Human Factors in Rail

Human Factors examines the relationship between human beings and the systems they interact with. Our main goal is to reduce human error and influence behaviour. This results in optimization of human well-being and overall system performance.

Our work contributes to the design and evaluation of tasks, jobs, products, environments and systems in order to make them compatible with the needs, abilities and limitations of people.

We achieve this through applying our human factors expertise (incorporating physical and psychological knowledge), research skills, relevant standards and various methodological approaches to evaluate the system in terms of:

- **The equipment:** including the design of the working environment, human machine interfaces and the design of displays and controls;
- **The role:** including areas such as the nature of the task, workload, and the role of procedures;
- **The individual:** including their competence, skills, personality, attitude, and risk perception;
- **The organisation:** including work patterns, the culture of the workplace, resources, communications, leadership and so on.

It is often assumed that human needs are dealt with implicitly within the system design, however Human Factors offers an approach that prioritises the human element, to complement the technical requirement. Considering Human Factors early, allows early identification and mitigation of a range of human related issues within the solution and the development of evidence based recommendations. Benefits of this early involvement includes avoiding costly rework and redesign and minimising risk.

HUMAN FACTORS SERVICES

Frazer-Nash Consultancy provides a range of services tailored to the size and requirements of the project, including:

- Human factors integration in system design and manufacture
- Human machine interface design and development
- Workstation and control room design including alarm design and integration
- Allocation of function assessment
- Workload assessment
- Support to the development and compliance assurance of 3D modelling work
- Assessment of manual handling tasks/ requirements
- Design for maintenance
- Training needs analysis
- Process control design and assessment
- Human performance modelling and simulation
- Human Factors research projects

Using our team knowledge of the rail sector we can apply our experience from across domains. For example, in a recent research project for EDF Nuclear we considered the Human Factors issues e.g. error, system design, safety auditing, training coordination and record keeping, associated with maintenance in nuclear operations, with a specific focus on procedural adherence. This involved a review of the available literature to assess current research in the area and approaches in other domains. This was supplemented by semi-structured interviews with maintenance SMEs to explore operational experience across a range of high hazard industries as well as in the aviation and rail domains. Recommendations were provided highlighting areas for further investigation.

HUMAN FACTORS RAIL CAPABILITY

‘Track Feeder Switch Human Factors Assessment’ – Network Rail (2015)

Our most recent example of work in the rail domain is a Human Factors assessment of the design of a new Track Feeder Switch (TFS) to be trialled to bring safety and efficiency benefits. We collected human factors evidence, and provided recommendations for input to the safety case to ensure system operability and safety were optimised. The Safety Case Report compiled by Frazer-Nash was praised by Network Rail and distributed as an example of good practice, citing the Human Factors input as a key contributor to the success of the Safety Case Report.

‘Driver Only Operation In-Cab CCTV’ – London Underground (2009)

Our Human Factors personnel have previous experience of introducing an in-cab CCTV system for drivers to monitor the Platform-Train Interface on existing lines on the London Underground network. This programme of work centred on the human factors aspects of integrating the system into the train cab environment, providing the optimal monitoring solution to the driver given the technological constraints, and assessing the operational impact of the system on the driver in terms of error potential and workload. The results of these assessments were used as the basis for union consultations, which provided a unique opportunity to understand the end-users’ perceived risks, and consequently the barriers to acceptance, of introducing a new system.

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Offices throughout the UK and Australia

For more information please contact
Human Factors on **0117 922 6242** or email
humanfactors@fnc.co.uk

FRAZER-NASH CONSULTANCY

Human Factors – Rail

PEN PROFILES

Georgina Fletcher:

Georgina is an adaptable and capable Human Factors professional with 20 years of experience. This has been gained developing, conducting and managing research, consultancy and training projects across a range of domains and organisation types. Her key strengths lie in understanding issues and developing practical solutions for improving individual, team and organisational performance in complex domains. Her specific areas of technical expertise include: team working, organisational development, integration of human factors, the systems approach to safety, non-technical skills training, and training assessment.

Gordon Bisset:

Gordon is a Chartered Ergonomics and Human Factors specialist with more than 6 years' experience with London Underground (LU) and Metronet. He is skilled in the successful delivery of human factors integration and planning in Rail projects, with key skills in human error assessment, human machine interface and ergonomic assessment learned in the Rail domain. Gordon has particular experience around the introduction of a Driver Only Operation (DOO) in-cab CCTV system for drivers to monitor the Platform-Train Interface at LU; the barriers to implementation of which are highly relevant to the introduction of in-cab CCTV. Gordon's knowledge extends beyond the design and build phase of projects to maintenance and enables the consideration of maintenance issues at early stages of design.
Within these roles Gordon has worked closely with Rail personnel and stakeholders and has a strong understanding of the key considerations and motivators within the sector.

Joanne Butler:

Joanne is an Ergonomics and Human Factors specialist working within the Systems Engineering Group, with over four years' experience applying Human Factors knowledge within the Defence, Technology and Nuclear domains. Joanne has extensive experience both providing design advice and conducting numerous assessments of system designs in terms of physical ergonomics and interface with the user, including extensive 3D model and mock-up reviews and user trials. Joanne has experience working with specialist multidisciplinary teams and conducting group research within both large and smaller teams.

Ryan Meeks:

Ryan is a Chartered Ergonomics and Human Factors specialist, with five years of experience of applying Human Factors commercially within the Defence, Security, Technology, Nuclear, Cyber, and Research domains. He has specialised towards applying HFI methods within Socio-Technical Systems and has experience of using various models and standards, conducting innovative human sciences research, conducting assessments and trials, and using a number of qualitative and quantitative research methods.

Alice McDougall:

Alice works within the Systems Engineering Group as part of the Human Factors Team. Alice is confident in applying Human Factors expertise across a range of domains, and is able to adapt methodologies and approaches to the task at hand. She has a lot of experience in supporting Human Factors Integration, especially in the early stages of design projects. Through this she demonstrates her ability to engage with users and identify issues to support programme development. As a psychologist, Alice has much experience of academic research and the application of psychological theories to a wide range of domains. Alice has experience of investigative design as well as the application of quantitative and qualitative methodologies and analysis.

Jo Purslow Morcom:

Jo is an Ergonomist and Human Factors specialist with working within the Systems Engineering group.

Previous experience working with Police and Fire Services on Emergency Control Room Projects to relocate and co-locate teams under a new operations model incorporating the introduction of new technologies. Utilising Human Factors knowledge and standards to inform design layout, optimise group working and support the new Operations Model. Auditing systems, technology, users, job roles, boundaries, to ensure end user fit for new system technologies. Conducting workshops to elicit subjective opinion for thematic analysis and usability trials.

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