Getting Started Kit
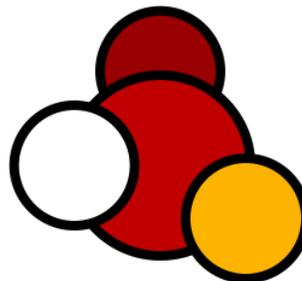## Project Support Information

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CONTENTS

CONTACTS

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Shipping Atoms

"So the question we are called on to answer is no longer primarily, "can it be built?", but rather, "should it be built?"

— **Ash Maurya**

DEVELOPMENT PROCESSES

The well-known Lean Startup methodology takes the idea of eliminating wasteful activities in manufacturing and applies it to product development. It is driven by a Customer Development process that requires validating the "right" product has been defined before investing in execution. Incredibly, this common sense idea is often ignored by companies.

The work of Steve Blank and Eric Ries in defining Lean Startup was centered on software products (that's where the VCs are investing!). Their toolset pairs Customer Development with Agile Development- something that make a lot of sense for software-only products:

Source: Eric Ries
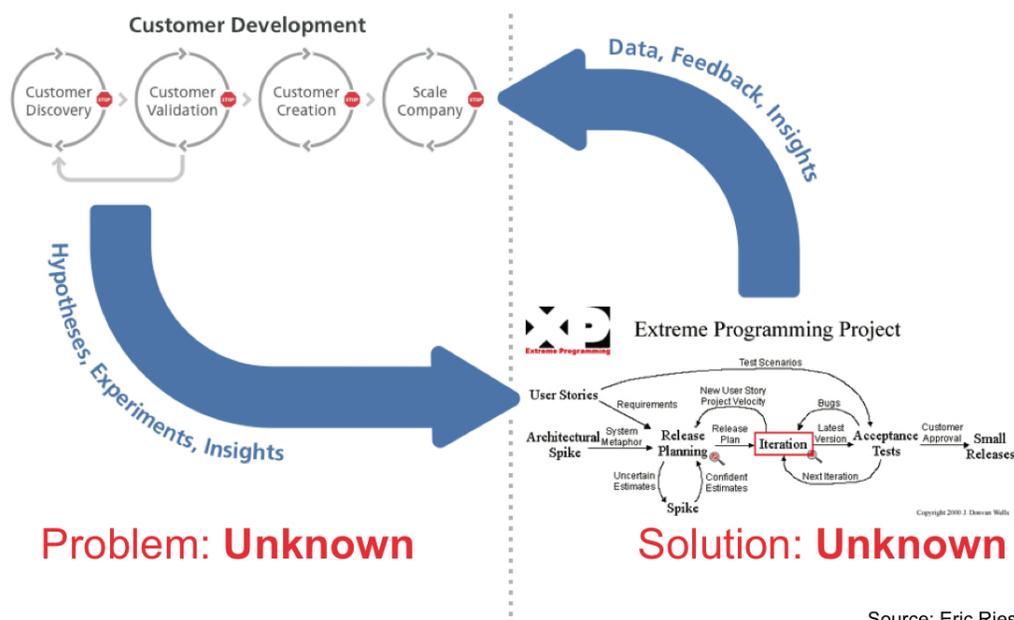
This is a great solution since the plasticity of software allows fast iterations at all stages in the Customer Development process.

The challenge of **getting atoms to do your bidding** requires Phase/Gate Development due to the relatively long cycle times to produce components, assemble them, test, and validate reliability. Because of the longer development time, it is even more important to apply the Customer Development process to minimizes the chance of costly errors.

The purpose of Customer Development (CD) is to ensure the product solves a real problem that customers will spend money to solve, make sure the solution fits, and validate the customers will buy it. These activities help minimize the use of product development resources on wasteful activity. Iterations occur in each phase before moving to the next phase. It becomes increasingly costly to move back to the previous phase. The lowest cost backward path is named the "Pivot".
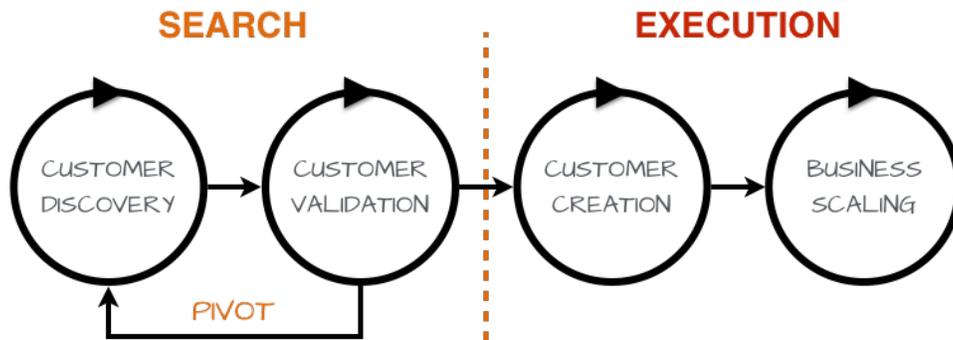
CUSTOMER DEVELOPMENT

PHASE	PURPOSE
CUSTOMER DISCOVERY	**Problem interviews, solution interviews, strategic goals, financial goals.**
CUSTOMER VALIDATION	**Demonstrated demand, validate part of business model.**
CUSTOMER CREATION	**Grow customers. Validate business model.**
BUSINESS SCALING	**Ramp business.**

The New Product Introduction (NPI) process takes an idea into a product that can that ship profitably and reliably. It is a Phase/Gate Development process based on iterating phases and release reviews. Moving to the next phase authorizes spending to continue the development.
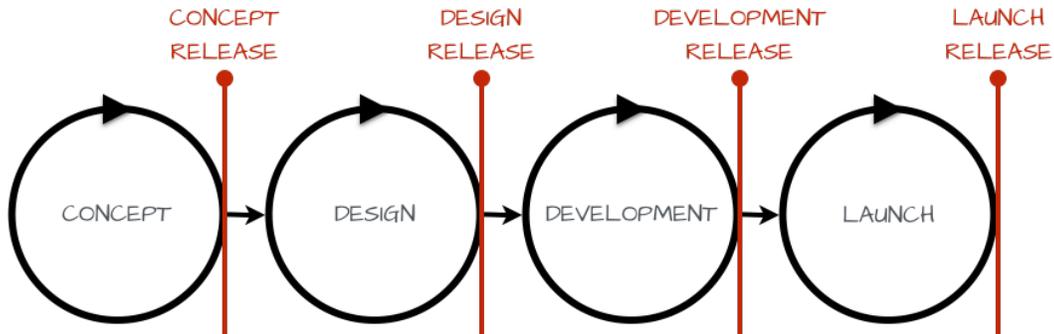
NEW PRODUCT INTRODUCTION

PHASE	PURPOSE
CONCEPT	Demonstrate concept in a prototype.
DESIGN	Mechanical, electrical, software design & integration. Begin product qual. CM selected, MFG process defined.
DEVELOPMENT	Qual MFG process. Tooling, fixtures, test dev. Complete product qual. Logistics dev. Packaging dev.
LAUNCH	Yield, cost, cycle time optimized. Safety stock build. Packaging qualified. Logistics validated.

"No business plan survives first contact with customers"

— **Steve Blank**

Costs significantly increase with each new phase. This is why it is so important to couple the NPI and CD processes. A startup's prime mission is to find a profitable business model before it runs out of cash. Minimizing wasteful cash burn in hardware development is critical.
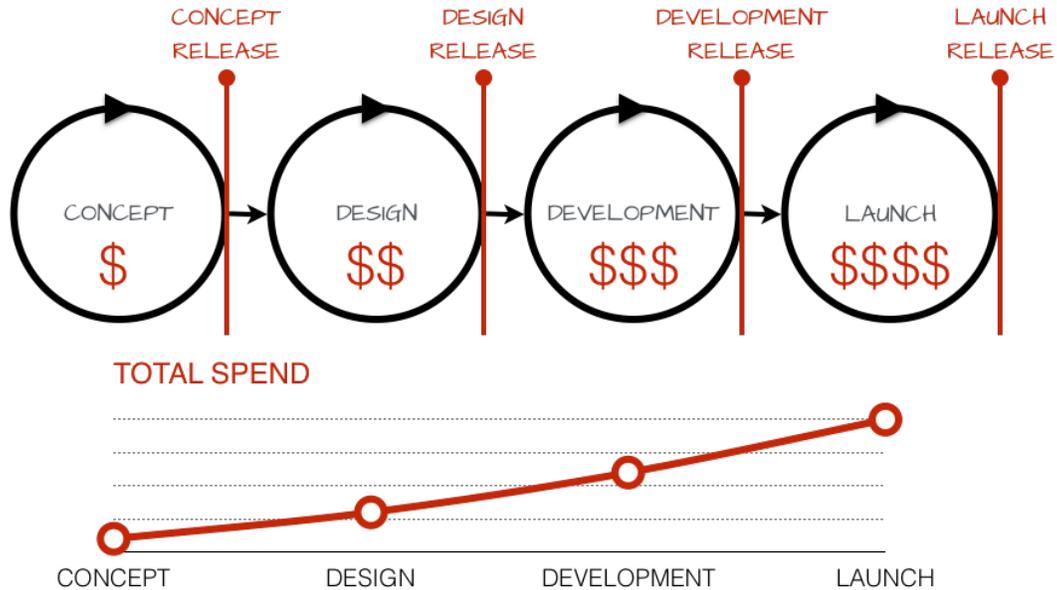
COUPLING DEVELOPMENT PROCESSES

It would be great to fully validate the market and customer needs before engaging in product design. However, this is an iterative process with customers: its easier for them to articulate needs after seeing your product. This is why Agile is such a good fit for software development- customer feedback can be quickly incorporated in a rapidly iterating product.

Because **atoms move slower than bits**, product development efforts must produce Prototypes and Engineering Samples for Customer Discovery and Validation. Most importantly, the Customer Development process **drives** the New Product Introduction process.

The detailed diagram below indicates how to couple the CD and NPI processes. The phases of each process are generally aligned, but starting the next NPI phase requires a "go-ahead" signal from the proceeding CD phase.
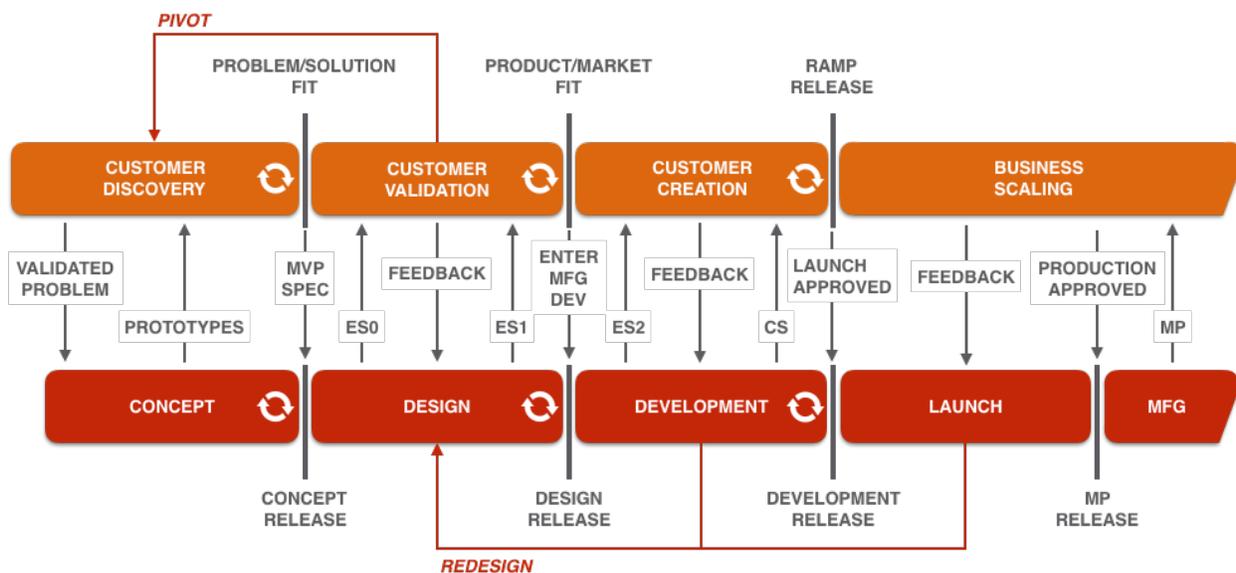
SAMPLE	DESCRIPTION	UNITS
PROTOTYPES	MODELS, DEMO, VISUALIZATIONS, PRESENTATIONS	1-2
ES0	LOOKS-LIKE / WORKS-LIKE INTEGRATION, IN-HOUSE BUILD	< 5
ES1	INTEGRATION/ASSEMBLY ISSUES RESOLVED, FINAL FORM/FUNCTION	<10
ES2	PRODUCTION TOOL MADE UNITS	10-20
CS	COMMERCIAL SAMPLES, PACKAGED UNITS	100-1000
MP	MASS PRODUCTION	FULL VOLUME

Discovery and Concept Phases

NPI Concept work begins when a validated problem is uncovered by CD Discovery. Prototypes (models, demos, visualizations, and presentations) are produced to help the effort to arrive at a Problem/Solution Fit. The outcome of Discovery is a specification for the Minimum Viable Product. The MVP spec is a requirement for Concept Release.

Validation and Design Phases

Engineering Samples (ES) from NPI Design are used to validate Product/Market Fit. If validation isn't achieved, a Pivot will move the process back to CD Discovery. Achieving Product/Market Fit is the signal to enter manufacturing development. It is required for Design Release.

Creation and Development Phases

Early production tool made samples are used to demonstrate traction in the Customer Creation phase. Feedback to NPI Development is incorporated. In the worst case, it may require Redesign moving the process backward (and increasing development costs and delays). Successful demonstration of market traction is required to signal launch approval (a requirement for Development Release).

Scaling and Launch Phases

By the time these phases are reached, hopefully a very costly requirement to redesign the product has been avoided. Scaling builds out the sales channels and marketing communications to drive demand while Launch activities make sure proper inventory levels exist. Success in Scaling signals production approval, a requirement for Launch Release into Mass Production.

CONCLUSION

Some observations from experience:

1. Attempts to embed customer development activities in a company's NPI process typically don't work. The NPI process will run the show and tends to ignore market feedback in a rush to get to a ship date.
2. There are no shortcuts in the NPI process. If you don't follow a robust process or try to skip steps, you will be doing these later anyway. Except now, you'll have a figurative gun to your head.
3. Even with the longer lead times of hardware development, iteration and learning can happen to minimize the overall development cost. It is important to keep the overall cost in mind, not just the current phase (see #2).
4. Each phase takes different skillsets. The valuable engineers who flourish in the "maximum flexibility" environment of the Concept phase often have difficulties in the "minimum variability" Launch phase. Disciplined manufacturing engineers often get frustrated in the chaos of early product development. But the product won't ship without both mindsets- the trick is managing the handoffs at the right time.

Working with Auxilus Systems
Support for your product development project

OUR APPROACH

We respect the the need to make sure every dollar spent brings you closer to your goal of shipping a product. Experience has shown us that following a robust process and systems gets you there faster. Rather than engage in large consulting projects, we:

1. Use small, focused, quick projects to bring experienced resources to different phases of your product development project only when you need them
2. Favor "lightweight" processes that drive results without bogging your team down
3. Keep our contracts really simple
4. Respect your intellectual property and protect it under Non-Disclosure Agreements and strict firewalling between clients

TYPES OF PROJECTS

We offer three types of projects that cover high level planning, specific development phase activities, and standardizing workflows.

Project Planning

At the start of a project (and during its course) it is important to have an overall plan in place. Key milestones, resources, and budgets (including capital as well as R&D expenses) need to be defined. We can help you create plans with the right balance between detail and being actually useful,

Development Reviews

We help you define your goals for each phase of development and establish a plan to meet them. Checklists for each phase make sure critical items are being addressed. We participate in your phase release review as independent reviewers.

Workflow Development

Repeating tasks need to be automated to save your team time. The barrier to using the many tools available is first defining what is going to be automated. We help you get processes documented and consider implementation options (which may be tools you are already paying for).

STARTING A PROJECT

1

PROJECT DISCUSSION

2

SIGN AGREEMENTS

3

GET TO WORK ON PROJECT

Use the contact information at the beginning of this document to set up an initial discussion. This will allow both of us to identify the specific type of project for working together. We'll discuss the details of how the project will be run, including milestones and deliverables.

We'll then send you a Non-Disclosure Agreement (or we can use your NDA) to ensure intellectual property is protected. We will also send you our simple consulting agreement.

With these in place, we will set up a kick-off meeting and get to work!

AUXILUS
systems

Project Planning Projects

DETAILS

This is a project to develop the high-level plan for your overall product development-from idea to launch. The plan includes the goals, assumptions, top-level schedule, budget, and risk analysis.

Milestones

- Kick-off meeting to capture goals and discuss assumptions [Week 1]
- Preliminary plan review meeting [Week 2]
- Final plan delivered [Week 3]

Deliverables

- Top-level schedule (MS Excel)
- Budget including resources, R&D and capital expenses (MS Excel)
- Risk analysis (MS PowerPoint)

Development Review Projects

DETAILS

This is a project to (1) capture the plan for a single phase of a product development and (2) participate as an independent reviewer at the phase release meeting. The phase development plan includes a schedule based on project and checklist activities, a budget, and risk analysis.

Milestones

- Kick-off meeting to capture development phase goals [Week 1]
- Plan review meeting [Week 2]
- Checkpoint call [@ mutually agreed date]
- Phase release review meeting [@ end of phase]

Deliverables

- Development phase plan (MS PowerPoint)
- Checklist requirements for development phase (MS Excel)

Workflow Development Projects

DETAILS

This is a project to define a workflow process sufficiently to guide automation. Routine, repeating tasks are analyzed to create a standardized process that will increase efficiency of the stakeholders. The outcome of this project will allow you to engage with implementers of the workflow more effectively.

Milestones

- Kick-off meeting to capture goals with stakeholders [Week 1]
- Business process diagram and process document [Week 2]
- First stakeholder review [Week 3]
- Second stakeholder review [Week 5]
- Finalized workflow and implementation analysis [Week 6]

Deliverables

- Business process diagram (MS PowerPoint)
- Process document (MS Word)
- Implementation analysis (MS PowerPoint)

Let's work together