



COST ESTIMATING AND PROJECT CONTROLS

CLOSING THE LOOP





COST ESTIMATING AND PROJECT CONTROLS: "CLOSING THE LOOP"

Foreword by Ko des Bouvrie

Cost Engineering is proud to welcome you to the Cost Engineering Event 2015, the fifth edition of the most important cost engineering event in Europe. Nowadays we see more and more pressure for projects to be delivered in time, within the established budget and with the best quality. Therefore, the theme for this year's Event is "Cost Estimating and Project Control: Closing the loop". A title that reflects the necessity of bringing estimating and project controls closer together.

At the previous Cost Engineering Event the theme was about Total Cost Management and we noticed that the companies we work with are more and more interested in the total concept of cost engineering. At Cost Engineering we therefore promote that companies should make a step in bringing the estimating and project controls departments closer together, as opposed to two different departments each with their own different views and tools.

We also see that projects are driven by cashflow. This asks for skilled project controllers who have access to more detailed information from the estimate to make better forecasts and analysis. In essence, forecasting is the same as cost estimating, so why don't we make better use of the estimate and the knowledge of the estimator?

In return, the estimator has to rely on good historical data and the feedback on what happened to the estimate. After all, estimating is looking into the future and project controls reflects the reality at the end of the project.

The goal of the Cost Engineering Event is to bring cost estimating and cost control closer together. The presentations of this Event hold the views from industry experts on how to close the loop between these disciplines.

I wish you a very informative Cost Engineering Event that will give you plenty of ideas for your own organisation.

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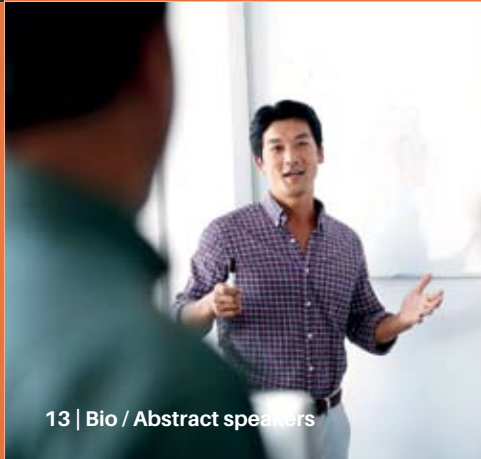
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A	ARRIVAL	WELCOME By Ko des Bouvrie	Keynote: Quantity Surveyor: COO of the Project By Alexia Nalewaik	Benchmarking for the Oil & Gas Market By Nick Papadopoulos & Jim Whiteside	COFFEE BREAK	Planning the Installation of the First-of-a-Kind Fusion Power Machine By Steve Gilligan & Debbie Cox	LUNCH	Getting a Grip on Maintenance Costs By Remco Jonker
B			Keynote: Quantity Surveyor: COO of the Project By Alexia Nalewaik	Contract Management to deal with Black Swans By Jouke van der Schors		Trends in Cost Engineering Research between 1997 - 2015 By John Ahmet Erkoyuncu		Benchmarking: Cost Relationship Analysis By Lance Stephenson
	14:50 - 15:35	15:35 - 15:55	16:05 - 16:50	17:00 - 17:15	17:25 - 18:25	18:30 - 20:30	20:30 - 21:30	
A	Management of Projects: Trends and Challenges By Hans Bakker	COFFEE BREAK	Implementation of Global Cost Estimating Standards By Janne S. Kristensen	THE GREAT GIVE AWAY & THE CHAPEAU AWARD	Demo Cost Management (Room C) By Chris Reebeen	DINNER	HAPPY HOUR	
B	How to Implement and Manage a Successful Trend Management program By Chris Reebeen		Productive Forecasting By Mike Younger		Break			

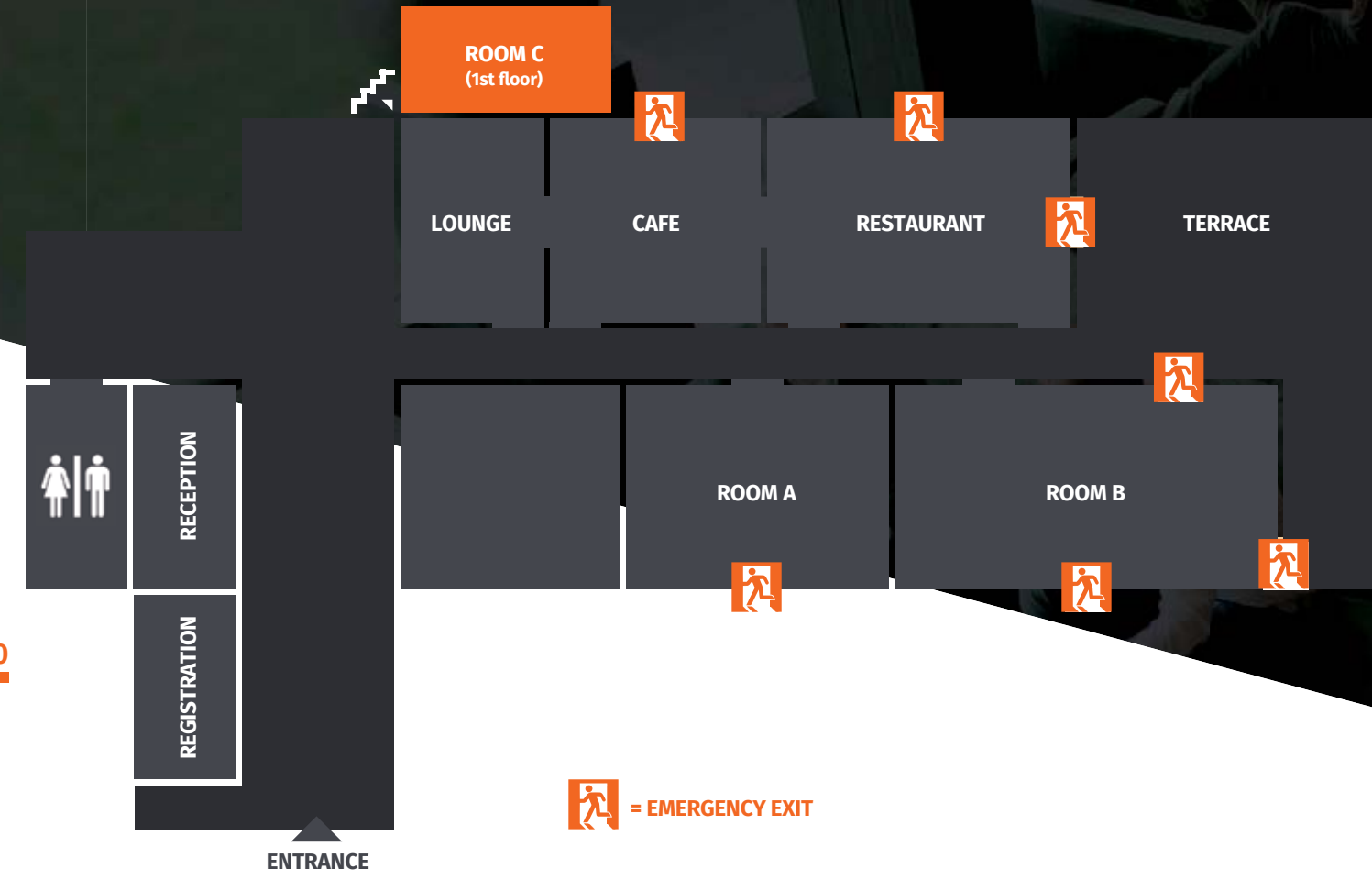
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Thursday, May 7th

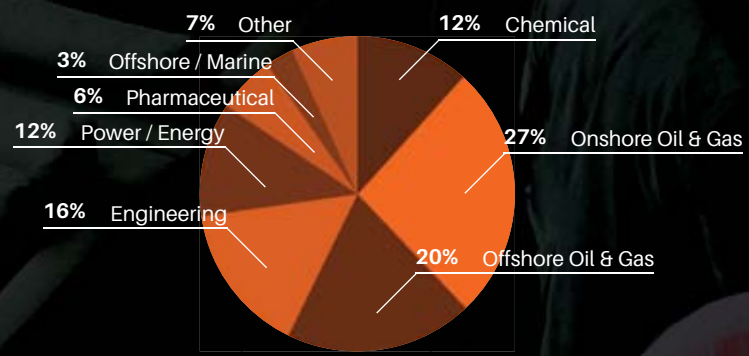
	08:30 - 09:30	09:30 - 09:45	09:45 - 10:30	10:40 - 11:25	11:25 - 11:45	11:55 - 12:40	12:45 - 13:45	13:55 - 14:40
A	ARRIVAL	WELCOME By Ko des Bouvrie	Cost Estimate Classes for the Process Industry By Thomas Rieckmann	Developing Key Quantities By Todd Pickett	COFFEE BREAK	S-Curves: A Relevant Planning Tool By Aldo Mattos	LUNCH	The Challenges for Owner Estimating By Larry Dysert
B			Avoiding Cost Overruns on Mega Projects - Estimating to Close Out By Madhu Pillai	How ERP Systems Can Help Project Controls By Liliana Dasu		The Project Machine By Gilles Turré		Cost Estimating Experiences and Developments at Vopak By Wim Bloks

Friday, May 8th

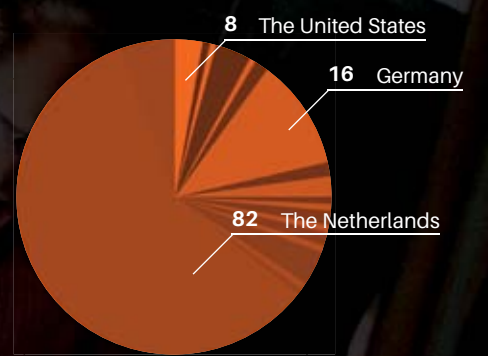
	14:50 - 15:35	15:35 - 15:55	08:30 - 12:30	12:30 - 13:30	13:30 - 18:30
A	Linking Cost With the Schedule By Patrick Kennerson	THE GREAT GIVE AWAY	Benchmarking Workshop: Part 1 By Jim Whiteside	LUNCH	Benchmarking Workshop: Part 2 By Jim Whiteside
B	Modelling Productivity Loss on Design-Bid-Build Projects Using System Dynamics By Stephen Warhoe	& WRAP UP			



REPRESENTED INDUSTRIES



TOP 3 COUNTRIES



10

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The average grade of the 2013 workshop

8

GENERAL INFORMATION

Registration

Please be aware that you will have to register again on day 2 of the Event (May 7th). You can do this at the same registration desk near the entrance of the hotel.

Evaluation Form

We kindly request you to complete the evaluation form and return it at the registration desk near the hotel entrance after the event.

You can find the evaluation form in the bag that was given to you when registering at day 1 of the event. We appreciate any comments (positive or negative) so that we can take them into account for the next Cost Engineering Event.

Event Presentations

When submitting your evaluation form at the end of the event, you will receive a nice gift.



COST ENGINEERING COMMUNITY



SPEAKERS

Bio / Abstract

This year's Cost Engineering Event brings you highly regarded speakers who are seen as the leading experts in the fields of cost estimating, planning and project controls. In the coming pages we present you the biographies of the speakers with an abstract of their presentations.



ALEXIA NALEWAIK
ICEC

Keynote: Quantity Surveyor: COO of the Project

Bio

Alexia studied Physics (BA) and Structural Engineering (Msc) and she successfully succeeded the SKEMA business school PhD programme in project and programme management. She has over 20 years of risk management, owner representation, and cost management experience.

After graduating, she started working in estimating and projects controls. After four years she switched to a position as management consultant at Deloitte. After this period she worked as an owner representative for several companies and founded her own company, QS Requin. As an owner and principal consultant for QS Requin Alexia focuses on cost management, audit, project performance improvement, risk mitigation, contract administration, and leading practices for global public and private sector Owner clients with capital projects and programs between \$4B and \$20B.

Alexia has also been involved in several professional associations in the field of cost engineering like AACEI and RICS. At the moment she is Chair of the International Cost Engineering Council (ICEC) and a member of the RICS Americas Governing Board.

Abstract

In her keynote speech, Alexia will tell us more about ICEC and her term as chair of this organization. Also she will give a presentation, titled "Quantity Surveyor: COO of the Project". The quantity surveyor / cost engineer holds a unique place in the project team. They are a liaison between members of the project team, accountable for cost and schedule, and have a thorough understanding of the contract. Similar to the QS role is that of the Chief Operating Officer in an organization, a role which requires both broad and deep expertise. This keynote presentation identifies parallels between the two roles, and concludes with thoughts on the future of our profession.

MAY 6TH / 09:45 - 10:30 / ROOM A & B



NICK PAPADOPOULOS
Eos Group

Nick Papadopoulos has over 30 years of experience in cost estimating technologies and automation, including software design, knowledgebase development, integration with upstream and downstream solutions, and process design. His work includes strategic planning, needs analysis, and process optimization for Top ENR firms, Fortune 1000 and US Federal Agencies in cost estimating, cost engineering and cost management.

He has over 20 years of experience in project history and benchmarking technologies, including software design, data architecture, metrics, analysis, and process design.

He has taught at numerous universities throughout the US and contributed to AACEI, ASPE and ASTM organizations for the past 25 years.

He has a Masters degree in Building Construction from the University of Florida and a Bachelors degree in Building Construction from Virginia Polytechnic Institute and State University.

Nick was born in Sparta, Greece and lives in Santa Barbara, California with his wife and two daughters.



JIM WHITESIDE
AACE International

Jim has 37 years of design engineering and project controls experience in chemical and petroleum facilities. He holds six US patents in the refining industry. He is involved in developing benchmarking analysis for the oil and gas industry.

Jim is focused on developing benchmarking consortiums to capture cost and schedule project data that enables companies to understand: cost/schedule ranges for major metrics, cost/schedule deviations & key root causes driving risk and relative performance within the oil/gas industry. Jim has created many assessment tools:

1. Onshore schedule analysis;
2. Onshore construction schedule analysis;
3. Brownfield estimating and scheduling tool for offshore;
4. Offshore brownfield flowline replacements;
5. Phase space analysis (e.g.: behavioral risk assessments).

Currently, Jim has been working extensively with a software company to create the first comprehensive benchmarking analysis database specifically designed for the oil and gas industry. Since the development of ConocoPhillips' estimating and benchmarking analysis database, he led the project to convert thousands of projects from a system he wrote to a web-based system. Many of the tools and features have been incorporated into the commercially available product designed to analyze any project that is located: onshore, offshore, or a pipeline. The next initiative is to automate the secure transmission of data from a company database to a benchmarking vendor.

Jim serves on the Technical Board for AACEI and has been a top ranked presenter at the annual conferences since joining AACEI.

Benchmarking for the Oil & Gas Market

Abstract

Eos Advisor is a web-based project history and benchmarking solution built for the preconstruction and design-build markets. It is a quick and easy way to access your company's historical data to establish conceptual or feasible estimates and benchmarking studies. In just a few short steps, you can generate averages, as well as ranges of normalized costs for each element of a given project. Advisor addresses all the categories of the design/build markets and can automatically adjust for location and time adjustment, escalating historical costs to present-day or future costs.

Eos Group has worked closely with Jim Whiteside to upgrade Eos Advisor in two critical areas important to the oil and gas industry. First, Eos Advisor is structured to support and be aligned with NORSOK Z014. Secondly, Eos Advisor has been updated to incorporate the analysis that Jim describes in the 2014 AACEI paper: "A Methodology for Benchmarking and Finding Causality" (DEV 1634). This second update will support any industry that has an interest in advanced benchmarking.

MAY 6TH / 10:40 - 11:25 / ROOM A

P. 51

Read more about the Benchmarking Workshop given by Jim Whiteside.



JOUKE VAN DER SCHORS

Vijverberg

Contract Management to deal with Black Swans

18 Bio

Jouke van der Schors is a senior contract management consultant primarily involved with tender management, contract management and claim management for large construction projects.

Since 2013 Jouke is director of Vijverberg Advies Groep. Founded in 1991, Vijverberg advises asset owners and contractors in the fields of tenders, contract management, claim management, planning, scheduling and risk management at projects.

As an advisor he is actively involved in a variety of construction projects: coal fired power plant, underground gas storage, gas transmission network, oil tank farm, road construction, offshore oil platform (maintenance), container terminal, laboratory, and office building.

Next to his activities at Vijverberg, he is chairman of the Contract Management Institute, a knowledge center for contract engineers and contract managers in The Netherlands. CMI provides access to the latest information and tools to implement professional contract management.

Jouke is author of the handbook "Construction Contract Analysis". This book offers a structured approach to

contract risk analysis of construction contracts.

Abstract

Contract management is all about making practical decisions concerning real-life deviations of a fixed prediction of the future in a contract. When we sign a contract with a five years execution period we "willfully" make a prediction of the future.

Most humans, at least myself, are incapable of predicting the future. It is possible to make educated assumptions on the future. However, we should be aware of Black Swans. All swans are white, but every now and then a black swan is born.

Nassim Nicholas Taleb, former derivatives trader, is a philosopher and scholar who wrote two brilliant books on unpredictability, risk and human behavior. In the classic *The Black Swan* (2007), Taleb argues convincingly that we never see the unthinkable coming, whereas we should actually learn to benefit from it.

Thinking about contract management for large construction projects from the perspective of Black Swans offers useful insights on how to control projects.

MAY 6TH / 10:40 - 11:25 / ROOM B



JOHN AHMET ERKOYUNCU

Cranfield University

Trends in Cost Engineering Research between 1997 - 2015

Bio

Dr John Erkoynucu is a Lecturer in Service Simulation and Visualisation at Cranfield University. John is part of the Operations Excellence Institute, in the Manufacturing Department. Prior to this role he completed his Post-doc and PhD at Cranfield University. His PhD focused on simulation of service uncertainties for cost estimation in Product-Service Systems within the UK defence sector. In his current role, John is involved with developing online courses in cost engineering, and offering consultancy to industry through research projects.

Abstract

The presentation aims to cover the trends that have been observed across research applied in cost engineering at Cranfield University, UK since 1997. A major target of the presentation is to demonstrate the path to maturity in cost engineering and to suggest a future research direction across industries. The talk covers different types of research (e.g. MSc and PhD) that span between

3 months and 3 years. In common, the research is in novel areas that offer tangible results to the industry. Overall, the research has been applied across a range of industries including defence, aerospace, oil and gas, automotive, construction, and steel.

Over a hundred pieces of research projects conducted with a range of organisations are analysed over the specified timeframe. The presentation covers the key research streams related to cost engineering. The analysis divides the key topics and derives trends across years to demonstrate any shift in research interests and the progression in terms of maturity in key areas. The trends are observed in terms of key challenges faced, processes/frameworks, and tools utilised. The presentation also reflects on some benchmarking results across industries by comparing interests and maturity. The presentation also aims to set out a roadmap for cost engineering related research based on industrial needs.

MAY 6TH / 11:55 - 12:40 / ROOM B

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STEVE GILLIGAN

ITER

Steve Gilligan has 28 years of experience providing Project Management, Planning, and Scheduling support to Large Science/Energy Projects and Engineering/Manufacturing services for the Scientific, Energy, Aerospace, Cryogenic, Motor Racing, Industrial Gases, Orthopaedic and Pharmaceutical industries.

From 2006 to present, he has held progressively responsible management positions supporting the ITER International Fusion Demonstration Project at the CEA (Commissariat à l'Energie Atomique) Cadarache Site near Aix-en-Provence, France. ITER is a fusion research and demonstration project involving seven nations (EU, China, India, Japan, Russia, South Korea, and the United States).

Currently serving as the Planning Responsible Officer in the Assembly and Operations Division, primary responsibilities include preparation of the construction project management strategy and associated, plans and procedures and schedules including all disciplines within construction management.

With a Bachelor of Science in Engineering, HNC in Mechanical Engineering and Project Management Professional (PMP) credentials, his early career (1987 to 2003) spanned assignments with several medium and large size engineering, tooling, and manufacturing companies in the UK with responsibilities for overall planning, engineering, cost, contracts, work scheduling, staff training, and management of manufacturing operations in a modern precision manufacturing environment.

From 2003 to 2006 he was assigned as Planning Engineer and Remote Handling Operations Engineer with the UKAEA (United Kingdom Atomic Energy Authority) supporting the JET Project, one of the world's largest experimental Fusion Reactor facilities. Responsibilities spanned planning and scheduling, risk management, earned value management, equipment specification development, QA, QC, and other life cycle activities required to effectively integrate suppliers, customers, and assembly operations.

Planning the Installation of the First-of-a-Kind Fusion Power Machine

Abstract

How does one plan for the assembly and installation of several million pieces on a first-of-a-kind machine such as ITER?

In terms of complexity, ITER is more comparable to a large EPR reactor than it is to one of the existing Tokamaks. ITER will have to install bulk commodities such as power cables, valves, and piping on a massive scale in multiple facilities—that leads to complexities of scale and complexities of organization that have not been seen before in fusion. We may have as many as 20 contractors from the ITER Organization and Domestic Agencies working at any one time in the Tokamak Building during assembly.

During the last 2 years installation engineers from the ITER Organizations Assembly & Operations Division have been combining their knowledge with construction planners in order to develop the process, and estimate the time and costs needed for each step of the 8 year long assembly, considering the design of the systems to be installed, the massive scale in terms of quantities and dimensions, the

physical and practical constraints, the processes to be followed, and the identified risks.

The Assembly & Operations Division is using industry-standard tools to manage planning—Primavera (for scheduling), Intergraph (for construction management) and Cleopatra, dedicated cost estimating software that can handle high-level conceptual estimates based on limited information right down to accurate estimates based on detailed engineering designs.

This type of detailed planning is a critical prerequisite to meeting the ITER schedule.

The totality of this information is the ITER Organization Integrated Assembly & Installation Plan—or, "How To Build a Tokamak."

MAY 6TH / 11:55 - 12:40 / ROOM A



DEBORAH JANE COX

ITER

Deborah Jane Cox is a certified Project Management Professional with over 15 years' experience providing Project Controls Support to large projects.

Since 2008 Deborah has held progressively responsible positions, providing Project Controls and Management expertise in support of the ITER International Fusion Demonstration Project at the CEA (Commissariat à l'Energie Atomique) Cadarache Site near Aix-en-Provence, France. ITER is a fusion research and demonstration project involving seven nations (EU, China, India, Japan, Russia, South Korea, and the United States).

Deborah's early career spanned assignments including the implementation of systems assuring Safety compliance with UK Nuclear Installations Inspectorate Regulations, implementation of UKAEA wide Resource Management procedures, and a UKAEA wide SAP Implementation Project.

Deborah is currently leading a team of Planning Engineers to support development of the performance measurement baseline for the Assembly, Start-up and Testing phase of the ITER project in a close collaboration with a distributed team of construction, cost, risk, and planning engineers.



REMCO JONKER
Mainnovation

Getting a Grip on Maintenance Costs

Bio

Remco Jonker is an industrial engineer with over 20 years of experience in maintenance and asset management improvement. He gained his experience while serving the Royal Netherlands Navy as an officer in several operational functions. Remco led the maintenance and industrial service practice of a big 5 consultancy organization before he joined Mainnovation in 2001. In his career he was involved in various reliability and asset management improvement projects with companies like AkzoNobel, Astellas, Firmenich, Forbo, Givaudan, TAQA, Pepsico, Leaf, DSM, BASF, Volvo Cars, Merck Sharp & Dohme, Johnson & Johnson, SmurfitKappa and Port of Rotterdam. He is former chairman of the CMMS section of the Dutch Maintenance Association (NVDO).

Abstract

Due to the economic crises and diminished demand for products, many companies have executed ad-hoc and sometimes drastic cost cuttings. Although probably justifiable for the short term, we all know that these so-called quick wins can have serious drawbacks on the long term. Is there a better way to do it? Yes there is! This presentation will show you how to proactively monitor your maintenance cost level, if needed, how to reduce it in a sustainable way. Remco will highlight the Cost Control Improvement Cycle and introduce special techniques like Asset Based Budgeting, Gatekeeping and Root Cause Cost Driver Analysis, including the use of reports and KPI's to support this process. Companies using this approach have been able to reduce maintenance spending by 20-50%; yearly recurring savings without penalizing equipment uptime or SHE compliance. It is a challenge, but it can be done! Can you afford not to learn how?

MAY 6TH / 13:55 - 14:40 / ROOM A

Benchmarking: Cost Relationship Analysis

Bio

Lance Stephenson is a Senior Project Controls Consultant with 30 years' experience in the Engineering, Procurement & Construction environment, which includes estimating, cost and schedule baseline development and validation, cost and schedule control, risk management and contract administration. Lance has provided consulting services to numerous clients in Canada and the United States, where he has experience in process assessment, development and implementation for improved capital project effectiveness and delivery.

Lance is a contributing member of the Technical Board for AACE International (Association for the Advancement of Cost Engineering), and devotes much of his personal time supporting their efforts by developing industry standards and best practices. Lance is also the Skills & Knowledge Trainer for the Edmonton Section of AACE. Lance has published many papers and articles on cost engineering topics.

Lance is a Certified Cost Professional, a Project Management Professional and certified Member of the Royal Institute of Chartered Surveyors. Lance has a Bachelor of Administration from Athabasca University, and a Mechanical Engineering Technology Diploma from the Northern Alberta Institute of Technology.



LANCE STEPHENSON
Enbridge

Abstract

Due to the volatility of the oil prices in today's market, it is imperative that companies ensure that their project delivery system is utilized in order to drive improved cost competitiveness. To further improve competitive outcomes, companies need to improve their understanding of cost drivers and behaviors through historical data collection and benchmarking.

This presentation provides the audience with an understanding of some simple approaches in using a cost relationship analysis that can be used to validate the estimate, provide a baseline for variance analysis during the project controls phase of the project, as well as support the completion of a forensic analysis in order to understand the variances from actual costs to estimated costs.

Through proper categorization of project attributes, robust cost collection as per the defined code of accounts, and sound change management practices, the project team can utilize their project controls efforts to assist in the calibration of the estimating tools, as well as provide the necessary validations with up-to-date project information.

Cost Relationship Analysis provides an empirical analysis based on the relationships (cost drivers and behaviors) for each account in order to provide an effective approach in calibrating and enhancing the estimating and project controls systems, while strengthening the overall project delivery and ensuring improved cost competitiveness.

MAY 6TH / 13:55 - 14:40 / ROOM B



HANS BAKKER
TU Delft

Management of Projects: Trends and Challenges

Bio

Hans Bakker PhD (1955) is professor management of engineering projects. He studied physics and mathematics at the VU University in Amsterdam, the Netherlands, where he obtained his PhD degree in Solid State Physics in 1985.

He started his career as a researcher with Shell's Amsterdam based laboratory in the field of materials engineering. Over the years he broadened his experience by making a switch to the manufacturing business in Singapore and the Netherlands. His broad experience in leading projects in research, maintenance and operations led to his appointment as the global manager for project services and his subsequent position as regional operations manager for capital investment projects in Europe, Africa and the Middle East. In this period he developed the Shell Project Academy concept.

Since September 2007 Hans holds the Chair Management of Engineering Projects at the Delft University of Technology (50% of his

time). The other 50% he spends on giving advice and consultancy on management of projects (www.managementofprojects.nl).

Abstract

The future trends and challenges for the management of projects are studied through a number of different lenses. First, the present performance of the management of engineering projects is reflected upon with the help of improvement areas as identified while writing the book "Management of engineering projects - people are key". Through a second lens the views of the industrial bodies or project management associations for 2025 is revisited. These views are seen as the practitioner's views. The third and last lens focuses on the academic perspectives of the future of project management. It is concluded that there is plenty of room and energy for further development of the project management profession.

MAY 6TH / 14:50 - 15:35 / ROOM A

How to Implement and Manage a Successful Trend Management Program.

Bio

Chris Reebeen is one of CEC's senior all-round cost engineers. He has gained vast experience in the challenging international arena of oil & gas projects for the past 10 years, delivering comprehensive cost engineering support & solutions throughout all project life cycle elements.

During his first years as a cost engineer he was associated with one of the founders of Cost Engineering Consultancy, which ascertained a refinement of traditional cost consultancy methods and skills which he combined with the utilization of modern IT systems. He is always looking to find, optimize and implement new cost engineering techniques to create effective solutions for his clients.

Currently he is working as CEC's project lead for the estimation of the ITER project.

Abstract

Cost control is not the same as cost accounting... this sentence is quite familiar and utilized in a lot of articles and lectures about cost control. However, in practice there are still many cost controllers acting as an accountant, this doesn't contribute to a successful "delivery against promise" philosophy.

A large part of this problem is based on the inability to forecast costs. Forecasting is essential for cost mitigations, trending and management steering data. A trend management program enables proper forecasting with a systematic approach to discover and manage early project warnings. The outcome will be a stable and robust communication on the "estimate at completion" to sponsors, business partners or any other stakeholders.

The collected early warnings also enable the project manager to mitigate upcoming cost in a prioritized way due to the fact that early warnings will be sorted on impacted areas and cost significance.

The in- and outputs of a trend management program should be incorporated in the project organization and it's respective work processes to ensure broad acceptance and understanding, which consequently delivers much better input to the program.

This quick guide in implementing and managing a trend management program, supports control professionals to improve their core control competences but also to increase their valuable management steering output helping the project/business deliver against promise!



CHRIS REEBEEN

Cost Engineering Consultancy

MAY 6TH / 14:50 - 15:35 / ROOM B



**JANNE
S.KRISTENSEN**
NNE

Implementation of Global Cost Estimating Standards

Bio

Janne Skovgaard Kristensen has 22 years of experience within the engineering & consultancy sector. She has a wide experience with cost estimating in all phases of a project, from the initial rough estimates in the programming phases to the detailed estimates forming the basis for project controls and to project closing by capturing of useful historical project data (closing the loop).

26 Janne has been employed in NNE Pharmaplan (NP) for the past 20 years. She is a cost estimation specialist and as chairman of the COI Cost Estimation (Community of interest) she holds the responsibility for implementing global estimating processes, procedures and methods in NP.

Janne is active in international activities within cost engineering. She holds the positions as deputy director of region 2 (Europa & Near East) in ICEC, International Cost Engineering Council and is program manager of a project controls group in Denmark with reference to Danish Project Management Association.

NP is a global engineering company within the pharmaceutical and biotech area. NP is involved in Conceptual Design, Basic Design and EPCMV contracts all over the world. The company is active in four regions; Northern Europe, Americas, Central Europe and Asia.

Abstract

For many years, cost estimation and budget submission has been a challenge in NP. Estimations were not always delivered to the client in a global standard structure nor in a transparent manner. Estimations versus final cost showed gaps and estimations from concept phase to detailed phase increased.

The reason for this is not that we are not able to estimate the expected cost for each discipline package for an applicable

facility for the client - it is more based on that we needed a central organisation responsible for setting the direction for the global procedures, processes and methods for the discipline. The solution seems clear - determine Cost Estimation as a recognized discipline in the company on the same level as Project Management and other disciplines as HVAC, Utility etc.

The development process started in 2012 and a global change initiative was launched. A COI group "Community of interest" was established with representatives from all regions as one of the essential points was to involve the right people with the right skills & interest in the development process and in the direction settings.

The objective for the COI group was to analyse the reasons behind the Cost Estimation challenges. Success criteria were determined and steps for improvement identified, in order to ensure that this gap between estimated cost and realised cost would be reduced.

The change initiative involved research and analysis on current practices, testing various methods and acquiring a third party evaluation. Processes and tools were documented and an ideal future situation identified. Best practices and standards from AACEI were used as a backbone to solutions with the intent to benefit from already established and proven practices, instead of trying to reinvent the wheel.

The presentation is about the positive steps that have already been made and the planned steps forward to develop the cost estimating discipline within NP.

MAY 6TH / 16:05 - 16:50 / ROOM A



MIKE YOUNGER
Jacobs

Productive Forecasting

Bio

Mike has been in Oil and Gas now for over 35 years since becoming an apprentice at the age of 16. He spent the first 8 years completing day release study to achieve an HNC and then a Bachelor's Degree in Mechanical Engineering. He has spent all of these years in Project controls on the Contractors design side, starting in Cost Control and moving into project Controls management at the turn of the century. He has been the corporate head of project controls at KBR and more recently at Jacobs.

He has a very balanced CV with half his career in the offshore sector, including 3 years working on North Sea gas platform as well as onshore work. He has lived overseas in 6 countries and worked on some of the biggest projects across the world during his career. He has also worked on projects starting at just a pre-conceptual study right through to operations of the plant, on one such project, the Leman Alpha Compression job, he saw this through all stages over a 5 year period working in 3 different locations.

Abstract

Everyday Project Controls people can spend most of their time looking at the past rather than the future; this presentation challenges this and asks should we not be looking forward more.

It shows ways Earned Value can be used to start to predict future performance by reviewing productivity against plan. This is a powerful tool which is applicable across all industries and all phases of projects and is easy to calculate based on data collected by us each month. This presentation challenges this and asks the question why are we not doing this so we can start to look forward and be more proactive in our control of projects?

The second part of this presentation looks at bulk material forecasting and challenges why there is so much scrap left at the end of projects; in an age when re-cycling and natural resource saving is in all our minds, why do we sometimes forget this at work?

MAY 6TH / 16:05 - 16:50 / ROOM B



THOMAS RIECKMANN
Cologne University

Cost Estimate Classes for the Process Industry: Required Documents & Expected Accuracy

Bio

Thomas Rieckmann started his professional career after his diploma in Chemical Engineering as scientific assistant at the Technical University Clausthal, Germany. During his doctorate he worked on the reduction of diesel soot in the exhaust gas of diesel engines by catalytic filtration. In 1993 he joined John Brown, a world-wide operating engineering company.

He worked as process engineer with a focus on the basic engineering of polycondensation plants. During his time as head of R&D, he was responsible for the development of processes for the recycling and processing of PET. During this period, he came into contact with the Cost Engineering profession and learned about the requirement of a professional estimate of fixed capital investment and production cost.

Today, he is professor at Cologne University of Applied Sciences teaching in the Process Engineering programme. His research and development interests focus on process and product development, chemical reaction engineering, polymer engineering and cost engineering. He also works as independent chemical engineering consultant offering consulting services together with a variety of seminars for chemical engineering professionals. Thomas Rieckmann is a member of the Dechema working party on Cost Engineering.

Abstract

Cost Estimate Classes for the Process Industry - Required Documents and Expected Accuracy

The risk of misunderstanding between contract parties and project failure is reduced when engineering tasks are defined within a mutual accepted frame. Well defined estimate classes can efficiently assist the contract parties to agree upon a specific scope for cost estimation tasks.

Different organizations from a number of countries like the US, UK, or Norway propose a variety of estimate classes which base on their experience, work flow, and respective company in-house philosophies.

Common to those estimate classes is that the quality of the available documents and the applied estimating methods control the accuracy ranges which can be expected. Typically, 3 to 5 estimate classes are proposed e.g. the 5 AACEI estimate classes.

Class 5 is the most uncertain one. The goal of a class 5 estimate is to provide an order of magnitude based on analogy, related projects and processes. A certain amount of crystal ball work and „guesstimate“ is necessary.

Class 4 is the estimate class most often applied in early project phases. It is mainly used for project screening and the discrimination between process variants. Stochastic estimate methods are applied such as equipment factors like the Lang method for an average process plant. Methods like the Hand method may be applied for projects with higher deviations from the average, with individual character, or for fine chemicals, specialities, or enzyme based processes.

For a class 3 estimate, deterministic methods are applied rather than stochastic methods. More detailed information of higher quality is required and more engineering departments are involved like piping or civil engineering.

The AACEI classes 2 and 1 base on calculation with no room for „educated guesses“. The purpose of those classes with accuracies of about 10 % and 5 %, respectively, is project control during basic engineering and detailed engineering.

Although major chemical and process industries together with a number of internationally operating engineering companies are located in the country, Germany is still lacking a mutually accepted frame work of cost estimate classes. The presentation will propose estimate classes together with required documents and expected accuracy ranges. The focus will be laid on cost estimation in early project phases.

MAY 7TH / 09:45 - 10:30 / ROOM A

MADHU PILLAI
Kentz Group



Avoiding Cost Overruns on Mega Projects – Estimating to Close Out

Bio

Mr. Madhu Pillai has 28 years of broad-based Oil & Gas, Petrochemical and Power industry experience in Operations and Project Management, and has worked internationally. He is associated as Projects Director with Kentz Engineering International Ltd, a Multinational EPC company.

Mr Pillai has spoken at more than 20 International events; and was a Keynote & Invited Speaker for many. He also chaired few international conferences in Project Management and has been a frequent speaker for various professional associations for motivating and inspiring their membership in different areas of professional development.

Mr Pillai was awarded the O T Zimmerman Founder's award by AACEI (www.aacei.org)in 2008 for his contribution to the 'Global Cost Management Professional Community', and is a recipient of the Millennium Achiever Award of International Institute of Success Awareness.

An ex-member of the international forum of PMI on enhancing the professional certification programs around the world, Mr. Pillai has also served on the nominations committee of PMI for the International Board elections.

He currently serves on the International Director Board of AACEI as Vice President (International Regions) and also on the board of International Cost Engineering Council – ICEC (www.icoste.org).

Abstract

A recent report by Earnest & Young (EY) reveals that almost two thirds (64%) of multibillion-dollar, technically and operationally demanding megaprojects continue to exceed budgets, with three quarters (73%) missing project schedule deadlines.

There are several internal and external factors that influence the success of a megaproject. While external factors such as regulatory issues and geopolitical challenges can only be mitigated to some extent through good project management practices; internal factors can be effectively addressed.

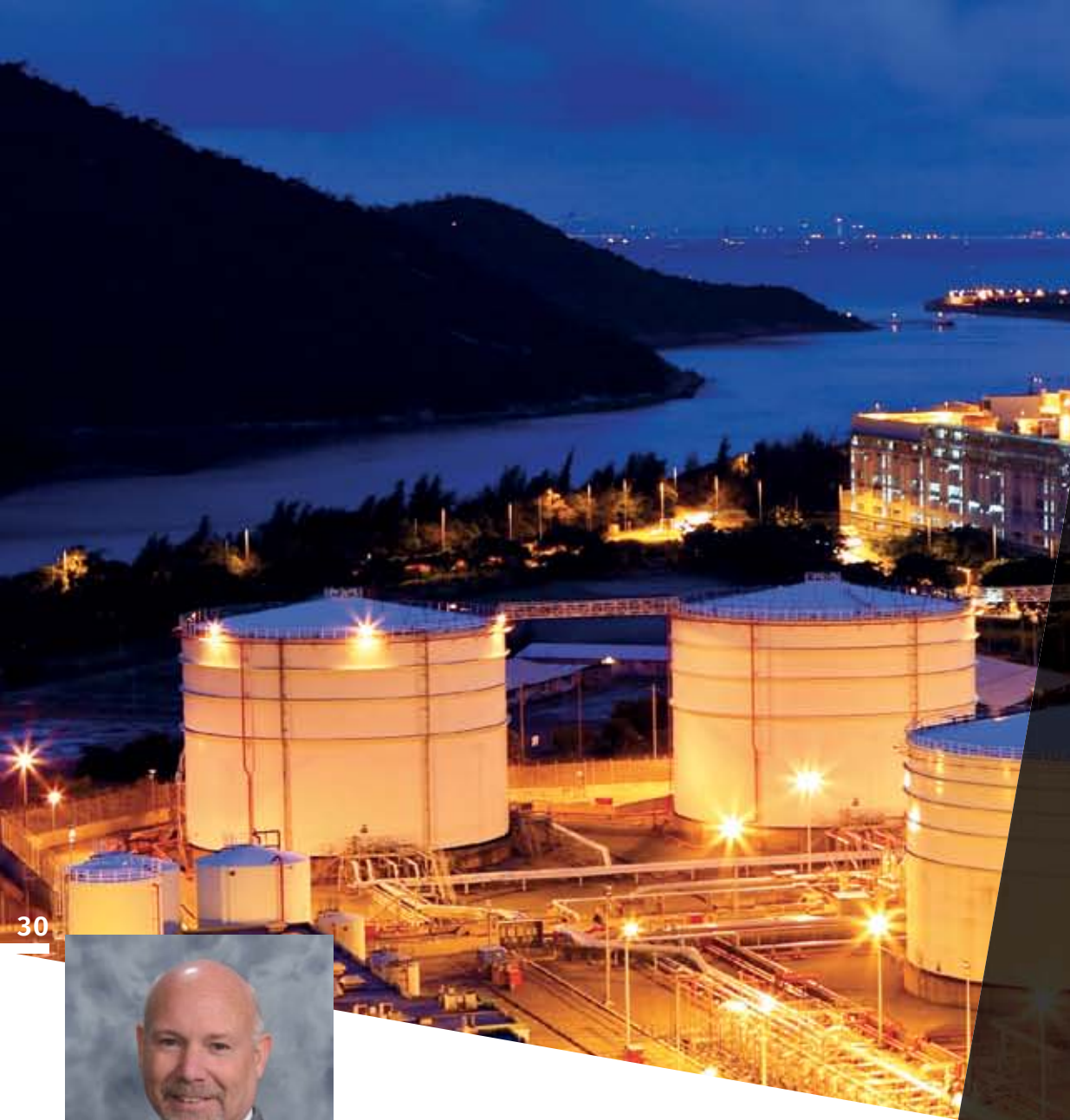
Internal factors may include aggressive estimate, inadequate planning, poor procurement (of vendors & contractors) etc. Most of these areas can be addressed through effective estimate development and efficient & effective management through all knowledge areas under project management.

An estimate, by definition, is a prediction of probable cost and hence involves uncertainty and risk. Therefore the correctness and completeness of the basis used for the estimate development are critical; and it needs to be validated throughout the project life cycle through all knowledge areas under project management.

The very first response from the assigned project manager on any mega project is more than likely negative on the project estimate. While it is important to be under budget for the capital cost; the project managers need to see, think and work beyond time, cost and quality. Project managers and teams have to think more strategically and take accountability for achieving project's business objectives and not just for "getting the job done". This in turn would expect the teams to be effective more than just being efficient. Otherwise avoiding capital cost overrun may not necessarily guarantee avoidance of overrun of life cycle cost.

Project validations undertaken during the project life cycle should be beyond cost, time and quality. It should be in line with the overall business objective of the project. We can see effective validation of estimate basis blended with best project management practices as key differentiator with highly matured EPC companies. This presentation will discuss some important aspects on avoiding or at least minimizing cost over-runs on mega projects.

MAY 7TH / 09:45 - 10:30 / ROOM B



LILIANA DASU

Petrom

How ERP Systems Can Help Project Controls

Bio

After graduating Liliana started to work in 1999 for Romanian National Oil Company, SNP Petrom S.A. - Crude Oil and Gas Processing Department as a mechanical engineer. In 2005 she took over the project control role within the Project Management Department, Refining Business Unit. Here she was responsible for the project controlling activities related to investment projects planned in refineries matured to FEL3. During this period of time she contributed to the implementation of the Project System module part of a well-known Enterprise Resource Planning (ERP) system - SAP R/3.

In 2010 she started to work for the Exploration & Production Division where she contributed to the rollout of the SAP PS system as well as to the planning and portfolio management of development investment projects. Later, in 2013, she became project controller for a strategic offshore investment project developed in the Black Sea region.

Liliana holds a bachelor's degree in Mechanical Engineering from Oil and Gas University, Ploiesti-Romania and a specialization in Reliability of Chemical and Petrochemical equipment from the same university. Recently she earned her Project Management Professional (PMP) certification and Cost Control Technician (CCT) certification, aiming to become soon certified as Cost Control Professional (CCP).

Abstract

For large companies with worldwide subsidiaries who invest yearly billions of Euros in new projects it is important to ensure that almost all the information related to their investments are maintained

properly over the entire project life-cycle. This pre-requisite can be accomplished by implementing a powerful Enterprise Resource Planning (ERP) software package which can be customized in order to satisfy business and multiple countries' statutory requirements.

By definition, the ERP system represents a tool which serves the global organizations in order to remain competitive and customer oriented. The main focus of these organizations is to stay in control - such as they will ensure a long term sustainability of the business. On the other hand, the Project Controls assists the project organization in controlling the project in order to meet its objectives. In conclusion, both the ERP system and project controls discipline contribute in meeting the business targets.

The presentation emphasizes how such ERP system (e.g. SAP, Primavera, etc.) fits with the project control process map as described in Total Cost Management Framework (AAECI), how it complies with 4-eyes check principle and how it ensures continuous improvement of control processes during a project lifecycle. As an example, there will be highlighted the customization flexibility, the various features and the benefits of using SAP PS (project system) to control projects and to manage the investment portfolio.

The experience of using such ERP systems proved that they have the capability to maintain asset historical database, they enable collaboration areas for different resources & different entities and assure a working environment that is auditable and controllable.

MAY 7TH / 10:40 - 11:25 / ROOM B



TODD PICKETT

Conquest Consulting Group

Developing Key Quantities

Bio

Mr. Todd Pickett, CCC CEP is a Principal with Conquest Consulting Group and is currently providing estimating and consulting services to owner estimating organizations worldwide. Todd has been responsible for preparation of conceptual and detailed estimates for capital projects, both domestic and international, as well as development and implementation of various estimating software applications and cost databases.

Todd has over 30 years of estimating, consulting, and training experience in the petroleum, oil sands, manufacturing, chemicals, high technology, power, and construction industries.

Todd is an active member of AACE International where he currently

serves as a Director on the Technical Board. He is a Certified Cost Consultant, Certified Estimating Professional, and a Fellow to AAECI. He has been a frequent presenter at the AAECI Annual Meeting.

Abstract

What is a key quantity? By this presenter's definition, a key quantity is a quantity, expressed in a defined unit of measure, that is associated with a cost element or discipline within an estimate. Key quantities can be important as an identification of the overall scope of a project and in establishing estimate metrics. Companies that execute successful projects will almost always use key quantity metrics during estimate validation and benchmarking. By using key quantity

metrics, in concert with other cost metrics, they can be confident that a project estimate - and hence budgeted project cost - has a sound basis that is supported by meaningful benchmarks.

This presentation will discuss the importance of developing and utilizing industry standard key quantities (with focus on the process industries) for use during estimate validation and project benchmarking. Examples of standard key quantities, key quantity metrics, and estimate validation charts will be included in the presentation.

MAY 7TH / 10:40 - 11:25 / ROOM A



ALDO D. MATTOS

Aldo Mattos Consulting

S-Curve: A Relevant Planning Tool

Bio

Aldo Mattos is an engineering project manager/director and consultant with extensive international experience. Based in Brazil, he is a nationally recognized expert in construction cost estimating, planning and management. He is also lawyer and holds a Master's degree in Geophysics.

32 His experience spans multiple industries around the world, including power plants, transportation, public housing and environment, adding up to US\$ 1B in contract value.

Aldo is currently President of AACEI Brazil Section. Author of "How to Estimate Construction Costs" and "Construction Planning and Control", and an active lecturer on a wide range of topics: bidding, public contracts, earned value technique, disputes resolution, planning, cost estimating, project management, etc.

Abstract

The development of an engineering project isn't linear in terms of cost or resource usage. Its behavior is typically slow-fast-slow. For the planner and the manager, it is important to monitor the job progress as time goes by. The level of activity of a project tends to be a normal distribution for work or cost, and its cumulative function has the shape of a letter S. The S-Curve can be obtained from the schedule combined with cost or work. Mathematical equations may be used to generate a standard S-Curve to be compared to the project S-Curves and provide the planner with notable conclusions. In this presentation the definition, properties and practical applications of the S-Curve are explained in detail. Examples and a case study are presented and some important conclusions are pointed out to highlight the relevance of this planning tool.

MAY 7TH / 11:55 - 12:40 / ROOM A



GILLES TURRÉ

Watif

The Project Machine

Bio

Gilles worked from 1978 to 2008 in Automotive Engineering as a cost specialist of the design of new products.

He has been involved in most of the next car development of Peugeot / Citroën and was in charge of the definition of the cost engineering methods, especially Cost Estimation and Cost Control.

Gilles was also in charge of all the costing software developed by or for Peugeot / Citroën, and was involved in most of their project management software developments.

Besides his practical experience, Gilles has also been academically active. He was in charge of courses on cost engineering at the ENSAM (Ecole des Arts et Métiers), at the IAE (Institut d'administration des entreprises) of Paris, the ENSPM (Ecole des Pétroles et Moteurs), the ESCE (Ecole Supérieure du Commerce Extérieur) and at the Lausanne University. He is still giving lectures at the Ecole Centrale de Paris.

He is the secretary and past president of the nonprofit organization SMAp (Société de Management de Projet) which animates the professional domain of project management and cost engineering. It promotes as well the IPMA and ICEC certification.

Gilles is the author of the book "Coût et valeur des projets" (Projects costs and value) and he is the co-founder of Watif, a company dedicated to estimation and risk software.

Abstract

We shall speak here of production, that is to say an iterative process producing developed products, materials or not, for personal or business use, produced at least at one hundred copies. These products are widely sold from a catalog, and if they can be provided to a customer as a result of a bid, that bid will have a very minor role in the product definition. Definition results of the needs of a market.

The industries concerned are typically the automotive and civil aircraft building, software packages, personal electronics, personal and professional equipment. Some are partially affected, such as military aircraft, shipbuilding and construction. They represent a large share of the global GDP, far more than engineering creating unique products.

All these industries of the competitive commercial world are held to a constant renewal of their offer. This renewal is now almost always made in project mode, through project-based management. This was not the general case thirty years ago, whereas the engineering of unique products had always been done in this mode. This shift explains that project management is still very marked by its engineering origin. The concepts, terms, even professional groups have their origin here.

Despite the weight of the production industries, the structures, roles and responsibilities at work in their projects to create new products are less well-known.

This is the aim of this study to present them and try to insert their concepts in the general description of PPP management. It focuses on the automotive industry, but it can be easily extended to other mass production industries.

We will see that this systematic renewal of a product by a programmed series of projects has something that resembles a production, so the title of "projects machine".

MAY 7TH / 11:55 - 12:40 / ROOM B



LARRY R. DYSERT
Conquest Consulting Group

The Challenges for Owner Estimating

Bio

Larry R. Dysert is the Managing Partner of Conquest Consulting Group (CCG). Larry has been actively involved in many of CCG's consulting areas, including providing cold-eyes estimate reviews, estimate preparation, estimating organizational development, estimating software implementation, project management and controls, and training.

Larry has over thirty-five years of project estimating, management, consulting, and training experience in the chemical, petroleum, oil sands, high technology, manufacturing, and construction industries. Larry has been responsible for the preparation of conceptual and detailed estimates for capital projects, domestic and international ranging to over \$25 Billion in size. Larry often provides training in estimating, total cost management, cost metrics analysis, and risk analysis.

Larry is a frequent presenter and author on estimating and project management topics. Larry is a Certified Cost Professional, Certified Estimating Professional, AACEI Fellow, Honorary Lifetime Member and Award of Merit winner of AACE International. Larry is the Chair of AACE's Technical Board. Larry received the Ambassador Award at the 2013 Cost Engineering Event.

Abstract

Estimating is a challenging activity even in the best of circumstances. By definition, they are inaccurate

even with complete project definition (i.e., they are still predictions of the cost of future events). Owners face a particularly broad set of unique challenges.

Owner companies are in the business to produce a product - whether it is a barrel of oil, a semiconductor chip, or a bag of potato chips. Although the cost of their capital facilities is important to their bottom line, their project development/project management groups (including estimating) are often under-staffed and certainly not the primary focus of the company. However, owner estimating is responsible for the preparation of a broad range of estimates - from very early capital budget planning estimates through detailed project authorization estimates (whether the estimates are actually prepared in-hour or contracted to 3rd parties).

Especially for the early budget planning and conceptual estimates, the lack of adequate and complete scope definition is one obstacle to accurate estimate preparation; and despite management's supposed acceptance of the wide accuracy ranges associated with early estimates, in the end it is often the initial first estimate prepared without adequate scope definition and consideration of risks that becomes a target cost for the project throughout the project lifecycle.

Early, conceptual estimates are dependent on effective conceptual estimating tools and data; yet many owner companies do not collect, normalize and analyze their historical project cost information to support conceptual estimating. This lack of historical cost data also affects their capability to adequately review and validate the more detailed estimates (typically prepared by 3rd parties) required for project authorizations.

Other challenges include changing markets and changing regulations during the project development lifecycle; scope creep; limited experienced estimating personnel; and inadequate consideration of project risks at all phases of the project. This presentation will discuss many of these challenges, and identify techniques to address them.

MAY 7TH / 13:55 - 14:40 / ROOM A



WIM BLOKS
Vopak

Cost estimating experiences and developments at Vopak

Bio

Wim has over 25 years of experience in different industries, such as food and beverages, manufacturing and oil and gas. After his studies in Mechanical Engineering he has held several jobs in engineering, project management and procurement.

At the moment Wim works as Global Director Sourcing and Procurement at Vopak. Vopak is the world's largest independent tank storage provider, specialized in the storage and handling of liquid chemicals, gasses and oil products. Within Vopak Wim is globally responsible for the Procurement function, directly leads a central team of twelve procurement professionals and indirectly leads a community of 65 FTEs that report in the operating companies.

Abstract

Cost estimating experiences and developments at Vopak, the independent tank storage company.

Royal Vopak is the world's largest independent tank storage company by capacity, specialized in the storage and handling of oil products, liquid chemicals and gasses. Vopak operates 80 terminals in 28 countries with a combined storage capacity of 34.0 million cbm. One of Vopak's drivers is to create value via capital disciplined growth. This takes place by a project portfolio that contains expansion projects with another 4.0 million cbm to be added by 2017.

To control the large sums of capital involved with the construction of storage capacity, Vopak has a number of specific processes and standards in use. These give guidance on the correct manner of managing projects, the way to design tank storage terminals, and the manner to achieve the right cost estimates in each phase of a project.

MAY 7TH / 13:55 - 14:40 / ROOM B



STEPHEN WARHOE
Warhoe LLC

Modeling Productivity Loss on Design-Big-Build Projects Using System Dynamics

Bio

Dr. Warhoe has 30 years of experience as a practitioner in the project management and construction management fields, primarily in the areas of heavy civil, major commercial and manufacturing. He is an internationally recognized claims and disputes consultant, specializing in matters concerning delay and productivity disruption.

Besides his practical experience, Steve also has academic experience as a professor at several international business schools. In 2011 he completed his role as adjunct professor at SKEMA Business School, located in Paris, France, and in 2012, completed his role as lecturer at Tongji University in Shanghai; lecturing at both universities on several topics in project management and project controls.

Lastly, he has been a member of AACEI for over twenty five years, culminating in becoming the association's president during 2008 and 2009, was recognized as a fellow in 2011, and is currently on the AACEI Technical Board.

Abstract

Identifying the cause and effect dynamics that result in productivity loss when scope changes are introduced on construction projects has been a topic of discussion and debate for several years.

Managing projects consists of a complex and integrated array of decisions, actions, and communications necessary to complete projects successfully. A project is a system requiring fully functioning processes and procedures, tools and resources, and when any of these aspects are not working efficiently, resulting especially from unanticipated changes, a cascade of problems can and does occur. When changes are introduced during construction work execution, specifically on a project delivered using the design-bid-build delivery method (DBB); individually and cumulatively, these changes can dramatically affect project performance and outcome.

From the results of system dynamic modelling, it is theorized that a construction contractor's ultimate productivity impacts can be calculated based on several causal influences and the feedback loops that create them. For many years, system dynamics modeling has been successfully used to model design-build projects to simulate productivity loss on projects resulting from rework caused by deficient design and owner caused changes.

Identifying and quantifying the cause and effect relationships between changes in order to mitigate or avoid their impact is vitally important to the construction industry.

MAY 7TH / 14:50 - 15:35 / ROOM B



PATRICK KENNERSON
Mott MacDonald

Linking Cost with the Schedule

Bio

Patrick is a senior manager at Mott MacDonald Limited with extensive experience managing financial, cost, estimating, scheduling, procurement, accounting and contract administration disciplines for complex engineering and construction projects and in functional management positions. Project types have included Naval, Aerospace, Software, Transportation, Nuclear, and Construction, both regulated and unregulated sectors.

Patrick has comprehensive technical knowledge of all aspects of project controls disciplines, ranging from planning and scheduling to Earned Value analysis, cost and estimating. He is experienced in budget development, trending, variance and performance analysis. Patrick is analytically adept and has accomplished with emphasis on formulating and implementing strategies to identify, analyze, and resolve complex program issues. He also

has extensive experience with numerous project management software systems utilizing multiple software configurations.

In his career he has had a successful record managing the development, implementation and application of project controls at all levels, including project and staff assignments, in both jobsite and office environments.

Abstract

Apart from very small short term projects (3 to 6 months and under \$200,000) attempting to directly integrate the cost estimating process with the scheduling process is fraught with difficulty. Even on these smaller projects, direct linking is not really feasible unless the primary source of all costs is staff directly employed on the work.

Most normal projects require a degree of integration between cost and schedule. This is usually achieved by developing a WBS and integrating time, cost, scope, risk and quality at either the Work Package level or the Control Account level.

MAY 7TH / 14:50 - 15:35 / ROOM A



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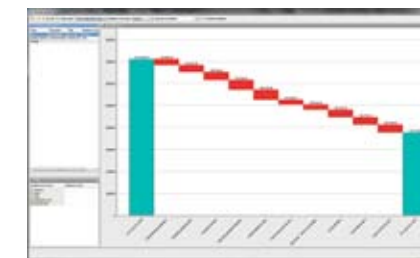


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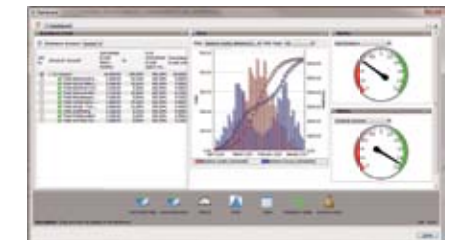
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ALEXIA NALEWAIK

KEYNOTE SPEAKER

Alexia Nalewaik is a Project controls director and quantity surveyor with over 20 years of risk management, owner representation, and cost management experience. She served various industries, including manufacturing (petrochemical, pharmaceutical, food & beverage, automotive, semiconductor), healthcare, higher education, K-12, hospitality, casinos, infrastructure, utilities, and laboratories (DOE).

She is Principal Consultant and owner of QS Requin Corporation and chair of the ICEC executive board.

We talked with Alexia about her career, the developments in the field of cost engineering and her plans for ICEC the coming years as chair.

Cost Engineering: Could you introduce yourself and tell us about your career?

Alexia Nalewaik: For a conference I once analyzed people's careers in cost engineering and I realized that no career path was the same. Nobody wakes up one morning and says "I want to become a cost engineer".

I did a bachelors' degree in Physics, but I very much enjoy architecture and especially classic architecture. Therefore, my advisor at the Physics department gave me the following advice: "If you combine architecture with physics you get Civil Engineering." So, I got my Master's degree in Structural Engineering.

After graduation I started looking around for job positions, and the most interesting position available was in estimating. From then on I worked a few years, and when we won a bid for one of our projects, I became the project controls engineer for this particular project. It was one of these rare transitions in which I was involved in the whole cycle. I not only did the estimate on the bid, but was also involved in schedule values, cost tracking, and scheduling. So I stayed there for several years and then I received a phone call from Deloitte about a position at their valuation and cost segregation group. And so I worked at Deloitte for about four years and that put me in the world of management consulting. I have pretty much been a management consultant ever since.

I am not in project controls, yet everything I talk about - and everything I deal with - is about expenditures on projects and the performance of projects. From there I became an owner

representative for 4 years, and after that, I took a position as senior manager in the division of an accounting firm that was auditing construction projects. I worked there for about 5 years.

Then I started my own firm, in which I am involved in audits primarily, cost management, owner representation and consulting. I get involved with claims and I perform risk analyses. In the end it's all cost engineering and project performance.

more mature" recommendations.

CE: If you look back, is there something you would have wanted to do differently?

AN: It is funny because every once in a while I look back with some of my friends from college and they talk about these courses that they took about fairytales, and then I say "I was a Physics major, I didn't get the chance to take classes in fairytales, boy would that have been



CE: You enjoy the diversity of what you are doing, instead of focusing on one part?

AN: I love the diversity because I can get the details as well as the big picture of the project: "Who are the stakeholders, where are the risks, how good is the governance for your project or program?" That way I end up giving advice not just on what I was asked to analyze, but also give recommendations for governance and oversights operations like team structure or organizational structure, both hard and soft recommendations, both the numbers and the sort of qualitative "here is how you can make your organization

fun". Then again it is like the butterfly effect, if you change one thing, maybe I would not have ended up here, and I am perfectly happy here. So I have learned not to do the 'what if's', because a lot of my changes in career have been kind of random. It might have been a big risk to jump from project controls to begin as a management consultant at Deloitte. Then again I have always thought that if this did not work out, I could go back to project controls. I never really went back to project controls, instead I brought project controls with me and then integrated it instead of zooming into one particular aspect. ▶

CE: So this multidisciplinary approach helped you further in your career?

AN: Definitely. I finally got to use the Physics! I did Monte Carlo modeling on several projects for different industries such as food and beverage, oil and gas and pharmaceutical, and finally got to use probability and statistics. It was great, because I was one of the few people who understood the statistical models and I was happy to have a physics degree.

CE: Who has been the most influential person in your career?

AN: There have been many, but I would not be where I am today if it was not for the head of the physics department at my university, Dr. Richard Olenick. He was the only person in my whole life who told me: "you are not a physicist, you are an engineer". At the final exam they gave me a problem I needed to solve in four hours. So everyone else got these theoretical physics questions, and the problem they gave me was to design a lift, and tell the friction forces, the size of the motor and the weight of the steel, etc. I do not think this same question had ever been asked, or was ever asked again to a student. If it was not for Dr. Olenick, I would probably have become one of the guides of a science museum.

There have been more influential people in my life, but there is a difference between mentors and champions. Mentors are people who can give you advice in things, but what has really made a difference in my career have been champions. Not just people who give you advice, but people who have the influence to make you visible to people higher up, and to push and promote you to get you that next step in your career.

CE: Do you consider yourself a mentor and a champion?

AN: Yes, I try. I have added junior staff members as co-authors on papers to get some visibility for their careers and get them to the next level. Some people did not care. They were happy to put their name on the paper but they did not really care. But I do what I can, and right now, with my own firm, most of what I am working with are client staff and owner staff. I work with them

“In the end, cost engineering is everything. A resource is a cost, time is a cost, risk is a cost, and even opportunity is a cost.”

for maybe a few months, so I can give them certain types of advice on what they can do with their skills. I try to help them realize that their career doesn't have to be narrow. There are so many factors which contribute to a successful career. I like to do what I can to help, I am happy to give advice.

CE: There are a lot of different definitions of cost engineering, what is your definition?

AN: In the end, cost engineering is everything. A resource is a cost, time is a cost, risk is a cost, and even opportunity is a cost. So to me, cost engineering is the most important aspect of a project (maybe I am just too much of a fan of our industry). At the IPMA conference for instance, everybody is talking about all these different methods and about how theirs is the most important of the project. The only thing I can say is: "The most important thing on the project is cost engineering."

CE: What do you think are the skills a good cost engineer should possess in order to perform a job properly?

AN: It depends on several things. First of all it depends on the person. You have a difference between the sort of cost engineer who picks up a number of skills across the board and addresses cost

engineering comprehensively. You also have the people who are perfectly happy with just focusing on their piece of the puzzle. This difference determines the kind of skills someone should possess. Secondly it depends on the kind of organization you work for. Some organizations are so extremely rigidly structured, that you end up with people in boxes performing very specific roles. The challenge here is the interaction between people, which is vital. The organization needs to be able to get the full picture. It also depends whether you work for an owner, for a contractor or for a managing consulting firm. So perhaps it isn't a realistic question to ask what the typical skillset for a cost engineer should be, because it depends on the type of person and the type of organization.

CE: What do you think are the challenges in our line of business?

AN: I think it's the ability of going forward.

For a long time our body of knowledge has been static. We are constantly teaching people how to estimate and schedule but if you start asking: "How well do you forecast?", "Do you do trending?" or "Are you doing proactive cost management and reporting?", they all answer these questions saying: "Oh, we do earned value." I think there has got to be more than one way to do something. So the question is, "What sort of models or methodologies could be developed?" Instead of constantly reacting to the project, try to forecast and get ahead of that risk curve and solve problems before they start. I think that is where we need focus on now. I have mapped how the body of knowledge from AACEI has changed from 1988 to 2006, and you can see how it has evolved from focusing purely on project controls, to this broader concept of all cost engineering.

between these organizations?

AN: I think there is good cooperation between the more sophisticated professional institutions. But there are some differences among the members of ICEC. Some are big, others are small, some are more academic, others may be more practitioners and some are in-between. You can see the bigger organizations like AIQS or the AACEI or even RICS (the cooperative partner with ICEC) assisting, communicating and providing access to technical knowledge. There are many dynamics and opportunities in ICEC.

CE: What are the challenges in cooperating?

AN: The challenge we face is the standardization of language, being an organization that incorporates quantity

terminology in different countries and we call ourselves different things in different countries. We might be construction economists, quantity surveyors, cost engineers, project controllers, estimators, schedulers or whatever. It makes it much more difficult for us as a profession, to have global visibility. So if we wish to give our profession the recognition it deserves, we need to find a way to market it commonly and bring that visibility as high as a project manager, because the project managers cannot do their work without us.

CE: What are differences between the member organizations and how do you bridge these differences?

AN: Mainly our methodologies are different. The methodology for bidding as a quantity surveyor is very different from bidding as an estimator. So we need to acknowledge the differences that we have within our associations, but we also have to acknowledge the similarities. Bringing people together, elevating the visibility of our profession, creating some more structure and partnering together on projects and conferences. Also, promoting our publications at companies and helping them understand the importance of not keeping that estimator separate from the rest of the project controls team.

CE: In your term as chair, what goals would you like to achieve?

AN: In my term as chair we are developing a baseline competency that we expect every organization to come up to. We have had an accreditation team now for at least four years, and this accreditation team has done a wonderful job of bringing up the expectations on how to accredit each member organization's certification programs. We have been doing a very careful job in looking at the body of knowledge and the robustness of the certification for individual members. ▶



CE: In October you got elected chair of ICEC. ICEC is involved in promoting the cooperation between the various cost engineering organizations, like AACEI, DACE and ACostE. How is the current cooperation

surveyors, cost engineers, and also project management associations. So one person says program, the other says schedule and we need to come to a sort of common agreement on how we can speak the same language so we can work together. We have an industry that uses different

CE: How does ICEC make sure the certification programs of the member organizations meet the required standards?

AN: For the first time people start getting turned down for their accreditation. We have established a baseline body of knowledge that each certification program must include. Also we added other elements such as the rigor of testing and organization structure for certification. In this way we establish equivalence.

CE: As an international organization, do you have plans to expand to other parts of the world?

AN: Yes, that is one of our ambitions. We are strong in Europe and we have become and are becoming stronger in South America. In the United States, Canada and the PEX region we are doing well, but in Africa and the Middle East we need to grow and get some more recognition. So we are going to pay attention to the regions that we are not serving as much as we would like to. It is not that we are failing or that we ignored them, but it is that we may not be aware of (or there may not even be) professional associations in these countries. Therefore, we are trying to introduce cost engineering in these countries and get them involved.

CE: So is it difficult to keep the ICEC members involved and contributing?

AN: You should see us trying to organize a Skype call. I don't know what it is, but somehow I am always the person that needs to be awake at night for a phone call, and I am not entirely sure if that is fair, haha. So yes, keeping in mind all these time zones is difficult, but we do have regional meetings and we meet up at conferences. So through me and others, giving presentations at various conferences like the AACEI or IPMA, we do see each other and we do interact. Periodically we team up

together and hold a small one- or two-day event. So we do find ways to get together but it is not easy, it takes effort. Fortunately technology is a lot better than it used to be.

CE: ICEC also coordinates the accreditation of the certification. Some people are still wondering what the value of certification is. What

“Helping companies understand the importance of not keeping that estimator separate from the rest of the project controls team.”

are the main benefits of being certified?

AN: I think a certification means different things for different people. Some cultures value certifications very highly and others do not. Some people just want to do it for themselves, because they feel that it is an achievement or maybe it fills a gap in their knowledge, not many schools have a degree in cost engineering. Others do it because they get a salary increase or a bonus for becoming certified. In my second year as an estimator I got the advice from someone who said 'Alexia, if you want to get ahead in this world, you need to get as many letters after your name as possible.' At the time it didn't make any sense to me, but four years later, when I worked at Deloitte, they told me I needed a to get certified. So I did the certification in the CCP and I got some other certificates like the ASA appraisers certification, CCA audit, SAVE (Value Engineering) and the RICS qualification. All of a sudden

here I am with more letters than I can reasonably put on my business card.

CE: What do you expect from the Cost Engineering Event 2015?

AN: I have heard a lot about it from others, and you certainly have - what I would call - cost engineer and project

controls celebrities who routinely attend. The legends in cost engineering speak at your event and that is fun to see. So I look forward to it, I already know a lot of people who are attending and I look forward to see them again. Certainly your event has a good reputation and an excellent diversity of topics. ●



ATTEND THE KEYNOTE SPEECH BY ALEXIA NALEWAIK: "Quantity surveyor: COO of the Project"

In her Keynote speech Alexia will identify the parallels between the COO and the Quantity Surveyor in an organization and she will conclude with thoughts on the future of our profession.

May 6th / 09:45 - 10:30 / Room A & B

GETTING A GRIP ON MAINTENANCE COSTS WITH ASSET BASED BUDGETING

By Remco Jonker

Maintenance adds value by providing available, reliable, safe and environment-friendly production equipment. Fulfilling this task involves costs that can account for a significant part of a company's overall expenditure. Nevertheless, few maintenance organizations truly have a grip on their maintenance costs. The maintenance budget in particular is not always arranged intelligently. All too often maintenance budgets are drawn up as an extrapolation of the budgets of previous years (historical budgeting). When this happens, there is no relationship with the planned maintenance activities necessary to achieve the agreed performance in terms of uptime (Asset Utilization) and Safety, Health & Environment (SHE). This makes it difficult to predict and rectify variances from the maintenance budget. The maintenance budget has no control function and is used purely as a readily available "pocketful of money".

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ASSET BASED BUDGETING

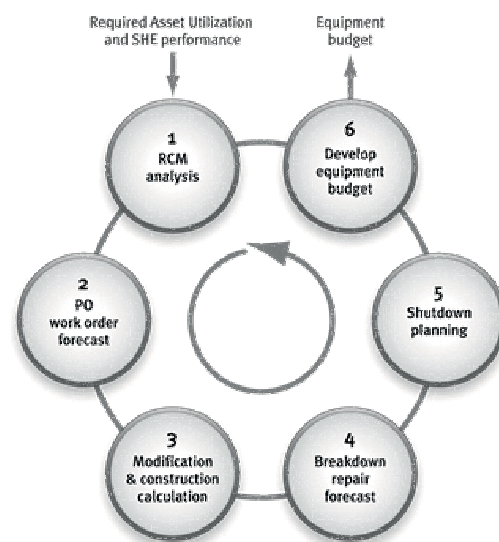
A more accurate way of budgeting is Asset Based Budgeting. The basis is that the maintenance costs are controlled at the asset level and not (or not only) at the level of the maintenance department. After all, maintenance costs are generated by the asset, not by the department. For each part of the asset there is an examination of the expected types of costs (worked hours, materials and services) for each kind of work (inspections, preventive maintenance, breakdowns, etc.). In this methodology, the cost budget is built from the bottom-up.

There are six steps when producing an asset based budget (see figure 1).

Figure 1 (right): The process of Asset Based Budgeting

The first step is to determine whether the required performance levels for asset utilization (uptime) and SHE are attainable

using the present preventive maintenance program. This step is particularly important if performance requirements change from year to year, or if it proved impossible the year before to fulfill the promised performance requirements. An RCM analysis is



performed to evaluate the maintenance program and modify it where necessary. Subsequently, it is possible to extract the individual maintenance activities from the maintenance program that need to be carried out in the coming year. Besides the proactive and preventive tasks (periodic overhauls, component replacements and inspections), there are also default actions (modifications, complete replacements and breakdown repairs). In the steps that follow, these activities are budgeted according to type. Each type of activity is allocated a separate budget code.

Step 2 of the budgeting process consists of budgeting the preventive maintenance activities according to the preventive maintenance (PM) work order forecast. The forecast simulates all preventive maintenance work orders (PM work orders) that will be carried out on the asset in the coming budget year. The basis for doing this is the (forecast) counter readings and stated values at January 1 of the budget year and the defined maintenance

Installation Asset	Cost / Resource Types						Total equipment budget
	Mech	Elec	Civ	Prod	Material	Services	
Inspections	10.400	10.400					20.800
Work from inspections	1.300	1.300			650		3.250
Periodical service			3.200	3.900	5.300		12.400
Breakdowns & repairs	1.040	2.080			1.560		4.680
Modifications (maintenance)							-
Modifications (production)						50.000	50.000
Engineering projects							-
Total	12.740	13.780	3.200	3.900	7.510	50.000	91.130

Figure 2: Example of an asset based budget

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intervals (for calendar-driven maintenance) or expected maintenance intervals (for counter and condition-driven maintenance). As the RCM analysis determines for each PM activity which assets (engineers, spares and contractors) will be necessary for its performance, it is simple to turn the forecast into a financial budget. If the preventive maintenance program has been entered into a modern EAM system, this step can be carried out automatically to a large extent.

Step 3 involves drawing up a budget for the project-driven default actions, i.e. modifications and complete replacements. The budgets for these activities stem from the related project calculations. If calculations are not yet available, the costs will have to be estimated. Note that the RCM analysis only yields modifications that influence maintenance behavior.

Modifications for adjusting or expanding the asset's functionality are usually reported directly by the production department. These modifications must also be budgeted based on a project calculation, but they are assigned a different budget code. This is because these costs must remain visible separately, as they do not form part of the maintenance costs and frequently have to be capitalized financially. The same applies to complete replacements of assets.

The final activities requiring budgeting are breakdown repairs (step 4). While the RCM analysis provides a good picture of the likelihood of a breakdown occurring, it is obviously impossible to schedule breakdown repairs at the start of the year. So for breakdowns there is no point in forecasting with work orders. The budget will be based on a forecast of the expected

costs of repair. This often takes place using an extrapolation of the historical cost level, possibly adjusted if the preventive maintenance program has been modified.

Before the asset based budget can be drawn up, there must first be a clear picture of which maintenance costs will be incurred during the shutdown (step 5). In various industries a large proportion of maintenance is clustered and carried out in a short period of time. A good example is the turnarounds (outage, shutdown) in the chemical industry. Others are the multiyear shipyard repairs in the marine sector and depot maintenance in the aircraft industry. It is important to make these costs visible separately because of the often large scale of these shutdowns (amounting in the chemical industry typically to 80% of total maintenance costs in a year) and because the shutdowns may

48 not occur every year. Both preventive and corrective maintenance is carried out during the shutdown, as are modifications and replacements. These activities will already have been budgeted in the previous steps, but will be assigned an extra budget code. Another advantage of making the total shutdown costs visible separately is that it avoids unnecessary internal wrangling about sudden increases in the maintenance budget.

The final step in the budgeting process is preparation of the asset budget (step 6). All items from the previous steps are gathered together and consolidated. Besides the subdivision into types of activities, the budget is broken down according to cost types (hours, materials, services). It also is wise to itemize the labor costs according to specialist group (for example, mechanical, electrical, instrumentation and civil) to obtain an insight for each specialist group into the expected workload for each asset. In the case of autonomous maintenance, production is also regarded as a specialist group.

As soon as all order information has been collected from the previous five steps for

each asset, the asset based budget can be drawn up and entered in the EAM system. This complete forecast for each asset must be laid down at the start of the budget period in order to monitor carefully its achievement during the period. An example of an asset based budget is shown in figure 2.

DEPTH OF AN ASSET BASED BUDGET

The depth of an asset based budget is often the subject of debate. Particularly when use is made of a computerized preventive maintenance work order forecast, it is possible to prepare budgets at a low asset level. But there are two reasons why this is not wise. Firstly, the budget is used as a financial translation of the wishes of the production department. These wishes are formulated in service level agreements (SLA) at the level of the plant, production line or critical function within the production line. In negotiations regarding the SLA, the production department will be interested only in the asset level at which asset utilization arrangements will be agreed. While budgets can be drawn up at lower asset levels, they should be used only for internal control purposes.

The second reason is controllability. Each year the budgeting process passes through several

cycles in which various changes must be made to the budgets. These will be difficult to maintain if budgeting occurs at an asset level that is too low. A rule of thumb is to keep the asset budget at the level of the SLA, possibly supplemented by sub-budgets at the level directly below (for internal control purposes). These sub-budgets are often prepared only for the cost drivers within the asset family.

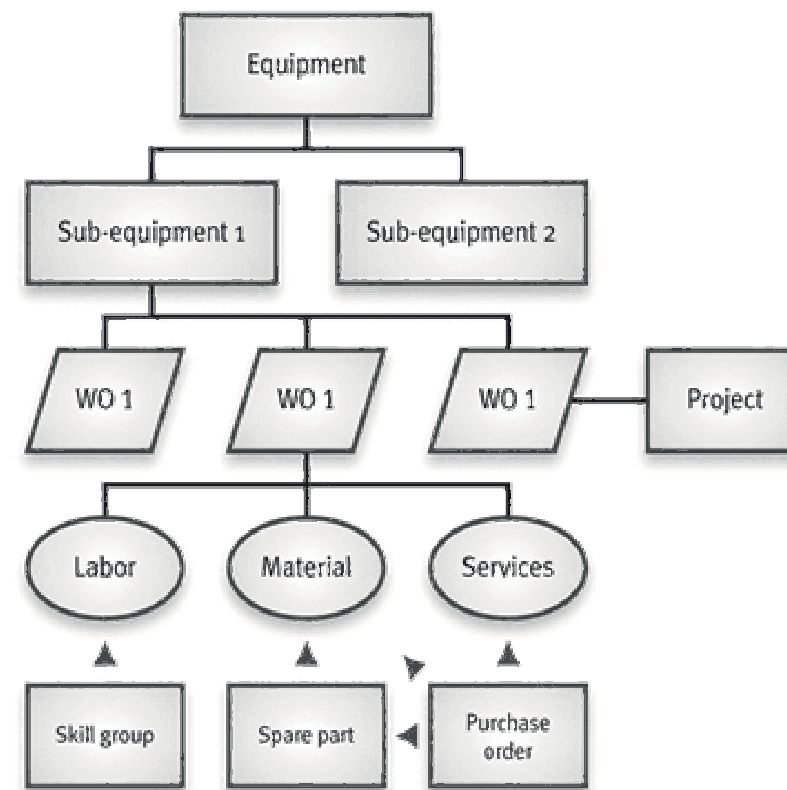
ENTERING ALL TYPES OF COSTS

The asset budget is divided up into sub-budgets for each type of cost, i.e. hours, materials and services. To monitor the budget, all these cost types must be entered on the work order (see figure 3). So it is necessary not only to state hours on the work order, but also for an hourly rate for each craft to be located in the EAM system. Otherwise the wage costs will not be visible. The same applies to spares, which after being used for a job must be entered on the work order.

Figure 3 (right): Relationship between work orders, cost types, projects and assets (equipment)

Spares (and services) purchased directly for a work order, the "direct charge items", must also be entered on the work order as costs. So it must be possible to link a work order to the purchase order and, in some cases, also to the invoice of the purchase

order. This will be the case, for example, when outsourcing maintenance on an as-needed basis, where the true costs become known only when the invoice is received.



USE OF WORK ORDER TYPE

Besides the subdivision into cost types, the asset budget can also be broken down into sub-budgets for each type of activity. For that purpose the work order costs must be identified by means of an activity

type code. In EAM systems this has been solved by means of the "work order type" (inspection, breakdown, etc.). A work order is of one work order type only so, logically, it can concern only one type of activity.

SUPPORT BY EAM SYSTEMS

Some preconditions are obviously also

attached to the introduction of Asset Based Budgeting. The information about the maintenance history of the assets will need to be reliable to a certain extent, for example. Another precondition is the availability of properly completed preventive maintenance work orders (including costs) and your EAM/

CMMS system must provide the right kind of basic functionality. This means hours, materials and services must be bookable against the assets via work orders, and also that a budget must be allocated to the assets concerned. Almost all EAM/CMMS systems provide this functionality.

Adequate support in setting up the budgeting is a different story. It might involve simulating the total preventive maintenance plan, showing the breakdown history of each asset in terms of problem causes, distribution of budgets over periods and assets/sub-assets, recording of several budget versions and the handling of approvals. By no means are all EAM/CMMS systems able to provide good support for these functionalities. Some provide a standard module to support it. Oftentimes these solutions are very labor intensive.

GETTING A GRIP ON COSTS THROUGH SOLID MONITORING

To get a real grip on the actual costs, a good reporting function is essential. By correctly using the basic functionality, the maintenance costs can be entered on work orders, making it possible to actively monitor the asset based budget (and its sub-budgets). In practical terms, this means that an insight exists into the current (cumulative) costs in each period of time (figure 4, left) and that for each period of time an insight is provided into the actual costs per asset and then how those costs are divided over the different types of work (figure 4, right).

This can even become proactive if you include the outstanding costs of already-planned work orders, materials reservations and purchase orders (commitments). At an early stage this enables you to identify impending budget overshoots and respond accordingly. We know from experience that

this makes it easier to control maintenance costs and that the "pocketful of money" changes into a tool for exercising control.

THE SMURFIT KAPPA ATTICA CASE: ASSET BASED BUDGETING FOR EACH PERIOD

Smurfit Kappa Attica is a subsidiary of the internationally operating corporation Smurfit Kappa Group SKG. Smurfit Kappa Attica produces approximately 120,000 tons of high-quality solid board each year for the packaging industry in more than 60 countries. Smurfit Kappa Attica has two production sites, each with a board machine. Out of approximately 200 employees, 25 work at the Engineering department. The department is responsible for the upkeep of the entire machine family, all buildings and the factory site. The paper and cardboard industry has been under huge pressure in recent years. So cost control is an important issue in the industry. It is also a key issue for the Engineering department.

started using asset based budgeting.

PEAKS IN ACTUAL COSTS

"It was difficult for the Engineering department to control the budget properly and get a grip on maintenance costs. One of the reasons for this situation was that budget was drawn up each year based on the past. The budget was linked to each top location in the plant (like "board machine", "energy supplies", etc.) and divided linearly

costs are many times higher than in 'normal' weeks. Also, many maintenance contracts are signed at the beginning of the year. Invoicing often runs behind contracts, so we were regularly confronted by big peaks in our costs. Time and again it required a big effort to obtain some degree of insight."

"By introducing Asset Based Budgeting we recognized we had a good tool for solving these problems. Each week a budget is prepared for each type of work for each asset

are usually carried out during a shutdown."

CHALLENGES

"One of the challenges was the initial preparation of the asset based budget. Determining the regular maintenance costs of preventive and corrective work orders required a lot of work. We ran through virtually all the previous year's work orders to filter out the larger jobs, like special maintenance and shutdown-related work orders. But it's going to be a lot easier in the coming budget year, because the costs have now been entered accurately for each work order and each type of work. Another challenge is dealing with commitments that have been entered into. From a maintenance point of view, these costs only surface in the budget after the activities have been carried out. But financially (in the ledger) the date of the purchase order is the time the commitments were entered into. So it's important to ensure the maintenance budget report and financial ledger reports are properly aligned with each other."

GREATER GRIP

"The big advantage of our new working method is that now both the budget and its fulfillment can be entered and monitored in our CMMS system. At the end of each week we check what kind of maintenance has been planned and we compare it per work type with the available budget. This way we can now make targeted and validated decisions as regards activities we will or will not carry out, or perhaps carry out later, and we have a grip on the costs." •

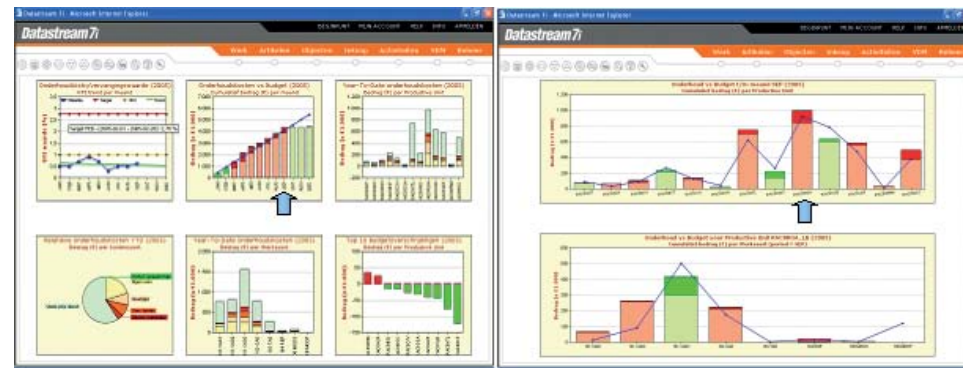


Figure 4: Monitoring an asset based budget in Datastream 7i with the VDM Control Panel

over the year. Each week we had a fixed budget to spend, while our maintenance costs exhibited absolutely no fixed or linear progression. For example, we have a production shutdown seven or eight times a year. During these stops the maintenance

group. This allows us to include separate budgets for every shutdown and make allowances for the payment terms stipulated in the contracts. So the budget for the 'normal' weeks is a lot lower than it used to be. We also have introduced a separate work type called Exceptional Maintenance (EM). This has made it possible to monitor separately the major non-recurring maintenance activities that

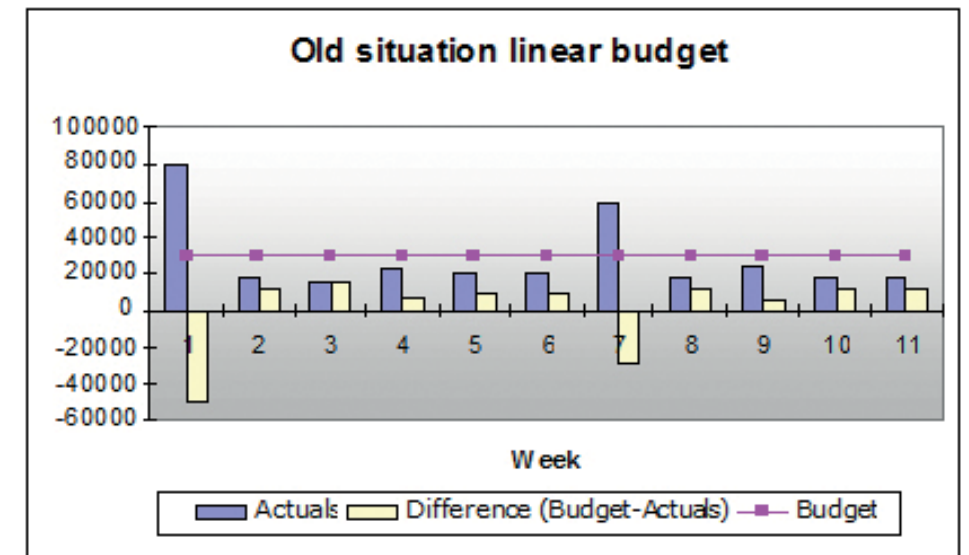


Figure 5

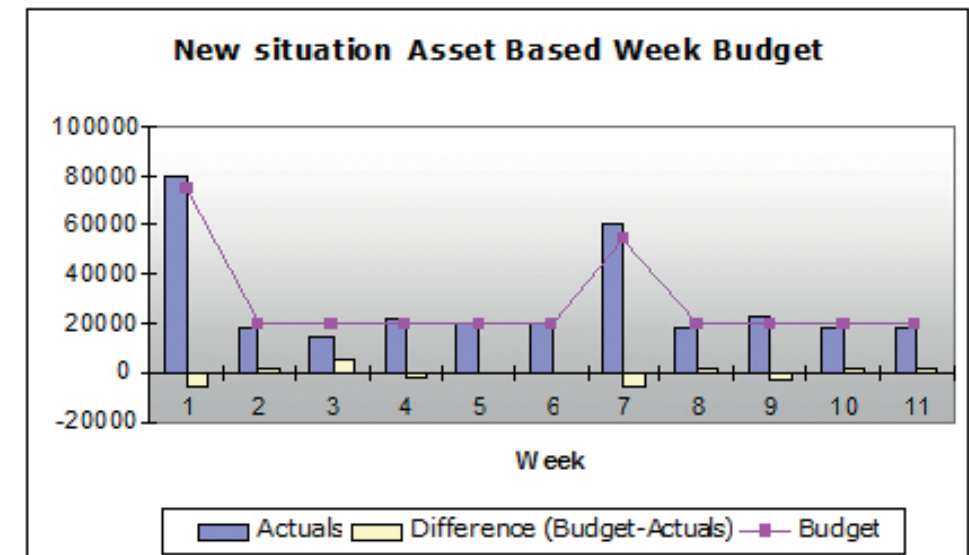


Figure 6



ATTEND THE PRESENTATION BY REMCO JONKER:
"Getting a Grip on Maintenance Costs"

May 6th / 13:55 - 14:40 / Room A



BENCHMARKING WORKSHOP

By James D. Whiteside

In today's business environment it is very important to have strong knowledge on project benchmarking. This is specially true for the global Oil and Gas industry. That is why we are very proud to present you the Benchmarking Workshop by James Whiteside. With over 35 years of design engineering and project controls experience in chemical and petroleum facilities, James D. Whiteside, II, PE is a highly valued speaker on the topic of Benchmarking.

ABOUT THE WORKSHOP

1 Day Workshop / Skill Level: Advanced
May 8th / 08:30 - 18:30 / Room A

The seminar is an overview of project processes along with the advanced analysis required to make informed decisions for capital projects. Participants will gain understanding of proven analysis techniques and data structures that are required to risk and estimate anything from schedule durations, resource loading, construction labor, to professional staffing services. Participants will also learn proven methodologies in risk assessment and benchmarking.

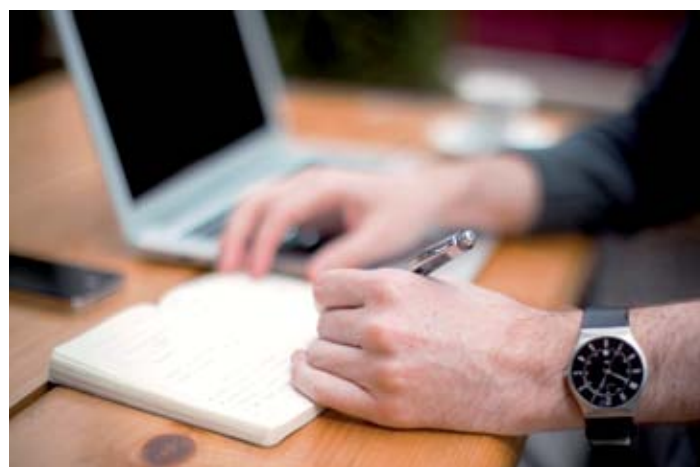
THE GOAL

This is a collection of some regularly used tools that have helped

improve productivity, understanding, and accuracy for the advanced cost engineering professional. The goal of this seminar is to equip the attendee with the knowledge of the tools and data that are necessary to help them deliver competitive projects within 5% of the funding estimate.

WHO WOULD BENEFIT BY ATTENDING?

This seminar will benefit senior estimating professionals and high-end estimators seeking how to leverage computing and intent on improving estimate performance.



TOPICS

The program of the workshop is as follows:

- Developing Estimating Models
- Practical Corporate Investment Decision-Making Guide
- Monte Carlo
- A Practical Application of Monte Carlo Simulation in Forecasting
- Top Risks to Project Cost and Schedule
- Construction Productivity
- Achieving Design Capacity
- Benchmarking and a Methodology for Finding Causality
- System Analysis

“This seminar will benefit senior estimating professionals and high-end estimators”



James D. Whiteside, II, PE has over 35 years of design engineering and project controls experience in chemical and petroleum facilities. Jim served on the Technical Board of AACEI, and is currently the Chair of the AACEI Benchmarking committee. This committee will produce a suite of Recommended Practices for benchmarking projects in the Oil and Gas industry.

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We assist our clients in different industries all over the world with the estimation of their projects, improving their cost management practices and making sure all costs stay within budget.

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In order to guarantee our high quality services we invest heavily in talent. With our young professionals traineeship we are the key provider of certified cost engineering professionals at leading companies in the industry.



COST MANAGEMENT: EXCEL VS. DEDICATED TOOLS

BY CHRIS REEBEN & STEFAN BAKKER

Everyone who is, or has been involved in project controls, knows that time is of the essence. A project that is currently heading towards completion within schedule and budget can quickly go wrong if warning signals are provided too late, or not at all. For every day that such a warning signal is delayed you lose the opportunity to take corrective action and prevent the delay or cost overrun from happening.

As a cost controller, you are continuously analyzing your project's forecast (also 'Estimate to Complete' or 'Latest Estimate'), the incoming commitments and actuals, and managing changes and trends. This makes for a labour intensive task, where the focus should be on analyzing trends and spotting potential overruns before they occur. Having been involved in various cost control projects in various organizations, I found that in reality too much time is spent in obtaining, transferring and converting data into the Excel spreadsheets used by the majority of organizations today.

After doing some research, I quickly found some crucial deficiencies and risks in the use of Excel sheets. With projects becoming bigger, using more complex technologies and with multiple stakeholders involved, the use of a dedicated cost management and earned value management (EVM) tool could be an

investment worth considering. Especially large EPC firms, who typically deal with a more detailed level of control than owners, staying in control of the project means the difference between profit or loss. In this article I will describe the possible benefits a cost management tool can bring, using my own experiences in cost control projects.

CHALLENGES OF EXCEL

Excel is probably the world's most used software platform. From a simple spreadsheet to calculate your personal finances, to advanced spreadsheets with macros, built-in formulas and look-up tables used to manage multi-billion projects. The greatest strength of Excel is ironically enough also its biggest problem; the unlimited flexibility and applicability. I am therefore pretty sure that the challenges (and sometimes frustrations) I am going to describe here are familiar for 99% of the people working with Excel.

In most cases, the growth of an Excel sheet is a gradual process which is only visible when comparing the current magnitude of the spreadsheet with a situation years back. This doesn't have to be a problem, as long as the people working on the development of the spreadsheet remain active within the organization and are always available to clarify the logic behind the macros and formulas to 'regular' users. Unfortunately, this is rarely the case and people switch jobs all the time. Furthermore, cost controllers are usually no Excel programmers and the other way around, Excel programmers are no cost controllers.

When you have to find the logic behind an Excel spreadsheet composed by someone else, that is where things can get really ugly. One of the clients I have worked with in the past even nicknamed their Excel tool "The Beast".

When projecting this on the work of a cost controller, it is essential that you can

“Measurements are the key.

If you cannot measure it,
you cannot control it.

If you cannot control it,
you cannot manage it.

If you cannot manage it,
you cannot improve it.”

James H. Harrington

rely on the figures and calculations where you base your actions on. On large and complex projects, where you could be facing thousands of control components, you do not want to check if every calculation adds up or if all your actuals are correctly updated. Yet, the bigger your Excel spreadsheet becomes, the more likely it will be that formulas or look-ups contain errors. Not being the developer or owner of the Excel spreadsheet makes it really hard and time consuming to locate the error and fix it. Time that could be spent on much more valuable activities. Of course, this only holds when the error is identified in the first place. In most cases errors are not even noticed within the vast majority of data. You can only imagine the impact this could potentially have on the end result of the project.

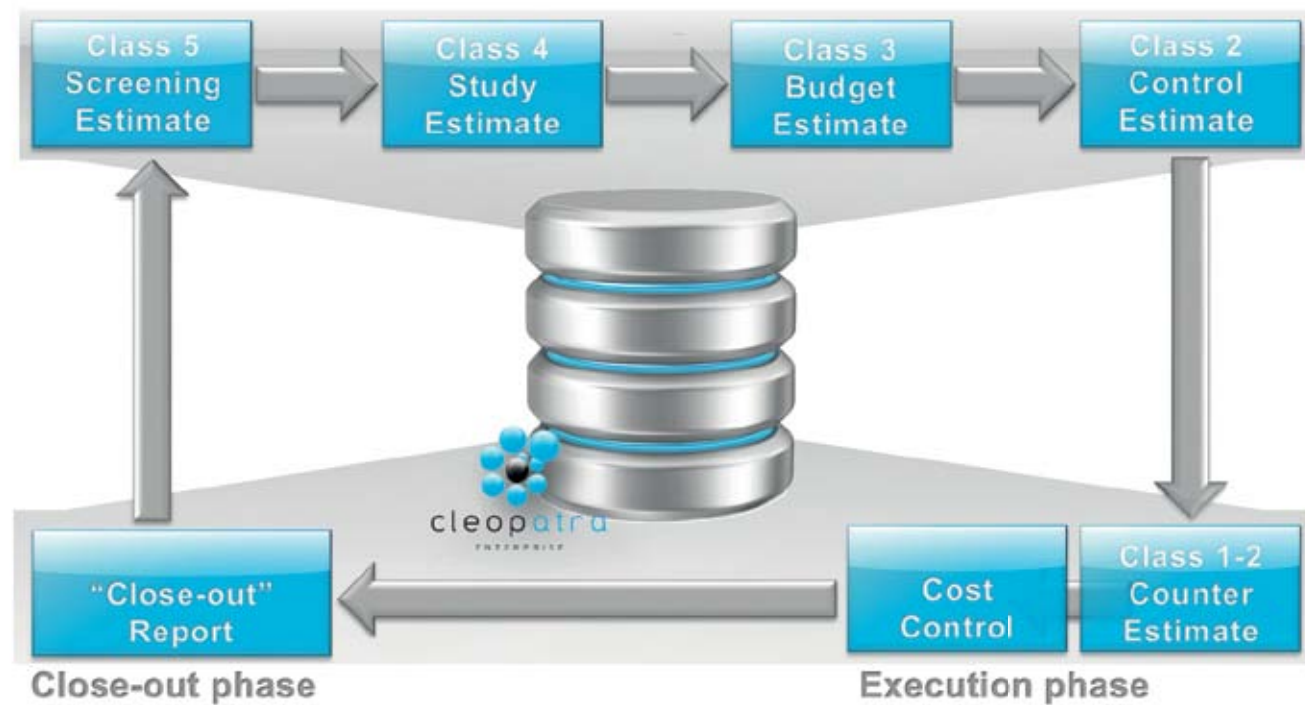
Another example where Excel has its limitations when it comes to cost control is keeping track of revisions. Of course, you can create a copy of your Excel control document and use it as a revision. However, keeping track of your revisions, let alone comparing them through time, is a tough job. In my experience, people tend to copy

the control document to their local machine as this is more "convenient". When at the same time a colleague decides to do the same, you quickly get two, three or even more versions of your control document, where no one has a clue anymore what the latest version is. Imposing restrictions to prevent this from happening is very hard, without at the same time limiting people in their permissions in the spreadsheet itself.

Finally, project managers are generally most interested in per project reporting and a dashboard overview of the project performance. Consistency in the reporting configurations are important for project managers, so that they know where they can find the information that matters and can easily compare project reports with each other. Having Excel to produce consistent reporting output can be challenging. In most cases, a summary sheet can be produced, but anything more than that will soon become problematic. In cost control, a great variety of reports are often required, such as: ▶

Breakdown structure Account	Original budget cost	Approved changes	Transfers	Revised budget cost	Commitments (Previous)	Commitments (To Date)	Expenditures (Previous)	Expenditures (To Date)	ETC (Previous)	ETC (To Date)	EAC (Previous)	EAC (To Date)	EAC (To Date)
Account													
Total Mechanical Equipment	572,303.29	8,513.95	0.00	581,017.20	325,845.40	27,155.28	353,020.58	155,784.31	30,726.33	186,500.64	338,894.25	-28,563.81	310,330.55
Total Piping Materials (AA)	646,795.85	8,328.01	0.00	655,123.86	370,725.32	36,201.86	406,926.99	198,498.97	0.00	198,498.97	398,226.39	-30,193.37	328,034.82
Total Electrical (AA)	761,221.83	15,486.42	0.00	776,708.25	432,215.35	40,501.47	472,716.83	233,114.01	37,388.07	240,602.08	448,757.23	-37,655.05	408,132.65
Total Instrumentation Materials	870,362.37	7,921.38	0.00	878,283.75	465,532.36	-42,958.80	538,509.38	206,081.92	0.00	206,081.92	466,679.54	-38,324.22	427,345.32
Total Miscellaneous (AA)	958,262.89	1,805.75	0.00	960,068.64	537,418.46	45,908.20	583,327.56	294,083.99	46,171.82	314,155.91	511,870.86	-43,140.18	468,730.68
Total Construction Services	464,857.12	50.00	0.00	464,907.12	177,133.64	16,711.65	189,844.34	98,530.52	0.00	98,530.52	296,662.62	-21,634.57	235,048.06
Total Constr. Tools & Consumables	518,636.52	0.00	0.00	518,636.52	184,589.05	15,047.06	199,636.14	89,677.68	16,717.65	168,395.54	292,930.29	-24,689.71	268,240.58
Total Scuffing	612,701.82	0.00	0.00	612,701.82	211,915.23	21,996.32	239,476.54	122,291.63	0.00	122,291.63	279,362.40	-23,365.53	236,008.88
Total Prefabrication	713,767.37	0.00	0.00	713,767.37	286,574.84	22,866.24	309,441.08	135,093.06	26,028.42	131,111.91	398,409.39	-32,828.74	336,634.13
Total 3rd Party Services	773,230.31	0.00	0.00	773,230.31	294,886.93	24,824.66	309,711.59	184,741.81	0.00	184,741.81	412,453.49	-24,945.83	376,298.66
Account	6,892,582.53	42,365.69	0.00	6,934,948.22	3,284,480.58	273,948.33	3,578,428.91	1,799,997.92	160,412.80	1,609,510.72	3,754,496.73	-316,449.19	3,438,049.99
Unassigned	52,618.16	0.00	0.00	52,618.16	74,156.28	6,211.37	80,509.62	40,940.27	1,598.44	42,094.71	52,918.16	0.00	52,918.16
Grand total	6,945,200.69	42,365.69	0.00	6,987,566.38	3,358,636.83	280,159.70	3,658,938.53	1,749,438.19	161,969.24	1,611,607.43	3,807,416.89	-316,449.19	3,490,967.70

INITIATION THROUGH CLOSE-OUT PHASE



- Monthly financial overview
- Forecast variance
- Cashflow
- Changes
- Progress / EVM
- Trend report
- Accruals

Dedicated cost management tools often have a built-in reporting manager that can quickly and consistently produce these reports, whereas Excel requires a lot of manual processing every time again to get the desired output.

Do not get me wrong. I am not saying that Excel is by all means a recipe for disaster. It has its upsides as well and by offering a great deal of flexibility it could work for some organizations. However, I found that dedicated cost management tools can eliminate many

of the aforementioned concerns and at the same time bring a lot of additional benefits, which will make the investment worthwhile for many organizations.

DEDICATED COST MANAGEMENT TOOLS

Various cost management solutions are available on the market today, that recognize the imperfections of Excel as a cost control system. Some of the more well-known cost management solutions are for example EcoSys, Ares Prism and Cost Engineering's own Cleopatra Enterprise. These tools each try to overcome these imperfections and usually promise to be easier to maintain and less prone to errors. Of course, individual cost management solutions can have their own flaws and are in no case a "magic tool", but generally speaking they offer a great deal of improvement over Excel.

One of the main advantages of these systems is the possibility to establish a

standard approach and methodology in cost control throughout the organization. A cost management solution will enforce users to work within set boundaries and adhere to the methodologies set by the organization, while maintaining a sufficient amount of flexibility. For example, certain breakdown structures can be included as a standard, while keeping the possibility to add additional (breakdown) structures if needed. Especially when these standards and methodologies are based on best practices from the industry, a big step in the overall project performance can be made.

Working with standards also applies in reporting. The more advanced cost management solutions usually have an integrated report manager, where reports can be configured and saved as a template for use throughout and across projects. Reports can therefore be generated much faster. When a cost management system is set up correctly, reports can be produced at the push of a button.

Having been employed as a project controls manager on some major projects, I quickly found that you should focus less on the individual figures of a project and more on the overall project dynamics. Where are we going, what trends do we see, how is our progress? Those are the things you should worry about and the answers to these questions should be readily available. Most cost management solutions have for example built-in indicators and Key Performance Indicators (KPIs) that will attract your attention to those parts that really matter. In general, these tools have the capacity to alert you of potential problems before they occur (through trend registers), giving you the option to mitigate instead of trying to control the damage.

Time is of the essence in cost control. For one of the projects where I was consulting as a project controls manager, the project was already in progress. Since there was a

sure that I would have been able to come up with the adjusted forecast in much less time. That would have left more time for the client to decide on the continuation of this project, before it passed the 'point of no return'. Also, some of the causes for cost overruns might still have been mitigated.

A good cost management tool will have capabilities you will not find in Excel that saves a lot of time. For example, most tools have a direct integration with accounting and scheduling tools for the exchange of data. In cost control this is not a one-time exercise, so being able to save even a few minutes each time you import your actuals from the Enterprise Resource Planning (ERP) system, is very helpful. Also, tools usually are better suited in handling large quantities of data, whereas Excel can quickly choke when you try to handle thousands of control components and the calculations behind them.

“You should focus less on the individual figures of a project and more on the overall project dynamics”

feeling that the forecast (ETC or LE) was in no way reflecting the real situation, I had to dig deep in the project's dynamics and control components and identify the trends that were likely to cause the expected overrun. Since the client was doing their cost control in Excel, I had to spend valuable time in understanding, checking and analyzing the spreadsheet. If I would have had the required information in a structured overview, such as a trend register, snapshots and forecasts in a system, I am

Maybe the most important advantage of tools such as Cleopatra Enterprise is the ability to close the loop between estimating and project controls, which is also the theme of the 2015 Cost Engineering Event. In the example of Cleopatra Enterprise, the tool incorporates complete support for both cost estimating and cost control. This makes it possible to transfer your original budget prepared by the estimators to your cost control module and keep a link to your (often ▶

more detailed) estimating components. All without leaving the application or having to make difficult conversions. During the project it is even possible to use the advanced estimating techniques for the bigger change- or variation orders.

Not only from estimating to cost control, but also the other way around it is important to close the loop. Many organizations underestimate the value

THE FUTURE LOOKS BRIGHT

Thinking about all these benefits and possibilities cost management tools have to offer, I can only conclude that there is still a lot to win in the way most organizations do cost control. Sometimes it is hard to imagine that large multinational companies still rely on Excel for one of the most important disciplines determining

Implementing a cost management tool will require some effort and people will need some time to get used to the new capabilities away from their 'trusted' Excel spreadsheets. From my experience I can only say that it is worth it. In the end, all that matters is to 'stay in control'!



of using the project close-out as a benchmark and feedback loop to the estimating department. Cleopatra Enterprise allows you to do in-depth comparisons between your actuals and original estimate and update the cost database used for estimating to allow for better, more accurate estimating.

the project success. Especially since most other disciplines, such as planning, finance and estimating are usually done in dedicated systems. Your estimate can be spot-on, but without doing your cost control in the right way the project can still go bad really quickly.



ABOUT CHRIS REEBEEN

Chris Reebeen is a Senior Cost Engineer for Cost Engineering Consultancy. With more than 10 years of experience in the fields of cost estimating and cost control, Chris has worked on numerous challenging projects in a wide range of industries. Currently, he is leading the project team involved in the estimation of the ITER Project (Nuclear Fusion) in France.

Chris will give a presentation about the successful implementation of cost engineering tools on May 6th, 14:50, Room B. Furthermore, he will present a showcase of the latest Cleopatra Enterprise Cost Management module on May 6th, 17:25 in room C.

ABOUT STEFAN BAKKER

Stefan Bakker is Sales Engineer for Cost Engineering Consultancy. For many years, Stefan has advised numerous companies in the industry who were looking to improve their work processes using dedicated cost engineering software tools. This involved everything from the initial identification of the company's requirements, to the system evaluation process and eventual implementation of a dedicated cost engineering system that is supported throughout the organization.



JANNE SKOVGAARD KRISTENSEN

Interview

Janne Skovgaard Kristensen has been employed in NNE Pharmaplan for the past 20 years in Denmark. NNE Pharmaplan is a global engineering company within the pharmaceutical and biotech area.

Janne is currently a cost estimation specialist located in the Northern European Region and also holds the global discipline lead for the Cost Estimating COI, Community of interest. The COI is responsible for implementing global estimating tools and standards in NNE Pharmaplan.

Furthermore, Janne is deputy director of region 2 (Europa & near East) in ICEC, the International Cost Engineering Council, and program manager of a project controls special interest group in Denmark with reference to the Danish Project Management Association.



“You could say that I took quite an unconventional path to get where I am today.”

For her contributions and extraordinary achievements within her company, she received the Chapeau Award at the Cost Engineering Event in 2013.

We meet with Janne at NNE Pharmaplan's office in Copenhagen, Denmark.

Cost Engineering: Can you tell us where it all started?

Janne Skovgaard Kristensen: You could say that I took quite an unconventional path to get where I am today. During my education I was trained to become a draftsman, in architectural design. However, when finishing my studies in the late 80's, the jobs in this area

of expertise were hard to find. So I decided to continue studying architecture in civil construction instead. When finished, I gained experience in various companies. As this was during the early 90's, the developments with AutoCAD caused a turbulent time but proved to be very useful for my future career.

Soon, I came to work at NNE Pharmaplan - still part of Novo Nordisk at that time - where I would take up different roles and responsibilities.

CE: In what role did you start at NNE Pharmaplan?

JSK: I started as a draftsman mainly

developing AutoCAD drawings, which really fit my educational background. I worked on various projects in Denmark, but also France and China.

Soon, I started to develop also interest in the economical part of the projects I worked on. For one of the biggest projects within NNE Pharmaplan at the time, they needed someone who could do the cost estimation for the building part of this large project. With my civil background and good skills in Excel, I was asked to take this position.

The actual cost estimate development was a quite fun experience. We did a ▶



detailed estimated based on sketches, as I had not really an idea about the cost of a building, as I have now. For example, I didn't really know how much various types of buildings cost per square meter.

When we started the tendering for this project, some parts such as the carpentering turned out to be twice as high as we had estimated. This could mostly be contributed to the lack of structure and large and complex spreadsheets that were used.

CE: In the past, a lot of projects in pharmaceutical were more time-driven instead of cost-driven. How did this affect your work at that time?

JSK: Indeed, for most projects time was more of an issue than cost. To some extent cost overruns were therefore not really an issue. However, being on more and more projects I started seeing the importance of cost and the improvements that could be made.

CE: That brings us to today. Are you still involved in estimating?

JSK: Yes, but my current role is different for the various phases of a project. For example, when we do a conceptual cost estimate, I still prepare the cost estimate for the

building part, as this is still my background and area of expertise. I also gather the information from the other disciplines such as process, utility and automation and perform benchmarking against executed projects.

I still really enjoy my work, as it has both the economical part and the technical side of projects. Both aspects really have my interest. The fact that estimating has so many stakeholders, such as sales, engineering, project management, keeps it dynamic.

Some people - even myself in the beginning - think that cost estimating is a boring profession, sitting alone behind your desk, but it involves a lot of people who each have their own role and interest in the process. The communication part is therefore a crucial part of this job. So, having an experienced team of people - from

mechanical engineers to project managers - who you can trust is very important.

CE: Is that why you have now taken up the responsibility to setup and manage a professional cost engineering organization?

JSK: This is a very exciting part of my job. I am the global discipline lead for the COI, which stands for Community of Interest. In the COI we have one person from each region or country, being a part of their respective cost engineering disciplines. That way, I am not only involved with projects in Denmark, but also in supporting people from around the world in their projects.

Some of the locations where NNE Pharmaplan is active are for example China, the United States, Brazil, Malaysia, India, Russia and of course most Western European countries.

Looking at the initiative of the COI, the goal is to implement global estimating procedures and structures. In order to achieve this,

we need to make sure that all needs are understood and covered in this global solution. It is a very interesting process that we are in and that we still have ahead of us.

Three years ago we started with a task force where Cost Engineering Consultancy [Kodes Bouvrie] was involved. This was the first



step we took on this ambitious journey. At that stage we started to conduct interviews with people from the different regions, to find out their situations and requirements. Soon after this, cost engineering was really seen as a discipline within NNE Pharmaplan.

CE: Did this speed up the process to achieve the goals that were set by the COI?

JSK: Unfortunately, there were some major organizational changes that slowed down the process. Some key people moved positions or left the company entirely, which didn't help of course.

The last two years I realized that the plan we are building for the future has to be realistic and that it takes time to accomplish changes.

CE: What is the importance of professional tools in a cost engineering organization?

JSK: Of course every good cost engineering organization needs knowledge and data. A tool that connects these two and provides standardization, for example in

breakdown structures, is very important.

In NNE Pharmaplan we currently still work with our in-house Excel based systems. Although we definitely see the value of a dedicated cost engineering tool, I believe we first need to work towards a global standard Cost Breakdown Structure (CBS). Also our global procedures and guidelines need to be described and implemented first. Our goal is to implement these global standards in 2015 and by the end of 2015 look for a tool that will support us in applying the established procedures. I have this plan in my head for 2015, but I also know that

there are many stakeholders involved, who can change the process I have in mind.

Janne starts to draw the current network of tools within NNE Pharmaplan on a whiteboard and describes the possibilities she sees for improvements.

JSK: Currently, I spend way too much time on transferring data from the individual discipline estimates into the overall summary sheet. Instead, I want to be able to spend the majority of my time analysing the data, which is of course a very important task.

Also, we need to limit the number of estimating methods and procedures that are used within NNE Pharmaplan worldwide. In the past it was like the Wild West sometimes, every man for himself. Changing this is of course easier said than done. I think we are on the right way though. It started by investigating the exact requirements from every business unit around the world and finding a common approach that satisfies everyone. Well, as much as possible at least.

CE: Cost engineering involves - besides estimating - also cost control. Is this also part of the COI improvement process?

JSK: Yes, we definitely see that cost control is just as important as cost estimating. For example, we recently hired someone who has the task to setup and manage our historical project database.

Currently, also the transition from our estimating spreadsheet to the cost controller's monthly reporting is mostly a manual task. When we want to create a feedback loop, using the project actuals, we need to copy and paste the information back into another structure again. This is therefore also an area of improvement, where using standardized structures is of great importance and using an integrated tool can take us even further.

Following on the workshop we did together with Cost Engineering Consultancy ▶



and the discussions that followed, the communication between cost estimators and cost controllers has really improved. People started to realize that they need to talk to each other to understand what the cost estimators have done and the assumptions they made. In return, the cost estimators can use the feedback from the cost controllers to improve the way in which they deliver their estimates. For example, I now automatically get a notification if the cost controllers have a closed project, so I can extract the key metrics from these projects and use them for the next estimate.

CE: You mentioned knowledge as a crucial part of every organization. How is the knowledge on cost engineering in Denmark?

JSK: It is not yet as good as I wish it would be. However within NNE Pharmaplan we have a good basis, mostly because we are actively working on this improvement process, which forces people to think about what they are doing and how they are doing it.

I also tell people about the AACE International recommended practices, available literature and organizations such as ICEC and ACostE. It is part of my role to point people at this information.

CE: Next to your busy work at NNE Pharmaplan you are also involved in various cost engineering organizations. Can you tell us more about that?

JSK: I am a member of the Danish Project Management Association which is represented in ICEC and IPMA. I'm coordinating regular network meetings here in Denmark. We come together with people from different companies here in Denmark with experience in the fields of estimating, planning and cost control. For example, we talk about opportunities to improve the education in cost engineering practices, as there is not so much focus on cost engineering as a profession.

The role of the cost engineer in an organization is often not really known. Here in Denmark, but also in other countries. Part of my role in ICEC is therefore to increase this awareness.

CE: At the previous Cost Engineering Event you received the Chapeau Award for your

achievements within NNE Pharmaplan. What do you think about the initiative and value of such an award?

JSK: First of all, I was really surprised that I received the Chapeau Award. I think it is a really good idea to reward people who make an effort, as it acknowledges that they are doing the right thing, even if your work can frustrate sometime.

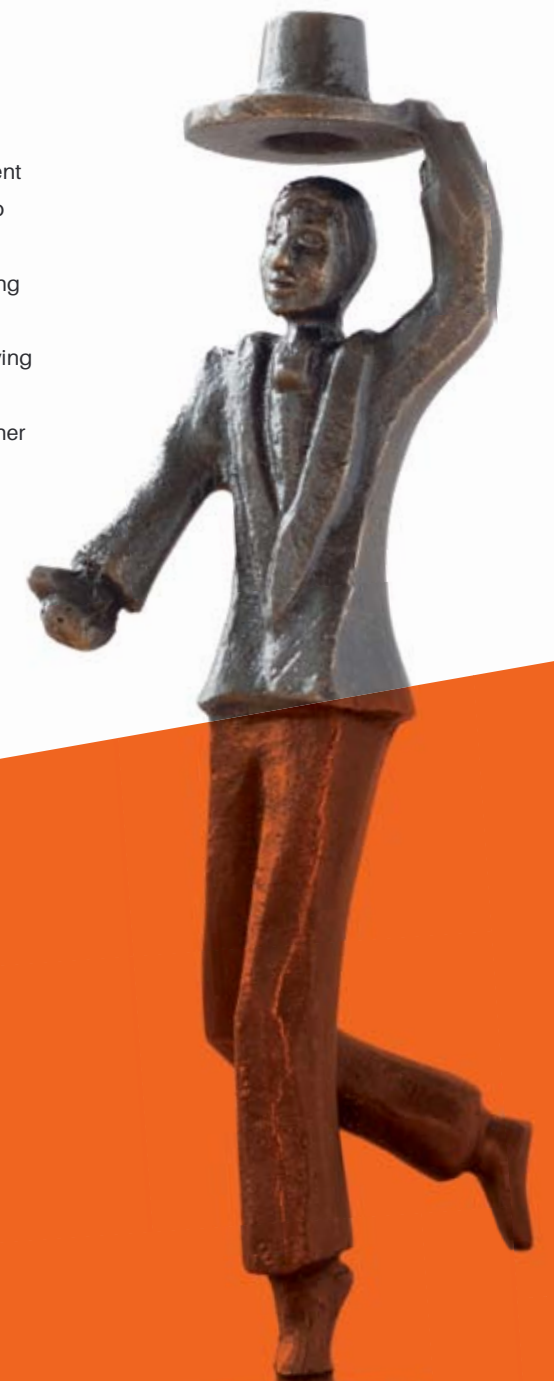
The Chapeau Award also made a big impression on my company and helped the process that we are in. After all, someone outside of our organization recognized our efforts. This showed many people that what we are doing is important and should be supported by the entire organization.

CE: What do you think of the Cost Engineering Event?

JSK: I think it is a really good event, as it has a wide range in speakers with different backgrounds and topics. For me it is also about aspects that are really close to my daily work, like this year's theme of closing the loop between estimating and cost control. This is also something we are trying to achieve here at NNE Pharmaplan. It is also a good opportunity to learn from other people, from different organizations.

CE: What is your biggest challenge for the next two years?

JSK: The challenge is to allocate enough time for the improvement process we are in. Dividing my time between managing our 'regular' projects and working on the development of our global procedures and guidelines can be challenging sometimes. ●



ATTEND THE PRESENTATION BY JANNE S. KRISTENSEN
"Implementation of Global Cost Estimating Standards"

May 6th / 16:05 - 16:50 / Room A



TRENDS AND CHALLENGES TOWARDS PROJECT MANAGEMENT IN 2025*

BY HANS BAKKER

The future trends and challenges for the management of projects are studied through a number of different lenses. First, the present performance of the management of engineering projects is reflected upon with the help of improvement areas as identified by the authors of the book "Management of engineering projects" (Bakker & de Kleijn, 2014). Through a second lens the views of the industrial bodies or project management associations for 2025 are revisited. These views are seen as the practitioner's views. The third and last lens focuses on the academic perspectives of the future of project management. In a final discussion session with 14 project management professionals the three most important improvement areas have been identified. What emerges are the "next practices". Furthermore, it is concluded that there is plenty of room and energy for further development of the project management profession.

FOOD FOR THOUGHT

Projects are failing by spectacular numbers and they have been doing so for as long as we can remember. Despite all the efforts that have been put into further professionalising the project management discipline an average of 40% of projects do not deliver according to the conditions given (McKenna, Wilczynski & Vanderschee, 2006; Bakker, 2008). For megaprojects in the oil and gas industry this figure is in fact far worse: 78% of the projects do not deliver (Ernst & Young, 2014). This does not mean that all of these projects have failed - other success criteria might have been agreed with the owner - but certainly the predictability of the management and the delivery of the projects are still not good enough. We are dangerously close to Einstein's definition of insanity: 'Doing the same thing over and over again and expecting different results.' If the future project management methods look anything like the existing ones what improvements in the project management performance can then be expected? What future is there for failing project management methods? These are some of the provocative thoughts and statements that need to be addressed when discussing the future trends and challenges for the management of projects.

Probably the most important improvement step is that the project management community should practice, what they preach: comply with the project management system and comply with the standards and procedures. But on top of that a number of improvements are also identified.

First of all, it is the focus on people that is of paramount importance to project success. Procedures, processes, tools and techniques have been created and will be created in the future, but it is the people applying those techniques and working together who make the difference when it

comes to project performance. So rather than looking at the iron triangle (schedule, budget, quality) to decide whether a project is successful or not, attention should be shifted towards setting goals for behaviour and not just targets for performance. Early involvement and true integration in the project team are the essential prerequisites for project success. The lessons of the interactive and integral approach are just as relevant as ever, already for now, but definitely for the future. In fact, in order to meet the challenges, there is an even greater need to link the various phases, functions, organisations and people as well as disciplines and technologies.

Secondly, attention for risk management is clearly shifting over the years. Although it has been mentioned by many that managing risks - both opportunities and threats - is probably the most important part of project management, very often it is a once-off activity. Risk management is not a regularly recurring action item on the project team's agenda. Once more, practising what is being preached is the golden rule.

The third element of the improvement actions is a fit-for-purpose approach. One size does not fit all. The project management processes should be commensurate with the type and complexity of the project. We should aim at a fair mix of standardisation and agility as well as creativity. Hence adapting the process to the project is the way forward; doing less for smaller projects and doing various activities more often for large projects. It is still unclear how to find a sustainable solution for fit-for-purpose management of engineering projects for the different types, sizes and complexities of the engineering projects.

The type of professional that is needed to become the project manager of the future is an area of attention. As already

mentioned by Hertogh (2013) the industry needs in the future T-shaped professionals (Figure 1). The vertical stroke of the T stands for the discipline knowledge an individual has. Her area of expertise and the depth of that expertise are represented by the vertical stroke. Unfortunately most of the university graduates nowadays only have that single discipline, and are in actual fact more I-shaped rather than T-shaped. But in their working careers our specialists must work together with many other disciplines and many other

should be a joined and concerted effort. This does imply that the industry should be willing to try out new methods once they become available and that the academia should focus on application-oriented solutions by getting closer to the industry and their requirements. This is easier said than done, but in principle it is not a major shift from what is happening already.

THE VISION OF THE INDUSTRY INSTITUTES

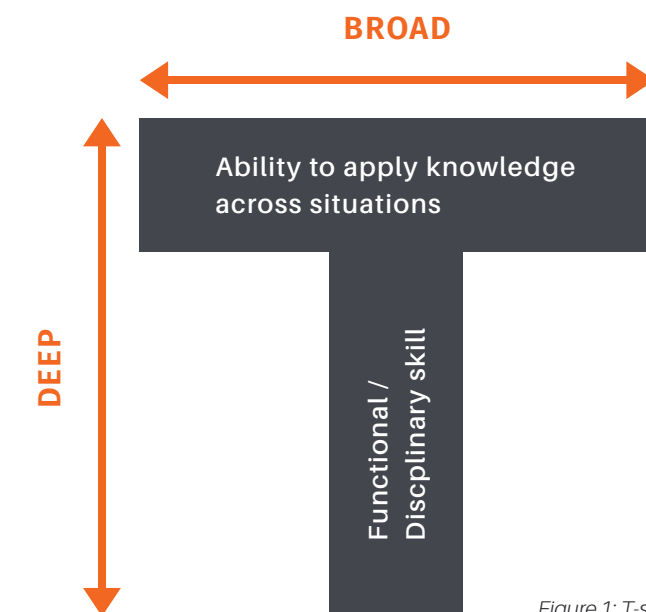


Figure 1: T-shaped professionals

specialists, so apart from depth they also need breadth. They need to be able to understand people from other disciplines and join hands. And that is where the horizontal stroke of the T stands for. The T is a true requirement, since people with only breadth, who have neither specialism nor expertise, lack the ability to really speak the language of the other disciplines.

Finally, who should be investing in the further development of management of projects? Are these the academia or is it the industry? Who is best situated to invest in this development and for whom will this development be most advantageous? It is safe to assume that the solution of this issue

Project Management Institute

A rich source of information about the likely future changes in project management is the book published by the Project Management Institute (PMI) in 2009 titled 'Project Management circa 2025'. A wide variety of authors present their view on the further development of project management in a broad range of industries and fields of application. Interesting for the present article are the global trends in construction and engineering and the expected global trends in project management.

In a chapter written by Cunningham ▶

(2009) the global trends in project management are discussed. Cunningham discriminates seven trends in project management, which are listed below:

1. From development to redevelopment
2. From silos to integration
3. From decree to engagement
4. From flying blind to envisioning renewal
5. From de-wealth defaults to renewal cultures (policymaking)
6. From proceeding alone to partnering
7. From project based to programmatic revitalisation using renewal engines

It is not the intent to go through all these trends in detail, but it is reassuring to see that a few of these trends have already been addressed previously: early integration, the engagement from all stakeholders and the different approach to collaboration. The approach Cunningham is taking is that new developments will gradually reduce, but the focus will be much more on the renewal or rejuvenation of existing facilities that have come to the end of their lifetime or are destroyed by acts of nature. The example that he gives that clearly jumps out is that during the rebuild of New Orleans after Hurricane Katrina opportunities were missed to focus on the renewal of the historic assets. Instead people were trying to create something new. This should have been integrated with the restoration of the coastal wetlands and the agriculture economy surrounding the city. But it took years before this happened and also before the various neighbourhoods actually got engaged in the redevelopment of their own living environment.

Based on these trends and the examples presented Cunningham comes to a description of the project manager of the future that is quoted here (bold by

HB): 'Project managers will increasingly be expected to know how to integrate the renewal of the natural, built and socioeconomic environments. They will be expected to know how to create renewal engines to organise, fund and perpetuate these initiatives. Few of these vital functions are being taught to today's architects, engineers, or even planners. It will always be essential for a project manager to speak the language of architecture, engineering, planning etc. Project management must emerge as the integrative, engaging discipline that fills - and adds value from - the interstitial spaces among the other disciplines.' The future vision expressed by Cunningham clearly resonates with our views.

Construction Industry Institute

The Construction Industry Institute (CII) is represented by a contribution from Thomas, Jaselskis & McDermott (2009). After first providing emerging trends and global perspectives they set the context in which project management for construction should be seen. Their view is given on four areas of project management: the project manager, the project team, the project delivery and the organisational set-up.

The project manager in 2025 according to CII is a proactive system integrator, who puts more emphasis on interpersonal skills and communication next to her considerable technical skills, and has a greater awareness of public and environmental issues. The project team is developing into a central command centre for a team that is acting globally and distributed over the globe. CII compares the project team with the mission control centres that NASA operates for their space missions.

Most elements of the future outlook fall in the last two categories, project delivery and organisational setup. For the project delivery CII foresees a standardised design

tailored to local codes. Most industrial projects would need sustainability programmes and there is an increased need for integrated information and collaborative management. Major improvements are necessary in the supply chain management and standardising the supplier relationships. Modularisation and preassembly will be the improvements in the project execution methods (see Figure 2). By introducing those concepts in the project execution methods they will become more 'LEAN' and 'Agile'. As an example they look at the shipbuilding industry. This industry has many similarities with the construction industry. However, a number of sectors within the shipbuilding industry have gone through impressive production improvements by introducing new techniques, the application of which could potentially lead to a substantial raise in productivity in the construction industry.



Figure 2: The world's first preassembled LNG plant by Worley Parsons, North West Shelf, Australia: an extreme example of 3rd generation modularisation.

The future organisational setup will focus more on the creation of joint ventures and public-private partnerships and collaborative partnerships in a global setting. In addition, significant changes in the distribution of the risks, the risk management and the contracting strategies are foreseen.

In a more recent publication by a CII Research Team (CII, 2012) the industry

trends that will have an impact on the competencies of the project manager are described as 1) the evolution of technology, 2) greater access to information, 3) rapidly evolving workforce demographics and 4) changing organisational structures. These trends will according to CII have a dramatic impact on the way the industry deals with projects, forms project teams and controls the information flow.

The study concludes that although these trends might require different capabilities and skills of the project manager the basic attributes that project managers have today will not be so much different in the future: integrity, accountability, initiative and decisiveness will still be the cornerstones of the character of a project manager. In the CII view the change is more evolutionary than revolutionary and the future project manager will require greater competences in communication, relationship building, complex decision making, business insight, risk management, diverse thinking, engagement with others and coaching and mentoring. In short, we are truly looking for a jack of all trades, with more depth in what technical people call the soft skills.

European Construction Institute

At the European Construction Institute (ECI)'s 16th Annual Conference in March 2005 Bradley delivered a lecture called 'Project Management Past, Present and Future'. The majority of the presentation focuses on history and present-day economic challenges. Bradley points out that the project manager should not be solely focusing on the iron triangle but should include predictability in his management approach and efforts. The future project manager in ECI's view is 'a person combining practical experience with knowledge of general, theoretical principles that can imagine something new and transform that mental picture

into physical reality.' In the following years papers were presented on the future of the construction industry (Soetanto, Harty, Goodier, Austin, Dainty, Price & Thorpe, 2006) and more specifically the European construction industry (Goodier, Austin, Guthrie & Metzdorf, 2008), indicating that ECI too is regularly looking at the future requirements for project managers and project management.

“We are truly looking for a jack of all trades, with more depth in what technical people call the soft skills.”

A more recent contribution presented at ECI's International Conference 2013 focuses on the future of the project management discipline (Bird, 2013). Bird argues that since the business environment is becoming more challenging a new approach for the management of projects is required. According to him 30% of the large projects are overrunning by more than 50% and more than 70% of projects fail to meet the client's expectations.

To fight these dramatic figures project management should be more closely integrated with business management. However, the biggest challenge for the years to come is to access the right level of

resources with the right competences. In his view, looking at potential future trends, improvements in project performance could be realised by choosing the best strategy for the supply chain from a contractor management and relationship management perspective. Finally, working together from the development phase forward as an integrated team will have the greatest impact on the future performance of engineering and construction projects. In this way the best use can be made of the skills and capabilities of the combined (and integrated) teams delivering pioneering spirit and high performance securing a successful outcome.

International Project Management Association

On the occasion of the 30th anniversary of the Dutch chapter of the International Project Management Association (IPMA) a booklet (IPMA, 2010) was produced looking forward to what may be expected from project management in the decade to come. Two main streams of development are recognised according to IPMA-NL. The first stream is focusing more on the competences of the project manager, the development of the softer aspects. It is expected that the project manager of the future can manage her stakeholders, create buy-in and is able to deal with political conflicts since that is becoming increasingly important for future projects. But this triggers another question according to IPMA: Wasn't the project manager the person who is responsible for the delivery of a tangible asset within time and budget? How can a project manager promise to create buy-in and solve conflicts within time and budget?

The second stream focuses on the development of the line organisation. In this second stream it is expected that the line organisation takes care of the stakeholder management and the resolution of conflicting interests. By doing this the ▶

project manager can primarily focus on the delivery of a tangible asset within schedule and budget. In this view it is essential to strengthen the role of the owner.

Another trend that is seen by IPMA-NL is a further increase in the use of agile or adaptive project management methods (Naim, Naylor & Barlow, 1999) also outside the field of IT. Especially the work attitude of the younger generations seems to fit better with the agile techniques than with classical ones. Whether agile project management methods will replace the classical methods or whether they will co-exist or a merger of both will show up is a question that has not been answered yet. Most definitely more thought needs to be given to the application and use of new IT tools and social media in the execution of projects.

ACADEMIC TRENDS

The development and evolution of the project management profession is certainly running behind the development of general management theory and practice. Given time the project management profession will most probably catch up, but serious effort should be invested in empirical and theoretical research to reach this level.

There are a couple of options for the project manager of the future. Firstly, the project manager might be a certified technical person, crossing over for a while to support or manage a project and afterwards return to or be promoted to a line management position. Secondly, the project manager is a certified competent professional, a senior manager in a special field. Thirdly, managers are becoming project managers. In this case project management will be a standard management tool and part of a normal MBA programme.

For the further development of the profession, the second option is probably most likely when it comes to project

management. As far as academic research is concerned a separation between theory and practice-based research will probably be required to further grow professionalism.

Recently, research into project management was categorised into seven 'schools of thought' (Söderlund, 2011). Based on 305 articles in 30 high ranking journals (Academy of Management Journal, Journal of Operations Management, Management Science and R&D Management), the following categorisation was developed:

- Optimisation School (logic-based, prescriptive research drawing on

“30% of the large projects are overrunning by more than 50% and more than 70% of projects fail to meet the client’s expectations.”

management science, optimisation techniques and systems analysis)

- Factor School (empirical research relying on descriptive statistics on the criteria and factors of project success and failure)
- Contingency School (empirical research, case-study-based and survey-based research on the differences between projects, characteristics of projects and contextual dimensions)
- Behaviour School (interpretative and descriptive research on organisational behaviour, processes and learning in projects)
- Governance School (prescriptive

research on governance and contract problems in projects)

- Relationship School (descriptive case-study research on relations between actors in projects)
- Decision School (descriptive and interpretative research on politics and decision-making in projects). (p.158).

These seven 'schools of thought' all have their own main focus of analysis, research approach and methodology and key questions to be answered. In fact they represent seven separate 'theories of project management'. In contrast to striving for one unified theory

of project management, Söderlund stresses the importance of these different perspectives: 'By embracing pluralism, project management research might be better equipped to explore and explain the difficulties of generating, forming, managing and even killing projects - such analysis would benefit from a comprehensive view on project processes and the use of multiple theories.' (p.169).

Over the years a number of articles have been published about the existing and future trends in project management and project management research. These papers are slightly dated by now, but still relevant to the further development of

the project management profession.

Crawford & Pollack (2006) have examined the trends in the literature about project management over the twelve years prior to publication of their article. The trend that they discovered that stands out is a reduction in the attention for interpersonal issues and quality management, while at the same time an increase in the attention for project evaluation and improvement as well as strategic alignment was evident.

A paper by Winter, Smith, Cooke-Davies & Cicmil (2006) presents the findings of a UK government-funded research network into the directions for future research in project management. The main finding is the definition of a framework, consisting of five themes or directions that can help further develop the field of project management. The five themes are:

- From the lifecycle model to theories of complexity of projects and project management
- From projects as instrumental processes to projects as social processes
- From product creation to value creation as the prime focus
- From narrow to broader conceptualisation of projects
- From practitioners as trained technicians to reflective practitioners

These five themes or directions present an idea of how the profession needs to develop in comparison with the developments in the world of practice.

The third paper that is worth mentioning is written by Söderlund (2004). He argues that in previous research too much effort was spent on finding the reasons for project failure and success. As a consequence the important questions that would help further develop knowledge about project

management have been left unanswered or even untouched. The questions he refers to are the five questions that would help build the theory of project management (Söderlund, 2004: p.186):

8. Why do project organisations exist?
9. Why do project organisations differ?
10. How do project organisations behave?
11. What is the function of, or value added by, the project management team?
12. What determines the success or failure of project organisations?

In 2008 the Harvard Business Review published a paper written by Sengupta, Abdel-Hamid & Van Wassenhove (2008). The article is called 'The Experience Trap' and offers interesting reading about the lack of learning from megaprojects. Traditionally experience is built over the years. Initially a person is involved in a project as a project engineer. Over the years their projects become bigger. If their careers develop well, not only the projects become bigger but also their responsibilities. Finally, while getting close to the end of their careers, they are nominated as project directors of megaprojects. Unfortunately there are not that many megaprojects around. So for them, there are not many colleagues they can go to for help or for sharing experience. In case they run into problems with their megaprojects they will first fall back on their own experience which unfortunately were gained during smaller or non-megaprojects. The question is whether experience gained during smaller projects is appropriate for the issue they must deal with when megaprojects are involved. After recovering and completing the project successfully, they will retire. In the rosier situation, they hand over their experience on megaprojects to their second in command who might benefit from it for a couple of years. In reality quite often the solutions for

problems emerging on megaprojects must be reinvented over and over again. This is called the experience trap.

The Delft University of Technology in the Netherlands is a successful incubator for advanced studies on the management of engineering projects. The research focuses mainly on the predictability and the complexity of the management of projects (Bosch, 2011) and the relationship building with a number of researchers focusing on contractual relations (Suprpto, Bakker, Mooi & Moree, 2014) and the government as owner (Koops, van Loenhout, Hertogh & Bakker, 2014). In addition Delft's researchers make a plea to enhance the learning from completed projects; to find new ways to disseminate the learning across the project management community. A potential solution for this issue is the creation of a so-called project simulator that is fed by experience from managers like the megaproject manager mentioned above. In a safe environment, with no fear of consequences, on a flight simulator a Boeing 747 pilot can practice various scenarios. Admittedly, an airplane behaves according to Newton's laws and laws of aerodynamics and therefore a flight simulator is perhaps easier to construct, but for the advancement of the project management profession and the improvement of project performance a project simulator might be the most useful tool that could be developed.

NEW PARADIGMS AT THE HORIZON

The main challenge for the future is to develop, build and maintain new types of relations between the main parties in the project. Traditionally the project team of the owner develops the initial phases of the project in relative isolation. Engineering contractors as well as suppliers have a wealth of knowledge that is quite often tapped into very late. If we would be able to make this knowledge accessible far ▶

earlier in the project, the front-end phase would be shortened and the execution phase would run smoother because all the parties have been involved from day one. In actual fact this means that we have to build relationships with suppliers, engineering contractors and consultants, which should last for more than one project. It is how we are able to build upon the experience and make better use of each other's strengths.

Creating integrated teams, really integrated across all stakeholders, will be the way forward to deliver better and more predictable projects. This means that we have to take a real hard look at how we actually work together, build teams without internal boundaries and make optimal use of each other's strengths.

Not only does early integration improve project performance, but also it will increase trust between the parties involved. Projects where the relationship between the parties is built on trust are among the most successful projects that have been delivered to date.

The traditional ways of contracting out will not work in the future; present-day relationships are most often too adversarial and are based on contractual terms. The traditional ways of tendering and bidding are based on maintaining competition to ensure a perceived price advantage. What we are advocating here is that relationships have to be built on trust. Trust does not come easy, trust needs to be built and trust needs to be gained. What helps is if there is a clear cause for working together, a trigger, a case for change or a 'common enemy'. We envisage two feasible approaches. The first approach starts with spending time on building a relationship. Once that has been established an agreement that will subsequently not jeopardise the relationship needs to be reached. The second approach is to negotiate a contract and once agreed

spend a considerable amount of time on building the real relationship, because having a contract does not mean having a working and fruitful relationship.

The second challenge that we see is about the education of the future project managers. Should a project manager of an engineering project have a deep knowledge of one of the technical disciplines in her project? Or to put it more provocatively: could a project manager with a background in social sciences or humanities manage an engineering project? What we see is that some of

“**The traditional ways of contracting out will not work in the future.**”

the engineering projects are becoming bigger than ever before and managing these projects is more like managing a large company. The most important competences of a future project manager are the ability to manage conflicts, work in-depth with a wide variety of disciplines and inspire staff into collaboration. Are we able to educate our young master students according to the T-shape model? We desperately need project managers and project control managers in the future who can speak the language of various disciplines and have some depth of expertise in one of the fields themselves. Are universities able and ready to work

across the various faculties to create this new 'homo universalis' of the future?

A trend that is observed is the technical side of the project being more and more dealt with or managed by the project controls manager whereas the project manager will dedicate more attention to the economical, commercial, organisational and political aspects of the project. In that case a broadly developed general manager with a well-developed sensitivity and eye for interpersonal relations might be the better choice to manage the project, even the engineering project. Because of this sensitivity we might need more female project managers since their relational and empathic skills are generally better developed and come more naturally.

One way to improve our projects and our project managers is to not only appraise them on the key performance indicators agreed upfront. Obviously this remains important and is part of the project success. But we should also appraise the project managers on the behavioural goals. Have they been able to really integrate the project team and have they further built the relationship with the various parties contributing to the project?

The final challenge for the future to be discussed is managerial learning. Can we improve the way we learn from projects, big or small, and can we speed up the development process of the next generation of managers of engineering projects? When the project manager starts with a new project the best thing to do is to look first at a number (at least 3) similar projects that are being executed or already completed. Take a close look at these projects in order to really learn. Project managers are always so busy and focused on completing their projects, that there is hardly any time left to develop themselves further. If we are able to collectively learn more, there is hope for this discipline. As mentioned in the previous paragraphs the development

of a project simulator or the further development of serious business games on the management of projects could be a way forward to speed up this process and reduce the costs of failures. This would also have an impact on the way we educate our future project managers. The project manager could test-drive on these simulators and learn faster than by completing actual projects.

We could also learn from other disciplines. Take the education of our future medical doctors as an example. In their education they go through a number of internships per discipline and after the completion of their basic training they spend 3 to 6 years specialising in the discipline of their choice. After this extensive period of education and traineeships they are ready to do their work in the operating theatre. A similar type of education is envisaged for our future project managers. It is not there yet, but it might be worthwhile considering an equivalent educational route.

In conclusion, the future management of engineering projects will be firmly based on the three themes highlighted in this chapter: collaborative relationships, a broader education, and improved ways of learning across projects. So the future will be firmly based on the right development and early involvement of people. **People are key. Today and tomorrow. ●**



ATTEND THE PRESENTATION BY HANS BAKKER:
"Management of projects: Trends and challenges"
May 6th / 14:50 - 15:35 / Room A

(*) This paper is an adapted version of the final chapter of the book "Management of engineering projects - people are key", 2014, eds H.L.M. Bakker and J.P. de Kleijn, NAP - The process industry Competence Network, Nijkerk, The Netherlands

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COST ENGINEERING EVENT 2013

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EXPLORING THE CITIES

Hotel ARA is surrounded by exceptional cities - like Dordrecht and Rotterdam - that are worth a visit. On these pages you will find several highlights that you should definitely keep in mind when spending some free time. Furthermore, a couple of great restaurants will provide for a great evening for those who value a first class dinner.

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DORDRECHT CITY WALK

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Delices

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The name ARA came from its central location between the cities of Antwerp-Rotterdam-Amsterdam.

TRAVEL LOGISTICS

On the 6th and 7th of May a free pickup service is available for visitors by train at the station Dordrecht and Zwijndrecht.

To use this service please send an email to secretariaat@costengineering.eu when you expect to arrive.

Train

The best possible way to get to Schiphol Airport is to take the Sprinter train from Zwijndrecht station to Rotterdam Blaak. From there you can get on the Intercity train to Schiphol Airport with final destination Lelystad Centrum.

Taxi

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Taxi centrale Zwijndrecht:
078 - 61 03 366

Last but not least the tour will end with a view of the steamship 'Rotterdam', the former cruise flagship of shipping company Holland America Line. An exciting 75 minutes with clear descriptions of everything you see.

ABOUT THE ARA HOTEL

Hotel ARA boasts a unique location in a splendid natural reserve on the banks of the Oude Maas river. The hotel is only a few kilometres away from the historic centre of Dordrecht, and the bustling city of Rotterdam is within easy reach.



WITH SPECIAL THANKS TO ALEXIA NALEWAIK, JANNE SKOVGAARD KRISTENSEN, REMCO JONKERS AND HANS BAKKER.

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THE COST ENGINEERING TEAM THANKS YOU FOR ATTENDING THE COST ENGINEERING EVENT 2015

We hope you enjoyed the Cost Engineering Event 2015 and we look forward to meeting you again. If you have any comments on the Event, please let us know. You can also contact us if you would like to receive information about our software (Cleopatra Enterprise) our professional services or the Cost Engineering Academy.

