Brad Harris

Chartered Mechanical Engineer,

STEM Ambassador and Independent STEM Consultant

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Profile / Summary

Brad is a Chartered Mechanical Engineer who has acquired a wealth of engineering knowledge, skills and understanding over more than 40 years of educational, training, research and industrial experience across the system, product, asset and project lifecycles in the automotive, defence, maritime, aerospace, oil & gas and utilities sectors.

For the majority of the last ten years Brad has worked as an independent consultant, including four and a half years of assignments on the programme that is creating one of the most complex products on earth. During this period, his clients included a number of blue chip engineering organisations:

- IBM - at BAE Systems;
- Babcock Marine and Technology;
- National Grid;
- GE Oil & Gas;
- GKN Aerospace;
- Warship Support Agency within the UK Ministry of Defence.

However, significant changes in personal circumstances sparked a re-evaluation of priorities over the Covid period. Consequently, Brad changed direction in 2020 and for the next chapter of his career he has decided to focus on giving something back to the education system, and by definition to future generations, which has served him and his family so well over several decades.

Recent Activities

May 2023 - Present:

- Re-thinking my CPD materials in light of the 2022 Institution of Engineering and Technology (IET) report "Engineering kids futures", the demise of the D&T subject in secondary schools and the knock on effects that that might have in primary schools.
- Starting to build a network of contacts that might help guide me as to how I can most effectively contribute to addressing the problem that far too few young people choose engineering as a career path post 16, potentially extending to include careers related work in secondary schools.
- Continuing with house extension and separate annex building projects.

January 2022 - April 2023:

- Reconfiguring, refurbishing and extending our second "project house" – pretty much full time…

November 2021 – May 2022:

- Delivering eleven STEM Ambassador sessions to over 400 primary school children and their teachers, including a full day in a special educational needs school, and one session to a secondary school science club.

January 2021 – November 2021:

- Personally researching into the state and status of the engineering dimension of STEM education in English schools and its effects on the engineering based economy.
- Developing engineering focussed STEM Ambassador presentation materials and hands on activities aimed at educating primary school children on some fundamental engineering facts of life. These provide an awareness of what engineering is; why it is different to science; how it relates to design & technology – including computing; what sorts of jobs can engineers do and how to become an engineer.
- Developing engineering focussed CPD presentation materials aimed at primary school teachers, leaders, governors and teacher trainers on some fundamental engineering facts of life. These cover the same

material as the STEM Ambassador sessions but bookend with background and motivational context on the one hand and "how can you become part of the solution" on the other hand.
- Registering as a STEM Ambassador and making my offer on the STEM Learning website.
- Voluntarily contributing to the planting of over 19,000 trees on a local coal mine spoil heap.

February 2020 – January 2021:
- Refurbishing our property ready for sale, including bringing to fruition all preparations needed to start the conversion of a mid 18th century barn into a residential property:
    - having building regulations drawings and specifications drawn up;
    - preparing for the immediate internal structural work;
    - successfully dividing the land.

Key Skills

- Open minded stakeholder engagement (Why):
    - questioning and listening, learning from others;
    - engaging with pupils, teachers, governors and leaders "as equals";
    - business analysis – assessing the "as is" reality versus the "to be" aspirations;
    - applying rigour to business, user and system requirements and acceptance processes;
    - to enable target driven delivery of the right results - on time and to budget.
- Systematic, methodical and pragmatic architecting, design and modelling of solution options (What):
    - Taking an enterprise architecture approach - to deal with complexity;
    - Using the most appropriate methods, standards and tools for the required business, information, system and technology architecture models.
- Disciplined governance of solution implementation (How, When, Where and Who):
    - Project planning, resourcing, control and change management;
    - Solution roll out and benefit measurement.

Previous Career Highlights

- The Royal Navy's Warship Support Directorate was in the position of having to support each of the different classes of warship through multiple different organisational structures, types and durations of contracts, collections of information systems and technology architectures – all of which had evolved over decades. A programme to define a "Common Support Model" for surface warships was initiated and I was engaged to act as the lead Enterprise Architect for the team of six experienced industry SMEs tasked with documenting the "as-is" landscape and defining a roadmap of defined "to-be" architectural states. Extensive stakeholder engagements were carried out, principle business issues identified, key user requirements defined and a programme of work to migrate the organisation to a common and integrated set of processes and information systems, was defined. The result was that the architecture specification document was widely accepted and a later role saw me seconded into Warship Support to act as technical lead for a team of six SME's with the remit of adding granularity to the roadmap previously defined, specifying implementation work and acting as an integral part of the solution acceptance authority.
- The Babcock Marine Through Life Support (TLS) team for new submarines rely heavily on design and build information, primarily from BAE Systems and Rolls-Royce, in order to perform TLS analyses and plan for in-service support activities – the first time Babcock have been actively involved at such an early period in a very large naval procurement programme. I have been engaged three times to identify data exchange responsibilities, produce information exchange specifications, specify and oversee the development of a Support Data Repository, and more recently to generate a wider architecture definition document for the Babcock scope of work. These deliverables provided necessary foundations to enable both the information flows between the organisations and the information management capabilities at the receiving end.
- GKN Aerospace (Aerostructures Europe) were part way through a Product Lifecycle Management (PLM) improvement programme, with the objective of transforming their use of the PTC Windchill PLM system from a document repository into a fully functional product data management system which was integrated with other engineering, manufacturing and enterprise systems. I was engaged to review and add rigour to the requirements sets and to provide detailed project planning advice to the chief engineer responsible for the programme, including governance, responsibility and accountability for deliverables, acceptance processes and the interfaces with the third party PLM system development team. These two key activities were essential enablers for the success of the programme.

Previous Career History / Work Experience

Straight Thinkers Limited - Director. Engagements:
Contracted by Babcock Marine Through Life Support team – Technical Architecture Consultant.
February 2019 – January 2020:
- Initiation, scoping, structuring and content development of the programme's Enterprise Architecture Definition Document, covering all 4 layers of architecture.

- Specification of Through Life Support integrated working agreements and engineering information exchange requirements with BAE Systems and Rolls-Royce, for platform and propulsion systems.

Contracted by Rmada Limited June 2011 – January 2020:

- Functional design, development, documentation and testing of a Maintenance Optimisation Support Tool (MOST) and associated MS Access database and queries for maintenance resource predictions (manpower, spares and tools) for maritime military projects, based on results of functional FMECA and RCM analyses. Demonstration of software to potential end users. Software currently used by the Type 26 Global Combat Ship project for manpower and spares modelling.
- Marine platform maintenance task review – software productivity tool development.
- Failure Finding Interval Calculator - software tool development.

Eurostep Limited. Principal Consultant. November 2017 – December 2018. Assignments:

- Seconded into MoD DE&S Warship Support to undertake the Engineering Support Chief Information Manager role. Leading a team of architects and analysts in the establishment of project, engineering and requirements frameworks, plus a development roadmap, for the information and application architectures to dovetail with the Common Support Model (CSM) business architecture for complex warships (Queen Elizabeth Class Aircraft Carriers, Type 45 Destroyers and Type 26 Global Combat Ships).
- Positioning of the Eurostep PLM / Collaboration system "ShareAspace" within the CSM.
- Specification and testing of a system interface for transferring Design information to the Integrated Logistic Support system (Raytheon EAGLE).

Straight Thinkers Limited - Director. June 2011 – November 2017. Engagements:

Contracted by GKN Aerospace Global Product Data Lifecycle Management (PDLM) programme – PLM Architect. January 2017 – August 2017.

- Specification of "best practice" PDLM Functional Requirements covering organisational, user, system and interface requirements for design and manufacturing functions.
- Consulting to the European Aero-structures organisation:
    - Documentation of PLM Architecture Principles and review of Policy.
    - Detailed planning of the first phase implementation project to attain best practices.
    - Documentation of the As-Is PLM architecture landscape, assessment of current capabilities against the PDLM requirement set and identification of business issues.
    - Development of a Requirements and Acceptance Management Plan, including a compliance matrix covering business, functional and non-functional requirements.
    - Assessment of PLM Services suppliers for configuration / customisation of PTC Windchill.
    - Use case development against business issues and functional requirements.

Contracted by Babcock Marine Through Life Support team – Information Architecture Consultant. September 2016 – December 2016

- Specification of Through Life Support information requirements for the Whole Boat Support Integrator's current and anticipated scope of work.
- Specification of the external responsibilities for the provision of Design, Build, and Through Life Support information to Babcock, from BAE Systems, Rolls-Royce, UK MoD and associated supply chain organisations.

Contracted by Babcock Analytic Solutions – Enterprise Architecture Consultant. January 2016 – July 2016.

- Performed the lead enterprise architect role in a team of 6 experienced architects for the Surface Ship Support Alliance (comprising UK MoD, Babcock and BAE Systems) Information and Knowledge Management project:
    - Documented the current information and application architectures (using TOGAF, MODAF and NAF artefacts) and the engineering and through life support problems / issues with them.
    - Elicited the key business / user requirements for change.
    - Defined high level target architecture options, road maps and business cases for future information and application architecture transformations.
- The focus was on improving maintenance management, but cognisance was taken of all the capabilities upon which this is dependent, namely design, equipment and class management, together with the management of technical data and documentation.

Contracted by GE Oil & Gas Product Lifecycle Management (PLM) programme – PLM Consultant. February 2015 – November 2015.

- Production of the Requirements and Acceptance Management Plan (RAMP), covering business, user and system requirements for drilling and sub-sea equipment and systems.
- Production of PLM Programme Business Requirements Document.
- Engagement with business users to elicit and specify:

- Integration requirements - from which improved planning, design, sourcing, manufacturing and through life support process, system and data architectures can be developed - (Teamcenter, CREO, ORACLE ERP and P6).
- Supplier collaboration requirements, process maps and use cases.

Contracted by National Grid in the Data and Information Team – Engineering Information Consultant. October 2014 – November 2014.

- Engagement with business users to elicit, develop and specify information requirements to support the management and maintenance of electricity and gas transmission physical assets. Logical UML class modelling of physical asset information requirements using SPARX EA. Liaison with the enterprise architecture and solution delivery work streams to ensure information requirements are satisfied.

Contracted by Babcock Marine Through Life Support team - Business Requirements Manager. June 2012 – August 2014.

- Development and implementation of the Whole Boat Support Integrator's Through Life Support Information Management Plan. Elicitation, specification and user acceptance of requirements for Through Life Support IT and process capabilities. Development of information requirements for the support data repository, including specification of integrated working agreements, information exchange requirements, detailed capability requirements and a logical data model. These supported the collaborative work with BAE Systems, Rolls-Royce, Babcock Marine and UK MoD as well as providing foundations for the next generation application architecture and the long term data architecture. Use of DOORS and SPARX EA. Whole Boat software support responsibility.

Contracted by IBM PLM practice at BAE Systems. Data Exchange SME. July 2011 – June 2012.

- Development of integrated working agreements, information exchange requirements and detailed capability requirements to support collaborative design and development between BAE Systems, Rolls-Royce, Babcock Marine and UK MoD. Domains included Mechanical and Electrical design documentation and System Diagrams, BOM and CAD model sharing / exchange projects. Specification of collaboration capability requirements for Siemens Teamcentre PLM development. Policy and process lead for the Secret infrastructure capability development.

Logistic Information Consultants, Partner and Principal Consultant. Jan 2010 – June 2011.

- Information management consultancy. Definition of User and System requirement specification for software for maintenance resource predictions for maritime military projects, based on results of functional FMECA and RCM analyses.

Eurostep Limited. Principal Consultant. November 1997 – December 2009.

Key Achievements:

- Being a top profit earner for 12 consecutive years - based on high utilization, good project management, excellent relationships with colleagues and delivering to budget.
- Always delivering client satisfaction, never having had a single complaint – based on establishing trust and consistently delivering quality work on time, leading to multiple repeat business.

Assignments:

- Project managed the establishment and maintenance of an ISO 9001 quality management system throughout the Eurostep Group across the UK, Sweden, Finland and Germany:
  - Cost benefit analysis, planning, scheduling and controlling resource usage.
  - Subcontracting production of QA system documentation.
  - Specification and management of the implementation and testing of the IT system for recording all QA records and documents, to enable distributed working across Eurostep.
  - Certification of the system in the UK - a pre-requisite for being able to bid for UK MoD business over the next 11 years.
- Project managed many PLM based consultancy assignments, primarily from UK MoD, but also including NATO CALS Office, Swedish Defence Material Administration, BAES Type 45 and Nimrod MRA4 projects, and Rolls-Royce RB199 and EJ200 projects. Responsibility included:
  - Liaison with internal business contacts and external clients to specify and agree requirements, budgets, risks, delivery timescales and payment milestones.
  - Planning, scheduling and resourcing against contract.
  - Production and quality control of deliverables and gaining client acceptance.
  - Cash flow and profit.
- Undertook technical work alongside the project management role:
  - Logicalization of the database structure of DEF STAN 00-60 to 3rd normal form – 110 tables, 1750 attributes.
  - Specification of the Royal Navy logical data model for through-life support of vessels, together with bi-directional mappings to 12 IT systems and 6 MoD standards.
  - Design and implementation of a PLM software demonstrator for the data model:

        - Specification of UML Use Cases and the functional requirements for the system, including the user interface
        - Design and implementation of the database, and coding SQL queries.
        - Review, testing and demonstration of the system.
    - Acting as a key technical resource in the development of a new tri-service Through-Life (PLM) Support Standard:
        - Specified stakeholder functional and user requirements.
        - Developed process models for support concept development and support optimization and integrated these with other domain models.
        - Undertook a share of the analysis of all 700 PLM processes and 3000 PLM information flows to identify candidates for automation.
        - Specified a tailoring methodology for the use of the standard.
    - Acting as a technical link between the PLM standards and the enterprise architecture owners of UK MoD through-life processes - wrt PLM data model, data exchange requirements and data exchange specifications:
        - Authoring the first fully integrated logical information model for UK MoD which rationalized and harmonized all the information requirements for the through life support of defence equipment – the Common Business Information Structure. This included requirements, systems and supportability engineering; configuration, obsolescence, maintenance, asset and fleet management; procurement and supply; and in-service usage and fault feedback.
        - Mapping each PLM data exchange requirement to existing data exchange standards capabilities, and where none existed, creating new ones. This required design and development of over 50 UK MoD PLM Data Exchange Specifications covering engineering and asset management, and supply support.
    - Contributing to the application of the UK MoD logistic information planning method to Rolls-Royce fast jet projects by identifying which PLM data exchange standards needed to be automated to best contribute to meeting the key performance indicators for the RB199 and EJ200 engine contracts.

Logistics Support Consultants Ltd. Project Manager. February – November 1997.

- Project Managed the Rapid Acquisition of Manufactured Parts project, under a UK MoD contract:
    - Planning, scheduling and controlling resource usage.
    - Liaison and communication with the client (UK Naval Support Command), two manufacturers and two Computer Aided Process Planning and Manufacturing system vendors.
    - CAD model and ISO10303-224 file generation of a range of first level fasteners in conformance with the applicable Naval Engineering Standards, using Pro/ENGINEER.

University of Leeds Department of Mechanical Engineering / School of Business and Economic Studies. Lecturer. September 1992 – February 1997.

- 3 year probationary period completed successfully in August 1995.
- Industrially based research and consultancy work with ICI, Rolls-Royce IPG and Vickers Defence Systems - analysing and solving engineering document and product data management problems, including requirements analysis, business process and data modeling, and system implementation.
- Lecturing: Measurement / Instrumentation, Software Engineering, Computer Integrated Manufacturing, Production Management, Quality Systems, Information Management and Product Data Technology.
- Development and implementation of QA system for teaching activities, based on ISO 9001.

CAD CAM Data Exchange Technical Centre (CADDETC) Part of the University of Leeds. Senior Project Engineer/Consultant. April 1990 – August 1992.

- Technical development, delivery, budgeting, planning, marketing, execution and quality assurance of commercially run courses on Engineering and Product Data Management, ISO10303 Standard for the Exchange of Product model data (STEP) and the EXPRESS data modeling language.
- Project management of the CADDETC contribution to ESPRIT project CadEx on development of ISO10303 file processors for CAD / Finite Element Mesh (stress analysis) systems. Leadership of the projects Test Group with BMW and FIAT.
- Consultancy projects on Engineering Document Management (EDM) / Product Data Management (PDM) including supervision of engineers on a project to develop an EDM system from an existing commercial document management system.

University of Leeds. Site Manager, Alvey "Design to Product" project. September 1986 – April 1990.

- Management of four researchers and one administrator working on the Leeds Solid Modelling Engine and NC Cutter Path Verifier, with GEC Electrical Machines and Lucas Diesel Systems.

NEI Clarke Chapman. Computer Development Engineer. July 1983 – September 1986.

- Introduction of DBMS methods and technology to the company using VAX DBMS, Datatrieve and TDMS. Applications included Marketing, Estimating, Material Requisitioning and Labour Utilization systems.

English Drilling Equipment Co. Ltd. Vacation job. Summer 1982.

- Shop floor materials handling problem investigated. Cost effective solution designed and implemented.

Mobil Oil Company. HND industrial periods. September 1977 – April 1981.

- 9 months workshop training. 9 months experience as an Engineer Cadet on steam and motor powered petroleum tankers, operating and maintaining engine room, pump room and deck equipment.

Qualifications Gained

- TOGAF 9 Certified Enterprise Architect.
- PRINCE2 Project Management Practitioner.
- Chartered Engineer (C.Eng) Member of the Institution of Mechanical Engineers (MIMechE)
- B.Sc. Hons. (First Class) Mechanical Engineering – University of Leeds
- HND (Credit) Mechanical Engineering (Marine) – Southampton College of Higher Education

Training attended

2021. ½ day. STEM Ambassador Training. STEM Learning.
2014. 4 days TOGAF 9 Foundation and TOGAF 9 Certified. The Knowledge Academy.
2011 and 2018. Half day ITAR training. BAE Systems.
2010. 5 days PRINCE2 Project Management Foundation and Practitioner. Datrix Training Limited.
2009. 2 days MooD 2008SE – Fast Track. Salamander Organization Limited.
2006. 3 days MagicDraw Training (Process modelling using UML/BPMN). No Magic Inc.
1997. 5 days Pro/ENGINEER/ISO 10303-224 (STEP) Design for automated process planning. SCRA.
1997. 8 days Pro/ENGINEER basic and advanced design. GMS, Northwich.
1994. 3 days Shell data modelling course. University of Leeds.
1994. 10 days MBA Module on Strategic Management. University of Leeds.
1992. 3 days Configuration Management. ECM II Ltd.
1988. 3 days Ada Programming Language. University of Leeds.
1983-1985. 25 days VAX DBMS, TDMS and Datatrieve. Digital Equipment Corporation.

Personal achievements

- Project managing the complete gutting, refurbishment and significant extension of our current and previous homes - on time, to budget and with the desired quality. Planning and controlling all materiel, labour and finance.
- Running my first marathon at the age of 49 in under 4 hours, raising nearly £1000 for a local children's hospice.
- Managing my eldest son's football team for 3 successful seasons, culminating in their promotion to the premier division of the Doncaster Boys Sunday League.

Publications

1. Harris S B, et al; **Engineering document management strategy: analysis of requirements, choice of direction and system implementation**; Proceedings Journal of the Institution of Mechanical Engineers, Part B, Journal of Engineering Manufacture; Volume 211, Pages 385 - 405; 1997.
2. Harris S B; **Business Strategy and the role of Product Data Management: a literature review and summary of the emerging research questions;** Proceedings Journal of the Institution of Mechanical Engineers, Part B, Journal of Engineering Manufacture; B3, Volume 210, Pages 207 - 220; May 1996.
3. Harris S B; **Product data management and standards**; EDMS Europe conference; June 1995; London.
4. Harris S B, Owen J; **The development of a quality system for higher education**; European Journal of Engineering Education; Volume 19/3; 1994
5. Harris S B; **Engineering Requirements of Database Systems**; Engineering Data Newsletter; Datamation; February 1994.
6. Harris S B; **Engineering Data Management Systems**; Seminar Volume of the Institution of Mechanical Engineers Seminar: Managing Business Information; October 1993.
7. Harris S B, et al; **ESPRIT 2195 - The CadEx project, Final Report, Chapter 6**; CEC; June 1992.
8. Harris S B; **Managing the Database;** Professional Engineering, IMechE; February 1991.
9. Harris S B, et al; **The Alvey "Design to Product" Project, Final Report, Contributions to several chapters;** GEC Electrical Projects; March 1990.
10. Harris S B, Chawdhry P K, Nadler U L, Woods M; **Solid Modelling and its applications in "Design to Product";** IEE colloquium (Digest No. 1990/119). The Alvey "Design to Product" Demonstrator Project; March 1990.
11. Bloor M S, et al; **Engineering Database Evaluation Project**; SERC project No. DB22082; University of Leeds and University of Glasgow; January 1989.
12. Bloor M S, de Pennington A, Harris S B, Holdsworth D, Mckay A; **Towards integrated design and manufacturing systems;** International Conference on Factory 2000; September 1988.

Courses, seminars and tutorials given

1. Harris S B, Bloor M S; **Introduction to STEP (ISO 10303) and STEP Application Protocols**; Two day tutorial presented to the MoD; Bristol; May 1997.
2. Harris S B; **Product Data Management**; Invited presentation at UKCIC CALS Awareness Course; London; October 1996.
3. Harris S B, Owen J, Nairn, W; **Introduction to STEP (ISO 10303) and STEP Application Protocols**; Two day tutorial presented to the Royal Navy; Bath; May 1996.
4. Harris S B; **Introduction to the EXPRESS data modelling language**; One day Course for CADDETC; Leeds; October 1995.
5. Harris S B, Owen J; **Engineering Data Management and the role of STEP (ISO 10303);** Invited one day tutorial presented at the Australian STEP conference for Standards Australia, Sydney; March 1995.
6. Harris S B, Owen J**; Engineering Data Management and An Introduction to STEP (ISO 10303);** Invited two day course presented at Lemac, Instituto Superior Tecnico, Lisbon, Portugal; April 1994.
7. Harris S B, Owen J; **Introduction to STEP (ISO 10303);** A one day course presented to Vickers Defence Systems; Leeds; December 1993.
8. Harris S B, et al; **Engineering Data Management**; One day Course for CADDETC; Leeds; June 1993.
9. Harris S B, et al; **Engineering Data Management**; One day Continuing Professional Education Course; University of Leeds; April 1993.
10. Harris S B, Davies M; **Engineering Data Management**; Two half day Management Seminars presented to BNFL Engineering for CADDETC; Warrington; December 1992.
11. Harris S B, Owen J; **Introduction to STEP (ISO 10303);** Invited 1 day Tutorial at the CIM-Europe Conference on Neutral Interfaces for Design and Manufacturing; Odense, Denmark; September 1992.
12. Harris S B; **The CadEx project (ESPRIT 2195);** Invited presentation at a 2 day CEC sponsored EC/US Workshop on Product Data Technology; Berlin; July 1991.
13. Harris S B; **The IDEF1X data modelling methodology**; Invited presentation at a 1 day seminar, SERC Community Club for the Modelling and Management of Engineering Data; UMIST; December 1990.
14. Harris S B; **Engineering Databases;** Invited presentations at a 2 day Object Oriented Databases course; University of Glasgow; October 1989.
15. Harris S B; **An evaluation of the TORNADO DBMS for engineering applications**; Invited presentation at a Technical Seminar, Rutherford Appleton Laboratory; July 1988.