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An innovation case study: a process, practice and learning perspective from a large hospitality and entertainment business

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Abstract

In the last several years, innovation has received an amplified focus as various traditional businesses have been interrupted by new business models as well as the Covid-19 pandemic. Large organizations are often challenged to keep innovating lest they be disrupted by new upstart business models or unforeseen shocks. This case study explores three dimensions of achieving systematic organizational innovation, specific to internal business optimization: a process framework for managing and tracking innovation activities and outcomes; an examination of the front-end of this process related to generating ideas for innovation; and a mapping of industrial engineering graduate courses to the innovation process framework. Being a case study, this paper will provide some key learnings for areas to focus on and what works when innovation becomes a priority.

Keywords
innovation process; education; project management; creativity

1. Introduction
Innovation has been a critical capability for companies to survive and grow. The purpose of this case study is to provide a process framework for innovating in back-of-house and operational areas. In the highly customer focused organization in which this case study was conducted, these areas do not often get the same priority or investment as innovations in product development, marketing or numerous strategy groups. The process framework enabled optimization efforts to be more planful, systematic and measurable.

A process framework is a set of key tasks, deliverables, and decision points from which to systematically drive innovation. Defining innovation in the broadest sense as "something new that creates value", can apply to other frameworks such as the DMAIC framework from lean process improvement [1] or the PMI project management [2] or agile methodologies [3] as these facilitate developing something new. These methodologies provide a cursory coverage of generating and validating ideas. The rationale for the framework is to address these gaps and provide clarity around what is meant by such terms as a "proof-of-concept", "prototype" or "pilot". These are often used interchangeably, creating confusion or setting inappropriate expectations. The innovation process framework proposes some clarity regarding the definitions of these terms. The framework also addresses the creative process for generating ideas.

Applications of the framework to three case studies will demonstrate the approach used to generate and validate ideas. The methods used provided rich lists of ideas, which drove the advancement, tracking and ultimately the funding of innovation initiatives. A word on these examples: these are from operations and technology groups doing the challenging work of business optimization. Cost base improvements are often managed through budgeting edicts and cost cutting versus true optimization, quality improvement and lean six-sigma efforts. These groups do not often get the opportunity for learning skills related to creativity. The work for this case study enabled these groups to develop these skills. This leads to the final component of this case study: mapping formal coursework in the context of innovation.

While competence in innovation is based on practice and experience, a level of formal training may enable additional tools for accelerating progress to achieve a successful innovation program. Using the innovation process framework, coursework from an industrial engineering graduate curriculum can be mapped to key components.

2. Methodology

A case study methodology was the basis for deriving the innovation process framework. This work emanated from the formation of an innovation group positioned within a technology team. This technologist team scanned the horizon for proven newer technologies that had clear use cases and could scale. While the organization had well established groups driving technological innovations for customer facing experiences, the focus of this team was to explore emerging technologies that were applicable to making significant cost base improvements. In fact, senior management had a view that the technologies were already there, and the work needed was to demonstrate the viability of these technologies and put together business cases to advance the implementation and achievement of significant cost base improvements.

The technology team formed a laboratory to try out the technologies related to imaging, robotics, artificial intelligence, machine learning and big data. The team partnered with vendors to create several proof-of-concepts, which occasionally caught the attention of senior leadership, but did not go much further. The challenge was that the use cases needed a level of business support and sponsorship. A second team, composed of experienced operations managers and process experts, was formed to collaborate with the technologists to advance use cases for innovations and to derive business cases for advancing concepts to production. To motivate the output of these two teams, leadership set a very aggressive long term cost base improvement goal in the tens of millions of dollars.

The partnership between the technology and operations teams at both the senior leadership level and at the staff level was critical for success. The technology teams brought knowledge and experience with new technologies, and the operational teams brought functional knowledge, business challenges and problems which, if solved, would drive efficiencies.

The framework described below was developed and refined through the experience of three sample case studies. The case studies were in the areas of training delivery, venue admissions, and food waste reduction. In the first situation, training was identified as an opportunity due to a legacy process that was very paper intensive, redundant and time consuming. For venue admissions, the use of facial recognition was explored as a viable way to match a customer with their ticket media in a non-intrusive way to enable a seamless and quick entry into the experience. Finally, the last situation was an environmental initiative to reduce food waste through a technology that measured and then provided a dashboard for understanding the value of the waste avoided. For this situation, having an external goal set by the United Nations provided a strong impetus for the teams to adopt new processes [4].

3. Innovation process framework

3.1. Objectives

The approach used by the technology and operations teams started with the following objectives:

- provide the teams with a clear roadmap for their activities,
- incorporate the creative idea generation component,
- be able to track progress and make course corrections as needed,
- develop a common language when reporting progress back to senior leadership, and
- not be a rehash of project management or lean six-sigma methodologies, but to build on these previous frameworks.

3.2. Background research

With these goals in mind, a number of sources were searched to help inform the approach. From Keeley, a definition of innovation as “the creation of a viable new offering was used [5]. Keeley’s “ten types” included some good proxies for business optimization in the form of “enabling process” and “core process” innovation types [5] . Other guidance for developing the framework was from Kelley regarding diverse participants, the importance of domain knowledge, the use of prototyping and willingness to make mistakes and accept failures [6]. To achieve the creative idea generation objective, creativity and where it comes from was researched, including the neurological

processes associated with the brain and its physical structure [7]. Root-Bernstein provided additional thinking tools for idea generation [8].

3.3. Innovation Framework Description

The framework started on a whiteboard and was refined after each initiative. Eventually, the phases were tracked in a database to understand time to market or where any good ideas were being held up or delayed. After several iterations, the framework in Figure 1 was developed and shared with the teams working on the innovation initiatives.

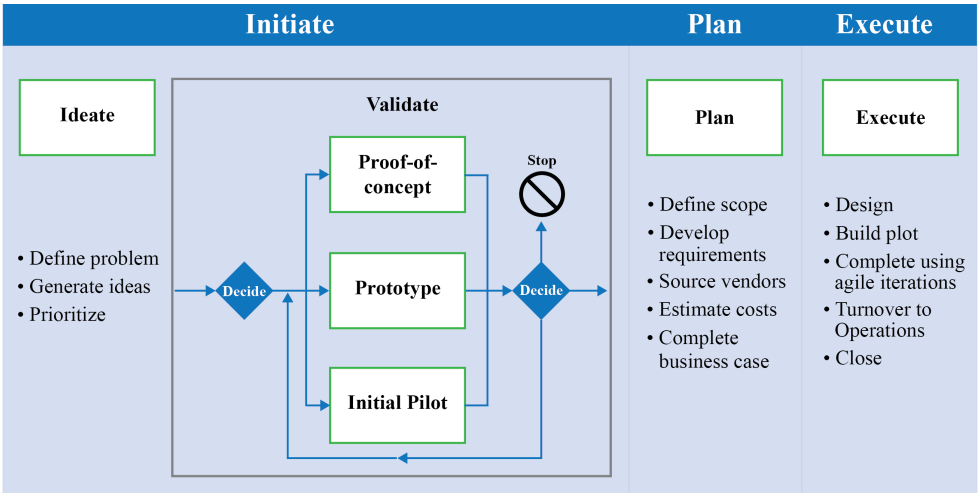

Figure 1: Innovation process framework mapped to project management phases.

3.4. Ideate phase: define the problem

The ideate phase was composed of three activities: defining a problem statement; generating ideas; and prioritizing. A problem statement sets up a domain and a rough scope or target for the ideas. For larger complex problems, the problem statement may be as elaborate as a functional system architecture which defines scope, identifies stakeholders and their interests (even if conflicting), and identifies large functional components and their connections to each other. For complex systems such as healthcare, workforce management, or a social-ecological system of systems a functional architecture is the gold standard for articulating the current situation [9].

As another example, the problem was defined by a lean/six-sigma process using the Define-Measure-Analyze-Implement-Control (DMAIC) process. For these efforts, the first three phases of define, measure and analyze do a more than adequate job of defining the problem and analyzing the current situation [1]. Interestingly, DMAIC goes from "analyze" to "improve" without formally including a step to generate ideas.

The deliverable for defining the problem is as simple as a problem statement, or as elaborate as a six-sigma analysis report or a full functional systems architecture laying out the current state. This step should not be underestimated; a well-defined problem or question will pay off substantially so that the teams will have focus and a clear response to "what exactly are you solving for?" when the innovation process moves along.

The problem statement for the training delivery was "How can training be offered intuitively, when needed, and with relevant content?" The problem statement for admissions was "What will enable an easy, fast, and secure flow of customers into the experience without hassles or exceptions?" For food waste, the problem statement was "What can be done to reduce food waste by 50% by 2030 in line with the United Nations sustainability goals?"

3.5. Ideate phase: generate ideas

The next task under ideate is to generate ideas. In working with an operations team, the first instinct is to do a traditional brainstorm. Operations staff enjoy traditional brainstorms; it is a day off-line, usually good snacks and an opportunity to say what is on your mind and network with others. However, traditional brainstorms create challenges. These are related to fears of ridicule or having the senior person "start the process" with an idea, followed by most ideas imitating the boss's in order to please him. The first step in generating ideas is the problem

statement above. Additionally, some people are better at thinking about a problem over a period of time, perhaps in a new setting [10].

The group should be 8 to10 participants and must be diverse. At a minimum, the group should include people familiar with technological capabilities along with people from operations. The operations people should be a mix of functional experts with about 10 years of experience as well as newer people who may not be beholden to the current processes. To maximize the diversity of ideas, these sessions should include a few radical thinkers and creative types to drive diverse ideas and prevent the group from being an eco-chamber. Frans Johansson provides a comprehensive guide to this concept in what he calls intersectional thinking [11].

Ideas were generated through two work sessions: the first session kicked off the process by sharing information about the problem statement, fundamentals of creative processes, and an assignment to generate at least 30 ideas; in the second session the ideas were shared and culled down. The assignment to generate ideas was a way to allow both individual and group ideation. In some groups, a sketch book and a pencil were provided to draw out the ideas visually. For many people, coming up with a large number of ideas was very difficult and forced them to think beyond the obvious. By requiring 30 ideas for each participant, there were 300 ideas when the group was back together. The participants were encouraged to consider generating their ideas in a different setting i.e., going to a beach, a forest or perhaps when observing customers. This was meant to help generate ideas with a clear mind [12].

During the second session the ideas were grouped by theme and worked collaboratively to get to several key working concepts. It was critical not to have only one working concept, but several. One additional consideration was to identify assumptions about the current process i.e., what are the underlying unstated rules. For example, in training, it was that all training changes had to be implemented immediately. In admissions, a ticket reassignment could only be done by an authorized individual. In food waste, food had to be displayed in the same quantity at the beginning and end of the meal period.

3.6. Ideate phase: prioritize ideas

After these activities take place the last step of the ideate phase is to prioritize. Using principles of decision analysis, the most effective way is to establish a set of criteria such as solving the problem statement, cost, timing, degree of change, level of risk, level of payback. The criteria are then weighted followed by scoring by a small sub-team to ensure consistency. While this is a basic process of prioritizing, the *process* may be more important than the final literal scores. This method is from Clemon and Riley [13].

To summarize key practices during the ideate phase:

- Generating a large number of ideas
- Combining both individual and group activities to generate ideas
- Inviting a diverse group of participants
- Considering intersectional thinking by applying concepts across disciplines
- Identifying assumptions or constraints that might be challenged
- Engage a small group to establish criteria and score each idea – include key sponsors

3.7. Validate stage: proof-of-concept, prototype, and initial pilot

The validate phase tests ideas to assess their viability. When this work first started, there was confusion about the definitions for proof-of-concept, prototype, and initial pilot. These terms were initially used interchangeably, and inconsistently. For example, in the food waste effort, a vendor had already been identified, enabling the product to be put in the field and tested for 6 months in a limited representative set of food operations. This was substantially more than just a “proof-of-concept” but was constantly referred to as such. Table 1 shows the working definitions from simplest to most complex. One other benefit of common terminology was that the classifications facilitated the building of a simple tracking database for these activities, which at their height involved over 50 people and over 100 ideas. The database provided an easy way to take a portfolio snapshot for the project sponsors.

Table 1: Working definitions for proof-of-concept, prototype, and initial pilot

Activity	Purpose	Persistence	Budget	Duration	Ecosystem
Proof-of-concept	Prove out key capability	Throw away	Low cost As-is technology	Weeks	Lab only
Prototype	Obtain customer reaction, Develop requirements	Throw away	Low to medium cost (less than $50K)	Weeks to months	Lab with limited customer test
Initial Pilot	Understand sustainability, Finalize product specification	Could stay on as funding for expansion is obtained	Medium cost (less than $500K)	Months	Field test with customers, limited system integration

The innovation framework in Figure 1 shows a flow between each of these validation activities; however, in the case of proven technology that has been deployed in similar operations, there may a need for only one of these activities or if many unresolved questions occur, then all steps might be needed. Whether a proof-of-concept, prototype or pilot is developed, the effort within these activities was iterative using an agile or lean start-up methodology to enable speed to market [14].

One critical aspect of the validation phase was a decision process following these activities. The decision consists of moving to a more elaborate validation activity, moving to a more formal planning phase, or stopping the project altogether. The decision was based on achieving functionality goals. After prioritizing the idea list, the top three to five ideas should be considered for proof-of-concept, prototype or initial pilot. This decision may be related to the risk tolerance of the organization, balanced by the patience of the sponsors with spending money on these activities.

At the end of the validation stage, there was a well-defined set of functional requirements and a foundation for technical requirements that will be completed during the planning stage. Additionally, an initial risk assessment for the technology may be derived and a rough order of magnitude (ROM) investment estimate. A more formal estimate will be completed in the planning phases.

3.8. Plan and execute phases

For the most part, these phases follow the well-defined methodology from the Project Management Institute (PMI) [2]. Planning activities entail formalizing requirements, sourcing, finalizing estimates and putting together the value proposition and business case in order to bring the proposal to key sponsors for funding. To evaluate the investment decision, a net present value analysis should be supplemented with a real options analysis [15]. Net present value (NPV) analysis assumes a predominantly deterministic process for execution with uncertainty addressed by using contingencies. For innovation related processes, it may be just as important to have the equivalent of an option to exploit a new technology versus beginning from a cold start due to an exogenous event (like a pandemic) or an industry disruption due to a competitor. For many innovations and technologies, having an option to be "in the game" may be paramount due to the capabilities and learning curves required at a future date when you must have it. Real options analysis provides the framework for pricing the cost of the option now with respect to the expected benefits in the future, if the decision to expand is exercised.

4. Education and Learning

Throughout the experience of this case study, a number of disciplines associated with a typical graduate program in industrial engineering have been referenced. As a summary, here are the areas where these topics were most useful:

Ideate processes related to courses in:

- Systems architecture – provides a comprehensive way to define a problem including stakeholders and their interests.
- Innovation in engineering design – provides key concepts of creativity in design
- Research methods – provides basics for researching an initial idea to understand if you need to invent or if an idea exists.
- Decision analysis – assessing decision options against weighted criteria to prioritize ideas

Validate processes related to courses in:

- Decision analysis – assessing decisions to move on, stop or go-back after validation activities
- Simulation – may be required in lieu of building expensive and time-consuming physical prototypes
- Experiment design – used to try various scenarios to evaluate sustainability, stability and to specify a new process
- Quality management, Lean/Agile/Six-sigma for the iterative nature of prototypes to stabilize and evaluate

Planning and executing related coursework:

- Advanced Engineering economic analysis (real options analysis) – to consider innovation investments as both traditional NPV as well as options to scale later with additional investment.
- Project Management – to effectively manage the planning and executing phases.

5. Conclusions

Understanding and executing on innovation has become a high priority not only in business but also in government and in most organizations. The three examples were all able to get off the ground with momentum into the funding process. This case study and the innovation framework are part of the evolution of building organizational capability in innovation. Innovation is a discipline that must be practiced to become good at it. This work is meant to be a process-oriented extension of core concepts of innovation to enable integration into process improvement (DMAIC) and project management by enhancing the Initiate phase. The framework provides guidance for tracking a portfolio of ideas and which stage they are in over time. Finally, this work is more than the process alone; senior leadership support and sponsorship are still critical success factors.

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