CURRICULUM VITAE

for

Paul Tobias Brookes

MSc (Reliability & Maintainability Engineering),
MSc & BSc (Industrial Systems Economics),
Fellow MA, MSoLE

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PROFILE

Paul Tobias Brookes is an academically trained Logistics Engineer with practical experience in Oil&Gas, Industrial, Marine, Mining, Power, Railway and Aeronautical systems. He has a Royal Navy safety background, holds two postgraduate university degrees and has an entirely international working experience. He has sixteen years of professional Risk, Safety and Reliability experience of which the last fourteen years he has been working as an international consultant specializing in managing Safety and Reliability engineering projects.

PRESENT EMPLOYMENT

September 2009 to date: Worley Parsons, Kuala Lumpur, Malaysia – Principal Asset Integrity Engineer

Tobias joined the Risk and Safety Group at Worley Parsons in Kuala Lumpur as their Principal Asset Integrity Engineer. Responsibilities consist predominantly of leading technical proposals, managing current projects, facilitating workshops and engaging in supervision of junior professional Risk & Safety, HSE and Asset Integrity Engineers.

Project experience:

- Lead RAM Modelling Engineer for the Mad Dog North Production Availability Study as part of a deep-water project in the Mexican Gulf (*British Petroleum*)
- Project Lead and HAZID Workshop Facilitator on the North Rankin 'B' Project for the Jacket, Piles and Bridge load-out in Batam, Indonesia (*McDermott & Woodside Energy Ltd*)
- Project Lead for undertaking Operational Requirements Documents Updates for the Gendalo Gehem Export Pipeline FEED Project (*Chevron*)
- HSE Case Manager for the production of the drill ship Frontier Discoverer's HSE Case in accordance with the IADC international guidelines. The work also includes spending several weeks offshore writing a Facility Description and facilitating HAZID, BowTie, SOOB and ALARP Workshops together with the crew. (*Frontier Drilling*)
- Principal Project Engineer managing the Laila Operations and Maintenance deliverables; Sparing Philosophy and RAM Modeling on the Laila Field Development Project (*Sarawak Shell Berhad*)
- Facilitating a Life Cycle Costing Workshop as part of the winning ITB for the LNG Regasification Facilities Project (*Petronas Gas*)
- Principal Project Engineer and Asset Integrity Advisor preparing a Comprehensive Asset Management Plan for West Malaysia's leading water supplier/treatment company (*Indah Water Consortium*)
- Managing RAM Study as part of Tapis EOR and Rejuvenation Project (*ExxonMobil (EMEPMI)*)

- Managing RAM Study as part of the Wortel Development Project *(Santos)*
- Managing RAM Study as part of the Consolidated Electrical Power System for QP Mesaieed Operations *(Qatar Petroleum)*
- Managing RAM Modelling as part of the E8K & F13K Compression Project (*Sarawak Shell Bhd*)
- Managing Subsea RAM Study as part of the Liwan Field Development Project (*Husky Oil China Ltd*)
- Managing RAM Study as part of the Sumpal Gas Plant Expansion Project (ConocoPhilips)
- Managing Chuangdongbei Gas Plant RAM Study (*Chevron*)
- Facilitation of a Construction HAZID for a Flare Tripod Support on the Seligi-A Platform (*ExxonMobil (EMEPMI*))
- Technical Reviewer and client for subcontracting a RAM ROM Review on the Satah Full Field Development Project (*EP Consult / ZADCO*)
- Principal Project Engineer undertaking a RAM Study as part of the Bien Dong Project (*Ranhill WorleyParsons Sdn Bhd*)

PREVIOUS EMPLOYMENT

May 2008 to September 2009: Germanischer Lloyd (GL), Kuala Lumpur, Malaysia – Principal Consultant

Tobias joined the Technical Risk and Safety Consultancy Group at Germanischer Lloyd in Kuala Lumpur as their Principal Consultant and Team Leader for a group of professional safety consultants. At Germanischer Lloyd, Tobias was leading numerous simultaneous projects, taking part of business development of oil and gas related projects and on a day-to-day basis guiding fellow consultants in achieving technical soundness. Tobias was the Reliability and RAM focal point within Germanischer Lloyd East Asia.

Project experience:

- Managing an Failure Modes and Effects Analysis (FMEA) and Fault Tree Analysis (FTA) study of the Loss Prevention equipment with the scope of the EPIC contract for the Ras Laffan Port Expansion Project (*Consolidated Contractors Group and Teyseer Contracting Company / Qatar Petroleum)*
- Managing Reliability, Availability and Maintainability (RAM) Modelling and debottlenecking exercises for the Malampaya Shallow Water Platform on the Malampaya Integrity Project (*MMC AMEC Sdn Bhd/Shell Philippines Exploration B.V.)*
- As part of a Safety Case development, managing engineering deliverables on the Chim Sao Premier Oil Vietnam Offshore FPSO Project including Hazard Identification (HAZID) Reporting, Safety Critical Elements (SCE) Review and Assessment, Performance Standards and Fire Consequence Analysis (FCA) (*EMAS/Premier Oil)*
- Managing a Nitrogen Gas Dispersion Study for the Kikeh Gas pipeline project *(Murphy Sabah Oil Co Ltd)*
- Managing a RAM Modelling Study for the OYO FPSO on the OYO Field Development Project *(Bumi Armada Bhd and Eni/Nae and Allied Energy Resources Nigeria)*
- Managing a couple of conceptual and detailed design studies on the F28 Gas Field Development Project, including a RAM Modelling Study on the F28DR-A platform together with the associated Emergency Response Plan (ERP) *(Technip)*
- Managing a Reliability-centred Maintenance (RCM) Study and facilitating the associated RCM Workshop for the Living Quarter Modules and Helideck on the F23-A platform *(Brooke Dockyard and Engineering Works Corporation / Sarawak Shell Berhad)*
- Provision of technical support for a RAM Modelling Study for the F6-A Tie In Platforms on the F28 Satellite Platform Development Project *(MMC Oil and Gas Engineering / Sarawak Shell Berhad)*
- Provision of technical support and RCM Workshop Facilitator for the PC4 HT Tie In on the PC4 Gas Development Project *(Petronas Carigali / MMC Oil and Gas Engineering Sdn Bhd/Sarawak Shell Berhad)*
- RCM Workshop Facilitation and provision of associated technical support for the Living Quarters on the B11 Platform *(Brooke Dockyard and Engineering Works Corporation / Sarawak Shell Berhad)*
- Provision of Technical support for a RAM Modelling Study on India's East-West

Pipeline *(Reliance Gas Transportation Infrastructure Limited)*
- RCM Workshop Facilitator for the B11 Compression Platform *(Ranhill Worley Parsons / Sarawak Shell Berhad)*
- Provision of technical support for a RAM Feasibility Study with regards to Power Supply to Halul Island *(Qatar Petroleum)*
- Provision of Technical RCM support for St. Joseph Re-development Project *(MMC oil & Gas Engineering Sdn Bhd / Sarawak Shell Berhad)*

February 2006 to May 2008: Bureau Veritas / IRC Asset Optimization (IRC), Perth, Australia – Principal Reliability Engineer

Tobias joined the Asset Optimization team at IRC as a Principal Reliability Engineer where he was involved in numerous oil and gas related jobs. In addition to normal project work, his day to day work also included managing projects, writing proposals, doing technical reviews, auditing, business development, marketing and guiding junior staff.

Project experience:
- Failure Modes Effects and Criticality Analysis (FMECA) Workshop Facilitator at Newman's High-grade Primary Iron Ore Crusher *(BHP Billiton Iron Ore)*
- FMECA Workshop Facilitator on an Iron Ore Car Dumper Apron Feeder at Nelson Point *(BHP Billiton Iron Ore)*
- HAZID Workshop Facilitator on Western Power's Outage Management System for provision of a basis for a professional safety system *(Western Power)*
- Seconded as Lead RAM Support Consultant undertaking various reliability tasks such as; RAM Management Plan, Availability Modeling, Facilitation of FMECA workshops and Reliability prediction of critical Pressure Protection Systems *(Gorgon Upstream JV)*
- Project Manager, undertaking RCM FMECA facilitation exercises, Reliability Block Diagrams (RBD) and Availability Modeling Studies on Cossack Pioneer's Gas Lift Compressor and Linear Winch *(Woodside Energy Ltd)*
- Workshop Facilitator for Drillship Frontier Discoverer's Cyclone Contingency Plan *(Shell Global Solutions)*
- Environmental Risk Assessment Workshop Facilitator for BHP Billiton Petroleum's FPSO Griffin Venture *(BHP Billiton Petroleum)*
- Undertaking a Reliability Review of the RG9 Rail Grinder, including FMECA, RBD and RAM Modelling *(John Holland Rail)*
- Environmental Risk Assessment Workshops for Devil Creek LNG Development Project *(Apache Energy limited)*
- Working on a Safety Integrity Level (SIL) and Reliability Assessment study for the Harriet Alpha platform *(Apache Energy Ltd)*
- Working on a Supply Chain Model simulating Optimal Asset Value for the Pluto LNG Supply Chain Analysis *(Woodside Energy Ltd)*
- Involved in BHP Billiton's railway project RGP4 Feasibility Study HAZID *(MPDJV)*
- Modeling asset optimization options for Pyrenees Deferred Production *(BHP Billiton)*
- Business Development of Financial Risk Requirements for companies listed on the Australian Stock Exchange *(Blakstone & Crabb)*
- Managing a project for incorporation of Bureau Veritas' Quality Management System into their newly acquired businesses in Australia and New Zealand *(Bureau Veritas)*
- HAZID Workshop facilitator for commercial jet boats *(Cruise WA)*

May 2000 to January 2006: Atkins China Ltd (ACL), Hong Kong – Senior Safety and Reliability Consultant

Within Atkins China, Tobias was the focal point of the Reliability, Availability, and Maintainability expertise. Duties consisted of project management of RAM and Safety projects, including guiding junior members of staff, reviewing reports, proposals, writing technical reports, project status reports, giving presentations and handling of subcontractors. Occasionally Tobias was acting as stand-in when the Head of Department was unavailable. Most work was undertaken on various railway projects,

mainly for Kowloon-Canton Railway Corporation (KCRC) and Mass Transit Railway Corporation (MTRC) in Hong Kong and for the last three years especially for Taiwan High-Speed Railway Corporation (THSRC) in Taipei.

Project experience:

- Working as a seconded Project Manager, and later, also Lead RAM Advisor in Taiwan, supporting Taiwan Shinkansen Corporation (through Mitsubishi together with Toshiba and Kawasaki) on their System Assurance-related requirements for Taiwan High Speed Rail Corporation. Planning, overseeing and reviewing all RAM requirements, work involving task scheduling and management, writing guidelines, reports and monitor sub-contractor's progress, especially overlooking the detailed work on the core railway system. (*Taiwan Shinkansen Corporation and Mitsubishi Heavy Industries*)
- Project Manager, working in Taipei and in London for Taiwan Shinkansen Trackwork Joint Venture and Taiwan Track Partners Joint Venture on all five of Taiwan High Speed Rail Corporation's Trackwork System Assurance contracts. The involvement includes activities with regards to Safety and Reliability, Availability & Maintainability assurance and demonstrations applying European Standard EN 50126. (*TSTJV and TTPJV*)
- Working as Project Manager and Project Reliability Engineer on Contract 810, Sengkang and Punggol Light Rapid Transit Systems. RAM activities include training, leading and reviewing work for subcontractors and internally reviewing work such as Reliability Analyses, Maintainability Analyses, Availability Analyses and Maintainability Specifications for systems such as Vehicle, Power Distribution System, Lift, Communication System, Uninterruptible Power Supply, and Signaling & Automatic Vehicle Control. (*Mitsubishi Heavy Industries (MHI), Singapore and Japan*)
- Project Manager and Technical Safety Manager (TSM) on a project for Escalators and Moving Walkways Installation for KCRC East Rail Extensions. The scope of work includes Reliability, Maintainability and Safety Plans, Hazard Log Management, Reliability Modeling and Predictions etc during design and installation. (*Schindler Lifts*)
- Working as Project Manager and Technical Safety Manger, giving System Assurance expertise for the construction and installation of East Tsim Sha Tsui MTRC station. The System Assurance activities included in-house RAM tasks such as Manufacturer's Failure Data Evaluation, Reliability Demonstration Plan, Maintainability Demonstration Plan, Failure Reporting and Corrective Action System (FRACAS), RCM, Maintenance Plan, Reliability Reports and management of FRACAS log. In addition various safety works was undertaken and liaison with Australian subcontractor for Electro Magnetic Compatibility (EMC) works. (*GEC Services Ltd*)
- Working as RAM Engineer, preparing RAM Predictions for DB2040, Light Rail Extensions. (*KCRC*)
- Project Engineer for EGSA-006 looking at the RAM & Safety interfaces between different contracts. The work including Availability Calculations and documentation reviews. (*KCRC*)
- Working as Project Manager on Contract674 responsible for RAM works with regards to the Building Services for Tseung Kwan O Extension and Tiu Keng Leng stations. The works comprised System Assurance Report generation such as Maintenance Requirements Analysis (MRA), Maintenance Plan, RAM Demonstration Report and FRACAS. (*GEC Services Ltd*)
- Assisting Project Manger for the System Assurance package part for MTRC's first phase of station instalment of Platform Screen Doors. Specializing on the Environmental Control System, deliverables include: System Assurance Plan, System Safety Plan, RAM Plan, Requirements and Specification Management Plan, System Assurance Audit Plan, Verification & Demonstration Plan, System Assurance Report, Hazard Analysis, Hazard Log, Deterministic Safety Assessment, Quantified Risk

Assessment, Reliability & Availability Analyses, FTA, FMECA, Reliability Apportionment & Prediction, Maintainability Requirements Analyses, Maintainability Prediction, Life Cycle Cost (LCC) Analysis, Functional & Operation Requirements vs Technical Requirements (PS) Analysis, System Diagram, Functional Flow Diagrams, Interface Checklists, Operational Flow Diagrams, Human Reliability & Ergonomics Assessment Report and Recovery Analyses. Compliance Monitoring Report, System Safety Report, System Assurance Audit Reports, System Assurance Demonstration Plan and System Assurance Demonstration Reports. (*Ryoden – Spie Enertrans Joint Venture*)

- Project Engineer working on Contract DB 320, Cross Passage Doors. Work including various RAM Modelling tasks. (*KCRC*)
- Preparing proposals for clients such as KCRC, Mitsubishi (Japan), GECS, Land Transport Authority (Singapore), Atkins Singapore, KOROS (Korea), Barclay Mowlem, MTRC, Siemens, Balfour Beatty, TSC (Taiwan), TSTJV (Taiwan) and TTPJV (Taiwan).

February 1998 to May 2000: Frazer-Nash Consultancy Ltd (FNC), London, UK – Senior Engineer

Tobias joined Frazer-Nash directly after completing his second MSc in Reliability and Maintainability Engineering. Duties consisted mainly on providing Reliability, Availability and Maintainability and Safety related solutions to a wide number of clients. Most work was undertaken on UK defence projects.

Project experience:

- Company Research regarding usage of different methodologies to perform LCC.
- Working as a seconded Integrated Logistics Support (ILS) Engineering Support Contractor on the Turkish Military Satellite Communication System (TMSCS). Being responsible for documentation such as FMECA, Reliability / Safety Critical Items Lists (RCIL/SCIL) and Level of Spare holding and Availability Analysis (LSAA). (*Matra Marconi Space*)
- Maintainability Prediction on KVMS Communication System (*Cogent*).
- Working as contractor on the Ultra Lightweight Field Howitzer. Liaising with ILS-Group/Customer and performing reports such as Reliability Predictions, FMECA, RCM Analysis, Maintenance Task Analysis (MTA) and Level of Repair Analysis (LORA). (*Marconi Marine (GECM) / BAE Systems, Consultant Support Contractor as ILS Engineer as part of an assignment for FNC, October 1999 - February 2000*)
- Project Management responsibilities in both internal and external projects. This has led to a high level of knowledge about Defense Standards 00-40, 00-60 and for FNC's internal Year 2000 Compliance review, also about DISC PD2000-1.
- Reliability, Maintainability and Testability (RMT), ILS and Logistics Support Analysis (LSA) Plans.
- Project Management, FMECA and RCM Analysis on Landing Gear, Electrical Power Management System and Primary Flight Control System for both NIMROD MRA-4 and Apache Attack Helicopter. *(Messier-Dowty, Fairey Hydraulics and Smiths Industries*)
- Safety Appraisals of an in-service Light Infantry Assault Bridge System, Challenger 2 Main Battle Tank and of the Stingray Torpedo, and Fire Safety Assessment on RN Mine Hunter using, for instance, Hazard and Operability (HAZOP) Analyses in line with the requirements of JSP454 and Defence Standard 00-56 to demonstrate that the risks are As Low As Reasonably Practicable (ALARP). (*Eisenwerke Kaiserslautern (Germany) and UK Ministry of Defence*)
- RMT Analysis/Modelling and on a Military Flight Training Rig and Reliability, Maintainability and Durability Analysis on Dump Trucks. (*Pennant International and Aveco Ford*)
- FMEA on gas turbines and on new Trent 500 Turbine Engine Parts Test Unit. (*European Gas Turbines and Rolls-Royce*)

Day-to-day tasks also included RAM & Safety Analysis, RBD analysis, Functional Block

Diagrams (FDB) analysis, Spares Optimisation etc on various projects.

PROFESSIONAL BODY

Tobias has been awarded a fellowship by the centre for Management of Industrial Reliability, Cost and Effectiveness Akademy. He is a member of Society of Logistics Engineers (SoLE) and signed up for the Certified Professional Logistician (CPL) Scheme.

Tobias has also been a regular post graduate guest lecturer at the University of Western Australia.

POST UNIVERSITY TRAINING

- Completion of MoD SSMO's Ship Safety Management Training Course, including preparation of a Safety Case. (*MoD / DNV / University of Strathclyde*);
- HUET, OPTIO Approved Tropical Basic offshore Safety Induction and Emergency Training; (*Perth, Australia*)
- Shell Global Solutions - Reliability Centred Maintenance (S-RCM) course provided by Woodside; (*Shell Global Solutions*)
- EDS' Oil&Gas industry training; and
- Completion of various specialist Report Writing, Presentation and Auditing Skills courses.

PUBLICATIONS

Brookes P T, *Whole Engine Reliability*, University of Exeter, 1998

Brookes P T, *Whole Engine Reliability*, Proceedings for the Annual International Logistics Conference in Orlando USA, Society of Logistics Engineers, 1997

Brookes P T, Kjellberg G, Lundkvist K, Lovmo H-A, *Utrustningseffektivitet*, University of Vaxjo, 1996

EDUCATION AND QUALIFICATIONS

University of Exeter (Exeter, UK), 1996 - 1998

Tobias successfully completed another MSc in Reliability and Maintainability Engineering. His dissertation, in conjunction with Rolls-Royce Military Aero Engines Ltd (RRMAEL), concerned Aeroengine Reliability. On this subject, he also completed an academic paper which was presented at the Annual International Conference for Society of Logistics Engineers (SOLE) in the USA. During his time as a postgraduate student he was also Research Assistant to the University of Exeter's Reliability and Maintainability Course Director.

University of Vaxjo (Vaxjo, Sweden), 1992 - 1996

Tobias successfully completed an MSc & BSc in Industrial Systems Economy. As scheduled, he took his Bachelors and first Masters Degree after four full-time years at university. The Exam Project was executed at Volvo Articulated Haulers AB, where they had just started up a new production line. He put forward a measurement method of analysis for production system efficiency and made a survey of possibilities for improvement applying preventive maintenance. The work was later awarded the Videum Scholarship.

Royal Swedish Navy (Stockholm and Karlskrona, Sweden), 1990 - 1991

Tobias did his military service at sea onboard one of the Royal Navy's warships (corvette). His position was Officer of Safety and Machinery. In charge of electrical supply and mechanical propulsion, duties also included responsibilities such as Nuclear, Biological and Chemical Defence (NBCD) hazards, reporting directly to the ship's captain.

Teknikum (Vaxjo, Sweden), 1987 - 1990

Tobias completed an engineering sixth-form college where he graduated after three years having voluntarily added additional courses to his curriculum.

LANGUAGES AND COMPUTER SKILLS

Tobias speaks both English and Swedish fluently. He also has a good knowledge of German and beginner's level of Spanish. Tobias is currently trying to gain a basic understanding of Mandarin Chinese.

Tobias is PC literate with additional experience of Macintosh, SUN, and operating systems such as; DOS, Windows, MacOS and UNIX. The computer programming languages he is familiar

with are; Ada, Comal, Basic, Pascal, C and machine code for MC 60 000.

Apart from Microsoft's standard software packages, Tobias has actively been using software such as MAROS, BowTieXP, OPTAGON, ACE, S-RCM, Optimise, Xfmea, PHAPro, AvSim+, Fault Tree+, Relex, MSG-3 and GALIOM on a day-to-day basis as well as software libraries such as OREDA, NPRD and FMD.

INTERESTS

For over 28 years Tobias has actively taken part in sports organisations. He has joined several rugby clubs and, as well as being a player, he has experience as coach, trainer and captain.

Other interests of his are golfing, tennis, hobby modelling, painting, reading macro-economic research, and not to forget, spending time with his wife and two children.