



the
DEEP TECH PLAYBOOK

Getting Your Innovation
From Lab Bench
To Market Launch
and funded!

Bill Magill

2026 Edition

Deep Tech Playbook

Getting Your Innovation



From Lab Bench



To Market Launch



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Deep Tech Playbook. 2026 Edition.

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Table of Contents

Introduction	4
Chapter 1: The Science	10
Chapter 2: The Use Case	12
Chapter 3: Technology Stack Placement.....	19
Chapter 4: Customer Compassion.....	23
Chapter 5: Product Design and Prototyping	28
Chapter 6: The Market Opportunity	36
Chapter 7: Competitive Positioning.....	43
Chapter 8: Milestones	50
Chapter 9: Budgets	54
Chapter 10: Fundraising	58
About the author	64
Acknowledgements.....	65

Introduction

This publication is NOT a book; it's a playbook. What does that mean? It is a short-form, action-oriented manual that provides a powerful guide for anyone wanting to start moving forward, step by step, on the commercial launch of a deep tech innovation. There are a number of long-form, hardbound books on the topic of building science-based startups. We can recommend a few. Those are extensive reference guides but challenging to read over a weekend bootcamp (and take up all your backpack space). This playbook can be stepped through easily over a weekend, or day, or even a few hours. You can refer to it on your phone during those bootcamp breakout sessions.

The Deep Tech Playbook is written for those tasked with moving science-rich (deep tech) innovations from lab to market. You may be:

an inventor and aspiring entrepreneur,
her professor/supervisor/mentor,
a manager of a tech incubator/accelerator,
or tech transfer department,
an instructor of startup entrepreneurship,
or investor in deep tech innovations,

or anyone else interested in the considerations and actions necessary to plan and implement the greatest commercial opportunities for a compelling science innovation.

What's new in this edition

A number of updates and improvements have been made to Deep Tech Playbook in this new edition. Highlights include:

- The merging of 2 chapters – *Use Case Options* (previously Chapter 2) and *Use Case Selection* (previously Chapter 4) – into a single chapter titled *The Use Case* (new Chapter 2).
- A rewrite of the section on prototyping to introduce the *Technology Readiness Level* (TRL) construct. Its 9 specific levels provide a more precise indication of an innovation's development stage than the 3-stage approach of *Proof of Concept*, *Alpha/Beta Prototype*, and *Minimally Viable Product*. (Chapter 5)
- Integration of the playbook onto the [Qinect](#) AI learning platform, for a more engaged and customizable experience. Interested in running your own deep tech venturing program? Contact me for more information at (bill@interprizegroup.com).

You have a hammer. Where's that nail?

Startup entrepreneurship orthodoxy holds that you begin with nail first, then hammer. In other words, start with an unresolved need suffered by a large market of users (or expected to be), and then develop an unmatched solution to resolve it. Market need is king.

Deep tech entrepreneurship is different. By its very nature, deep tech entrepreneurship almost always starts with a discovery, breakthrough, or invention in the bowels of some R&D lab in the service of science. An aspiring entrepreneur recognizes its commercial potential and starts the work of sussing out just how promising is said potential. This work will require a solid appreciation for the innovation's novelty, identifying users who will value this novelty the greatest, determining whether there are enough of them to constitute an exciting market, and assessing whether this market can be competitively pursued, profitably. So yes, that magic hammer opens the door to opportunity, but is just one small piece of the commercialisation calculation.

A focus on lowering risk, not hyping reward

Most deep tech innovations require a lot of time and capital to productize and bring to market. A constant call for cash should shift the entrepreneurs focus from science excitement to venture derisking.

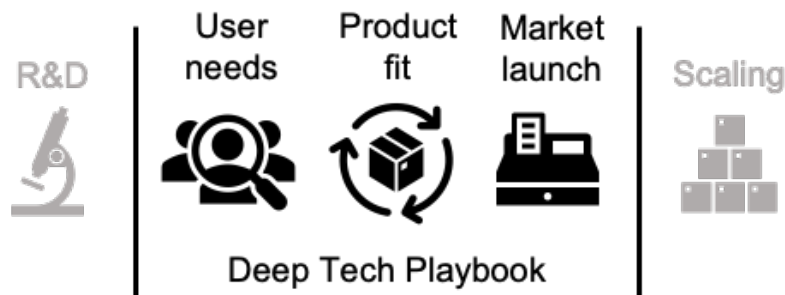
Expect to raise money for your deep tech venture; a lot of it and regularly. Fortunately, public investment programs for deep tech venture creation are getting record support in the US, Europe, and Asia in 2026. But you'll still need private capital, and VC interest in your amazing innovation will be motivated as much by the ability to derisk product design and development, customer capture, market dynamics, and scaling, as by an innovation's peerless attributes.

And so, this playbook focuses more on derisking every part of a deep tech business model than amplifying the glorious upside opportunity (this glorious upside is a given if you're committing your time and energy and investors are starting to call). To that end, we leverage the tools and templates of startup entrepreneurship, such as customer empathy and product-market fit, but adapt them for deep tech innovations in the drive to lower risk and increase stakeholder comfort; be they investors, acquirers, customers, partners, or key hires.

Concept to market

The content and breakouts in this playbook focus on that section of project development from *concept proven* (okay, the science works) to *general availability v1.0*. We assume that the innovation's core science has been developed and fundamental limits are known. It works in a controlled lab setting, possibly even providing utility at deep research facilities like CERN or MIT. Now how do you finance and productize it for commercial markets?

The Playbook guides you to the point of a fully-funded market launch with a v1.0 commercial-grade product, but does not continue into market scaling and the graduation of your startup to a more mature enterprise shipping in large volumes. The skillset, product and market strategies, and sums and sources of funding required for this latter part of a commercialisation lifecycle are significantly different than the focus of the Playbook: getting a raw innovation from concept to first commercial customers.



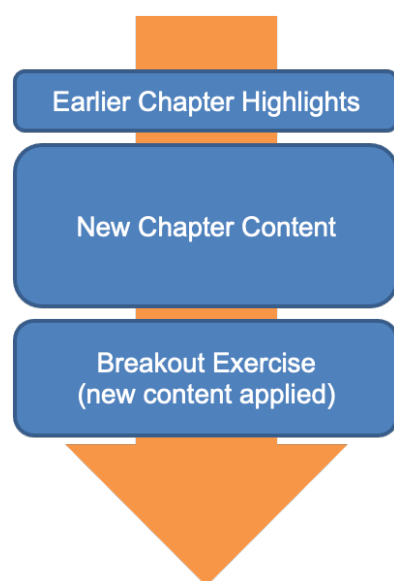
Playbook structure

This book is segmented into 4 sections: Concept, Product, Market, and Execution. As you endeavor to convince others to back your journey, these are the 4 dimensions through which key stakeholders will frame your plan:

1. Concept: understanding the deep tech innovation to be commercialized and who would value it most.
 - a. Chapter 1: The Science
 - b. Chapter 2: The Use Case
2. Product: defining the most compelling product species (configuration and features) for the scientific innovation.
 - a. Chapter 3: Technology Stack Placement
 - b. Chapter 4: Customer Compassion
 - c. Chapter 5: Product Design and Prototyping
3. Market: assessing the size of the market opportunity for your product, and the competitive forces working to deny you that opportunity.
 - a. Chapter 6: The Market Opportunity
 - b. Chapter 7: Competitive Positioning
4. Execution: putting steps in place to pursue this opportunity, and filling the budget to fund this pursuit.
 - a. Chapter 8: Milestones (to market launch)
 - b. Chapter 9: Budgets (to support the milestones)
 - c. Chapter 10: Fundraising (to support the budgets)

This manual is designed to be followed sequentially, each chapter to the next. The creation of a deep tech commercialisation model, like any business model, is not a predictable, linear process, however. Many assumptions about the market, its users, their needs, your product, the

competition, and other core model elements will be made and then found weak through validation. This is normal and part of the real-world, constantly-revising, iterative process of business model creation. The redesign practice is never finished. Accept that you'll be taking 2 steps forward and 1 or more back often. But each step will strengthen your knowledge and outlook of success as your understanding of the commercialisation model strengthens. So revisit earlier chapters and reconsider the tangent of your commercialisation strategy as new insights deem necessary.



Each chapter begins with bulleted highlights of previous chapters that should be by that point well understood, applied to your project, and effective in derisking those elements of the business model. You must be comfortable presenting this content – vis-à-vis your innovation – to key stakeholders before starting the new chapter. The new material being presented will build on this earlier content and continue to drive the commercialisation effort forward.

After new content is presented, each chapter ends with a *breakout assignment* to help put this content into practice. It's possible that a dive into new content and assignments reveal flaws in former thinking, which requires a return to previous chapters. It's all good. As mentioned earlier, you may find this iterative process more the norm than exception.

Suggestions for additional readings and complementary resources are added when appropriate.

Author's confession and readers' agreement

This playbook is based largely on the deep tech venture building courses and workshops that I've been leading for INSEAD and other partners for the past 15+ years, most recently with my collaborator and good friend Adrian Johnson. We had decided that a manual stepping through the core concepts and assignments of our program would be helpful to participants, and so I set about writing one in 2023. As entrepreneurship evolves so does its teaching, and so I update and improve on the playbook (at least) annually, ... with your help.

There is no charge for acquiring and using this playbook, but I ask a favor in return. This third edition will be updated as required with the help of you and others interested in contributing to the best practices of bringing a deep science innovation to market. Two things will help me continually improve on the playbook:

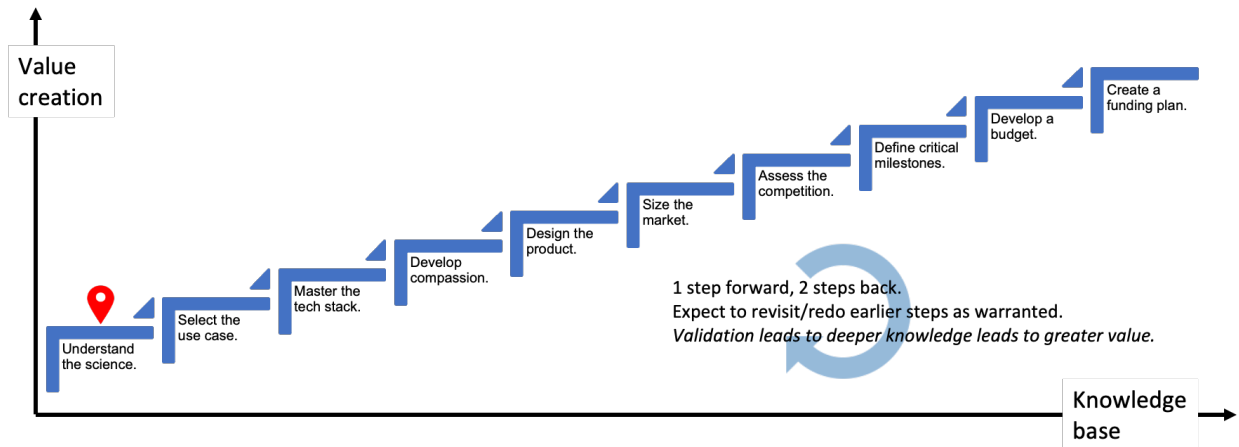
1. Let me know which edition you are using (This is the 2026 edition). I would like to track the number of copies in use and notify you when a new edition is published.

2. Provide feedback about the playbook, principally on what works best and how it can be improved. If there are additional readings on specific topics that you think would be valuable for readers please let me know. Want to propose a new chapter (and even write it)? Tell me more. I want this playbook to become the definitive global reference guide for the process of commercialisation of deep tech innovations. That will only happen with broad community support. If you're reading this now then you are part of the community.

In both cases and for all other contact I can be reached at bill@interprizegroup.com.

The Concept
So, what you got?

Chapter 1: The Science



Every stakeholder involved in the commercialisation of a deep tech innovation must have a basic grasp of the underlying science. For anyone contributing to the process through management, money, or promotion, knowledge of what’s happening under the hood, even if at just a layman’s level, is the fundamental Step 1 to making that contribution.

The science underlying any innovation anchors its value foundation. A basic understanding of its operating principles helps frame the unique strengths that create commercial promise and the limitations that gate its universe of applications. This knowledge forms the base on which the commercialisation model will be constructed.

Commercialisation model development without a basic grasp of their underlying operating principles of the science can be an interesting academic exercise, but with limited value beyond that.

So you’re buzzed about a truly disruptive innovation! What do you really know about the underlying science?

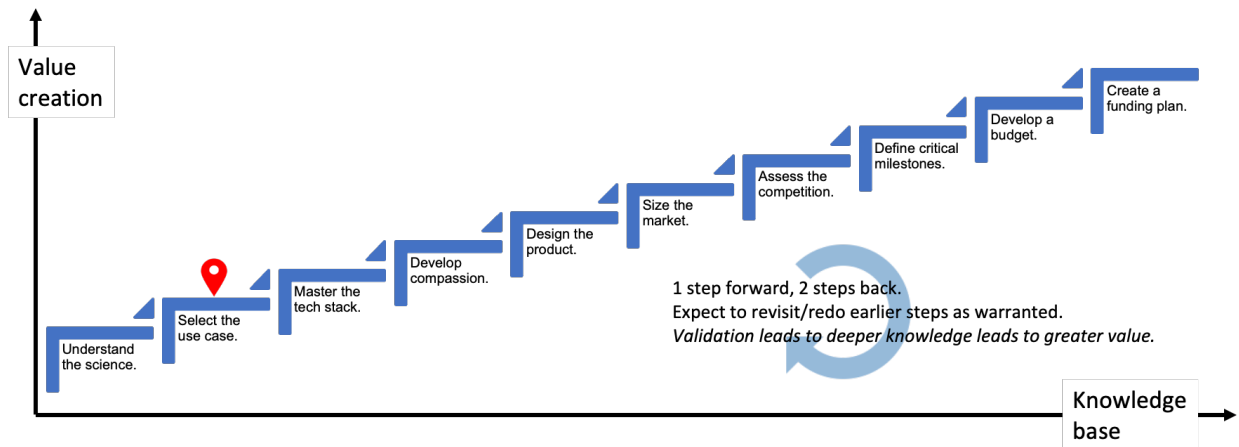
Science Breakout

To derisk your knowledge of your innovation’s value-creating novelty, answer these questions about the science you hope to commercialize:

- What is it? What does it do (in layman’s terms)?
- What are its disruptive strengths and performance advantages? What makes it exciting?
- What is the scientific achievement/breakthrough that enables its strengths and advantages (the thing that can be patented)?

- Do these advantages represent an incremental improvement over existing solutions or a radical disruption to the industry? (This distinction will have implications for your competitive positioning, as discussed in Chapter 7.)
- How might its performance improve in time and what fundamental limits to the science will cap these improvements?
- How might its performance advantages create market value, in broad terms? (We'll take a more detailed look at value creation in subsequent chapters.)
- What industries will value this strength/advantage? (Boil the ocean of possibilities now. We'll take a deeper dive into use cases in Chapter 2.)

Chapter 2: The Use Case



To start this chapter you should have:

- A solid understanding of the underlying science.

... and be confident defending with key stakeholders.

Note: If you have already identified a use case that generates the greatest value from your innovation and are 100% committed to that choice, you may skip this chapter. However, it is critical to validate all assumptions on which your commercialisation model is founded, and the content herein should be constructive in validating your hypothesis about the use case selected.

Consider all use case options

The optimal commercialisation strategy for each science innovation is unique, a function of its many differentiating science, product, and market factors, all covered in this playbook. The bookends to these factors include the source science and end uses to which it provides the greatest market value.

The use cases will determine if the market strategy is B2C, B2B, some hybrid of both, or another open innovation approach. The use case will determine if the product implementation is an IP license, component, module, subsystem, full hardware/software/service platform, or something else along the technology stack (tech stack). It will determine your channels and partners and competition.

It's essential to start narrowing down on the best use cases early when plotting the commercialisation strategy and design to those applications. And it's essential to NOT commit to a product concept BEFORE understanding the best use cases. This is a recipe for much needlessly wasted money and time.

Unless you have the luxury of unlimited resources – capital, people, and time – you’ll want to identify the one single most promising option around which to create a commercialisation model. This chapter will get you to that use case, version 1.0. (Note that in the course of framing a science commercialisation model you may realize that those assumptions about the opportunity that had you most excited are wrong. That’s okay. You can pivot as necessary, and in the process gain a better understanding of your commercialisation model as you advance.)

So, what is your use case of greatest promise? If not immediately clear, then start with the big picture and focus in. Start with WHY this innovation merits investment, not exactly WHAT will be developed. Create a *Mission Statement* that reflects the greatest purpose the commercialisation of this innovation can provide for its users and other beneficiaries.

Building on the previous chapter, answer (1) WHAT is the science innovation, (2) HOW is it novel, and (3) WHY does it merit time, resources, and a lot of other peoples’ money to commercialize it? (This is an adaption for deep tech of Simon Sinek’s *Golden Circle*; see links at end of the chapter.) How might it change the world and for whom? The Mission Statement will serve as the north star for your strategy and execution through time.

Don’t confuse the Mission Statement with your Value Proposition. The former spells your organization’s broad purpose (why you exist). The latter frames how that purpose creates value. Here are 3 examples of well-crafted Mission Statements. In all cases the mission is clear, inspiring, and impactful.

Boston Dynamics



To imagine and create exceptional robots that enrich people’s lives.

SPACEX

To revolutionize space technology, with the ultimate goal of enabling people to live on other planets.

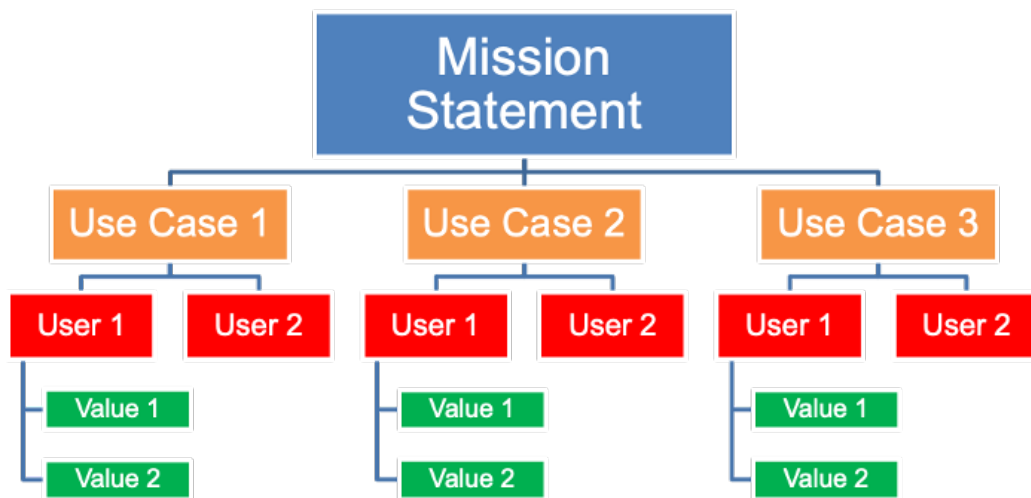


To bring superhuman capabilities to every human, in every industry.

Once you are satisfied with your Mission Statement, list what you know (at this point):

- Which use cases will value your innovation and mission?
- Which actual users (give them titles) stand to benefit the most from each use case and mission?
- What value/benefits does your innovation bring to these users: Costs, performance, size, efficiency, time-to-market, and other factors can be key to this evaluation.

In all instances, is the alignment of these profiles with the Mission Statement tight? If not, does the Mission Statement need to be revisited?



Select the single most promising use case

You'll want to rank options and then select the single most compelling use case to pursue if your startup is operating on limited resources (and it almost certainly is). Some innovations offer real value in different applications and industries, but pursuing them all requires too much capital in money, manpower, and time for most startups to manage.

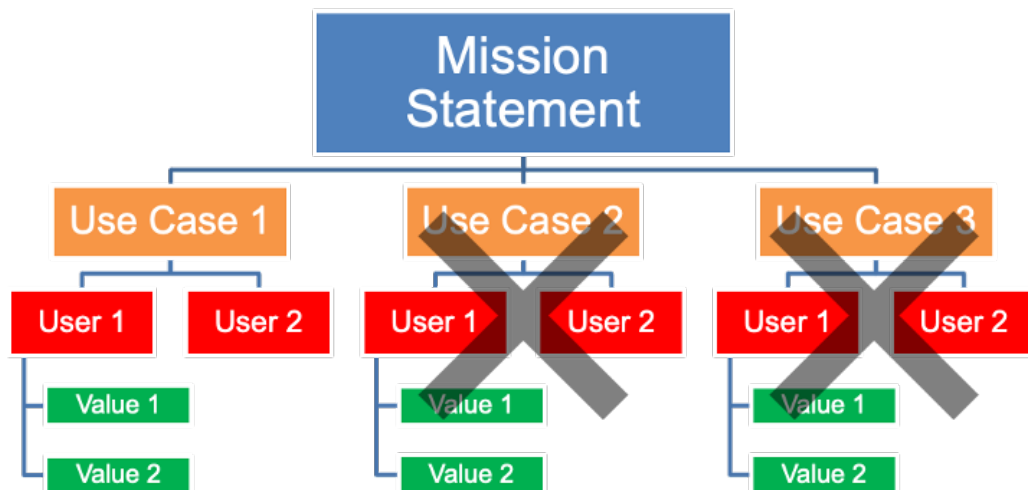
As an example, consider a novel silicon material that significantly enhances operating efficiency (higher speed or lower power) and enables the growth of non-silicon semiconductor materials directly onto the silicon substrate, without lattice defects. Chips made from this material could be

of great value in standard semiconductor end markets like computers and cell phones, where speed and power are critical performance differentiators. They could also be used to create low-cost integrated optical switching elements on silicon for communications markets. And a third application space could be in photovoltaics, where efficiency improvements by just a few percent creates immense competitive advantage. (This could describe Amberwave, a 2000 MIT spinout led by Professor Eugene Fitzgerald.)

A startup may be tempted to pursue multiple use cases given a large market potential of each. It's unlikely that sufficient capital can be raised for such an ambitious strategy, and even less likely that an organization of this breadth could be effectively manned and managed by a small, raw startup team. So how do you rank to options? For each consider:

- The return on invested capital (ROI). A back of the envelop estimate is sufficient at this stage: how much it will cost to pursue this use case, and how much might it return if successful. (See end of this chapter for a link to an ROI primer.)
- Time to market.
- Capital equipment needs.
- Manpower needs.
- The likelihood to raise capital for that product species.

Note that the use cases ranking lower than #1 on your priority list can still be monetized through other avenues. Perhaps a spinout can be created or licensing to a larger corporate entity arranged. *Open Innovation*, an approach popularized by Henry Chesbrough of the University of California, Berkeley (link at chapter end), encourages organizations small and large to think about nontraditional strategies for commercializing compelling innovations beyond just an IP license or *build it ourselves*. The options are many.



Once your #1 use case is selected it is critical to run a rough sanity check on the resources required for your innovation's commercialisation to that target application. With regards to moving your science to the commercial market, identify:

- The time required to move the innovation forward to commercial availability (science innovations often require years of development and testing).
- Major capital equipment needed.
- Critical headcount and profiles required to finish R&D and separately build product design, engineering, and business development/sales teams.

Don't waste time at this point fine tuning a monthly or quarterly budget. You may not have sufficient data and it's not yet a priority. But you need to make at least rough estimates of the time, manpower, and funding needs to confirm, or not, that the use case you've prioritized as the most attractive is indeed realistic to pursue. (We'll talk more extensively about budgets in Chapter 9.)

Use Case Breakout

1. To derisk your knowledge of use case options:
 - Draft a Mission Statement that reveals the greatest market ambition driving the commercialisation of your science innovation. Who will benefit? How will they benefit?
 - Given this Mission Statement, list up to 3 promising use cases for your innovation. You may know only one. You may know a dozen. Start with 1-3 for manageability. For each, identify:
 - The application in which your innovation will be applied.
 - The user whose activity benefits from this application. Maybe it's a rocket designer, or the astronaut, or the engineer who assembles the spacecraft.
 - The jobs or activities they perform that involve your innovation.
 - The benefits and value that your innovation brings to these jobs or activities.
2. For each use case can you identify:
 - The pains or challenges the users encounter while doing their jobs or activities that can be eliminated or lessened by your innovation?
 - The gains or improvements enabled by your innovation that would make their jobs or activities either easier, less expensive, more precise, or support some other positive outcome. (Identify the pains and gains from a high level here. We'll take a deeper look in Chapter 4;)
3. To select the single most attractive use case rank the possibilities with rough estimates of:
 - The ROI.
 - Time to market.

- Capital equipment needs.
 - Manpower needs.
 - Funds required to get to market.
4. Given the results of this breakout analysis the team needs to accept, or not, that this option warrants pursuit. If yes, congratulations, you are ready to continue with the productization of your innovation. If no, redo this chapter on the second most appealing use case you have identified.

Additional reading:

There is an endless list of well-written articles on crafting powerful Mission and Vision Statements online. For one that we like from WeAreBrain click [here](#).

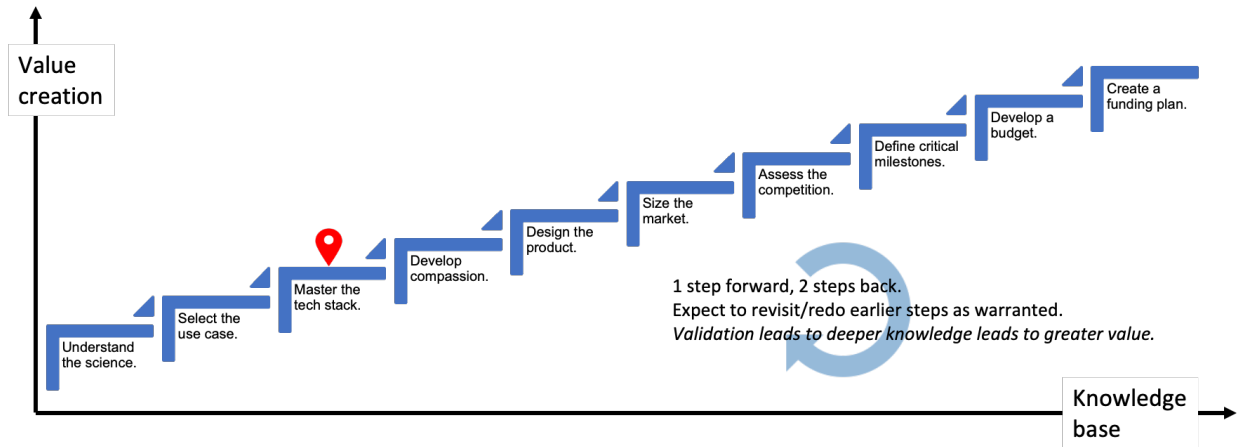
Simon Sinek is the originator of the *Power of Why* and its *Golden Circle*. A search will turn up his many fascinating TED Talks and other content. To go to his organization *The Optimism Company* click [here](#).

To read an interview with Henry Chesbrough on the concept of *Open Innovation* click [here](#).

For a primer on ROI analysis by Investopedia click [here](#).

The Product
What's its species?

Chapter 3: Technology Stack Placement



To start this chapter you should have:

- A solid understanding of the core science underlying the innovation to be commercialized.
- Identified the most compelling use case for its application.

... and be confident defending with key stakeholders.

This chapter is not about setting product features, specs, and other design considerations. It is about something more fundamental that will guide those considerations: the placement of your innovation in the tech stack of your industry. You have compelling deep tech IP. Should it be simply licensed, or does it merit an investment in productization? If the latter, should that product be a material, component, module, subsystem assembly, full system with control software, or something else?



*An optical switch tech stack: IP, component, module, subsystem, and full system.
(Based on Calient's 3D MEMS innovation.)*

It is critical to think about tech stack placement early in the commercialisation process; before you've invested significant time and money in developing a prototype or product. There are two approaches and additional considerations to finding your place in the industry tech stack:

- Approach #1: Optimizing the return on productization investment. With this approach you control the placement decision.
- Approach #2: Accommodating supply chain and market forces. With this approach your suppliers, customers, and the larger market sway the decision, even if suboptimal from an ROI analysis.
- Additional considerations: The impact of your placement on time-to-market, and where along the stack are VCs favoring investments?

From a purely financial perspective you want to pursue Option #1. A rudimentary ROI analysis (building on Chapter 2) will determine your optimum placement in the tech stack based on a comparison of the discounted cash flows from each product form and the investment capital required to support these cash flows over time. Cash flow generated by an IP licensing strategy will be much less than from selling full systems, but the capital required to support a licensing model will be orders of magnitude less as well. The ROI may be higher.

From a practical perspective you will likely pursue Option #2. For your customers the desired product species may be in a form factor other than that for your maximum ROI. For example, the end user may be uncomfortable buying a full system from a startup. (Will you still be in business in 10 years to service it?) They may prefer that you exist *lower* on the stack, supplying

components or subsystems to an established and trusted full system manufacturer, who then assembles, tests, sells, services, and guarantees the final product for them.

An additional key consideration is timing. To accelerate the adoption of your innovation you may have to move *higher* on the tech stack. No one will be eager to license your IP or source your component if there isn't a clear path to adoption in the existing industry. Referring to the diagram above, imagine that you have novel 3D actuated MEMS mirror IP optimized for all-optical communication networks, but no one in the industry has yet developed a full optical switching system. You can wait for an established systems manufacturer to do that and be its MEMS mirror supplier, or with sufficient resources you could design and build the entire system yourself. The latter option will be expensive but may be the quickest route to market, which will affect your ROI analysis.

Another consideration is venture capital (VC) targeting in your industry. If full systems companies are getting most of the investment capital now, should you design a full system? With any deep tech startup's regularly need for capital, it is a consideration. This early point in innovation commercialisation is the time to identify and consider all forces impacting product design. ([Hello Tomorrow](#), [PitchBook](#), and [CB Insights](#) are just 3 of the many sources of data on deep tech venture investment trends available online. More on this in Chapter 10 on fundraising.)

If you have the option to bring your innovation to market at different points along the tech stack then an ROI analysis, even a simple calculation based on imperfect information, should be conducted, just as you did when comparing use cases. Ultimately, however, a successful market placement will likely be dictated by the existing industry supply chain forces and structure, and your customers' expectations. How do you know your customers' expectations? Ask them.

Before investing significant resources in prototypes approximating commercial form factors, first understand how *you* prefer to productize your science (based on an ROI estimate) and how *the market* prefers you to productize your science (based on select validation discussions). In a beautiful world it will be the same. Then stress test that answer with your additional considerations of time-to-market and VC investment trends.

From chapters 1 and 2 you should already understand the science and its disruptive strengths and commercial value, plus the most promising use case. You should also have started organizing your customer and user targets by industry, company, and title. There might be 100 target individuals, or there may be 10 or fewer. Whom can you contact to introduce your innovation and confirm your assumptions and preferences on how its value can be best leveraged in the market?

Consistent with the core tenants of *Lean Startup Methodology*, it's critical to validate your assumptions on how and where your innovation will find its place in the market before committing considerable resources to that commercialisation effort.

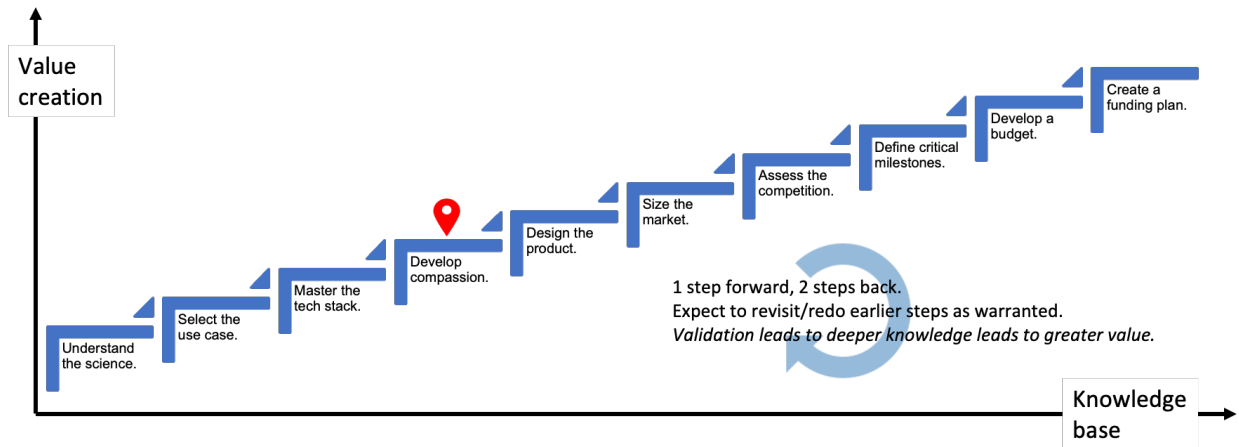
Tech Stack Breakout

1. Based on your core disruption and use case, derisk your assumptions of tech stack placement by:
 - Sketching the tech stack for your targeted market. Your insertion possibilities along the stack will likely be bounded by a pure IP licensing option at one end and a complete system/platform productization at the other.
 - Based on an ROI analysis and other resource considerations (limiting constraints or enabling assets) where would prefer to insert your innovation into the stack?
 - Whom can you talk with to explain your innovation and share your commercialisation model assumptions, as they exist at this early point, for feedback? This may include others directly behind you on the stack (your suppliers) and those in front (your customers).
2. Through these discussions confirm (or refute) that they:
 - Understand and value your deep tech disruption (from Chapter 1).
 - Would in theory be interested in supplying to or sourcing from your organization selling this innovation in this product format.
3. Also determine what considerations and requirements other than price would affect their decisions to be suppliers or customers. These could be technical or financial.
4. Based on the feedback from these early discussions, and considerations about time-to-market optimization and the VC trends (favoring or disfavoring your targeted product species), reevaluate your position in the industry tech stack.

Additional reading:

For more information on *Lean Startup Methodology* click [here](#).

Chapter 4: Customer Compassion



To start this chapter you should have:

- A solid understanding of the core science underlying the innovation to be commercialized.
- Identified the most compelling use case for its application.
- Characterized its product species and determined its optimum placement in the industry tech stack, with select, targeted interviews.

... and be confident defending with key stakeholders.

Compassion: *Sympathetic consciousness of others' distress (i.e., empathy) together with a desire to alleviate it.*

Merriam-Websters Dictionary

On empathy

Capturing *customer empathy* (through *customer discovery*) has risen to the apex of critical deliverables in most workshops, courses, and publications on business model development. It resides at the core of the lean-inspired startup methodologies mentioned earlier, and for good reason. Before significant sums of capital are invested (and likely wasted) in product development it is essential to understand the customers' needs, pains, limitations, and other factors that help you maximize value through product design and a go-to-market strategy.

But capturing empathy is just a means to an end. It must be applied through smart product design and support to offer compassion and create value (for both your customers and your organization). A customer compassion program involves 2 steps:

1. Gaining empathy for your customers' pains, needs, and desires.

2. Optimizing product design and support to amplify their gains and alleviate their pains.

Deep tech innovations are most always developed with a specific function to achieve or challenge to address. To measure, or modulate, or parse, or drill, or filter, or convert, or sense, and do these things in a way that improves upon earlier approaches. There are real user pains being resolved, real gains being sought. So, developing empathy is relatively straightforward, as opposed to the many *me-too* innovations with questionable utility seen in the mobile app space (but we digress).

How do you heighten customer empathy? Primary research through interviews (and surveys) is the most effective and insightful approach. When the innovation is an app or other consumer product then this is simple to organize. Online resources are plentiful. Existing surveys can be accessed. Potential users number in the millions. Deep tech is different.

Science-rich industries tend to be concentrated and the end users more complicated to contact. You won't likely have millions of customer targets. You may have dozens; you may have fewer. Telecoms, pharma, energy, space and aeronautics, semiconductors, AI: these are just a few examples of concentrated industries in which large mega players dominate.

Building empathy for your customer(s) - whether you have just 1 or 1 million - starts with a solid understanding of how they conduct their jobs (as mentioned briefly in the previous chapter). What are they doing, precisely, that your innovation can impact? Building rocket engines, analyzing data, modulating a laser over fiber optics or free space, ...? What challenges and limitations constrain execution? What enhancements (that you can enable) would improve execution?



Adapted from the Value Proposition Canvas, Strategyzer

Empathy to compassion

Once a foundation of understanding and empathy for your customers' challenges takes shape, then a customer compassion plan for expressing this empathy through product design and related support can be created.

Consider this example. Your science disruption is a high-efficiency battery chemistry that recharges rapidly in a small, light form factor. An exciting scientific breakthrough. The customer - perhaps a power utility - values this distinction, and through a few select interviews you understand that it needs to deploy such solutions to remote locations with short notice, and with various scalable power capacities. By designing rackable, stackable, portable units pre-installed in truck trailers you are showing real customer compassion. Your science disruption is in battery chemistries, but your productization, perhaps through an industry partner, is optimized higher in the tech stack: at the platform solution level.

Compassion to the Value Proposition

From empathy and compassion follows value. With customer awareness and product design decisions in hand, you can draft a *value proposition* that reveals the users' pains and how your science solution resolves them, not only effectively but without equal. This concise statement forms the foundation of that *elevator pitch* you can deliver, often unexpectedly, to any type of stakeholder in your commercialisation success: an investor, potential new key hire, startup competition judge, or other. It will need to be tattooed to the back of your head, as the saying goes, so you can deliver it by muscle memory, even when flustered to find yourself in an elevator with the most respected investor in your technology sector.

There are no hard and fast rules for crafting strong value propositions. They need to amplify the promise of the innovation, succinctly, impressively, but without superfluous flourish. Value propositions must be irresistible, irrefutable, and easily digestible. That final requirement can be a major challenge for deep innovations built on an exotic sciences.

If struggling to create a strong, clear value proposition consider using a *positioning statement*; essentially a template for expressing the distinct and competitive value of one's product or service. Note that like most all effective value propositions, it starts with the pain being resolved, not the solution itself. No one cares about your impossibly narrow laser linewidth or high battery charging efficiency if they can't first understand why that matters and to whom.

Positioning statement template:

For (target user)

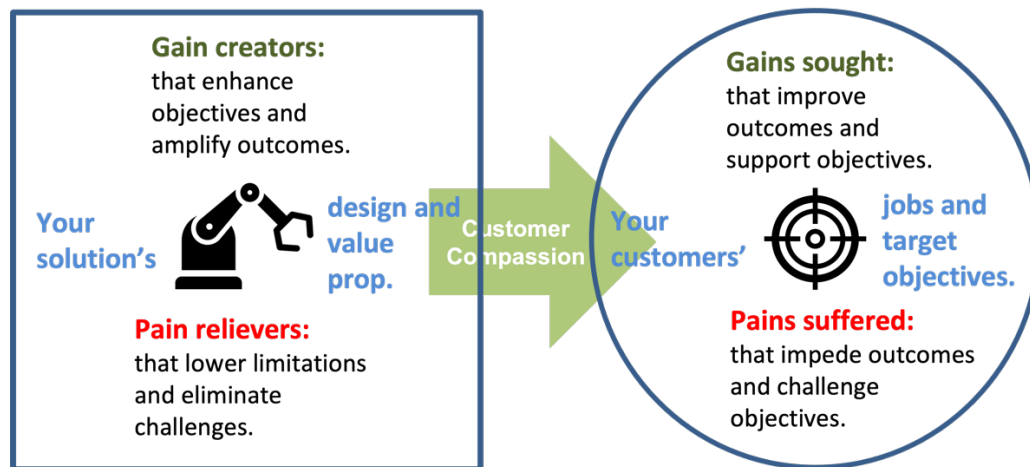
Who (statement of need, related to the pains/gains above)

Our (technology) is a (technology category)

That (statement of benefit, that resolves the pains or amplifies the gains)

Unlike (competitive technology alternatives)
Our approach (statement of primary differentiation)

Regular and repeated communications of your assumptions about user needs and how you address them is required with favored customers, or those with whom you hope to be first customers. Concepts and early prototypes are the best form of customer collaboration and communication. More on that in the next chapter.



Adapted from the Value Proposition Canvas, Strategyzer

Customer Compassion Breakout

1. To ensure that you've derisked assumptions about your customers' needs, answer these questions about the identified customer of your targeted use case (to the best of your existing knowledge):
 - What are they trying to accomplish (that is relevant to your innovation)?
 - What challenges complicate meeting these goals?
 - What are they doing now to solve these challenges?
 - How can your solution do a better job of helping them overcome these challenges?
 - Write a powerful value proposition for your targeted user. (Use the positioning statement template if helpful.) Can you deliver it in less than 30 seconds?
 - Create an elevator pitch about your effort, including the solution's proposed value, but also the skilled team, large market size and defensible market dynamic, and anything else that sets the hook. (We'll work on perfecting this in Chapter 10 on fundraising.)

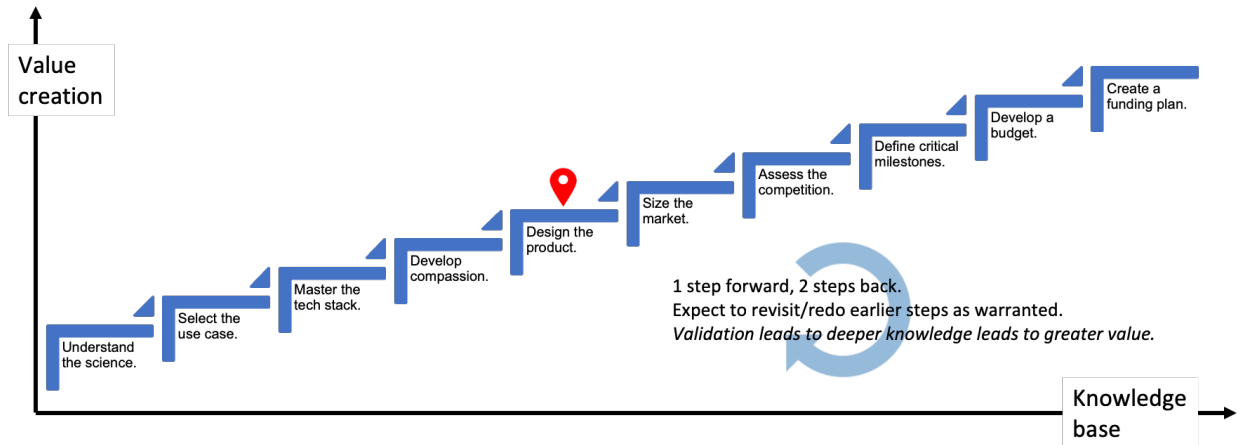
- Are the value proposition and elevator pitch well aligned with your Mission Statement from Chapter 2? If not, analyse and recreate as needed.
2. You will not have solid, validated insights to all of these questions. For those that you do, list your knowledge and assumptions. For those that you do not, list what you (think you) need to learn.
 3. It may be helpful to create a questionnaire of pass/fail questions to validate your assumptions and gain a better understanding of the unknowns. With whom can you start to validate your customer compassion strategy? Refer to Strategizer (link below) for helpful tips and tools for validation testing.

Additional reading:

The [Value Proposition Canvas](#). Strategizer.

Resources for validating assumptions. Strategizer. Click [here](#).

Chapter 5: Product Design and Prototyping



To start this chapter you should have:

- A solid understanding of the core science underlying the innovation to be commercialized.
- Identified the most compelling use case for its application.
- Characterized its product species and determined its optimum placement in the industry tech stack, with select, targeted interviews.
- Created a customer compassion strategy centered on a profile of (1) your targeted user, (2) their needs, pains, and desired gains, and (3) how your innovation can address them.

... and be confident defending with key stakeholders.

You're about to start the arduous process of designing products, or at least early versions of them: prototypes. To avoid wasting time and money on designs that no one wants, ensure that you have had initial discussions with customer targets about your innovation concept and features, and identified your optimal product placement in the tech stack of the industry, per earlier chapters. You are convinced, based on these discussions, that the greatest value from your deep tech disruption will be gained through a discrete component design, or full system platform, or other product species in between. Based on customer discovery, you also understand the core features that will most effectively amplify your "unfair advantage" and distance your product from its competition. (This is an iterative process, of course, so all assumptions may change significantly in time.)

A short word on prototyping in deep tech

Prototypes, short for *pretend prototypes*, are nonoperational product mockups, invaluable for validating (often disproving) physical design intentions for hardware innovations, or the user interface and experience in digital innovations such as apps. How to know if the product

experience you imagine will be embraced by your target users? Create a pretotype - often in an hour or a day - that can be shared for feedback. Nothing is happening *behind the curtain* in a pretotype, but the user gets a good sense of the dimension, weight, buttons positions, product design, and possibly key features. Pretotypes are particularly useful in deep tech innovation workshops, allowing student teams to experiment with physical productization options that can be shared with other workshop participants over the course of a few days.

The rest of this chapter will focus on the evolution of functional prototypes for deep tech ideas, but a link to more on prototyping is provided at the end of this chapter.

Pre-release evolution

Product commercialisation means evolving that lab achievement that incited initial excitement into a product that can be manufactured to spec at scale. That evolution requires 3 major stepstones along the product development process:

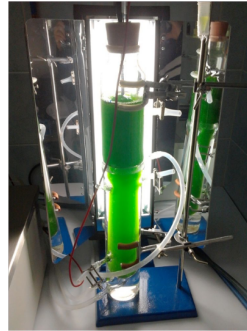
1. Proof of Concept (PoC): Prove that the science works as theorized (repeatedly) on a lab bench, in a petri dish, etc.
2. Prototype (or alpha prototype): Assemble that functionality into an autonomous unit (be it a material, component, module, full system, or other rendering) that meets the core functional claims of the concept. This can be assembled into an inelegant one-off and not to the final form factor. It will be tested by you at your facility and shared with a small number of “friendlies” and other stakeholders for feedback.
3. Minimum Viable Product (MVP, or beta prototype): Improve on the productization to meet a *minimum* set of core specs – size, power, speed, etc. – of the final commercial design that most effectively express its greatest value. The form factor should be elegant and close to the final product. It might not yet be fully featured, but the specs that have customers most interested need to be met. The MVP needs to be available for testing by a larger number of target customers and other stakeholders, at their facilities and should provide a good sense of its capabilities and the user experience.

Example of 3 levels of prototypes for a photo-bioreactor.



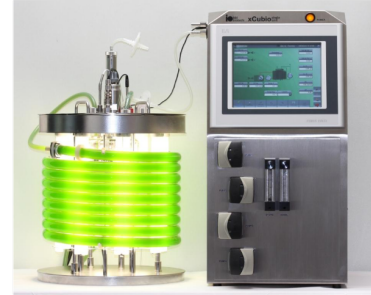
Proof of Concept

Does it work?



Alpha Prototype

Can it be assembled?



MVP

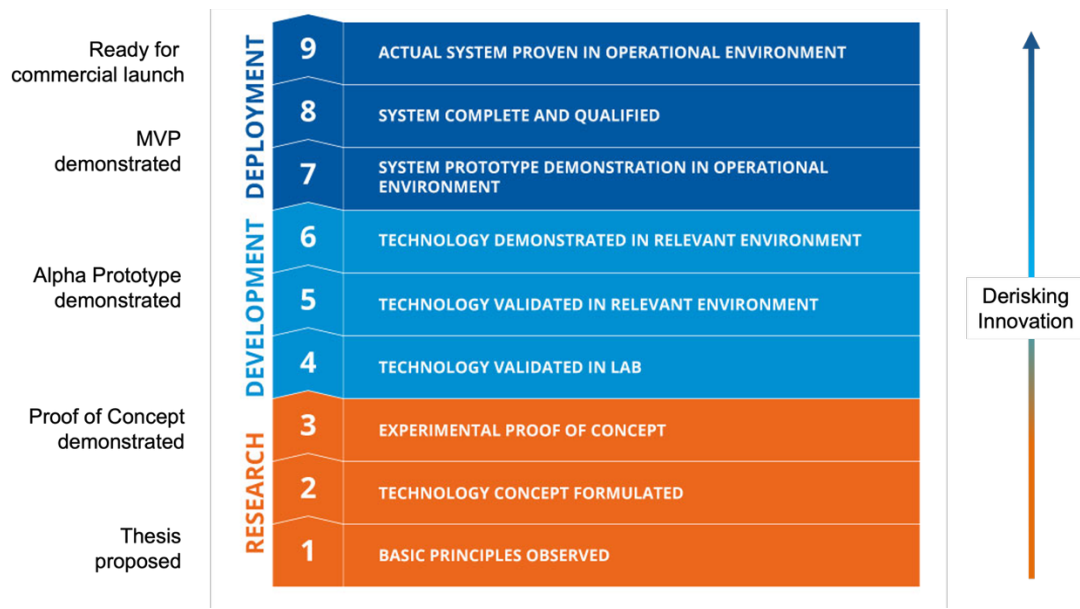
Can it be productized?

Identifying your Technology Readiness Level (TRL)

Sharing your innovation's maturity through the broad brush of PoC, alpha prototype, or MVP provides a helpful, general status of the productization effort: still in the lab; graduated to a prototyping space; now in final tweaks in a commercial facility. But a finer granularity of technology maturity can be provided through the Technology Readiness Level (TRL) structure. And this level of detail will be demanded by the key stakeholders in your venture's success.

The TRL system was developed by NASA in the 1970s, to assess the readiness of new innovations for adoption into its aerospace projects. As shown in the diagram below, it provides 9 levels of technology progress, from *basic principles observed* through *proven in an operational environment*. Its utility has been embraced globally as the standard for measuring technology maturity.

You will need to identify and defend your innovation's placement along the TRL scale as you discuss IP transfer, apply for grants, negotiate with investors or others considering supporting your startup. A link to more detail on the TRL system is provided at the end of this chapter.



Adapted from The Welding Institute

Building prototypes

Building prototypes is key to derisking product design: they help optimize product spec to market need and strengthen *Product-Market Fit*. Early user feedback is essential for focusing on those features they love and eliminating those that they don't. Is it the right dimensions, weight, and color? Does it plug in or bolt up seamlessly to products above and below on the tech stack? Does it operate as designed? In the users' opinions, what essential features are missing, which nice-to-have features would add value (and they would be willing to pay for), and which features are of low interest (and they don't want to pay for)? In sum, how can you make it better?

Prototypes streamline product design investment in 2 fundamental ways: the physical design and the performance design:

- Look-like prototypes: testing these, users will confirm that the physical aspects - dimensions, weights, colors, assembly/disassembly, packaging, and other - are correct (or not). How would the user improve it?
- Work-like prototypes: testing these, users will confirm that the operational aspects - power needs, processing speeds, precision, repeatability, and other - are known and meeting or exceeding expectations (or not). How would the user improve it?

The sooner you can get started on a prototype the better, especially to get user feedback on performance expectations before wasting precious time and money on poor designs. If early iterations look kludgy that's okay, it is an iterative process. As your understanding of customer expectations improves an MVP will take shape that more closely resembles a final product that excites the market.

Developing prototypes for mobile apps can be fast, easy, and inexpensive. For deep tech innovations this is often not the case. It may indeed be the biggest challenge you will face on the road to innovation commercialisation. Gaining access to specialized equipment, highly trained staff, custom design tools, ISO-certified clean rooms, 3D printers, laser spectrometers, and other expensive assets while operating on pre-seed funding or small grants frustrates the situation. A sizable Series A investment round may be needed to fund access to the prototyping resources required, but few VCs are willing to make that kind of investment until a prototype has been produced. It's a conundrum.

No perfect solutions exist to this challenge for many aspiring entrepreneurs in the deep tech world, although recently incubators have begun building alliances to share prototyping facilities and expensive, specialized equipment, as mentioned below. Various approaches to reducing the prototyping challenge are available, depending on a founder's situation. They include:

University labs	<p>The good: access to high-end, specialized equipment and qualified scientist support, at the university's expense.</p> <p>The bad: limited time per week in the lab, which is shared with other professors and students.</p>
Prototyping houses	<p>The good: rapid turnaround to relatively standard designs.</p> <p>The bad: expensive and may struggle with exotic designs.</p>
Startup incubators / accelerators	<p>The good: access to maker spaces as part of incubator fees.</p> <p>The bad: the equipment will be purchased for general needs, so specialized equipment for your innovation may not be available.</p> <p>The new: collaborating incubators sharing access to specialized tools.</p>
Industrial partners	<p>The good: access to high-end, specialized equipment and qualified scientist support, at the partner's expense.</p> <p>The bad: the partner may bias your prototype spec to their specific needs and want an equity stake in your startup for their support.</p>
*VC funds	<p>The good: access to high-end, specialized equipment and support at the investor's expense.</p> <p>The bad: there is little downside here. Just remember that VCs, by their charter, operate on a transactional basis that maximizes ROI.</p>

*SOSV, through its HAX program, is pioneering the effort among deep tech VCs in supporting the prototyping needs of its portfolio companies.

Post general release product evolution

Your MVP will be the final product version before commercial release: v1.0. Then what? All innovations need a roadmap of successive feature and performance enhancements: versions v2.0 and on. No investor will back a startup offering a static product that cannot grow with technology advances and the market need. (As of this writing, OpenAI has released 5 principle generations of its AI tool since the initial prototype, ChatGPT-1, in 2018. General availability was made in 2022.) A large industrial acquirer or licensor will want to know that the innovation being acquired can evolve in pace with its own in-house offerings. That accomplished VP of Sales you want to hire needs to know that a series of amazing offerings to sell in the years to come are in the pipeline.

Developing a product roadmap is key to understanding the evolution of your product design and needs to be shared with key stakeholders. Apple's sales of the original iPhone are estimated at 6 million, which was an impressive debut but small in comparison to the success of future releases. (Total iPhone shipments have exceeded 3 billion units since the 2007 launch.) Just a few new features of each successive iPhone over its first 4 years include:

iPhone	2007	camera, finger resizing, touch screen
iPhone 3G	2008	video, GPS, Appstore
iPhone 3GS	2009	compass, accelerometer, voice control
iPhone 4	2010	2 cameras, gyroscope, Siri

Product Development and Prototyping Breakout

1. To derisk your product design and development plans, establish the current status of your innovation and list the defining characteristics of each successive version according to the following table guide. (Your stakeholder targets might be different.)

Version	Defining Features & Specs	*Stakeholders
TRL	<i>What is your current level and what enhancements get you to next level?</i>	
POC		<i>Internal team, pre-seed investors</i>
Alpha Prototype		<i>Industrial partners, early evangelists, seed investors</i>
MVP		<i>Pending first customers, Series A investors</i>
Release v1.0		<i>General market</i>
Release v2.0		<i>General market</i>

- For each pre-release version in the table above, is it fulfilling the needs of work-like prototype, look-like prototype, or both?
- What resources and assistance will you need to get each pre-release version of your innovation built?
 - University lab, prototyping house, incubator facilities, or other?
 - Would a digital rendering be sufficient to convey the innovation?
- With whom can you test each pre-release prototype to assess its feature set and product-market fit?

Additional reading:

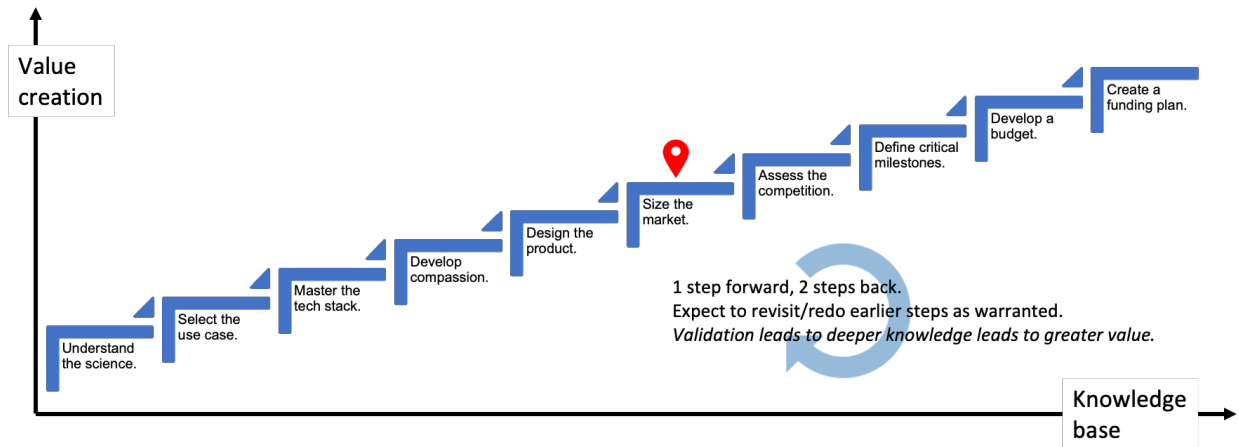
For more on prototyping refer to the excellent work by Alberto Savoia at his home page [here](#).

For a primer on the TRL system of technology maturity click [here](#).

The Market

How big is the opportunity?

Chapter 6: The Market Opportunity



To start this chapter you should have:

- A solid understanding of the core science underlying the innovation to be commercialized.
- Identified the most compelling use case for its application.
- Characterized its product species and determined its optimum placement in the industry tech stack, with select, targeted interviews.
- Created a customer compassion strategy centered on a profile of (1) your targeted user, (2) their needs, pains, and desired gains, and (3) how your innovation can address them.
- Placed your product's development stage on the TRL scale, and defined its form and features evolution from PoC through MVP and first commercial launch.

... and be confident defending with key stakeholders.

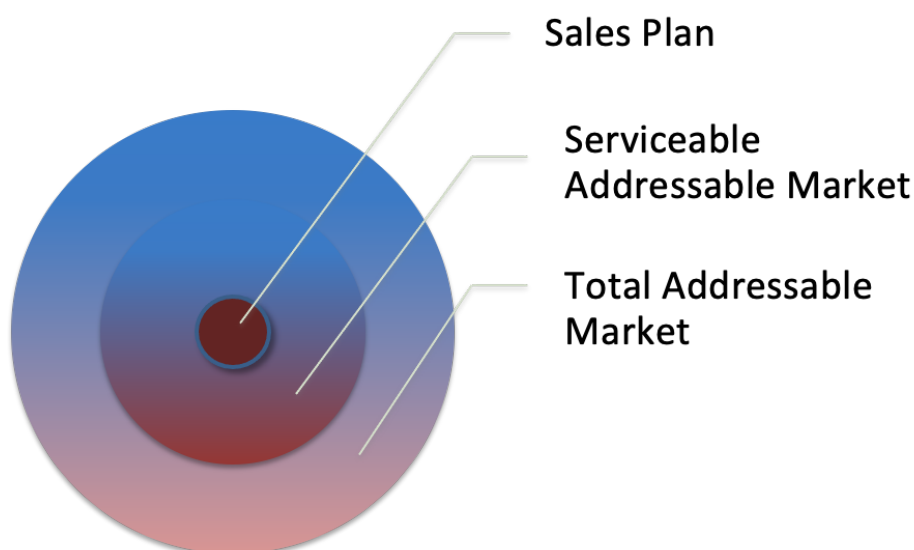
Sizing your market opportunity – realistically and on rigorous analysis – is critical to most every element of the commercialisation model. In business school speak we have TAMs, SAMs, SOMs, PMs, and other acronyms to define market size parameters. It's good to have a common lexicon to which everyone agrees. The challenge is in finding agreement on just what EXACTLY is the definition of this or that xOM.

To simplify definitions consider these 3 market estimates. You should be able to define these, at a minimum, and share them clearly with others:

1. The total market opportunity pursuable with unlimited resources in capital and time. We'll call this your *Total Available Market (TAM)*.
2. That part of the TAM that is pursuable with the current products, resources, and business model. We'll call this your *Serviceable Addressable Market (SAM)*.
3. Your sales forecast. This is the part of the SAM that you expect to capture as revenue. We'll call this your *Sales Plan*.

Your market estimates will also need time vectors: this is our TAM now, or SAM 3 years from launch, or Sales Plan in Year 5 (which we forecast to be 202x). Large market estimates (of the size you use to impress investors) depend on a variety of factors, including the maturing of your market. The TAM of an emerging innovation at the beginning stages of its adoption cycle will be tiny compared to a few years out when adoption starts to peak. So let me repeat (boldly): **EVERY MARKET SIZE ESTIMATE NEEDS TO BE DEFINED WITH TIME.**

Every major stakeholder in your commercialisation effort will want estimates of the market sizes. Some will ask you to provide them, some will create the estimates themselves. In the latter case you'll want to sanity check these against your own assessments.



TAM

The TAM is your blue sky, unconstrained but credible, long-term market opportunity. It is often presented by aspiring entrepreneurs as their “market opportunity” because it is the most impressive. It can also be the most deceiving. Your major stakeholders will indeed want to know the total market opportunity you can pursue with unlimited human and financial capital, and over a long period of time. But they won’t assume you can pursue that entire opportunity now. (And that’s why you also need estimates of your SAM and Plan).

Let’s consider investor interest in your TAM. Venture capitalists are most attracted to startups with the potential to grow into billion-dollar opportunities valuation-wise. This requires major scaling over the long term. Given the large amounts of capital required to bring most deep tech innovations to market no single investor will be providing all the funding to support that growth strategy, but she will (she hopes) still be a shareholder when an exit occurs and your potential is

rewarded. If you want to get investors excited about funding your dream you need a large, credible TAM that you can scale sales into with all the resources their capital, and that from others, will enable.

Credible is the key word in the earlier paragraph. As mentioned, the TAM should represent the entire market available to your innovation void of resource constraints. It cannot, however, include markets closed to your innovation, even in a world of unrestrained assets. Russia and Iran are 2 countries on most western nations' list of trade sanctions as of this writing (December 2025), and technology sales or partnerships with Chinese military implications are forbidden for US or EU startups, and vice-versa. These are just 3 examples of likely limitations to your TAM.

SAM

As with your TAM, any pending stakeholder in your commercialisation effort will want to know the size of the markets you can pursue in the near term with the Gen 1 product under development: your SAM. A VP of Sales will be compensated largely on sales targets and her ability to beat them. What market opportunity serviceable now is reasonable for her to pursue? An industrial partner will want to understand the size of the markets your innovation can help them open up now.

Continuing with the investor example, a venture capitalist will want to know what her funds in the current investment round might achieve. How far forward it will advance the commercialisation process. Perhaps it will get the prototype finished or the Gen 1 product to market; perhaps not. But the size of the market this innovation will encounter now (or when released) is a critical part of her due diligence and the *do-I-invest-or-not* decision process. How big is the opportunity that you can pursue with the capital in hand or plan to raise in the near term? This is your SAM.

Sales Plan

The Sales Plan is the top line of your cash flow statement (discussed more deeply in Chapter 9). It includes the revenues you forecast from product sales, licensing fees and royalties, engineering support fees, and all other sources of sales and services related income. It will be that slice of the SAM that you plan to capture, quarter by quarter, for at least the next 3 years.

Your investors will expect a defensible estimate of sales, even if you don't yet have a clear sense of your larger budget. It reflects the maturation of your product commercialisation effort, when you expect to generate first revenues, and how quickly they might grow. You may not expect product sales for the next 3 years (although certain fees could start sooner). Identify when you believe that revenues will start and project 3 years out from then.

A note on modeling sales

Deep tech product and customer development requires more time than digital innovations, particularly for emerging, disruptive technologies. Will the product work in the field? Will all the products work to spec when produced in quantity? Will it still be working to spec 3 years, 5 years, and 10 years from now? How seamlessly will it work with entrenched platforms? Will the company manufacturing it - perhaps your startup - still be in operation in 10 years to service it? These are just a few questions adopters of new technologies ask themselves before placing commercial-scale orders. Be aware of these and other customer hesitations and put a plan in place to reduce their impact on sales growth before forecasting a rapid scale up in orders.

The TAM, SAM, and Sales Plan weave together to reflect a credible effort at understanding the opportunity to create commercial value from your innovation, both in the long term and more immediately. The Sales Plan will be a percentage of your SAM, which will be a percentage of your TAM. And these percentages will shift over time as product penetration into your markets is expected to grow. If you cannot credibly forecast sufficient growth into your markets to excite investors or industrial partners, then it is a good moment to question the viability of your deep tech commercialisation effort.

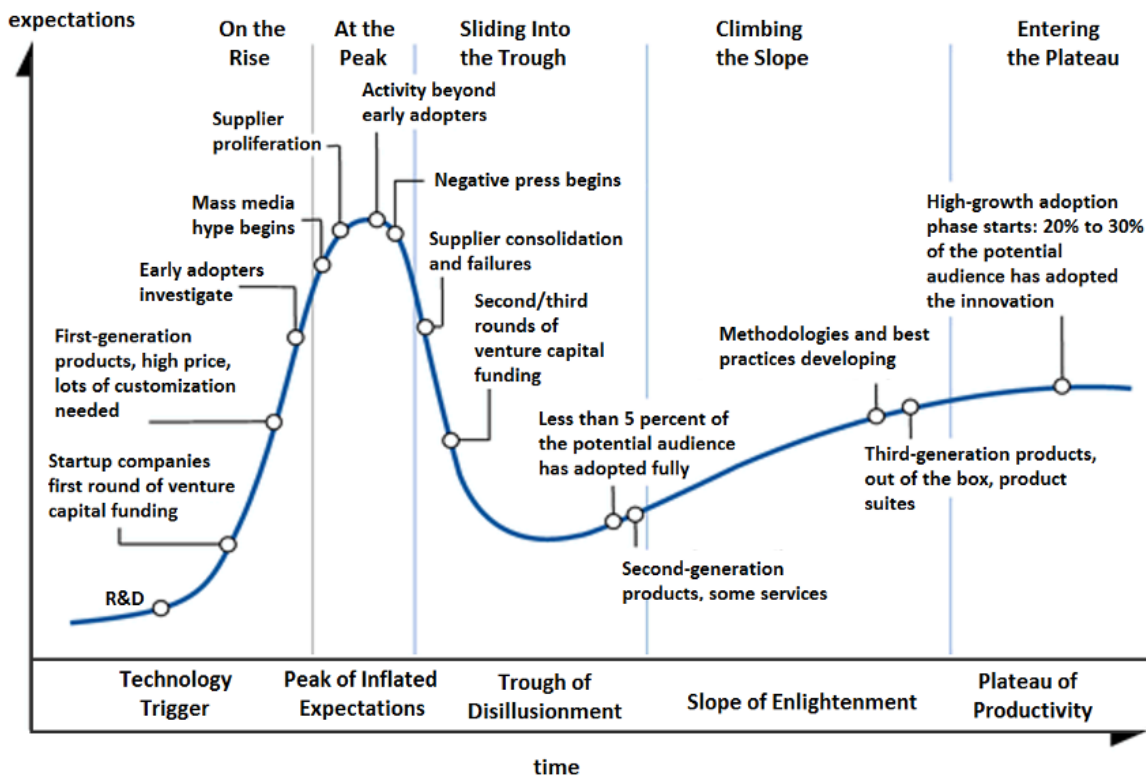
Adoption Timing

Getting a deep tech innovation from *light-bulb moment* to first customer orders can take years, decades even. You may push up against fundamental limits. You may struggle to buy commercial equipment for testing and measurement. You may need to progress through multiple time- and cost-consuming phases of regulatory certification. It will likely take longer than projected to get it working as a commercial product, meeting performance promises repeatedly and reliably. And perhaps most frustratingly, your global target customer base – who collectively comprise your TAM – may lose confidence in the grand technology promise just when you have overcome productization hurdles, as mentioned earlier. (The dream of all-optical networking, which hyped a massive market bubble in the late 1990s, is just 1 example.)

The Hype Cycle, originated by the Gartner Group, is a convenient tool for considering the dynamics of deep tech adoption when sizing your markets. With the curve, Gartner suggests that most new technologies pass through a cycle of expectations and adoption marked by a peak of early exuberance, then a trough of mid-term caution and disappointment, and finally (if the technology is still relevant) a long-term plateau of market embrace. The shape and duration of any single technology curve has much to do with working out the bugs and convincing users that the technology is sound and reliable.

There are endless articles online about the Hype Cycle and how to use it. Indeed, Gartner produces dozens of technology-specific curves annually. This diagram by Olga Tarkovskiy provides a clear definition of major points along the curve. Where does your science innovation reside and what does that mean for your market sizing projections?

Gartner Hype Cycle



Gartner Hype Cycle, Adapted by Olga Tarkovskiy

Sources of market intelligence

Where do you get market forecasts? This is one of the biggest challenges encountered by entrepreneurs when building credible deep tech commercialisation strategies. Finding intelligence on established technology markets - semiconductor wafers, fiber optics cable, industrial robots, military drones - is relatively straightforward. Estimates of emerging technologies - thin film solid state batteries or quantum cryptography-secured optical networking systems, as examples - are much harder to find. Indeed they may not yet exist.

Market intelligence comes in 2 forms: primary research (do it yourself, or DIY) and secondary research (someone else does it).

Primary market research:

The only option available to sizing your targeted market may be through calls, visits, and estimates done by you. For newly-emergent innovations secondary market research reports may not yet have been produced.

The upside to the DIY approach is the control you have over the parameters of the forecasts and your feel for their level of accuracy. Because you're conducting the research you can drill down into any level of product category granularity - your exact position on your industry's tech stack - and ask targeted questions that will best unearth the data you seek.

The downside is time, money, and forecasting expertise. Off-the-shelf studies (Option 2) offer immediate estimates that were arrived at by a team of experienced analysts (hopefully), but they are expensive. If you retain a professional market analyst to conduct bespoke research you may pay even more, but the research will be targeted and professionally conducted. It will, however, take time (think months).

Fortunately we now have AI, and it can aid the task of conjuring reasonable estimates based on grounded assumptions and recognized unknowns. Forecasts derived through AI and general internet searching may indeed be much less perfect than a bespoke research study, but also less expensive (free) and immediate.

Secondary market research:

Secondary market research is available in 2 forms:

1. Estimates produced for purchase by market research firms and private analysts.
Gartner, Forrester, and IDC are 3 of the larger firms creating general and customized research for high-tech markets. Dozens more exist. Private analysts skilled in the art of data collection and market forecasting are available as well to produce analysis - sizing, growth, and market shares - in various deep tech domains. Many analysts learned the craft while working for larger market research organizations.

Market studies from this source will be priced in the thousands or tens-of-thousands of dollars typically, although one could expect that AI-generated analysis will put downward pressure on prices. Free data can sometimes be found in the overview of findings, which are often available online to promote the research. An AI or Google search might reveal enough data to enable a start on estimates by you with "reasonable" confidence.

2. Estimates produced ancillary to other services from sources such as investment banks, management consulting firms, and online newsletters/podcasts can provide some of the best estimates for no charge. These groups create a lot of content for their clients for free. Getting access to it can sometimes be a challenge, but "horse-trading" is worth a try.

All of these architects of market analysis and forecasts mentioned above - market researchers, equity market analysts, management consultants, producers of online content, and others - are looking for unique knowledge and insights on emerging markets that their competitors don't possess. Information on a core science ("explain to me one more time how a qubit stores data?"), which universities or large industrial corporations are doing the most compelling research in this space, the challenges

innovators are struggling with moving the innovation from lab to prototype to market; this is high value-add intelligence when they are writing compelling research. If you've got, see if you can trade it. They'll be happy you got in touch.

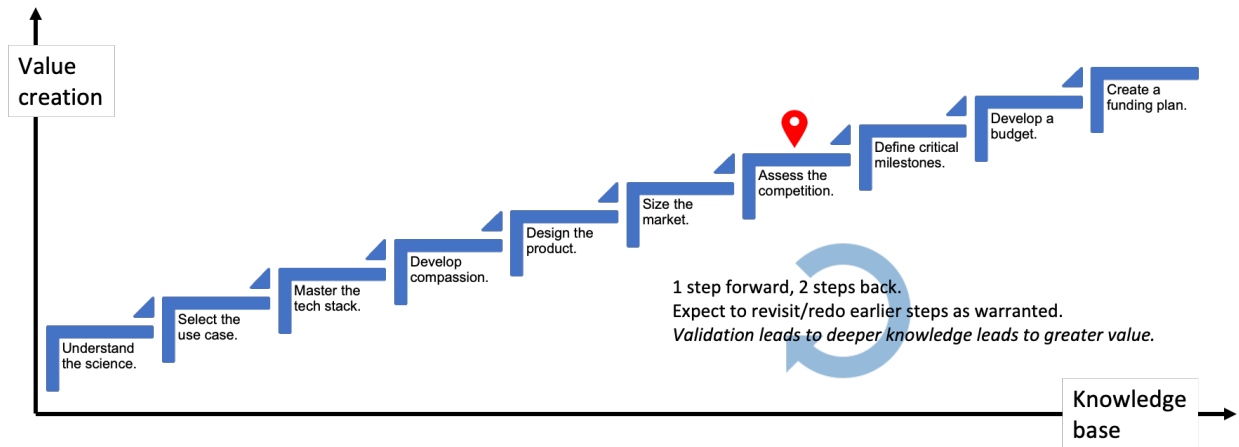
The Market Opportunity Breakout

1. To derisk your market knowledge, using primary or secondary research, generate the following market opportunity estimates:
 - Your TAM for the next 3 years (or when product v1.0 is launched for general availability.) Include your sources and assumptions.
 - Your SAM for the next 3 years. Include your sources and assumptions.
 - Your Sales Plan for the next 3 years. Include your sources and assumptions.
2. Determine where your innovation currently resides along the Gartner Hype Cycle and ensure that adoption dynamics are consistent with your market sizing estimates.

Additional reading:

The Gartner Hype Cycle. Go to the [Garner Group website](#), then type in hype cycle in search. There are also endless articles online explaining how to interpret and use the Hype Cycle tool.

Chapter 7: Competitive Positioning



To start this chapter you should have:

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- Identified the most compelling use case for its application.
- Characterized its product species and determined its optimum placement in the industry tech stack, with select, targeted interviews.
- Created a customer compassion strategy centered on a profile of (1) your targeted user, (2) their needs, pains, and desired gains, and (3) how your innovation can address them.
- Placed your product's development stage on the TRL scale, and defined its form and features evolution from PoC through MVP and first commercial launch.
- Estimates of the TAM, SAM, and your annual Sales Plan for the next 3 years.

... and be confident defending with key stakeholders.

A sober assessment of the competitive nature of your targeted industry is essential to optimizing a commercialisation strategy. With whom will you compete in the existing market, how deeply rooted are their positions, where are their vulnerabilities, are they 100% foe or potential allies, and is it possible to create an entirely new market void of established competition?

The competitive assessment must align with the market assessments from the previous chapter, particularly the SAM and the Sales Plan. A rapidly accelerating sales forecast into a mature market dominated by well entrenched players will understandably draw skepticism. Revisiting one's market size estimates after completing the competitive assessment is highly recommended. Size your markets, adjust for engineering hiccups and adoption timing, fold in your understanding of the competitive dynamics, then cast your forecasts. Constantly revise.

Positioning

Every innovation with commercial value has competitive alternatives (unless you are originating an entirely new industry; read more on *Blue Oceans* below). Traditional solutions to existing customer needs are one alternative, particularly in mature markets. New, disruptive solutions climbing the TRL ladder may represent other market options (in time). Graphically characterizing your innovation's position vis-à-vis the alternatives helps major stakeholders gauge their interest in supporting the commercialisation effort.

- A venture capitalist needs to know if money invested has an acceptable chance of (eventually) carving out a compelling market position.
- A director of sales or business development you are recruiting needs to know against whom she will be competing and how. (Her commission-based salary will depend upon it.)
- An industrial partner will need to understand how your innovation compares with established technologies and other emerging alternatives.

As discussed in the previous chapter, market research is available for most technology markets. Companies like Gartner and IDC offer off-the-shelf studies and analysis of a large host of industries, detailing emerging trends, market growth, and competitive assessments. Specialty firms and independent consultants focus on specific technology spaces. High-level analyses may be available for free, but in-depth research is usually fee-based and it can be expensive. (As mentioned earlier, if you cannot afford a report that you need then try “horse trading”. Research analysts may value your scientific depth and unique knowledge about technology trends. You want their data and forecasts. Propose a trade.)

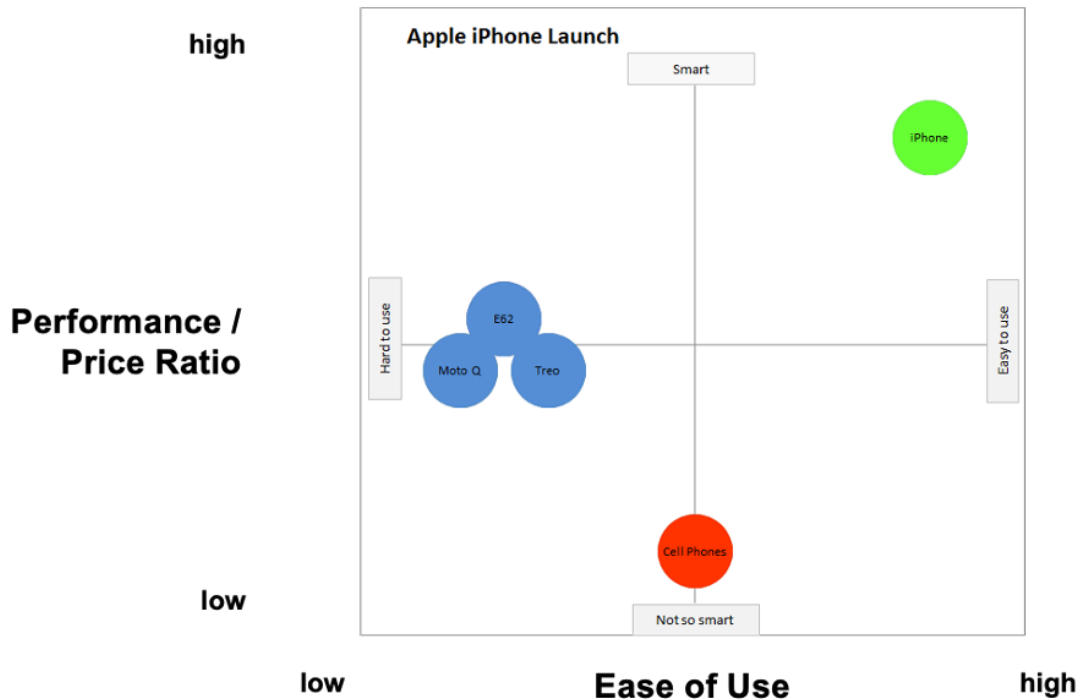
As a startup you may not have the budget for fee-based research reports depicting market positions by annual sales. You can still represent your positioning, specifically on how you compare along the most important metrics, graphically. The appropriate graphical style depends on the solution you're developing. You clearly want to paint the most compelling position possible, while remaining factual and accurate. Stakeholders will see through bullshit. (If it's not possible to represent your innovation's competitive strengths in a compelling fashion, does it merit commercialising?)

If uncertain how to position your innovation's strength, consider these two common options: the XY positioning chart and the bubble table (that is used commonly by *Consumer Reports* magazine when comparing products).

XY Charts

An XY chart plots key differentiators along 2 axes. Deep tech comparative metrics often revolve around performance advantages (speed, size, capacity, manufacturability, etc.). *Performance per Price* and *Ease of Use* were the 2 metrics selected by Apple when comparing its iPhone at launch to existing smartphones on the market, per the slide below. Jobs famously pointed to an XY plot that placed his company's innovation in the upper right corner, leaving all competitive

alternatives below and to the left. It was simply a matter of emotional optics. The lesson being, whichever metrics you decide on, when using an XY chart YOUR SOLUTION NEEDS TO BE UP AND TO THE RIGHT.



Bubble Tables

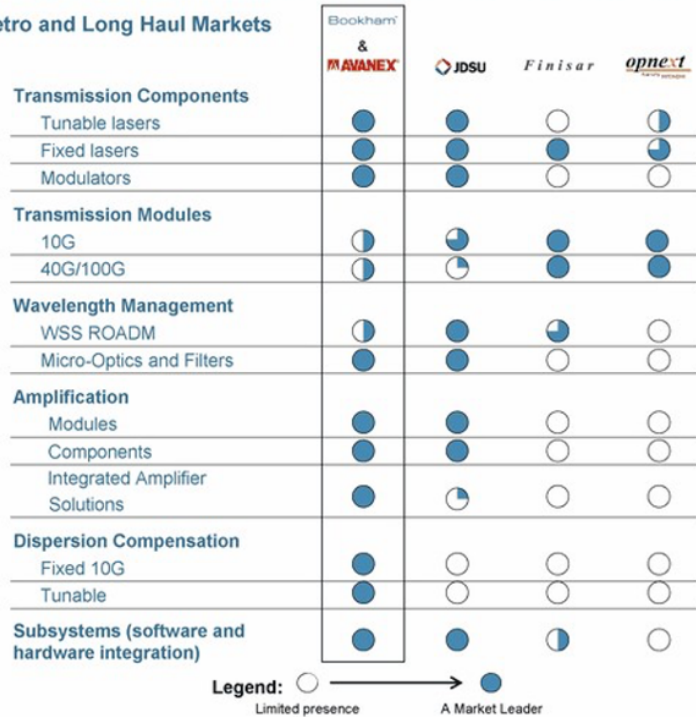
The bubble table provides more granularity than an XY chart on relative advantages. Each bubble in the table will be filled by a quarter, a half, three-quarters, or fully depending on how it meets the feature or availability, again, per the *Consumer Reports* standard. Consider it when your innovation excels along a longer list of important features or your company has a broader set of offerings than the competition, as per the bubble table below, circa year 2000.

(Bookham/Avanex was a supplier of optical components for the communications industry during that period.)

Creates A Competitive Platform In A Consolidating Industry



Telecom Metro and Long Haul Markets



Page 7

Blue Oceans in Deep Tech markets

In MBA speak there are red oceans and blue oceans. The measure of competition in any given market can be considered across this color spectrum. Red oceans need not be mature, but their competitive dynamics are relatively fixed. Entrants are known and differentiate through conventional qualities. The 1980s PC market is a good example. The home computer revolution was still in early days, but its rules of engagement were relatively conventional. Entrants like IBM, Commodore, and Apple competed on features, price, and brand power; the standard list. Truly disruptive innovation in red oceans occurs at the fringes and year-over-year changes in total market shares tend to be marginal.



Competing with an established set of features and specs



Disrupting with a new approach to meeting needs

Blue oceans reflect markets either just emerging or experiencing notable disruption. Market share is unsettled (or perhaps unknown) and the differentiators of market strength are

reimagined. In Chapter 1 readers were asked to place their science innovations along a spectrum of innovation degree: from marginal improvement (deep red) to complete disruption (deep blue). Blue ocean strategies are well suited to highly disruptive innovations that can rewrite the value proposition of an industry significantly. (Think AI today.) Deep tech sectors offer prime blue ocean possibilities.

RED OCEAN STRATEGY	BLUE OCEAN STRATEGY
Compete in an existing market space.	Create an uncontested market space.
Beat the competition.	Make the competition irrelevant .
Exploit existing demand.	Create and capture new demand.
Make a trade-off between value and cost.	Break the trade-off between value and cost.
<i>Forces a startup's activities around a choice of differentiation or low-cost.</i>	<i>Liberates a startup's activities to pursue both differentiation and low cost.</i>

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The introduction of the iPod in 2001, followed by the iPhone (2007) and iPad (2010) created a deep blue ocean for Apple, who had been struggling in the conventional PC market. Apple introduced a compelling new quality to the list of differentiating factors: seamless interoperability. It understood the value in connecting disparate devices with which customers browsed, worked, listened to music, and read books. Layer on top of this hardware the content platforms offering work and design tools, music, and books, and the rules of customer engagement were flipped on its head.

Blue Ocean positioning

The Blue Ocean concept was conceived by INSEAD professors Chan Kim & Renée Mauborgne. They submit that Blue Ocean alignment occurs when value exceeds price to the customer, and price exceeds cost to the supplier. Your innovation may indeed not be suitable for a Blue Ocean strategy, but the possibility merits an evaluation. To conduct a Blue Ocean analysis, run tests in this order and leverage these tools by the Blue Ocean Institute (instructions on these tests can be found [here](#)):

1. Strategy Canvas 1: Start by breaking down your existing industry situation. Through which key factors do established participants compete?
2. 4 Actions Framework (ERRC Grid): Eliminate or reduce factors that the industry competes on now. Raise or create factors the industry has never offered and your deep tech solution can exploit, due to its disruptive attributes.
3. Strategy Canvas 2: Overlay your strategy.
4. 6 Paths Framework. Consider alternative markets, partners, buyers, and other elements outside the conventional boundaries or tech stack of your industry.

5. Tiers of Noncustomers: Rather than focusing exclusively on growing your traditional customer list, investigate non-customer opportunities to expand the universe in which you compete.
6. Buyer Utility Map. Where can you create value for your buyers, from purchase to disposal?
7. Strategy Canvas 3: After running steps 4-6, revisit the Strategy Canvas and update.

For deep tech innovations there is a natural tendency to focus on the disruptive nature of the product. But disruption is simply the means to an end: value creation is all that matters in commercial markets. Accept this and let it guide all of your decisions around product design and competitive positioning. An innovation's performance differentiators will create the biggest marketing splash at product introduction. But it is commercial value creation that will establish a stronger competitive position and create the greatest value for your firm over the long term.

Competition Breakout

1. To derisk assumptions about your competitive positioning:

- Refer back to Chapter 4 on Customer Compassion and describe the job or undertaking your customers are doing that involves your innovation. Describe your innovation's unique value in resolving their challenges and boosting their gains.
- List all competitive efforts that pursue your target customers with similar technology solutions. (These can be companies, research labs, university programs, or other.)
- List alternative solutions based on dissimilar technologies that can also solve your customers' needs, and the companies, labs, programs, etc. that sell or develop them.
- Building on these lists, design a graphical representation that compares your innovation's effectiveness in delivering value against your competitors or the general market. Optimize the graph's design to magnify your innovation's key differentiators.
- Is there a Blue Ocean strategy for your innovation? To answer, run an experiment with the 7 steps highlighted in the previous page (instructions on these experiments can be found at the [Blue Ocean Strategy](#) website). Ensure that you clearly define:
 - Your value using the *4 Actions Framework*.
 - Your customers using the *3 Tiers of Noncustomers* approach.
 - Your offering as compared to the established industry using a *Blue Ocean Strategy Canvas*.
- Then, decide on the merits of a Blue Ocean strategy, or adapting some elements of one.

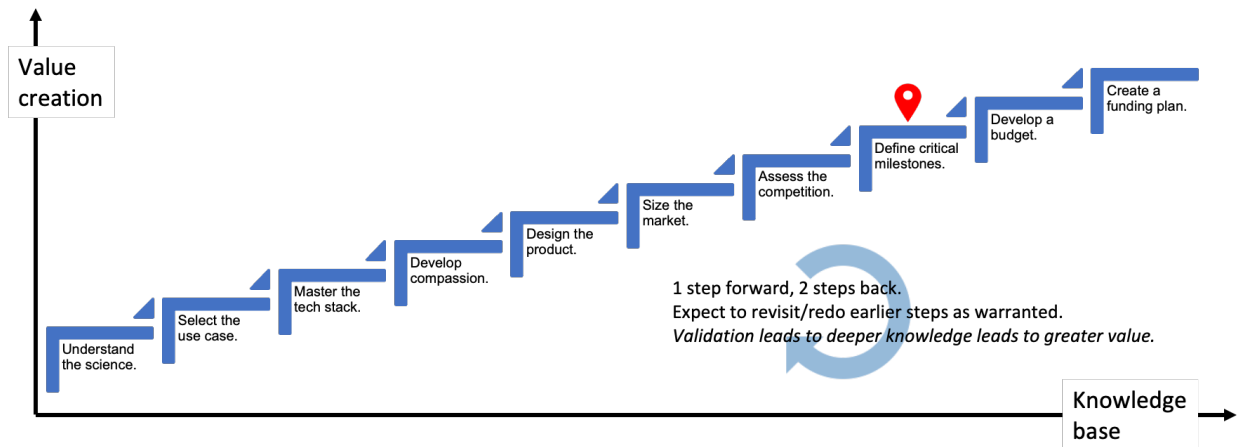
Additional reading:

The [Blue Ocean Strategy website](#).

Execution

What's the implementation plan?

Chapter 8: Milestones



To start this chapter you should have:

- A solid understanding of the core science underlying the innovation to be commercialized.
- Identified the most compelling use case for its application.
- Characterized its product species and determined its optimum placement in the industry tech stack, with select, targeted interviews.
- Created a customer compassion strategy centered on a profile of (1) your targeted user, (2) their needs, pains, and desired gains, and (3) how your innovation can address them.
- Placed your product's development stage on the TRL scale, and defined its form and features evolution from PoC through MVP and first commercial launch.
- Estimates of the TAM, SAM, and your annual Sales Plan for the next 3 years.
- Assessed your disruptive position along the ocean color spectrum of red to blue, and illustrated your advantages vis-à-vis the competitors in clear, compelling graphics.

... and be confident defending with key stakeholders.

The process of moving an innovation from discovery to a commercially available product does not follow a linear, orderly path. As you push across that grand fecund pond nurturing and challenging the idea-to-prototype-to-product migration there will be a series of starts and stops, stumbles and advances, and a disorderly saw-tooth pattern of (hopefully) forward momentum.

You are not a frog breast-stroking methodically across a calm surface. Rather, you are making leaps from lily pad to pad, some which gave away. You'll be working to move development forward one achievement at a time, then preparing your next leap.

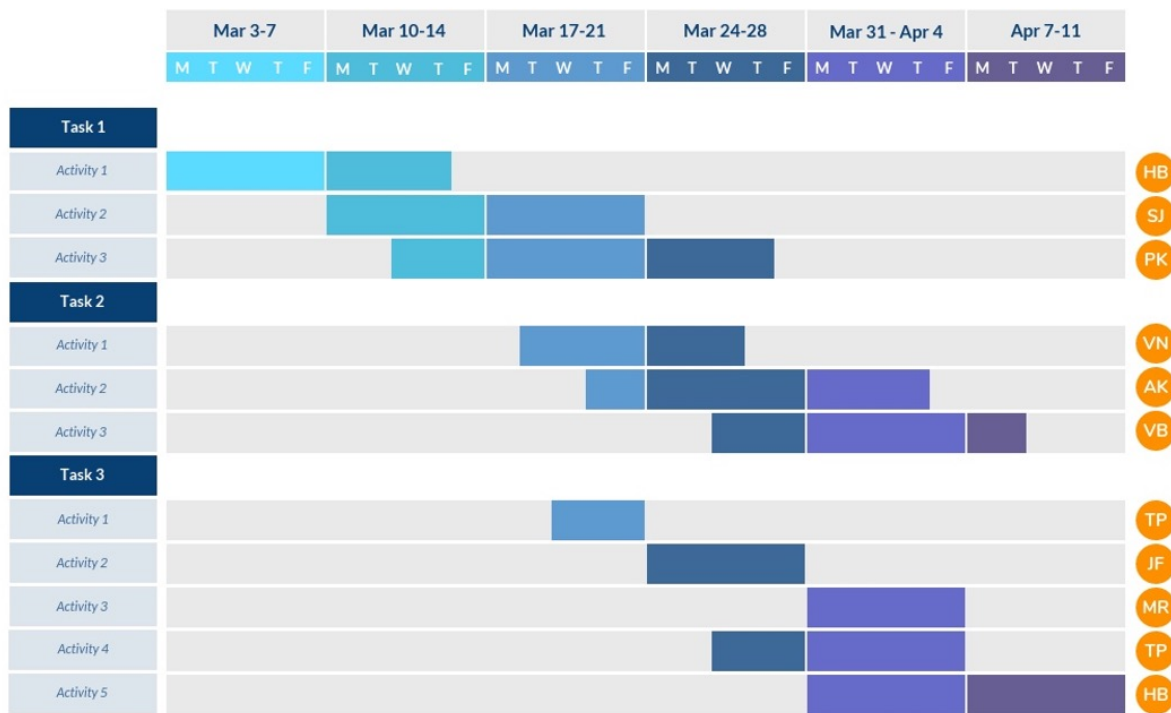
Milestones measure the pace and progress of the commercialisation effort. They are your lily pads, and plotting them is essential for:

- Understanding the key achievements that will mark forward progress.

- Projecting the time and resources required to meet these achievements.
- Communicating the timeline and key markers of this plan to stakeholders like investors, partners, and the team.
- Helping investors estimate the capital required to get the product released and the company to a cash-flow positive state.

Deep tech commercialisation milestones will fall into 5 categories: IP acquisition and expansion; product development; customer pursuit; key hires; and funding. A multitude of subcategories will fall from each of these buckets, depending on the specific innovation and its road of milestones to market. Using a Gantt Chart or similar tool is encouraged to visualize and synchronize the many milestones and their related action items.

Gantt Chart



IP acquisition and expansion

The long road to commercialisation starts with having or securing control over some or all of the core innovation. This may be through legal patents or guarded trade secrets. It may come with boundaries around the applications, geographies, or other market-specific delineations of your exclusivity, to be negotiated with a tech transfer office or inventor. The internet is full of resources on these topics, and time spent with an IP attorney up front can be invaluable. Before embarking on the long and expensive journey of commercializing a deep tech innovation,

ensure that you have the IP secured, and a forward-looking roadmap for ongoing IP development.

Product design and development

Once the IP is secure, milestones will revolve around the design and production of the PoC, prototype(s), MVP(s), and commercial launch, as discussed in Chapter 5. The “(s)” are included as a reminder of the iterative nature of the product engineering process, with its many projections, adjustments, redesigns, and assembled versions. Large investments in facilities and capital equipment may be required to enable product development. What equipment will be needed, when, and how much will it cost?

Customer pursuit

We purposely use the term “customer pursuit” as opposed to “market development” here. Deep tech markets tend to concentrate around a few or a few tens of key players, not the thousands or millions (or billions) of customers common to B2C markets in the digital innovation realms. There are exceptions of course, but mostly likely you’ll have a short list of large organizations in your crosshairs. First customer contact, prototype testing, non-recurring engineering (NRE) agreements, first volume purchase orders (POs): these are just a few of the many customer milestones that can mark your progress in the market.

Team

Many deep tech companies start with a university professor and one or more of her graduate students spinning out their research. The team is tiny and fluid. Titles are assigned but mean little, as the focus is on the science and building a product around it. Everyone takes on every task. As the startup matures, responsibilities need to become clearer and more formalized. Key hires in business development, sales, HR, and finance become crucial in evolving the company from a small group of scientists to a more balanced and mature business. Finding and hiring key talent for these roles are important milestones, and the company needs a time map as to when each key slot should be filled.

Funding

All deep tech startups require external capital to get to a cash-flow breakeven point. The timing of grants, pre-Seed, Seed, Series A, and other rounds of equity and debt financing need to be plotted forward at least 3 years (you can make longer forecasts, but they will likely change substantially). Major cash in and out events should also be projected as milestones. These include sales and other revenue-generating highlights (first NRE, for example), and the purchase or lease of critical assets such as facilities or equipment. As in the previous examples, attaining these targets will reflect a company that can not only meet its financing forecasts but achieve the performance milestones enabling them.

The OKR system

A useful system for implementing and tracking milestones for startups has been offered by founder and legendary tech investor John Doerr, in his 2018 book *Measure What Matters*. Doerr proposes a system for setting clear and actionable Objectives and tracking specific and measurable Key Results: OKRs. Its adoption helps overwhelmed teams focus on what is most important to achieve and when, and hold individuals accountable for the stretch goals met and targets missed. If you are struggling to get a grip on a flurry of interdependent deliverables this book will help.

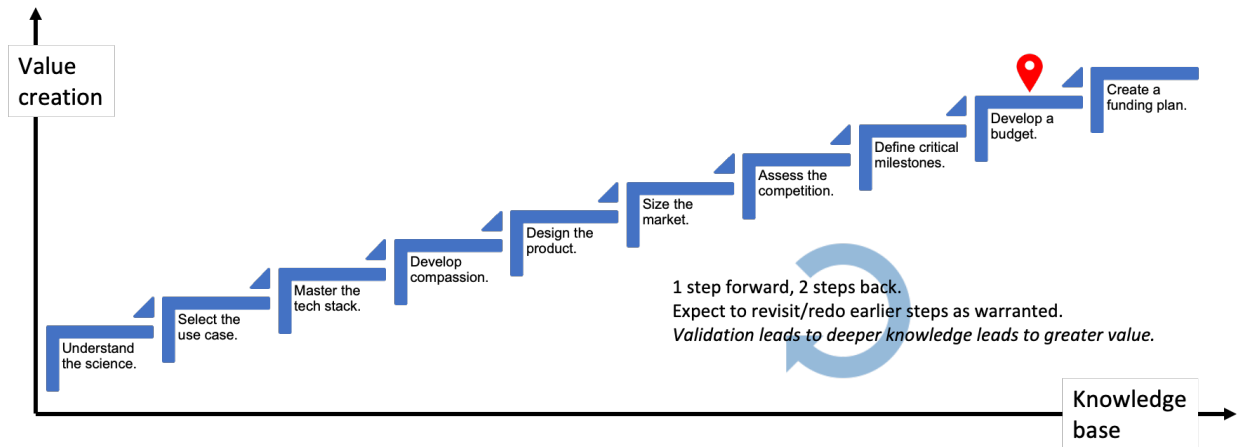
Milestones to Market Launch Breakout

1. To derisk your appreciation of the major markers that will reflect company progress, establish milestone charts for each of your 5 core areas: IP acquisition and expansion; product development; customer development; key hires; and funding. These can be Gantt charts or other time-dependent maps or graphs. If helpful, use project planning software to facilitate your milestone setting work. Numerous platforms can be found and compared online:
2. For each of your charts:
 - Create a list of all major targeted tasks in chronological order.
 - Identify the major milestones among these tasks that highlight forward progress and enable subsequent advances.
 - Identify dependencies among the milestones across your charts and ensure that the timing seems logical and possible.
 - Share the timeline with your entire team, to ensure that buy-in is unanimous.
 - Add supplemental documentation to the charts so milestones are well defined and the plan for their achievements are clear.

Additional reading:

For more information on John Doerr's *Measure What Matters* and the OKR system click [here](#).

Chapter 9: Budgets



To start this chapter you should have:

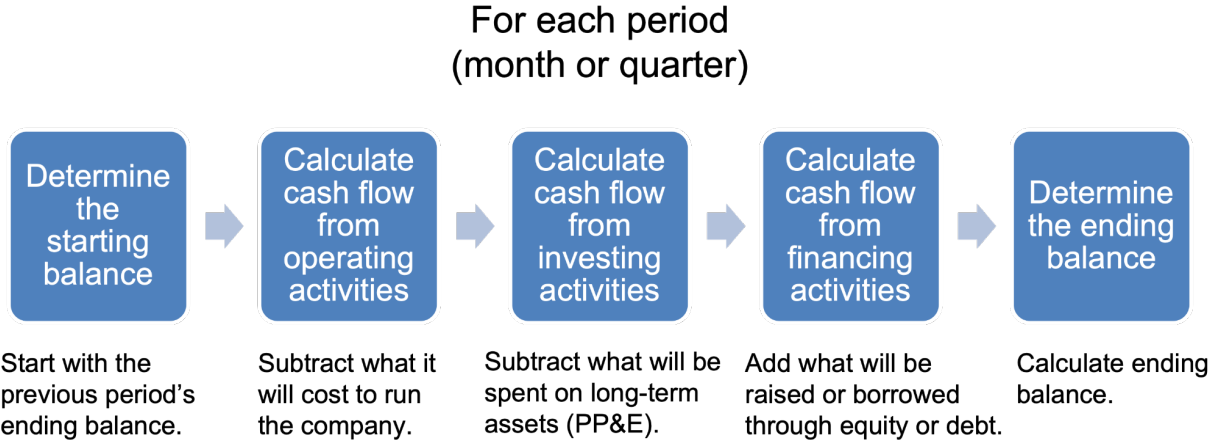
- A solid understanding of the core science underlying the innovation to be commercialized.
- Identified the most compelling use case for its application.
- Characterized its product species and determined its optimum placement in the industry tech stack, with select, targeted interviews.
- Created a customer compassion strategy centered on a profile of (1) your targeted user, (2) their needs, pains, and desired gains, and (3) how your innovation can address them.
- Placed your product's development stage on the TRL scale, and defined its form and features evolution from PoC through MVP and first commercial launch.
- Estimates of the TAM, SAM, and your annual Sales Plan for the next 3 years.
- Assessed your disruptive position along the ocean color spectrum of red to blue, and illustrated your advantages vis-à-vis the competitors in clear, compelling graphics.
- 5 synchronized timelines (IP, product, customer, team, and funding) of major milestones from launch until commercial market introduction.

... and be confident defending with key stakeholders.

Chapters 8, 9, and 10 - on milestones, budgets, and fundraising - work together conjointly. Pursuing milestones will burn cash that needs to be financed. So, casting a budget that supports the milestones that get your innovation from now until a cash flow break-even point (or at least next financing) is essential.

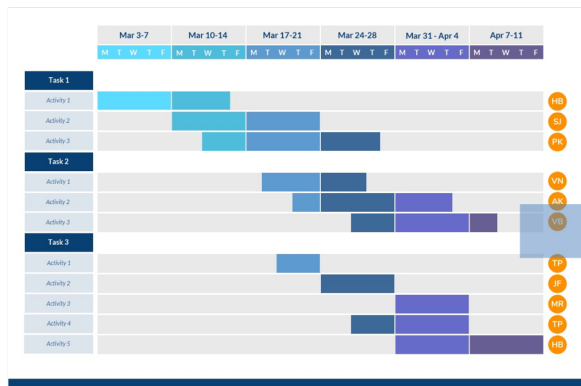
The most critical financial statement required at this early point of an innovation's commercialisation is the cash flow statement. It shows each period's beginning cash balance, the burn associated with operating expenses on the sheet, planned investments for that period in property, plant, and equipment, cash in from debt or an equity issuance (and toss in prize money expected from venture competitions), and the ending balance (which then becomes the

next period's beginning balance). Non-cash charges such as depreciation and amortization are important in the wider scope of financial accounting and when calculating profits. It's unlikely you'll be enjoying those for some time. Investors, key hires, industrial partners, and other stakeholders will be focused on cash burn and cash runway. The cash flow statement provides a record and forecast of these measures.



The milestones plan from Chapter 8 will be instrumental in guiding the development of a cash flow statement and vice versa. Are each of the actional objectives (referring to Doerr's *Measure What Matters*), many of which incur expenses or investment, reflected in the budget forecast? Is there sufficient cash available to pursue them in the Gantt chart period assigned? If not, either a cash infusion will be required sooner than anticipated or the actional objective postponed.

Ensure that your milestones plan and cash flow statement are in harmony. Prepare to spend a few iterations. As with strengthening product-market fit, this takes time and is a continuous process.



Simple Financial Model, Cash Flow									
Currency: EUR									
	Q1	Q2	Q3	Q4	Year 1	Year 2	Year 3	Year 4	Year 5
Average price per unit	100.00	100.00	100.00	100.00		100.00	95.00	90.00	85.00
Cost of goods sold per unit	60.00	60.00	60.00	60.00		55.00	50.00	45.00	40.00
Number of units sold	500	1,000	2,000	3,000		15,000	20,000	40,000	60,000
Revenue	50,000	100,000	200,000	300,000	650,000	1,500,000	1,800,000	3,600,000	5,100,000
COGS	30,000	60,000	120,000	180,000	390,000	825,000	1,000,000	1,800,000	2,400,000
Gross Margin	20,000	40,000	80,000	120,000	260,000	675,000	800,000	1,800,000	2,700,000
Customer payment terms	60	60	60	60		60	60	60	60
Supplier payment terms	45	45	45	45		45	45	45	45
Operating cash flow									
+ Cash from customers	16,667	66,667	133,333	233,333	450,000	1,053,425	1,234,247	3,320,548	4,853,425
- Cash to COGS suppliers	15,000	45,000	90,000	150,000	300,000	813,288	978,425	1,701,370	2,326,027
Operating cash out									
Personnel	50,000	60,000	80,000	100,000	290,000	400,000	450,000	500,000	610,000
Rent and leases	5,000	5,000	5,000	5,000	20,000	20,000	30,000	40,000	50,000
Non-personnel R&D	10,000	10,000	10,000	10,000	40,000	50,000	100,000	200,000	250,000
Marketing & PR	30,000	30,000	30,000	30,000	120,000	300,000	400,000	700,000	1,000,000
Legal	5,000	5,000	5,000	5,000	20,000	30,000	40,000	50,000	60,000
Travel	10,000	10,000	10,000	10,000	40,000	50,000	100,000	150,000	200,000
Other operating costs	7,000	7,000	7,000	7,000	28,000	40,000	80,000	90,000	100,000
Operating cash flow	-115,333	-105,333	-103,667	-83,667	-408,000	-349,863	-344,178	-110,822	217,397
Discretionary cash flow	100,000	50,000	75,000	50,000	275,000	100,000	200,000	200,000	200,000
Cash flow after CapEx	-215,333	-155,333	-178,667	-133,667	-683,000	-349,863	-344,178	-410,822	17,397
Non-discretionary cash flow									
+/- Financial interest charges	0	0	0	0	0	0	0	0	0
- Taxation	0	0	0	0	0	0	0	0	0
- Dividends	0	0	0	0	0	0	0	0	0
Cash flow before financing	-215,333	-155,333	-178,667	-133,667	-683,000	-349,863	-344,178	-410,822	17,397
Cumulative cash flow before financing	-215,333	-370,667	-549,333	-683,000		-1,032,863	-1,577,041	-1,987,863	-1,870,466
Financing									
Equity cash injection	250,000	600,000	0	0	600,000	600,000	0	0	0
+/- Change in st. debt	0	0	0	0	0	0	0	0	0
+/- Change in lt. debt	0	100,000	0	0	100,000	0	500,000	400,000	0
NET CASH FLOW	34,667	294,667	-178,667	-133,667	17,000	90,137	-84,178	-10,822	17,397
CASH POSITION	34,667	329,333	150,667	17,000	17,000	67,137	22,959	12,137	29,534
Total Equity Financing	250,000	600,000	600,000	600,000		1,000,000	1,000,000	1,000,000	1,000,000
Total +/- debt financing	0	0	0	0	0	0	0	0	0
Total +/- debt financing	0	100,000	100,000	100,000		100,000	600,000	1,000,000	1,000,000

New to financial statements? Not to worry, there are numerous tutorials and cash flow templates online; *Google Sheets* and *Microsoft Office* to name just 2. ChatGPT and other AI assistants can be helpful in getting you started with the proper entries.

Budgeting Breakout

- To derisk your sense of a practical budget that will carry your project to point of self-funding:
 - Create a cash flow statement by quarter that either:
 - brings the commercialisation effort of your innovation to cash flow break-even, or
 - details forecasted cash burn and balances by quarter for the next 36 months.
 - Refer to your milestones assignment from the previous chapter to ensure that all major milestones and the spending they represent are included in the budget.

Additional reading:

For an Investopedia primer on cash flow statements [click here](#).

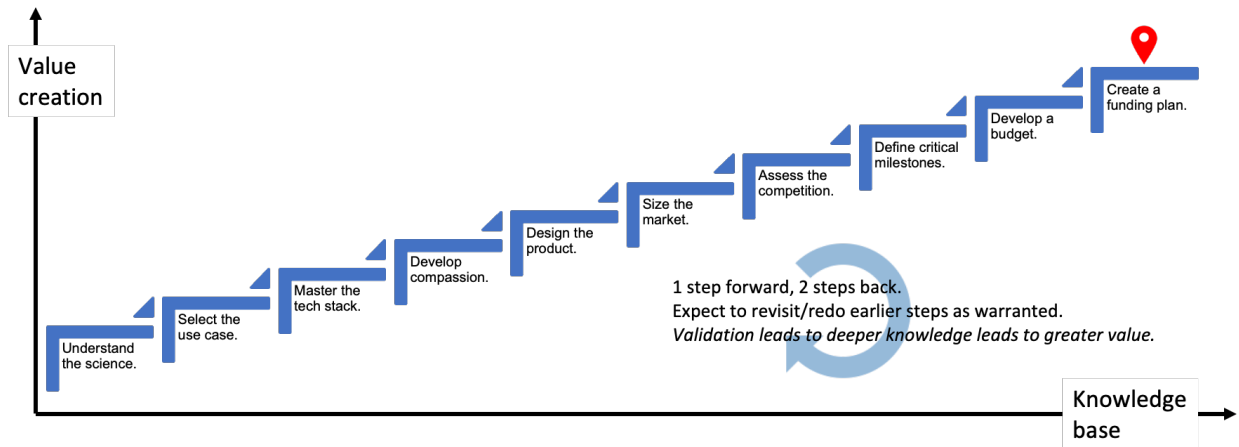
For an Investopedia primer on balance sheets [click here](#).

(We have not discussed balance sheets in this chapter, because they are less relevant to the

milestones – to cash flow – to fundraising sequence that is key to getting an innovation from lab bench to market launch. You will, however, be required to create one as you incorporate and raise capital.)

Forecasting payroll expenses? Numerous organizations provide current salary information online including Glassdoor ([click here](#)) and SalaryExpert ([click here](#)).

Chapter 10: Fundraising



To start this chapter you should have:

- A solid understanding of the core science underlying the innovation to be commercialized.
- Identified the most compelling use case for its application.
- Characterized its product species and determined its optimum placement in the industry tech stack, with select, targeted interviews.
- Created a customer compassion strategy centered on a profile of (1) your targeted user, (2) their needs, pains, and desired gains, and (3) how your innovation can address them.
- Placed your product's development stage on the TRL scale, and defined its form and features evolution from PoC through MVP and first commercial launch.
- Estimates of the TAM, SAM, and your annual Sales Plan for the next 3 years.
- Assessed your disruptive position along the ocean color spectrum of red to blue, and illustrated your advantages vis-à-vis the competitors in clear, compelling graphics.
- 5 synchronized timelines (IP, product, customer, team, and funding) of major milestones from launch until commercial market introduction.
- Forecasted a budget of all major expenses linked to your milestones, and associated cash flows.

... and be confident defending with key stakeholders.

If you have been working through this playbook and completing the breakout assignments, then you will have a solid start on the key knowledge and materials needed to launch an effective fund-raising campaign. Dispensers of cash of all stripes, from university competition judges to venture capital investors, seek out startups with the *perfect* investment profile. Perfect doesn't exist in the real world and they know this, but they'll want to tick off as many of profile elements as possible when evaluating your effort. The ideal profile looks like this:



To this point in our playbook you've been working on:

- Why you exist. (Chapter 2)
- The problem(s) you solve and how you resolve them. (Chapters 3 and 4)
- The product species, features, and evolution. (Chapters 4 and 5)
- The market opportunity. (Chapter 6)
- Your unfair competitive advantage and major competitors. (Chapter 7)
- The business model's core milestones and budget. (Chapters 8 and 9)

Projecting how you'll budget for and spend money to bring your innovation to market is relatively straightforward. Understanding where that money will come from is more complicated (and changes unpredictably with public market gyrations and political winds). Entire books are dedicated to this challenge and every fundraising situation is unique to the innovation and markets in question. Still, certain best practices are common across all situations and they will be covered here.

Note that this chapter focuses on engagement with equity investors, who provide cash for ownership. Plenty of governmental programs are providing grant capital to promising deep tech projects in the US (such as the SBIR and STTR programs), Europe (Horizon Europe and the ERC), and Asia (the JST Agency in Japan and NSFC in China). Generally speaking, free money is great money, until the paperwork outweighs the benefit. Specialty advisors can help navigate the paperwork and the best are worth the success-related fees.

Deep Tech differences

Deep tech investors seek out opportunities with as many of the ideal qualities shown above as possible, but they need more as well. Much of this *more* is driven by the hard science nature of deep tech development. It takes years of specialized training and focused research to bring many disruptive scientific inventions to commercial grade. It calls for an extremely deep and narrow expertise that few others can match (which grants you, at least initially, a beautiful unfair advantage). Regardless of any single investor's knowledge about your general sector, don't expect her or him to match your dive depth in your specific domain. They may need help understanding:

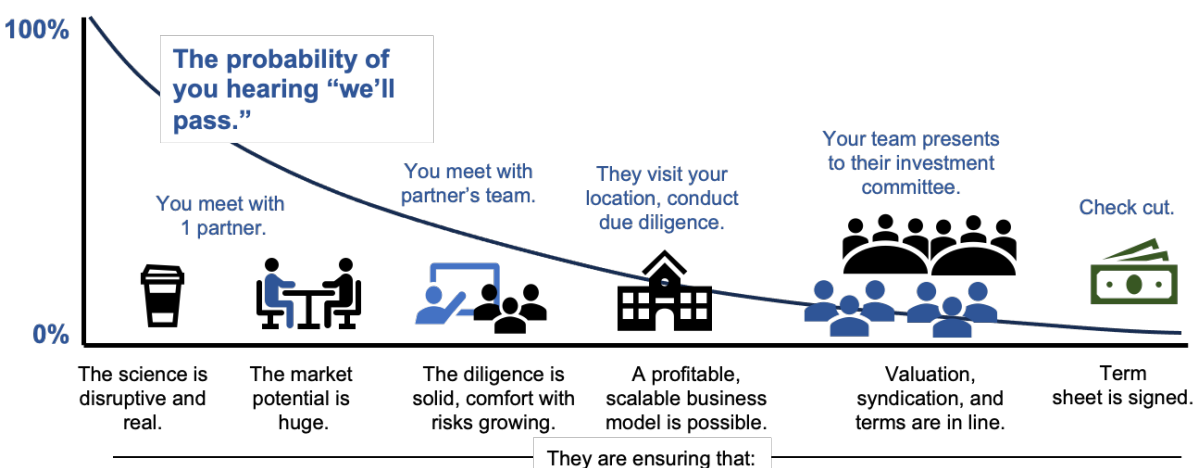
- Fundamental performance limits.
- The pacing of product performance improvement.
- Prototyping costs and timelines (particularly for specialized tools and equipment).
- Commercialisation costs and timelines.
- Required industry standards and certifications.
- Team needs and how these needs will evolve.
- Competitive threats (efforts by other universities and industry players).
- Industry supply chain dynamics and challenges.
- Political risks (sourcing/supplying from/to countries like China, Russia, or Iran, for example).
- Government or industry support programs (to get some of that free money mentioned above).

Get a data room started now (in a Google Drive, Dropbox, or other online shareable platform) that addresses these various elements. The collection of information will help potential investors get up to speed more quickly on your innovation and its commercial potential.

The investment dance

Firstly, there is no precise, repeatable sequence of investment dance steps to master; that tango you embark upon from the first encounter with a potential moneyed suitor. Every entrepreneur/investor set of interactions from first call or coffee to signed term sheet will be unique. Still, there is a general progression to the relationship built on markers of growing comfort by an investor with the innovation’s commercial prospects and interest in committing funds.

In personal relationships a couple has a first encounter, which may lead to dating, which may lead to a proposal and then marriage. The world of high-tech fundraising follows a similar trajectory. It looks like this:



First encounter (days):

1. You meet an investor in an elevator at a conference and deliver a well-created and expertly delivered pitch in the few seconds while she is captive. *A massive market is suffering severe pain that can be best resolved with our peerless invention.* She's intrigued and invites you for coffee to learn more.

The first go/no-go hurdle is the science itself. Is there something real here being developed, or simply “vaporware” and wishful thinking? Early-stage investors are comfortable with technology risks, but they'll want confidence that no fundamental limits to the science are being violated. Investing in a fantasy that other investors knew would never work is ruinous to one's reputation.

Dating (months):

2. Your initial interactions may be with your first point of contact; the woman in the elevator. If she works in a VC fund then others from her team will soon join the effort – an associate partner and analyst, perhaps – as a concerted diligence dive is undertaken. Market size and growth, competition now and expected, forecasted fixed and variable expenses and long-term capital needs, validation of the science and the sector in general by independent experts, and other diligence requirements. Expect to make regular visits to the fund's offices, perhaps via video, for updates on findings and new requests. It can be exhausting.

They will also want to visit you and see first-hand how the magic happens. This could be in a university lab facility or other space from which you are operating, possibly with a small fab and areas for assembly, testing, and prototype design.

3. A major component of the investment analysis will center on the business model. The elements explained in this playbook's previous chapters will be put under a microscope, analyzed, and validated (to the extent possible). Being one step ahead of investor requests will save time, accelerate the investment consideration, and impress upon your suitors that you are well prepared. They'll need comfort not only with your science, its repeatable manufacturability, and the performance advantages, but that it can be boxed, shipped, and serviced in growing volumes profitably. Their analysts may run numerous financial models to understand sensitivity points and areas for concern.

Proposal (weeks):

4. As the major diligence concerns whittle down (or are put into that *acceptable risk* category) a discussion around the terms of an investment will ratchet up. This will include the investment round size and its valuation, of course, but also the syndicate of other investors (a pre-seed or seed round may have a single investor), and the

many terms and conditions under which the exchange of cash for equity will be made.

Chapters can be committed to explaining term sheets and how they are negotiated. They include dozens of terms of which a handful are key to negotiation and the rest are mostly boilerplate legalese. Investors from the US, Asia, and Europe may each have different pain points to emphasize, and negotiation leverage will be heavily influenced by the investment climate of the moment. In bull public markets venture capital tends to be in abundance, putting you, the fundee, in a stronger negotiating position. In bear markets private capital dries up quickly, making it difficult to find investors and lowering your leverage. We include helpful resources on term sheets and their negotiation at the end of this chapter.

Note that term sheets are non-binding instruments for debate and adjustment. They are crafted by the lead investor as a starting point for discussion and not a final, definitive offer. Paying an attorney specialized in venture investing term sheets to help you review and propose changes to the document is highly recommended.

Marriage (years)

5. When an investment syndicate is finalized and the fundee and funders have negotiated term sheet harmony, binding legal documents are drawn up and the marriage is consecrated. Both parties will sign various legal documents formalizing voting rights, stock purchases, and the other terms of the term sheet. Then champagne all around.

Having a fresh round of money in the bank is a liberating, pressure-easing event that marks the next chapter in a startup's life. It also means more oversight through a newly constituted board of directors with whom you'll meet regularly. The investment dance from first meeting through final signing will have given both parties time to see how well they tango together. A good investment partner will be supportive and guiding, not hostile and overbearing. There are plenty of both archetypes in the investment world. Choose wisely.

Fundraising Breakout

1. To derisk your fundraising strategy:
 - Review your cash flow statement created in Chapter 9. Identify fundraising points along the timeline from now until the project is cash flow breakeven, based on:
 - Timing: fundraisings should be spaced 18-24 months apart.

- Milestones: your milestone achievements, as projected in Chapter 8, serve as triggers for subsequent financings. Investors will use major milestones to gauge your attraction and value now, and those of future rounds.
- Cash out. Plan to close any single funding round at least 1 quarter before burning out of cash, then work back at least 6-9 months to launch a serious fundraising effort.
- Create a slide deck for investors that includes:
 - Why you exist (your Mission Statement).
 - The problem you solve (your users' pains and gains).
 - Your unbeatable solution (the innovation under development).
 - The market opportunity (TAM, SAM, and Sales Plan).
 - The team as it exists now and key posts to fill.
 - A compelling business model that is scalable and ultimately profitable.
 - Your ask (how much do you want to raise, which major milestones will it support, and how long will that cash infusion last).
- Start a data room with all materials that will support your pitch deck and funding needs.

Additional reading, including links to sample legal documents such as term sheets:

Investopedia [terms sheets primer](#)

[The National Venture Capital Association](#)

[Invest Europe](#) (formerly the European Venture Capital Association)

About the author



Bill Magill started his relationship with deep technologies in the early 1980s, working on laser systems at Lawrence Livermore National Labs and the Star Wars space weapons program. This was followed by positions in technology market analysis, Wall Street securities analysis (he wrote the banking industry's first research paper on all-optical networking: "The Appeal of All-Optical Networking, or *How I Learned to Love the Photon*"), and venture capital, where he was a general partner in one of Silicon Valley's leading deep tech funds.

Today, Bill is an adjunct professor of entrepreneurship at INSEAD, where he has taught courses on technology commercialisation, asset and startup valuation, private equity, and fundraising. He co-created INSEAD's Sci-Tech Accelerator, which was awarded 2012 Innovation of the Year by the AMBA, and leads innovation venturing partnerships with leading science centers such as CERN and the European Space Agency. Bill has run workshops on startup creation for other leading universities and incubators around Europe, Asia, Africa, and the US.

Other publications by Bill include *Postcards from a Runaway: Provence Chronicles Volumes 1 - 3*, and *Where Now & How*. He also writes a monthly Substack and has released 3 albums of rock drama. Links to this and more can be found at Bill's Creative Collider page [here](#).

If you'd like to know how Bill can support your organization's efforts in deep tech venture creation, contact him at bill@interprizegroup.com.

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