GROWTH OF THE DIGITAL ENTERPRISE

The Value of Going Digital
Project Execution
Conquering Handover Challenges
Customer Awards
From Our Leaders
4  Letter From the Editor: You Say Want a Revolution?
6  From the President: Mattias Stenberg

Feature: DIGITIZING THE ENTERPRISE
8  Special Feature: Intergraph® Rebrands to Hexagon PPM
10 Growing the Digital Enterprise
12 The Value of Going Digital
14 Outsmarting the Perfect Storm in Project Execution
16 Conquering the Big Handover Challenge with Digitalization

Industry Updates
18  Fluor and Intergraph Smart® Construction
20  Harvard University uses EcoSys
22  Technip and Intergraph Smart 3D

News & Events
23  Partners & Projects
24  Launches & Releases
25  Visionaries: Customer Awards
26  Keep Learning
You Say You Want a Revolution …

Asset-intensive industries have the option to completely digitize their entire business models. Information technology clusters like cloud technology, augmented reality, the Industrial Internet of Things (IIoT) and Industry 4.0 mean that you can literally get any piece of data, from anywhere, to anywhere, on any device, at any time, for any reason, and with any options that are desired.

With this proliferation of possibilities, there are few insurmountable technology limits. Capital-intensive industries like oil & gas, mining, offshore fabrication and shipbuilding are experiencing cyclical lows. Many corporate boards are demanding their executive teams evaluate more innovative options as they ponder downsizing.

Necessity has arrived, and the birth of invention is upon us. The winners of tomorrow are developing evolutionary strategies to change their value delivery.

We’re witnessing a new industrial revolution. In this reformation, the catalyst is the continuous evolution of technology that is connecting machines, systems and processes to create an intelligent network across the industrial life cycle, reducing waste and optimizing decisions.

Construction time-on-tool levels remain stubbornly low, revealing the opportunity for more precise planning and streamlined information access. Asset operators continue to evaluate how to automate their operations. All the technology is out there for fundamental change.

Fluor shares how the Advanced Work Packaging system in Intergraph Smart® Construction (pages 18-19) revolutionizes project execution by breaking down huge construction jobs into daily assignments for an orderly progression of work and materials. True analytics – as provided by EcoSys (pages 20-21) – kick in when the information is trusted, and efficiency improves when performance can be tracked to original bids and budget agreements.

Excellence in materials management is required to minimize capital investment and match materials to resources efficiently. Intergraph Smart Materials Mobile Scan has enabled automation of another piece of the project value chain, between the home office materials system plans and the field personnel who need to use the materials.

Whether managing change within a facility, monitoring safety and production processes, or looking to minimize maintenance expenditures, owner operators need trusted, accessible digital documentation to achieve operational excellence. With Intergraph Smart Digital Asset | Collaboration Module (pages 14-15), the digital asset can be maintained from a project’s beginning to handover to operation and management.

So, you say you want a revolution? It’s here. For those who are planning their future now, I think it’s gonna be alright.
AUTHENTIC GLOBAL EXECUTION
INTEROP PPM SMART DIGITAL ASSET COLLABORATION MODULE

Performance project management solutions. Collaborating effectively on global project delivery requires strategic decision-making, including real-time communication, collaboration, and accountability.

Hexagon PPM

www.hexagonppm.com
NEW PPM LEADER LOOKS TO DIVERSIFY CUSTOMER BASE, LEVERAGE SOLUTIONS ACROSS HEXAGON

When taking over the helm of Hexagon PPM in January, Mattias Stenberg – who joined Hexagon eight years before and had been serving as the corporation’s chief strategy officer – contemplated the business at a very primal level: Why does it exist? Stenberg explains not only why, but what, when, where and how.

Insight: Why do you think you were chosen to lead Hexagon PPM?

Stenberg: During my time with Hexagon corporate, I was involved with analyzing acquisition opportunities and strategizing on optimum growth trajectory paths for the corporation’s eight divisions. It is my familiarity with all of Hexagon which led Hexagon President & CEO Ola Rollén to believe that I can add value in speeding up the alignment of the synergistic possibilities Hexagon brings to PPM solutions. PPM is clearly one of the stars in Hexagon’s portfolio, so I am super-excited about this opportunity.

Alignment is a simple but powerful strategy. At PPM, we provide solutions to help our customers visualize, create and manage facilities and structures across the industrial landscape. We provide our customers with access to data across the project life cycle.
With this in mind, we want to go from what is – unstructured data and information from disparate systems – to what should be. And what should be is a digital reality of organized, accessible information, resulting in facilities and structures that operate safely and efficiently.

**Insight:** How does the timing of the rebrand from Intergraph® Process, Power & Marine to Hexagon PPM affect your vision for the company?

**STENBERG:** I think the timing is perfect. In the past year alone we’ve added construction solutions serving the AEC (architecture, engineering, construction) market as well as project controls capabilities with the acquisition of EcoSys®, for virtually any industry. EcoSys has an interesting product in itself with project controls. But it also has a great opportunity for cross-selling. I see many opportunities for marketing EcoSys in the traditional PPM markets and to the other Hexagon divisions.

As we have grown, we have become much more than process, power and marine. As we continue to augment our solution portfolio strength – through acquisitions and other means – it’s more important that our name represents our legacy, history and what we stand for, than a descriptor of what industries we serve. Thus, it’s my opinion that we maintain the legacy of PPM, though not focus on what it used to stand for.

**Insight:** What do you see Hexagon PPM’s mission to be?

**STENBERG:** Every business needs to know why it exists. It doesn’t exist to generate X amount of profit. Because I’m Swedish, I’ll give this example. Ikea says it exists so that everyone can afford a nice couch. So, why does Hexagon PPM exist? Access. It exists to provide access. Our design tools give access to ideas. Our information and materials management tools give access to projects at all levels. Our cloud offering gives access to all data and analytics. Our asset management tools give access to the most critical assets.

**Insight:** Other than leveraging PPM solutions Hexagon-wide, what are your most immediate business strategies?

**STENBERG:** Currently, about half of our customer base is in the oil and gas industry. And while that created a wonderful track record for 10 or 15 years, the past two or three years have been difficult due to a downturn in market prices. We must create a bigger footprint in some of the other industries in which we currently have a smaller presence.

Our solutions must feature a more intuitive user interface so that non-engineers can use them. Also, with more companies turning to cloud computing, PPM will further emphasize cloud-enabling our entire portfolio.

**Insight:** Hexagon PPM is a global company, with offices in 60 countries and customers across the world. What is your plan for coming to understand the needs and possibilities in those areas?

**STENBERG:** I will be traveling to each of those offices as quickly as possible to meet Hexagon PPM employees as well as customers. HxGN LIVE will also be a great opportunity to become even more familiar with the industries and clients that PPM serves.

**Insight:** What is your education and professional background, prior to coming to work at Hexagon?

**STENBERG:** I have an MBA in economics from Linköping University and a degree in computer sciences from Stockholm University, both in Sweden. I worked in investor relations and corporate development for Stockholm-based Autoliv, which is the world’s largest automotive safety supplier. I also worked in business development and finance while at Teleca, a software provider in the mobile phone industry.

**Insight:** What else should Hexagon PPM’s clientele know about you?

**STENBERG:** I believe in transparency – I will share the bad news as well as the good news. I appreciate the trust that our customers have placed in us, and I do not take this for granted. I believe in accountability – if we say we are going to do something, we are going to do it. I believe that curiosity is imperative, and I am challenging our organization to find better ways of doing things. And I understand urgency ... markets move fast, and so will we.

Patricia McCarter is senior content marketing specialist and editorial director for Insight Magazine for Hexagon PPM. She is based in Huntsville, Alabama, US.
NEW NAME, EXPANDED MISSION

What’s in a name? When the name is Hexagon PPM, quite a lot.

T his exciting change is the next step in the evolution of our company. As we continue to integrate our technology and expertise with that of our parent company, Hexagon, we have also expanded to include project controls (EcoSys), fabrication (Nestix), and the building infrastructure or AEC market (HxGN SMART Build).

The words process, power, and marine – while still vital to our mission – no longer fully describe our broad portfolio of solutions.

Hexagon PPM, we believe, does. We use the word “Hexagon,” and not only because that is the entity who owns us. With that word comes an alignment with the corporation’s seven other divisions – Agriculture, Geospatial, Geosystems, Manufacturing Intelligence, Mining, Positioning Intelligence and Safety & Infrastructure.

As we break down the silos of these individual businesses, we are finding common ground on what can help our customers Hexagon-wide discover their greatest successes. We are uncovering synergies daily within that Hexagon umbrella.

We are retaining the letters “PPM” in our name because there is history there. Much like other successful companies who are now known by their acronyms, we know we have respect and recognition with PPM that we do not want to lose.

That’s why as of June 6, 2017, Hexagon PPM was born.

WHERE IT ALL STARTED

Intergraph began in 1969 in Madison, Alabama, as a hardware manufacturer (then by the name M&S Computing). We experienced impressive growth providing intelligent graphics software running on enhanced terminals connected to host computers. We developed the first interactive CAD product, Interactive Graphics Design Software (IGDS), which quickly became an industry benchmark.

We exited the hardware business in 2000 and restructured our worldwide operations around vertically-focused divisions. In 2003, we introduced our leading-edge, data-centric plant modeling software solution, SmartPlant® 3D (now Intergraph Smart® 3D).

In 2010, Intergraph acquired Houston-based COADE® Holdings Inc. – provider of CADWorx®, CAESAR II®, PV Elite® and TANK™ products – the leading software for pipe stress, pressure vessel and storage tank analysis.

Also in 2010, Intergraph was acquired by Hexagon, with Ola Rollén assuming the role of CEO of Intergraph following the acquisition.

More acquisitions followed: in 2014, GT STRUDL®, a leading computer-aided structural engineering (CAE) software system acquired from Georgia Tech University; in 2015, OhmTech A/S of Norway (provider of pressure vessel design software) and Blue Iron Systems, Inc. (and its flagship radio-frequency identification (RFID) and bar code product, IronScan); also in 2015,
EcoSys of Colorado, adding project controls into the portfolio; and in 2016, NESTIX Oy of Finland (managing and nesting parts for fabrication and welding assembly).

**WHAT IS TO COME**

We are changing ... not just our name, but our purpose. Hexagon PPM is building on five decades of innovation and proven leadership to transform our future, as well as yours.

Partner with us as we help you visualize, create and manage unorganized data into intelligent, actionable information that enables smarter design, construction, and operation of projects across the industrial landscape.

[HexagonPPM.com](http://www.HexagonPPM.com)

Patricia McCarter is senior content marketing specialist and editorial director for Insight Magazine for Hexagon PPM. She is based in Huntsville, Alabama, US.

**GUIDED BY LEADERS**

The Hexagon divisions serve three primary landscapes – engineering, geospatial and manufacturing. Each is committed to pioneering innovations in business processes, value chains and information exchange.

Growing doesn’t have to just mean getting bigger. It can also mean getting better (which can then lead to getting bigger).
While uneasiness is sometimes associated with change, the rewards that come with streamlining the way you share and store information—especially if you’re a large industrial entity—are well worth the extra effort. For megaprojects, it can result in saving hundreds of thousands or even millions of dollars.

One of the most painless ways to minimize risk and rework while cutting costs is to grow the digital enterprise. Too often, the human element sullies data. And for data to be truly intelligent, it must have context. Employees project-wide must have confidence that they are all reading from the same uncompromised page as part of an extended enterprise that crosses traditional organizational boundaries.

With digitalization, information is accessible by everyone, at all times. Using legacy Hexagon PPM solutions—such as SmartPlant® Fusion, SmartPlant Foundation and Intergraph Smart® Plant Enterprise for Owner Operators—this information can be trusted as being up-to-date and available to all.

With the new Intergraph Smart Digital Asset | Collaboration Module, EPCs and owner operators alike will be confident they are genuinely communicating throughout the planning, reviewing and building process while securely sharing relevant information. Because this information is created digitally, the “digital twin” of the plant grows incrementally throughout the project and will already exist for the owner operator at handover.

With the new Intergraph Smart Digital Asset Online—an engineering information management service—the power of information is deftly placed into the hands of the facility workers, with no on-premise hardware, software or system support personnel needed.

Keep safe those things you value most ... your information and your people’s access to it.

Patricia McCarter is senior content marketing specialist and editorial director for Insight Magazine for Hexagon PPM. She is based in Huntsville, Alabama, US.
Management of facility information is critical for safe, efficient plant operations, and ease of access to that information supports day-to-day plant floor activities such as maintenance, repairs, inspection and rapid response to incidents.

ARE YOU STILL STUCK ON STEP NO. 1?

Having a virtual asset or “digital twin” that represents the current state of the physical asset is increasingly important. Truly innovative technologies exist, such as augmented reality on mobile devices for field workers and 3D training simulations to prepare staff for critical activities.

However, many brownfield facilities are struggling to get the basic high quality information that such technologies are dependent on. Those facilities are stuck on step No. 1 – how to gather and provide access to high-quality information. Brownfield assets typically have enormous volumes of unstructured information. They often do not have 3D models, laser scans or integrated operations systems with high-quality structured information. Large volumes of unstructured information, such as documents and drawings, regularly arrives from suppliers, vendors and engineering partners.

ALL WORKERS NEED ACCESS

There is disparity between how people access information in their private life and what they experience when working on most process facilities.

Every worker in a facility – whether in operations, maintenance, inspections or reliability – plays a vital role in its safe, efficient and profitable operation and needs that same quick, simple, reliable, contextual-based information access to make important decisions.

But given that a facility may have been in operation for decades, critical
KEEPING THE ENGINEERING INFORMATION UPDATED AND THINKING ABOUT DIFFERENT WAYS OF MANAGING IS OFTEN SEEN AS SOMETHING NOBODY HAS TIME FOR.

Information may be incompatible or outdated, and this information will most likely be scattered around in unofficial storage locations.

Operating facilities need to focus on their core business, whether they need to harvest barrels of oil or produce chemicals, megawatts of electrical power, or tons of ore. Keeping the engineering information updated and thinking about ways to best manage the information is often seen as something nobody has time for.

WHAT IS INTERGRAPH SMART® DIGITAL ASSET ONLINE?

Intergraph Smart® Digital Asset Online (SDA Online) provides a cloud-based information management service that puts the power of information into the hands of the facility workers with no on-premise hardware, software or system support personnel.

This pre-packaged, scalable offering provides instant access to asset information in a cloud environment. Existing facility staff, local engineering partners or a certified partner can maintain the engineering content on behalf of the facility owner operator, including information security, disaster protection and system performance monitoring.

SDA Online enables users to simplify the brownfield data capture. It helps to rapidly find, capture, organize, link and visualize large volumes of data and documents. It creates tag to document relationships and makes information accessible through a simple web portal.

SDA Online helps utilize the information captured in PDF, AutoCAD, MicroStation and Microsoft Office formats, and more. 3D models and laser scans, if available, can also be incorporated.

CHALLENGES OF SUSTAINING CAPITAL PROJECTS

If the next expansion or upgrade project is already underway, managing the handover of data and documentation for commissioning or start-up can be especially daunting. This needs to happen as early as possible in order to de-risk the project and minimize delays. It is also important for EPCs to reduce the time they spend in assembling the handover documentation and ensure the quality of information at the same time.

SDA Online provides a handover platform to share all project information with the various stakeholders and helps rapidly capture and structure information and ensure its completeness, correctness and consistency.

Data validation can’t be entirely automated; it requires input from competent individuals with a thorough knowledge of engineering information. The SDA Online service optionally includes support from service providers and significantly helps reduce the time and costs associated with ensuring quality information.

EASING SECURITY CONCERNS

SDA Online provides a highly reliable level of service uptime, ISO 27001 data security certification, single-process ticket filing, agreed-upon disaster recovery times and regular and ongoing backups and maintenance. Data is secure in any situation, and SDA Online provides dedicated 24x7 support that can react quickly and efficiently to any issue found.

SDA Online offers Hypercare – a customer-centered support system – as an additional option to the service. This enhanced, onsite early-implementation support identifies issues and removes barriers in the initial phase of the service adoption.

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A “PERFECT STORM” IS A PHENOMENON THAT OCCURS WHEN TWO OR MORE MAJOR WEATHER EVENTS COMBINE AND INTENSIFY ADVERSE CONDITIONS. MAJOR PROJECTS FACE A SIMILAR PHENOMENON TODAY, AND THE SCALE AT WHICH THEY OCCUR EXACERBATES THE EFFECT ON PROJECT EXECUTION.

INTERGRAPH SMART® DIGITAL ASSET | COLLABORATION MODULE (SDA COLLABORATION) IS HELPING CUSTOMERS EXPLORE NEW WAYS OF EXECUTING PROJECTS. HEXAGON PPM WORKED IN COOPERATION WITH EXXONMOBIL TO DEVELOP THIS NEW PRODUCT THAT FACILITATES COMMUNICATION, ACHIEVES CONSISTENCY, RAISES EFFICIENCY AND PROVIDES RELIABLE PROJECT PERFORMANCE.

DIVISION OF LABOR

Global execution is a common strategy to shorten schedules. The work is divided so that scope can be completed in parallel, diverse locations. By executing in multiple, global offices, work continues around the clock.

Modular engineering and fabrication is another approach used on almost all projects to allow parallel execution. While highly effective in compressing schedules, there are difficulties, such as time zone and language differences. A higher degree of coordination and planning are required to ensure that the design will come together in the end. Each office, fabrication yard and factory is responsible for its own scope, but they must all work together after modules are built and installed on site.

Lack of consistency, unique execution strategies and poor communication can result in major rework. To address this, companies request information from their suppliers, participate in calls at inconvenient times and travel on site for key events. SDA Collaboration provides a consistent platform for exchanging information, planning deliverables and interfacing with stakeholders. It gives the customer a single location to find information about the design of the project.

TACKLING THE LOSS

When the oil and gas industry was at its peak, the number of major projects reached unprecedented levels. To meet project demand, it was difficult to find enough experienced resources to fill open positions. After oil prices fell, companies downsized by retiring or laying off staff; this took a toll on many organizations’ experience and knowledge.

Now, when a project arrives, there is often a struggle to find appropriate, available resources. Most are already working at full capacity. Baby Boomers’
A DATA-CENTRIC ‘DIGITAL TWIN’ OF THE FACILITY CAN BE VIEWED AND NAVIGATED TO LOCATE RELEVANT DATA AND DOCUMENTATION IN CONTEXT.

retirement and the trend to high-value centers are resulting in a loss of practical experience and a significantly increased demand on subject matter experts (SMEs).

By implementing SDA Collaboration, stakeholders become much more efficient in this high-pressure environment. They can access a trusted single source of truth for information and utilize a secure, controlled communication platform. SMEs can offer practical guidance and develop organizational competency through the next generation of SMEs, with no regard to geographic barriers or the need to sit adjacent to the evolving talent.

IT’S COMPLICATED

Project designs are also becoming more complex. New technologies, improved safety and increasing levels of detail have drastically increased the number of drawings per piece of equipment on projects. The repercussion is an increase in time spent handling, reviewing, marking up and altering documents. An unintended consequence is that management of change and interface management also become more difficult to control as the number of stakeholders increases.

This growing pile of details can result in information overload. Contributors need to focus on what’s most important and filter out the noise of details that aren’t relevant. Traditional distribution matrices don’t have the intelligence needed to differentiate irrelevant documents from critical documents. The result is a congested inbox without any clue as to how important a document is, thus leaving the recipient to evaluate everything that comes in.

A smarter approach evaluates the engineering data of the related equipment and uses business rules to make an initial assessment; this is the approach that SDA Collaboration uses in routing documents for reviews.

Individually these challenges are not insurmountable. However, the cumulative effect is like that perfect storm. SDA Collaboration provides for the project-wide, web-based submission, validation, distribution and review of data and document deliverables. A data-centric “digital twin” of the facility can be viewed and navigated to locate relevant data and documentation in context. Electronic workflows, distribution rules and subscriptions ensure the correct and consistent review of deliverables with auditable traceability.

SDA Collaboration reduces the cost and time associated with locating the right information, ensures critical information is subject to appropriate scrutiny and reduces the time needed for review.

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>> hexagonppm.com/go/sdacollaboration
Conquering the BIG HANDOVER CHALLENGE with digitalization

The process of information and documentation handover is typically a messy, high-stress, complex operation. Industry research has shown that costs for handover to operations for a US$1 billion facility can typically be up to $20 million and take up to one year.
Hexagon PPM recently surveyed industry information management professionals about their biggest challenges during information handover. Reviewing information quality and checking on completeness – as well as validating information against specifications – were noted as the most critical.

WHERE IS THE CHALLENGE?

The greatest value associated with quality data handover is experienced in the operations phase. High-quality data is critical to the safe, reliable and effective operation of any manufacturing facility. If the quality of information handed over to operations is questionable from the start, plant personnel quickly learn they have to walk-down equipment to verify the true state of the plant.

Of course, this dramatically increases operational costs over the entire life cycle of the facility and exposes facility workers to unnecessary risks of slips, trips and falls. The cost of finding and validating the engineering design basis to undertake a modification can typically be 30 percent of the cost of a modification.

MAKING IT BETTER

These pains are eased when the capture, quality and availability of unstructured data are improved during EPC handover; standardization is essential. This enables customers to achieve an accurate “as-is” virtual record of the physical asset, and leveraging this data optimizes operations and maintenance.

To assist with this process, Hexagon PPM has for many years offered a standard handover specification as a service to our customers, detailing the digital facility information requirements to be handed over for operations. This specification has proven to be an invaluable guideline that many customers have adopted or incorporated into their own contractual handover requirements. We have also been at the forefront of adopting evolving industry standards from delivering the world’s first POSC Caesar-based data warehouse in 1997 and adopting ISO 15926.

Hexagon PPM is now aligning our handover specification with the new CFIHOS standard. CFIHOS (Capital Facility Information HandOver Specification) is a standard being developed under the auspices of USPI in the Netherlands and the Engineering Advancement Association in Japan. Hexagon PPM’s new information management product suite, Intergraph Smart® Digital Asset (SDA), will also be compliant with CFIHOS to simplify adoption and handover of information.

These smart handover solutions provide approaches that manage complementary aspects of handover and deliver a structured, intelligent, complete, accessible, correct and consistent “digital twin” of the physical asset. With the power of the “digital twin,” owner operators better maintain standards, schedules, operational integrity, reduce CAPEX and OPEX costs, optimize plant productivity and achieve health, safety and environment (HSE) objectives.

SmartPlant® Fusion and Intergraph Smart Data Validator support creation of intelligent information from unstructured, duplicated and non-integrated information. The solutions enable users to rapidly find, capture, organize, link and visualize large volumes of information.

It will help to improve the capture, quality and availability of unstructured data during handover. This enables you to achieve an accurate “as is” virtual record of your physical asset and leverage this data to optimize operations and maintenance. Adding a data validation component to this process helps both EPCs and owner operators to keep complete control of how structured data – such as equipment lists, cable schedules, valve lists, etc. – is imported from multiple data sources. Both incremental and final data deliveries can be subject to data validation against end user-defined business rules e.g., CFIHOS-based validation rules.

Later this year, we will be offering Intergraph Smart Digital Asset | Collaboration Module. This product offers projects a unique, simple to use, scalable, secure, flexible, cloud-based tool. SDA Collaboration provides a uniquely data-centric approach to ensuring the right deliverables at the right milestones are scrutinized by the appropriate specialists, based on intelligent rules. Data and documents are gathered incrementally during projects and subject to automated validation as well as workflow-driven engineering reviews, dramatically reducing the time required and costs involved to handover project information and documentation to operations.

As an alternate approach for projects not requiring the power of SDA Collaboration for managing cross-organizational collaboration on projects, Hexagon PPM offers a simple cloud-based service, Intergraph Intergraph Smart Digital Asset Online (SDA Online). SDA Online helps to address basic information handover challenges such as organizing, linking and extracting tag cross-references from documents. It provides a service that is already set up and ready to go. SDA Online provides a handover platform to share all the project information and ensure its completeness, correctness and consistency prior to handover.

>> hexagonppm.com/go/sdacollaboration

Gena Hayes is the marketing programs manager for Hexagon PPM information management solutions based in Huntsville, Alabama, US.
The construction industry widely recognizes the importance of performing detailed planning to issue constraint-free, executable work packages to the field to increase construction productivity, increase predictability and reduce costs. A construction-driven execution, supported by the right technology, revolutionizes and shapes modern project execution around the world.

In this context, Fluor’s construction-driven execution is enhanced by implementing Advanced Work Packaging (AWP) Workface Planning aided by Intergraph Smart® Construction.

**CONSTRUCTION BUSINESS DYNAMICS**

In the global market, productivity demands and more complex facilities require new approaches in project execution, from design to construction; the ability to innovate has become a competitive necessity.

A leading industry consortium, the Construction Industry Institute presents the Advanced Work Packaging – Workface Planning (WFP) best practice RT-272 as a model that ensures engagement of construction during the early project phases, aligning engineering and procurement to the construction path and to the turnover requirements.

This approach is focused on the development of Engineering Work Packages (EWP) and Construction Work Packages (CWP) during the design phase. These CWPs are broken down into a more detailed level construction deliverable, the Installation Work Package (IWP).

An IWP is a single discipline portion of work to be executed for a single crew on a single rotation. Hence, developing and releasing IWPs constraint-free to the field becomes the core of the AWP-WFP implementation. Effective management of the constraints will determine the success of the program.

**MANAGING CONSTRAINTS FOR SUCCESS**

Have you ever bought new flat pack furniture and assembled it by yourself?

In theory, you should be able to open the box, follow the instructions and install the pieces by using the appropriate tools.

But what happens if there is a mistake in the drawing, the instructions are wrong, some pieces are missing or duplicated, or you don’t have the right tool?

When something goes wrong with the
package, you need to spend more time than expected trying to make it work, perhaps going back to the store, sourcing the missing pieces or buying tools.

Now, imagine yourself solving the same issues thousands of times, not in a comfortable home but in the world’s toughest locations, just like construction professionals do.

In reality, IWPs are more complex than flat pack furniture. Each IWP requires accurately identifying specific drawings for the scope of work, assessing material availability and other constraints such as schedule dependencies, workplace availability, permits, construction equipment, tools, trade, scaffolding, quality requirements, safety and survey work, among others. All of this needs to be addressed prior to an IWP being released to the field.

But just like you do with the flat pack furniture, work-crews expect their IWPs to be complete and all the barriers to be removed; otherwise they will spend most of their time solving issues and construction productivity, negatively impacting cost and schedule.

The effort required to develop and release an IWP to the field should not be underestimated, as construction workforce planners need to gather a large amount of information, dealing with multiple stakeholders and removing barriers in order to achieve constraint-free IWPs.

Technology and innovation make a significant difference in managing this extensive volume of information and increase workforce planning productivity and accuracy.

SMART CONSTRUCTION: THE ASSEMBLY POINT FOR CONSTRUCTION

Smart Construction provides a user-friendly environment for workforce planning; it acts as the assembly point to integrate engineering, procurement and fabrication data for interactive construction planning.

Workface planners can navigate through 3D smart models and apply visual filters to analyze the construction planning strategy.

They can scope IWPs by just dragging and dropping components from 3D smart models, smart drawings or registers to the work package; this simple action triggers powerful automation to identify the main constraints, by automatically attaching drawings, building material requests, assigning labor hours and work steps, among other key interfaces.

Smart Construction is based on component attributes and relationships, in addition to its core functionalities; it provides a common platform to develop custom innovative Application Programming Interfaces (API).

These custom APIs bring additional value to the project execution, by enabling Smart Construction to assemble project data from multiple sources, for the benefit of construction schedule, safety and cost.

This technology empowers the construction team to make informed decisions on the execution, by looking at the 3D smart models to get visual direct answers to key issues, such as: What are the drawings required? When will the materials be available? When is this work scheduled? What work is required to complete this system?

The remarkable benefits of this level of automation can only be achieved by implementing a truly construction-driven execution, monitoring and tracking construction data requirements throughout the project execution.

CONSTRUCTION-DRIVEN EXECUTION AT FLUOR

Fluor – one of the world’s largest engineering, procurement, fabrication and construction (EPFC) companies – implements construction-driven approaches. This requires thinking first and foremost about executing project construction and then defining how to drive the execution, making sure engineering deliverables and material deliveries are aligned to the path of construction and turnover systems.

Fluor is executing multiple projects with Smart Construction, from snow-capped lands in Canada to the desert in Kazakhstan, not only for self-perform construction but contracts; construction-driven technology implementations create automation bridges to interface and integrate the EPFC.

- Engineering: not just about producing drawings anymore. Engineering 3D smart model and design data are the main source for work packaging.
- Procurement: live and seamless interface to material availability and material requests. Right material in the right place at the right time.
- Fabrication: accurate planning, assemblies’ availability and warehouse interface by using fabrication models and drawings, such as structural detailed steel and piping spools.
- Construction: give to get pays off. Construction involvement during the front end execution ensures a smooth transition from process development to a construction and start-up driven execution.

All of this results in Fluor’s enhanced and integrated construction driven execution, an Advanced Work Packaging – Workface Planning model powered by Smart Construction, that is changing project execution around the world. ■

» fluor.com

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Harvard University is the oldest institution of higher education in the United States and is ranked annually as one of the top national universities. Its main campus is located in Cambridge and neighboring Allston, Massachusetts; it also has campuses in Washington, D.C., as well as Florence and Fiesole, Italy.
Harvard owns more than 25 million gross square feet in over 650 buildings. These buildings are the responsibility of Harvard’s 11 principal academic units – 10 faculties and the Radcliffe Institute for Advanced Study – and many administrative units. In 2011, the executive vice president established a process whereby the university consolidates capital projects of schools and units into one integrated plan that aligns with academic, strategic and financial priorities. The university invested $467 million in capital projects and acquisitions during fiscal year 2015 and $597 million in 2016.

With the new integrated planning process, Harvard anticipated the need to move away from manual spreadsheets and develop an enterprise automated solution. The solution not only had to be able to capture and consolidate five-year capital project information of almost 1,000 projects, but it also had to be available for stakeholders to update and to report plan and project data on a daily basis.

Recognizing the decentralized management of its physical plant, Harvard met with its schools/units to develop requirements that met users’ needs.

After its research, Harvard selected the EcoSys® software platform because of its ease of use and configurability. Based on Harvard’s experience with EcoSys, key business stakeholders expanded its use to cost controls and are now looking at expanding the use of EcoSys to include contract management.

EcoSys would deliver a single repository for capital plan information providing a shared set of reliable data to give users an easy-to-use tool that eliminates the need for static spreadsheets and manual reporting processes. The integration of the capital planning process with the existing project approval system (in Oracle) provided a single point of entry for all related capital project data.

**ECOSYS BENEFITS**

- Less time and fewer resources required to administer, submit and consolidate capital plans within the schools
- Integrated management of actuals and forecasted projections across the capital plan, built on a single data repository, with consolidated input from other systems
- Monthly and periodic progress monitoring of projects for stakeholders
- Bi-directional integration between EcoSys and the university’s project approval system, actual expenditures and data warehouse
- Role-based access via the web for managers, internal stakeholders and outside consultants to access real-time project data, performance, current status and forecast

**ABOUT ECOSYS**

EcoSys, a Hexagon PPM company, is the global standard for enterprise project controls software. Its easy-to-use web-based platform, helps organizations worldwide plan and manage project portfolios, control project costs and improve project performance.

Adam Goldfarb is marketing director for EcoSys, a Hexagon PPM company. He is based in New York, New York, US.
Because clash resolution is much costlier onsite than in design stages, it is imperative to begin clash management in the early stages of modeling. Proper clash management keeps the clash count under control and addresses real clashes effectively.

Generally, clash management is done after modeling has matured. Earlier versions of 3D modeling software did not provide efficient, user-friendly options to select clashes the way Intergraph Smart® 3D does. Using Smart 3D utilities, Technip India had the option to address and drive clash management right from the beginning of the design process. The first step involves preparing a checklist of pairs of objects and system paths from different disciplines, which can be qualified for mass and interactive approvals jointly with discipline teams.

Smart 3D provides excellent functionality for managing the clashes using utilities such as Automation Toolkit, Graphic Clash Report and Interference Management. We can open the relevant filter for an area with the related discipline models to run a clash report, where we can select pairs of clashing items based on the system path and object name to mark them for either mass or interactive approval.

CHECKLISTS FOR MASS AND INTERACTIVE CLASH APPROVALS

Discipline teams identified all the system paths and part names combinations, which can fall under false or real clashes. After some interaction, two checklists for mass and interactive approvals could be made. Mass approval checklist had pairs of objects, which could be categorized under false clashes. This typically includes items in a test path, temporary models, paving, steel vs. steel, etc.

We need to review these clashes in a semi-automatic way by filtering out similar objects and then approve or leave them for further resolution by the discipline teams. Clash counts per area were targeted to be reduced from thousands of clashes to a few hundred initially. We were issuing clash counts for all the areas to all the discipline teams on a weekly basis. After reduction of all false clashes, finally the balance clashes were given to the discipline teams for actual resolution.

FURTHER AUTOMATION

The mass/interactive approval can significantly save man hours. For a typical project, we could reduce the total clash count for all areas, from 100,000 to few hundred toward the end of a project. Considering each clash takes one or two minutes to evaluate for an approval, between 2,000 and 3,500 labor hours were saved.

“Smart 3D was very effective in developing a clash-free 3D model in an efficient manner,” said Technip Mumbai project head Somasundaram Subramanian. “It has improved our productivity and the quality of the 3D model.”

Jai Singh Baghel wrote this article while working for Technip India.
CEPSA
Leading Spanish energy company CEPSA has expanded the use of Hexagon PPM solutions, adding Intergraph Smart® 3D, Intergraph SmartPlant® P&ID and Intergraph SmartPlant Electrical, as well as analysis tools PV Elite®, CAESAR II® and TANK™.
CEPSA chose to increase the use of PPM solutions to leverage real-time concurrent design, ensuring integrity and accurateness of engineering design throughout the engineering workflow. Also, the interoperability between analysis and design solutions helps CEPSA drive efficiency and minimize errors between different project steps.
CEPSA piping department lead Patricia Chacon Sangines said, “PPM solutions have allowed us to make a qualitative leap that has led us to the forefront of industrial plant design.”

cepsa.com

Fennovoima Finland
Finnish energy coalition Fennovoima has purchased Hexagon PPM solutions to build and maintain a centralized engineering database for a nuclear plant project. This includes SmartPlant® Foundation, SmartPlant Enterprise for Owner Operators, SmartPlant P&ID, Intergraph Smart® Data Validator and Intergraph Smart 3D.
Fennovoima currently has a plant supply contract for Hanhikivi 1, a nuclear plant to be built in northern Finland with a subsidiary of JSC Rosatom Energy International, RAOS Project.
Fennovoima information management manager Marko Juslin said, “We expect that the acquisition of the software enables us to implement plant information modeling as sponsored by the International Atomic Energy Agency (IAEA), offering us the capability to manage all engineering data throughout the project in one centralized location.”

fennovoima.fi/en

Whessoe Engineering
Whessoe Engineering Limited, a global technology/engineering company headquartered in the United Kingdom, is using Intergraph® SmartPlant® Foundation to modernize engineering information management.
The company needed a modern information management system that offered flexibility and provided a centralized database where all engineering data and documents could be saved.
Whessoe Engineering Limited CEO Len Taylor said, “SmartPlant Foundation has exceeded our expectations. We have been particularly impressed with how quickly we can set up new projects.”

whessoe.co.uk

Burns & McDonnell
Burns & McDonnell – a Missouri, US-based engineering, architecture, construction, environmental and consulting firm – has selected Intergraph Smart® Cloud to assist in supporting much of its power, process and water engineering systems infrastructure.
Hexagon PPM tools to be hosted include Intergraph Smart 3D, SmartPlant® P&ID, SmartPlant Electrical, SmartPlant Instrumentation, SmartPlant Review, SmartPlant Reference Data, SmartPlant Foundation, CloudWorx™ for Smart 3D, CAESAR II®, PV Elite® and SmartPlant Construction.
Burns & McDonnell Senior Vice President & CTO Gregory Gould said, “Our company first placed SmartPlant Reference Data in the cloud in July 2015, and that successful implementation gave us the confidence to transition most of our Intergraph tool set to Smart Cloud.”

burnsmcd.com

Petroleum Development Oman
Leading Middle Eastern oil & gas company Petroleum Development Oman (PDO) has chosen Intergraph Smart® Data Validator and Intergraph® SmartPlant® Enterprise for Owner Operators to improve engineering information management.
Since finding oil in 1962, PDO has specialized in production at the Oman Sultanate; it accounts for about 70 percent of local oil production and nearly all of Oman’s natural gas supply.
By replacing its legacy in-house software with Hexagon PPM solutions, PDO aims to enhance integration between its engineering software, improving data quality.

wwwpdo.coom

Técnicas Reunidas
Leading Spanish EPC company Técnicas Reunidas has implemented Intergraph Smart® Materials and Smart Materials Portal to enhance full life cycle material, supply chain and warehouse management. It is the first company in Europe to add the Advanced Supplier Web Collaboration function to its existing Smart Materials implementation to improve integration of workflows.
Técnicas Reunidas information technology manager Marcos Bauer said, “With the new Smart Materials Portal, the integration between the processes carried out in the portal and in our back office is guaranteed. This enables more accurate construction planning and results in lowered costs and improved efficiency.”

www.tecnicasreunidas.es
LAUNCHES AND RELEASES

CADWORX® 2017

The new release of Intergraph CADWorx® Plant 2017 offers the option to run on the AutoCAD® or BricsCAD® DWG platform. This gives users a powerful tool for effective plant design with unparalleled flexibility and collaboration.

“Clients have requested other design platform options, and we are ready to deliver,” said Rick Allen, president of CADWorx & Analysis Solutions.

By including the ability to choose the design platform, CADWorx continues to expand upon and provide powerful and adaptive tools that enable quick and easy creation of fully intelligent 3D plant models. CADWorx continues to provide users with all the familiar benefits, ensuring every plant designer and engineer have the tools they need to complete projects efficiently.

“It was great to work together with the CADWorx team to port such a powerful suite of engineering software to our platform. We have built a real choice for CADWorx customers that offers everything they are used to without the need for additional training,” said Erik De Keyser, CEO of Bricsys.

CADWORX STRUCTURE

CADWorx Structure 2017 will create concrete and steel structure designs for engineers who model plant buildings, pipe racks, offshore topsides and industrial structures that are part of the process, power and manufacturing plant world.

This solution has been developed with end users in mind at every decision point and includes the targeted annotation tools needed to create revenue-driven models easily and quickly. Like CADWorx Plant, CADWorx Structure gives simplicity and efficiency in design and reduces modeling time.

It provides selection filters for getting the perfect select set; gusset plates to reserve model space for necessary structural connections; openings in members for when it isn’t possible to route around a structural member; and export to structural analysis packages so members will remain upright.

INTERGRAPH SMART® CONSTRUCTION ONSITE

Intergraph Smart® Construction OnSite reduces the labor hours required to capture progress and minimizes opportunities for data entry errors associated with traditional methods of status reporting. Using Android devices, on-site workers are able to view, update and track project progress in real-time. Having the ability to view the work package from a tablet or phone allows crews to have the most up-to-date project information, which improves productivity and enables accurate task planning.

With automatic updates to the system when connected to WiFi, users can work offline with ease knowing their inputs are being captured instantly.

PV ELITE® 2017

PV Elite® 2017 provides the newest version of the complete solution for vessel and heat exchanger design, analysis and evaluation used by engineers, designers, estimators, fabricators and inspectors.

The release offers a number of productivity enhancements, new codes and code updates, enhanced analysis and output generation and reports.

Productivity enhancements to PV Elite will help vessel designers get the job done faster. For example, they can take advantage of Undo/Redo functionality. With the News Feed, users can instantly access the latest product release news, webinars and social networking opportunities.
The award winners are chosen annually by members of the Hexagon PPM Engineering & Design team for being valuable contributors in making PPM solutions successful – not only for their companies, but also for the entire industry.

This year’s Hexagon PPM Engineering & Design Tools Excellence Award recipients are true visionaries and are listed on the right.

We offer our congratulations to these customers for taking full advantage of the benefits that our solutions provide. It is an honor to recognize them with this year’s Engineering & Design Tools Excellence Awards, and we look forward to continuing these partnerships for even greater achievements in the future.

Mattias Stenberg
Hexagon PPM President
Follow our social channels stay up to date with the news, views and interest to people who design, create, operate and manage industrial projects of all sizes. Our blog Insights is also a great source for PPM information.


An expanded digital version of Insight magazine – with added information on Partners & Projects, Launches & Releases, customer stories and more – can be found online. When you visit the zmags.com site, be sure to access the Insight archive.

Are You a TUF Member?

Join our LinkedIn Technical User Forums (TUF) for online discussions and year-round peer-to-peer networking.

Join the Winners Circle

Submit a project using Hexagon PPM tools on a challenging project for a chance to win prizes.

Download the Golden Valve Desktop Calendars featuring a different winner each month.

Webinars & Training

Hexagon PPM offers superior training services with options to meet your needs. Virtual and instructor-led training classes are available for various PPM solutions.

TRAINING: bit.ly/ppm-training

WEBINARS: bit.ly/PPM-Webinars
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hexagon.com