

IE 101 | Innovation and Entrepreneurship 101

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CHAPTER 08 | TECHNICAL BEHAVIOR Technical Behaviors for Innovation

In the last section, we described a set of general behaviors and characteristics that support innovation. In this section, we will focus on the behaviors and mindsets that are the most appropriate for technical leaders and technical architects. The text explains how these behaviors intersect with entrepreneurial and innovation processes. Successful entrepreneurs/innovators have always known how to target the most valuable of problems by using storytelling, inductive learning, and agile implementation processes. In parallel, great technical architects have always understood how to solve complex problems by breaking them down to a fundamental systems-level, all while keeping the design as simple and effective as possible. We have observed that there are significant similarities between the entrepreneurial business process of creating a new venture and the technical process of creating, architecting, designing, and developing an early-stage technological innovation

System Architecture Development Entrepreneur/Innovator Start with the user's story -> Get to Effective Implementation
1.0 Start with user's story -> get to Business Model Break it down: first principals/relationships Use story to gather stakeholders/ resources Agile execution Inductive learning Minimal Viable System: Keep it Simple Minimal Viable Product for market fit Use broad thinking to reduce failures/flaws²³ Use broad thinking to reduce business risk This table illustrates the parallels between System Development and the Entrepreneurship/Innovation Process From the table above, we can immediately see corresponding steps between the technical and contextual aspects of an innovation project. With these similarities in mind, we must also acknowledge the many aspects of the process which are specific only to the technical team. In the text below, we will focus on the best practices and behaviors that are the most relevant to the technical lead and the technical team. User-First Both the technical and business perspective should always start with the user's perspective. Note, this is sometimes considered the customer's perspective. The business objective is to find a working business model or mission model, while the technical objective is to ²³ Could be written as increase robustness, increase reliability, reduce cost, increase performance (all are true while holding other variables constant)

get to an effective technical implementation. An important mindset for a technical leader is to begin with the user's viewpoint first. It is only once this viewpoint is clearly established that the system architecture and the implementation can begin development. Break it down While the context lead is focused on using the story to gather stakeholders, customers, investors, team members, etc., the technical lead must evaluate potential solutions by breaking the proposed system down into simple sub-systems with minimal inter-connections. Critical thinking is always needed to understand the interactions and causal relationships between subcomponents. Of course, if a subcomponent already exists or can be easily obtained, then there is no need to build or redesign that subcomponent. For example, when Tesla created its battery, they began with the thousands of cells that were already being produced in mass scale, instead of designing a completely new battery architecture. Effectuation Great technical innovators and entrepreneurs all use "Effectuation Principals" in a natural manner. Roughly, what this means is to start by taking inventory of what you have first. By way of illustration, consider the process of making a home-cooked dinner. Would you first choose an intended dish, and then gather the ingredients (not effectuation)? Or, would you look at what you already have in the kitchen and then invent a new recipe from these ingredients (effectuation)? This principle can be applied to technical and business projects in the same manner. Look for Insight in the technical story Search for insight about the location of value, the power, or "the magic" in the system design. What will make it effective or exciting? This concept is a technical parallel to the entrepreneurial behavior

of understanding the user's true needs, what they actually care about, or what they are willing to pay for. Minimal Viable System Architecture Get as quickly as possible to a 1.0 version. Distill the story as quickly as possible to the simplest possible implementation. From this, a more complex system can be evolved using an agile, iterative model to develop greater capability. This is parallel to the entrepreneurial approach of building a Minimum Viable Product (MVP) for testing product market fit, but in this case the focus is the system architecture for testing technical feasibility. Agile Increments and Flexible Technology Strategy: After developing a minimal demonstrable solution, use agile increments to prioritize further development:

1. Start with the simplest possible demonstration on the path to the best solution.
2. Use a technology strategy that allows for easy adaptation.
3. Be agile driven. Accept that it is impossible to predict the final product in advance. Keep it Simple The focus of the project should be on keeping the design simple, easy to explain, easy to verify, and easy to debug. Technical architects and designers are often interested in technically brilliant and complex solutions, but true elegance lies in simplicity. As quoted from a historical Apple advertisement, “Simplicity is the ultimate sophistication.” You might think of this in parallel to timeless works of art, which are characterized by having exactly what is needed to convey the message but not a single extra stroke of the brush.

Reduce the Downside Optimize to reduce the downside of risk and failure, not to maximize cost and performance. Always evaluate corner cases. This is the parallel of broad vs. narrow thinking within engineering. The broad thinking version in business would be used to avoid business risk as well as predict the expected outcome in the broadest terms. Measurable Objectives Develop measurable objectives to identify when goals are being achieved; you cannot improve what you cannot measure. For example, in a data science algorithm, how will you know that the prediction is good enough? Having both a measure and a target allows you to estimate whether the work needed to achieve a marginally higher result is even worth the expense of doing that extra work. To understand this more, learn about the concept of Value of Perfect Information. See Hubbard, “How to Measure Anything”, Wiley. Create a support ecosystem Build a support ecosystem with the highest quality partners that you can both reach and trust. Many technical leaders are tempted to reach out to the more convenient lower-quality contacts (team members, suppliers, partners, customers, etc.). These may be easiest to contact, but it will not result in the highest quality outcome. As long as trust can still be maintained, it is a best practice to push out of our comfort zones and find the most ideal people and organizations that we can.

Summary This section was written to provide a wide-ranging understanding of the behaviors and mindsets needed for technical teams and their leaders to successfully develop innovative projects. In case examples, we will see that these same behaviors come up frequently. We also note that behaviors beyond the ones listed have been identified in these cases.