



Newsletter 2-2018



Enhancing the business effectiveness of the capital facility life cycle through research and development and driving business value for your capital projects

CII Annual Conference Report Back – Indianapolis

Each year the Construction Industry Institute (CII) holds its annual conference in a different city in the USA. This year, the conference was held in Indianapolis, in the state of Indiana during the last week of July.

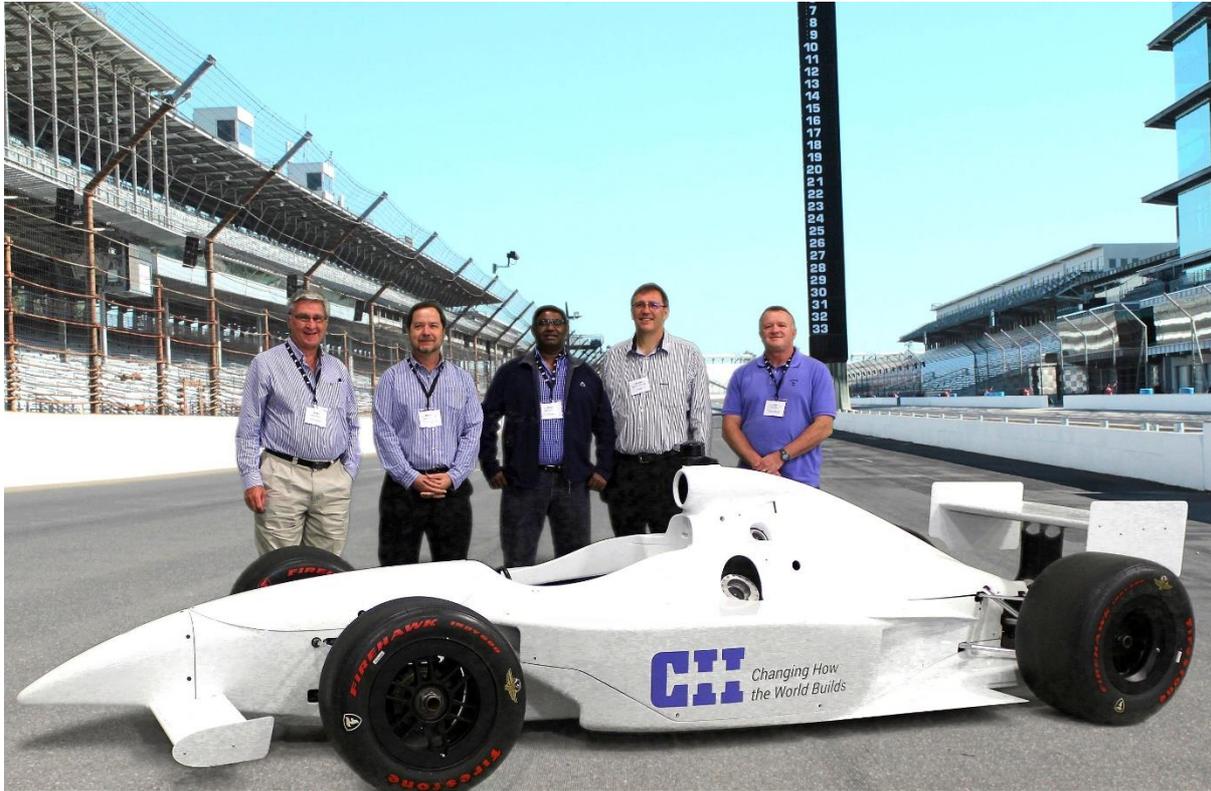
The CII Annual Conference is the premier event of the capital projects industry, where the CII research findings and developments are presented by some of the brightest minds in academia and industry experts from owner companies, large contractor companies and original equipment manufacturers.

The conference was attended by over six hundred delegates representing many well-known large owner, contractor and original equipment manufacturer companies, as well as academia and government agencies. The CII is comprised of over 149 different industry member organisations.



The CII Africa Chapter was represented by Giel Bekker from the University of Pretoria and Mike Murray. In addition, we had two delegates from Exxaro and one from Kumba. Hardus Mulder, who is currently sitting for a PhD in Project Management at the University of Pretoria, presented on his Research Report; the development of a Project Definition Rating Index for Mining Projects, to the CII Upstream, Midstream, and Mining Sector meeting.





*SA-Team – standing LtoR:
Mike Murray, Hardus Mulder, Mervin Govender, Martin von Wielligh, Dr Giel Bekker*

The conference theme this year was, ‘**Imagine – the value of transformative possibilities**’. This theme provided the context for speakers’ presentations that focused on the emerging developments in technology, automation, artificial intelligence and the challenges facing the craft (organised labour and trades) that will impact and transform the construction and capital projects landscape in the next decade, and sooner.

Driven by the rapidly changing environment in which construction and capital projects take place, CII research and development of best practice methods and tools is becoming focussed on shorter development cycles and more immediate benefits appropriate to specific industry sectors.

The members of CII represent some of the most successful companies in the world. The CII provides a unique industry collaborative forum for researching and sharing best practices within the capital projects industry. As such, CII participation provides a tremendous advantage to member organisations. The vision for CII is improvement of the capital projects sectors and CII member companies are helping to drive that success.

The CII organisation is structured into five industry sectors with research being more focussed on a per sector basis to ensure relevance and applicability to a particular sector. Research and development of practices, methods and technologies has to be shortened so that long-term development is achieved within two years, and shorter-term research and development is of six months to a year in duration, to ensure quicker applicability and relevance in a rapidly changing landscape.



Dr Stephen Mulva, the Director of the CII, a research component of the University of Texas at Austin, opened the Annual Conference with topic; ‘Imagine what’s possible’. For the past few years, CII has been repositioning its structure and operations to prepare its membership and the capital project industry for future success. The CII intends to provide the lead in delivering innovation and discovery to realise “what’s next”. He set the foundation for the conference by asking; is your organisation prepared to embrace emerging technologies and the new opportunities they bring? Will you, the delegates, personally, volunteer to lead the industry and your company in doing things



differently? If the answer is “yes”, then you’re ready for the next step: to imagine what’s possible!

Stephen highlighted the underutilised services and resources of CII: Online training and other training services; Performance assessment and benchmarking; the Implementation and deployment of the many CII best practices; participation in research teams (RT) to identify industry needs and develop improved practices; industry networking, and university collaboration opportunities. The CII provides the platform and structure to support industry capital performance improvement – the industry needs to make use of it to gain the full benefits. CII research and CII member companies have clearly demonstrated statistically significant improved cost performance for CII members working with each other, versus CII members working with non-CII members. In addition, they have demonstrated significantly better cost performance when an owner’s business and project teams interact at a high level and the project sponsors are actively involved. And significantly improved schedule performance when CII practices (FEP and PDCS) are deployed and the project sponsors are actively involved. The construction capital projects industry is the only major economic sector NOT to have benefited from productivity improvements going back to the 1960s. In fact, its productivity has dropped.

The biggest challenges facing CII sustainability in achieving its goal and objectives is maintaining and growing volunteer efforts and participation in ongoing research and the deployment of best-practice implementation tools and practices.

The CII together with the integration of FIATECH is creating the knowledge structures to enable the capital projects industry to be prepared for and embrace technology enabled transformation. Digitisation, automation and artificial intelligence are rapidly evolving and the capital projects industry has to be prepared for them if the industry is not to be left behind.

Fiatech is the emerging technology arm of the Construction Industry Institute (CII) that is focused on enhancing capital asset value through leading innovative technologies. It is predominantly an industry-led, collaborative, not-for-profit, technology research and development consortium to address breakthrough technology-oriented opportunities to accelerate integration and automation. They have developed a Capital Projects Technology Roadmap to amalgamate the efforts of industry, industry associations and funding agencies in the development and deployment of emerging and new technologies.

A motivating keynote address titled ‘Life is about influence’ was provided by John Daly, the Liddel Professor of Communication at the University of Texas at Austin. He highlighted the fact that successful leaders know how to effectively influence others, stressing that the skills required to influence others are critical for safety, efficiency and effectiveness. The presentation provided well described ways to enable people to be more influential in the workplace by presenting ideas that have impact and delivering more persuasive messages.

A model of influence was provided with four stages; create a need; have a plan; show the benefits to be had; define what will happen if we do not adapt. He described a useful technique, “Nudging”, to create settings or events that “make” people engage in different behaviours without feeling forced to change their behaviour.

The value to be had from the presentation, ‘Life is about influence’, was that it provided conference delegates with a proven approach and the requisite knowledge to be better equipped to influence their own companies to participate in CII activities, or to motivate other non-member companies to consider becoming members of the CII.

The CII Annual Conference is primarily a platform for the member organisation Research Teams (RT) to share new research, best practices and implementation tools.

It is important to note that CII Research Teams are motivated by the industry member companies of CII and the research team members comprise personnel from both owner, contractor, academic institutions and public sector institutions. They are not solely academic driven. In addition, the participating team members carry out the work of the research team in a voluntary capacity.



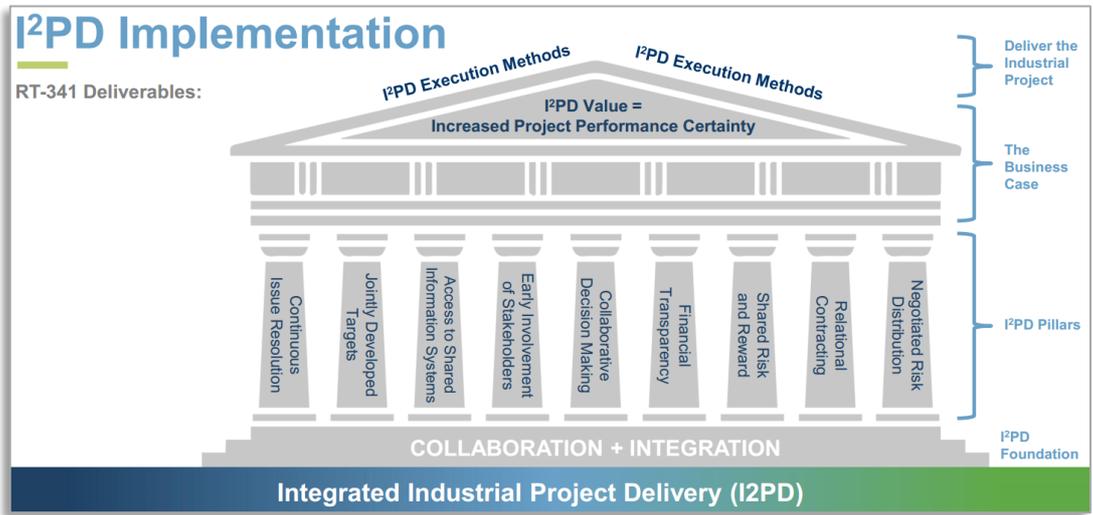
This year's conference provided the platform introducing and launching the following research reports and implementation resources:

RT 341 Integrated Project Delivery for Industrial Projects: Collaborate. Integrate. Succeed

Collaboration plus Integration equals Certainty. This in turn has been demonstrated to translate into better performing industrial projects. The importance of collaboration and integration in capital projects is essential to aid in the successful delivery of industrial capital projects. Over the past decade, integrated project delivery has been used successfully to deliver a number of large construction projects, but it has not been widely adopted for industrial projects.

Examples of how the industry is failing in delivering capital projects successfully were provided. For example: 98% of projects over \$1 Billion exhibited cost overruns of 80%. And 65% of large scale industrial projects FAIL to meet business objectives. There are a number of different factors that affect productivity on large projects. The three most significant are: Management factors (36%), Organisational factors (29%), and Labour factors (19%).

Improving certainty through I²PD (Industrial - Integrated Project Delivery) is a delivery method that fundamentally enhances project collaboration and integration. It has been shown to significantly promote enhanced collaboration and integration, thereby delivering capital project success.



I²PD is now a CII Best Practice supported by a range of implementation tools, contract templates and user training modules.

RT 335 Improving the U.S. Workforce Development System

Though this research and the outputs from the team are solidly focussed on the U.S. workforce, the context is much the same as what we are experiencing in South Africa. The findings and recommendations are equally applicable for consideration in our construction and capital projects environment.

Even with dramatic increases in infrastructure funding and stronger development of innovations, the U.S. no longer has the skilled construction workforce necessary to build the physical and technical infrastructure required for future generations. Over the past three decades, they have seen an emerging shortage of skilled construction craft (trade) professionals. The skills shortage has worsened to the point that it is not only hard to find qualified craft professionals, but the shortage is affecting capital projects' schedules, costs and safety.

The U.S. workforce development system desperately needs to be overhauled to address these challenges. As a process, workforce development includes the recruitment, training, placement and retention of individuals in gainful employment opportunities.



A series of policies have been identified that affect industry stakeholders and governmental agencies. These policies include:

- Establish and strengthen career awareness and education opportunities for students in secondary school
- Significantly improve participation in work-based learning programs by removing barriers to industry and company participation
- Measure performance and involvement in workforce development when awarding construction contracts
- The secondary education system must be provided greater incentive to ensure the career readiness of all high school graduates
- Increase the recruitment of underrepresented groups in Career and Technical Education (CTE) through greater outreach and mentoring
- Promote industry and company involvement and investment into the secondary and post-secondary CTE programs
- Increase funding available to CTE programs most needed by industry

An interesting statistic that was presented was: Based on the U.S. labour market data, for every occupation that needs a master's degree or more, two professional jobs require a university degree, and there are seven jobs requiring a one-year certificate or two-year degree. This ratio is a fundamental to all industries.

A sizable portion of public education and workforce funding is not effectively allocated to meet the needs of the national economy. To address this issue, the goal of the policies is to increase funding available to CTE programs that prepare the individuals most needed by industry.

RT DCC-02 Construction Readiness Assessment

The RT DCC-02 research team focussed on identifying the criteria critical for assessing a project's readiness for construction. Construction readiness is defined as; A series of activities and procedures that should be completed or substantially completed prior to construction in order to productively start and sustain construction operations.

The team identified 228 factors, grouped into 15 categories, critical to a project to start and sustain productive construction operations.

Effective project execution planning, including planning to maximise labour productivity, requires project management to understand the project's readiness for construction.

The research team developed a decision-support tool that can be used to assess a project's construction readiness by utilising new data analysis methods created by the team integrating other research into improving field productivity.

The strength of the Construction Readiness Assessment tool is derived from the variety of previously validated research that focussed on constructability, modularisation, activity analysis, advanced work packaging, planning for start-up and preventing out of sequence construction activities.

The team demonstrated that those projects that were evaluated to be construction ready significantly outperformed those projects that were not ready. Construction ready project demonstrated a 20% cost saving, 29% gain in productivity, and 22% schedule reduction versus those projects that were not construction ready.

RT 340 Corporate Practices for Productivity Improvement

The focus of this research and the resulting outputs was to identify the practices that could be implemented by a project organisation at the corporate level to improve productivity across the enterprise.



Most previous productivity research has been focussed on improvements at the craft (trade) and project delivery levels, but these efforts rarely translated into long-term productivity gains. Using the capital project industry's success with implementing and maintaining corporate driven safety improvement practices as a model, the RT 340 team identified six key practices that, when implemented effectively, will achieve enterprise-wide, lasting improvements in productivity.

The research team identified six key practices critical to driving and sustaining improvements in productivity: Leadership; resources; structure and communication; planning for productivity; productivity monitoring and control, and continuous improvement. Within each of the key practices, there are a number of critical elements that have to be planned, managed and implemented.

The research team was able to demonstrate that there was a significant increase in the use of proven productivity practices when organizations effectively implemented actions across these six elements.

RT 344 Improved Integration of the Supply Chain in Materials Planning and Work Packaging

The RT 344 research team was focussed on identifying increasing “visibility” into the extended resource and materials supply chain to improve project certainty and success. Their goal was to improve the integration of the supply chain in materials planning and work packaging.

Depending on the project, 40 – 50% of the projects cost is attributable to materials and materials impact or control 80% of the project schedule!

Siloed stakeholders impede visibility of the complete supply chain and disparate systems and asymmetric data coupled with misaligned incentives further compound that visibility.

The team discovered that “visibility” decreases significantly the further the observer is from the source of the supply node within the supply chain. This lack of visibility creates uncertainty which is calculated and treated as risk with the end result that projects create large buffers to avoid material and resource waiting times.

The team identified ten key supply chain activities that the project team require for effective and timely decision making, and 76 items of “visibility” that will enable the project team to make those key decisions.

Other Presentations

The CII conference had a range of presentation in addition to the report back by the various research teams. These presentations provided insight into autonomy and automation in construction industry projects, the management of uncertainty in mega-projects through the application of uncertainty management and the active pursuit of opportunities. One of the more advanced and future-looking presentations was on the future of construction technology, enabling technologies and what we can look forward to post-digitisation.



A particularly interesting presentation was given by the Director of Innovation and Emerging Technology at Caterpillar. Dan Henderson presented on Automation and Autonomy in Construction Industries. Automation and Autonomy in the mining industry has demonstrated haulage 20% productivity gains, which are forecast to increase to 40%; underground cycle-time improvements of 44%; drilling 25% productivity gains. The automation roadmap demonstrates the progress from machine control and guidance to, eventually, autonomous machines and the autonomous worksite.

Takeaway

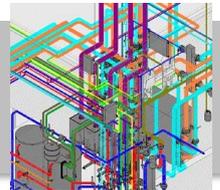
The key take-aways from the conference were:

- The construction capital projects industry has to urgently look at improving productivity, otherwise it will be slowly disintermediated by other fragmented industries and digitisation
- More focus has to be placed on encouraging, developing and supporting the education and skilling of craft (trades) from secondary school, making a craft a meaningful career
- Bringing in and mentoring younger workers (the millennials) to provide them with meaningful work and career opportunities
- Embracing technology, digitisation and the progress towards automation. In line with this, upskilling craft (trades) so that they remain employable to benefit from digitisation and automation and not be excluded from future work opportunities.
- The biggest take-away, was the enthusiasm and willingness of both owner and contractor companies, academia and public agencies to cooperate and work together to develop practices that will improve the performance and productivity of capital projects for the overall benefit of the industry and the Nation as a whole.

Next CII – Africa Chapter Workshop



Tuesday 23 October 2018
Automation, Building Information
Management (BIM) – Going Beyond the Call of Duty



A full-day workshop is being structured to provide participants with a thorough insight and understanding in the role of automation and BIM in improving capital project performance.

Notification of the details of the workshop, venue and speakers will be circulated to CII – Africa Chapter members and other interested stakeholders shortly.

Regards

Dr Giel Bekker

Director

