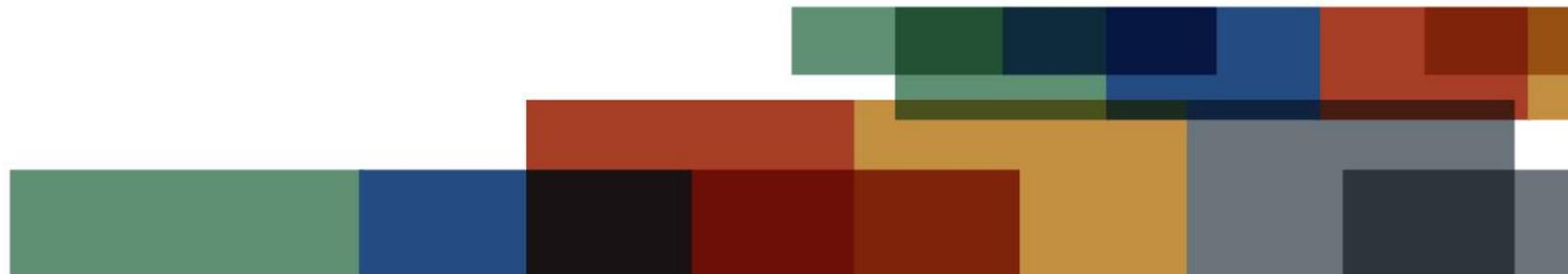




decisions with confidence

Well Cost Reduction

May 2015

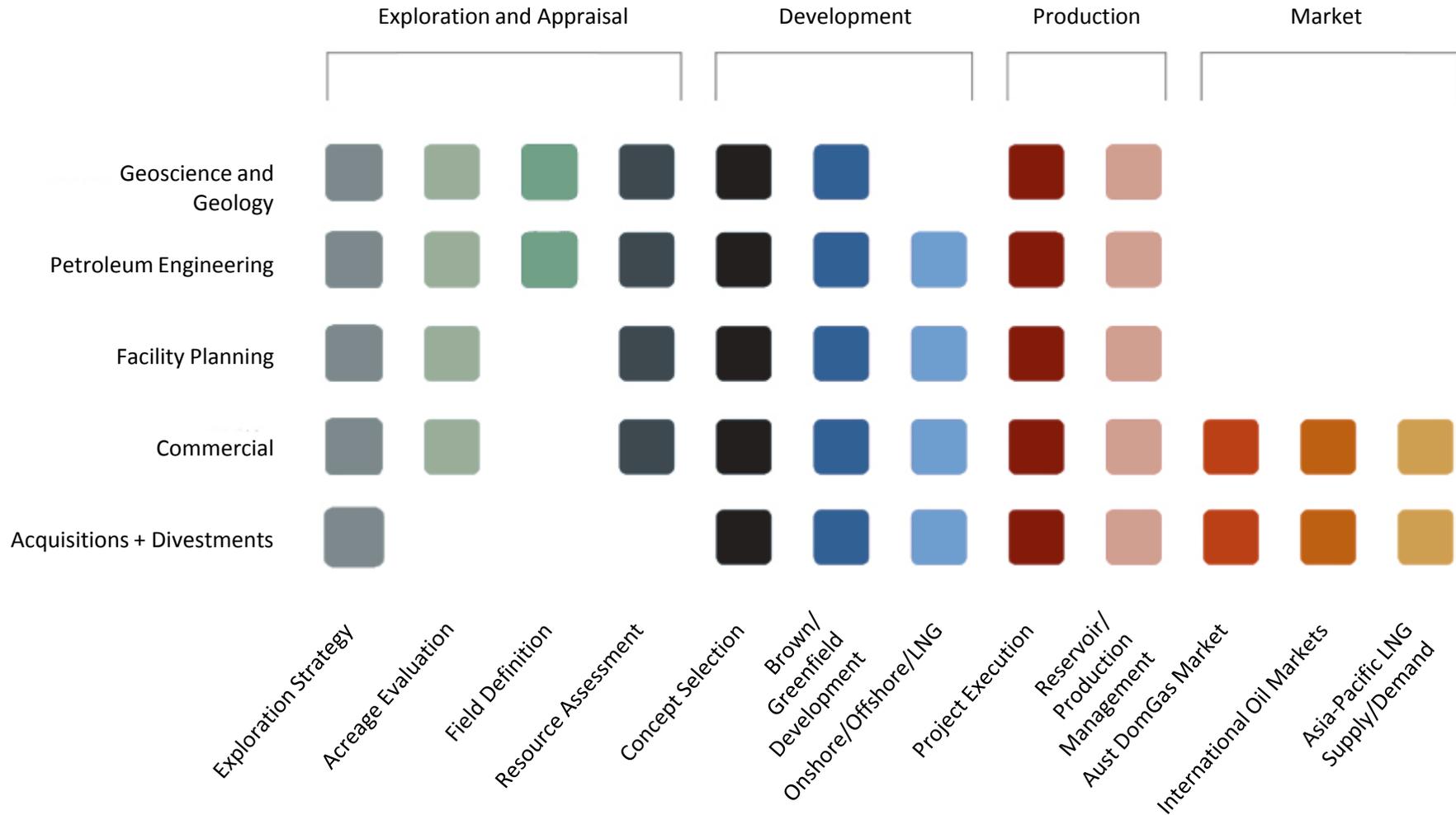


-
- **About RISC**
 - Overview of well costs and the need to act
 - RISC's approach
 - Track record and team
 - RISC's service and engagement structure

- Founded in 1994, independent upstream oil and gas advisory firm with broad range of technical, commercial and A&D services across the entire oil and gas lifecycle
- Our mission: *to assist our clients to make decisions with confidence.*



The highest level of technical, commercial and strategic advice across the value chain



- Global reach with offices in Perth, Brisbane, London, Dubai and Jakarta
- We have completed 2000+ assignments in more than 90 countries for over 500 clients and have grown to become an international oil and gas consultant of choice



Our expertise is relied upon by many upstream companies

Majors



Global Independents



NOC's



Japan



ASX listed



LSE/AIM





Independent Opinion

- Competent Persons Report
- Reserves Audit and Certification
- Independent Expert
- Asset evaluation



Peer Assistance

- Exploration well proposals
- Pre-FEED project reviews
- Subsurface modelling
- Project scope and capex
- Project scheduling
- HSE and organisational capability



Commercial Advisory

- Strategy and corporate planning
- Commercial opportunities
- Petroleum economics
- Gas market evaluation



Due Diligence

- Supporting debt, equity or acquisition
- Commercial assessment and risk
- Development plans, costs and schedules
- Production profiles and recoverable resources
- Exploration valuation, prospect assessment
- In-place resource estimates



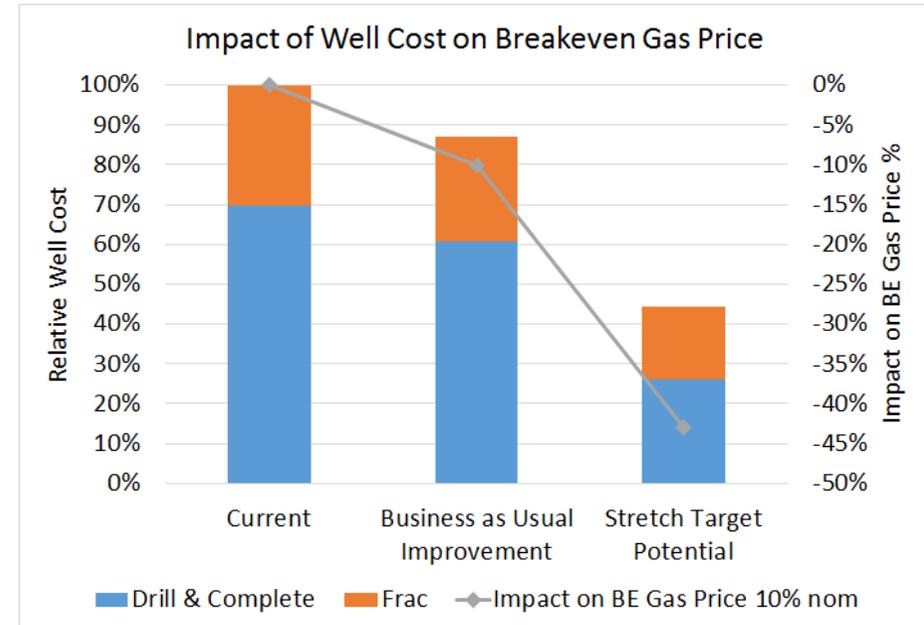
Technical Advisory

- Asset valuation
- Portfolio management
- Operational effectiveness
- Well and completion cost reduction
- Field development plans
- Reservoir Management
- Exploration evaluation
- Basin studies
- Structural geology
- Sequence stratigraphy
- Seismic interpretation
- Static and dynamic reservoir modelling

-
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Well costs and the need to act

- A typical E&P company may spend 50% or greater of its capital budget on drilling and completion costs
 - Some companies with a large unconventional resource component may spend much more
- High well costs directly affect profitability
 - Increases the breakeven reserves volumes or prices
 - Reduces participation in exploration and appraisal drilling to find new reserves
- RISC’s analysis shows that a well drilling and completion cost reduction of 50% or more in some cases is not only possible but necessary to monetise the substantial potential that exists in many portfolios



Why are well drilling and completion costs too high?



- In many locations the cost of drilling and completing wells is much higher than it needs to be.
- Of the factors which influence this, many are within the control of the E&P company:
 - Ageing equipment and superseded technology
 - Non-aligned contracting and procurement processes
 - Inefficient specification, design and operating practices
 - Sub-optimal continuous improvement processes
 - Lack of organisational empowerment
 - Limited competition for service
- Low activity levels
- High labor costs
- Remote operations, weather conditions
- Lack of infrastructure
- Outside of N America, where sheer weight of activity drives improvement, a highly disciplined business approach is required to drive costs down at an acceptable rate

Largely in company control

-
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-
- Top down directive mandated by the CEO
 - A champion at senior management team or board level
 - Preferably someone not functionally responsible for wells who can provide support and clear road blocks
 - Building a performance culture
 - Courage to openly commit to ambitious goals as opposed to “achievable” goals
 - Appreciation of failure as a means to learn and improve
 - No fear of change
 - Leaders that “stimulate” performance, not just “drive” it
 - A true “no blame” environment

- Holistic approach
 - Integrate procurement, logistics, contracting, drilling, completion, stimulation, productivity, reservoir
 - Ensure value and cost trade-offs are understood with a life of well perspective
 - This includes collaborative engagement with service providers
 - Be prepared to change the business model on how wells are delivered
- Build a centre of excellence within the organisation
 - Create a project with a dedicated motivated team with the right skills
 - Build empowerment within the team
 - Continuous improvement attitude unconstrained by baggage and the ability to engineer problems out.
- Include organisational change in the scope once the team has shown the way to enable roll-out and ensure sustainability
- External expert facilitation provides a disciplined process, focus and challenge
- **RISC has secured a team of industry experts to facilitate the well and completion cost reduction process**
 - **international experience and a proven track record with more than 2 decades consistent performance**
 - **RISC is now offering our well and completion cost reduction (WCR) service to our clients**

Typical well drilling and completion cost reduction schedule



Typical duration

4-8 weeks

4-8 weeks

6-12 months

months-years

Diagnostic

Opportunity
Generation

Planning

Implementation

- Source team
- Engage organisation
- Gather data
- Carry out gap analysis
- Identify non-productive and invisible lost time
- Prepare cost drivers and cost building blocks
- Benchmark performance
- Define technical limits and set initial targets
- Communicate to organisation
- Internal sign off

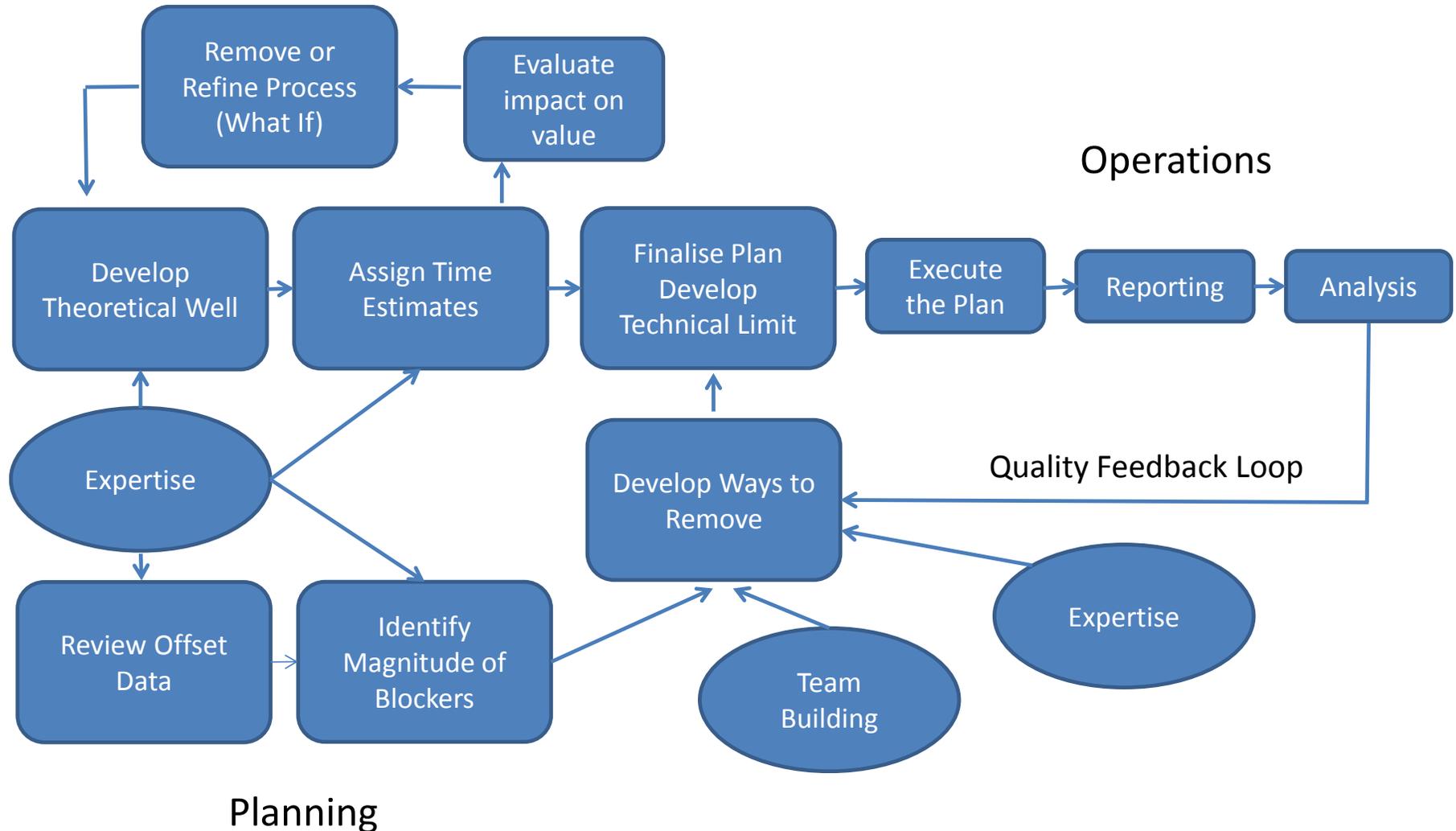
- Engage and challenge organisation to identify opportunities
- Screen opportunities for feasibility
- Quantify and rank opportunities
- Communicate to organisation
- Internal sign off

- Source core implementation team
- Engage technology specialists or external support
- Prepare plans to implement opportunities
- Create empowerment within the organisation
- Set up information gathering and continuous systems
- Align service providers, contracting and procurement
- Set work plans, budgets and goals
- Communicate to organisation
- Obtain approvals

- Monitor performance
- Capture and communicate learning
- Identify areas for further improvement
- Plan and implement improvements
- Set new continuous improvement targets

Planning and improvement are a continuous process during the implementation phase

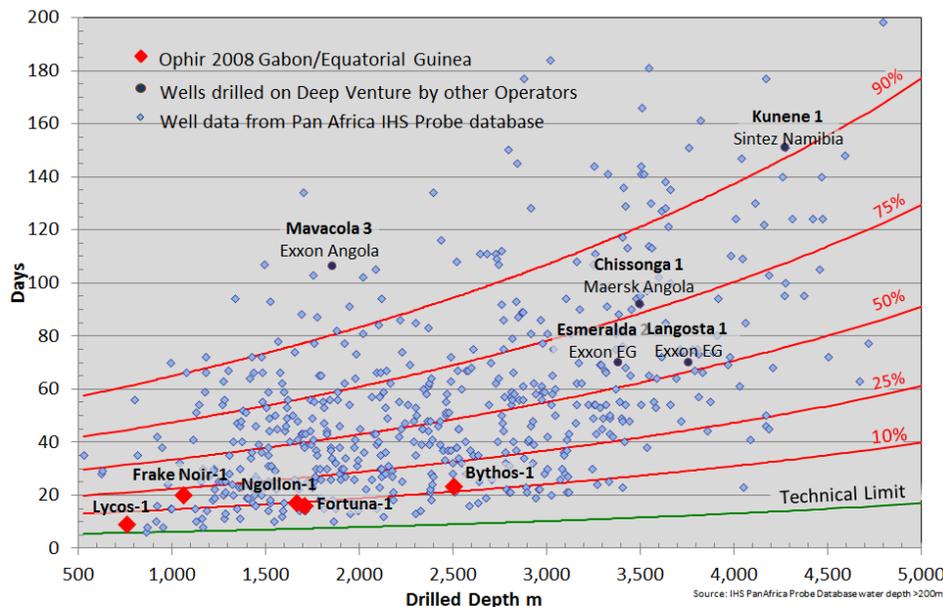
Planning and Implementation Feedback Loop – Example Removable Time Project



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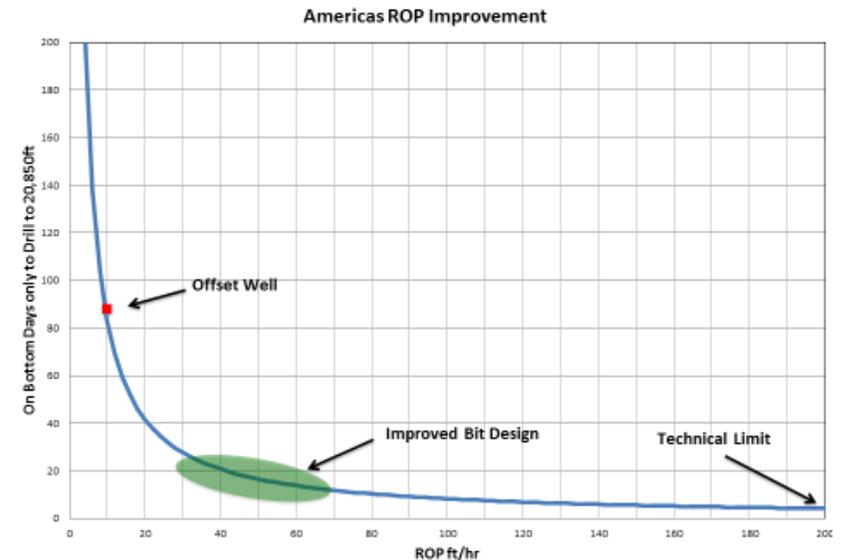
Offshore West Africa

- Ophir (2008-2011)
- Introduced technical limit challenge process
- Critical path analysis, parallel activities
- Reducing time for execution critical path activities
- Implementing continuous improvement systems
- Introduced team enabling environment
- Alignment of service providers
- Top quartile performance achieved



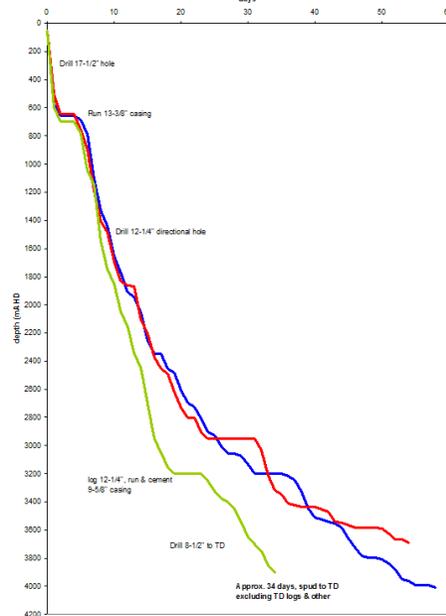
Offshore Americas

- Operator confidential (2012)
- Challenge process identified ROP improvement was possible
- Specialist lab study and analogous formations showed formation was PDC drillable
- ROP's improved 3-4 times, 7-8 times possible
- \$60m well cost saving



Onshore Vietnam

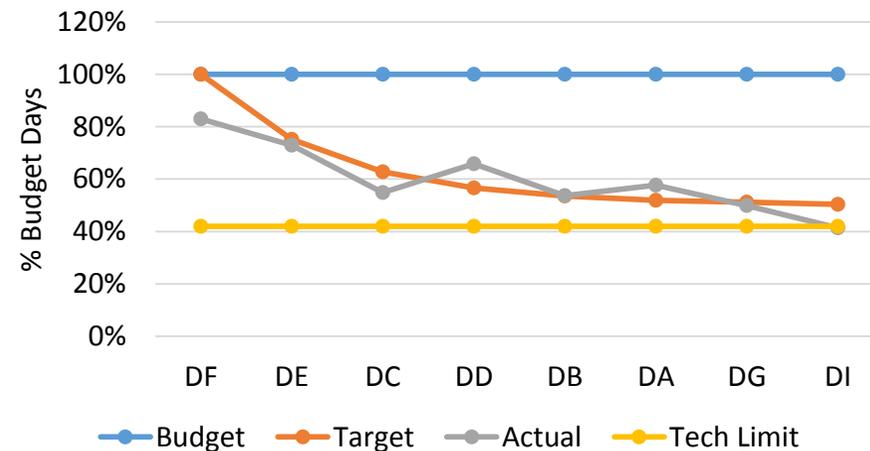
- Client confidential (1998)
- Optimising bit and BHA assembly in 17-1/2", 12-1/4" and 8-1/2" hole sections
- Increase horsepower per square inch at bit nozzle
- Improved mud systems and upgrade shale shakers to provide better hole cleaning
- Avoiding directional drilling in 8-1/2" hole section
- Implement well completions to take well testing off rig critical path
- 40% reduction in rig days



Nile Delta

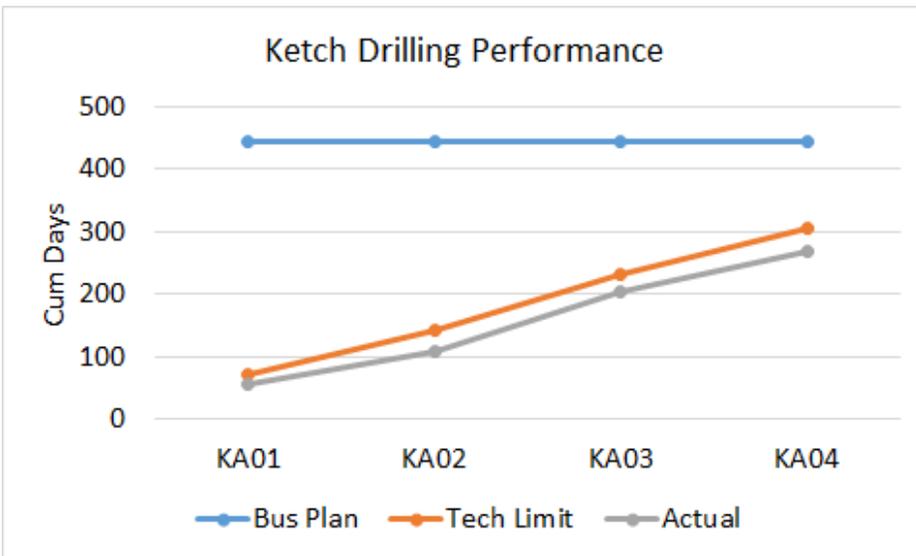
- BG (2002)
- Introduced technical limit challenge process
- Critical path analysis, parallel activities
- Reducing time for execution critical path activities
- Implementing continuous improvement systems
- Introduced team enabling environment
- Alignment of service providers
- Top quartile performance achieved

Scarab-Saffron Subsea Completions



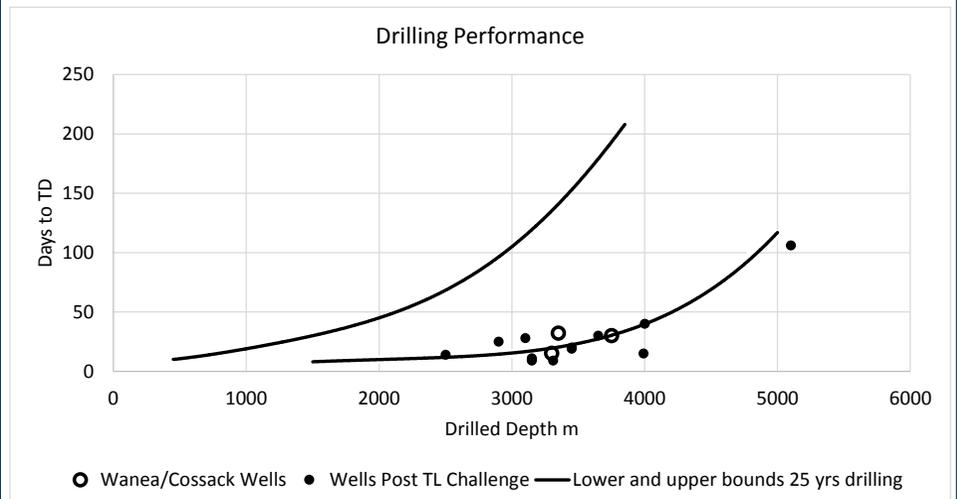
North Sea

- Shell (2001)
- Introduced technical limit challenge process
- Critical path analysis, parallel activities
- Reducing time for execution of critical path activities
- Implementing continuous improvement systems
- Introduced team enabling environment
- Drilling days reduced from 445 to 269
- Costs reduced from GBP 48.4 million to 34.2 million



North West Shelf

- Woodside (1992-96)
- Team led by Phil Scott and Dave Bond devises technical limit drilling process
- Top quartile performance achieved on drilling and well completions when compared to previous 25 years drilling by company
- Over 50 rig days saved compared to budget in drilling and completing 6 subsea wells in initial TL campaign establishing viability of process





Geoff has 30 years of global experience in the upstream hydrocarbon industry and is the leader of RISC's unconventional petroleum practice. With extensive expertise in the areas of asset valuation, business improvement strategies, evaluation of conventional and non-conventional petroleum, due diligence assessment for M&A and project finance requirements and reserves assessment/certification in over 50 countries, he has developed a reputation as a keen industry observer and independent thought leadership.

Geoff's was in Woodside's business improvement team that assisted in the roll out of the technical limit drilling process to the wider Woodside organisation and has applied this learning with a number of RISC's clients in well cost reduction and project value improvement studies

Geoff is the Past Chairman of the SPE WA Section, past member of the SPE International's Oil and Gas Reserves Committee 2007-2009, co-author of the PRMS Application Document on Coal Bed Methane and is a recipient of SPE's 2012 Southern Asia Pacific Award for Projects, Facilities and Construction. Geoff is a qualified petroleum reserve and resource evaluator (QPRRE) under ASX listing rules.

Recent projects

Geoff has consulted to investors and management in the hydrocarbon and energy related industries with assets based in Australia/NZ, throughout Asia, Africa and the Middle East. Some examples of assignments and achievements are:

- Led independent technical and commercial assessment of US\$2.1b acquisition of integrated oil and gas development portfolio (client confidential)
- Coordinated the due diligence assessment, valuations and bid strategies for the acquisition of interests in one Brownfield and four Greenfield LNG projects, including a major coal seam gas to LNG project.
- Set up RISC's unconventional gas and oil practice
- Coordinated Independent Reservoir Consultant assignments for banks in support of project finance in Australia, SE Asia and Africa
- Preparation of Independent Technical Experts reports for IPOs, rights issues, mandatory reports and unitisations studies for Australian & SE Asian listed companies.
- Led onshore drilling and completion studies for a 4 well exploration and appraisal campaign in Vietnam which resulted in significant cost reductions
- Management review and project improvement studies for a US\$1 billion SE Asian oil and gas development including reservoir, facilities and drilling improvement studies.
- Facilitation of strategic plan for a US\$6 billion company.
- Management of oil and gas field development studies in SE Asia, China and the Middle East.
- Preparation of independent reserve estimates and certification studies to SEC, SPE PRMS and other national and international standards of conventional, coal seam gas and tight gas properties.
- Designed and presented reserves seminars in Perth, London and Kuwait including special requirements for unconventional gas.
- Development of risk/reward strategies for offshore engineering contracts.

Career history

Partner

RISC, 1996–present

Oil Development Team Leader

Woodside Energy Ltd, 1995–1996

Head Petroleum Engineer, Gas Department

Woodside Energy Ltd, 1993–1995

Senior Reservoir Engineer

Shell NAM, 1989-1993

Senior Reservoir Engineer

Woodside Energy Ltd, 1986–1989

Production Technologist/Senior Reservoir Engineer

Bridge Oil Ltd, 1981–1986

Education

- BSc (Chemistry), Melbourne University, 1980
- M.Eng.Sc (Pet Eng), Sydney University, 1989
- Member of SPE



David has had an extensive drilling career around the world working for several major operators. His career has seen him involved with platform drilling and completions, jack up operations, sub sea drilling and completions, land operations, deep and ultra deep-water exploration.

David has authored five SPE and OTC papers and was a panel member for the 2010 OTC well control session in New Orleans. He also holds two patents for Surface BOP related equipment.

With Phil Scott, David was on the team that devised the Technical Limit drilling process and has remained passionate and committed about providing cost effective well solutions.

Recent projects

Some examples of David's key achievements are:

- As Director of Drilling and Completions at Ophir, David's mandate was to build a deepwater drilling capability to allow Ophir to drill its own wells in deepwater Africa. His team delivered five wells in between two counties in West Africa in less than 100 days. They also were the first operator to drill three wells in deepwater Tanzania;
- During his tenure with Reliance in India, David was involved in the building of a six rig capability for both exploration and subsea completions;
- Formed a consulting company with a focus on assisting operators around the world, including Shell, BP, Geodynamics and BG, to achieve improvements in drilling and completion performance;
- Whilst at Woodside, pioneered the development of the Invisible Lost Time system which later became known as the Technical Limit. As International Drilling Manager he set up Woodside's first international operation in Mauritania in West Africa.

Career history

Principal Advisory, Drilling Engineer

RISC, 2015–present

Director

Technical Limit Performance, 2005–present

Director Drilling and Completions

Ophir Energy, 2007–2012

Operations Manager

Reliance Industries, 2005–2007

Principal Drilling Engineer

Woodside Energy, 1992–2005

Senior Drilling Engineer

BHP Billiton, 1988–1992

Education

- M.Sc. (Honours) Mechanical Engineering, University of Leeds, 1981
- Member of SPE



Phil has nearly 40 years of experience in the international oil and gas industry. Phil established a consultancy company to provide training and consultancy services to the drilling industry, focussing on exceptional project management and application of “Technical Limit” to maximise project performance.

Prior to this, Phil held various positions at Woodside Energy from Drilling Engineer, Production Engineer to Chief Drilling Engineer, Project Team Leader, MODU Drilling Manager then Change Manager.

Phil has authored three technical publications:

Scott, P., Lintern, G., Embury, J. *“Drilling Extended Reach Wells – North-west Shelf, Western Australia.”* Paper SPE 23014

Bond, D., Scott, P., Page, P., Windham, T. *“Applying Technical Limit Methodology for Step Change in Understanding and Performance.”* Paper SPE 35077

Scott, P., Bond, D. *“Setting and Achieving Technical Limit Goals in Well Construction by Enabling the Talents, Energies and Attributes of People.”* Paper OTC 8637

Recent projects

Some examples of Phil’s key achievements are:

- Responsible for engineering and executing Woodside’s first extended reach gas development wells on the North Rankin A platform. The project involved extensive rig upgrade, wellbore and drillstring modelling for torque and drag, application of state-of-the-art directional drilling techniques and use of oil based drilling fluid. Well NRA 21 equalled, in length, the world’s longest reach well at the time and the project won second place in Shell International’s 1992 E&P Quality Awards;
- Applied newly developed Technical Limit (TL) planning techniques to Woodside’s first 6-well sub-sea oil development. The project was delivered 20% under budget and an average 40% greater than expected well productivity. This well construction team went on to drill exploration and appraisal wells in record times with no compromise on delivery of objectives.
- Used partnering with contractors to enhance cooperative operations with a special focus on safety through process control
- Practiced and refined positive people management across whole (200+) operations team thereby engaging nearly all, in the achievement of exceptional performance
- Worked with Shell International E&P on implementation of Technical Limit approaches worldwide. With successful pilots, TL has become a best practice in Shell.
- Implemented Technical Limit approaches in:
 - Amerada Hess Limited, Aberdeen - pilot well drilled in 30% less time than previous similar well. Sub-sea development well finished 40% under previous time standard. Further improvements ongoing.
 - BG Group worldwide - exceptional sub-sea development results and strong learning curves on development projects. Created broad acknowledgement of the power of the approach.
 - Petronas Carigali - performance improvement on pilot project prompted Carigali management to adopt the approach across all projects

Career history

Principal Advisor, Drilling Engineer

RISC, 2015–present

Principal

Technical Limit Engineering, 2004–present

Well Engineering Manager (Multineer-Exeter Project)

Santos Ltd, 2003–2004

Principal

Technical Limit Engineering, 1999-2002

Engineer/Manager

Woodside Offshore Petroleum, 1985–1998

Drilling Equipment Engineer

Tasman Oil Tools, 1984-1985

Staff Engineer

Magnet Group of Companies, 1976-1983

Education

- B.Eng. (Civil), University of Western Australia
- Member of SPE



Ray has 34 years' experience in the design, execution, and evaluation of reservoir stimulation treatments. He is highly experienced in stimulation design, execution and evaluation of coals, shales and naturally fractured reservoirs.

Ray's MSc Thesis was the first shale gas Thesis from UT relating to the Wolfcamp Shale and entitled, "A Methodology to Determine the Initial Field Development Strategy for a Naturally Fractured Shale Gas Resource." His PhD in Mining Engineering at the University of Queensland focused on applications of reservoir engineering and hydraulic fracturing to improve gas pre-drainage for coal mining, using example data from the Bowen Basin of Australia. Since 1998, Ray has resided in Brisbane Australia and has been involved in the exploration, appraisal, or development of numerous tight gas, coal and now shale gas fields producing in Australia.

Ray has been actively involved in the Society of Petroleum Engineers, was recipient of the 2011 SPE Asia Pacific Regional Technical Award for Production and Operations, and has co-authored numerous presentations and publications on reservoir engineering and reservoir stimulation relating specifically to unconventional reservoirs.

Key capabilities

Some examples of Ray's recent experience include:

- Thirty four years experience in USA shale gas plays, Australia gas shale plays; USA CBM plays, Australia CSG plays, USA tight gas plays, Australia tight gas plays, USA naturally fractured reservoir plays;
- Unconventional reservoir appraisal, pilot project and development planning and management;
- Unconventional resource and reserves assessments;
- Reservoir, completion and production (technology) engineering;
- Fracture treatment design, execution, optimisation, onsite supervision and post-job evaluations;
- Evaluations for high permeability oil and gas reservoirs; unconventional reservoirs and low permeability oil and gas reservoirs
- Pressure transient testing design and analysis in conventional and unconventional reservoirs;
- Well construction design, evaluation and remediation.

Career history

Principal Advisor, Reservoir Engineer

RISC, 2015–present

Principal

Unconventional Reservoir Solutions, 2014–2014

Reservoir Development Advisor

Armour Energy Limited, 2011–2014

QGC-CSG Technology Hub Chief Advisor

QGC (BG Group), 2011-2011

VP Technical

BG Australia, 2008-2009

Chief Operating Officer

Blue Energy Limited, 2007-2008

Independent Petroleum Consultant

Various, 2006-2007

General Manager, Exploration & Technical Services

QGC Pty Ltd, 2004-2006

Senior Staff Reservoir Engineer

Santos Ltd, 2000-2004

Senior Petroleum Engineer (Consultant)

Schlumberger Oilfield Australia, 1998-2000

Regional Technical Manager

Baker Hughes (Texas), 1980–1997

Education

- PhD Mining Engineering, University of Queensland, 2014
- Graduate Diploma Information Technology, Queensland University of Technology, 2007
- MSc Petroleum Engineering, University of Texas at Austin, 2000
- BA Chemistry, Texas A&M University, 1980
- Member of AusIMM; Society of Petrophysicists and Well Log Analysts; Society of Petroleum Engineers



Elliot has been in the position of ultimate responsibility for delivering drilling programs safely, within budget, covering all phases of procurement, planning and operations.

Leveraging off his prior experience as COO and General Manager, Elliot in his current role as consulting Operations Advisor maintains working relationships with drilling resources in the SE Asia region, including engineering, planning and supervision.

In a prior role as Operations Manager for onshore geothermal programs in Indonesia, Elliot supported the drilling of 35 wells across Java and Bali and in remote regions requiring the coordination of 6 rigs, field and office personnel, and community relations.

Recent projects

Some examples of Elliot's recent projects are:

- Executive responsibility for carrying out a two-well exploration program on time, on budget with zero accidents in a remote area of the Natuna Sea, Indonesia (as COO and General Manager for Black Platinum Energy Ltd.). Elliot attributes detailed planning and a tight-knit motivated drilling team to this success.
- During his tenure with Black Platinum, Elliot also reviewed and critiqued three other offshore drilling programs by other operators (Eni, Niko, and AWE) during which he was able to observe the start to finish procurement, planning, and drilling phases with lessons learned from each campaign.
- Elliot is now a consulting Operations Advisor, recently advising on start to finish planning and operations for an exploration well in the Browse basin (offshore WA, Australia), completed within budget with zero accidents. Elliot has also supported the negotiation and execution of several drilling contracts in his role as Operations Advisor.

Career history

Principal Advisor

RISC, 2013–present

Director, COO and General Manager

Black Platinum Energy Ltd, 2010-2013

Country Manager, Indonesia

AWE, 2006–2009

General Manager

CalEnergy Gas (Australia) Ltd, 1999-2005

Operations Manager

CalEnergy International, 1995–1999

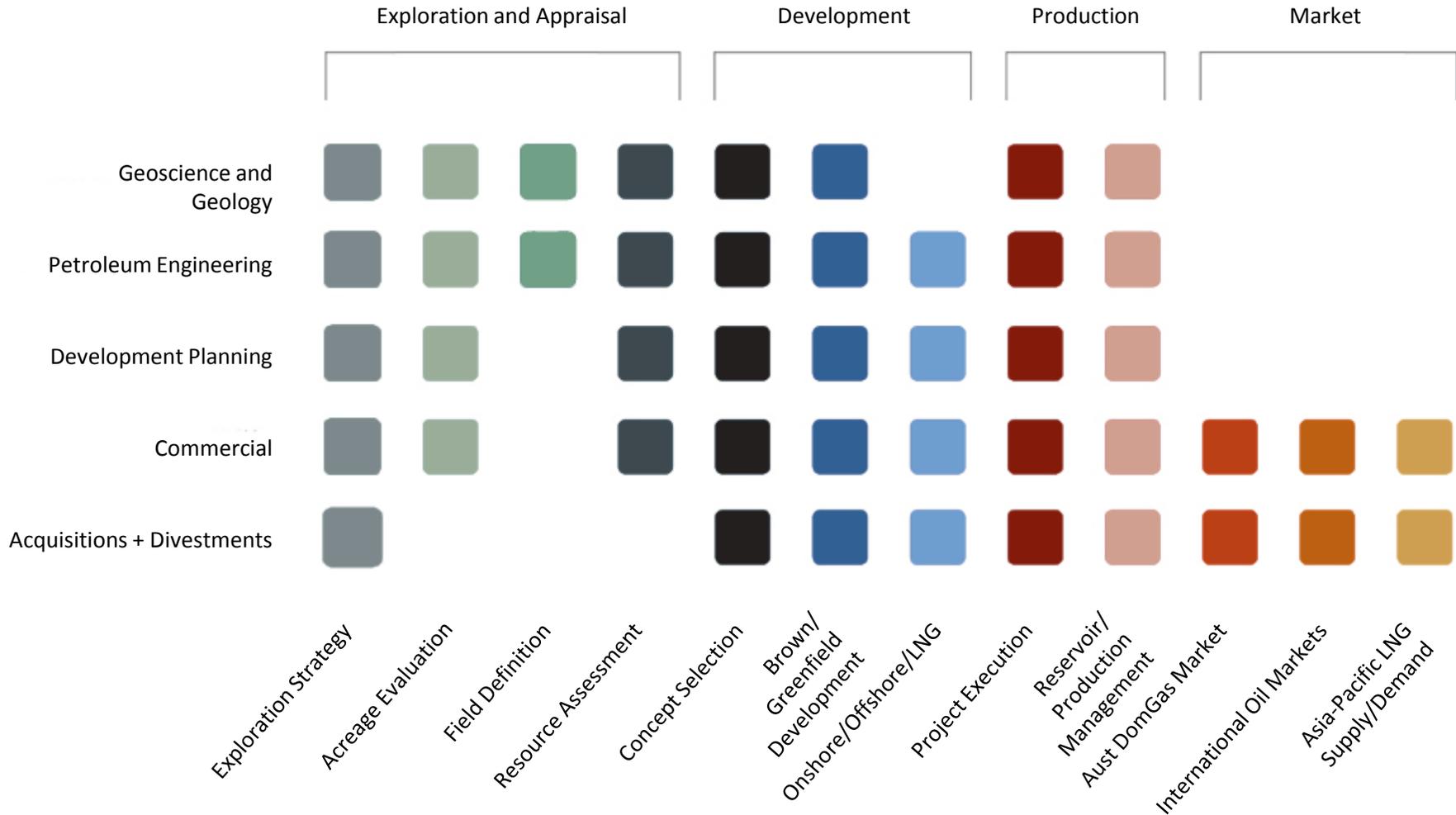
Senior Reservoir Engineer

CalEnergy Company Inc, 1992-1995

Education

- M.Sc. Applied Mechanics (Mechanical Engineering), Colorado School of Mines, 1989
- B.Sc. Geological Engineering, Colorado School of Mines, 1981

RISC advantage – we can integrate and leverage services across the value chain



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RISC's Service Offering

- Provide the well drilling and completion cost reduction and value enhancement process framework
- Engage with client's team and assist in setting up well cost reduction project terms of reference, team, schedule and budget
- Assist with the provision of project measurement and reporting systems
- Facilitate the project's various phases, bringing in expertise as required to complement clients staff
- Provide independent challenge, process discipline and feedback to senior management
- Provide mentoring and guidance to teams
- Access to RISC's full integrated services across value chain

RISC's Fee Structure

- Flexible fee structure depending on terms of reference and project scale
- Retainer and bonus with milestone payments linked to performance to ensure alignment with clients business goals

Contact

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