The Toyota Way

- Bibliography and Future Reading
  - Self-Help by Samuel Smiles
  - Toyota Production System: Beyond Large-Scale Production by Takahiro Fujimoto
  - The One-Minute Manager Builds High Performing Teams by Ken Blanchard
  - The Geography of Thought: How Asians and Westerners Think Differently ... and Why by Richard E. Nisbett
  - The Fifth Discipline by Peter Senge
  - On The Mend: Revolutionizing Healthcare to Save Lives and Transform the Industry by John Toussaint
- Quotes
  - Sakichi Toyoda to his son Kiichiro: "Everyone should tackle some great project at least once in their life. I devoted most of my life to inventing new kinds of looms. Now it is your turn. You should make an effort to complete something that will benefit society."
  - "Be always sure that you are right, then go ahead." David Crockett (see similar quote from book on page 18)
  - "I would have grave reservations about our ability to rebuild Japan's industry if our engineers were the type who could sit down to take their meals without ever having to wash their hands." Kiichiro Toyoda
- History and Background
  - Pragmatic idealists
  - Lead by example
    - Toyoda Family
  - Toyota Production System (TPS)
- muda, mura, muri
  - muda (non value add, waste)
    - Overproduction
    - Waiting
    - Unnecessary conveyance or transport
    - Over processing or incorrect processing
    - Excess inventory
    - Unnecessary movement
    - Defects
    - Unused employee creativity
    - Anything that takes time but does not add value
  - muri (overburdening people or equipment)
    - people - safety and quality issues
    - equipment - breakdowns and defects
  - mura (unevenness)
    - These are highly interconnected
      - Eliminating waste can lead to overburdening
      - overburdening leads to unevenness
      - unevenness ultimately causes waste
- People
  - Motivation
    - How are human beings, motivated by self interest, convinced to focus on learning and continuous improvement instead of short term gain?
    - Sense of purpose - generate value for customer, society, and economy
    - Responsibility and self-reliance
    - People are motivated when working toward a greater common purpose
  - Oscillating between periods of overburden and lightness causes waste
    - During overburdened time you make mistakes and get tired
    - During overburdened time you don't have time to stop and fix problems
    - During lightness you rejuvenate - necessary due to overburden
- Examples
  - Lexus Development
    - Try to prototype something that is viewed as Impossible
      - The prototype can help everyone see possibilities (build consensus)
      - In this example the prototype was a one off prototype of an engine with extremely tight tolerances
      - Helped show the value of tighter tolerances – quieter engine
    - Optimize by having engineers get their hands dirty
      - Engineers cut the clay models themselves to optimize aerodynamics
      - The result was something that was not beautiful or usable
      - The knowledge learned however was able to be applied to the real ID concepts
      - Result was beauty and aerodynamic optimization
      - hundreds of engine architectures were explored in detail
    - Spend much more time exploring possibilities
  - Prius Development
    - New product development process
      - Cross functional team and chief engineer work together daily in same room
        - information management
        - on the spot decision making
    - Toyota built a transistor fab to support development
      - switching FETs are a key part of efficiency, and Toyota wanted to fully understand them
- Lean Production
  - Tools and Techniques
    - Just-in-time
    - kaizen
    - one-piece flow
    - jidoka
    - heijunka
    - 5S
    - kanban
- Toyota's Internal Principles
  - Challenge
  - Kaizen
  - Respect and Teamwork
  - Genchi Genbutsu
- Continuous Improvement and Learning
  - Try things - learn by doing
  - Get your hands dirty
  - Truly innovate and think deeply about problems based on facts
  - Hansei (Reflection at key milestones)
  - Standardize best practices - avoid reinventing the wheel
  - Learning organization
- Solve Problems / Eliminating Waste
  - Go and see
  - Analyze the situation
  - Pareto diagrams to understand the situation
    - Sort problems by severity
    - Sort problems by frequency
    - Sort problems by nature
    - Sort problems by source
  - Use one-piece flow and andon to surface problems
  - Ask why 5 times
  - Problem solving is 80% thinking, 20% tools
- Flexibility
  - Departmentalization of speciality skills will destroy flexibility
  - True flexibility comes from continuous flow – generalists working on what is necessary at any time
- Mistake proofing
  - Have lots of examples of what "correct" looks like for people to refer to
  - Automated systems enforcing standard ways of doing things
    - ie light grid detects if you picked up and put down the screw driver
- Related Concepts
  - Pragmatic Thinking and Learning by Andy Hunt
    - Experts
  - Debugging Rules by David Agans
    - Quit thinking and look
  - Agile Methodology
    - Prioritize the work backlog
    - Team works on the prioritized backlog
      - Fully implement and test features
      - Review
    - Implement features only as they are needed
    - Confront impediments daily
    - Everyone has a stake in every problem - the TEAM is responsible
    - Short sprints with reviews and retrospectives at end - stop and reflect
    - Visual controls
      - task board
      - burndown chart
      - daily hours logged chart
    - Design, implement, test feature by feature = one piece flow
    - Scrum master is like the team leader in TPS or a coach
    - Daily reporting is a form of go and see for managers
    - Retrospectives to reflect on weaknesses and strengths
- System
  - The 4 principles of TPS form a system
  - Without all parts of the system working together, there is nothing
- Long Term Philosophy
  - Base management decisions on a long-term philosophy, even at the expense of short-term financial goals
    - Putting customer first
    - Trust and mutual respect
    - Self reliance
    - Process orientation vs. Results
      - Focus on how we get there, not just bottom line results
      - The right process will achieve the right results
- Process
  - Create continuous process flow to bring problems to the surface
    - Batch processing leads to waste (storing stuff and moving it around)
    - Inventory required in batch processing masks problems
    - Continuous flow brings problems to the surface and forces you to solve them while the causes are still fresh
    - Flexibility
    - No one produces anything before it is needed by the next person / step in the process
    - Give ground to gain ground
      - Give up local efficiencies in the short term
      - Expose problems and deal with them
      - Long term efficiencies are realized
    - Discussion Points
  - Use "pull" systems to avoid overproduction
    - Replenish what you use (super market model)
    - Raw materials are not pushed per a schedule, but pulled when they are used up by the downstream process
  - Level out the workload (tortoise, not the hare)
    - muda, mura, muri
    - Having enough staff on projects to anticipate problems and work proactively to fix
    - Many companies start by trying to eliminate waste - ultimately this causes unevenness which leads to waste
    - Level workload is crucial to eliminating waste
    - Might cause things to take longer for any individual customer - aggregate will be faster and more efficient
  - Build a culture of stopping to fix problems, to get quality right the first time
    - Shut down the line immediately after problems surface and solve them
    - Everyone is empowered to shut down when they notice something is wrong (andon)
    - Simplicity in quality control - involve people, not detailed processes
    - jidoka - stopping when problems are detected
    - Intense study of alternatives during spec / architecture phase
    - In engineering, stop to thoroughly consider all options before racing ahead
  - Standardized tasks are the foundation for continuous improvement and employee empowerment
    - Capturing best practices knowledge is easy
    - The hard part is getting people to use the standards and contribute to improving them
    - Standardization in a coercive social structure
      - Leads to bureaucracy, extensive written rules, and procedures, and hierarchical control
    - Standardization is necessary before continuous improvement can begin
      - Otherwise improvements will be random and not followed or lasting
  - Use visual control so no problems are hidden
    - 5S (Sort, Straighten, Shine, Standardize, Sustain)
    - Clutter hides waste and covers up problems
    - 5S does not solve problems or reduce waste, only makes it more visible
    - Any communication device that shows at a glance what the standard way of doing something is and if current work is deviating
    - Must be viewable by everyone to be effective
  - Use only reliable, thoroughly tested technology that serves your people and processes
    - "At Toyota we do not make information systems. We make cars."
    - First perfect the process and behaviors, then apply technology to help
    - Don't implement a new tool and assume the desired behavior will follow
- 14 Principles
  - People and Partners
    - Grow leaders who thoroughly understand the work, live the philosophy, and teach it to others
      - Leaders develop slowly over time within organization
      - Changes in leadership are natural
      - No radical changes in direction or strategy
      - Leaders are in place for long periods - promotes learning organization
      - Leaders are teachers of the company philosophy
      - Chief engineers
        - remarkable technical skills
        - engineering intuition
      - Problems are opportunities for coaching
    - Develop exceptional people and teams who follow your company's philosophy
      - Teamwork - exceptional teams consist of exceptional individuals
      - Challenge people / respect people
        - Results in willingness to give heart and soul to team's success
      - One piece flow forces teamwork
      - Building effective teams takes years
      - Team leader - mentor always present on all teams
        - removes impediments
        - looks at the big picture
        - does the work
        - mentors and teaches
      - Motivation - all theories of motivation are considered
    - Respect your extended network of partners and suppliers by challenging them and helping them improve
      - Power of supply chain is ingenuity and relationships
      - Not using IT to manage suppliers
      - Working together toward a common goal
      - Set challenging aggressive targets for suppliers
        - teach them and help them get there
        - bullying = disrespect
      - Walls between suppliers cause each silo to suboptimize for local benefit, to the detriment of the whole system
      - Be selective in outsourcing - maintain competence in important technologies
      - Joint ventures allow developing competence
      - Jishuken - voluntary study groups amongst suppliers
      - Extended learning organization
  - Problem Solving
    - Go and see for yourself to thoroughly understand the situation
      - Metrics, tables, numbers show results but not how the results are achieved
      - Process of how results are achieved is most important
      - Just going to see is insufficient; must have skill to observe and analyze
        - surface version
        - deeper version
      - Decisions rooted in facts, not theory
      - Data != facts
      - Think deeply, don't just do what you're told
      - Daily reporting - way for senior executives to trust
      - Discussion Points
    - Make decisions slowly by consensus, thoroughly considering all options; implement decisions rapidly
      - 5 Elements
        - Thorough consideration in decision making
        - Finding out what is really going on
        - Understanding underlying causes
        - Broadly considering alternative solutions and developing detailed rationale for the preferred solution
        - Building consensus within team
        - Using efficient communication vehicles for 1-4 (ie one sheet of paper)
      - 80% of time spent planning, 20% implementing
      - achieving consensus = belief in reason, pragmatism, integrity, and excellence
    - Become a learning organization through relentless reflection and continuous improvement
      - Standardization and innovation - two sides of the same coin
      - 5 Aspects
        - Learn from mistakes
        - Determine root cause
        - Provide countermeasures
        - Empower people to implement countermeasures
        - Transferring knowledge to make it part of organization's repertoire
      - Self reflection and self criticism, NOT blame
      - root cause != source
      - Really focus on weaknesses, be sad about them, plan to improve
      - Without hansei, there can be no change - it is the incubator of continuous learning
      - Finding weaknesses is not an attempt to hurt but to help improve - difficult for our culture