Introducing Technology with Reduced Risk

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Speaker

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Agenda

- The unique challenge
- What rules apply
- Technology mindset
- Examples – success and failure
- Expanding on the rules
- Common questions

The Challenge

- **Technology development tends to plug into a project/ product if it is “successful”**
  - A technology path
- **Cannot schedule it, so add a line for “new technology” and hope for the best**
  - But we are stuck if it fails
- **How do we manage this?**
  - Forcing Product Development rules that do not apply causes issues and higher risk
- **Is this EVER talked about?**
  - Very little detail exists about managing raw technology
  - MDDI article about developing technology - https://bit.ly/3Pr6JB0
  - Managing Technology Development Projects, PSU, https://bit.ly/3sIQs0H

Typical Rules – that do not work

- **Comprehensive requirements**
- **Focused concept**
- **Test to confirm**
- **Design of ideal/ final product**
- **Reduce risk as fast as possible**

- **References**
  - Project Management Best Practices – MDM - https://bit.ly/33I2o4T
  - Best Practices for Robust Design – PDMA - https://bit.ly/318zgB0

Typical Rules – that do work

- **Core requirements**
- **Multiple concepts (set based design)**
- **Test to learn**
- **Design of workable product**
- **Use options to reduce risk**
  - Not only lesser technology
  - Incremental funding: $1k, $10k, $100k, $1M

Technology Mindset

- **Tolerant of uncertainty, but only to a point**
- **Decision points still apply**
- **Surrogate metrics for progress**
  - Technical Performance Parameters with expected growth path
- **Incremental planning – versus detail plan for next 3 years**
- **Learning focus is essential, experimental mentality**
- **Knowledge capture is important**
  - Not only successes, outliers could be opportunities
  - Include assumptions - “we tried that, but it didn’t work” – often the context is not the same
- **Planning for the unknown – https://bit.ly/3l4Hgym**

New Technology - Success

- **Core requirements**
  - Stretch targets
  - Metrics for progress
- **Flexible (not elegant) prototypes to update and change quickly**
- **Options so at some point someone says, “no, not doing that”**
- **Frequent reviews/ status**

New Technology - Failure

- **Simple applications/ options first**
  - Wanted US and OUS for power supply
  - Capable to expand
- **Enter where limited options**
  - New technology is risky so harder to enter mature applications
- **Materials and processes should support each other**
  - Higher cost raw material, or limited supply (suppliers) makes start up a challenge

Core Requirements

- **Requirement set should be for proof of technology**
  - Stretch targets
- **Start with "whatever it takes"**
- **Integration within exact configuration and constraints takes time**
  - Example – a more elegant cast product could be desired. For now, live with threaded rods or machined part

Set Based Design

- **Generally – unique concepts, one with higher risk characteristics**
- **Pursue these different approaches as long as possible, as long as there is no large cost investment**
  - Incremental planning plus 3D printing to quickly adjust
- **One team focusing on each concept**
  - Combine teams after final selection
  - Final selection may be a combination of the concepts evaluated
- **Integration concerns evaluated early**
  - If high-risk technology “works” later, we can understand impacts of implementing now or later
- **Considered part of Toyota Production System**

Test to Learn

- **Paper study**
  - Computer simulations, but only good if validated
- **Prototype – technology focus**
  - Concept, bread board, alpha test, beta test
- **Prototype materials**
  - 3D printing for timely material and configuration options
  - Cardboard, foam, clay, machining versus casting
- **Integration - Higher level assembly with constraints**
- **Final Product**
- **Design of Experiments https://bit.ly/14HgKSz, which benefits from 3D printing**

Design of Acceptable Product

- **Avoid gold plating initial design**
- **Get out in the field and get feedback**
  - And do it early
- **Lots of simultaneous new technology is going to take a long time, and something will not be required by customer**
  - Work high priority technology first
  - Pre-planned product improvements

Options to Reduce Risk

- **Incremental funding – if on track (technical and schedule), continue to next level**
  - $1k, $10k, $100k, $1M
  - Paper study, concept evaluation, advanced prototypes, extensive testing and integration
- **Set based approach using a mix of risk levels**
  - Do not just reduce technology
  - Do not just add technology

Common Questions

- **A few common questions to address your situation**

Which Comes First

- Technological advance or the unmet market need?
- It can happen in either direction

Company Size

- In large companies
  - New technology can get lost in the lab
  - May not get resources as cash flow needs to be maintained on existing products
  - Concern of taking a risk and making company look bad
    - Outsourced is one option
    - May tend toward incremental improvements, and not know how to handle new technology
- In small companies
  - May need to gamble on new technology
  - Focused as this is why we exist
  - Ability to break into market with low risk
    - Battling existing, mature technology can be difficult

Supplier Involvement

- New technologies can be created in our supplier network
- Do not depend on this source, but also do not ignore it

Priority Setting

- If we are not on critical path, how do we get resources?
- Placing technology plan on path to product release, we can see a target
- This also shines a light on activities

Thank you!

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QUESTIONS?