Job Analysis of the Design Integration Manager Role on Design-Build Projects

Problem Statement

Since the early 1990s, Design-Build (DB) has become a prominent project delivery method in the commercial building sector and has seen continued growth in the highway, industrial, and aviation sectors (Jones 2006). There are several ways of organizing a DB team, including (1) an integrated Design-Builder with the capability to perform both design and construction services in-house, (2) a designer as the team lead who subcontracts a builder and other designers or engineering consultants, (3) a builder serving as the team lead who subcontracts a designer and engineering consultants (Yates 1995, Charles Pankow Foundation 2011, Tran et al. 2017, DBIA 2018,). The builder serving as the team lead is the most common and relies on the relatively new and unique role of the Design Integration Manager. The Design Integration Manager is an employee or representative of the builder, and is most active during the proposal, post-award, early design, and detailed design phases. The Design Integration Manager is not the designer-of-record or the construction manager, but instead organizes and oversees all the players involved in the design process of the project (Charles Pankow Foundation 2011). Generally, they are responsible for coordinating and developing work plans for the design process, facilitating interaction between the owner's operations staff and the project designers, monitoring procurement schedules, maintaining morale and refocusing the team when challenges arise, and is the bridge between design team and construction team efforts to maintain project alignment. During the construction phase, they will support the construction manager.

Despite the importance of the Design Integration Manager in the DB process, little guidance is currently available on how to prepare individuals to perform in this role. In addition, many other roles exist that may have overlapping responsibilities during the design phase, such as a BIM Manager overseeing the implementation of virtual design and construction processes (Hosseini et al. 2018), or a Design Manager ensuring coordination across the various design disciplines, including structural, mechanical, and electrical systems (Eynon 2013). This raises several key questions about the role, including: *What tasks does a Design Integration Manager perform and when are they performed? What knowledge, skills, abilities, and other factor (KSAOs) competencies are needed to perform those tasks?* The lack of clarity around the role makes staffing the position challenging for builders and reduces the likelihood that the DB team can leverage the value offered by a skilled Design Integration Manager. Therefore, this research proposes to investigate the role of the Design Integration Manager by conducting and reporting on the results of a job analysis that identifies the tasks and required competencies that are needed to perform this role successfully.

Research Methods

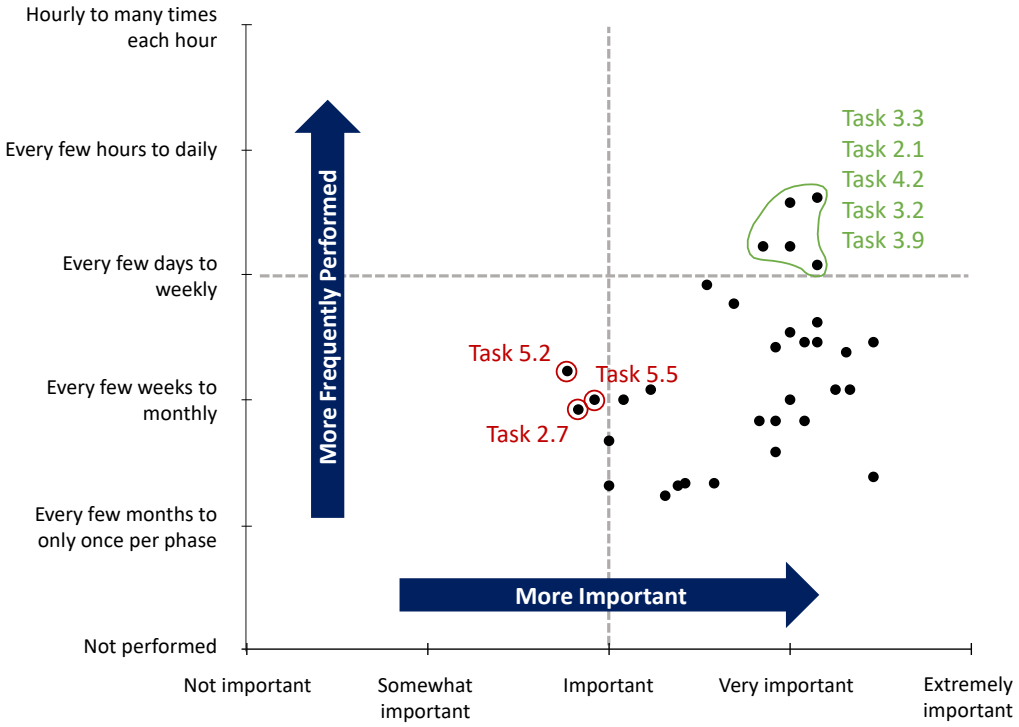
A job analysis generally follows three steps: (1) identifying the specific work tasks performed by the role and the KSAOs that are beneficial to performing those tasks, (2) identifying the critical tasks needed for job performance, and (3) identifying the critical KSAOs needed for an individual to succeed at those tasks. To identify the tasks performed by the Design Integration Manager, we assembled a pool of seven subject-matter-experts (SMEs) on design management in the building construction sector, who were either currently serving in the role themselves or overseeing the Design Integration Managers in their organization. We held a two-day in-person research charrette with these SMEs as participants, which was designed as a guided workshop designed to elicit the responsibilities and competencies of the Design Integration Manager. An example of a discussion led during the first day of the charrette was to have participants articulate their activities on a typical day in their job, as well as at various stages of a project. The participants were instructed to describe their activities using an action verb, the outcome of the action, the tools needed to perform the action, and the amount of flexibility they had when taking the action. This allowed us to quickly identify duplicate or similar tasks that could be represented by a single, more generic task. On the second day of the charrette, our discussion was focused on the competencies needed to achieve these tasks. Participants were asked to describe what knowledge, skills, abilities, or other factors (KSAOs) they possessed, which enabled them to perform well in their role. The result was an exhaustive matrix of tasks and their associated KSAOs.

After the research charrette, we prepared a survey questionnaire to evaluate the criticality of both tasks and KSAOs to the Design Integration Manager role. This survey was distributed as a pilot via Qualtrics to a larger group of 46 design management SMEs across a variety of construction sectors, including highway, industrial, and aviation. For each task, respondents were asked to evaluate both the importance of the task and the frequency that the task is performed. Similarly, for each competency, respondents were also asked to evaluate each KSAO by

its importance, as well as the degree to which the KSAO was needed at the start of the project and its value in distinguishing a superior Design Integration Manager from a barely acceptable one. Both task and competency evaluations were made on Likert scales tailored to each measure. This survey pilot was needed to streamline the questionnaire. Specifically, tasks and KSAOs that scored low across all measures were targeted for removal in the planned broader distribution through professional organizations, such as the Design-Build Institute of America (DBIA) and the Construction Industry Institute (CII).

Key Preliminary Findings

The results of the pilot survey provide early insight into those tasks and competencies that are most critical for the Design Integration Manager role. As shown in Figure 1, technical tasks, such as refining deliverable schedules (Task 2.7) and prioritizing submittal reviews (Task 5.2) tended to score lower, in both importance and frequency scores, on average. Conversely, several management tasks, including building a supportive team culture (Task 2.1), setting goals for effective meetings (Task 3.2), and maintaining team morale (Task 4.2) were rated very important and were performed multiple times per week, on average. This suggests that the Design Integration Manager is seen as having more of a coaching role in the DB team.



Most critical tasks performed:

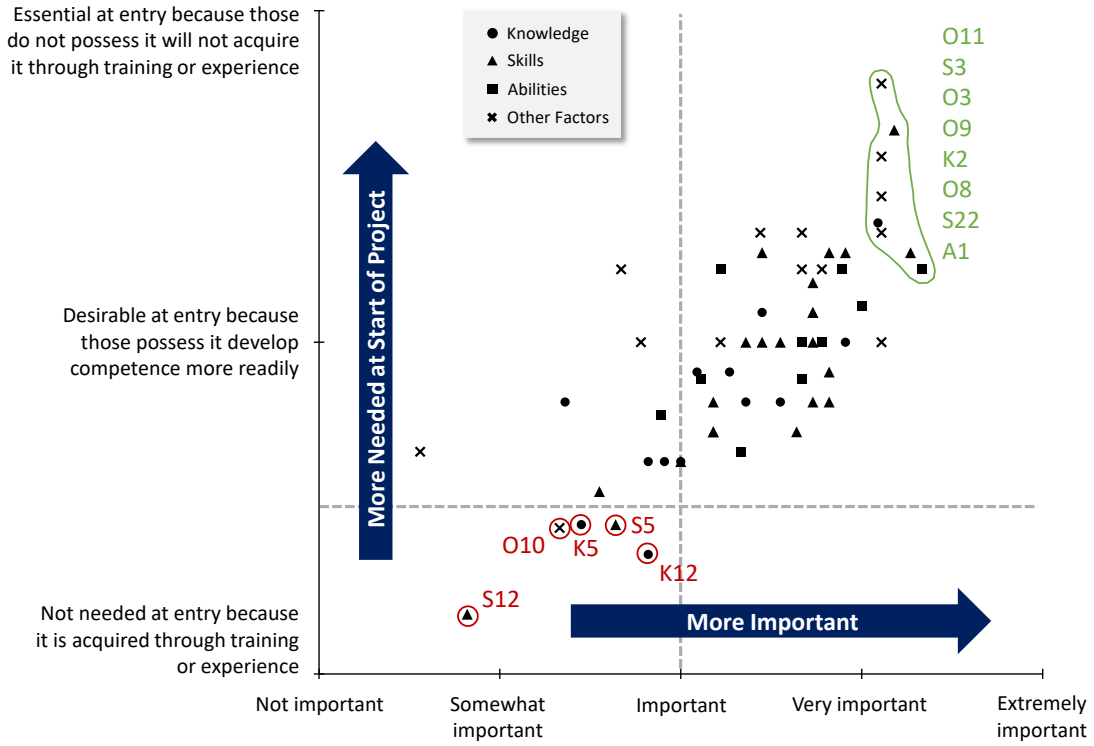
- **Task 2.1:** Build a supportive team culture.
- **Task 3.2:** Set goals, plan, and organize effective meetings.
- **Task 3.3**: Feed information, proactively, to necessary parties in the design team and construction team.
- **Task 3.9:** Maintain a log of design changes and their associated costs.
- **Task 4.2:** Maintain morale and refocus the team when things are not going well.

Least critical tasks performed:

- **Task 2.7**: Refine work plans for design deliverables.
- **Task 5.2**: Prioritize and assign submittals to improve submittal management.
- **Task 5.5**: Remain a resource to project team after completion of design.

Figure 1: Average frequency versus importance for tasks performed by the Design Integration Manager

A similar theme was also evident in the rating of competencies, where skill in listening (S2), the ability to collaborate with partners (A1), other factors that included motivation (O3), trustworthiness (O8), and decisiveness (O9) were all highly important and essential at the start of the project. Interestingly, these are mostly soft competencies, which are not easily teachable. As shown in Figure 2, the least important competencies were more technical, such as skill in using scheduling software (S5) and skill in using design and drafting software (S12), which were seen as easily acquired through on-the-job training or experience. While these results currently represent a limited sample of SMEs, we are actively seeking more participants to expand both the size and breadth of the sample.



Most critical competencies:

- **K2:** Knowledge of the design process and stages of design.
- **S3:** Skill in listening.
- **S22:** Skill in determining client and stakeholder expectations and needs.
- **A1:** Ability to collaborate with team members and partners.
- **O3:** Motivation.
- **O8:** Trustworthiness.
- **O9:** Decisiveness.
- **O11:** Respectfulness.

Least critical competencies:

- **K5:** Knowledge of the capabilities of design and drafting software.
- **K12:** Knowledge of the experience and reputation of local architectural and engineering design service providers.
- **S5:** Skill in scheduling software and pull planning processes.
- **S12:** Skill in using design and drafting software.
- **O10:** Competitiveness.

Figure 2: Average need at entry versus importance for KSAOs needed by the Design Integration Manager

Implications

The construction industry is continuing to grow, and DB projects are expected to represent 47% of U.S. construction spending by 2025 (FMI 2021). This research provides necessary guidance to the body of knowledge on the role of the Design Integration Manager role, which will increase in importance along with the use of DB as a delivery method. When builders cannot find individuals with the skills and qualifications needed to serve as a Design Integration Manager or are not aware of the training needed for the role, then project performance may suffer. There is currently a gap in how academic institutions and builder organizations prepare employees and students for roles on a DB team. This research could be used by academic institutions and professional organizations to adapt their curriculum to better serve and train for this role, and by builders to hire candidates with the needed set of competencies.

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