

Project Management Best Practices for Engineers



← **Perry K. Parendo**
651-230-3861
Perry@PerrysSolutions.com



Shannon Witkowski →
Baxter Healthcare

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Baxter Healthcare

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Our Agenda Today

- **Our Product Development and Management Association (PDMA) talk in May discussed key elements for any New Product Development (NPD) process. That discussion led to this presentation**
- **Evaluate key aspects of leading NPD processes**
- **Identify common themes/ elements**
- **Determine valuable, key differences**
- **Review these elements in a case study**

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Typical Improvement Attempts

- Stage Gate (control)
- Design For Six Sigma, DFSS (tools)
- Toyota Product Development System/ Fast Cycle Time (speed) (sometimes called Lean)
- Agile (flexibility)
- APQP (Big 3 Automakers, not discussed today)

No one process is going to be a magic solution

Planning

Approach	Requirements	Risk	Schedule
Stage/ Gate	Firm/ deliverable	Decision points	Checklist
DFSS	VOC	FMEA	Detailed
Toyota	Use case	Transparent	Hard
Agile	Evolving	Rapid prototype/ learning cycles	Variable
Commonality	Deep understanding with flexibility	Quick, honest learning to allow timely decisions	Focused end date, but flexible and simple communication

Requirements

- **Issues come from missing or wrong requirements.**
 - The User Story can help this
- **Majority fixed with ability to evolve at lower levels**
- **Some need to be flexible**
 - As technology evolves
 - As customer understanding evolves
 - Test and evaluate unknowns early
- **Track status**
 - How many flexible
 - How many new
 - How many changes of fixed items
- **Understand basis and test approach**

Risk

- **Honest with self**
- **Any tool only provides a relative risk**
- **Learn about high risks early**
- **Focus on actions to take**
- **Have trigger dates for back up plans, if not going parallel path**

Scheduling

- Based on decisions to be made
- Firm, predictable end date
- Decisions on critical path early
- Rolling wave/ evolving as we learn
- As deep as useful
 - For this project
 - For the next project
- “If we knew what we were doing, it wouldn’t be called Research.” Albert Einstein

Execution

Approach	Concept	Testing	Management
Stage/ Gate	Focused	Phases	Project Manager
DFSS	Pugh Concept Selection	Decrease variation	Sponsor
Toyota	Set based design	Early/ often	Chief Engineer
Agile	Minimum viable product	Cadence/ pace	Product Owner
Commonality	Multiple with layers of decision points	Early learning	Knowledgeable leader with broad ownership

Concepts

- **Flexible early**
- **Set based design, with one option the minimum viable product**
- **Understand decision points and what will trigger them**
 - Tooling
 - Vendor selection
 - Critical technology

Testing

- **To make decisions**
- **High risks early**
 - Instead of later because we are not sure how to solve them
- **For learning. Early and often**

Management

- Knowledgeable leader with a system perspective
- Understands customer and needs
- Understands capability of solutions
- Able to remove road blocks
- Comfortable with uncertainty

Contradictions/ Conflicts in NPD

- Flexibility with control
- Focus with options
- Predictable advancements with risk taking

The NPD Solution Framework

- Understand what is important for your business and for your market
- Vision of the end state
- Understanding the right customers
- Risk management/ contingencies
- Decision making
- Increase the speed... of learning!
- Smart prototypes, maximize the learning from each one

Requirements, planning and execution
Pareto, 2011, MQC, <http://bit.ly/14aLnwH>

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Baxter Device Program Management

- Implantable device with new technology
- Experts available in each core technology area to understand risks
- Strong connection with medical experts to understand requirements

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Project Situation

- After a period of development effort, performance instability existed
- Risks related to vendor, manufacturing capability of prototypes and development testing

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Device Project Solution

- Requirements clarification
 - Plus test method development for R&D purposes
- Expand concept to allow ability to determine root cause
 - Not that we will change, but what if we did
- Understand and develop test strategy for regulatory approach
- DOE for:
 - Test method (3 variables and 24 tests, to ensure measurement repeatability)
 - Design (7 variables and 32 tests, versus potential of 2187 combinations using 3 conditions and all combinations)
 - Manufacturing (5 variables and 16 tests versus potential of 243)

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Project Results

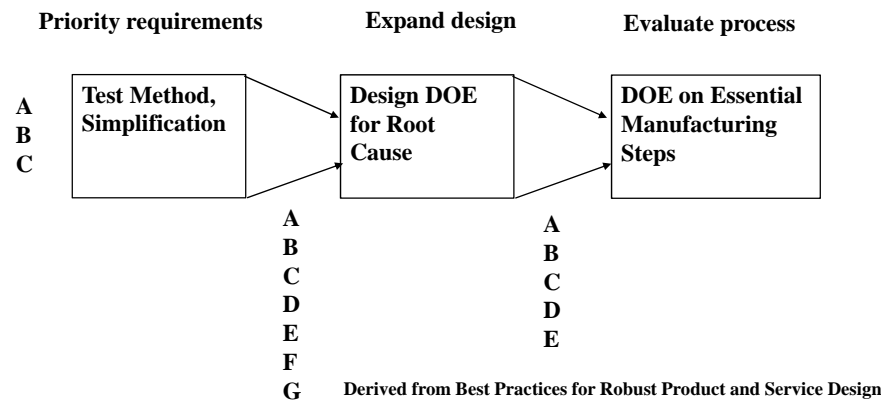
- Completed project with robust design solution (stable), with a 2 month FDA approval.
- Led the way being first to market with this new technology advancement
- Improved relationship with key vendor
- High long-term field reliability

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Convergent/ Divergent in Action



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- **High stakes product development problem solving and training**
 - From DOE and SPC to project planning and management
- **Phone: 651-230-3861**
- **Email: Perry@PerrysSolutions.com**
- **Website: www.PerrysSolutions.com**
- **Twitter: @PerrysSolutions**

