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Addressing Product Development Failures

-Using Agile Methods to Address Root-Causes of Development Failure-

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Why do new products fail?

Data on new product development failure is difficult to gather, as there is often little retrospective on canceled projects. According to Clayton Christensen, a professor at Harvard Business School, 95% of all new products fail. In addition, 92% of all startups fold within three years because their products fail. [1]

Anyone involved with a failed project can point to the critical factors leading to failure:

Poor Market Fit:
- The product doesn't solve a problem
- The product is not something that customers will pay for
- The product is not priced accordingly
- The product is not marketed effectively
- The product does not meet legal or trade requirements

Change in Market Conditions:
- New competitors
- Changes in customer need
- Changes in regulatory requirements

Poor Development Execution:

- Not what customer needs
- Doesn't meet customer or trade requirements
- Poor manufacturing or transportation execution
- Inability to meet development schedule
- Inability to meet development cost

When analyzing the root-causes of development failures, they can typically be divided into two general categories; the lack of clear goals and objectives, and/or the inability to manage complexity and change:
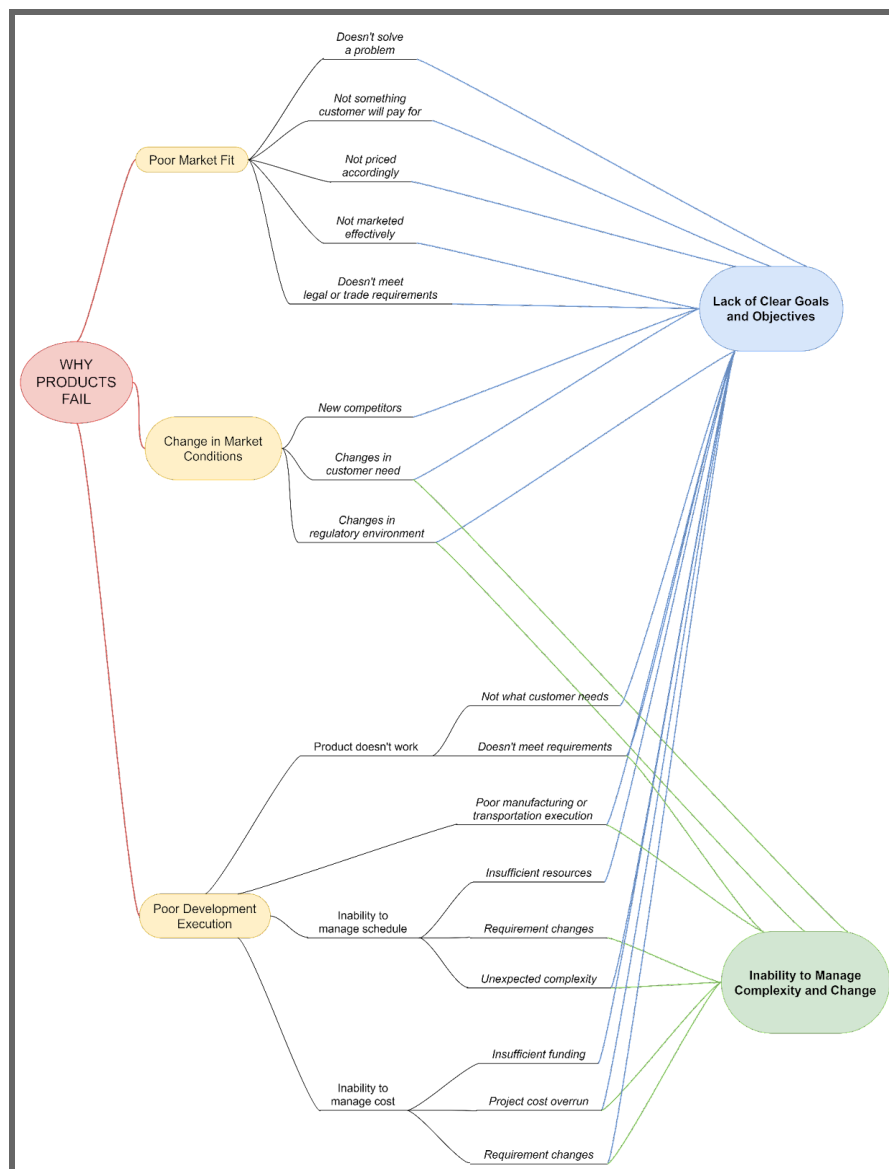
Root Cause of Development Failure

Structured Product Development

So why does a development program following a strict process like ISO 9001 fail, doesn't the process limit critical factors leading to failure?

Not necessarily. A structured product development process is designed to ensure *product quality*. In some cases, a rigid product development process impedes the ability for quick program adjustments, necessary when adapting to inevitable specification changes that happen during any development program.

Addressing Product Development Failure

Knowing why products fail means we can put methods in place to reduce risk and provide feedback during the development process. A number of *Agile tools* exist that can be used in a structured development environment.

What is Agile?

Agile is a methodology that provides tools and frameworks for feedback during the development process. Agile methods allow teams to be more responsive to change and keep work to be focused on the most important product features. In this case, we are not talking about Agile *replacing* a structured product development process, we are instead using Agile methodologies to supplement the process.

Agile methodology has many tools and applications, let's consider tools appropriate for addressing the root-cause for product failures; *lack of clear goals and objectives* and *the inability to manage complexity and change*:
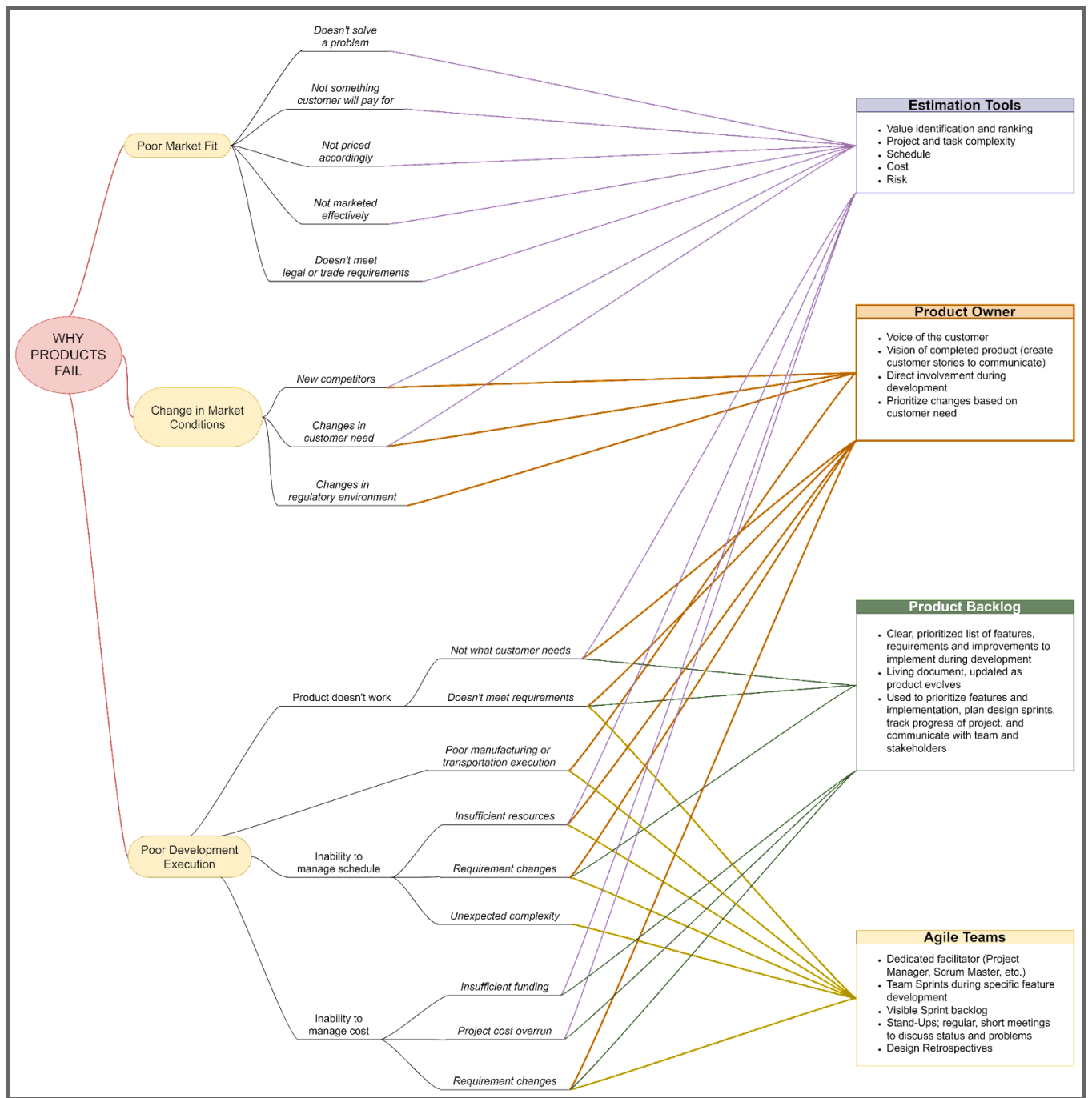
Agile Methods Applied to Root-Cause Development Failures

These Agile tools include:

Estimation Tools:
- Value identification and ranking
- Project and task complexity
- Schedule estimation
- Cost estimation
- Risk identification and estimation

A Product Owner:
- Provides the voice of the customer
- Provides a vision of the completed product to the development team
- Direct involvement during all phases of development
- Prioritizes changes based on customer need

Product Backlog:
- Clear prioritized list of product features, requirements and improvements to implement during development
- Living document updated as product evolves
- Used to prioritize features and implementation plan, design Sprints, track progress of project, and communicated with team and stakeholders

Agile Teams:
- Teams includes a dedicated facilitator to address roadblocks and keep team focused on design
- Team Sprints during specific feature development are able to be adjusted based on changes to the project
- A visible Sprint Backlog provides visibility to team progress and roadblocks, providing transparency during development
- Development Stand-Ups provide regulate short meetings to discuss status and problems, enhancing communication
- Design retrospectives are important for improving the process and communicating important information learned during the design

Applying Agile Methods to a Structured Development Process

The key to applying Agile in a structured development process is in understanding where Agile provides an advantage and why. Let's consider an example, using a simplified development process.

Typical Structured Development Process

A typical structured development process has five major stages:

1. Feasibility:
   - Define the objectives for development
   - Create sketches, models, and prototypes
   - Estimate time and cost of project
2. Project Planning:
   - Plan the development process and assign resources
   - Develop specifications
   - Create a formal design plan
3. Design:
   - Project is broken down into discrete design elements
   - Perform an iterative design process on each element
   - Verify elements against specifications
4. Product Verification and Validation:
   - Pre-production build
   - Confirm product meets requirements
   - Validate customer expectations
5. Product Release:
   - Final documentation
   - Freeze requirements and specifications
   - Release to manufacturing

Feasibility

Agile **estimation tools** can help identify product value from a customer perspective and rank potential features based on their perceived value. In addition, estimation helps to evaluate project and task complexity, estimate schedule, and develop a cost model. Using estimation tools during the Feasibility Stage of development helps to identify and quantify areas of risk that could lead to schedule slip and cost overruns.

Feasibility typically involves modeling and prototyping, during a time when not a lot of detail is known about the final product or technology and process needed for design. During times of uncertainty, methods such as **kanban** can assist in prioritization and control of tasks for experimentation and modeling.

Project Planning

The result of project planning is a clear list of product specifications and features. By organizing this into a prioritized list and constructing a **Product Backlog**, a living document is created that can be used for prioritization, tracking, and communication with stakeholders during the project. Having a defined and prioritized list of product features helps to resist 'feature creep' that slows projects during design.

Agile includes the concept of a **Product Owner** (not to be confused with a Project Manager). The Product Owner provides the voice of the customer and is involved throughout the project, providing vision and prioritizing product concepts and features based on customer needs.

Design

Agile teams typically work specific areas of design in short, time-boxed periods called **Sprints**. During a Sprint the team works on specific areas of development defined by a visible **Sprint Backlog** - the list of tasks the team plans to complete during the Sprint and meets regularly in short **Stand-Up** meetings to discuss status and issues. The Sprint format fosters a team environment, promoting communication and problem solving. Sprints allow regular input to the design process allowing for course corrections in the development plan as issues and changes occur. These course corrections allow

the overall project to react to complexity and specification change, keeping the overall project on target for the final product, limiting cost and schedule overruns.

Agile design also includes an important element at the end of each Sprint, called the **Retrospective**. The retrospective is a short meeting where the results of the Sprint are discussed, what went well, and what did not. Providing visibility into issues can often benefit other teams and in fact help other areas of the company anticipate and address issues such as component shortages, technology changes, etc.

Agile teams also include a dedicated team facilitator, typically called a **Scrum Master**. The Scrum Master is responsible for removing obstacles and encourages collaboration, helping the team work effectively together. Scrum Masters advocate for the team, obtain necessary resources, remove organizational roadblocks, and bring in outside resources to help with technical issues when needed. This frees up the team members to concentrate on design tasks, improving efficiency.

Verification and Validation

Effective product verification and validation is a direct result of how accurately the product was specified and customer needs were addressed during the development process. Agile methods including Estimation Tools, a Product Owner, and the Product Backlog are designed to maximize the understanding and prioritization of specifications as well as needs of the customer.

Release

A successful product release relies on careful planning and setup for manufacturing, shipping, and deployment. Embedding manufacturing personnel in Agile teams before release, and engineers in manufacturing teams during the release process, helps to ensure the product can transition smoothly to a manufacturing environment.

Summary

Product development failures can be broken down into two general categories; the lack of clear goals and objectives, and/or the inability to manage complexity and change. Addressing the cause of failure in a structured and process-oriented development environment is difficult, adding more structure can cause inefficiency and confusion.

Improving collaboration among the team leads to improved communication and supports success. Agile methods exist for providing feedback during the development process. Specific methods can be used in conjunction with a structured development process to improve communication, collaboration, and decision making, reducing development risk.

REFERENCES

(1) *"Nearly 30,000 new products are introduced each year, and 95% of them fail according to Clayton Christensen, a professor at Harvard Business School.", "In fact, 92% of startups fold in their first three years for that same reason."*   MIT Department of Professional Education website.