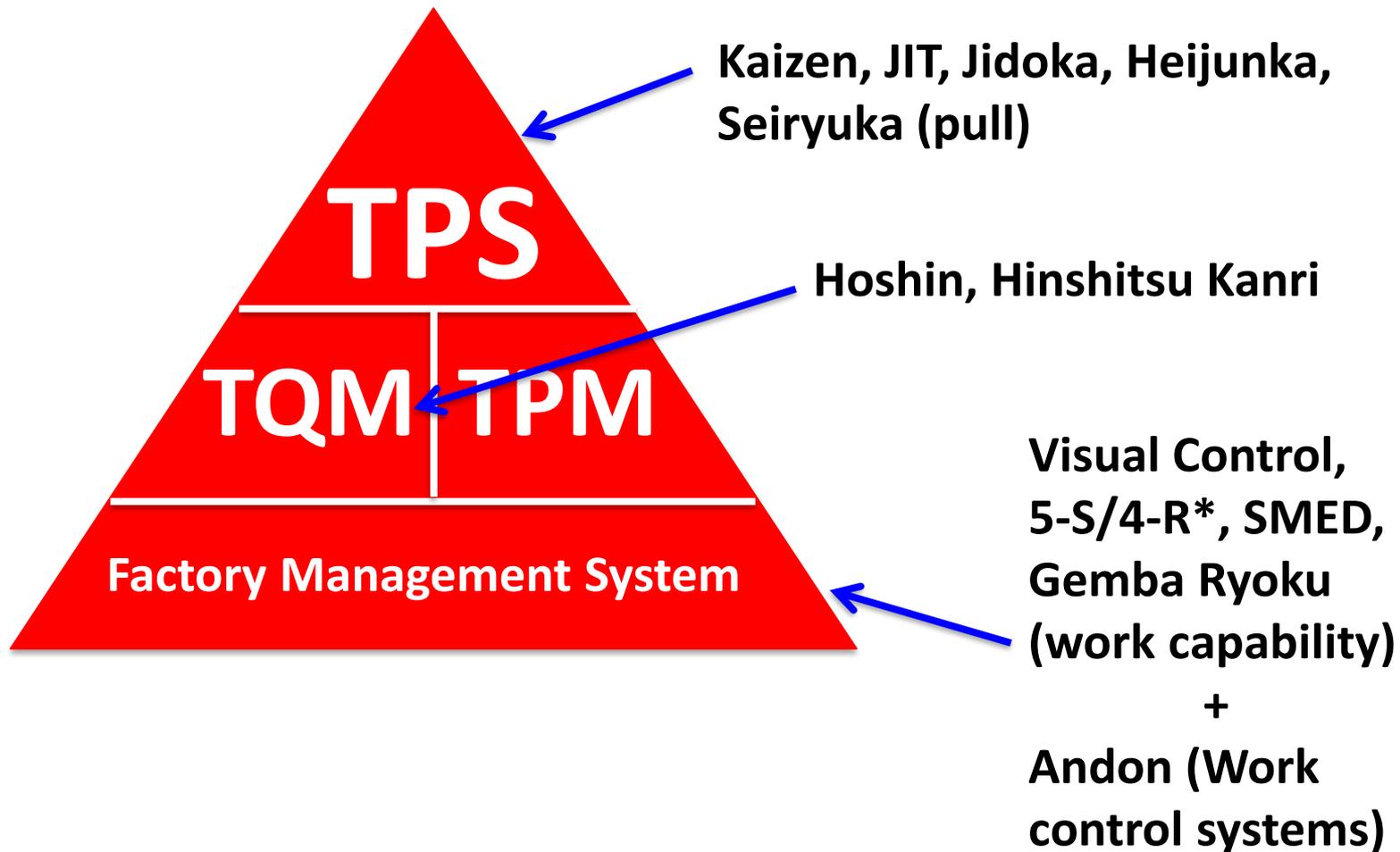
- Work is movement – applying energy to achieve a purpose.
- Work may add value if it achieves a purpose or it may create waste, loss or inefficiency if it does not contribute to its purpose.
- Three types of work are conducted for organizations to achieve and maintain sustainable, predictable performance:
 - **Standard Work**: routine work as documented in work standards and supported by design of administrative forms, fixtures and production fixtures [targets for individual improvements].
 - **Continual Improvement**: a never-ending pursuit of better ways to perform standard work by eliminating waste, inefficiency, and loss and increasing the value of deliverables to customers of the work outcomes (products or services) [team-based projects].
 - **Strategic Work**: work achieves objectives and contributes value to customers while satisfying workers [hoshin projects].

Learning how the holistic system operates: Putting together a business architecture for Toyota's Production System.



What are these other two layers and how do they operate in a Daily Management System?

There is more detail to learn in this triangle!



Total Quality Management (TQM):

TQM is a management approach for implementing an organization-wide operating philosophy of continual improvement.



Total Productive Maintenance (TPM):

TPM reduces the total cost of operations through maintenance and improvement of physical assets and assigning the responsibility for routine upkeep of equipment to equipment operators.

ASPECTS OF TPM:

Eliminate losses due to

1. Performance: minor stoppages and off-speed operations
2. Availability: equipment breakdowns and changeovers
3. Quality: startup rejects and operational defects

Applying methods of:

1. Source inspection, 3-S, and autonomous maintenance
2. Inspection management, visual control
3. Condition monitoring
4. Maintenance scheduling
5. Work order management



Focuses on
Equipment
Maintenance

Factory Management System (FMS):

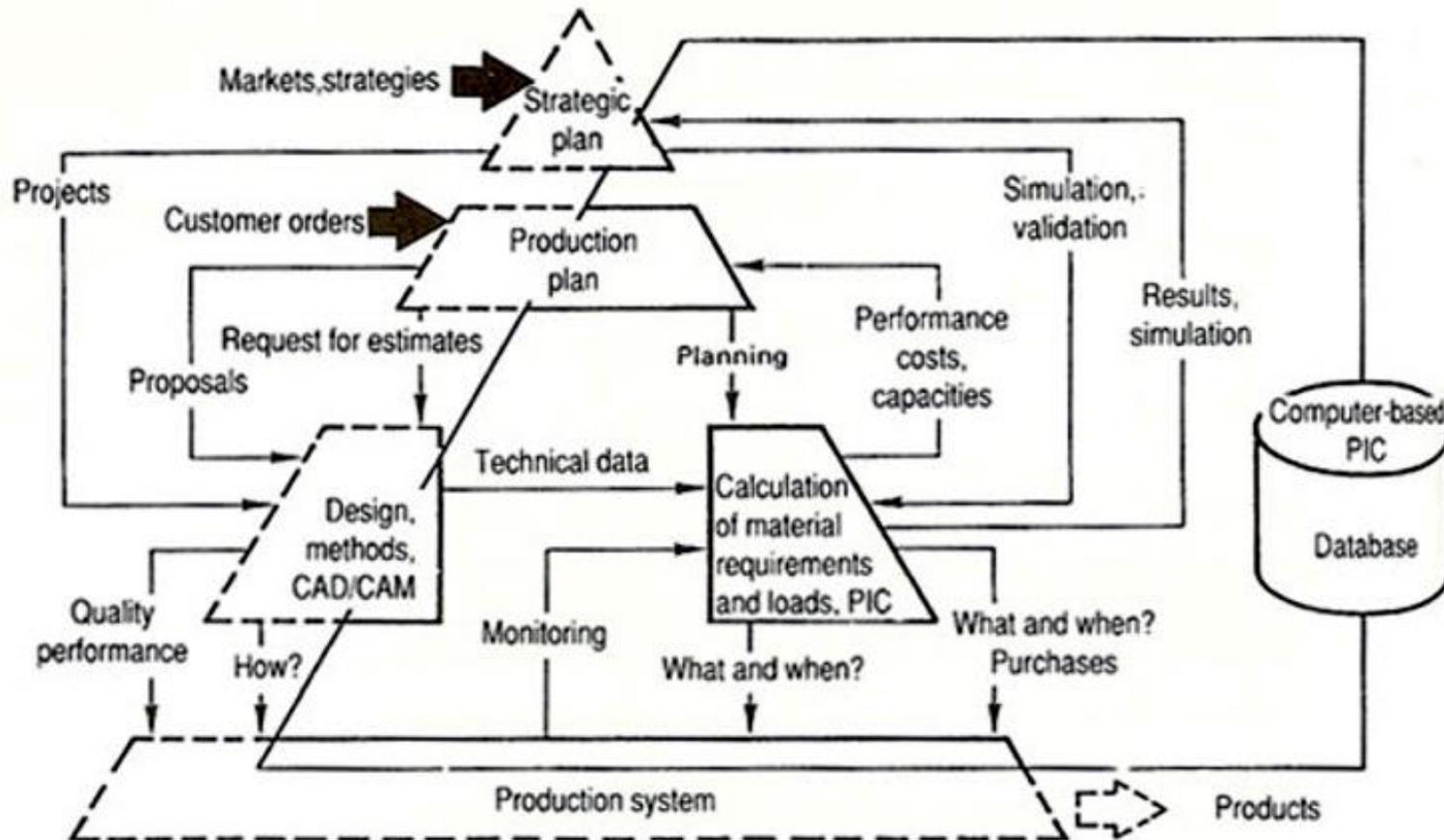
Fundamental elements in a Factory Management System:

- Policy control
- Budget and target control
- Delivery control and standard time control
- Skill control
- Safety control
- Visual control
- Daily control
- Quality control and inspection
- **Production planning**
- **Production tracking**
- **Production control**
- Stock and scrap control
- Material handling
- Communication control (3 meetings)
- Machine performance control
- Preventive maintenance
- Purchase control
- Sub-contract control
- Key performance indicators
- 5-S and 4R

Focus of IT automation systems

Integrating Production Control Mechanisms:

Managing and controlling the “invisible factory” – the job of IT – joining production systems to management systems.

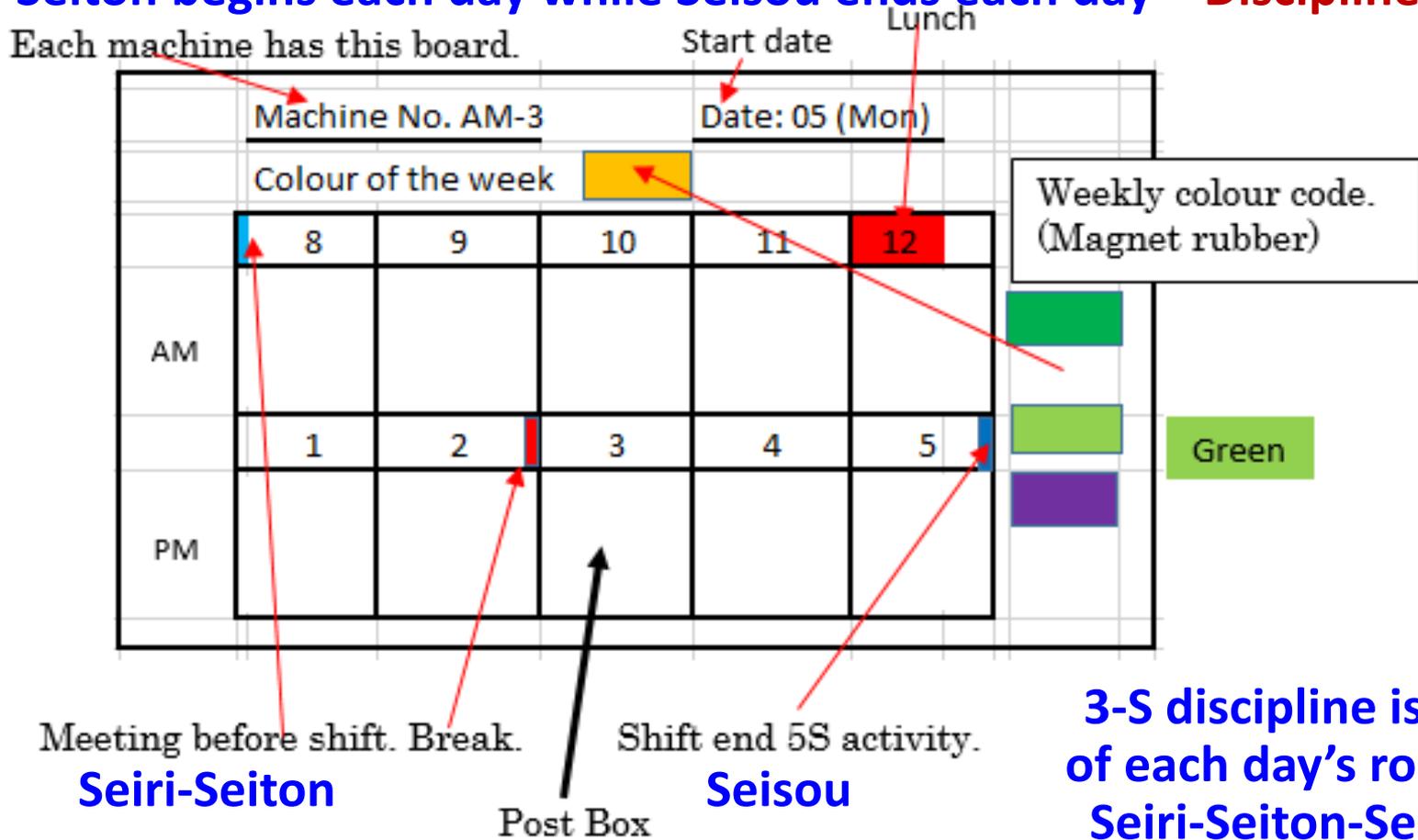


Operational Excellence at Toyota

Part 3: Methods for Daily Control

Planning the Daily Flow: Work Scheduling

Seiri-Seiton begins each day while Seisou ends each day = **Discipline!**



Managing Production Flow: Control Boards

Board combine visual codes, logical locations and status of work loads.

Automatic Machine Weekly Production Control Board

Machine Name	2nd Week/June						1st Week/June						4th Week/May					3rd W					
	17	16	15	14	13	12	11S	10S	9	8	7	6	5	4S	3S	2	1	31	30	29	28S	27S	26
1																							
2																							
3																							
⋮																							
39																							
40																							
Total																							

Weekly Colour Code (points to 2nd Week/June header)

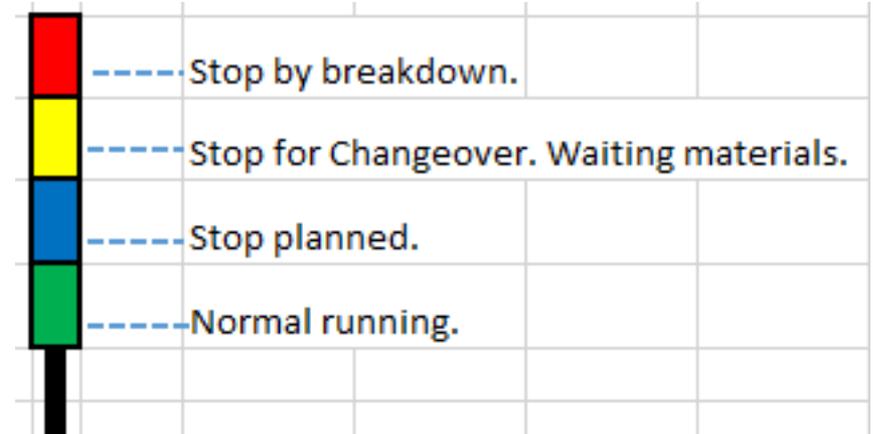
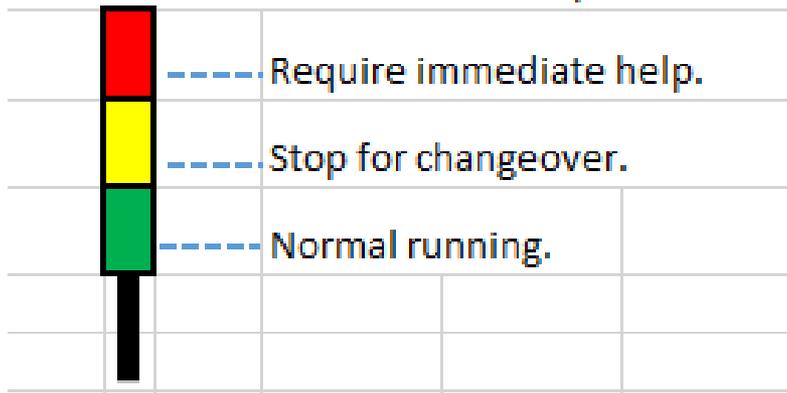
Post Box for the C & C Instruction Cards (points to Machine 3)

Total cut & Crimp circuits/day for Work load Heijunka (points to Total row)

Signaling Interruptions in Daily Flow: Andon

Avoid irregularity and signal everyone whenever it does occur!

Automatic machine & Hand crimp machine.



First button – any one can signal.
Stop button – only supervisor can signal.

Andon requires imadeshō (最近): now is the right time – do immediately!

Assembly line.



3H's = Inevitable irregularities: CAUTION!

- Hajimete (初めて): New product (first time)
- Henkou (変更): Design change (inflexible rule)
- Hisasiburi (久しぶり): Infrequent production (long time, no see)

Signal to attract worker special attention!

Operational Excellence at Toyota

Part 4: Eliminating Waste and Loss

What drives loss in an operational system?

Management system elements that create lags, losses, or friction are really producing waste that is costing an organization a profit leakage!

In *The Tyranny of Waste* (1925), Start Chase focused on “lags, leaks, and friction” that occur as a result of poor “unity of control” across the production systems.

There were lags in time that created mis-matched schedules; leaks in material flows as over-production led to losses; and in between organizational planning processes and also within own organization execution systems there was friction and no collaborative way of working.

Chase defined waste as: “any bar to maximum use of value of output at minimum real cost in energy and materials.” Chase argued that coordination is needed to eliminate waste. He described the first “theory of waste” in the following way:

“There are two parts to this theory of waste: the analysis of requirements – as the target at which economic activity aims; and the effectiveness of the production methods by which these requirements are turned out.” He observed that waste is an engineering problem, rather than a “moral” or “ethical” problem – not doing good!

Muri – irrational waste drives losses!

Muri (無理): Unreasonable or irrational waste that creates loss!

- Any requirements that are impossible, irrational or unreasonable.
- Muri includes leadership-induced waste like purchasing unnecessary assets; spending more than is required to gain production capacity; resisting building competence to achieve future objectives; failing to extend product life to meet evolving market demands; etc.
- Attempting to push systems (people and machines) beyond their natural limits (process capability and production capacity).
- Muri can be built into management systems (i.e., in a standard cost accounting system is based on averages; in purchase requirements for parts; in design of equipment; in planning of transportation flows; etc.). Management often creates muri by its use of average performance instead of properly treating variation!
- **Question: do you just want to be an AVERAGE company?**

Mura – flow waste drives losses!

Mura (無斑): Uneven or inconsistent flow creates timing waste!

Variation in a process that is not caused by customers:

- Managing to “make the numbers” at the end of accounting periods (e.g., quarters and annual closures).
- Driving campaigns or offering discounts to stimulate increased sales.
- Creating a “bullwhip effect” on operations planning and distribution.
- Making minimum order quantities higher than needed and buying ‘greater than required amounts of raw material or parts.
- Maintaining inventory of slow-moving products to make a balance sheet look healthier (these assets have a low probability of profit but nonetheless inflate the level of assets which looks good.
- Using batch production in advance of an actual customer orders.
- Unbalancing the flow across the end-to-end supply chain.
- **Mura is avoided by implementing Just-in-Time management!**

Muda – loss of discipline drives losses!

Muda (無駄): Wasteful work that is not useful or productive!

Any process activity that does not add benefits by generating value for customers. There are two types of muda:

- Type I: Non-value-added tasks appear as essential or required work. Business conditions must be changed to eliminate this type of waste.
- Type II: Non-value-added tasks that can be eliminated rapidly through work-level improvements by developing increased work discipline:
 - Transport or wasted movement of materials
 - Inventory (excessive raw, work-in-process or finished goods)
 - Motion that is wasted by people
 - Waiting time or delays in operations or throughput
 - Over production or production before consumer demand
 - Over-processing or processing more than is required
 - Defects, rework, and scrap



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These wastes must be redefined for your own business model and the types of waste that it produces!

Take-away Exercise: Naming YOUR Waste!

Search your own organization for waste, but don't call it the same as the system used by Toyota that may not be best for your organization. Instead, create your own waste nomenclature.

Conduct a survey or “waste audit” of your organization. What types of waste can you find in your work processes across all three gemba? List waste according to the three categories (muri, mura, muda) using the three levels describing where you found it (Gemba 1, 2, or 3). See the first matrix on the following slide.

Next, operationally define these wastes and classify them according to a scheme making sense to the workers in your own organization. In the second matrix list these wastes, classify them, operationally define each, and provide an internal example that workers can relate to.

Identifying Waste in Your Infrastructure:

	Daily Management (Gemba 1)	Cross-Functional (Gemba 2)	Organization-Wide (Gemba 3)
Muri Cognitive Decisions			
Mura Flow of Activities			
Muda Workplace Discipline			

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Take-away Lessons Learned

Critical take-away observations:

The daily management system of an organization includes all of its productive system components: Toyota's Production System rests on the foundation of Total Quality Management (TQM), Total Productive Maintenance (TPM), and Factory Management System (FMS).

Operational excellence delivers a stable yet improving system of daily management that maintains control over its variation.

This webinar addressed the following learning objectives:

- **Discover the Toyota Management System**
- **Understand Daily Management System Operations**
- **Eliminating Waste and Loss from Operations**

Bonus – the Pizza Candy: Answers to the Kano Quiz

Take this quality quiz on Kano's theory:

1. Under which of the three quality characteristic curves would you most likely list the features of a “killer” app or a “hot” product?
2. Do attractive quality and one-dimensional quality converge, or do they diverge as they approach “engineering excellence?”
3. Will “attractive quality” always be superior as a decision-making criteria to the other two quality functions?
4. What quality function will a customer most likely describe as being important to their decision to purchase?
5. Which quality characteristics are most likely to be ignored when a “voice-of-the-customer” survey is conducted?
6. Do one-dimensional quality and must-be quality converge, or do they diverge as they approach “engineering failure”?
7. Where does “irrelevant quality” appear in Kano's model?
8. What identifies an irrelevant quality function in Kano's model?
9. What is the meaning of “reverse quality” in Kano's model?
10. How do these three quality functions relate to design strategy?

Question #1:

Under which of the three quality characteristic curves would you most likely list the features of a “killer App” or a “hot product”?

The concept behind a “killer App” or a “hot product” is that it has hit a “sweet market niche” that greatly appeals to the desires of customers, so they are “compelled” to buy it for either its functional capability or its “esteem appeal” or inherent charm. These factors indicate that this is an “attractive quality” type of product.

Question #2:

Do attractive quality and one-dimensional quality converge, or do they diverge as they approach “engineering excellence?”

By nature of its inherent characteristics, “engineering excellence” is a concept that approaches physical, chemical, biological, or human limits of performance. Curves for “attractive quality” and “one-dimensional” quality are subject to the same underlying constraints, so these curves will converge as in both cases “engineering excellence” will also increase the level of customer satisfaction. Thus, a curve shift from “attractive Quality” to “one-dimensional quality” may not be so great in the eyes of customers – it is more a matter of the number of competitors offering the same “attractive” features or functions.

Question #3:

Will “attractive quality” always be superior as a decision-making criteria to the other two quality functions?

While this may be an intuitively appealing outcome it is not true. When an attractive quality characteristic is coupled with a poorly performing one-dimensional characteristic, then a consumer’s choice will be based on the relative importance and value of the two features or functions or features have. However, if an attractive quality feature or function is compared with a poorly performing “must-be” quality characteristic, it will be cancelled out as the basic feature is a fundamental reason for a purchase.

Question #4:

What quality function will a customer most likely describe as being important to their decision to purchase?

While “common wisdom” dictates that the customer is always right, it is not really true. Often customers cannot accurately describe what it is that they desire. They often confuse reports of desires (inferences), with choices about relative merits (judgments), and observations on the state of performance (reports). However, customer requests will be most often “one-dimensional” quality items as these can be specified in a requires for quotation or proposal, or in a statement of work. It is these characteristics Kano calls “spoken quality” features or functions.

Question #5:

Which quality characteristics are most likely to be ignored when a “voice-of-the-customer” survey is conducted?

Ignored quality characteristics are one of two types. These are features or functions that Kano called “unspoken quality characteristics.” They are “unspoken” for one of two reasons: (1) customers do not think that they should specify them because they are so ingrained in the way the product operates that “everyone knows” it should do this (e.g., a car is not a car if it does not start, stop, or steer); or (2) customers have no idea what can be done with new technology as its application is out of their realm of understanding – thus “must-be” and “attractive” quality are likely to be ignored in the voice of the customer.

Question #6:

Do one-dimensional quality and must-be quality converge, or do they diverge as they approach “engineering failure”?

Based on the diagram depicting the Kano Model they converge. But, is there a reason for this? Actually, yes, and the logic describing it is the inverse of what happens at the other end of a “one-dimensional” line of a particular quality characteristic. When engineering of that quality characteristic degrades it merges with the line where failure occurs in the bottom left quadrant of the Kano Model. As the physics of failure is approached customer satisfaction for both curves is driven toward the point of rejection – or zero satisfaction – and there is a total loss in the consumer confidence of the product; both for the same reason!

Question #7:

Where does “irrelevant quality” appear in Kano’s model?

The term “irrelevant quality” describes the quality characteristic of a product where no matter how well it has been designed, it remains in the neutral zone for customer satisfaction – it is neither positive nor is it negative. Essentially, this occurs because the customer does not want that market feature or engineering function and they basically ignore it as a characteristic of the product. It is similar to many extra functions in the design of a mobile phone that users never use. The quality of its design is mostly ignored as the customer never experiences it.

Question #8:

What identifies an irrelevant quality function in Kano's model?

An “irrelevant quality function” is a line that runs in a parallel direction to the “degree of fulfillment” axis. It may also be thought of as a zone that is close to the center of the axis between “customer satisfaction” at a zero value and “degree of fulfillment” at the same level. Around this point there is basically a “zone of indifference” where the design is neither strongly good or bad and customer satisfaction is not strong nor is it weak. In that zone, customers just do not care – they are not excited no matter what the reason.

Question #9:

What is the meaning of “reverse quality” in Kano’s model?

The concept of “reverse quality” occurs as a dynamic shift between two observations of customer response that occur at different times. If a design does not change over time; however, the competitor’s design is changed for the better, then the “one-dimensional quality” line will show a decline in both a relative excellence in its engineering function on the “degree of fulfillment” line and a backwards shift in “customer satisfaction.” The combination of these two events creates a dynamic shift in the quality characteristics – despite not doing anything to your own product, the customer’s perspective of its quality degrades so this shift in customer perception across product generations is therefore called “reverse quality.”

Question #10:

How do these three quality functions relate to design strategy?

A new product design team can use the Kano Quality Characteristics as a means to classify the marketing features and engineering functions of a product. Must-be quality characteristics need to be included in a way that inhibits their failure from a customers point-of-view. They must be flawless or reliable and if a product is fully characterized this way, it is essentially a commodity so it must be low priced. If the characteristic is one-dimensional – it must be perceived as better than the competition in the way customers appreciate its value in their application. If it is an attractive quality feature, then this becomes a sales point which must be marketed to gain attention that motivates consumer purchasing.



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Thank you

Gregory H. Watson, PhD.

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Future QMD Webinars – 6:00 PM ET

(unless noted otherwise)

Managing for Quality Webinar Series by Dr Gregory H. Watson:

No. 11: "Defining Quality to Apply to Everyone, Everywhere" October 14, 2020

No. 12: "Managing for Quality Amidst Digital Turbulence" November 17, 2020

Other Webinars in 2020:

“QMD Part 3- How to find QMD Content“ by Susan Gorveatte 10/5/2020 **3 pm ET**

“Write Persuasively So Readers Understand Your Message” by Leslie O'Flahavan
10/8/2020

“QMD Part 4- How to create content in support of quality management
professionals” by Dawn Ringrose 10/29/2020 **2 pm ET**

“Strategic Planning and Hoshin Kanri” by Jd Marhevko and Eric Zinc 11/5/2020

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