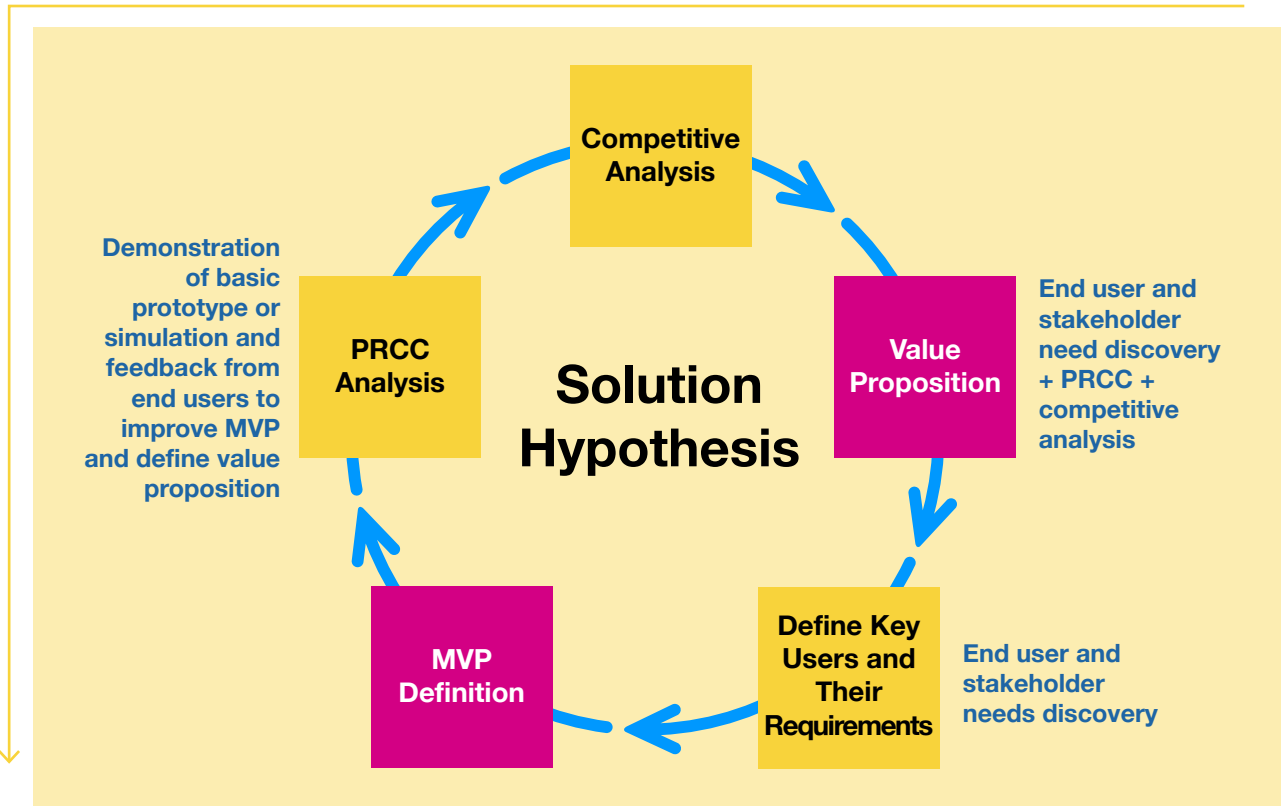
Invent: Unpacking Solution Readiness Level 1

The first level of the Invent-Apply-Transition framework involves moving through scaling activities that explore and define a problem. In this ***invent*** stage, the researcher will formulate a deep understanding of the perceived need, generate a problem/solution hypothesis, and create a prototype to demonstrate that the solution can fulfill the needs of the end users.

Overview

The activities in the ***invent*** stage involve a non-linear process that involves a cycle of iterative steps. These steps include defining key users and their requirements by developing a needs hypothesis and key performance indicators, defining the minimum viable product (MVP), a PRCC (Performance, Reliability, Convenience, Cost) analysis, competitive analysis, and lastly creating a value proposition.



Needs Hypothesis

The following questions aim to help researchers create a thoughtful, equity driven needs hypothesis that will assist in creating and developing a mindful intervention in the ***apply*** stage.

- What is the specific problem the innovation is meant to address?
- Is the problem widespread enough that it has been acknowledged by practitioners? Do people in the education community identify this need as a priority and core equity challenge?
- Who are all the people who will need to support and use the innovation? Who is closest to the pain points? Furthest from power?
- Is the problem in line with the needs and top priorities identified by school districts, state education agencies, and schools?
- How is the proposed solution believed to be better than existing options (the competition)?
- What is still needed to better understand the stakeholders involved, the systems, and sources of inequity the intervention is trying to address?

Key Performance Indicators

Key performance indicators (KPIs) are used to define measurable intervention outcomes that align with school needs/goals, indicators of implementation integrity, and anticipated success timelines that are linked to implementation integrity scale. End user and stakeholder needs discovery surveys along with prototype simulation testing should be used to inform KPIs.

- What outcomes, including intermediate outcomes, would the innovation improve, if effective? Are those well-aligned to the problem identified in the needs hypothesis?
- What measures could serve as “key performance indicators” that, if monitored, would suggest the innovation is likely to be efficacious once adopted?
- If adopted, could a state, district, or school begin to see evidence of “success” on those KPIs within 3 months to secure continued buy-in?

Minimum Viable Product (Core Components)

The minimum viable product is a version of a product that has the smallest number of components needed to fulfill a customer need. Start by envisioning the core components - only the components necessary to produce the intended outcomes. The core components will inform the minimum viable product or MVP. It is the starting point for developing a prototype and iterating to build a product.

- What are the key components of the intervention?
- What is the smallest number of components needed to produce the targeted effect (“core components”)?
- What components can be adapted to fit local context, if any, and which must remain true to the model?

- Who are the key users of the solution?
- Does the innovation fit with existing practices and workflows of typical schools?
  - How does it fit with current data systems, assessments, curricula, and learning platforms?
  - What level of effort is needed to learn, use, and sustain the innovation?

Customer Value Proposition

After the solution hypothesis, teams should begin to formulate a ***customer value proposition***. This is a succinct statement of 1 to 2 sentences that conveys how users will benefit from this innovation. Consider:

- What is the need being addressed?
- What is the potential impact of the product on the outcomes of the community being supported?
- What benefits does the innovation offer?
- Are diverse perspectives represented in the ideas?
- How is the innovation different from existing solutions?
- How do these differences benefit the user?
- How does the innovation fit within the context of the existing ecosystem?

Creating a value proposition that is end user and school or district focused is important. It is easy to fall into a proposition that appeals to researchers. It's best to be simple and direct. The customer value proposition will change over time as the innovation evolves. Summarizing the innovation and its value from the start can be beneficial. The value proposition can be tested and refined during the recruitment of schools and districts before large-scale studies are conducted.

Performance, Reliability, Convenience, and Cost (PRCC) Analysis

As teams move through the framework for a particular innovation, they also need to assess the customer value of the innovation in terms of Performance, Reliability, Convenience, and Cost.

Performance refers to what kind of impact the innovation has on educational outcomes. Researchers should consider the innovation's efficacy and how this compares with the efficacy of existing innovations.

Reliability refers to how well the innovation can be implemented in a variety of contexts and whether the innovation will be able to achieve its intended outcomes for all intended users.

Convenience refers to how easy the innovation is to implement and how smoothly it fits within the existing educational context in which it is being used.

Cost refers to the financial and labor investment needed to implement the innovation.

Researchers focus on performance, reliability, and cost, but tend to underestimate the importance of convenience.

Table 2. Questions For Assessing PRCC

PRCC	Questions researchers should be asking
Performance	Is the solution's improvement on student outcomes incremental or significant? Can this improvement be demonstrated within 3 months of adoption? Does augmentation with other approaches strengthen the solution? How superior will the performance be to existing solutions?
Reliability	Has the team accounted for the typical implementation fidelity loss in the anticipated levels of reliability that happens when the developer or researcher is no longer overseeing implementation? Has the team identified the key components that must be implemented to achieve the intended outcomes? Has the team accounted for the different kinds of environments in which it will be implemented? What resources, training, and organizational support are required to achieve implementation fidelity?
Convenience	**Usable** Does the solution make the user's life easier? Does it require less time than existing solutions? Is it practical and easy to use? How does the innovation compare to non-education consumer products that people are accustomed to using every day? **Adaptable** Define what components of the innovation can be flexibly adapted and what parts need to be replicated? **Easily Integrated** Does the innovation seamlessly fit with existing systems in the host environment such as technology systems and equipment, curricula, assessments, professional development models, and class schedules?
Cost	What are the initial adoption costs and the ongoing operation costs?

Competitive Analysis

Initial Market and Differentiation Analysis

A market analysis is necessary to understand other innovations that address the same or similar problem, how the new innovation is differentiated from those currently available, and how many customers exist in the target market. It is critical to understand how the new innovation compares to existing solutions. The field and market may change over time, such as the introduction of new competitors or their offerings, new legislation that impacts relevant policies or funding streams, or events (e.g., COVID-19) that fundamentally change how education is delivered.

Differentiation Hypothesis

Understanding how the problem is being addressed today will be the first step in creating what is known as a "competitive matrix," that is, a mapping of direct competitors and their product features, pricing, funding sources, and value propositions. What are the characteristics of competing products, including their convenience, increase in productivity, contextual fit, or cost? The competitive matrix will clarify how crowded the market is and what types of characteristics the innovation must include in order to compete with existing solutions. Here are the questions to consider:

- How is the innovation differentiated from the competition?
- Does it enable a capability that does not exist already?
- What are the compelling reasons why a user or customer would choose this over competing solutions?

Basic Prototype or Simulation Demonstration

From the activities above, teams should be able to create a basic prototype that demonstrates that the solution can fulfill the needs of the end users.

Learn more about the I-A-T scaling activities and access resources here.