

## ENABLING LEAN WITH IT

Champion: Rafael Sacks

Support: Fritz Gehbauer

Construction research is increasingly revealing synergies between the adoption of lean practices and information technologies (IT). Information systems tend to improve process flows: by eliminating non-value adding activities, shortening cycle-times and reducing errors in production, thus reducing rework, and mitigating variation in processes. In some cases, the IT systems are introduced as part and parcel of planned lean construction initiatives, and so are consciously and carefully geared to facilitate implementing lean construction. In other cases, the initiators of IT systems in construction may be oblivious to the fact that the benefits that accrue can be understood and explained from a conceptual perspective in terms of lean construction concepts, such as pull flow, production system design for reduced batch sizes, elimination of waste, and unobstructed information flow and transparency.

Naturally, the degree of realization of the potential of IT implementations in construction is likely to be much greater when the OIT systems are part of a conscious lean thinking oriented improvement strategy. On the other hand, lean initiatives in construction are greatly enhanced, and sometimes can only be implemented, by application of IT.

The main goal of this IGLC focus area is therefore to investigate the synergies between lean construction and IT. How can lean measures be facilitated by building information modelling (BIM)? How, and how much, do IT systems contribute to improved process flow, reduced rework, etc.? What kind of IT tools are needed? What IT implementations are appropriate for what lean measures?

Some of the specific focus areas for IT application are:

- Optimization of materials, information, and labor flows.
- Reduction of the incidence of non-value added activities.
- Increasing product values by better understanding client needs.
- Reducing process variability.
- Reduction of process cycle time (transportation + wait + pre-process + inspection) reduction.
- Enabling smaller production batches.
- Better production process planning guaranteeing the availability of materials, equipment, tools and information at the right place and time with the required quality.
- Increasing product flexibility.
- Increasing process transparency

IT research in service of lean construction is not limited to implementation of IT systems, but also includes a range of methodologies and research and experimentation tools needed for the incremental improvements that lean thinking demands. The range of methodologies and tools, and some of the key research issues, include:

- Simulation, modelling and optimization tools to study and optimize materials, information and labour flows.
- Sensors, GPS tools, scanning technologies, wireless computing, and radio frequency ID tags for improved construction site data acquisition allowing better modelling, knowledge

generation, inventory management, and control of construction processes (applied to tracking managing flows of material, equipment, and labour).

- Methods, such as BIM, to reduce lead times for engineered-to-order products.
- Virtual construction: improved construction product and process models allowing us to learn how to build the project in the model.
- Development of tools to support the transition from a document-based to a model based design process.
- IT Tools to increase pre-assembly and prefabrication in order to reduce construction on site to final assembly installation and commissioning.