Trinity College Dublin
Coláiste na Tríonóide, Baile Átha Cliath
The University of Dublin

Centre for Innovative Human Systems

PEOPLE
PROCESS
PERFORMANCE

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The products and services we take for granted in the 21st century are the outputs of **complex human systems**; transport, healthcare, security, education, finance, the Internet and politics.

Vast, complex, interdependent systems of individuals, organisations and technologies interact to innovate, design, develop, finance, regulate, certify, produce, test, localise, market, sell and deliver these to us. **At the core are people**, designing, operating, managing and improving the system to produce results.

As consumers and citizens we are rarely conscious of these systems until they let us down. Sometimes this is in small ways – an app keeps crashing, our weekly shop is not delivered, the bus is late. But their failures can be chronic - treatment delays in healthcare, or catastrophic, such as when a train derails.

Over the past 25 years, the Centre for Innovative Human Systems (CIHS) has been focussed on bringing together a **range of perspectives** to develop better ways of describing, understanding and effectively changing these systems and processes. Psychology, Business and Organisation, Engineering and Computer Science, and Health Sciences all contribute to the work of the Centre. The CIHS provides a variety of offerings in Research, Education/Training and Consultancy.

“SYSTEMS AND PROCESSES HAVE TO WORK FOR PEOPLE AND THEY CAN ONLY DO THIS IF THE ROLE OF HUMANS IS CENTRAL”

PEOPLE
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Our Mission

Improving performance and reducing risk by putting people at the centre of innovative system design

THE PRODUCTS AND SERVICES WE TAKE FOR GRANTED IN THE 21ST CENTURY ARE THE OUTPUTS OF COMPLEX HUMAN SYSTEMS; TRANSPORT, HEALTHCARE, SECURITY, EDUCATION, FINANCE, THE INTERNET AND POLITICS.

RESEARCH THEMES

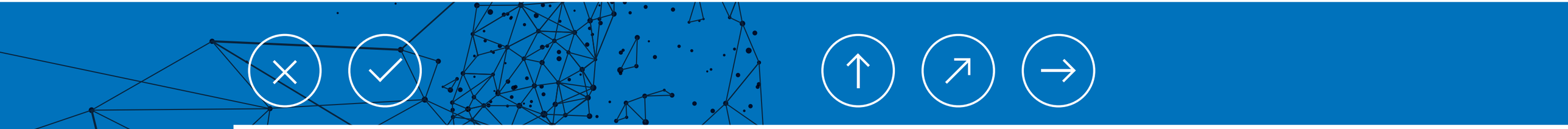
Human-Centred Design
Automation
Process and System Modelling
Risk, Safety and Performance
Competence
Communication and Coordination
Change Management
Culture
Leadership

Human-Centred Design

Effective design of tools and equipment has always focussed on human requirements - what is the role of the person, what is the role of the technology and how do they interact? As socio-technical systems become increasingly complex, understanding and designing for the multiple ways different actors will interact with the system has become ever more challenging. In the CIHS we innovate in the design processes that put people front and centre, ensuring that the system works for the people integral to it.

Automation

Autopilots have been the norm in aviation for decades and the aviation sector has long experience of the benefits and challenges of automation and of effective ways of human-machine coordination. Automation is now appearing in many aspects of life – banking, autonomous vehicles, robots for the elderly, etc. This brings particular challenges – role delineation, handover between the human and the artificial agent, the operator's understanding of what the system is doing. Automation is a special case of human centred design – at some point the automated system has to interface with the human.



THE WAY THINGS ARE ACTUALLY DONE DIFFERS SIGNIFICANTLY FROM THE WAY THEY ARE SUPPOSED TO BE DONE.

Process and System Modelling

A long-kept secret of many industries is that the way things are actually done differs significantly from the way they are supposed to be done. The traditional approach has been to train for compliance while tacitly accepting non-compliance. When something goes wrong – an error, incident or accident - the operator is blamed for "deviating from procedure", while the company hopes there is no audit trail showing that the deviation was tolerated by management.

In the CIHS we treat deviations as nuggets of gold – they can tell us so much about a task or process and the stresses and strains that it comes under in the dynamics of an operational environment. By understanding how things are really done in a range of contexts, and how this maps (or does not map) onto the official procedure, we can model the operational process in its natural environment. From this we can identify where improvements can be made – changing the procedure, redesigning the equipment or process, improving the training, enhancing the communication tools.

Risk, Safety and Performance

There is a saying in the film industry that you should never work with animals or children. There is too much that can and will go wrong. An extension of that argument is that the ideal system should not include people – they are too unpredictable.

Fortunately the movie industry largely ignores that advice and makes many a great film with children, animals or both. The risk is worth it. Similarly ideal systems always include people – otherwise what is the point? A healthcare system without patients? A transport system without passengers?

The systems we work with include people as a natural, inevitable, part of the system. They bring risks, but they also open up opportunities - for innovation, creativity and connection. In the CIHS we bring a range of tools to bear to dynamically identify people-related hazards, and assess and manage the risk they pose. The more complex the system, the more complex this process becomes and the more sophisticated are the methods that are needed.

Of course people are not just hazards in a system. They are dynamic hazard identifiers and risk managers. The best systems build on these capabilities to empower people to effectively contribute to the overall safety of the system through preventative and mitigation action, coordination and reporting.

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Competence

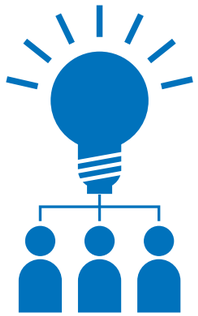
Training needs analyses, and training courses themselves tend to focus on the technical requirements of the job. But in most jobs the greatest challenges and the greatest opportunities for performance gain are in the non-technical skills required to do the job in a range of operational and social contexts – under time pressure, when fatigued, when the procedure is unclear or unworkable and despite tensions with colleagues.

Our competence requirements analyses are designed to capture these non-technical skills. A particular focus is on the tacit knowledge - knowledge that is gathered on-the-job that people may not even know that they know. Our approach to competence is not individualistic (i.e. focusing on one person) but is holistic and collective. The performance of any single worker relies on inputs from other colleagues and collaborators who perform roles in other processes and sometimes in other organisations. Only by looking at the performance of all workers who contribute to an output, and the context in which the work takes place, can competence be assured.

Communication and Coordination

One of the most common causes of both every-day nuisances and catastrophic failures in organisations is communication failure. Huge resources are poured into the design of ICT systems while human communication receive scant and amateurish attention.

We employ a range of tools that put the communication and coordination requirements front and centre of our analyses. They enable us to visualise the network of relationships, the critical communications channels, the ones that are vulnerable, and the ones that are mission-critical. On this basis a new communications landscape can be designed – clearer protocols, agreed codes, enhanced technology and critical checks.



Change Management & Implementation

Having acquired new technology or designed a new process, many organisations rely on a simple once-off one-way communication, such as an email, to inform staff and introduce the change. Evidence from industry is that the process of introducing change is as critical, and often more challenging, than deciding the direction of that change in the first place.

By incorporating the implementation of change into our engagement with industry, we ensure that we don't leave clients "high and dry" with a new technology or process that fails to deliver because it is not effectively implemented. Experience from cross-sectorial implementation projects has provided the CIHS with practical skills and methodologies for planning, executing and evaluating implementation projects in operational settings.

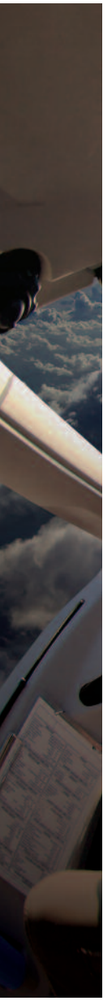
Culture

As organisational culture becomes a pervasive explanation of organisational performance, cultural transformation seems a panacea for system problems. Culture is the link between how individuals think and act and how that sustains an organisation over time. It covers just about everything that happens in an organisation from the point of view of values, beliefs and norms of behaviour and the meanings attached to everyday things. Our understanding of the culture of organisations requires both breadth, through surveys, and depth, through interview and observation. Much of our work concerns the implementation of policies, processes, procedures and practices which can promote the positive development of an organisation's culture.

Leadership

Leadership is critical to every organisation. Yet in our research we have found that many leaders are unprepared to do what needs to be done to implement effective change. We put leadership *practice* centre stage, shifting the focus from the traits and characteristics of individual leader to the shared *activities, interactions and functions* of 'leadership'. Our approach emphasises accountability, transparency, and continuous improvement in building leadership strategy and capabilities.

CASE STUDIES



AUTOMATION TO MANAGE PILOT WORKLOAD AND INCAPACITATION

ACROSS
Advanced Cockpit for Reduction Of Stress and Workload

This project is funded by the European Union

The client's challenge

How can you reduce pilots' peak workload and stress, supporting them when dealing with difficult situations, thus enhancing safety and performance? Rather than a passive autopilot that waits to be switched on, how could automation monitor and respond to the crew's workload, physical and psychological state?

What we did

Requirements & Concepts definition. We started by articulating the core concept of the proposed new system and defining a range of relevant scenarios – crew fatigue, illness, excessive workload, etc. These were then explored with stakeholders, designers and external advisors through a series of workshops. This led to a robust user-centred requirements definition to take into the next stage.

Technology development. We provided human factors expertise to the technology development partners, working with users to iteratively evaluate interfaces of increasing sophistication, from low fidelity mock-ups to full motion simulators

Validation. The final validation was carried out across a range of operational contexts to ensure that the system delivered across the range of scenarios originally defined and the integrated technological functions were evaluated with external industry experts from a range of backgrounds (flight operations, air traffic control, legal experts, weather experts, medics, crew resource management trainers, risk assessors, and engineers). http://www.across-fp7.eu/across-solutions-video/

Impact

A 'Crew Manage the Operation' concept was developed which put the crew at the centre of the operation, emphasising the 'situation awareness bubble'. This was operationalised in a new workload concept with three components:

- Proactive Workload Management enables anticipation, planning and allocating resources along the timeline.
- Immediate Workload Management uses of automation and enhanced decision support to reduce demand in the here-and-now.
- Reactive Workload Management detect pilot incapacitation and suggest mitigations.

Industry	Aviation
Funding mechanism	EC FP7 funding through the ACROSS project http://www.across-fp7.eu/
Centre theme	Automation, Human-Centred Design, Risk Management

ORGANISATIONAL SAFETY MINDFULNESS FOR SYSTEM IMPROVEMENT

This project is funded by the European Union

The client's challenge

Accidents in complex systems like aviation tend to involve many factors including the organisational and management processes which are behind every operation. However, as aviation is very safe, we need new methods of learning how to be *even safer* which go beyond analysing recent accidents. We need to generate new information about *what goes right* as well as what could go wrong in order to generate a more acute consciousness of risk and an agenda for improvement – we call it Organisational Safety Mindfulness.

What we did

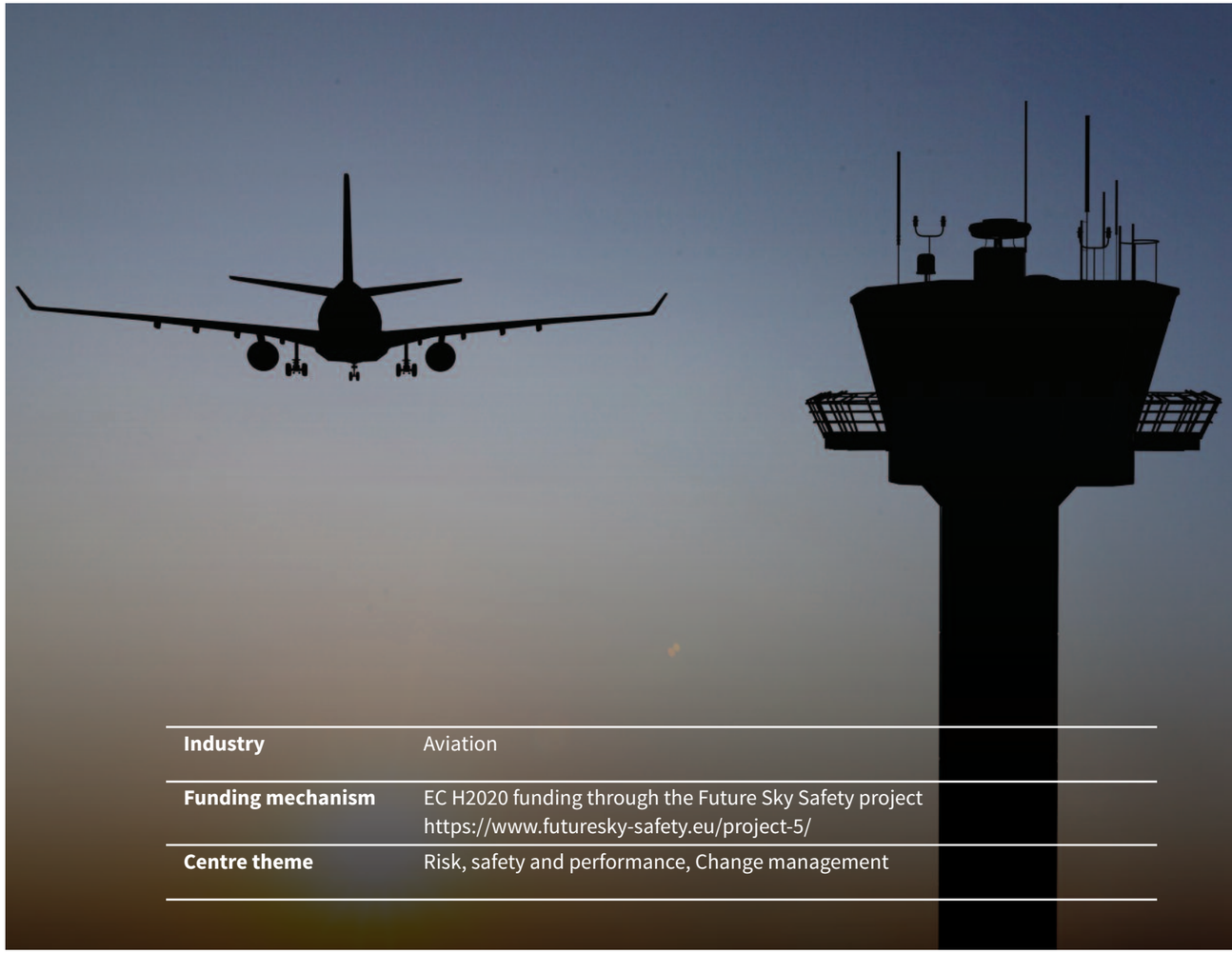
We developed and tested two customised applications.

For Alitalia (Italian Airline, Ground Operations Division) we undertook 'big data' risk pattern analysis of ground operations audit data. We identified *briefings* as a critical issue and initiated an improvement initiative. An Implementation Manager application and a new reporting tool were developed to support improvement initiatives like this one.

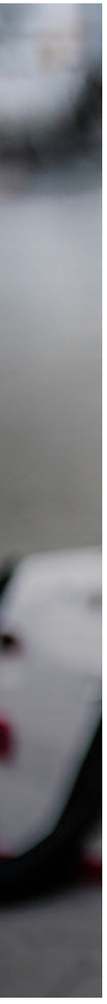
For MUAC (the Maastricht Upper Airspace Centre in The Netherlands) we demonstrated the need for the gathering and circulation of risk related narratives amongst air traffic operational staff. This was needed to heighten safety mindfulness in this ultra-safe sector. To meet this need we developed a mindfulness application ensuring effective feedback loops of relevant information into the operation.

Impact

Both organisations are planning a full scale trial of the applications in their operations. Put together, both case studies demonstrate an integrated approach to operational mindfulness and system improvement.



Industry	Aviation
Funding mechanism	EC H2020 funding through the Future Sky Safety project https://www.futuresky-safety.eu/project-5/
Centre theme	Risk, safety and performance, Change management



ENHANCED INFORMATION MANAGEMENT IN EMERGENCIES

iSAR+ SOTERIA

This project is funded by the European Union

The client's challenge

Information management is a key challenge in emergencies. Decision makers face uncertainty as information is often incomplete and inaccurate. New computer-mediated communications can offer enhanced information management potential, but it is necessary to understand what the implications are for introducing new information technologies into the emergency management system.

What we did

We conducted research in partnership with emergency management organisations and technology developers to identify opportunities for information technology implementation in emergency response. To do this effectively we developed a Human Centred Concept of Operations (CONOPS) that mapped a current systems definition, which subsequently informed the future system description. The CONOPS addressed people, their roles, activities and relationships from the perspective of an emergency as a common information system.

Impact

The research provided a socio-technical framework that supported the development of computer mediated communication technologies and a set of recommendations for its implementation.

Industry	Security
Funding mechanism	EC FP7 funding through the iSAR+ and SOTERIA projects http://isar.i112.eu and http://soteria.i112.eu
Centre theme	Communication and Coordination; Process and System Modelling; Human Centred Design

TECHNOLOGY ENABLING WELLBEING, SOCIAL PARTICIPATION AND INDEPENDENCE FOR OLDER PEOPLE IN RESIDENTIAL SETTINGS

Oneview

The client's challenge

How can new technologies be effectively used to foster independence, wellness and social participation for older people living in residential homes and assisted-living communities?

What we did

Our researcher is embedded in the technology development team at Oneview using a stakeholder evaluation approach to requirements elicitation and user interface design to ensure the technology works effectively for the older people, their families and their care-givers. Specifically, the study design combines several qualitative human machine interaction (HMI) design frameworks/methods, including realist ethnography, scenario-based design, persona-based design, and participatory design. A suite of interrelated technologies has been advanced for older people and other stakeholders (i.e. nurses, care assistants, admissions/administration personnel and family members). This includes a resident tablet, various in-room and ambient sensors (linking to data analytics), a nurse/caregiver tablet, a wall mounted display (outside resident room), a nurse station whiteboard, a care management application (nursing desktop), and a mobile application for family members. Further details here: http://www.mdpi.com/2227-7080/6/1/18.

Impact

New technologies have been developed to support the older person in positive ways (i.e. to support communication and community dwelling) rather than simply using them to manage the risks of ageing. These technologies enable a resident experience that is similar to "living in one's own home". These technologies afford the possibility for improved social relationships, enhanced wellbeing, better quality of care, and independence. This technology will enhance direct resident/patient care and associated communications/interactions. Further, from a care perspective, this technology provides an opportunity to bridge existing information gaps between care planning, care assessments, daily care and incident reporting.

Industry	Healthcare
Funding mechanism	Directly funded by Oneview http://www.oneviewhealthcare.com/
Centre theme	Human Centred Design

ENHANCING OCCUPATIONAL SAFETY IN A PORT

COMHLACHT CHALAFORT ÁTHA CLIATH
DUBLIN PORT COMPANY

The client's challenge

Dublin Port Company (DPC) is responsible for the management, control, operation and development of Dublin Port Estate, the second biggest industrial estate in Ireland with 4,000 people employed in the port area. From 2004 – 2013, 11 people were killed whilst working in Irish ports and docks, five at Dublin Port. The main causes of the fatalities were falls from height, being crushed or run over by a vehicle and being hit or struck by an object (HSA, 2015). As part of the Management of Health & Safety in Ports the HSA recommended that "A consultation mechanism should be in place to ensure communication of all relevant safety matters between port users, operators and administrators. DPC do not have legal responsibility for Health & Safety within their tenant companies but wanted to support and foster a collaborative approach to the management of Health & Safety across the Port Estate. Our role was to provide an evidence base and strategy for this. From a scientific point of view our research questions were:How can management objectively and scientifically discover how employees perceive safety in their organisation? How can they tell if safety programmes and processes are working well or falling short?

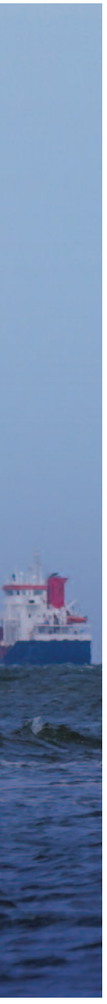
What we did

We spent six months working in partnership with DPC to understand the reality of their safety programme and processes. We systematically gathered and analysed a range of feedback from employees using safety culture surveys, interviews, and structured observations. In effect this was a comprehensive improvement audit that identified gaps between DPC's existing state of safety and its desired state.

Impact

The project developed a Cultural Safety Maturity Model for DPC which clearly defined a plan for enhancing safety culture and management across the port.

Industry	Transport
Funding mechanism	Directly funded by Dublin Port http://www.dublinport.ie/
Centre theme	Risk and Safety Management, Safety Culture, Change management



HUMAN FACTORS PROFILING OF A NEW SECTOR

SEAHORSE

This project is funded by the European Union

The client's challenge

Transferring innovation or initiatives from other sectors is a common starting point for human factors initiatives. But how do you go about doing this? The maritime sector, aware that it lags behind aviation in the application of human factors, tasked us with profiling their specific human factors requirements and identifying what innovations could be translated from aviation.

What we did

We developed, and implemented, a theoretical approach to transferring learning/innovation across sectors which has a systemic basis. This approach has three broad steps:

Comparison: Comprehensively comparing the sectors involved to establish a common database of safety dimensions and sector characteristics – this looks at the entire socio-technical system.

Match: The comparison provides information on the needs of the "destination" sector and the potential offering of the "departure" sector. This is the input to matching the safety needs of one domain with the successful solutions implemented in the other domains.

Adaptation and Implementation: Those solutions which match the identified needs are then adapted and implemented in a systematic manner, taking into account the impact on other parts of the system.

Impact

A systemic and systematic methodology to transfer safety innovation across sectors. See https://link.springer.com/chapter/10.1007/978-3-319-45430-6_3

Industry	Maritime, all safety critical sectors
Funding mechanism	EC FP7 funding through the Seahorse project https://www.seahorseproject.eu/
Centre theme	Culture, competence, system modelling, change management, implementation

HUMAN FACTORS TRAINING FOR THE BIO-PHARMA MANUFACTURING SECTOR

STAMINA BPM

This project is funded by the European Union

The client's challenge

Translation of human factors training from aviation to the bio-pharma manufacturing sector in a way that addresses the particular challenges it faces.

What we did

We embedded our researchers in the industry partners to get an in-depth understanding of their culture systems and processes. Through structured, observations, interviews with a stakeholders, analyses of occupational safety and quality data and documentation review we built up a rich picture of the human factors challenges of the sector.

This formed the basis of a gap analysis, which identified common and distinctive training needs between the two sectors. This gap analysis was used to tailor human factors training to the sector – some elements could be readily adapted with industry-specific examples, while some new topics were required.

At core of the training we developed are:

- The Truffle Game – a serious game that highlights the particular human factors challenges of production to a recipe
- "A Whole Batch of Problems" – a short film depicting fictional scenarios in two pharma companies across the space of a day. The scenarios bring out the range of relevant human factors challenges.

Impact

A bespoke human factors profile and training programme for the sector

Industry	Bio-pharma manufacturing
Funding mechanism	EEC Leonardo funding through the STAMINA BPM project co-funded by partner organisations including bio-pharma companies
Centre theme	Competence, culture

USING ON-TRAIN-DATA-RECORDERS TO UNDERSTAND DRIVER BEHAVIOUR

Science Foundation Ireland sfi For what's next

Iarnród Éireann Irish Rail

The client's challenge

Irish Rail provides rail transport in Ireland. The company is strongly committed to enhancing safety performance to ensure a safe environment for both passengers and staff.

The modern Irish Rail train fleet is equipped with state of the art on-train-data-recorders (OTDR) which capture a wide range of operational data on train performance and driver actions. The primary uses of this data are fleet maintenance (i.e. fault finding) and incident investigation, but the wealth of data collected may have additional applications in improving railway safety which Irish Rail were keen to explore.

What we did

This project focussed on exploratory work to link the data collected on the trains to train driver and infrastructure performance. The vast quantity of data collected, including all control lever movements by drivers, means that a single one hour journey generates upwards of 10,000 lines of data. We analysed a selection of journeys at the same time of day over the same route during the same calendar month to compare the driving styles of different drivers in the data. We also examined the number of red signals approached by all trains over the course of one week, and ran an experiment comparing physiological data (heart rate and galvanic skin response) over the course of the journey to the OTDR data for the same journey. Preliminary findings from this experiment suggest that drivers physiological reactions are more closely related to anticipated events (such as braking) than to actual control actions.

Impact

The project provided Irish Rail with an improved understanding of how the metrics in their OTDR can be applied to safety management and monitoring. Further work is needed to operationalize the findings.

Industry	Transport
Funding mechanism	Funded by Science Foundation Ireland (SFI) as an Industry Fellowship
Centre theme	Risk and Safety Management

COMPETENCE DEVELOPMENT

JUST AS COMPETENCE IS A CORE THEME OF OUR RESEARCH, BUILDING COMPETENCE IS CORE TO OUR MISSION OF ENGAGEMENT WITH INDUSTRY. OUR CONVICTION IS THAT HUMAN-SYSTEMS KNOWLEDGE SHOULD NOT BE THE PRESERVE OF ACADEMIA, BUT SHOULD BE EMBEDDED IN EVERY SECTOR.

Bespoke Training

We can work with you directly to analyse your competence requirements and develop tailored solutions for your organisation. Or you can avail of our open Education and Training offerings. Building on over 25 years of industrial research the centre we offer a range of training and education possibilities from an online Master's Programme 'Managing Risk & System Change' to bespoke human factors and safety management shorter courses.

M.Sc/Postgraduate Diploma in Managing Risk and System Change

Our online M.Sc/Postgraduate Diploma in Managing Risk and System Change attracts students from a wide range of industries, including Finance, Emergency Services, Health, Aviation, Casino and Gambling, Law Reinforcement, Process and Software development across the globe. It is the first course of its kind that brings the next generation of safety, risk and change management that is embedded in everyday operational practice with a systemic, proactive and performance focus. World-class international teams who have collaborated through industrial research provide the highest calibre research led teaching, supervision and professional expertise.

The option of Certificate Level qualification for this course will also be available from September 2019. (https://psychology.tcd.ie/postgraduate/msc-riskandchange/).

Managing Yourself and Leading Your Team is a 3-day training programme that will help you achieve real outcomes for your own understand and gain knowledge in managing & leading your team; and decision making; develop your career prospects by identifying personal strengths & improvement areas. This short course is run in collaboration with Trinity Research in Social Science (TRiSS).

The STAMINA Human Factors Training is an industry leader in addressing safety, quality, reliability and improvement in organisations. We deliver Human Factors training to aviation, pharmaceutical and other safety critical organisations (e.g. healthcare, emergency services, process industries). Our philosophy is based on a dedication to developing human factors competence that extends beyond compliance with industry regulations.

Students of both our educational and training services also become part of a global community of practice, a community of professional learners, across a range of safety critical sectors, where they benefit not only from the academic and industrial experts delivering the course but also from the extended network of cross industries.

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About Us

We are a multidisciplinary centre, based in the School of Psychology, but incorporating expertise from Engineering, Computer Science, Health Care, Business Studies and other fields. In our 25 years we have had the privilege of working with many partners across industry and academia.

Director – **Prof. Sam Cromie**

It is a great privilege to be Director of the CIHS – to work with a team of highly experienced and dedicated researchers, to address the real challenges faced by diverse sectors, to produce solutions that put people front and centre.

The focus of my research has been on developing a sophisticated understanding of the application of human factors and safety management principles in real operational situations.

I have over 22 years' experience of action research in healthcare, aviation, pharmaceutical, process, manufacturing and maritime sectors and have worked with great organisations such as Aer Lingus, Rolls Royce, Airbus, British Airways, SAS, Cathay Pacific, EASA, Pfizer, BP & Statoil.

I have served on the JAA Maintenance Human Factors Subcommittee, working groups of the European Aviation Maintenance Training Committee and as an advisor to the HSE National Incident Management Team. I also run a training and consultancy business, delivering tailored human factors and safety management solutions to the aviation sector. This keeps my implementation focus sharp– the solution has to work for the end user.

Assistant Director – **Prof. Siobhán Corrigan**

I am Director of the online Masters in Managing Risk and System Change and Assistant Director of the Centre for Innovative Human Systems. My research focuses on working in partnership with industry in understanding the complexities of managing and implementing change and improving overall risk and safety performance. All of my projects are characterised by multifaceted industry collaboration allowing for the transfer of research-based knowledge from College into industry and services in order to meet societal and community challenges.

My current research focuses on understanding human behaviour, organisational learning, stakeholder collaboration, leadership and managing the risk in implementing change. I have played a leading role on a number of high profile EU, national and industry funded research and training projects and has an extensive range of collaborations with national and international industries, universities and research institutes. I am also an active member of a number of working groups both at EU and national level tasked with setting the research agenda for the future. I am a member of the LERO (The Irish Software Research Centre) https://www.lero.ie/, a certified STAMINA Human Factor trainer and I have substantial experience in the development, delivery & evaluation of Human Factors, Safety Management and Change Management training.

Centre founder – **Prof. Nicholas McDonald**

I have spent my career pursuing research on the role of people in complex systems with a focus on risk, safety, change, emergency response and system design. My early research convinced me that the answers must come from the system much more than the individual. Together with a group of aviation professionals, human factors practitioners and researchers we founded the Aerospace Psychology Research Group in 1996, which I then directed. Since then I have led and contributed to a series of international collaborative European-funded research projects progressively developing a systemic approach to human factors, initially focused on aviation, then broadened to other industries – process industry, emergency services, and more recently, health. Reflecting this, the APRG morphed into the Centre for Innovative Human Systems. Initiating the on-line Masters in Managing Risk and System Change in 2015 fulfills part of a mission to turn this research into practice. In late 2017 I retired as a full time academic and from directing the CIHS and the Masters programme, retaining a part-time role contributing to the Masters program and new research, but above all, using my time to focus on the implementation of the ideas, models, methods and tools we have been developing over the years, seeking to bridge the gap between theory and practice.

Centre Operations – **Paula Hicks**

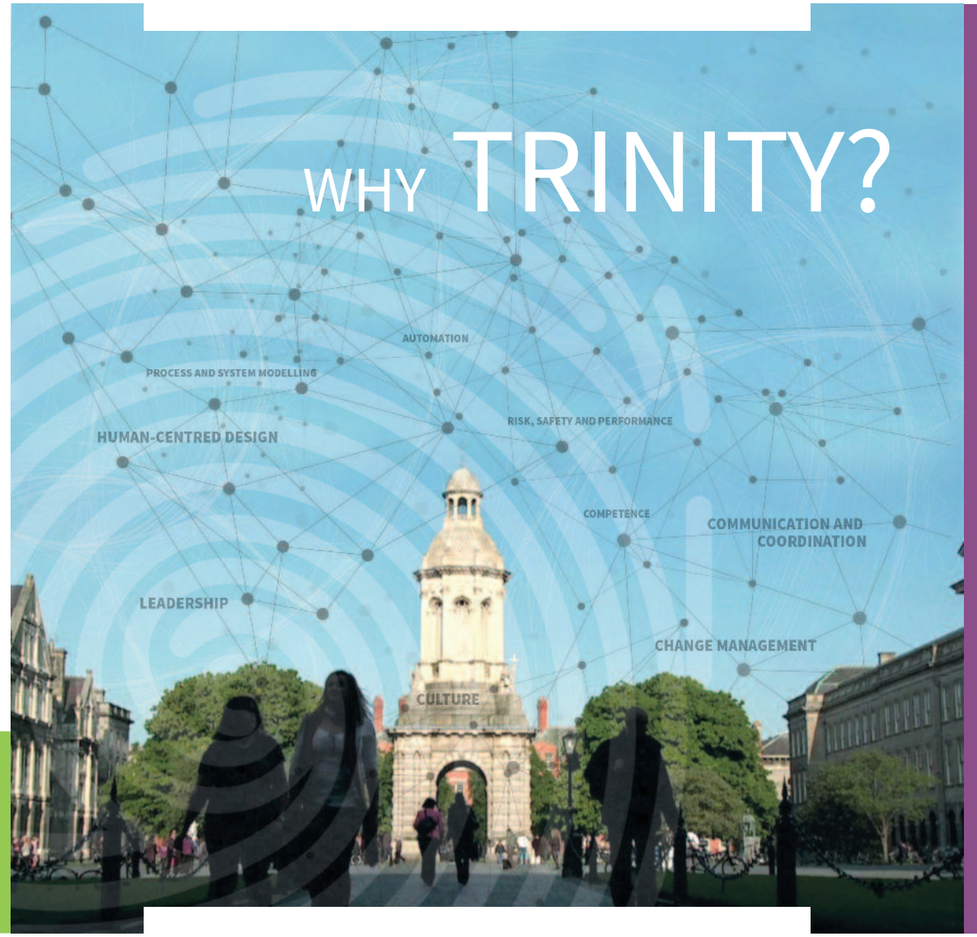
Having worked in Trinity College Dublin for over 20 years, I have gained extensive experience in a variety of roles, including Project Management, Research Centre Operations, Strategic Planning, Lecturing and Business Analysis. I joined CIHS in 2013, managing the day to day operations of the Centre, whilst also working closely with the Director and Management Team on Strategic Planning. I hold a Diploma in History of Art, Teaching Diploma in IT Skills, and a Masters in Health Informatics.

Prior to this role I worked as a research project manager in the Centre for Health Informatics where my expertise was in the use of innovative technology solutions and interventions to support improved psychosocial outcomes for children in hospital, leading two award winning projects. I have also developed modules and lectured to various programmes in the area Health Informatics, and have published a number of book chapters and journal articles.

Course Administrator & Centre Support – **Rory Carrick**

I have worked with Trinity College Dublin for the past fourteen years in a variety of roles including Undergraduate and Postgraduate admissions, examinations and a number of years coordinating the School of Business MBA programme. Additionally I have worked extensively on a college wide change management project. I joined the CIHS in 2015 to coordinate the Online M.Sc. in Managing Risk and System Change as well as support the CIHS involvement in research project planning and management.

I am a quadruple graduate of Trinity College holding a B.Sc. in Business and IT along with a Postgraduate Diploma in Project Management and am currently pursuing a M.Sc. in Digital Marketing Strategy. In addition I hold a Diploma in Counselling and Psychotherapy and a Diploma in Sports Nutrition.



Founded in 1592, Trinity College Dublin is the number one university in Ireland, and ranked 88th in the world for quality of its teaching and research. Knowledge created by Trinity is critical in shaping the education and opportunities we offer our students, and for the economic sustainability of Ireland itself. Through our Innovation and Entrepreneurship strategy Trinity seeks to harness and maximise the societal and economic benefits from all newly generated ideas and technologies.

CONTACT US

We would be happy to discuss any potential collaboration opportunities, please contact us.

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W www.tcd.ie/cihs

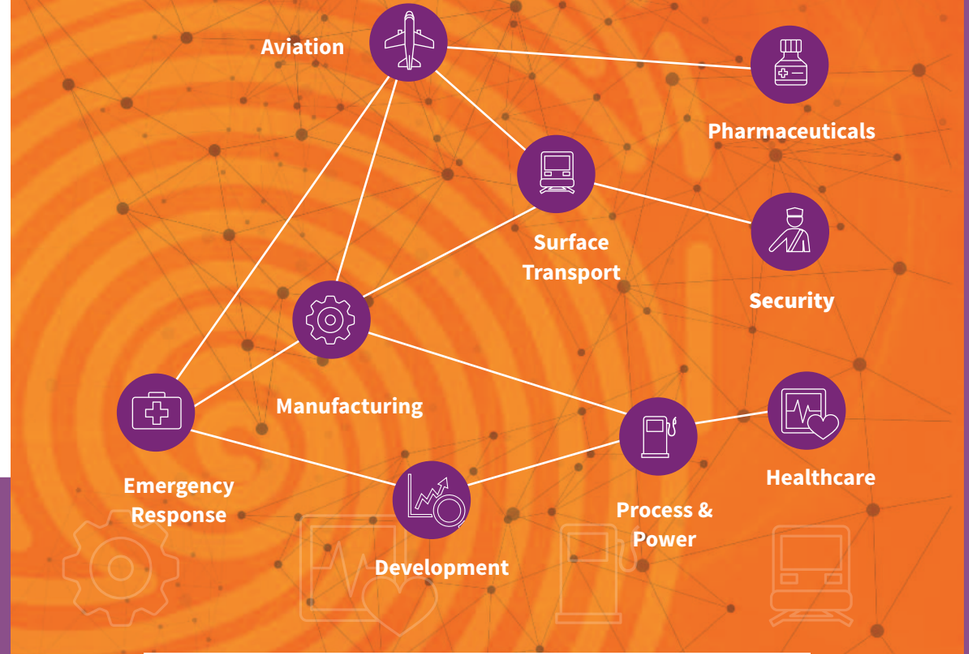
Why work with Us

The CIHS brings academic rigor and innovation together with a focus on the real-world needs of the industrial partner. Working with CIHS provides access to a world class research capability focusing on the specific challenges of the organisation without long term commitments. CIHS has built up over twenty-five years' experience with projects which aim to resolve problems and bring about meaningful changes in behaviour, operations and policy. These applied projects focus on areas such as developing and implementing safety training for the design, operation and maintenance; implementing process improvement initiatives to improve cost effectiveness; conducting needs assessments and safety culture assessments. Constantly innovating and evolving solutions means that there is a transfer of learning between multiple sectors. Transferring this expertise and knowledge to the benefit of organisations can be done in multiple ways, from leveraged research funding to dedicated research funding.

Researchers in the Centre for Innovative Human Systems have received national and international recognition for their work, with over €25 million of funding secured from European Commission research Programmes, National Funders and Industrial Sectors. CIHS researchers contribute to SFI Research Centres LERO and ADAPT, and are members of European and global research collaborations.

THESE ARE SOME OF THE SECTORS WE HAVE WORKED WITH

INDUSTRY SECTORS



"One of the outstanding qualities of the professionals of CIHS is their ability to communicate well with the industry, listen and understand its needs and above all develop realistic and effective solutions"

Vangelis Demosthenous, Managing Director of Kratis Training and Consulting

BUSINESS DEVELOPMENT TEAM

The Business Development team within Trinity Research & Innovation are here to help you identify and access this world class talent. We are keen to develop relationships with industry and to support industry engagement and the commercialisation of Trinity research

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Senior Business Development Manager
Email: ckeely@tcd.ie
+ 353 (1) 896 3028
+ 353 (0) 87 743 2836

Hugh O'Neill
Business Development & Innovation Manager
Email: hugh.oneill@tcd.ie
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+ 353 (0) 87 616 7857

FUNDING MECHANISMS

TCD's Office of Corporate Partnership and Knowledge Exchange (OCPKE) can provide a wealth of information on the most suitable funding mechanisms for research collaborations between researchers and your organisation from Science Foundation Ireland, and Enterprise Ireland. This can significantly reduce the cost of a project that you have in mind, or enable new activities that you wouldn't otherwise be able to justify. These mechanisms vary in range from small scale research engagements to larger strategic partnerships.

There are a multitude of possibilities available to industry including:

- Working together to develop new and improved products or services
- Placements for researchers within your organisation
- Joint training of doctoral researchers
- Long term high level partnerships between your organisation and Trinity researchers
- Collaborations can also lead to international consortia, with the possibility to bid for multi-million Euro European funding opportunities, and to access a range of new partners across the continent and beyond.

PARTNER ORGANISATIONS

Some of the organisations we have had the pleasure of working with

AIRBUS

ATHENS INTERNATIONAL AIRPORT ELEFTHERIOS VENIZELOS

AP&A GROUP

Alitalia SKYTEAM

Bord Altranais agus Cnáimhseachais na hÉireann
Nursing and Midwifery Board of Ireland

CARR COMMUNICATIONS

COMHLACHT CHALAFORT ÁTHA CLIATH
DUBLIN PORT COMPANY

CORBALLIS CONSULTING

deepblue

ESM Investigación y Formación en Seguridad y Factores humanos

EUROCONTROL

VisionMonitor

JEPPESEN A BOEING COMPANY

ICAPSS Irish Centre for Applied Patient Safety & Simulation

innaxis

KITE SOLUTIONS

KTH VETENSKAP OCH KONST

RRe Reducing Risk exposure as

CELTIC OIL

Iarnród Éireann Irish Rail

İTÜ İSTANBUL TEKNİK ÜNİVERSİTESİ

krátis Training & Consulting Ltd

nlr

oneview

SAGA

TECHNICAL UNIVERSITY OF CRETE

THALES

TNO innovation for life

SJÖFARTSVERKET

UCC University College Cork, Ireland Coláiste na hOllscoile Corcaigh
Medical Education Unit

UCD DUBLIN

Trinity College Dublin
Coláiste na Tríonóide, Baile Átha Cliath
The University of Dublin

Centre for Innovative Human Systems

PEOPLE
PROCESS
PERFORMANCE