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Agile Engineering: Managing Change to Unleash Innovation

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Agile Engineering

Managing Change to Unleash Innovation

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Introduction

The field of Organization Development is undergoing an exciting transformation. As well-established corporations begin to integrate with each other through mergers, acquisitions, and other business opportunities to increase market share, Change Management methodology becomes an especially important task in achieving sustainability. This article explores the interdisciplinary nature of OD by examining the structure of a behavioral-based change management technique and similarities related to the field of systems engineering. Additionally, the concept of Agile tools and processes is explored as an integration point between OD and systems engineering to lay the groundwork for using a combination of the tools to stimulate innovation. Finally, this article introduces an adaptation of the traditional software V-model explained step-by-step in the context of organizational learning and innovation.

The true value of Organization Development has been an understated practice in achieving bottom line results for companies. In my experience, I have noticed that Organization Development is relegated to serving the training and development needs of its associates. However, we practitioners realize that the role of OD is virtually boundless; elements of OD are found in many different divisions across organizations, such as process improvement, systems implementation, and software engineering. The changing nature of today's business environment prompts several questions about organizational adaptation; for example:

- How can we anticipate and take advantage of cutting-edge research and technology?
- What tools and processes can be developed and honed to accelerate innovation?
- What will future employees look like?
- What skills and abilities will they need to thrive in the workplace of tomorrow?

Organizational Change Management from an Interdisciplinary Perspective

In order for an organization to adapt to the future, it is important to gain perspective by considering what has worked in the past and what has not. Additionally, leaders should review credible resources and literature that can help them to gain an accurate representation of the current situation. Cady et al., (2019, p. 2) highlight the value and necessity of fully utilizing the work done by researchers before us because it helps us to acknowledge our foundations, they argue leaders must:

- Trace history in ways that connect research with practice.
- Integrate theories across disciplines and contexts in creative ways.
- Reconnect with the giants of their disciplines.

Based on this perspective and relevant research, I consider Boyatzis' Intentional Change Theory (ICT) as an effective method for managing the behavioral aspects of sustainable change.

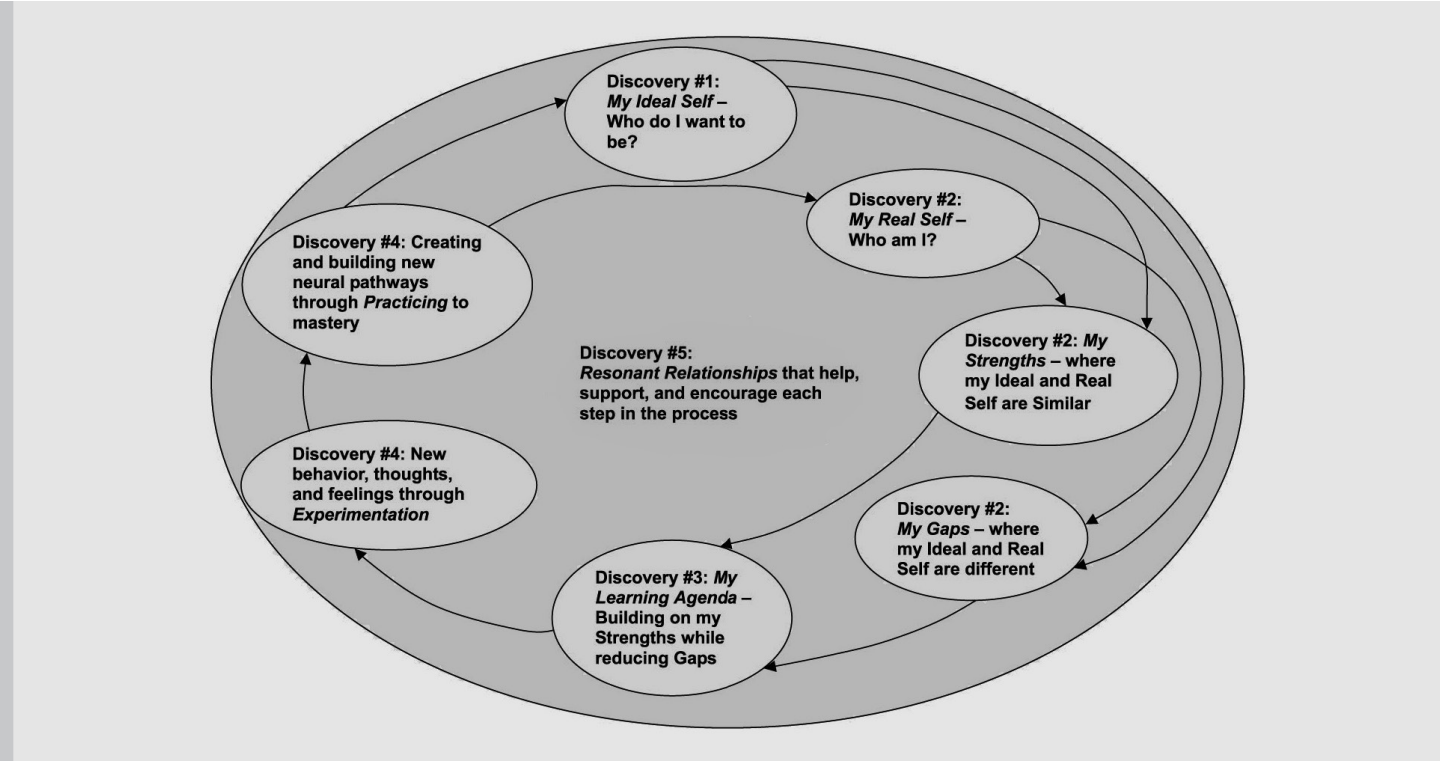

Figure 1. Boyatzis's theory of self-directed learning (Boyatzis R.E., 2006, p. 610)

As most leaders are fully aware, change management is a bi-directional, iterative process.

Influencing change at the individual level is the most critical element in ensuring that organizational change is sustainable. As stated by Boyatzis et al., "A proven method of coaching with compassion in a way that leads to sustained desired change is to guide an individual through Boyatzis's model of intentional change" (2019, p. 34). *Figure 1* provides an illustration of leading an individual through this cycle, which prompts the individual to get in tune with their ideal self and, in the process, evaluate their real self, strengths, and opportunities for improvement, thus laying out a plan for new behaviors to learn, practice, and master.

Interestingly, the model can be applied at the individual, group, and organizational level. As stated by Boyatzis:

> Sustainable change occurs at any level of human and social organization through the same ICT. In this sense, these other levels are fractals of ICT at the individual level. In other words, desired, sustainable change within a family, team or small group occurs through the cyclical iteration of the group through what can be called the "group level definition" of the five discoveries. Similarly, desired, sustainable organizational change occurs through ICT's five discoveries at the organizational level. (2006, p. 618)

ICT clearly illustrates how change can be mindfully sustained at the individual level and gives credence to its utilization at the group level and organizational level. Another interesting parallel is the Tavistock approach, as this particular method acts as a precursor to the concept of socio-technical systems and the work done by Eric Trist. The studies completed on socio-technical systems "emphasize the interdisciplinary nature of change management and its potential to merge with other structured methods, particularly engineering" (Trist, 1981). On this very note, it seems that there is great potential to combine the behavioral aspects of change management with the structured nature of systems engineering.

Systems Engineering and Requirements-Based Change Management

Engineering practices are quite similar to ICT in that both methods use defined structure to manage change. A cogent example of this is in the area of software development, in which a common tool to define the change process is the Software V-Model (*Figure 2*). The V-Model is an industry-wide concept, in which the top left side of the "V" is focused on defining the requirements of a software application from a high-level concept, and extends down to the bottom of the "V" as detailed specifications are developed. Beginning on the bottom right side of the "V," software developers focus on creating solutions within the application and then validating, or testing, the software as it is developed. On the top right side of the "V," the figure represents a fully functional, tested product. In theory, the V-model illustrates change from a high level and has many parallels to ICT, particularly when managing behavioral change at the organizational level.

Once an overall plan for engineering changes has been defined, it is then crucial to further elaborate on how those changes will occur. Relevant literature by Hamraz et al. (2013) suggests that "use of the change predictive method (CPM) is a critical step in defining the requirements of an engineering related change" (pp. 765–793). The authors additionally define the steps that comprise the change predictive method:

» Decomposing the product into components.

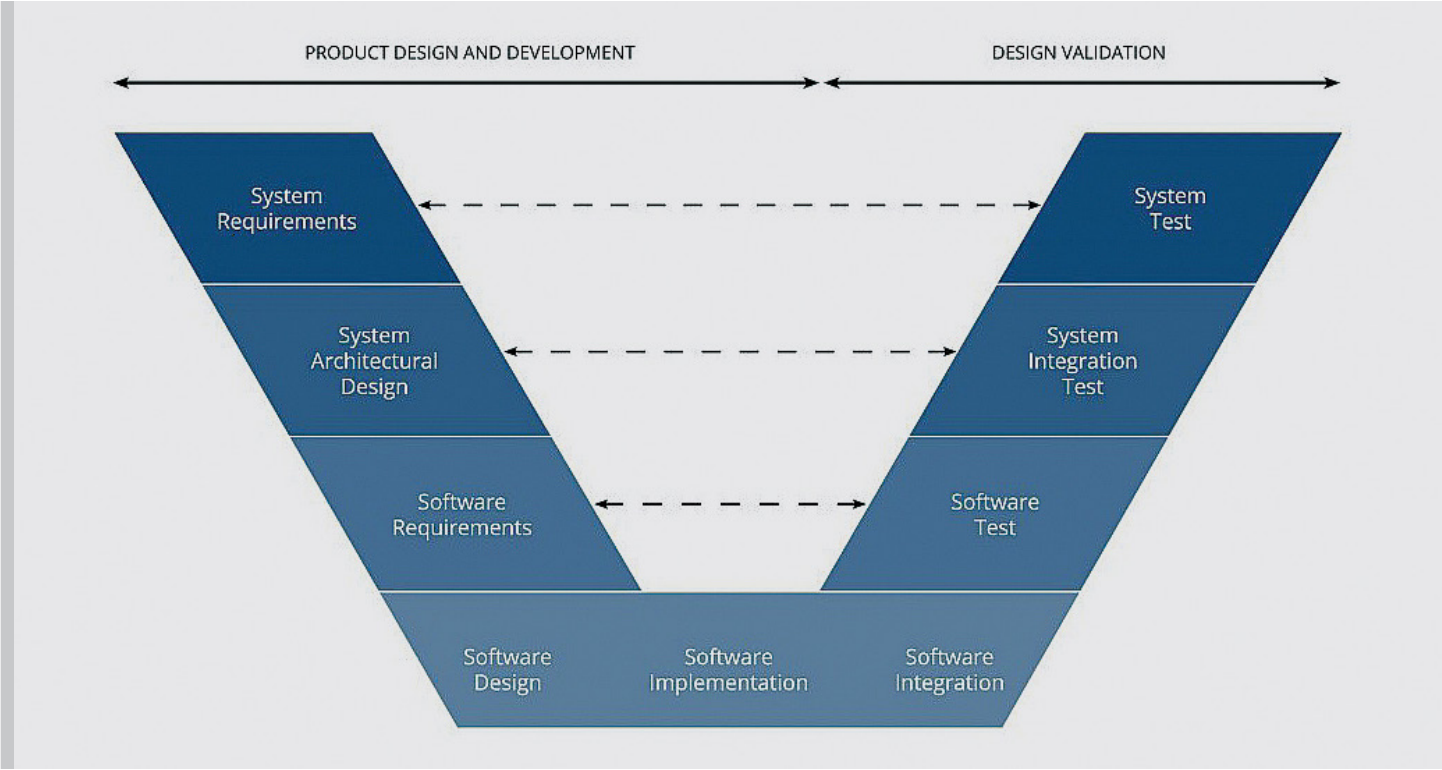

Figure 2. Software Development V-Model (Innovo, Pi, 2019)

» Identifying the direct dependencies and capturing them using a design structure matrix to quantify the likelihood and impact of change propagation, and
» Applying an algorithm to these numeric components to compute the combined risk of change propagation (Hamraz et al., 2013, p. 770)

This process also parallels behavioral change and ICT, particularly when considering change at the group level. Creating a plan for how to go about those changes involves prioritizing, identifying patterns, and digging deeper into the risks and opportunities involved.

To initiate changes at a micro level, individual requirements for any undertaking need to be defined to understand the desired output. Hooks & Farry (2001) recommend a nine-step process as a guide for managing change. A summarized version determines the following steps:

1. Define scope by defining the business case, needs, and overall goals/objectives.
2. Develop "story cases" to understand desired behavior.
3. Determine inputs and outputs.
4. Begin writing requirements for what the customer wants.
5. Understand reasoning behind the requirements.
6. Ensure traceability.
7. Develop testing methods for each requirement.
8. Develop and follow formats, document, and ensure visibility for team members, and
9. Baseline requirements after validating to ensure completeness.

This guide parallels behavioral change and ICT at the individual level by addressing each change from a micro-level perspective and provides logical, actionable steps toward transformation.

To summarize the findings of the giants who made these discoveries, it is evident that ICT and systems engineering are effective methods individually, but is there value in combining the two methods? Organizations usually manage change by staffing two separate experts in these respective areas, but individuals with multiple areas of expertise are sought-after assets within organizations. Bopp et al. (2010) introduce the concept of "Versatilists" as "people whose widening portfolios of roles, knowledge, insight, context and experiences can be applied and recombined in numerous ways to fuel innovative business value" (p. 130). Versatility within the workplace suggests an interesting link to Agile, a concept that has never been more in demand than at this current moment in time.

Agile as a Method for Introducing Incremental Change

Agile is a methodology that was conceived at the turn of the millennium but is increasingly being adopted within industries of practice. It is interesting to note that the concept of Agile has origins that connect back to the field of OD. Herr et al., (2015) recall that Lewin "was the first to develop a theory of action research that made it a respectable form of research in the social sciences" (p. 12). Additionally, the authors note that "Lewin believed that knowledge should be created from problem solving in real-life situations" (p. 12). The essence of Lewin's work suggests that sustainable change is incremental in nature, and likely paved the way for the concept of organizational agility. It also reflects the interdisciplinary nature of OD and the potential it represents.

The concept of Agile can be described as a set of guiding principles, values, and mindset. As described by Martin, "At the core, Agile is a software development methodology that emphasizes adaptability

and malleability in a collaborative process to deliver tangible products in short, iterative cycles" (2017, p. 39). The Agile mantra emphasizes:

» People first and foremost.
» Collaboration as opposed to negotiating.
» Working tools or processes over documentation.
» Responding/adapting to change by following a plan.

Agile teams are usually comprised of only seven to ten people, and this small-group dynamic encourages members to make decisions as a team, build a high-trust environment, and ultimately become a high-performing/high-output team. Teams are supported through an Agile practitioner, sometimes referred to as a scrum master. The Agile practitioner's role is unique because it is not focused on traditional leadership and decision-making, but rather it serves as a supporting role to facilitate the team's process of development and help the team prioritize and break down barriers. Several of the most well-known Agile tools include:

» **Scrum:** Similar to servant leadership; used to eliminate barriers & maintain team progress.
» **XP (Extreme Programming):** Pairing members to expedite learning and reduce errors.
» **Feature-Driven Development (FDD):** Iterating a product/process according to customers' expectations. Emphasis is placed on creating a minimal viable product for acceptance.
» **Kanban:** Managing work using a "pull" system to control workflow.
» **Lean (Kaizen):** a methodology focused on eliminating waste through continuous improvement.

Adopting Agile methodology is no easy task, as there is a specific mindset that must be mastered. As explained by Denning, "Agile processes and concepts are driving rapid-paced, customer-focused continuous innovation initiatives needed to survive in today's dynamic marketplaces" (2019, p. 3). The article goes on to express the need for leadership to support the journey, noting, "Not surprisingly, progress towards business agility correlates positively with the level of leadership directing the Agile journey" (Denning, 2019, p. 3). As a salient takeaway, he explains the ten-step model of Agile transformation (Denning, 2019, pp. 4-9):

1. Take stock by reading the latest information available on the subject.
2. Learn from peer practitioners by visiting other organizations that practice Agile.
3. Form a team to lead the transformation; ideally at the top (C-suite).
4. Prove the concept and increase adoption by showcasing early wins.
5. Maintain momentum by expecting setback and using them as learning opportunities
6. Evolve the idea of change and adapt based on situational needs of the organization.
7. Avoid "dumbing down" the idea of Agile as an efficiency tool.
8. Normalize change by also including administrative functions in adopting Agile methods.
9. Achieve Agile fluency through practicing and gaining mastery, and
10. Achieve strategic organizational agility by applying the concept from a business perspective.

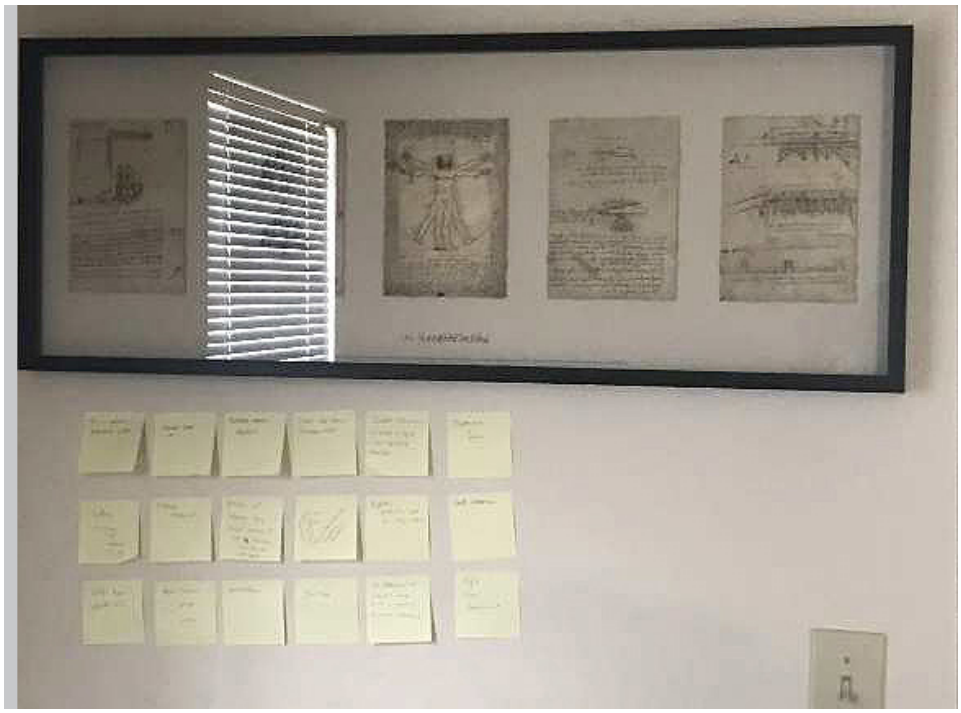

Figure 3. Kanban Board (Ideation) (Rogers, Brandon, 2019)

A key characteristic of Agile is the concept of iteration planning, a method in which teams and product owners (i.e., customers) come to an agreement of expectation for the final product, a time frame is set for development (e.g., 2–3 weeks) and the product is shown to the customer incrementally to ensure customer satisfaction and ultimately, for acceptance. The process is similar to painting a picture: it begins as small strokes on a piece of paper, but over time, it begins to showcase depth and finally the elements of a completed masterpiece.

In my own practice, I utilize the Kanban technique to visually lay out the concepts explored in this article. Using this technique, I was able to brainstorm the different ideas in my head, and it allowed me to map out the initial phase of my project in a logical way, as illustrated in *Figure 3*. Another significant characteristic of Agile is that it embraces ambiguity and encourages experimentation. One example of how it does this is the common use of a "Spike," a risk-based experiment to determine if a method, process, or business idea will work. In a world of globalization and constant change, the value of using Agile is evident. Denning summarizes the ultimate goal of Agile as "the ability of an organization to renew itself, adapt, change quickly and succeed in a rapidly changing, ambiguous, turbulent environment" (2019, p. 3). Agile succeeds as a result of

Table 1.

Focus Area	Influential Factors	Recommended Actions
Partnerships	More complex and more varied types of partnerships	Develop nontraditional relationship structures that redefine processes
Process	Disciplines processes are, and will be, important to competitiveness	Find ways to harness discipline in innovation processes
Position	Changing consumer and talent pool demographics will affect innovation	Harmonize procedures and practices across corporate locations and cultures
People	The composition of innovation teams will be different than it is today	Tap into innovation by creating meaningful work experiences for teams
Profession	Innovation management is experiencing growth pains	Develop open innovation practices and measure team/individual activity

its flexibility, enabling leaders to make swift decisions while allowing for recovery where mistakes are made, and learnings are allowed to occur.

Integrating the Concepts: Engineered Agility for Intentional Change and Innovation

Considering the way that the world has been reshaped as a result of CoVID-19, the implications indicate a greater need for increased flexibility and innovation. Recent literature suggests:

> Today's pace of technological change is likely the slowest we will experience for the rest of our lives. This chaotic environment is reshaping how firms approach innovation and, consequently, the role innovation managers play—as the range of technology options and advancements gets wider and more complex, firms are increasingly relying on both internal and external sources of innovation and inspiration to accomplish their goals. (Jones et al., 2016, p. 49)

As a result of the pace of change that Jones et. al describe here, an interdisciplinary model can help leaders form their responses. Furthermore, the authors explain several factors that will influence the future of innovation and recommended actions moving forward (Jones et al., 2016, p. 57) (see *Table 1*).

To address the aforementioned factors and recommendations, the need for increased organizational learning is evident. When considering each of the individual methods, the intentionality of making behavioral change using ICT, the structure of systems engineering, and the incremental nature of Agile, I believe that there is a significant opportunity to combine the best practices of each discipline to result in increased speed of organizational learning, and therefore innovation. Relevant literature supports this idea, indicating, "Organizational learning is a critical corporate trait that is of interest in both Agile and Lean Manufacturing because it

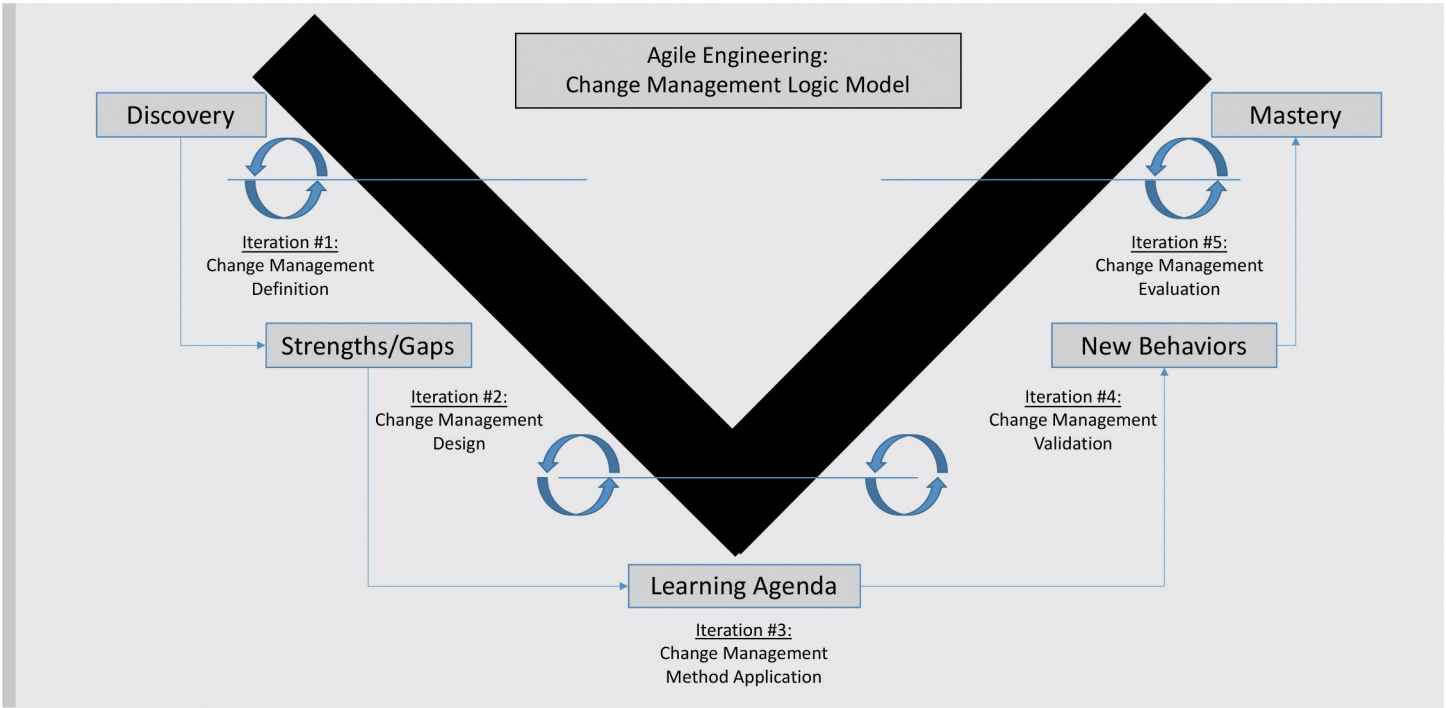

Figure 4. Agile Engineering: Change Management Logic Model. Rogers, Brandon, 2019

is viewed generally as an organizational behavior essential to competitive advantage" (Flumerfelt et al., 2012, p. 242). This presents a well-positioned opportunity to build upon existing knowledge, ideally resulting in new modes of thinking and organizational know-how.

One way to visualize integration of the three elements is through the use of an adapted software development "V" model. The idea is similarly focused on the systems engineering concept of collecting requirements and then testing those requirements from left to right but is instead focused on the behavioral aspects of ICT and structured change from an engineering perspective. At each of the five stages, it begins a new "iteration," which reinforces the concept of organizational learning through use of Agile methodology.

In *Figure 4*, I propose a model which includes the best of both worlds: a process model which introduces the structure of engineering development, the foundational elements of intentional change theory, and incremental, iterative change.

The intent of such a model creates a space in which not only behavioral challenges are met with improvement, but also organizational learning increases, fear decreases, and ultimately initiatives can be quantified based on the requirements initially gathered and the tailor-made solution prescribed. From an organizational perspective, Research & Development (R&D) centers are usually a "proving ground" for innovation, particularly within large companies. As explained by Majerus, "R&D has a huge influence on value streams and a big effect on the bottom line. Despite the relatively small cost base of R&D, it has an enormous influence on profits (2016, p. 5). Given this context, R&D centers provide a fantastic playground for leaders to put methods into practice.

Conclusion

Creating value and efficiency are key elements to impacting the bottom line of corporations. In a rapidly changing business environment, keeping up with the pace of technology is critical for creating sustainability. Organization Development is a field with powerful potential to impact not only the bottom line of a corporation but also grow the capabilities of the workforce in exponential ways, yet it is often unrecognized in engineering. By combining the behavioral and structural aspects of change management and systems engineering, organizations will find that the processes followed are in parallel and complement each other. Furthermore, in introducing the concept of Agile, the trifecta creates a thought-provoking approach to cultivating an environment of creativity, organizational learning, and ultimately a wave of innovation that is guaranteed to benefit the ROI of an organization.

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