

## WorkFace Planning Automation – ConstructSim from Bentley Systems

**What is the innovation and why is it innovative** – WorkFace Planning (WFP) is the process of organizing and delivering all the necessary elements before work starts to enable crews to perform work in a safe, effective and efficient manner. While basic work packaging and lean construction “last planner” technique of managing the flow of resources in a way that enables front-line supervisors to make practical work assignments are nothing new and serve as the roots for this innovation, utilization of the new “WorkFace Planning (WFP)” model is very new; taking it to a higher level by driving it with construction simulation and automation technology is a true innovation. The Chevron Gorgon project is using an innovative software program called ConstructSim from Bentley Systems to automate the best practice Last Planner and WorkFace Planning best practices to reduce the amount of time it takes create crew level work packages by 90%; reduce crew idle time, rework and out of sequence work; and substantially improving field productivity and job site safety. ConstructSim aggregates data from the major project IT systems on the project including: 3D CAD, isometrics, fabrication drawings, materials management, schedule, and project controls databases to create a virtual construction model (VCM). A team of dedicated planners then uses ConstructSim to create construction work packages (CWPs) at an area and discipline level that are further broken down into field installation work packages (FIWPs). Before the work packages are released to the field ConstructSim is used to perform constraint analyses (engineering, pre-requisites, materials, tools, permits, scaffolding, etc.) as part of a Last Planner process to ensure that packs that are released to the field are executable. As construction is being executed in the field the visual status of progress is generated in ConstructSim to enable the project team to a much more proactive CM approach. These innovations of using ConstructSim as a WorkFace Planning automation tool have created a quantum leap forward in construction planning, sequencing, execution, and progressing.

**Where and when it originated, has been used, and is expected to be used in the future** - When Chevron decided to move forward with the Gorgon Giga-project in Western Australia, it quickly became evident that things were going to have to be done differently and with a large amount of control and visibility. With an estimated 17,000 work packages to be developed, a focus of Workface planning was to ensure that work packages would be released to the field in a controlled, constraint free, and efficient manner “before” work was to be started. The plan was to utilize Work Packaging and enable it and maximize the potential value with technology. This would create the ability for crews to be more efficient and would give an exceptional level of visibility and predictability to the work scope.

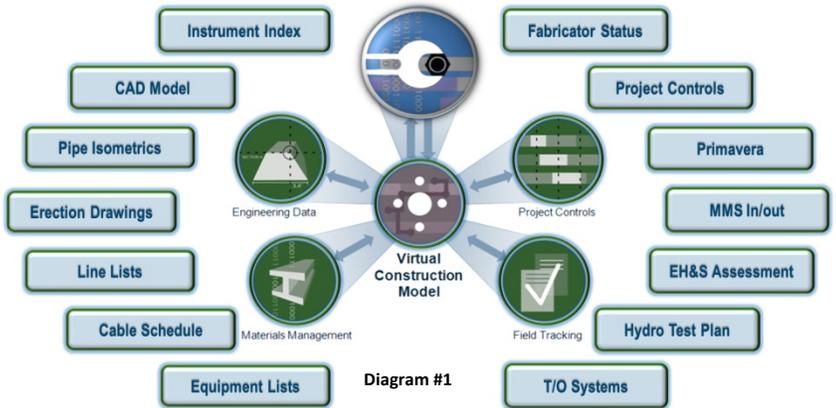
A project with such of extreme size, logistical challenges and complexity would require a substantial technology to assist in this effort. Bentley Systems Inc. and their ConstructSim software were chosen as the technology to bring this to fruition. After a lengthy Proof of Concept in the fall of 2010 the direction was set for any required further development and the melding of the WorkFace Planning model with Bentley technology. The implementation of technology driven WorkFace Planning saw utilization in Perth for path of construction planning in early 2011, and then was taken to site on Barrow Island for installation planning activities in late 2012.

The project is now in full swing and WFP efforts have been bearing very favorable results. The results are considerable time savings in package creation (~8 less hours to create per package), control, visibility, predictability, and efficiency. This WorkFace Planning automation software should be a benchmark in the industry and serve as a guide for all future major projects to follow. For the Gorgon project the plan is to continue to utilize this innovation to stream line commissioning and start-up, then permanently as the means for planning and controlling maintenance and shut down operations.

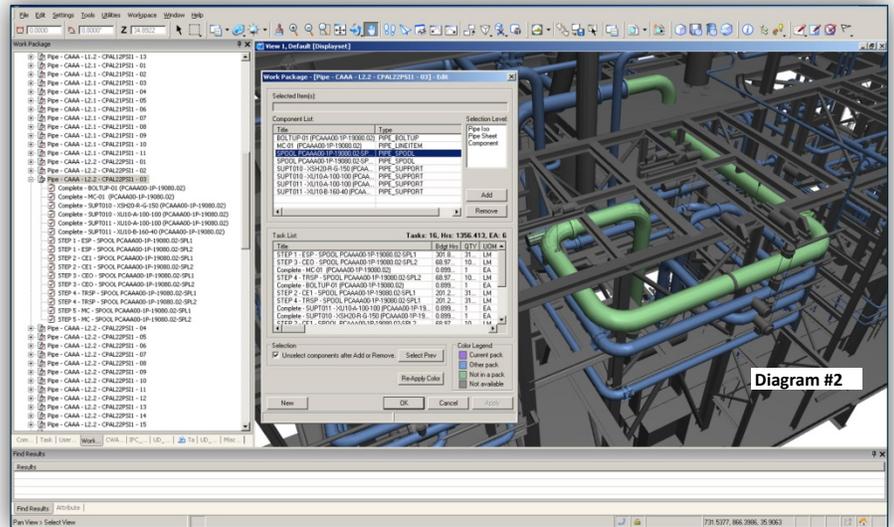
**What it changed or replaced** - Due to the considerable resources and time required to manually create crew level work packages, the creation process was an extreme burden, and thus work packages (aka Field Installation Work Packs (FIWP)) were often riddled with change management issues and missing data. With the utilization of ConstructSim, work packages are easily created and edited as required, supervisors now have more time on the tools not only increasing field productivity but also creating a safer with higher quality site due to the level of increased supervision. This technology has enabled management to have near real time visibility and predictability into the status of the project by viewing multiple sources of data visually in the virtual construction model. Finally, the largest benefit is that crews now receive work that can actually be executed due to the integration between project IT systems. This allows planners and crews to properly follow schedules, tie material availability into the planning efforts, properly plan crew assignments, and ensure that all constraints have been removed before a crew in the field receives the work package.

# WorkFace Planning Automation – ConstructSim from Bentley Systems

1) Diagram #1 is an illustration of the inputs used to power the ConstructSim Virtual construction model. ConstructSim aggregates data from many sources to enable the user to have a single source of data powered by graphical representations of the data. The ability to integrate data from commercial and “internally created” systems ensures that the environment for planning contains all the necessary information to make the appropriate decisions quickly.



2) Diagram #2 shows the work packaging tool in action. When the tool is active the user is immersed in an environment specific to the type of package to be created, items in grey are out of Scope, Items in blue have already been planned, and green indicates items available for planning. When the user selects the items to be added to the work package they are **immediately** given the estimated time for each task based on the project rates. This makes identification of work package scope very quick and simple.



3) Diagram #3 is a view of the ConstructSim status visualization tool. Stat-Viz is used to view the data from many systems. In this example the data from the material management system has been displayed and illustrates the location and status of materials.

This data is vital to the planners to ensure that a FIWP before issuance to the field can actually be completed. An easy to understand graphic view shows the user this information and allows them to overlay multiple data sources. Stat-Viz is also used to display information such as; spool fabrication, equipment installation, ISO release status, advance revision notices, work step tracking, test pack status, QA/QC status, and other FIWP constraints. This information is vital to the planning efforts; ConstructSim makes it visually available for quick and easy decision making.

