12 MEETING FACILITATION TECHNIQUES TO IMPROVE HEALTHCARE DESIGN DEVELOPMENT

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ABSTRACT

Architecture-Engineering-Construction (AEC) project development is complex when the work of many design and construction specialists is tightly coupled. Since it is inefficient for these specialists to be individually responsible for obtaining the input they need from others, project team leaders often rely on coordination meetings to facilitate the exchange of requests and information between specialists. Such coordination meetings are critical to lean projects because they provide a framework for clarifying and prioritizing stakeholder values, design and construction objectives, and constraints to design and construction work. To help the AEC industry improve its management of coordination meetings, we describe 12 meeting facilitation techniques used to improve coordination of design development on a current hospital project. These techniques enable project team leaders to view and manage coordination meetings as production systems and thus learn how to better manage the decision making process required for design development. We want this paper to inspire others to share their facilitation techniques and begin investigating their effectiveness to improve efforts in "coordinating the coordination meetings."

KEYWORDS

Meeting Facilitation, Coordination Meetings, Healthcare Design Management, Lean Leadership, Big Room, Oobeya

MANAGING MEETINGS IN THE BIG ROOM (I.E., "OOBEYA")

Toyota used oobeyas or "big open offices" to bring "together people from all parts of the company" to work on reducing costs, mistakes, and constraints (Warner 2002). Previous AEC research has recognized the value of using "Big Rooms" to coordinate all design detailing work between specialty contractors (Mikati et al. 2007, Khanzode et al. 2008). In this case study, we will review how a hospital used a Big Room for coordinating the design development process. Since client delays in decision-making introduced constraints into the design development process, we will describe how the AEC project team used techniques to improve the client's decision-making process and ensure that the project's design supported and improved hospital operations.

CASE STUDY OVERVIEW

We conducted our research on a hospital addition project in the Simon Family Tower of Indiana University (IU) Health's Riley Hospital for Children. IU Health signed an Integrated Project Delivery (IPD) contract for the design and construction of the

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hospital addition with the project team (HKS 2011). The project's IPD team includes Indiana University Health (client), BSA Life Structures (MEP design), Bright Sheet Metal (mechanical and ductwork subcontracting), Cripe Architects + Engineers (equipment planning), Ermco, Inc. (electrical subcontracting), HKS Architects (architectural design), Maregatti Interiors (interior design), Messer Harmon (construction manager), North Mechanical Contracting, Inc. (plumbing subcontracting), and Ratio Architects, Inc. (architectural design) (ibid). Baker & Daniels LLP served as the IPD team's legal counsel.

On the Simon Family Tower, the IPD team used Target Value Design (e.g., Ballard and Reiser 2004), Choosing By Advantages (Suhr 1999), and Set-Based Design (Sobek et al. 1999) to help with work structuring (Tsao et al. 2004). This paper will focus instead on describing 12 techniques that meeting facilitators used to manage design development meetings on the Simon Family Tower. The meeting facilitators on the project were HKS' lead healthcare planner and design project manager. These two HKS employees regularly exchanged the roles of lead meeting facilitator and facilitator support to provide each other breaks from leading the meetings and introduce some variety of personality and style into the meetings.

TECHNIQUES FOR FACILITATING COORDINATION MEETINGS

The Simon Family Tower used a number of meeting facilitation techniques to improve coordination of healthcare design development. Although these techniques continue to evolve, the following sections explain in greater detail their current use on the project based on a reflection of their most recent applications and lessons learned.

TECHNIQUE #1: USE OF A3S AND A3 FILE NAMING CONVENTION

File naming convention is important because it helps establish a communication protocol for design management and integration (Staub-French and Khanzode 2007). On the Simon Family Tower, the majority of design work consisted primarily of problem solving tasks. Consequently, the project team selected A3 reports as the approach for recording problems, developing strategies for resolving the problems, and capturing results (Sobek and Smalley 2008). The project team decided to manage all problems, even the small ones, with A3 reports. As a result, the project team generated a number of A3 reports for this project, so much so that HKS needed to offer a course on generating A3s for its employees who were involved in the Simon Family Tower to promote the benefits of real-time recording of problem solving.

For example, during the first design sequence (i.e., "Sequence 1") of the Simon Family Tower, the project team generated 55 A3 reports across six 2-day meetings held every two to three weeks. At these meetings, 24-30 meeting participants generated the A3 reports to balance the operational needs within design development for the Burn Center, Cancer Center, and Neonatal Intensive Care Unit (NICU). Of the 55 A3 reports, 30 addressed new design issues and 25 revisited previous design issues (N.B. – the project team recorded the revisiting of previous design issues on "Iteration A3s"). Figure 1 shows the number of A3 reports generated during Sequence 1 of the Simon Family Tower. The dates in Figure 1 correspond to the first day of the 2-day design coordination meetings. "Iteration A3s" revisit previously addressed design issues. Since IPD team members were not co-located, the IPD team used these meetings to work not only with the client but each other as well.

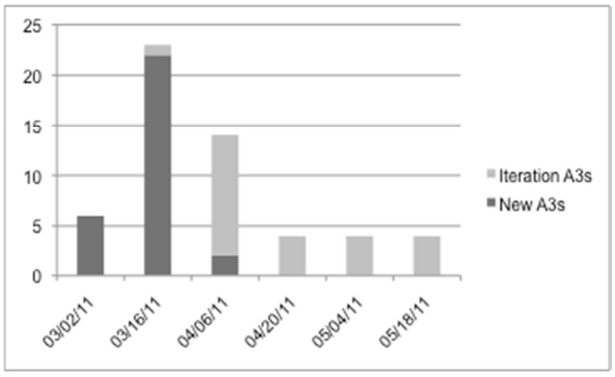

Figure 1: A3 Reports Generated during Design Meetings for Sequence 1

From Figure 1, we can see how the project addressed numerous design issues, especially during the 2nd and 3rd meetings. Thus, in accordance with the 5S technique for workplace organization, the project targeted "sorting" and "standardizing" the A3 reports to maintain better project records and improve design communications.

At the start of design, the project team developed a standard naming convention for the A3 reports. Each filename consisted of the following four components

- **Letter Codes** identified the classification of the A3. They may reference a process used by the project team (e.g., Target Value Design) or a hospital unit that is being design.
- **Number Codes** established the type of problem being addressed.
- **All-Caps Phrases** highlighted the design spaces being discussed.
- **One- to Four-Word Phrases** briefly described the type of problem being addressed.

Number codes in the 100s, 200s, etc. up to the 900s represented the generation of new A3s. Those in the 101s, 201s, etc. up to the 901s represented revisiting previous design issues and the resultant generation of "Iteration A3s." Number codes in 150s, 151s, etc. represented the "Unit Configuration A3s." Those in the 1000s, 1001s, 1500s, and 1501s, etc. represented "Mock Up A3s." New A3s, Iteration A3s, and Mock Up A3s all supported the development of the Unit Configuration A3s. Unit Configuration A3s then informed the development of the project's Revit model.

Table 1 outlines the naming convention used during Sequence 1 of the project.

TABLE 1: Naming Convention for Sequence 1 A3 Reports

Letter Codes	Process or Units	Design Space	Number Codes	Types of A3s
TVD	Target Value Design	TVD	100s, 200s, etc. up to 900s	New A3s
B	Burn Center	BURN	101s+, 201s, etc. up to 901s	Iteration A3s
HS	Cancer Center	CANCER CENTER	150s, 151s, etc.	A3s for Unit Configuration
N	NICU	NICU	1000s, 1001s, etc. 1500s, 1501s, etc.	A3s for Mock Ups

Based on this naming convention, A3 filenames took on the following form:

- **Naming Convention:** "LettercodeNumbercode-DESIGNSPACE-Designtopic.pdf"

- **Examples:** "B400-BURN-patient transport.pdf", "HS151-CANCER CENTER-Unit Configuration.pdf", and "N1002-NICU-Patient Room Mock-Up.pdf"

For example, "N1002-NICU-Patient Room Mock-Up.pdf" represented the third iteration of the NICU patient room mock-up. Thus, if someone mentioned an A3 filename during a meeting, those who were stakeholders in that design issue would be alerted to pay closer attention to the emerging discussion. Although it was tedious to develop and adhere to the A3 filename convention, team members were able to communicate more efficiently about the design issues that were under consideration.

TECHNIQUE #2: ADHERE TO SEVEN FLOWS OF HEALTHCARE

Healthcare clients focused on improving the delivery of healthcare systems have embraced the "Seven Flows of Healthcare" (i.e., flows of patients, clinicians, medication, supplies, equipment, information, and process engineering) as a standard approach for managing the healthcare delivery process (Black and Miller 2008, Graban 2011, Wellman et al. 2011). Since lean design focuses on designing around operational flows, the space does not tell you how to work in it. Rather, the work tells you how the space should be built. Accordingly, lean design needs to not only understand but also respond to how:

- **Patients** flow through a space, that is, how people travel through a healthcare facility.
- **Clinicians** generate value through their interaction with patients. Lean design needs to support the interaction between patient flow and clinician flow in such a way as to add and not remove value.
- **Medication** flow supports the treatment of patients and compliance with industry regulations. Lean design needs to reduce and eliminate inefficient or disruptive flows that introduce errors into medication flows.
- Clients use data to make transparent, coordinate, and support **supplies** and **equipment** flows.
- Healthcare operations relies on the flow of **information** in both clinical data related to the practice of care as well as operational data related to the process of care.
- Clients sustain continuous improvement through the flow of **process engineering**.

It is very important for the design of healthcare facilities to factor how the Seven Flows interact with each other and how the built environment can affect the Seven Flows. Hence, it is an architectural responsibility to provide innovative ideas that will help facilitate and improve the Seven Flows to improve client operations. On the Simon Family Tower, facilitators used the Seven Flows to organize discussions, structure design problems in the form of A3s, and settle on final design decisions.

TECHNIQUE #3: VARYING MEETING ACTIVITIES PHYSICALLY & MENTALLY

Wittenberg (2006) noted that research on optimal team numbers is inconclusive, but "it does tend to fall into the five to 12 range, though some say five to nine is best, and the number six has come up a few times." Due to the IPD contract and project complexity, the Simon Family Tower was not able to limit design coordination meetings to so few attendees. Rather, meetings involved 24 to 30 people each due to

their expertise and input into the design development process. For instance, a design meeting may contain about 20 client attendees and 10-12 IPD team members.

Design meetings also ran for four hours at a time. While there is reasonable cause for concern that such meeting lengths will increase worker fatigue or workload, Luong and Rogelberg (2005) did not find this correlation in their research. Rather, the workers they studied reported increased feelings of fatigue and workload primarily due to a higher frequency of meetings. Thus, instead of switching to holding multiple, shorter meetings, meeting facilitators on the Simon Family Tower focused on keeping attendees engaged during longer meetings. Specifically, facilitators varied meeting activities physically and mentally to help attendees pay closer attention to the tasks at hand and make better-informed decisions. This is similar to how the managers at Toyota's Georgetown, KY, manufacturing plant broke up each worker's 8-hour shift into four 2-hour elements consisting of one challenging task, two medium-difficulty tasks, and one easier task to prevent worker fatigue and injury.

Technique #4: Introduce Gemba Walks

Facilitators introduced Gemba walks as a way to break up meetings (Imai 1997). Gemba on the Simon Family Tower involved taking a walking trip to see: (1) the end users' existing space, (2) different detail options, (3) mock-ups, or (4) any value added trip that gets meeting attendees onto their feet. By engaging attendees in a physical activity, facilitators were able to encourage attendees to use more senses to describe, consider, and resolve design problems. As a result, the Gemba walks helped the IPD team and client attendees develop a common language and project understanding based on their shared sensory experiences.

Technique #5: Aggregate Discussions based on Design Specialties

Facilitators also aggregated design discussions based on design specialties instead of rooms. Traditionally, meeting attendees would discuss all details related to a single room before moving on to the next room. Then the meeting discussion would move from room to room within a hospital unit. Within this type of discussion structure, design specialists became engaged in the meeting for only about 5-10 minutes at a time whenever their design specialty came up in the room discussion. This resulted not only in an inefficient use of design specialists' time, but the meeting became tedious as the same series of design questions were re-deliberated from room to room with often similar if not identical results.

Instead, on the Simon Family Tower, facilitators made specialists responsible for managing the discussions based on design specialties. For example, the lighting specialist managed the lighting discussion during which all facets of lighting were discussed at once. This enabled the right person to not only ask questions of the end users, but it also allowed the right person to respond to end user questions.

Technique #6: Save Sensory / Creative Considerations for the End of Meetings

Certain types of design decisions involved spatial reasoning (e.g., determining the square footage for a patient room) while others involved sensory and creative considerations (e.g., deciding on a patient room's interior finishes or room amenities). Facilitators found it easier to keep meeting attendees focused if some of the last design discussions involved more sensory decisions. For example, attendees remained more engaged near the end of the long, 4-hour meeting if they handled

physical samples for different interior finishes or observed project renderings to consider different paint colors for a room under consideration. The renderings and the physicality of handling solid samples for interior finishes created a sensory response to design amongst attendees. As a result, these sensory and creative considerations evoked more feelings by attendees about the spaces under consideration more than sorting out the square footage. Due to this higher response rate, facilitators always made sure to schedule these tasks for the end of the long, 4-hour meetings.

Sample Meeting Design

The following sample agenda demonstrates how the facilitators attempted to vary physical and mental activities for a four-hour meeting. During the meeting, the facilitators will also adjust the agenda based on needs and what is on the Parking Lot.

- First hour – Square footage discussion for a patient room in the Burn Center (seated in Big Room)
- 10-minute break – Walk to visit the tub room mock-up located on another floor
- Next 40-minutes – Review and discuss tub room mock-up (everyone standing)
- 10-minute break – Walk back to the Big Room
- Third hour – Review patient transportation process within the Burn Center and its implications on unit configuration (seated in Big Room)
- 10-minute break – Meeting break
- Next 40-minutes – Review amenities for the Burn Center's patient rooms (seated in Big Room)
- Last 10-minutes – Meeting Plusses/Deltas (seated in Big Room)

TECHNIQUE #7: MAKE-READY PROCESS FOR DECISION MAKING

Taylor (1993) noted that (1) design is highly interactive, (2) there is considerable interdependence between the problem and solution, (3) design entails foresight and anticipation, (4) there are alternating periods of divergence and convergence, and (5) design evaluation is typically a comparative process. To help the client sufficiently consider these various design issues and design alternatives, project team leaders implemented a "Make-Ready Process" for decision making on the Simon Family Tower. The following list details the primary elements of the "Make-Ready Process."

- **At the start of each design sequence:** Project team leaders and the client broke up the project into three sequences to establish which hospital units would be developed first. Then, the client formed a group of 15 decision makers at each sequence start. Instead of selecting decision makers based on hierarchy, the client selected staff who had the right mind-set for improving unit efficiency, possessed the trust of their unit, and could act on behalf of the hospital as a whole.
- **Two weeks before the next two-day design meeting:** Project team leaders sent to the decision makers a list of design decisions that needed to be made during the next design meeting. Decision makers familiarized themselves with the issues related to these decisions in the time leading up to the design meeting. Design meetings typically occurred once every two to three weeks.
- **First day of two-day design meeting:** Decision makers participated in a 24- to 30-person design development meeting that lasted four hours at a time. During this meeting, different stakeholders sorted out competing project values that influenced the design issues at hand.

- **Second afternoon of two-day design meeting:** Decision makers met with the project's IPD group for two hours to go through each design decision. Sometimes, decision makers ended up representing two different perspectives (e.g., two different hospital units). If decision makers from both perspectives made the same choice for a decision, then the decision was easily settled. If they disagreed, then they negotiated a decision to support the ultimate goal of hospital standardization.
- **The CEO is watching:** On occasion, the hospital CEO sat in on the two-hour decision makers' meeting. This encouraged decision makers to focus on global optimization as opposed to local optimization (i.e., making decisions that improved hospital operations as a whole as opposed to optimizing the operations of a single hospital unit).

With this "Make-Ready Process" in place, the IPD team ensured that the client made decisions on a timely basis and allowed design development to proceed as planned.

TECHNIQUE #8: MEETING ATTENDEE CHECK-IN POSTER

During Sequence 1 of the Simon Family Tower, the project team had difficulty keeping track of the meeting attendee check-in sheets. These sheets were printed on letter-sized paper and easily got lost amongst the shuffle of papers in the Big Room. As a result, the meeting facilitators did not have an accurate record of meeting attendance despite their requests of meeting attendees to sign the check-in sheets.

By Sequence 2, facilitators decided to emphasize the importance of the check-in process by increasing its transparency. Specifically, they developed a check-in poster approximately 76 cm x 229 cm (30 x 90 inches) in size containing 72-point font. The check-in poster's rows contained the names of all potential meeting attendees and columns represented the dates of all meetings within the design sequence. Facilitators placed the check-in poster near the Big Room door so attendees would be reminded and encouraged to check-in once they entered the room (Figure 2).

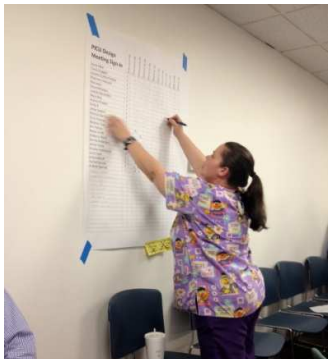

Figure 2: Meeting Attendee Checking-In (Photo by B. Beikmann)

Figure 3: "Big Room Rules" Posted on Back of Big Room (Photo by B. Beikmann)

This transparency made meeting attendees more accountable for themselves. Meeting attendees became responsible for: (1) checking in for the current meeting, (2) confirming that their attendance was recorded correctly for past meetings, and (3) ensuring that their names were spelled correctly within the project record.

TECHNIQUE #9: BIG ROOM RULES OF ENGAGEMENT

Establishing rules of engagement for the Big Room improves and encourages the engagement of all meeting attendees during design discussions. The Simon Family Tower settled on the following Big Room Rules of Engagement:

- **This is a Safe Zone** – Everyone is encouraged to speak their mind without concern for embarrassment or ridicule by others.
- **No Stripes** – We all have equal status and say in all matters. No one person has more authority than others.
- **Speak Up** – Get engaged in conversation and share ideas. Your opinion is important in helping guide the team.
- **Listen to Others** – Focusing on what others have to say helps you understand their point of view.
- **No Sidebar Conversations** – Only have one meeting at a time. Conversations should be heard and shared by all.
- **Not Here, Not Now** – You have the ability to declare this if a conversation goes the wrong direction. New conversation will be put in a parking lot for later discussion.
- **Two-Minute Rule** – If anyone talks about a single point for longer than two minutes, it may be worthy of a side conversation or agenda topic, declare this to put this idea in the parking lot for future discussion.
- **Stay on Time** – This includes start time, end time, break times, and agenda.

To illustrate their commitment to these rules, the facilitators posted an abbreviated version of the rules on the back wall of the Big Room for each meeting (Figure 3).

TECHNIQUE #10: PARKING LOT

Meeting facilitators strived to design the meetings to ensure that: (1) the right people were there at the right time, (2) the discussions were appropriate for the people in the room, and (3) experts were present only for the discussions in which their expertise is needed. However, it was inevitable that meeting discussions will begin addressing: (1) information, topics, or discussions that were not essential for the discussions or decisions in the current agenda item, (2) research required for the decisions at hand, or (3) discussion too detailed for the decisions at hand.

If these meeting discussions carried on for more than two minutes, the meeting facilitators placed them in the "Parking Lot." Specifically, the meeting facilitators alerted the meeting attendees that their discussions were not appropriate for the decisions at hand, so they recorded the issues being discussed onto a flipchart located on the front wall of the meeting room. This enabled meeting facilitators to capture important information and discussions but not lose sight of the tasks at hand.

The Parking Lot showed meeting attendees that while their thoughts were important, the meeting needed to prioritize the decisions that were part of the current value stream goal. It also helped meeting facilitators end discussions when the right people were not in the room. Then, meeting attendees were able to: (1) discuss a Parking Lot item at the end of the meeting if time permits, (2) designate a Parking Lot item as an agenda item for a future meeting, or (3) form a task group to research a Parking Lot item to assist with future decision-making. Such plans would then be recorded on related A3 reports as homework items.

TECHNIQUE #11: BIG ROOM WALL LAYOUT

On the Simon Family Tower, the meeting facilitators got the client to cover the front wall of the Big Room with white board paint. Then, the front of the Big Room featured: (1) a projection screen for projecting related PowerPoint or Revit files, (2) specific meeting goals, and (3) the Parking Lot (Figure 4). As the meeting attendees completed a meeting goal or resolved a Parking Lot item, facilitators checked off the goal or item on the front wall of the Big Room.

As noted earlier, meeting facilitators posted the Meeting Attendee Check-In Poster near the Big Room door (Figure 2) and the Big Room Rules on the back of the Big Room (Figure 3). They also listed all meetings within the design sequence next to the Big Room Rules and checked off each completed meeting on that list.

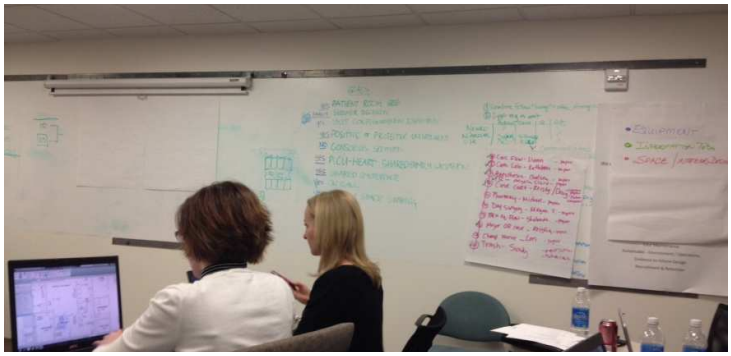

Figure 4: Layout of Front of Big Room (Photo by B. Beikmann)

TECHNIQUE #12: BRING IN AN OPERATIONS SPECIALIST

The Simon Family Tower experienced one design breakdown in which client attendees became uncomfortable with a proposed patient room size but did not speak up about their discomfort for two meetings. They revealed their feelings during the 5th meeting of a design sequence, so the facilitators had to stop the current design conversations and get all attendees to reconsider unit configuration. Since this problem would delay design development, the facilitators brought in an operations specialist to help after the 6th meeting. The specialist was an expert with a medical background who was also experienced in the Seven Flows of Healthcare. The specialist led an all-day workshop to help meeting attendees develop five to six ways to achieve an ideal future state for processing patients through the hospital unit. Then, due to the intervention provided by the specialist, the project team was able to turn the design around in a matter of weeks versus what could easily have been months.

FUTURE RESEARCH AND CONCLUSIONS

The project's IPD team on the Simon Family Tower continues to refine techniques to improve the healthcare design development process. Future research may examine how the IPD team used Target Value Design, Choosing By Advantages, and Set-Based Design to help with work structuring as well as how the IPD team used the Last Planner System™, Responsibility-based Project Delivery (RbPD), and visual management to help manage design development. By initially describing 12 facilitation techniques in this paper, we strived to begin making the facilitation

process transparent and encourage other AEC researchers to join the conversation on "coordinating the coordination meetings" by sharing their lessons learned in meeting facilitation. Then, we encourage future research to begin investigating the effectiveness of the most popular techniques being employed in practice.

REFERENCES

Ballard, G. and Reiser, P. (2004). "The St. Olaf College Fieldhouse Project: A Case Study in Designing to Target Cost." *Proc. 12th Ann. Conf. of the Int'l. Group for Lean Constr.*, IGLC-12, Copenhagen, Denmark, Aug 3-5.

Black, J. and Miller, D. (2008). "*The Toyota Way to Healthcare Excellence: Increase Efficiency and Improve Quality with Lean."* Health Admin. Press, CHI, IL, 224 pp.

Graban, M. (2011). *Lean Hospitals: Improving Quality, Patient Safety, and Employee Engagement.* CRC Press, Boca Raton, FL, 268 pages.

HKS (2011). "Indiana University Health Team Signs IPD Contract on Riley Hospital Addition." HKS Press Release, Dallas, TX, 11 July, Available at: http://hksinc.com/news/hospitality/press-releases/2011-07-11/Indiana-University-Health-Team-Signs-IPD-Contract-on-Riley-Hospital-Addition, visited 4/10/2012.

Imai, M. (1997). *Gemba Kaizen: A Commonsense Low-Cost Approach to Management.* McGraw-Hill Professional, New York, 354 pages.

Khanzode, A., Fischer, M., and Reed, D. (2008). "Benefits and lessons learned of implementing building virtual design and construction (VDC) technologies for coordination of mechanical, electrical, and plumbing (MEP) systems on a large healthcare project." *ITcon*, vol. 13, 324-342, http://www.itcon.org/2008/22.

Luong, A. and Rogelberg, S.G. (2005). "Meetings and More Meetings: The Relationship Between Meeting Load and the Daily Well-Being of Employees." *Group Dynamics: Theory, Research, and Practice*, 9(1), 58-67.

Mikati, S., Roller, T., Tommelein, I.D., and Khanzode, A. (2007). "Priority Conversations: A Case Study On Priority Walls." *Proc. 15th Ann. Conf. of the Int'l. Group for Lean Constr.* IGLC 15, East Lansing, MI, July 18-20.

Sobek, II, D.K. and Smalley, A. (2008). *Understanding A3 Thinking: A Critical Component of Toyota's PDCA Mgmt. System.* Productivity Press, NY, 184 pages.

Sobek, II, D.K., Ward, A.C., and Liker, J.K. (1999). "Toyota's Principles of Set-Based Concurrent Engineering." *Sloan Mgmt. Review*, 40(2), Winter, 67-83.

Staub-French, S., and Khanzode, A. (2007). "3D and 4D Modeling for Design and Construction Coordination: Issues and Lessons Learned." *ITcon*, 12, 381-407.

Suhr, J. (1999). *The Choosing By Advantages Decisionmaking System.* Quorum Books, Westport, CT, 304 pages.

Taylor, A. (1993). "The Parallel Nature of Design." *J. Engrg. Design*, 4(2), 141-152.

Tsao, C.C.Y., Tommelein, I.D., Swanlund, E., and Howell, G.A. (2004). "Work Structuring to Achieve Integrated Product-Process Design." *ASCE, J. of Constr. Engrg. and Mgmt.*, Nov/Dec, 130(6), 780-789.

Warner, F. (2002). "In a Word, Toyota Drives for Innovation." Fast Company, New York, Jul 31, available at: http://www.fastcompany.com/magazine/61/toyota.html.

Wellman, J., Jeffries, H., and Hagan, P. (2011). *Leading the Lean Healthcare Journey: Driving Culture Change to Increase Value.* Productivity Press, New York, 292 pages.

Wittenberg, E. (2006). Quoted in "Is Your Team Too Big? Too Small? What's the Right Number?" Knowledge@Wharton, Philadelphia, PA, June 14