

DIGITAL KANBAN BOARDS USED IN DESIGN AND 3D COORDINATION

Ralf-Uwe Modrich and Bruce C. Cousins AIA

1 BACKGROUND AND IDENTIFICATION OF PROBLEM /KNOWLEDGE GAP

As the design decisions have been accelerated and building projects have become more complex, the requirement for design teams to become more collaborative is critical to meeting schedule milestones and design deliverables. This change is a result of the compression of design phase schedules and the early active participation of former late phase stakeholders. Traditional planning and management processes are ineffective in managing the design phase of built projects. The Last Planner System® [LPS] has been developed to overcome the inadequacies of traditional push scheduling methodologies. The LPS has been used effectively by construction managers in the construction phase of projects. It has been less effective in the managing the design phase of projects. However, the LPS has proven to be less effective in the project validation and design phase of capital projects.

The Last Planner provides all stakeholders visibility of the overall design schedule and by combining the LPS with an Agile process using a Kanban Board with the following benefits:

- Actions or Inactions are visible and resolved or pivoted from sooner
- Adjustments are easily made on the fly and adjust or predict cycle time and look a head
- The visual effect of seeing new or unplanned work give the design team an up to date indication of design solutions' completeness
- Constraints are immediately seen by the Design team to be scheduled for resolution.
- Limiting work in process [WIP] creates Pull in the project decisions and deliverables
- Implementation requires that the Design Team stop to reflect & adjust plans & processes

2 RESEARCH AIM AND METHODOLOGY

Last Planner System® combined with an agile methodology [Kanban Board] is not now widely used in Design and Construction to plan and manage the Design Phase. This paper used a case study method to evaluate the acceptance and effectiveness of this method by three project teams during the design phase. The case study participants each used a variety of commercially available Digital Kanban applications that are offered by software vendors. Each application was cloud based and supports real time synchronization among stakeholders for distributed development and monitoring of work activities, Information and delivering promised design work for upstream production and meet schedule requirements.

The research used a case study approach to understand

- Acceptance of the design team to of the Kanban method
- The methodology of agile and scrum as a supplement to Last Planner
- The improved process impact on delivery of design decisions with less latency



- The way project teams modified or improved the Kanban Method to meet their desired work flow and ultimately project deliverables

3 RESEARCH FINDINGS

Three use cases showed that the proposed approach was effective. Furthermore, in two case studies the Last Planner System was used as an initial planning tool to set design milestones as well as a weekly work planning. The combination of LPS metrics with the typical Kanban board metrics resulted in synergies and information flow improvements and less latency of the design/builders' work products in the validation and design development phase of project. The hypothesis, that a Kanban Method when combined with a Last Planner method is well suited to management of the Design Process, has been proven true.

Project Teams Reported the following benefits: Use Case One Sword – Confidential Client, **“KanbanFlow”**

- Owner signoff were completed in a Timely way
- Look ahead estimates of Manpower loading was more accurate to balancing work load assignments
- Revisions and Rework were blended into the normal workflow – Less fast tracking was required
- Coordination of the upstream supply chain handoffs were articulated and prioritized
- Kanban Cards preserved a record of individual work activities
- Daily Stand-up meetings identified constraints, allowed rapid adjustment and/or indicated pivots minimizing negative iterations.

Project Teams Reported the following benefits: Use Case Two Woods Bagot **“Trello”**

- Made communication of responsibilities of JV Teams, consultants were made clear
- Posting work to the board clarified both short and long term deliverables priorities
- Created a project wide transparency and better overall communication between owner, construction manager and the designers
- Level of Development [LOD] was used to define work products

Project Teams Reported the following benefits: Use Case Three Austin Webcor, **“SmartSheet & Jira”**

- Each team member could quickly see the assigned work load and commit to achievable work load.
- Visualizing work in process on project, team and company level
- Assigning work across office locations and software application
- Bi-directional data flow between Kanban software increased cycle time
- Kanban card show picture of actual 3D coordination view-point
- 24/7 status visibility of weekly committed work plan on Kanban board

