Maximising Project Efficiency for Improved Performance and Delivery

- Autumn Forum Proceedings, 28 Nov 2013

European Construction Institute

ECI Autumn Forum

Maximising Project Efficiency for Improved Performance and Delivery

Presentation slides for
Thurs 28 November 2013

Sheraton Amsterdam Airport Hotel,
The Netherlands

ECI Autumn Forum

Maximising Project Efficiency for Improved Performance and Delivery

Thurs 28 November 2013

European Construction Institute

Contents Page

ECI AUTUMN FORUM PROGRAMME

Thurs 28 November 2013, Sheraton Amsterdam Airport Hotel

09.30 (Room: Universe 2)

Registration / refreshments and networking opportunity

10.00 (Room: Universe 3)

Welcome and Introduction: ECI Chairman's Address
John Oliver - Head of Project Management, BG Group and ECI Chairman

Delivering Challenging Projects: Session Chair - John Oliver, BG Group

Executing Successful Projects in Remote Locations
Imre Csoti - Vice President Operations The Hague, CB&I Nederland B.V

Managing Projects in Challenging Regions
Ton Rouwhorst, Executive Director Project Operations, Fluor

Achieving Success in a Challenging Compliance-Driven Environment
Nigel Barnes, Managing Director, WSP CEL & Trevor Keep, Wytch Farm Engineering Manager, Perenco

12.00 Refreshments and networking opportunity (Room: Universe 2)

Addressing Skills Shortages: Session Chair - Jan Broekman, CB&I (Room: Universe 3)

Addressing Key People and Skills Shortages Within the Industry
Ray Sanderson, Head of Project Delivery, BG Group

Accelerating the Development of Future Project Management Pprofessionals
Hans Bakker, Project Manager / Professor, Shell / TU Delft

13.30 Lunch and networking opportunity (Room: Universe 2)

Task Force Research: Session Chair - Alistair Gibb, ECI (Room: Universe 3)

Civils and E&I Pricing Systems (new Task Force)
Gerard Bakker, Director Contracts Management, Fluor

Collaborative Business Relationships BS 11000 to ISO 11000
Clive Winkler, ECI & Institute of Collaborative Working

Maximising the Potential of Information Flow Across the Design : Construction Interface
James Bishop , ECI

Ensuring Safe Projects through Effective Design: Session Chair - Alistair Gibb, ECI

Safety by Design and into Construction
Jim Lenton, Engineering Director - Europe, AMEC

Approaches to Effective Design Health & Safety
Dietmar Schulz, Global Facilities Engineering, Procter & Gamble

16.40 Summing up and Close: John Oliver, BG Group

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Attendees List

Abdullah Al-Bashiri	Hawk International Finance & Construction Ltd
Adrian Fenton	AMEC
Alistair Gibb	Loughborough University
Almudena Rios	Fluor B.V.
Amy Triesscheijn	Kapp Nederland B.V.
Andrew Sharman	AMEC
Andy Brown	ECITB
Anne Martine de Vries-Robbe	Fluor B.V.
Bruce Douglas	Aveva Solutions Ltd
Chris Taylor	Faithful & Gould
Clive Winkler	ECI
Colm Fitzgerald	PM Group
Daan van der Schroeff	CB&I Netherlands B.V.
Dietmar Schulz	Procter and Gamble
Edward Hogan	Shell Global Solutions International BV
Erwin Lassooy	Fluor B.V.
Fiona Bannister	Centrica Energy E&P
Francis Edum-Fotwe	Loughborough University
Gabriele Burian	Kingsfield Consulting International Ltd
Gerard Bakker	Fluor B.V.
Gertjan Rietveld	Mammoet
Guven Isiklar	CB&I Netherlands B.V.
Hakan Westerlund	Royal Institute of Technology
Hans H L M Bakker	Shell Global Solutions
Hein Sanders	CB&I Netherlands B.V.
Imre Csoti	CB&I Netherlands B.V.
James Bishop	ECI

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Jan Broekman	CB&I Netherlands B.V.
Jan Heemskerk	CB&I Netherlands
Jim Lenton	AMEC plc
John Oliver	BG Group Plc
Joris Haesaerts	CB&I Netherlands B.V.
Kees de Rijk	Mammoet
Leon Voogd	Fluor B.V
Marius Poll	Fluor B.V
Mark Triesch	ePM
Marko Zubic	CB&I Netherlands B.V.
Martin Hierl	Fluor B.V.
Marcela Diaz	Fluor
Mohammed Hezam	Hawk International Finance & Construction Ltd
Nigel Barnes	WSP CEL Limited
Patrick Woodcock	AMEC Power and Process Europe
Paul Hooft	CB&I Netherlands B.V.
Pauline Doran	AMEC
Peter Kay	WSP CEL Limited
Peter Roedolf	Fluor B.V.
Ray Sanderson	BG Group Plc
Stacy Taylor	AMEC
Stephen Costello	PM Group
Teo Perez	Shell Global Solutions International BV
Ton Rouwhorst	Fluor B.V.
Ton Van Gestel	Fluor B.V.
Trevor Keep	Perenco UK Ltd
Wim Berendsen	CB&I Netherlands B.V

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Executing Successful Projects in Remote Locations

Presented by:

Imre Csoti

Vice President Operations, The Hague

CB&I Nederland B.V

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Maximising Project Efficiency for Improved Performance and Delivery

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IMRE CSOTI

IMRE CSOTI, VP OPERATIONS THE HAGUE

CB&I NEDERLAND B.V

Imre Csoti is Vice President Operations and leader of The Hague office management team for CB&I. Imre has also been a Director for CB&I Nederland B.V. since 2011. Imre has over 30 years' experience in engineering, procurement, fabrication and construction of energy related projects including refining, petrochemicals and oil and gas processing.

Overcoming Challenges of Working in Remote Locations

Amsterdam, 28 November 2013

Imre Csoti, VP Operations The Hague, CB&I Nederland B.V.

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Challenges Faced When Working in Remote Locations

1) Safety / Environmental Culture
2) Cultural and Social Impacts
3) Government Regulations
4) Logistics
5) Unskilled workforce
6) Crime / Violence
7) Climate

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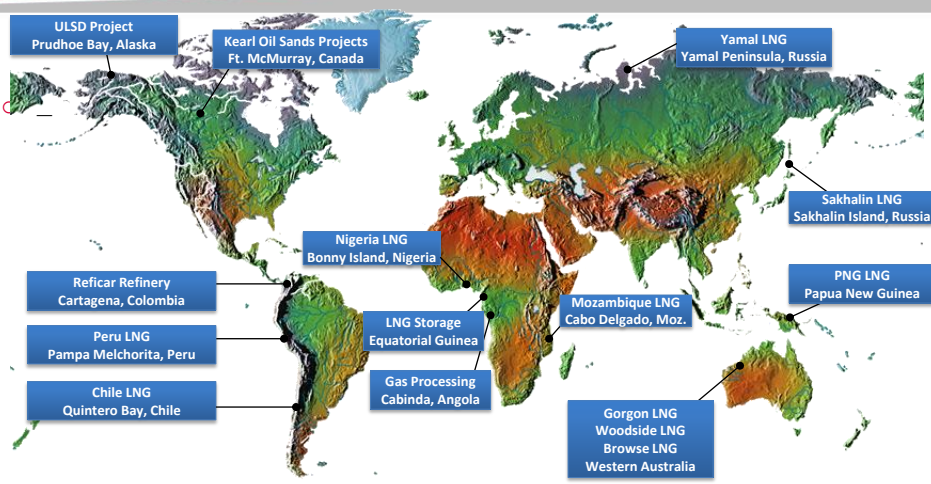
Samples of CB&I Remote Project Experience



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Safety Culture

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Safety Culture

Considerations:

- Current safety practices in Region?
- What steps can we take to change the current culture?
  - Safety Training
  - Establish behavior based safety programs and tools

Sample Initiatives used on CB&I Projects to aid in changing Safety Culture:

- Safety Culture Initiative / ARP SURA (3rd party) Safety Culture Focus
  - Safety Culture Message (DVD)
  - Motivational Speakers
- Family Communication: Videos, hosted by the project mascots, are sent to workers homes to initiate safety conversation in a family setting and shows how safety can affect their personal lives.
- Adapt safety tools to suit the workforce

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Refinery Expansion Project – Colombia – Safety Culture

CURRENT WORK EXECUTION PRACTICES IN MANY CONSTRUCTION SITES OUTSIDE REFICAR EXPANSION PROJECT




FALL PROTECTION TRAINING INSIDE REFICAR EXPANSION PROJECT CHANGE IN EXECUTION


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Papua New Guinea - Safety Culture

- **Papua New Guinea LNG**
  - Core long term supervisory staff mobilized to implement the safety culture at the start
  - One management system on site
  - Effective training program to suit language difficulties with integrated cultural awareness
  - Recognition program to celebrate milestones and encourage positive behavior
  - Safety Champion program established aids locals to actively drive the safety culture

Safety Culture Final Thought:

"The challenge is to change a culture and a way of life that is embedded, but we cannot expect to change the HSE attitude of people overnight. We need to be persistent and effective in our message to gain results. Think outside the box."

ADAPTED SAFETY TOOLS TO SUIT WORKFORCE

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Cultural and Social Challenges

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Cultural and Social Challenges

Considerations:

- What effect will the project have on the local community, and vice versa?
- Positive?
- Negative?
- What can we do to make positive impacts and reduce the negative impacts?
- Do we have a Strategic Plan to manage union, criminal or corrupt elements?
- In some remote sites, all activity is controlled or strongly impacted by Tribal or Cultural Leaders. These leaders often tie members into key positions. Do we have effective relationships and a strategy to manage these influences?

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Papua New Guinea - Cultural & Social Challenges

- Security
  - Tribal culture that encourages payback (Two eyes for an eye)
  - Police force & Army utilized but limited in remote locations
  - Required to use local labor for guard force
  - Strict journey management protocols implemented & vehicle tracking utilized

- Community Engagement
  - Juni Training Center - welding, carpenter & scaffold training programs
  - Conducted women's health and awareness training sessions
  - Established bank accounts for people used to barter system
  - Hired local spotters during heavy haulage operations to keep children away & reduce possible security issues

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Papua New Guinea - Cultural & Social Challenges

- Health
  - Training locals on personal hygiene basics
  - Stringent pre-employment medicals – (minimize medevac)
  - Robust health programs for immunization, TB malaria & regime of ongoing health inspections
  - Set up world class medical clinic & staffing

Cultural / Social Challenges Final Thought:

"Understanding the local communities and supporting programs for education, culture, health, and environment is paramount to sustain the communities view and ultimate acceptance of the project. Devise a plan to identify and promote social, economical, cultural, and environmental issues in the community to benefit the local population."

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Government Regulation

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Government Regulation

Considerations:

- Do we have effective ties and a strategy to manage all government agencies that will exercise control over the project?
- Do we have experience and knowledge of local laws/regulations affecting our project?
- Are we aware of local labor laws and government requirements?
- Are there any environmental restrictions we must abide by?
- What permits do we need to obtain before we can commence construction?
- How long is the approval process and do we need to consider this in the schedule?
- Are there any ongoing reporting requirements that will require additional staff/resources?

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Browse LNG - Government Regulation

- Traditional owners and land right issues
  - Project was required to undertake extensive consultation with owner and aborigines to ensure access to site was legally allowed
- Traditional owner cultural heritage issues
  - Project was required to undertake extensive permitting and protection works before any work could be performed
  - Dinosaur footprints were not allowed to be disturbed and design required modification in the case of discovery
- Government development requirements for local workforce
  - 300 aborigines were to be employed at peak

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Browse LNG – Environmental Regulation

- Environmental activists
- Strict environmental requirements and reporting
- Challenging environmental working conditions

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Sakhalin/PNG LNG – Government Regulations

Sakhalin LNG - Russia

- Unparalleled socio-political and environmental challenges
- Russian approvals are rigorous and contribute to a large element of delay and unpredictability. Difficult to control schedule.

PNG LNG

- Requirement to use 50% local workforce consisting of local tribal members

Government Regulation Final Thoughts:

All development activities are subject to regulation throughout the world's jurisdictions. Some of the regulation the project may be subject to are: right to access land, minerals or petroleum rights, heritage protection, protection of biological diversity, environmental management, pollution control and local area approvals.

Project approvals create cumbersome uncertainty and usually contribute to a significant increase in overall project costs. Often, creation of regulatory approvals teams within project development teams as a means to better manage the increasing complexity of the regulatory system is required.

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Gorgon LNG – Environmental Regulation

- Barrow Island is a Class “A” Nature Reserve
- Strict Quarantine rules to prevent introduction of non-indigenous species
- Comprehensive Environmental Impact Statement limiting beds and disturbance area

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Logistics

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Logistics in Remote Locations

Many Considerations:

- How do we get people, material and equipment to site safely and on time?
- Are there adequate transport facilities in place to receive staffing, materials & equipment?
- What is the lag time from time of order to delivery with staffing, materials & equipment?
- Is there an adequate number of shipping lines, airlines, or land transportation means?
- If lag times are long, do we have the ability to acquire locally or a machine shop?
- Is there adequate infrastructure to support the project and personnel?
- Do we need to construct dock facilities, runways, heavy haul roads, etc.?
- Do we need to improve or build housing, water, sewer, electric, medical and security infrastructure?
- Is there redundancy in our planning measures and enough spare parts included for emergency repairs?
- What measures must be taken to ensure adequate and constant communications?
- Are our communications methods secure and reliable?

Detailed Planning = Effective Execution

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Papua New Guinea LNG - Logistics

Mobilization

- No local accommodation available
- Tent Camp utilized
- Language difficulties required use of translators
- Sourcing bare minimum equipment from local Landowners
- 3 months + to mobilize personnel from outside PNG

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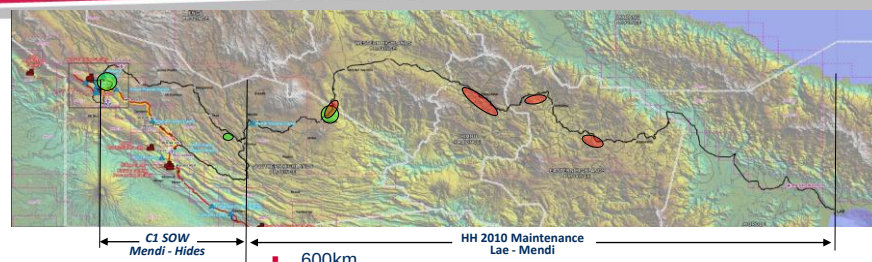
Papua New Guinea LNG - Highlands Highway Overview



- 200km
- C1 SOW
- 5 Sections of road upgraded from Mendi to Hide
- Total 21 bridges
- Three phase bridge replacement process: Repair & Propping, Piling and Installment

- 600km
- Government SOW with Exxon Support
- Total 69 bridges

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Papua New Guinea LNG - Logistics

- 4984 truck loads have been dispatched from Lae to Hides (1600km round trip) carrying various construction materials, fuel and equipment complete
- 1136 Hercules flights between Lae / Port Moresby and Tari complete
- 90 Antonov Flights between Port Moresby and Komo
- 70 Heavy Haul Operations between Komo and Hides (25km Dirt Road with 24% Gradients)
- Cargo Weight moved to Komo, 5,653,941 kgs is the equivalent of approximately 1,408 African Elephants
- JET Fuel consumed would be enough to refuel 39,000 Land Cruisers!!

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Gorgon LNG – Logistics

Onshore Staging Areas

Mason Road – 30 Hectare bulk laydown area

Quill Way – 3.25Ha Hardstand and 16,500M^2 under cover

Patricks – 8,700M^2 under cover

All are full

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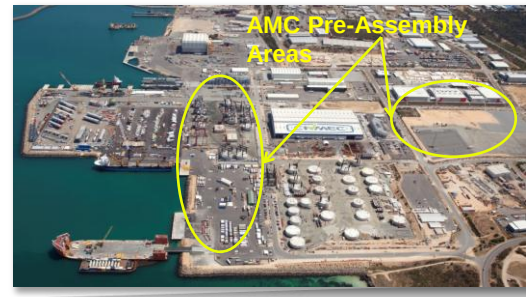
Gorgon LNG – Logistics

- Camp and Laydown space is extremely limited on Barrow Island
- 1700 People “Off Island” supporting 800 people “On Island”
  - 500 People in Material Handling and Logistics
  - 1200 People in Pre-assembly works
  - On Island workforce will eventually grow to 3000+
- Massive pre-assembly areas in an effort to move work “Off Island” (900k+ direct manhours)



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Unskilled workforce

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Unskilled Workforce

Considerations:

- What are the current skill sets in the region, and what training will be required?
- How many people will need to receive training?
- Who will take the necessary steps and pay for the training required (Government, Client or Us)?
- Where will the training centers be located; at site or local communities?
- Where will we get the trainers, and who?

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Peru LNG - Unskilled Workforce

Training

- Over 1,000 individual craft trained
- 946,163 hours of total project training

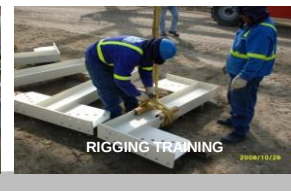

PIPE FITTER TRAINING


BASIC CIVIL OJT


MILLWRIGHT TRAINING


FIREPROOFING TRAINING


INSULATION TRAINING


RIGGING TRAINING


WELD TRAINING

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Papua New Guinea LNG - Unskilled Workforce

Under the National Content Plan, CB&I was tasked with recruiting as many PNG Nationals as possible.

- CB&I employs over 1400 PNG Nationals with over two thirds coming from the local community. Most of whom have never worked in the industry.
- Residential Juni Training Facility Trainee Program was established.
- Since mobilizing to PNG, CB&I has put a workforce, mostly PNG Nationals, through over 220,000 hours of training through September 2013.
- Multicultural workforce - 28 nationalities

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Cartagena Refinery Expansion – Unskilled Workforce

Unskilled Workforce Final Thought:

"Extensive workforce training efforts are almost always required for any remote project where the area has not been industrialized. Actively training the available work force is crucial for safe and successful project completion."

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Crime/Violence

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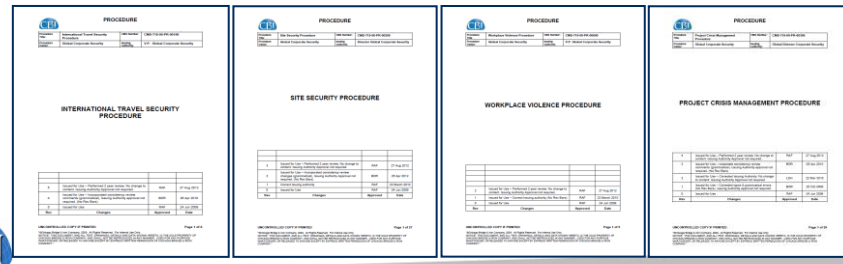
Crime / Violence

Considerations:

- What is the threat rating of the country of the proposed project?
- Has there been a history of crime / violence in the region?
- Do we have a detailed Travel Security and Site Security procedures?
- Do we have a Crisis Management Plan and Evacuation Procedure in the event of an emergency?
- Are management personnel trained and prepared to take action in an emergency situation?

CB&I Security Procedures



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Crime/Violence

Circumstances that could be reasons for enactment of these plans include, but are not limited to:

- Civil/Communal Unrest/Hostilities
- Crimes against Persons, Kidnapping, Assault
- Outbreak of War or Act of War
- Sabotage or Terrorism
- Natural Disasters including Earthquake, Hurricane, Flooding
- Plague or Epidemic
- Medical Hazards, Exposure to Contagious Disease
- Injury or Illness Requiring Evacuation for Medical Treatment (ISOS)

Crime/Violence Final Thought:

Crime/Violence is a common occurrence in remote project locations. CB&I's mission is to establish and maintain a secure work environment by:

- Evaluating the potential risks, and
- Establishing proactive programs to mitigate the risks

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Climate

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Climate

Considerations:

- What historical weather data is available for the region?
- Is the area prone to any weather events that could substantially affect the project?
- If the region is prone significant weather, when does it tend occur?
- Will we need to plan certain work in the good weather windows (foundations, shipping, etc.)?
- Do we need special work procedures when working in extreme weather conditions?
- What parameters need to be set to determine when it is unsafe to work?
  - Max. / Min. Temperature Limits
  - Maximum Wind Speed Tolerance

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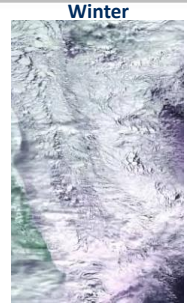
Sakhalin LNG Russia - Climate

Summer

Winter



- Hostile climate for work crews
- Minimum winter average temperature - 24 ° C
- Heavy sea ice for 5 months
- Typhoon area
- Approx. 6 month weather window

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Northern Canada and Alaska - Climate

Kearl Oil Sands

- **Winter Working Procedure** to prevent safety incidents, illness and loss of life due to exposure and working in cold weather. Procedure applies if outside temperature falls below -15° C.
- **Construction Warm Up Shacks** are provided during winter months for crews to take a break from the elements.

Prudhoe Bay ULSD

- Due to cold weather climate all foundation engineering had to be completed very early to support construction. Civil and Foundation work had to be completed the summer before equipment/modules started arriving.

Climate Final Thought:

"When working in harsh climates and conditions, always plan for the worst and schedule the unexpected. Schedule allowances and working windows should be considered in any case."

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Conclusion

When making a decision or planning to undertake a project in a remote location, ensure that all the questions are answered by experienced personnel and that appropriate actions are taken:

Culture

1)Do we fully understand the culture in the region, and have an effective strategy to change safety habits?

2)Do we have effective relationships and a strategy to manage tribal or cultural leader influences?

Government

1)Do we have a full understanding of the impact of government regulations and a plan to manage all government agencies influencing the project, and can we manage union, criminal or corrupt elements?

Logistics

1)How do we get people, material and equipment to site safely and on time?

2)What infrastructure do we need to support the project and personnel?

Unskilled Workforce / Crime & Violence / Climate

1)Do we have enough qualified craft personnel? Do we have the time and budget to train personnel locally?

2)What steps have we taken to mitigate social and environmental factors associated with the location?

3)Have we planned for and allocated enough time and resources to ease any negative impacts or risks?

HAVE WE IDENTIFIED ALL THE RISKS AND ANSWERED ALL THE QUESTIONS???

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Managing Projects in Challenging Regions

Presented by:

Ton Rouwhorst

Executive Director Project Operations

Fluor

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TON ROUWHORST

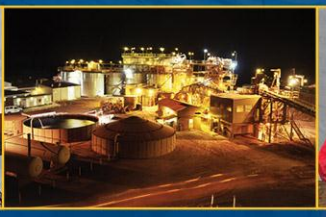
EXECUTIVE DIRECTOR PROJECT OPERATIONS

FLUOR

Ton is Executive Director for Project Operations and has over 35 years Industry experience in the Refining, Chemical, Infrastructure and Mining industries. He has had various different Engineering, Departmental, Project Management and General Management positions in a variety of Fluor offices, Project sites and Business lines.

Managing Projects in Challenging Regions

Ton Rouwhorst, Fluor Project Operations


Topics of this presentation

Project Overview
- Location
- Project Execution
- Scope

Regional Aspects
- Environment
- Culture
- Ethics
- Politics
- Country Laws
- Permitting
- Local Contracting

Safety
- Local personnel
- Training

Health
- Local project staff
- International project staff

Infrastructure
- Relocation
- Accommodation
- Weather Conditions (Rain Season)

Logistics
- Transport
- People
- Material

FLUOR

Project Overview / Location

The Simandou project is an iron ore exploration and mining project, located in Guinea's Forestiere and Haute Guinee region.

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Project Overview / Execution

Project includes 5 projects and will be performed through dispersed execution

- Overall Project Management – by PMC Paris
- Port area – by Melbourne, Australia
- Ore handling Plant – by Perth, Australia
- Railway – by Toronto, Canada
- Infrastructure – by Farnborough, United Kingdom
- Resettlement Housing – by PMC office in Paris, France including Site-based team using local contractors

Key Factors

- Total project management execution staff 2013: 1250
- Estimated total construction work force: 20.000 – 25.000
- Total estimated TIC: In excess of US$15bn
- Program duration: 7 years

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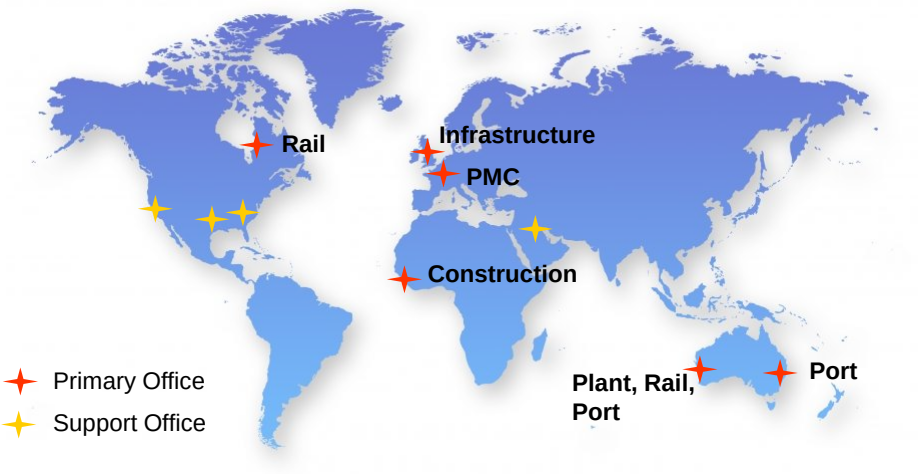
Project Overview / Dispersed Execution



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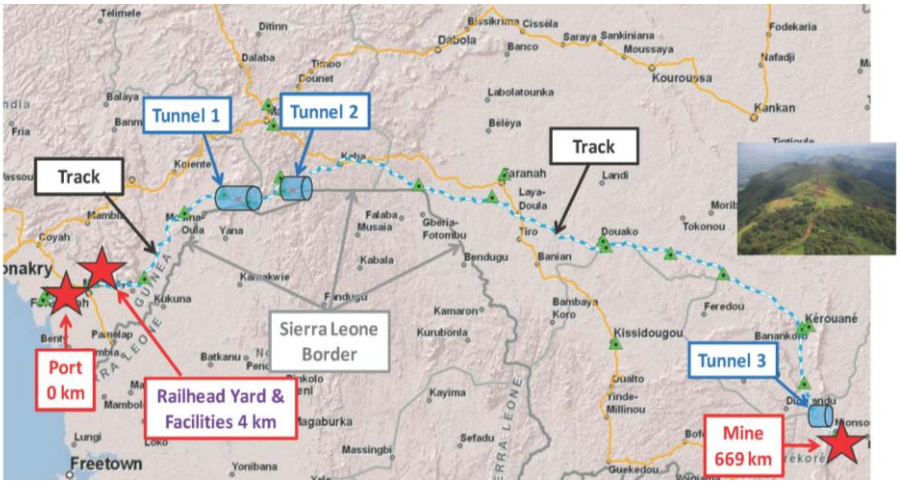
Project Overview / Scope



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Project Overview / Scope

Port scope:
- Unloading & Offloading facilities
- Marine structures & Jetty
- Shipping channel dredging
- Infrastructure
- Pioneering offloading facility

Infrastructure scope:
- Transport Roads / Bridges
- Power Plants
- Fuel Supply & Storage
- Water Supply
- Communications / IT / Telephone
- Buildings / Camps / Warehousing

Rail scope:
- Mainline track, Including three Tunnels
- Mine load-out facilities / Port unloading facilities
- Locomotive and ore car provisioning facility
- Signaling and communications

Ore handling plant scope:
- In-pit crushing
- Downhill conveying
- Stockpile, further crushing & screening plant
- Feed conveyors, stockyard and trainload

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Project Overview / Scope – Relocation Housing

Relocation Housing scope:
- Housing for resettled households
- Common buildings in resettlement villages – school, clinic, market, mosque
- Site development of resettlement villages
- Potable water supply for resettlement villages
- Access roads to resettlement villages
- Transport of resettled persons and belongings from existing homes to resettlement villages
- Removal and disposal of abandoned structures
- Replacement of productive lands and compensation for loss of income

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Relocation Housing

Relocation

- Relocate people (homes / villages) is often very emotional.
- Better houses in our perspective is not always their perspective.
- They may be better off in their palm leave sheds as our idea of stone houses.
- We touch the local sensitive environment and culture.
- A specific tree may be the ancient core center of a village, moving that may destroy complete worlds for people.
- Sensitivity to sacred sites

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Regional Aspects

Environment

Large projects like this one have a substantial influence on the environment of the area.

The project "scars" the country from West to East.

Starts with the port construction in the West, with impact on the sea life, the fish life conditions impacted local fishing habits and life of fisherman population.

Rail-track construction over 640 kilometers through the entire country, following a more or less optimized route, is subject to intensive studies of found fauna and flora with the target to reduce damages as much as possible. When influences are obvious, these studies result in additional measures, such as new planting areas as well as avoiding the living environments of animal populations.

Villages have to be relocated due to new track. Very extensive studies are required to understand the historically positioned settlements. Housing conditions that seem very good in our view, may be completely unacceptable for the local population.

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Regional Aspects

Culture

Different culture which sometimes seems completely irrational to us.

We need to try and understand, and accept their culture/ways.

We are the guests, hence we must try to understand them, we cannot expect them to understand or ways.

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Regional Aspects

Ethics

There may be an accepted local attitude which condones a corrupt / non-ethical way of working, but Fluor will act ethically in all situations, even when others don't, and even when this means we may loose the job. Fluor is known world-wide for this solid ethical behavior. In the end this will prove our ethics & compliance culture.

Politics

We must never speak-up on this topic in whatever group of people or location. Even one-on-one discussions have to be avoided at all time. Need to understand National, Regional and Local politics and work within these frameworks.

Country laws

Specifically the appliance of local laws needs attention. Interpretations are not always logical.

Permits

Obtaining permits takes a long time and needs the cooperation of local project staff. For this purpose, a dedicated project team is required.

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Safety

Safety

- Our safety rules are to be followed without exception. Just as our ethical attitude, this is Fluor's known trademark.
- Local personnel (often mandatory), needs safety. training specifically
- Training starts with basic life skills before teaching specific job skills
- Pre- employment medicals are a critical aspect of the selection and screening process

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Health

Illnesses

- Conduct risk assessment and develop mitigation strategies
- Be careful not to introduce illnesses to local project staff.
- Minimize (avoid) illness for international project staff
- Take extreme care for cleanliness and prevention. This is never overdone.

SOS

- Install international SOS contract with own medical staff and facilities throughout the entire country

Malaria

- Install Malaria prevention program

Emergencies

- Install and implement emergency and evacuation program for international staff via own helicopters and fixed wing planes

Supplies

- Distribute survival kits to all active (in-country) staff, including business travelers

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Infrastructure

- **Roads and Bridges**
  Improving existing roads and bridges is required to support the overall project execution. Detailed road surveys are done early in the execution phase of the project.
- **Accommodation**
  Office space; it is sometimes very complex to get office space, which may result in extremely high costs. Often needs a substantial upgrade to get to an acceptable standard
  Housing
  Same as office space. Shall be arranged early. Local agencies may jump to funny high prices.
- **Fixed camps**
  Throughout he entire new track, a range of permanent construction camps is required to enable the new construction works.
- **Fly camps**
  The early construction activities (such as soil investigations) require a quick set-up of temporary accommodation for relatively small teams. Due to the limited existing infrastructure, these facilities were brought to the various locations by air.

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Logistics

Transport

- Pioneer marine offloading facility
- Local situation shall be thoroughly investigated. Often time-consuming. Our safety standards require more than the locals are used to.
- Purchase 4-wheel trucks
- Helicopters and airplanes (in country)
- Setup of international (intercontinental) air services for people and material
- Development of PLP (Project Logistics Provider) contract at project initiation.

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Logistics




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Summary

- The success of a project like this is ***not just in "engineering"***
- The success is all about good project management of:
  - Logistics
  - Local culture and communities
  - Environment
  - Health & Safety of staff and local population
  - Infrastructure Improvement to support project execution
  - Risk Management
  - Attracting skilled project staff

It also needs flexible project team members, with a broad out-of-the-box interest, an eagerness to learn, with a proactive attitude, and commitment.

FLUOR

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Maximising Project Efficiency for Improved Performance and Delivery

Thurs 28 November 2013

European Construction Institute

Achieving Success in a Challenging Compliance-Driven Environment

Presented by:

Nigel Barnes

Managing Director, WSP CEL

and

Trevor Keep

Wytch Farm Engineering Manager, Perenco

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NIGEL BARNES

MANAGING DIRECTOR

WSP CEL

Nigel has been leading WSP CEL for over 5 years. His role involves the oversight of many complex multidiscipline projects for a range of industrial sectors around the world. Nigel joined WSP CEL from GlaxoSmithKline, where he was Vice President of Engineering.

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TREVOR KEEP

WYTCH FARM ENGINEERING MANAGER

PERENCO OIL AND GAS EXPLORATION

Trevor is the Wytch Farm Engineering Manager at the Perenco Oil and Gas Exploration and Production facility here in Dorset. He has worked in various operational, project and management roles across a number of UK sites including BP Chemicals in Hull, Wytch Farm in Dorset - under BP Exploration and under Perenco UK Ltd, and also at the Dimlington Gas Terminal.

Achieving Success in a Challenging Compliance-Driven Environment

Nigel Barnes, Managing Director, WSP CEL
Trevor Keep, Wytch Farm Engineering Manager, Perenco

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Project Objective

“ Increase production from the L Site facilities to meet business plans, based in a site of Special Scientific Interest, on time, in budget, with minimal Health, Safety, Quality or Environmental Impact “

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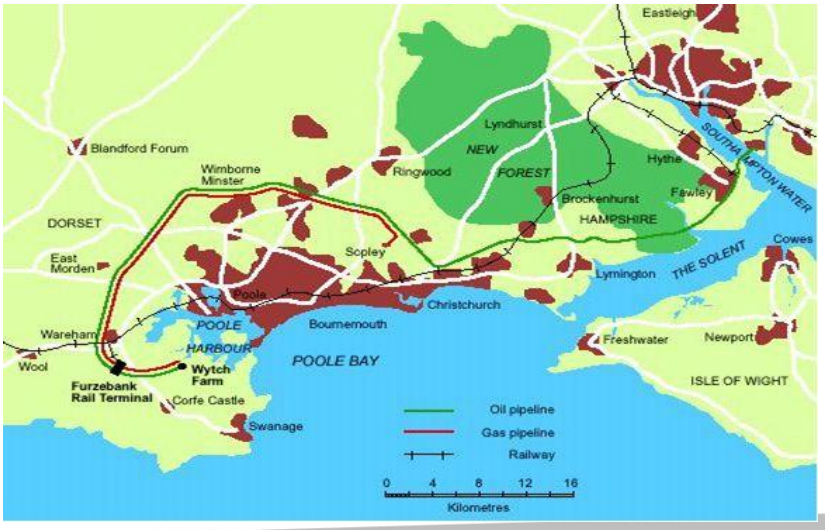
Western Europe's Largest Onshore Oil Field and production facility



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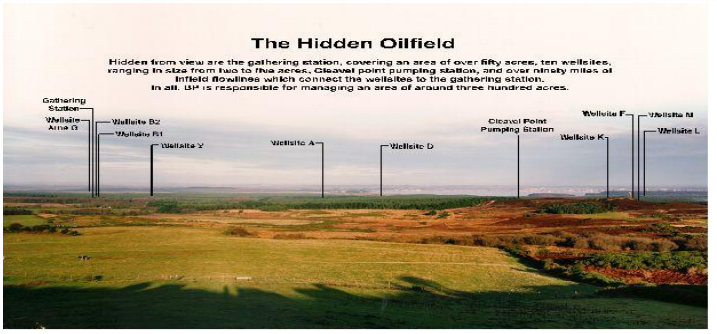
World Heritage Coastline, SSSI, RAMSAR, AONB, SPA, SAC…….



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A tourist hotspot……Difficult conditions to work in ?…….....




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Out of nowhere……




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There is a thriving production facility…….

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Wytch Farm is nothing special, but it is to us…….

- Wytch Farm is unique in many ways.
- Part of our planning conditions are that we cannot be seen, heard or smelt.
- There is no standard formula for what we do or how we do it.
- And hence any relationship with a 3rd party contractor / supplier has to be very carefully selected and conditional in nature.
- And as a result we have found that an integrated approach with stakeholders and contractors / suppliers is the key to success.

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Project Specific challenges

- **Hybrid delivery model**
- **Complex High Hazard process**
- **Stop/Start in nature**
- **Change in Asset Ownership and personnel**
- **Construction installation timescale were challenging**
- **Logistics constraints**

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Start with the End in Mind

- Reviewed the challenges
- Review the ACTIVE VEP's
- Designed an implemented a win-win strategy
- Focus on building clarity behind one common objective for all
- Made it flexible
- Kept it simple

- 1: Project Concept and Definition
- 2: Project Team Management
- 3: Supply Chain Relationships
- 4: Information Management and Communication
- 5: Project Risk Management
- 6: Innovation and Continuous Improvement
- 7: Project Execution
- 8: Performance Measurement

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Project Specific challenges

- **Hybrid Delivery Model** a non standard EPCM approach was required
  - Engineering
    - Detail design by WSP CEL with interaction by Perenco Technical Authorities
  - Procurement
    - Contractual Arrangements was an open book approach taken on a reimbursable basis
    - Fixed price downstream with the exception of the Electrical Contract where a more bespoke arrangement was mutually agreed
    - Placement of Contracts/Orders by Perenco
  - Construction delivery via an Integrated Site Team
    - Perenco & WSP CEL PMs with clear lines of responsibilities
    - WSP CEL Construction & Engineering Support
    - Sub contractor Site management team
    - Perenco Commissioning Team

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Project Specific challenges

- **Complex High Hazard process** requiring multiple interfacing activities undertaken in a unique combination of sequenced and parallel tasks
  - High pressure process, hydro carbon hazards, high environment constraints (Site of Special Scientific Interest)
  - Multiple site activities combated by unique team approach to co-ordinating activities with competing priorities
  - Fully operational plant requiring high levels of operational, engineering and project interfaces
  - Integrated operational and project inductions developed/delivered
  - Project team integrated into the site communication and briefing procedures,

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Project Specific challenges

- **Stop/Start in nature**
  - Client brief and scope changed and evolved at pace over a two year period
    - 2 major scope reviews/changes
    - 2 major stand downs during the design phase
  - Construction phase
    - Complicated intermittent project access windows inter linked with Production needs and Drilling program changes at short notice
    - Proactive daily planning touch time

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Project Specific challenges

- **Change in Asset Ownership and personnel**
  - Facility ownership BP to Perenco in Dec 2011
  - Process of Change effects and cultural transition support implemented
  - Implemented quality, timely, knowledge transfer communication events for all
  - Used the Project objectives and Ways of Working to keep us focused
  - Quality on the ground decision making team developed including all Key Stakeholders

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Project Specific challenges

- **Logistics Constraints**
  - Remote and heavily regulated location - Poole Harbour – very busy shipping lanes
  - Personnel and Equipment planning - dedicated Ferry and Barge from Poole slip to the island – Barge outage 3 weeks
  - Planned use of plant and craneage to match the availability of the barge
  - Limited space on slip and island, JIT equipment/people planning approach developed and implemented
  - Working alongside Rig, Wells, Ops Personnel and associated Equipment
  - One team, one office, one purpose, great communications and team spirit developed

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What went well

"Not everything that is faced can be changed. But nothing can be changed until it is faced."

-James Baldwin

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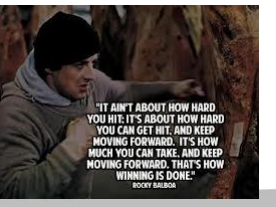
What 3 Key things did we Learn

- Building flexibility and courage to change are key

- All in it together, we only succeed if we all pass the finish line together!

- It is all about attitude



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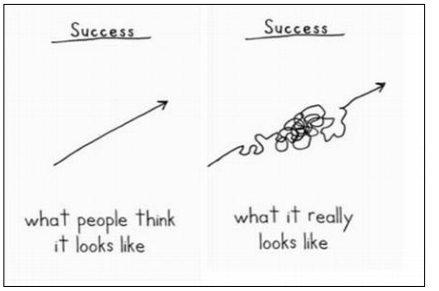
ECI Highly Commended Small Project 2013



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Thank You - Questions?

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Thurs 28 November 2013

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Addressing Key People and Skills Shortages Within the Industry

Presented by:

Ray Sanderson

Head of Project Delivery, BG Group

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RAY SANDERSON

HEAD OF PROJECT DELIVERY

BG GROUP

Ray joined BG Group in May 2010 as Group Construction Manager and has recently taken up the new position of Head of Project Delivery. In this capacity, Ray also chairs BG's Construction Safety Leadership Group. Prior to joining BG Group, he was a Director of Projects for a major contractor in the Oil and Gas and Nuclear Industries. His industry experience to date includes major projects in the United Kingdom, Australia, South Africa and Saudi Arabia.

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Addressing key people and skills shortages in the industry

Ray Sanderson, Head of Project Delivery, BG Group

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Key People & Skills Shortages

- Industry attractiveness – why join ?
- Resourcing megaprojects
  - Chronic skills shortages ?
  - BG Countries of operation
  - Challenges facing the industry
- Delivering the resourcing strategy
  - Employment model
  - Attracting & retaining talent

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Industry Attractiveness

Positives

- Challenging & Rewarding
- Global opportunities
- Increasing need for diverse skills & technology

Potential negatives

- Boom & bust image
- Multiple alternatives
- Work & life balance
- Changing demographics

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Resourcing megaprojects

- Industry for European Contractors is truly global
- Bigger & more complex projects require key people to deliver project certainty
- Clients, owners & contractors seek similar skill sets (both behavioural & technical)

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Chronic skill shortages ?

An industry facing multiple challenges – there is a looming demographic and labour market crisis in the oil and gas sector that has the potential to shake the very foundations of the industry

Ernst &Young Human Resources in Canada's Oil & Gas Sector 2011

60% of companies have successfully developed existing staff
90% reported significant difficulties with finding suitable candidates

Scottish Building Federation, Sep 13

62.5% reported difficulties recruiting managers and engineers
52.1% reported difficulties recruiting supervisors.
10% + reported difficulties recruiting welders, pipefitters and technicians.

ECITB 2008 skills demand, supply and gaps

Shortages in critical resources skills have existed for a decade - PWC 2012

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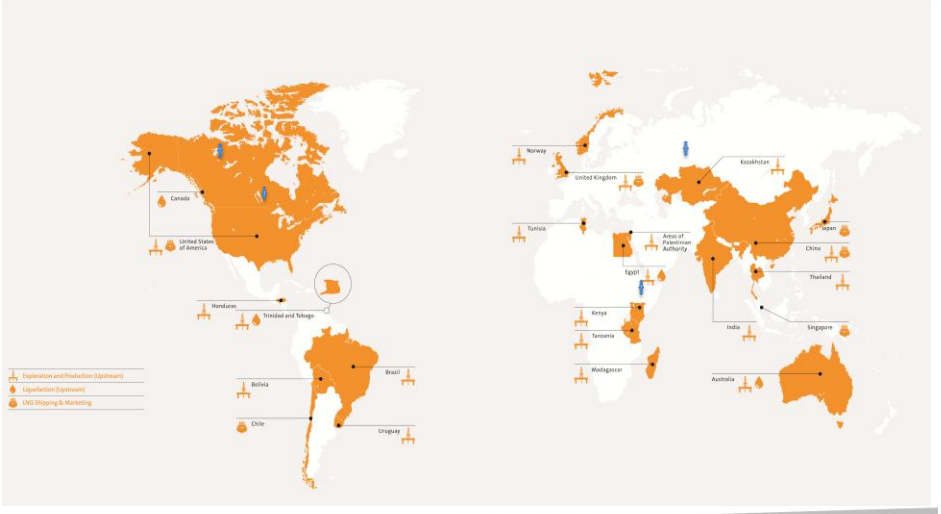
BG Countries of operation



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Challenges facing the industry

- Aging workforce
- New markets with limited talent pool
- Multi - cultural environment
- Local content and sustainability obligations
- Developing new skills for the future

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Delivering the Resourcing Strategy

Buy

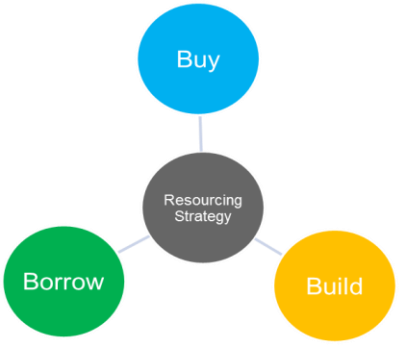
- Partnership with contractors with key skills rom the local and international market

Borrow

- Expats to establish immediate capability and support long term capability

Build

- Relationships with contractors to secure resources supply for future growth



Discipline Functions + HR + Recruitment in Collaboration

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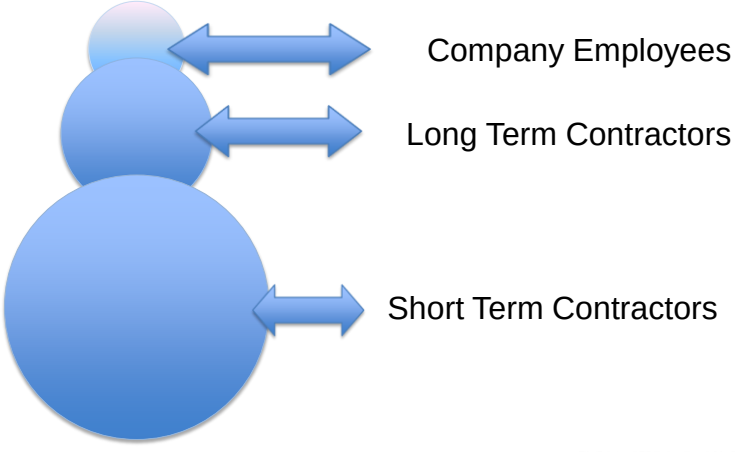
Employment Model ?



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Attracting & Retaining Talent

- Selling the organisation & opportunity
- Business diversity & transferrable skills
- The role of the function in resource management
- Parenting, coaching & mentoring – career path
- Talent & performance management

Creating value through people

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Q & A

Reflections ??

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Accelerating the Development of Future Project Management Professionals

Presented by:

Hans Bakker

Project Manager at Royal Dutch Shell in Rijswijk (NL)

Professor at TU Delft,
Chair Management of Engineering Projects

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Thurs 28 November 2013

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PROF. DR. HANS BAKKER

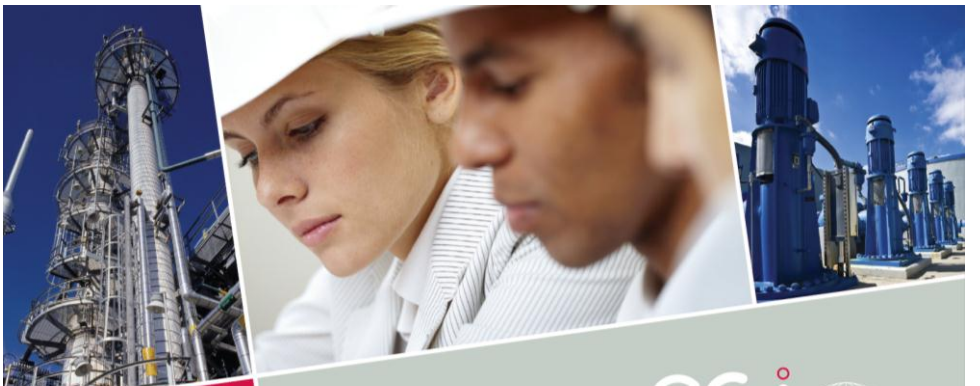
PROJECT MANAGER AT ROYAL DUTCH SHELL IN RIJSWIJK (NL)

PROFESSOR AT TU DELFT,
CHAIR MANAGEMENT OF ENGINEERING PROJECTS

Hans is a Project Manager at Royal Dutch Shell in Rijswijk (NL) and Professor at TU Delft with a Chair in the Management of Engineering Projects

Professor Hans Bakker received his PhD in Solid State Physics from the Vrije Universiteit Amsterdam in 1985. In the same year he joined Shell Research as a research physicist and has remained for the rest of his career.

Hans is the founder of the Shell Project Academy, and in 2007 was selected for the chair of Management of Engineering Projects at TU Delft ,at the Mechanical, Maritime and Materials Engineering Faculty.



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Accelerating the development of future project management professionals

Prof.Dr Hans L.M. Bakker
Chair Management of Engineering Projects, TU Delft

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Background

- PhD in Solid State Physics
- 28 years with Royal Dutch Shell – research, inspection, maintenance, consultancy, operations, project management
- Founding father of Shell Project Academy
- 7 years Chair Management of Engineering Projects

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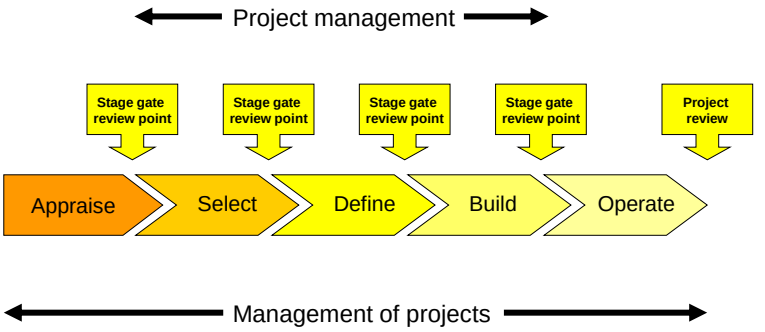
Management of Projects



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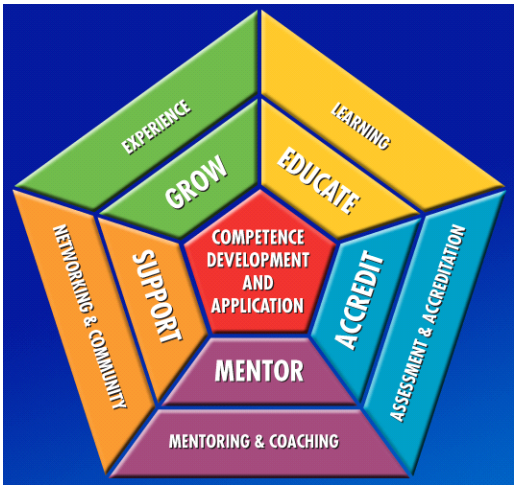
Shell Project Academy



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PM Competence Development principles

Objective:

- to develop staff
- to ensure consistency of approach
- to create a continuous learning culture

Competence growth is predominantly achieved by working 'on-the-job'

Competence growth is staff AND line responsibility

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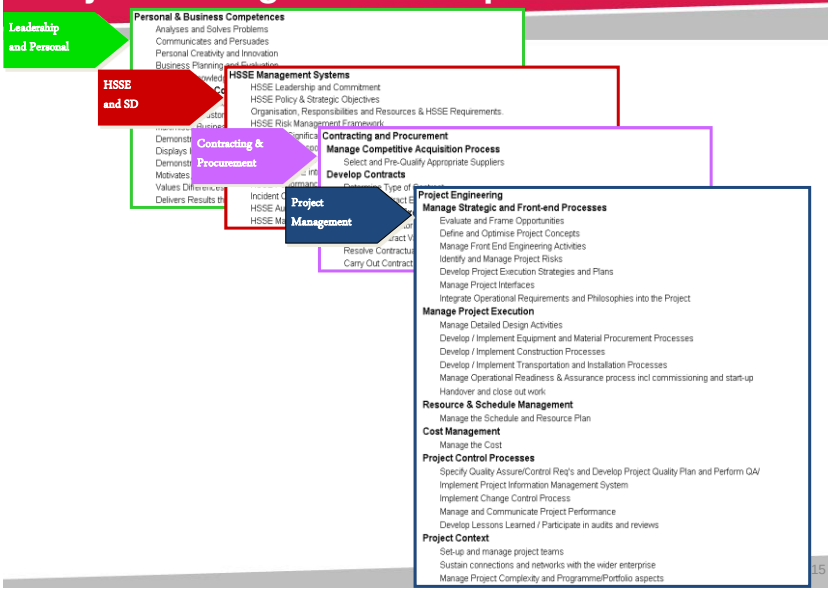
Project Management Competences



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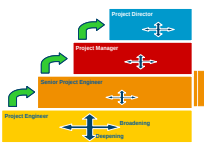
Project Competence Assessment Process

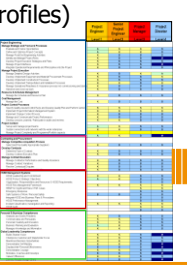
Step 1:

What Competence Level?



Step 2:

What are the competence gaps? (assess against requirements – Job Competence Profiles)



Step 3:

What development actions shall be taken?

IDP
An Investment in your Future

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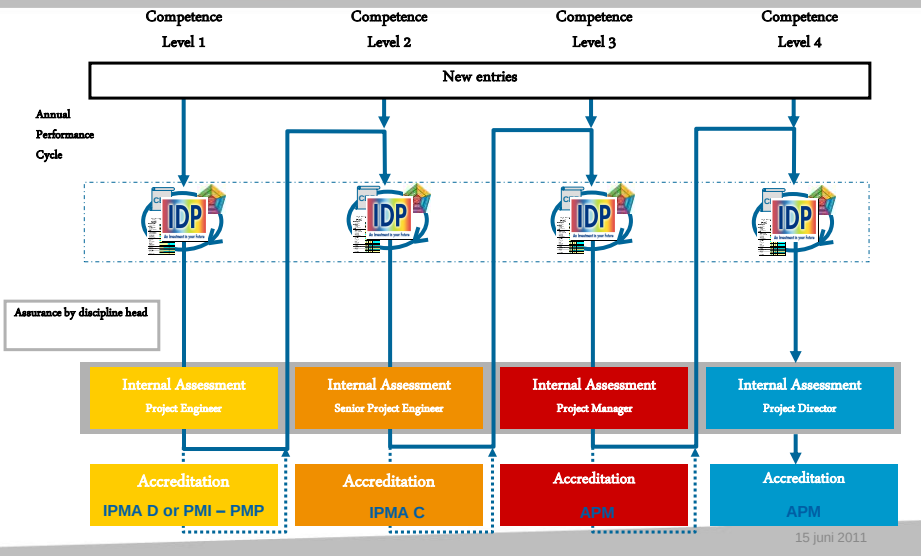
Assessment & Accreditation process



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Future Development

- Master in Management of Projects – co-assistant / intern
- Graduate entry possible – MoP university grads (industry)
- Working alongside an experienced MoP - challenge
- Early career opportunities – exposure
- Take deliberate time to reflect – Time-out/Sabbatical
- People skills must get more attention – inter-faculty / university

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Food for Thought

- Projects still fail at ridiculous rates
- If the future project management methods look anything like the present what improvements can we then expect?
- What future is there for this failing method?
- Why do we take project management research not more serious?
- Who is currently investing in designing the future of PM?

ECI Autumn Forum

Maximising Project Efficiency for Improved Performance and Delivery

Thurs 28 November 2013

European Construction Institute

Civils and E&I Pricing Systems

(new Task Force)

Presented by:

Gerard Bakker

Director Contracts Management

Fluor

ECI Autumn Forum

Maximising Project Efficiency for Improved Performance and Delivery

Thurs 28 November 2013

European Construction Institute

GERARD BAKKER

PROJECT PROCUREMENT & CONTRACTS MANAGER

FLUOR

Gerard joined Fluor in 1974 and has held positions in project-contracting, engineering, fieldwork, and as division manager. Having worked for Stork as division manager, Gerard returned to Fluor in 1998 as contracts department manager.

In this role he also chaired the ECI Benelux sub-contracting task force that developed and published the ECI pricing system for piping in 2005, and is now project procurement & contracts manager on a number of Fluor's projects and proposals.

European Construction Institute

ECI Benelux (New) Subcontracting Task Force
Civil-, and E&I Pricing Systems
November 28, 2013

Gerard Bakker
Director Contracts Management at Fluor

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Task Force Civil-, and E&I Pricing Systems

Why this New Task Force ?

Causes: Client's/Owner's markets dictate shorter schedules and increasing risks for EPC contractors (LSTK)

Effects: Schedule compression and poor scope definition causing….

- High bids du to (unnecessary) contingencies or
- Low bids with qualifications or claims later on

Needs: Early-, clear-, and complete scope definition and Flexibility due to overlapping engineering and construction

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Task Force Civil-, and E&I Pricing Systems

Objective

- Facilitate the shorter schedules, compressed engineering and increasing risks on LSTK projects…
  by improved Unit Rate Pricing Systems
  - Transparent…..(Actual cost per operation)
  - Less complex...(Allow early price agreement and reduce bidding time)
  - Fair…….(Ensure cost to vary linear with quantities)
  - Better identify, manage, and assign risks
  - Simplify measurement of scope and scope changes
  - Support progress-, and productivity assessment

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Task Force Civil-, and E&I Pricing Systems

History

- Earlier attempts by ECI's Subcontracting Task Force were already successful (2000-2005)
- The Task Force contained 3 individual work groups for
  - Piping Prefab and Installation
    ("ECI Pricing System for Piping Works"- published 2005)
  - Civil Work, *(system not published but draft data still available)*
  - E&I Work, *(system not published but draft data still available)*

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Task Force Civil-, and E&I Pricing Systems

History (Cont'd)

- Participants ECI Subcontracting Task Force (2000-2005)

Ballast Nedam
BAM
Croon
Fabricom
GTI
Imtech
MBG (CFE)
NBM Amstelland
Ponticelli Freres
Royal Haskoning
Stork

ABB Lummus Global (CB&I)
Fluor
Kvearner
Raytheon
Tebodin
Technip

Erasmus University

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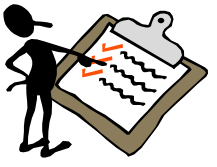
Task Force Civil-, and E&I Pricing Systems

Development Process

- Prepare "Shopping List"
- Compare existing systems (including existing ECI material for Civil and E&I)
- Select, agree, and implement improvements and develop the system
- Test the systems within the Task Force
- Present the systems at ECI (trial) workshops / master classes
- Include essential comments and finalize the systems

Typical in all three earlier Shopping Lists…

- Recognize complexity / project nature
- Separate directs from indirects
- Relate to man-hour content
- Relate to engineering MTO's



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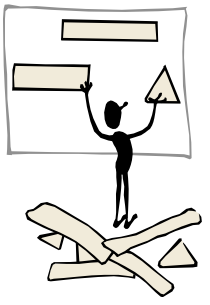
Task Force Civil-, and E&I Pricing Systems

Plan

- Establish a (new) ECI Subcontracting Task Force
- Assign “Work Groups” for Civil and E&I
- Re-visit existing draft data for Civil and E&I Systems
- Follow proven process to reach Task Force objectives
- Present, publish, and promote systems to the market.



Expected Timing

- Commence with Task Force per January 2014
- Systems ready for trial presentations within 6-9 months
- Systems ready for publication within 9-12 months

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The True Purpose of this Presentation

Candidates to participate in this Task Force

- **Who could participate**
  - EPC contractor representatives
    Contracts Management, Project Controls, Engineering, Construction Management
  - Construction contractor representatives
    Estimating, Construction, Project Management, Project Controls
- **Why participate**
  - Opportunity to learn from your pears in EPC and Construction companies
  - Opportunity to contribute from experience
  - Opportunity to influence the result
  - Excellent networking
  - Professional pride
- **Why not**
  - Regular “Work Group” sessions to attend
  - Homework

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The True Purpose of this Presentation

How to accept the challenge of participating

- **Please mail to gerard.bakker@fluor.com**
  - to discuss your participation or
  - to obtain any additional information

Questions & Answers...

ECI Autumn Forum

Maximising Project Efficiency for Improved Performance and Delivery

Thurs 28 November 2013

European Construction Institute

Collaborative Business Relationships
BS 11000 to ISO 11000

Presented by:

Clive Winkler

ECI Autumn Forum

Maximising Project Efficiency for Improved Performance and Delivery

Thurs 28 November 2013

CLIVE WINKLER

EUROPEAN CONSTRUCTION INSTITUTE (ECI)

&

INSTITUTE OF COLLABORATIVE WORKING

Following some 30 years as a Chartered Engineer, Clive set up as an independent practitioner to promote best practice. Clive is a BIS Benchmark Index accredited facilitator, a Qualified NVQ Assessor and a Construction Best Practice Programme Advisor.

Clive supports ECI in coordinating workshops and the alignment of ECI activities with those of the Benelux and Italian regions, and is also a representative of the Institute of Collaborative working.

Collaborative Business Relationships
BS 11000 to ISO 11000

Clive Winkler
ECI Autumn Forum
Amsterdam - 28 November 2013

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Agenda

- **What is BS 11000**
- **Journey to BS 11000**
- **Forward to ISO 11000**

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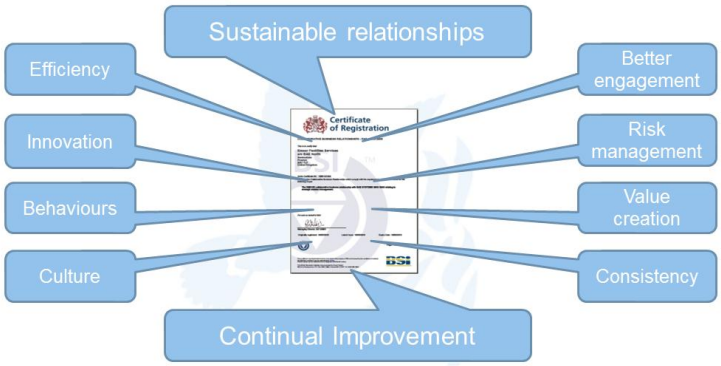
BS 11000 is about better business



Not a plaque on the wall .... its a different way of working !

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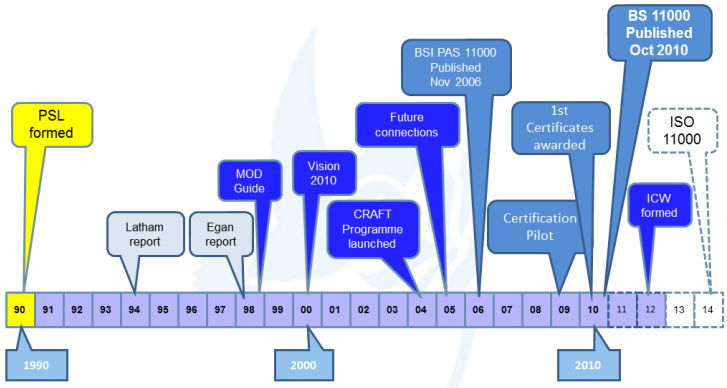
Significant Milestones in the development of BS 11000



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Background to ICW

- **Formed in 1990 by DTI now BIS and the CBI**
- **Assist organisations to develop collaborative relationships for competitiveness**
- **Develop, share, promote best practice Business Relationship Management**
- **Self financing – Not for Profit**
- **23 years of practical relationship management experience**
- **Executive Knowledge Network 87 members - Public sector/Industry / Academia**

ICW Board
Lord David Evans of Watford (Chairman), Lord Tony Berkeley , Les Pyle (CEO), Andy Scott- CBI, David Smith- BIS, Barry Sheerman MP, Dawn Marriott-Sims (Capita)
David Hawkins Knowledge Architect & Director of Operations

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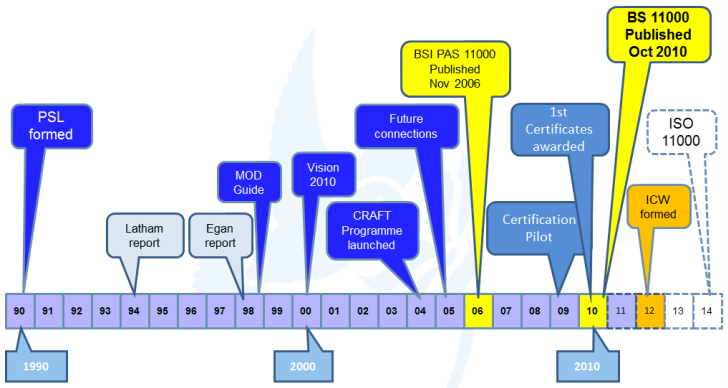
Significant Milestones in the development of BS 11000



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Overview of collaborative framework/BS 11000

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BS 11000 Early Adopters

Defence
General Dynamics European Land Systems
NetworkRail
Atkins
Colas Rail
ascent
babcock
Costain
Balfour Beatty
Capita
NATS
BT
carillion
HML
EMCOR UK
First
hp
Frequentis
PERA
Boeing
Fujitsu
SELEX Systems Integration
enterprise mouchel
Raytheon Systems Limited
bp
Lockheed Martin
debut
Skanska
Hochtief (UK) Construction

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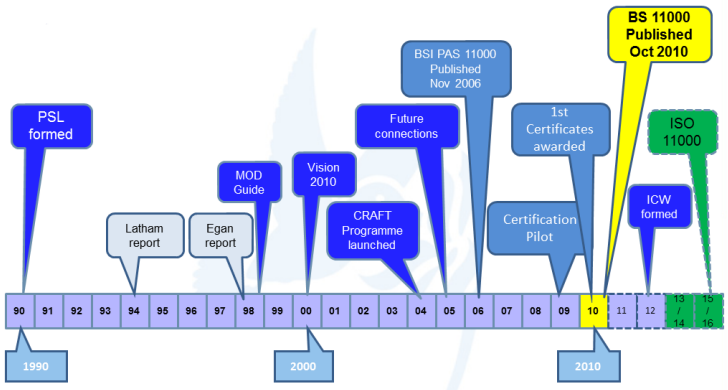
Significant Milestones in the development of BS 11000



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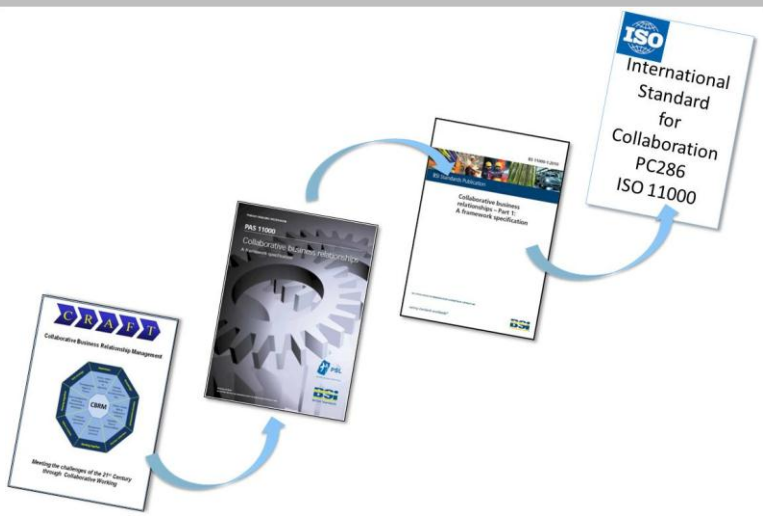
BS 11000 to ISO 11000



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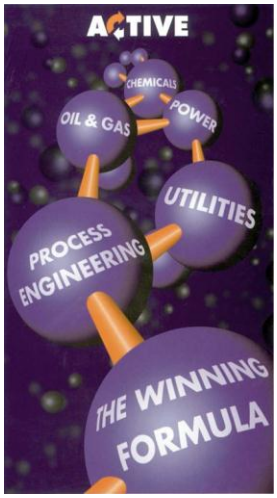
ACTIVE Principles

Effective…

1.Project Concept and Definition
2.Project Team Management
3.Supply Chain Relationships
4.Information Management and Communication
5.Project Risk Management
6.Innovation and Continuous Improvement
7.Project Execution
8.Performance Measurement



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ACTIVE – the future

- **Continuing to refine ACTIVE**
- Confront challenge for using elements of ACTIVE on all projects regardless of the contract
  - Provide more Benchmarking capability and data
  - Provision of Workshop Training and Communication
  - Review and Update of Principles and Value Enhancing Practices (VEP's) by members.
  - Use of ACTIVE as the process itself or in support of existing organisational procedures

ECI Autumn Forum

Maximising Project Efficiency for Improved Performance and Delivery

Thurs 28 November 2013

European Construction Institute

Maximising the Potential of Information Flow Across the Design: Construction Interface

(Young Professional Task Force)

Presented by:

James Bishop

ECI Autumn Forum

Maximising Project Efficiency for Improved Performance and Delivery

Thurs 28 November 2013

JAMES BISHOP

EUROPEAN CONSTRUCTION INSTITUTE (ECI)

James is responsible for overseeing the operational activities of the Institute. He joined ECI, having been Research Manager for Loughborough University's Innovative Manufacturing and Construction Research Centre (IMCRC), before which he worked on strategy for managing technical knowledge and expertise within engineering consultancy, Ramboll Whitbybird.

He has a long-standing relationship with Loughborough University both through ECI, and having also completed his Engineering Doctorate at the institution.

European Construction Institute

ECI Young Professionals Task Force

Maximising the Potential of Information Flow Across the Design : Construction Interface

James Bishop, ECI Manager

European Construction Institute

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Young Professionals Task Force

- Setup November 2012
- 13 Members
  - AMEC, BG Group, CB&I UK, Fluor, Foster Wheeler Italiana, Foster Wheeler UK, PM Group, WSP CEL & Kingsfield Consulting
- Mission Statement:
  - To identify the critical issues facing Young Professionals in the delivery of projects
  - To undertake research projects that will help improve project performance, develop best practice, shape the future direction of ECI and support the progression of the industry.
- Research Focus: Information flow over the project lifecycle

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Information Management

- What does information management include?
  - The generation and transfer of data between stakeholders within the project supply chain

- Streamlining project lifecycle processes
  - RFI/TQ process
  - Collaboration systems
  - Electronic work packages
  - Punchlist management

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Critical Issues

- Issues in the management of information:
  - The control and availability of information
  - Managing information notifications
  - How data is stored within the supply chain
  - Email issues – contractual, storage, communication
  - Management of software, file types & training etc.
  - Handover Information management
  - Use of common terminology
  - Critical software functions

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Research

- YPTF has spent the last year identifying critical issues within the context of three key areas (People, Processes & Technology)
- Gaining feedback from professionals with in-depth knowledge of problems and solutions experienced
- Interviews to date have been completed with organisations represented on the YPTF.
- Target audience for interviews: Project Managers, Information Management Personnel

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Format of Research Interviews

- Support from Loughborough University – Martin Tuuli
- Establishing an understanding of what “information” means within the context of their position and their organisation.
- Identify key roles and responsibilities with regards to information management
- Identify specific categories of information using incidents and project examples
- Systems, processes and approaches used for managing specific information categories / types
- Key guidance already in use on projects

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Early Findings

- System – people interactions
- Roles, responsibilities & culture
- Management, leadership & training
- Compatibility of systems
- Information reliability & confidence/trust
- Procedural robustness to ensure effective information flow
- Importance of softer factors (IT as an enabler)

- **Get involved – We need <u>your</u> help!**
  - **J.a.bishop2@lboro.ac.uk**

ECI Autumn Forum

Maximising Project Efficiency for Improved Performance and Delivery

Thurs 28 November 2013

European Construction Institute

Safety by Design and into Construction

Presented by:

Jim Lenton

Engineering Director - Europe

AMEC

ECI Autumn Forum

Maximising Project Efficiency for Improved Performance and Delivery

Thurs 28 November 2013

European Construction Institute

JIM LENTON

ENGINEERING DIRECTOR – EUROPE

AMEC

Jim joined AMEC in January 2012 as the Engineering Director for the EWA business, and was subsequently promoted to the Engineering Director, Europe position in October 2012. In this role Jim is responsible for the Engineering and Technical function across the AMEC European businesses, with a total workforce of some 12,000, and a business representing more than £1b/annum.

Safety by Design and into Construction

Jim Lenton
Technical Director, Europe
AMEC

Jim Lenton, Technical Director

- British born
- Grew up in New Zealand
- Relocated to Scotland 1993
- Married with 2 sons
- CEng FIChemE
- Four career companies:
  - Methanex NZ
  - KBR
  - Petrofac
  - AMEC
- Part of AMEC Europe Leadership team
- AMEC Europe is £1.3b; 11,500 people business
- AMEC is a £4.2b, 30,000 people business

High-value services in core sectors


Oil & Gas

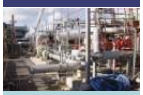

Unconventional Oil & Gas


Mining

- Oil & Gas
- Mining
- Clean Energy
- Environment & Infrastructure


Transmission & Distribution


Nuclear


Conventional Power


Renewables and Bioprocess


Commercial & Industrial


Government


Transportation / Infrastructure


Water

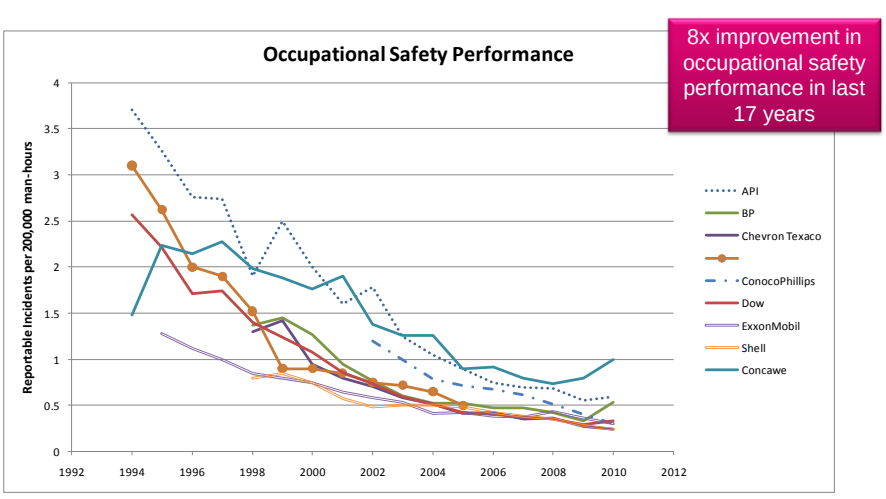
Strong scaleable positions

Contents

- Who am I?
- The Industry and how our safety performance has progressed
- Safety by Design – the AMEC Way
- Inherently Safer Design
- Design into Construction
- Summary

Occupational Safety vs. Major Accident Safety

Trend in occupational safety

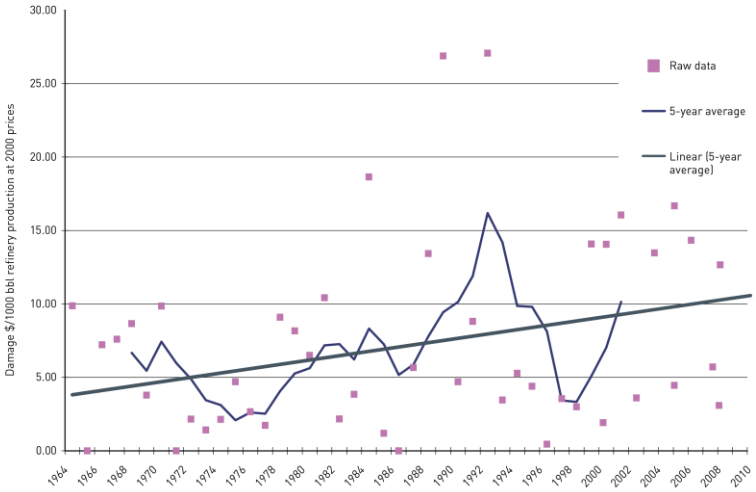


8x improvement in occupational safety performance in last 17 years

Ref. DNV, Robin Pitblado, "Offshore major accident safety: is SEMS enough?", OTC 23922, 2013

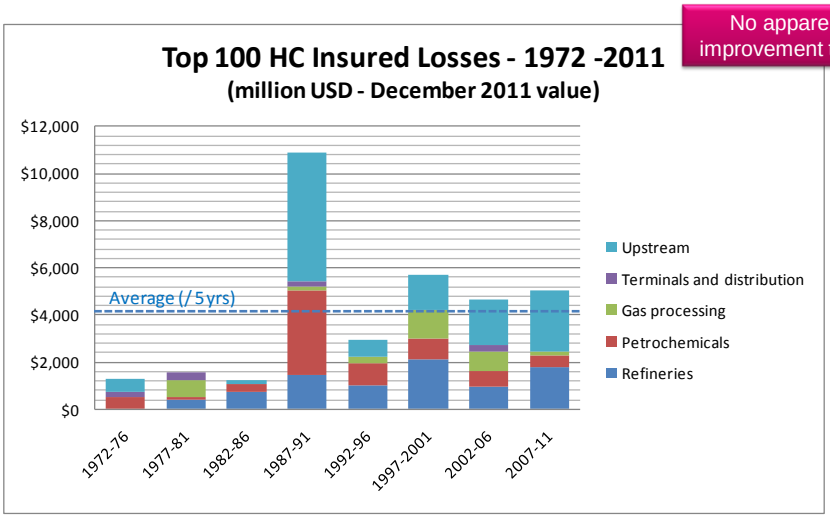
Trends in Refinery Damages

Incident costs - $ per 1000bbls refinery capacity corrected to 2000 prices



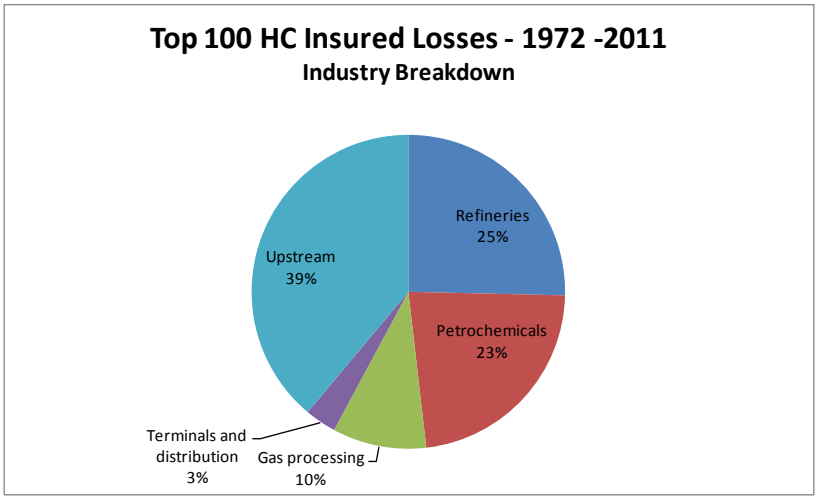
Trend in major accidents – based on Top 100 losses in hydrocarbon industry

No apparent improvement trend



Ref. Marsh, "The 100 Largest Losses 1972–2011 – Large Property Damage Losses in the Hydrocarbon Industry", 2nd Edition, July 2012

Major accidents – based on Top 100 losses in hydrocarbon industry



Ref. Marsh, "The 100 Largest Losses 1972–2011 – Large Property Damage Losses in the Hydrocarbon Industry", 2nd Edition, July 2012

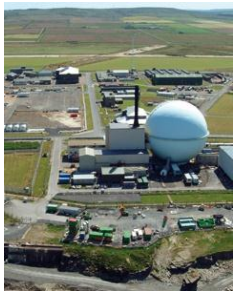
Occupational safety vs. major accident safety

- Significant improvement in occupational safety performance in oil and gas industry achieved over last 20 years
- No good metrics for major accident safety but Marsh 100 Largest Losses does not show a similar trend **– in fact, statistically no improvement is shown**
- Majority of losses are caused by fire or explosion

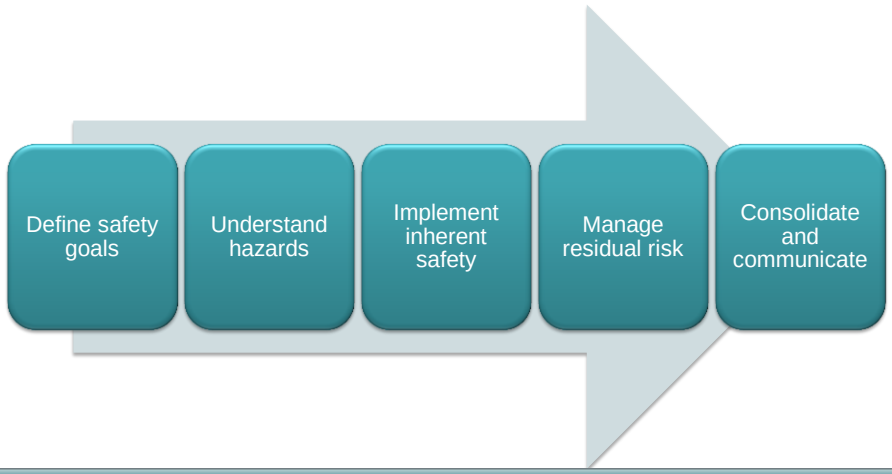
- Necessity to adopt a systematic approach to identifying and addressing occupational and major accident safety – starting in the designing phases of projects
- Focus on occupational safety does not mean major accident safety is addressed: need for targeted focus in "**Safety by Design**" process

AMEC's Safety by Design Process

part of the AMEC Way



AMEC's Safety by Design process



Is applied through the complete life cycle of the project

AMEC's Safety by Design process

Define safety goals | Understand hazards | Implement inherent safety | Manage residual risk | Consolidate and communicate

- Ensure compliance with regulatory requirements
- Project and client specific safety and environmental goals, requirements and criteria

AMEC's Safety by Design process

Define safety goals | Understand hazards | Implement inherent safety | Manage residual risk | Consolidate and communicate

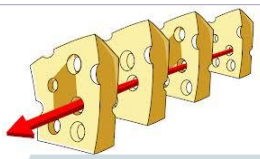
- What can cause harm
- What is nature (occupational, major accident, environmental)
- During which life cycle (operations, construction etc.)

AMEC's Safety by Design process

Define safety goals | Understand hazards | Implement inherent safety | Manage residual risk | Consolidate and communicate

- Eliminate hazard completely or reduce its magnitude significantly
- Improvements are inherent to design
- Reduce need for safety systems and procedures to control hazard

AMEC's Safety by Design process



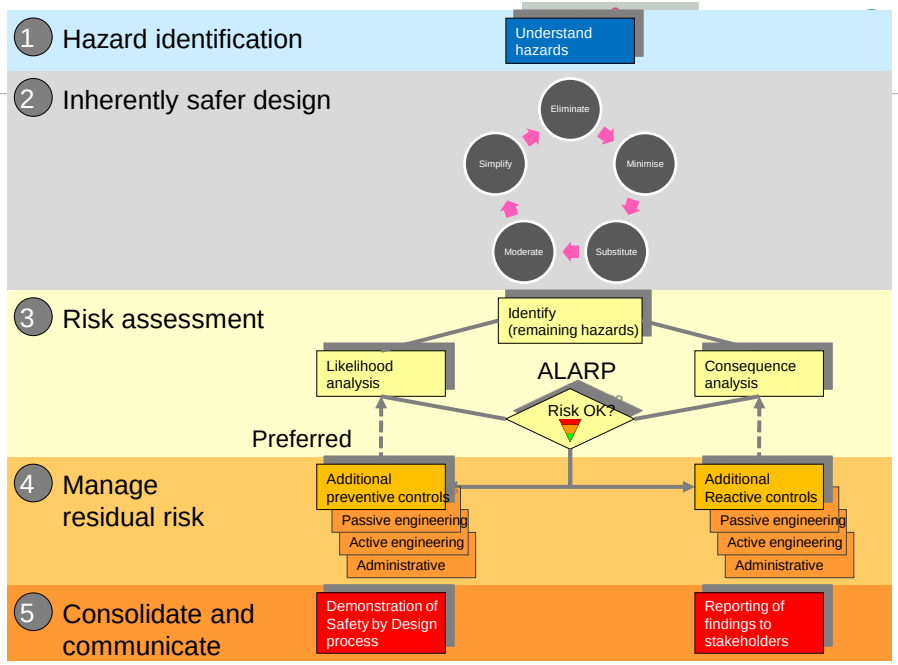
Define safety goals | Understand hazards | Implement inherent safety | Manage residual risk | Consolidate and communicate

- To a (risk) level that is acceptable to stakeholders
- Through pro-active rather than reactive controls
- Through engineered rather than procedural controls

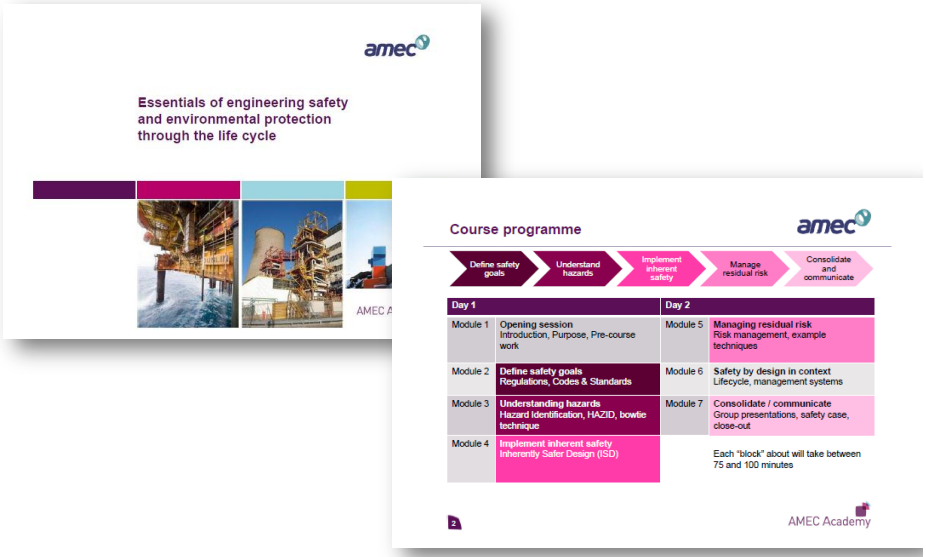
AMEC's Safety by Design process

Define safety goals → Understand hazards → Implement inherent safety → Manage residual risk → Consolidate and communicate

- Demonstrate that process has been adopted
- Report its deliverables
- Communicate findings to stakeholders



The AMEC Academy – focus on Safety



So what can go wrong when the process is not applied adequately?

Unrevealed Vulnerability

The case of

Mumbai High

How the cook cut his finger ... and the platform fell into the sea ...

Mumbai High North (27 July 2005)

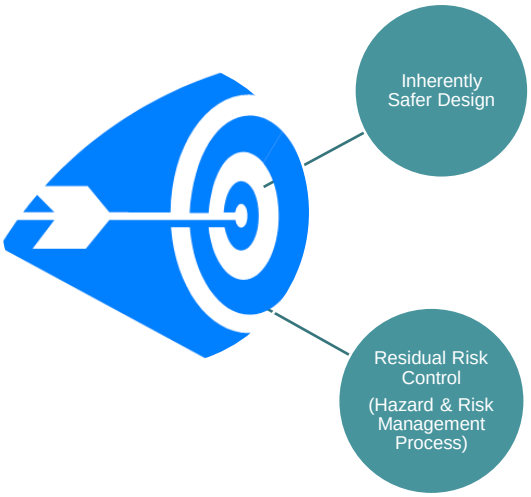
Mumbai High North (27 July 2005)

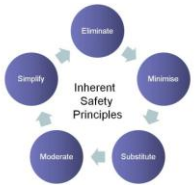
Mumbai High North – Aftermath

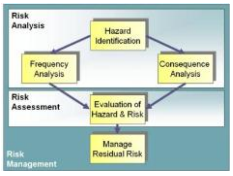
- The seven-storey high processing Platform collapsed after around two hours, leaving only the stump of its jacket above sea level
- The *Sumadra* suffered extensive fire damage and was towed away from scene but later sank on 01 Aug 2005, about 18 km off the Mumbai coast
- A total of 384 personnel were on board the platform and jack-up at the time of the accident, 22 reported dead … only, tropical sea temperatures
- Significant problems were reported with the abandonment of all the installations involved, only 2 of 8 lifeboats and 1 of 10 life rafts were launched

The Inherently Safer Design Approach

Putting it all together ...



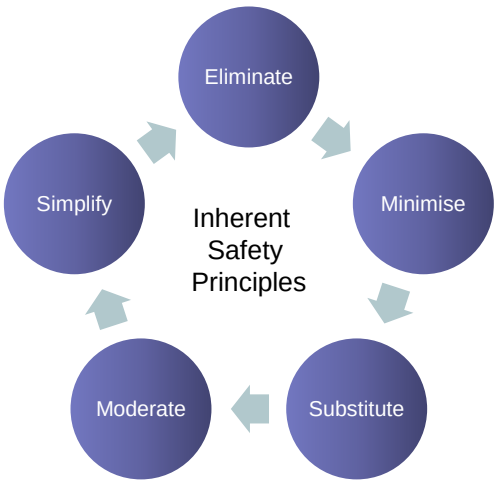




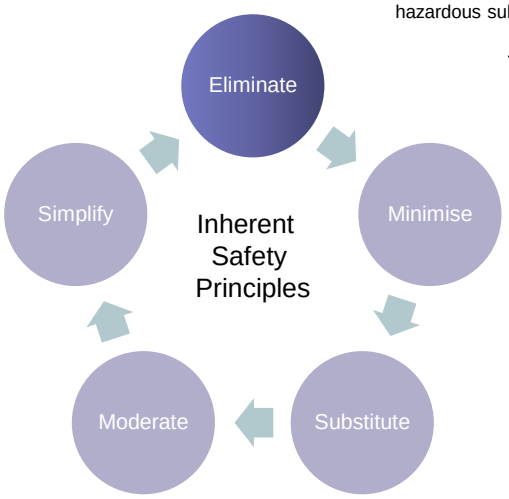
Inherently Safer Design – What is it?

- The intent of Inherently Safer Design is to **eliminate a hazard completely** or **reduce its magnitude significantly**
- Thereby eliminating / reducing the need for safety systems and procedures
- Furthermore, this hazard elimination or reduction would be accomplished by means that were inherent in the design and process and thus permanent and inseparable from them

Principles of Inherent Safety and Environmental Protection

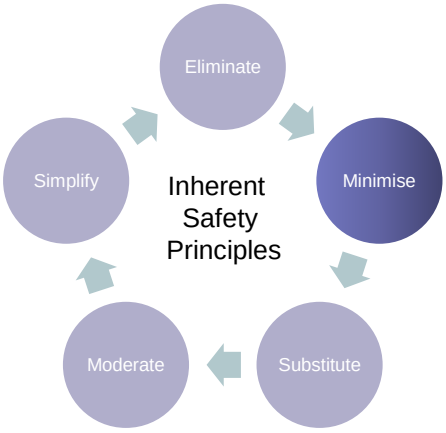


Principles of Inherent Safety and Environmental Protection

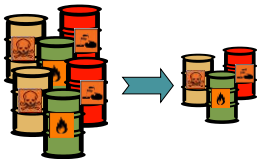


Eliminate – remove the hazardous substance/condition

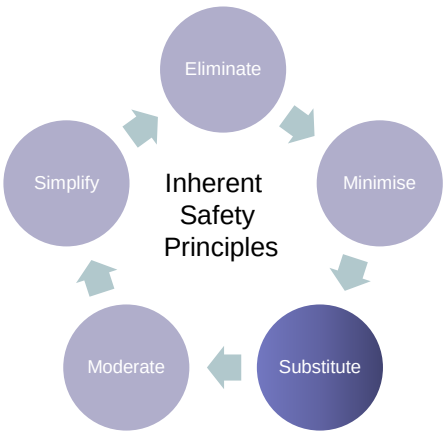
Principles of Inherent Safety and Environmental Protection



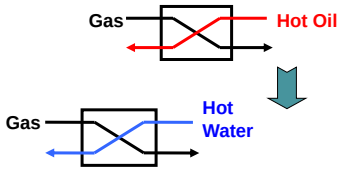
Minimise – e.g. reduce quantities of hazardous substances



Principles of Inherent Safety and Environmental Protection

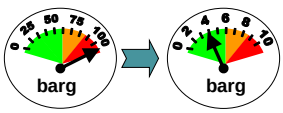


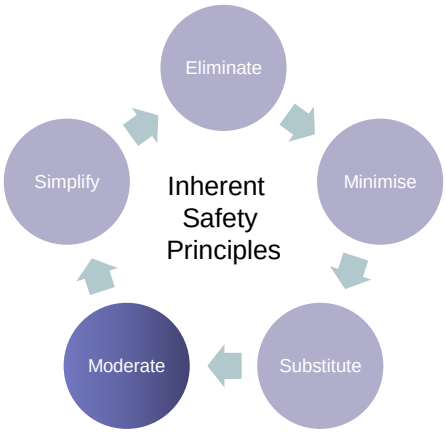
Substitute – e.g. replace a material with a less hazardous substance



Principles of Inherent Safety and Environmental Protection

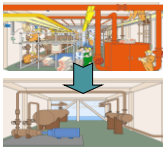
Moderate – e.g. use a less hazardous condition, a less hazardous form of a material, or facilities that minimise the impact of a hazardous material or energy

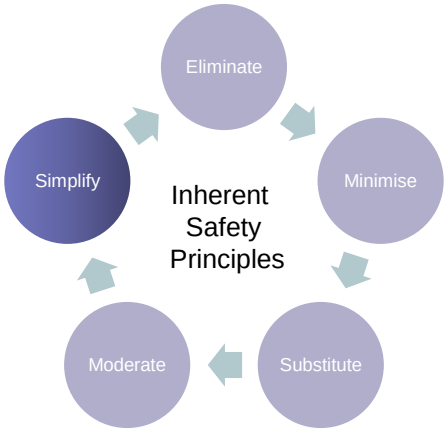




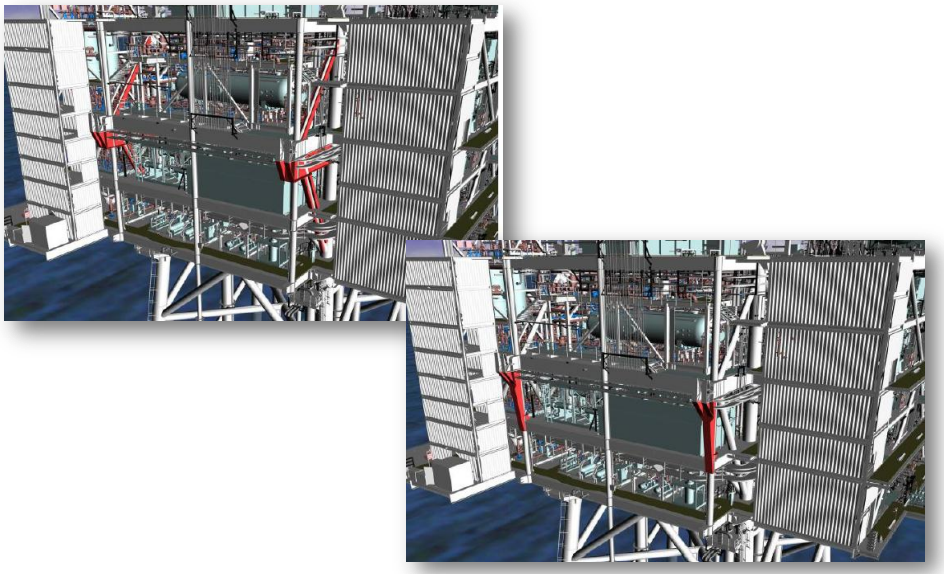
Principles of Inherent Safety and Environmental Protection

Simplify – e.g. design facilities that eliminate unnecessary complexity and make operating errors less likely and that are more forgiving of errors which are made

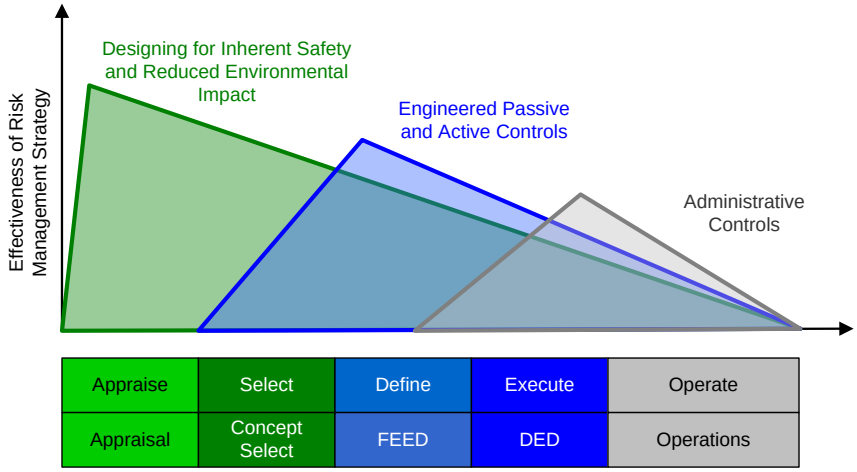




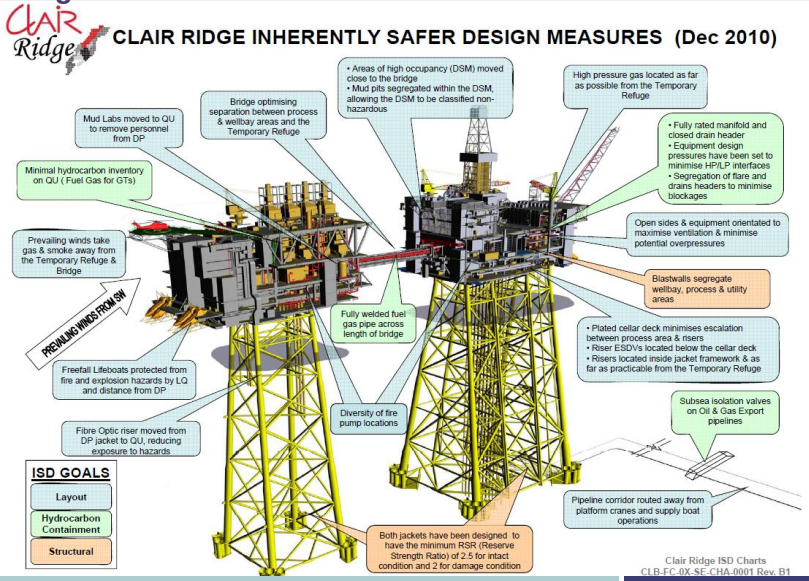
Alder over Britannia



Controls through the Project Lifecycle



Clair Ridge Inherently Safer Design Measures Implemented During FEED



Relevance of ISD in the Modern Context

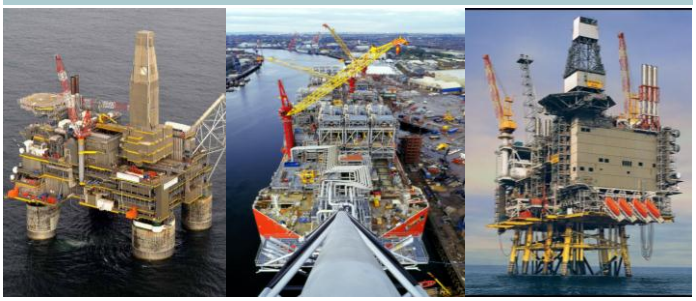
- Progress has been made in increasing safety such that the bar is higher to achieve the next increment of progress
- We can be more certain of - known unknowns, and unknown unknowns
- The implementation of ISD principles through all project phases results in:

Fewer Unrevealed Vulnerabilities and Unforeseen Event Sequences

Reduced Consequences

The question is … why are we not doing more of it ?!!

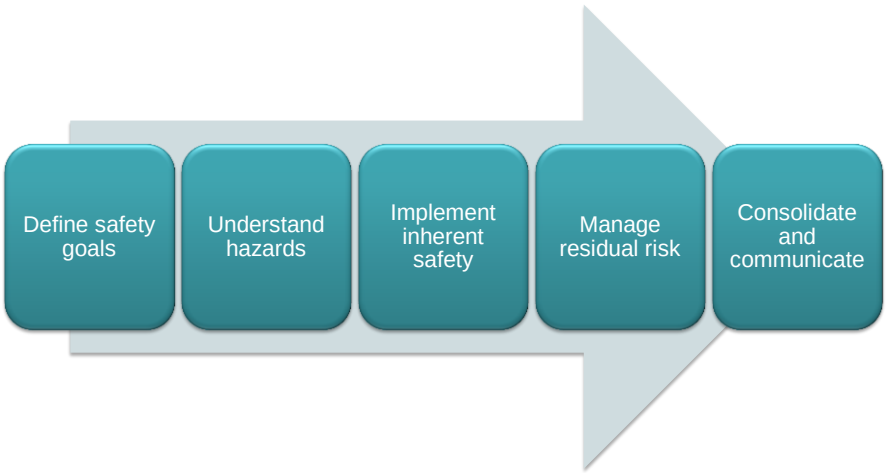
Safety – taking it into Construction



Objectives

- Explain how AMEC's Safety by Design process can be used (in a workshop) to address hazards in the construction phase
- Including the application of the principles of "Inherently Safer Design" (ISD)

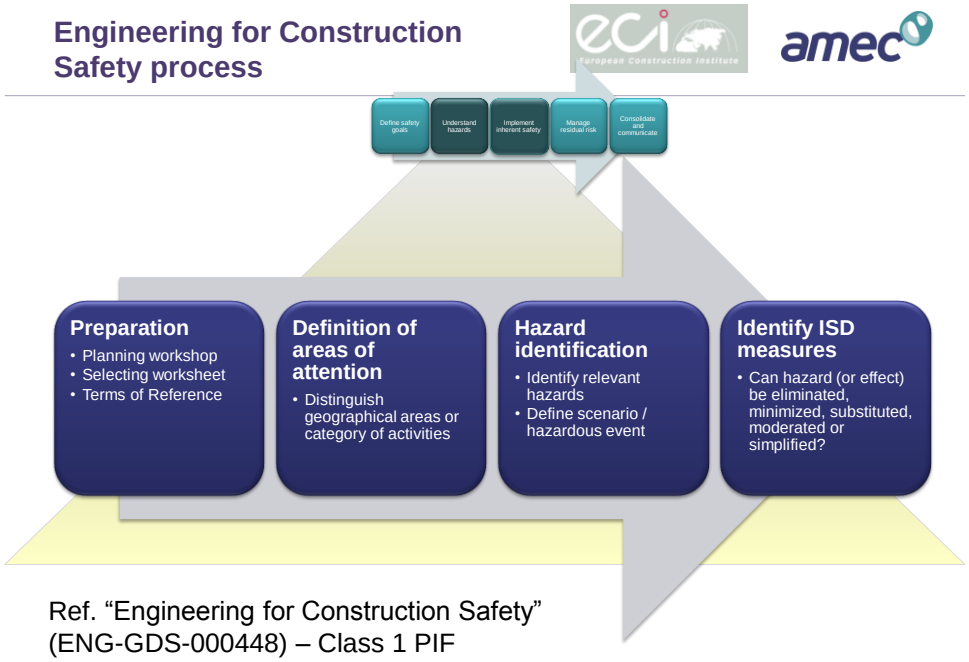
AMEC's Safety by Design process



Ref. "Safety by Design" (ENG-PRO-000344)

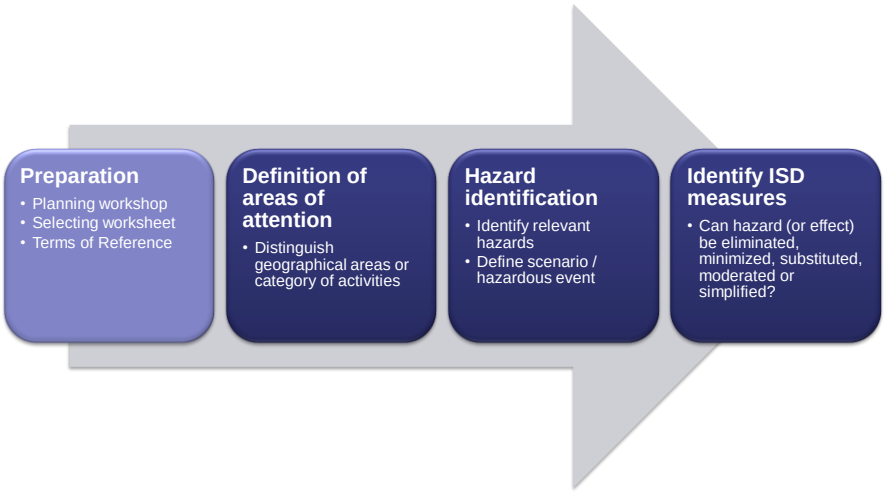
AMEC's Safety by Design process

Engineering for Construction Safety process



Ref. "Engineering for Construction Safety" (ENG-GDS-000448) – Class 1 PIF

Engineering for Construction Safety process



Workshop timing

- Timing is critical:

workshop must be planned early in design phase

Engineering for Construction Safety process

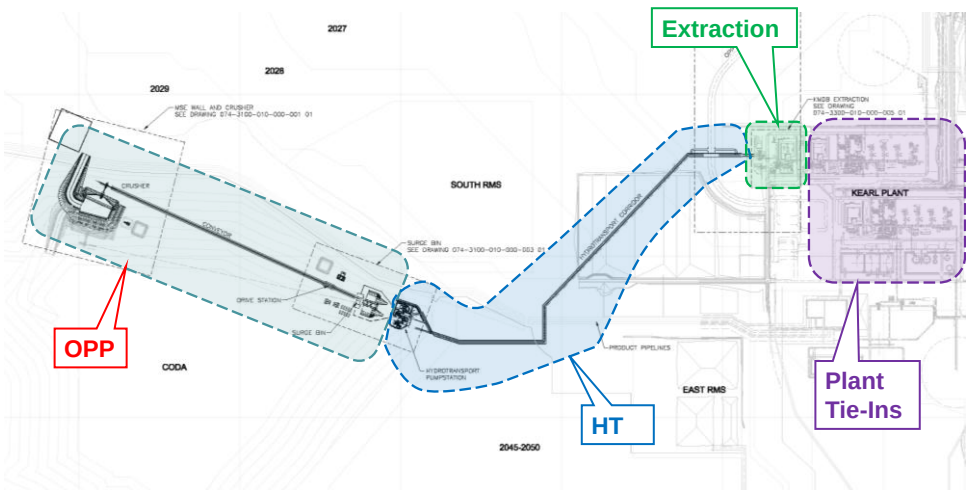
Preparation
- Planning workshop
- Selecting worksheet
- Terms of Reference

Definition of areas of attention
- Distinguish geographical areas or category of activities

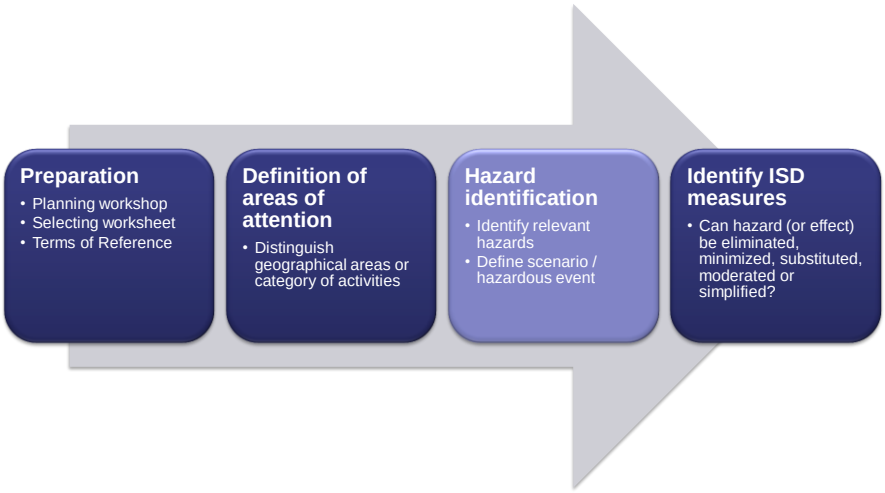
Hazard identification
- Identify relevant hazards
- Define scenario / hazardous event

Identify ISD measures
- Can hazard (or effect) be eliminated, minimized, substituted, moderated or simplified?

Areas of attention – example



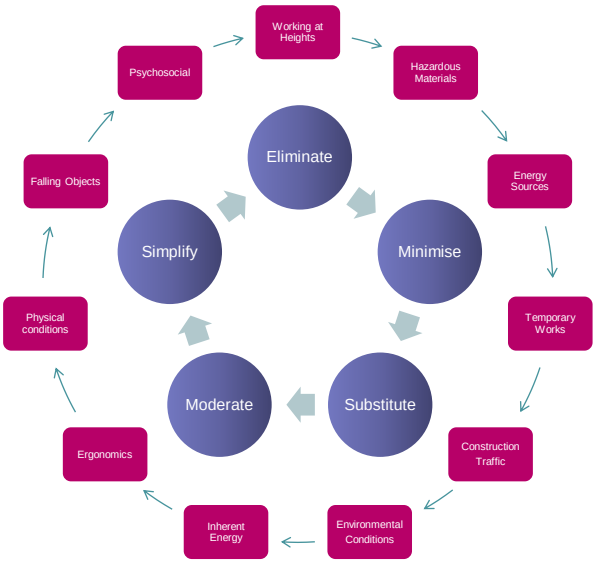
Engineering for Construction Safety process



Hazard identification

- Identify potential hazards that could occur in the construction phase
  - In dedicated workshop
  - Brought forward by individuals
  - Review “Hazard log(s)” (if any) already developed
- For guidance, apply overview of potential types of hazards (next slide)

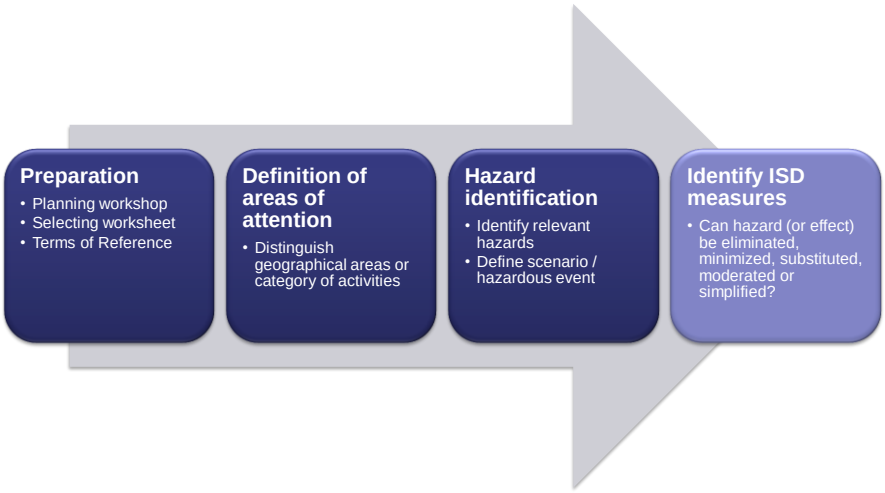
Consider Construction under ISD Principles



Overview hazards – examples (1)

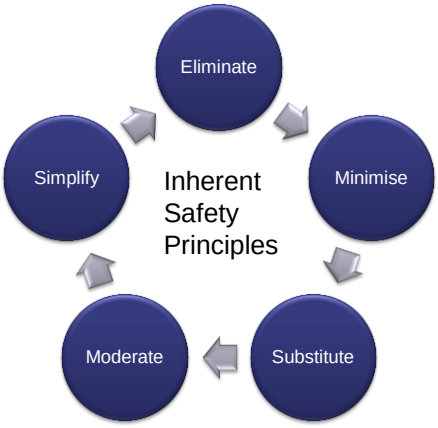
No	Hazard Type	Example Hazard
1	Work at different heights	- Working at height - Working overboard / over side - Working in excavations / underground
2	Falling or uncontrolled moving objects	- Lifting overhead - Use of lifting equipment - Manhandling
3	Electricity, energized and energy sources	- Voltage, electrostatic energy, batteries, induced current, stared charge (e.g. capacitors) - Lightning discharge - Fires, open flames, hot work
4	Occupational health - poor ergonomics	- Repetitive and forceful movements - Awkward postures that arises from poor working postures and methods - Improperly designed work stations, tools and equipment - Exposure to hot / cold surfaces or fluids

Engineering for Construction Safety process



Identify ISD measures

- Systematically apply ISD principles to each hazard identified
- Focus on **engineering changes / design solutions** rather than controls that have to be applied once construction / installation activities have started!

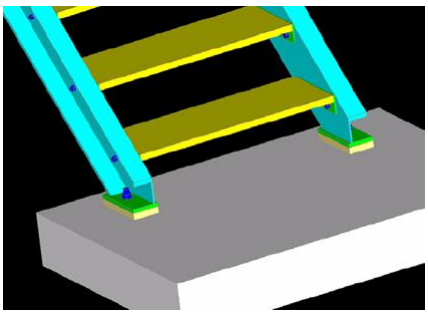


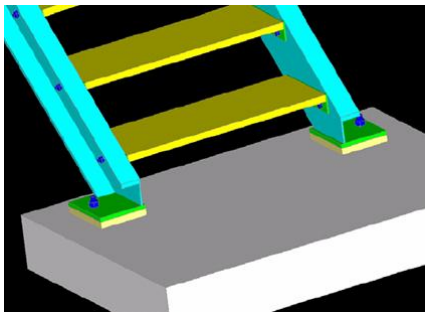
Example – Prefabrication of steelwork

- Bridge was constructed on the ground, reducing the need to complete connections at height
- Scaffold handrails were pre-installed, reducing the risk associated with finishing work
- Reduced installation time

Example - Cast-in concrete holes for easy installation of stair railings

Example - Easy access to bolts for installation





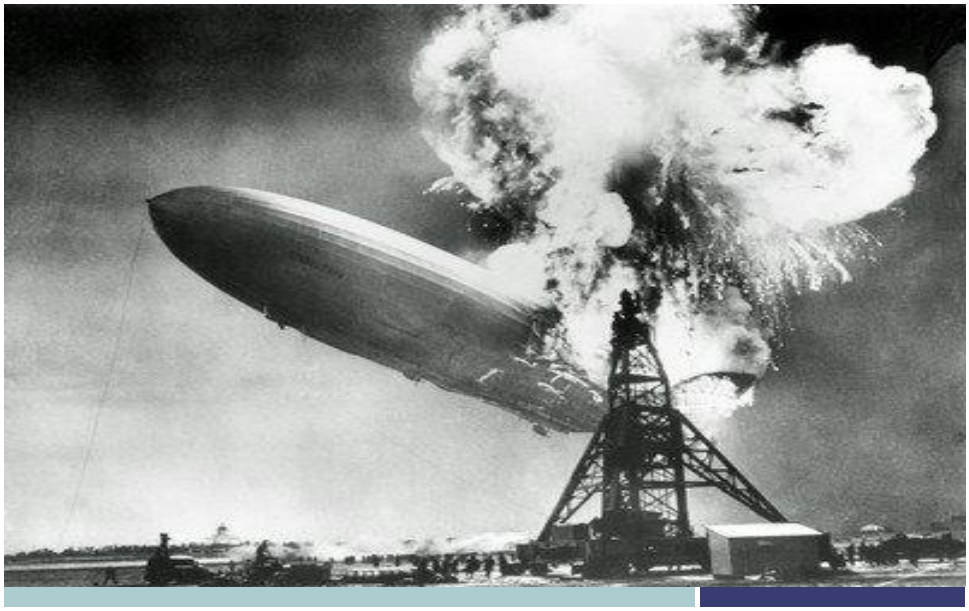
Engineering for Construction Safety - Example greenfield workshop findings

- Improved **layout** of roads and segregated access (pedestrian versus heavy traffic) to the construction site. Improved access and egress for emergency services
- **Pavement** of construction roads to and on site. Use same roads as those designated for operational phase
- Revised **delivery schedule** (i.e. early delivery) for building material and stockpiling of aggregates, in order to peak shave heavy traffic on site. Use of railcars or trucks on bed of the rail track to deliver building material
- Review potential impediment caused by **temporary and permanent buried installations**
- Dedicated centralized **storage for flammable gases**

Engineering for Construction Safety - Example brownfield workshop findings

- **Review existing access roads** in order to determine whether these can be utilized for construction activities, and whether potentially hazardous crossings of transport flows could occur
- Identify and address **interference with existing infrastructure**. E.g.
  - Potential crossings with existing product pipelines in order to minimize incursions into Right of Way (ROW). Develop a lay-down plan for new facilities and consider location of ROW of existing product pipelines
  - As-built location of underground infrastructure (e.g. electrical lines). Develop a plan for routing and crossings of above ground power lines, in order to minimize the plot space impact
- Where feasible adopt a strategy to **optimize use of existing support structures** to support new piping and equipment, e.g. for
  - Cable routing plans for electrical, control and telecom lines
  - Existing dewatering/drainage system utilized during construction

Thanks for listening have you any questions ... ?



ECI Autumn Forum

Maximising Project Efficiency for Improved Performance and Delivery

Thurs 28 November 2013

European Construction Institute

Approaches to Effective Design Health & Safety

Presented by:

Dietmar Schulz

Global Facilities Engineering

Procter & Gamble

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DIETMAR SCHULZ

GLOBAL FACILITIES ENGINEERING

PROCTER & GAMBLE

Dietmar has been with P&G for 12 years, and is currently working as a Regional Construction Manager. He is EMEA and Trainer for Construction and Construction Safety within P&G.

Dietmar's experience includes his roles as Construction Manager in Neuss and Weiterstadt in Germany, as well as Design Leader, Technical Manager and Construction Manager in Egypt, Hungary and Russia.

Approaches to Effective Design Health & Safety

Dietmar Schulz, Regional Construction Manager – EMEA
Procter & Gamble

Dietmar Schulz
Married, 2 children
12 years @ P&G

Education: Civil/Structural Engineer (Dipl.- Ing.)
Regional Consruction Manager – EMEA and Trainer for Construction and construction Safety within P&G
Some projects:

- *Construction Manager for Paper Building, Neuss, Germany*
- *Construction Manager for High bay and Logistik building in Weiterstadt, Germany*
- *Design Leader, Technical Manager and Construction Manager for new Diapers Plants in Egypt, Hungary and extension in Russia*

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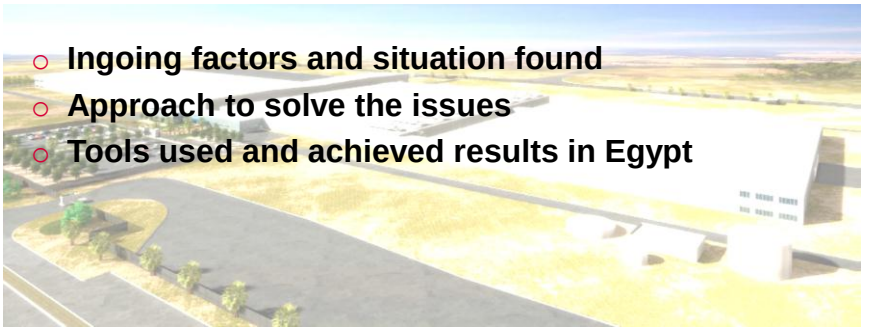
Approaches to Effective Design Health & Safety

- Agenda
- Real life example from Egypt



- Ingoing factors and situation found
- Approach to solve the issues
- Tools used and achieved results in Egypt

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Ingoing factors and situation found

- HS&E not existing
- Illiteracy rate of 50 % and higher on construction sites
- Language barrier
- Unskilled labour
- PPE
- No available systems
- Project of this magnitude will have 8 fatalities
- Rare Local HS& E resources
- Only Expat resources with right skill level available

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Ingoing factors and situation found

Approach to solve the issues

- **Pre construction phase**
  - **Tour existing construction sites upfront**
  - **What works ? Go from there!**
  - **Understand the local culture and education**
  - **Choose the right Leadership**
  - **Include safety into contract**
  - **Set clear expectations**
  - **Provide good examples**

Approach to solve the issues

- During Construction:
  - Develop and maintain systems and tools:
  - Set up HS&E plan for YOUR site
  - Method statements and Risk analysis (JSA's)
  - Audits
  - Construction Safety and Process Analysis (CSPA)

Tools used and achieved results

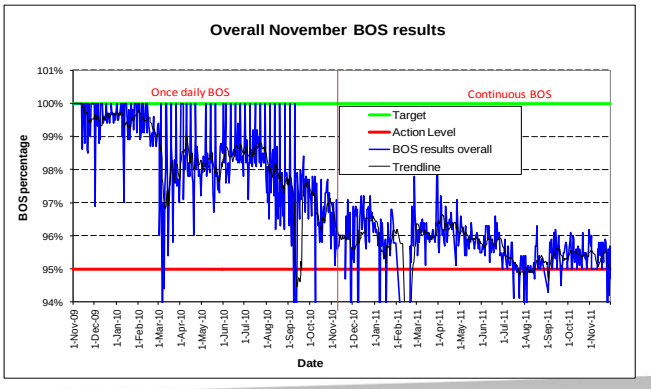
- During Construction:
- Tools used and developed
  - Tool box talks
    - Twice a week and before a new task will be done
    - Who – all relevant people

Tools used and achieved results

- During Construction:
  - Rewards and Recognitions:

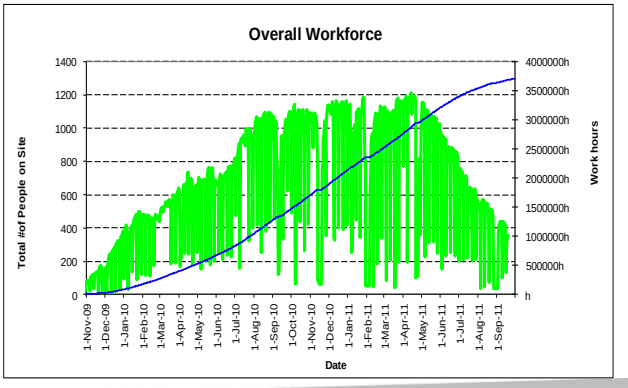
Tools used and achieved results

- During Construction:
  - BOS tours and BOS tracker



Tools used and achieved results

- **During Construction:**
  - **Workforce tracker**



Tools used and achieved results

- **During Construction:**
  - **Create a safe culture and enviroment**

Tools used and achieved results

- During Construction:
  - Systems and controls

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Approach to solve the issues

- After Construction:
  - Learning report and input for next construction
  - People are proud of the achievements
  - Local people have learned and are ready for new safe construction sites
  - Received CURT Award for Construction Safety
  - Improved others lifes

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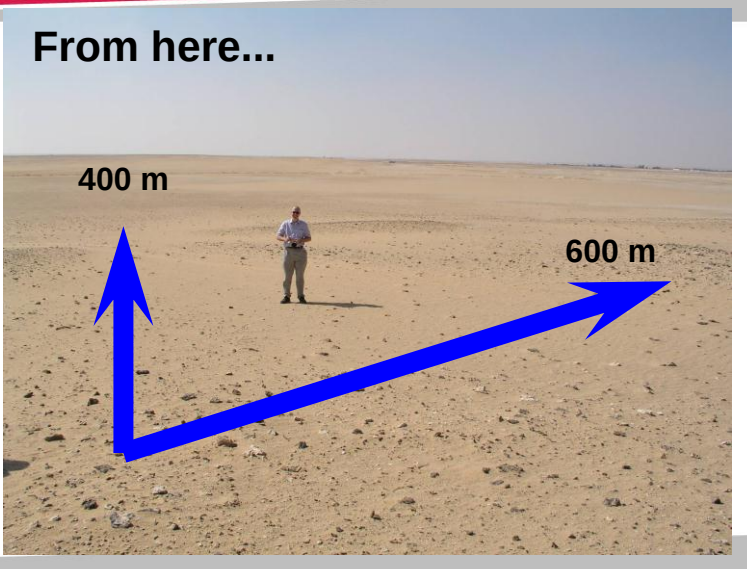
Tools used and achieved results



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Tools used and achieved results

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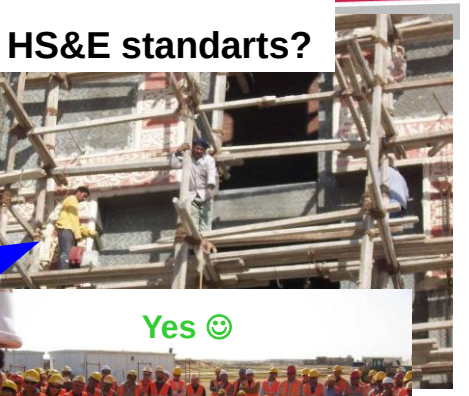
Local Construction Safety Standards compatible with European HS&E standarts?



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Questions?

Thank you!

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