Engineering Educators Bringing the World Together
2025 ASEE Annual Conference & Exposition
Palais des congrès de Montréal, Montréal, QC • June 22–25, 2025 ASEE
Paper ID #48603

Utilizing Project Management Principles to Administer a Graduate Engineering Recruitment Initiative

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Abstract

Project management principles may be utilized to facilitate and guide the administration of graduate engineering recruitment programs. By adopting a hybrid approach that combines multiple agile methodologies, administrators can create both a structured and flexible process that adapts to the dynamic needs and circumstances of the higher education environment. This project is centered on a targeted graduate recruitment initiative used at a large-scale, Research One (R1), public university in the Midwestern United States, to diversify internationalization and broaden participation in graduate engineering studies from specific regions of the world. The hybrid project management principles taken from both Kanban and Sprint practices are analyzed for their applicability in the higher education setting and their process efficiency in guiding a select cohort of graduate engineering students, as they assist prospective graduate engineering students with the application and enrollment decision making process. The project emphasizes the importance of clear goal setting, evidence-based decision making, comprehensive planning, and effective risk management. It is expected that implementing these Agile project management principles, specifically Kanban and Sprint methodologies, promote efficient time management and resource allocation, team collaboration and transparency, precise, personalized candidate engagement, and ultimately, a more successful recruitment program that attracts top engineering talent.

Introduction

The primary goal of this project is to utilize Agile project management principles to operationalize the management of a graduate student-run recruitment initiative focused on internationalization, most specifically, the diversification of international graduate student enrollment in a top-tier college of engineering in the Midwestern United States. “Currently, there is little understanding of how international student recruitment practitioners operationalise [sic.] institutional strategies and how these practitioners respond to their institutional strategies [1].” In addition, graduate student recruitment has become increasingly competitive as it strives to compete with demands for personalization, timeliness, fiscal limitations, etc. [2]. The intention is to build a project management model that is readily accessible to higher education practitioners and assists them with managing the detailed steps required to address these competing demands.

While the Agile Manifesto was founded in 2001 primarily to guide software development [3], its theoretical foundation creates a project management framework that has since been applied to different sectors, including but not limited to, healthcare, business, government, and education (primarily in classroom settings). “Agile is an iterative approach to project management that helps teams deliver value to their customers by delivering work in small increments. Requirements, plans, and results are evaluated continuously so teams have a natural mechanism for responding to change quickly [4].” The concept of the Agile methodology is well suited for higher education as it involves continuous learning, testing, evaluating, revising, and resetting. The theoretical underpinnings of Agile are aligned with processes associated with higher education, however, the actual framework must be translated contextually for an environment

that differs from that which is linked to the production of technological software. This demands a shift to how higher education teams identify tasks and segment them into measurable outcomes. The long-term goal of this project is to provide a comprehensive, practical model that directly pertains to project management within the higher education administration context. This model can then be utilized for student, faculty, or staff administrative initiatives.

The research questions for this project are as follows:

RQ1. What is the process of applying an Agile-based project management model to practices in the higher education environment?

RQ2. What are the challenges encountered when applying a hybrid agile methodology historically rooted in software engineering to a higher education administration project?

RQ3. What are the benefits of applying this model to an administrative recruitment initiative in graduate engineering education?

This article addresses these questions directly in the subsequent sections entitled, Process (RQ1), Challenges (RQ2), and Benefits (RQ3). A discussion section with next steps concludes the paper, along with recognition of study limitations.

Process (RQ1)

The project is managed by a graduate research assistant and a college administrator, along with 5 full-time graduate engineering students, all from countries/regions of the world where the college is seeking an increase in enrollment. These students have applied and been selected to participate in this initiative with an expectation of an average of three hours per week of their time. This initiative is in its first year, the graduate students applied at the start of the semester, and the program launch began approximately four weeks into the semester start. This discussion covers the first ten weeks of the initiative, starting with program launch and the conclusion of the first semester. The development of the project management processes over these initial weeks are central to this discussion.

The first step involved assembling a small team of five graduate engineering students. Their roles and expectations were clearly defined at the outset to ensure a shared understanding of responsibilities for recruiting graduate students in accordance with the international recruitment goals of the college. International students are an increasingly vital component of enrollment in graduate programs in the U.S. According to *Open Doors*, “502,291 international graduate students pursued study in the United States in 2023/2024, an 8% increase and an all-time high [5].” Preliminary discussions focused on team member’s skill sets, general engagement to get to know one another, evaluation of enrollment data from target countries, and development of baseline tasks for recruitment outreach. This groundwork laid the foundation for the entire semester, ensuring the team could proceed with clarity.

To further streamline task management, Microsoft Planner was introduced, leveraging its Kanban board system for centralized and visual organization of tasks. The Kanban board facilitates the tracking of tasks at different stages, including Backlog, To Do, In Progress, and Completed. Kanban benefits student teams by “making the work visible, especially seeing work-in-progress bottlenecks…making the work visible helped the teams create improved team knowledge [6].” The Kanban board reflects the assignment of responsibilities and the

establishment of deadlines. This enhances transparency and improves the team's ability to stay informed about ongoing progress.

Challenges (RQ2)

It eventually became evident that while the Kanban system worked well for broader oversight, a more granular approach to tracking was necessary to evaluate the team's efficiency in detail. A sprint system, inspired by Agile project management, was then introduced to assess team efficiency in specific categories. "By focusing on specific goals within a defined timeframe, teams can significantly boost their output [7]." The increased efficiencies fostered by sprint systems, along with their ability to foster a culture of communication, provide an effective addition to this developing model. A hybrid, Agile methodology was then formulated. "Hybrid approaches to project management are more effective in complex projects, that is, large projects with a focus on the development of innovative applications [8]." The adaptation of this methodology required the integration of new processes and frameworks to fit the unique demands of graduate recruitment, which involves a diverse range of tasks. These tasks vary significantly in complexity, from simple one-on-one connections to larger projects such as organizing webinars or attending national conferences. To manage the range of responsibility required for these different types of recruitment outreach, the tasks were categorized into five distinct levels of complexity:

1. **One-on-One Connections**: These are personalized interactions, such as direct communication with prospective candidates. They are typically short and straightforward, but their importance lies in creating meaningful engagement and fostering a sense of connection.
2. **Gathering Connections/Networking**: This involves building and maintaining professional relationships, both within academic circles and beyond. These tasks often require outreach to multiple individuals or organizations and may include follow-ups, making them moderately complex.
3. **Literature Review/Material Preparation**: These tasks require detailed and focused efforts to create or curate content. Examples include compiling resources, reviewing documents, or preparing presentations. Such activities demand significant attention to detail and alignment with project goals.
4. **Organizing Talk Sessions**: Tasks in this category involve planning and coordinating sessions, such as webinars or discussion panels. They require logistical oversight, collaboration with multiple stakeholders, and a clear vision for execution, making them more involved than simpler tasks.
5. **Attending Conferences**: These represent the most complex tasks, involving significant time commitments and external dependencies. Participation in conferences often includes preparation, travel, networking, and follow-ups, demanding a high level of organization and effort.

By categorizing tasks in this manner, the program ensures that each type of activity is tracked and evaluated in accordance with its demand on time and resources. This approach also prevents simpler tasks from skewing efficiency metrics when compared to more intricate and time-consuming activities.

After determining the need for a sprint system, the sprint schedule was carefully deliberated. A sprint cycle with a two-week sprint cadence was designed to allow sufficient time for progress on complex tasks and to maintain frequent intervals for evaluation and adjustment. Performance tracking was implemented using Excel to log data across multiple sprints. This tracking system provides valuable insights into efficiency, enabling the identification of bottlenecks and opportunities for improvement through data-driven analysis.

Category	**3**				
Sprint	**1**	**2**	**3**	**4**	**5**
Throughput	-	1	4	2	2
Spillover	-	0	0	0	0
Backlog Count	-	0	1	1	2
Average Cycle Time (days/task)	-	7	3	4	1
Sprint efficiency	-	100%	100%	100%	100%

Figure 1: This sample is a mock-up of how multiple sprints are tracked for *Category 3: Literature Review/Material Preparation*.

The metrics adopted for the sprint method are carefully chosen to ensure effective tracking of tasks and to provide real-time insights into the project's performance. Since the project operates on a sprint-based system, these metrics are designed to align with sprint cycles, offering a comprehensive view of task management and team efficiency. The following metrics are being utilized:

1. **Throughput**:
   Throughput measures the total number of tasks completed within a sprint. It acts as an indicator of productivity, helping to determine the sprint rate. This metric enables the team to assess how effectively tasks are being handled and completed during each cycle.
2. **Spillover**:
   Spillover represents the tasks that were planned for a sprint but were not completed. This metric is essential for understanding bandwidth limitations and identifying instances where the team's capacity may have been overestimated. By analyzing spillover, adjustments can be made to optimize future sprint planning.
3. **Backlog Count**:
   The backlog count tracks the number of tasks still pending and awaiting action. This includes tasks that have not yet been allocated to a sprint. By maintaining a clear view of the backlog, the team can prioritize tasks based on urgency and available bandwidth. Tasks from the backlog can either be added to the sprint backlog for immediate attention or remain in the project backlog for future planning.
4. **Average Cycle Time**:
   Average cycle time calculates the number of days it takes to complete tasks within each category. This metric provides insights into the time required to handle different types of tasks, enabling better planning and resource allocation for future sprints. It is particularly useful for identifying inefficiencies and optimizing task management.
5. **Sprint Efficiency**:
   Sprint efficiency evaluates the overall performance of the sprint by comparing completed tasks against planned tasks. This metric provides a real-time understanding of how effectively the sprint is progressing. Efficiency numbers allow the team to gauge their current performance and make informed adjustments for the next sprint.

Together, these metrics form a robust system for monitoring progress and efficiency. They not only provide real-time visibility into task management but also serve as a foundation for data-driven decision-making. By analyzing these metrics, the team can continuously refine their approach, ensuring that the process remains aligned with the program's goals and operational demands.

Benefits

The more nuanced development of category types for the various recruitment tasks, along with the specific metrics assessed within each sprint, provide new dimension to an already dynamic developing project management model. The detailed tracking implemented in the program makes the project resilient and self-sustaining. Even if team members are replaced or roles are reassigned, the established systems and processes ensure continuity. Tracking tasks at such a granular level allows the program to operate as a standalone framework, ensuring that progress remains unaffected by personnel changes. This is especially suitable to the context of this student driven initiative, as students are in a constant state of change throughout their educational journeys.

It should also be re-emphasized that this project involves graduate engineering students. The project management model requires time for training in a specific application of principles. It is a benefit that graduate engineering students often come with familiarity of project management principles or key concepts. The brief time period detailed herein is somewhat dependent upon students arriving to the initiative with at least a basic understanding of project management.

Concluding Remarks

The research questions regarding the process, challenges, and benefits of applying a hybrid Agile methodological approach to administering a graduate recruitment initiative appear below with concluding remarks:

RQ1. What is the process of applying an Agile-based project management model to practices in the higher education environment?

This project represents a novel application of Agile methodology in academic-administrative project management. By combining innovative tools such as Kanban software and Sprint data tracking spreadsheets, the program is in the process of creating a dynamic model for optimizing complex processes. As the system evolves, ongoing refinement of metrics, processes, and feedback mechanisms will ensure that this developing project management model remains effective and adaptable to the unique demands of graduate engineering student recruitment in higher education.

RQ2. What are the challenges encountered when applying a hybrid agile methodology historically rooted in software engineering to a higher education administration project?

Future assessment of critical enrollment management metrics including applications, admissions, and yield from target countries will be completed. It is also important to note that the Sprint methods were implemented closer to the conclusion of the team's outreach at the end of the semester. It is imperative that the process operate for an entire recruitment and admissions cycle to provide the necessary time needed to effectively assess the efficiency of the sprints. More robust evaluation will therefore be completed in future semesters.

Retrospective sessions with individual team members and the lead graduate assistant and administrator are planned for the end of each sprint. These sessions will provide an opportunity to reflect on what worked well, to identify areas for improvement, and to incorporate team feedback. This collaborative approach will ensure continuous improvement of the process while fostering a sense of ownership among the team members. Retrospectives will also support the long-term sustainability of the system by embedding adaptability into the framework. The retrospective sessions will further enhance the project by systematically capturing lessons learned and integrating them into future workflows. Participant observer surveys will also be conducted to allow team members to provide anonymous evaluative feedback regarding their own experience with the project management process, needs for training, and team collaboration.

RQ3. What are the benefits of applying this model to an administrative recruitment initiative in graduate engineering education?

This project began with a focus on optimizing efficiency in a graduate engineering recruitment initiative led primarily by students. The application of the Kanban and Sprint project management methods came together over time and now serve as the foundation of the effort. Although widely recognized in industrial applications, these principles are relatively new in higher education contexts involving graduate student recruitment. As a result, the project management process is modified to align with the goals of the initiative and the context of non-profit higher education institutions.

Stakeholder engagement, particularly involving graduate engineering students in the graduate recruitment process, can provide valuable insights, increased access to pivotal networks, and the potential to improve recruitment outcomes. It is expected that implementing these Agile project management principles, specifically a hybrid Kanban and Sprint methodology, will assist higher education stakeholders in promoting efficient time management and resource allocation, precise, personalized candidate engagement, and ultimately, a more successful recruitment program that attracts top engineering talent. The developing project management model herein represents a clear first step in providing these project management efficiencies within the sector of higher education administration.

Limitations

The limitations of these findings, due to the small sample size and limited time for program development, include potential issues with generalizability. These factors may also further impact how the hybrid Agile project management model is best formulated. In addition, replicability of the process herein is challenged not only by the small sample size, but also the

unique backgrounds, networks, and skill sets of the individual graduate engineering students selected to carry out this graduate recruitment initiative.

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