

NATIONAL REGISTER OF
RF WORKERS



'Risk, perception, management and mitigation in RF Safety'

A National Register of RF Workers event
supported by the Cambridge Wireless Radio Technology SIG

12th November 2024



Welcome from

Maria Kelly, Leonardo and Chair of the RF Register

NATIONAL REGISTER OF

RF WORKERS

National Register of RF Workers Annual Meeting 2024

Sponsored by



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In conjunction with



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WIRELESS

History of the Register

Sprang from a recommendation by the made by the Independent Expert Group on Mobile Phones - Chaired by Sir William Stewart

“a register of occupationally exposed workers be established to facilitate studies into cancer incidence, mortality or other potentially harmful effects.”

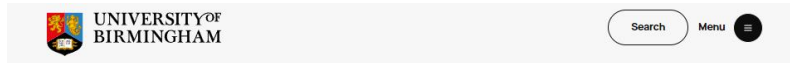
Management of the Register

The HSE established the Register in 2003.

The Register is managed by a Steering Group with members drawn from across the RF industry.

University of Birmingham (Department of Health Science) was selected to administer the database and facilitate recruitment.

Information About the Register



Home > Research > Research in the College of Medicine and Health > RF Register



National Register of RF Workers



- In RF Register
- > The National Register of RF Workers
- > About the Register
- > FAQs
- > How to Join
- > Useful links

The concerns over electromagnetic fields (EMFs) and specifically radiofrequency (RF) radiation continue to grow and have been labelled by the International Agency for Research into Cancer (IARC) as "possibly carcinogenic to humans".

Search for "National Register of RF Workers"

It will show up under University of Birmingham

Click "FAQs"

Click "How to join"

Please join the Register if you are not already signed up.

Who is eligible for inclusion?

The Register consists of people :

“whose work brings them in close proximity to transmitting antennas, broadcasting masts or are otherwise potentially exposed above public exposure guidelines”

Job categories will be classified into three broad exposure groups for analysis (high, medium and low).

Currently there are over 2700 names held on the register database.

How will the Register be used?

The Register will be used in investigations examining potential adverse health outcomes such as :

- Cancer incidence and mortality
- Cognitive effects
- Eye conditions
- Sleep disorders
- Any emerging health concerns...

Initial follow-up study

First study underway: a long-term, follow-up study.

Over time and as numbers increase both this, and future studies will become more informative.

Results will appear in the scientific literature and inform future policy, regulations, and guidance.

The coming years...

Predicted numbers = by end of 2028 will be in excess of 3000.

Research into the effects of RF exposure are likely to be of continued importance :

- EMF Directive
- Public concern

Sponsorship

Following the HSE's financial support, in 2005, Industry took over sponsorship

Currently sponsored by Arqiva, Everything Everywhere, Leonardo and Link Microtek.

For 2025 onwards graduated sponsorship packages available, between £1000 and £5000 per annum.

Please speak to any member of the Steering Group for further information if you would like to get involved.

<https://www.birmingham.ac.uk/research/activity/mds/projects/haps/ioem/rf-register>

A word from our event partner Cambridge Wireless

Brian Collins, BSC Associates

& Radio Technology SIG Champion for CW (Cambridge Wireless)





OUR MISSION IS TO HELP OUR MEMBERS GROW

NETWORK

Meet & collaborate with companies across all industry sectors for shared success

LEARN

Learn about and debate the latest developments in wireless technology and its applications

GROW

Strengthen business capability and reach in a rich and diverse community of members

The CW community comes from across the whole technology ecosystem

Testing



Broadcasters



Rapid scale-ups



Devices



Software giants



Vertical markets



Embedded



Equipment and components



Network operators



Consultants



Special Interest Groups (SIGs) are the backbone of CW activities

- Focus on specific technology and market sectors
- Keep members up to date with industry developments
- Create opportunities for influencing developments
- Explore new business opportunities
- Encourage networking

- Academic & Industry
- Artificial Intelligence
- Automotive & Transport
- Connected Thinking
- Content Production & Delivery
- Enhanced Mobile Broadband
- Future Devices & Technologies
- Healthcare
- Industrial IoT
- Location
- Non-Terrestrial Networks
- Radio Technology
- Security, Privacy, Identity & Trust
- Small Cell
- Smart & Intelligent Cities
- Sustainability
- User Experience
- Virtual Networks
- Wireless Heritage

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Agenda

- **Jonathan Dudley, Radiation Protection Adviser, Defence Radiation Protection Services, part of AWE** - 'Management of EMF/RF Safety in Defence'
- **Karen Fuller, HM Specialist Inspector of Health and Safety (Radiation), Health and Safety Executive** - 'EMF – A HSE perspective'
- **Sami Gabriel, Distinguished Engineer, Vodafone** - 'RF risk perception, mitigation and precaution, an overview'
- **Azadeh Peyman, EMF Dosimetry Group UK Health Security Agency, BioEM President and Secretary of EMF and Health subgroup of COMARE** - 'UK activities in the field of EMF and Health: BioEM and COMARE'
- **Sundar Ali, Senior Design Manager, MBNL** - 'EMF Compliance Modelling Methods & Challenges'
- **Paige Hulls, Senior Research Associate, Bristol Medical School, University of Bristol** - 'The promises of 5G - are they fulfilled according to business and industry stakeholders in Europe and the United Kingdom?'
- **Panel with all speakers**



'Management of EMF/RF Safety in Defence'

Presented by

**Jonathan Dudley,
Radiation Protection Adviser,
Defence Radiation Protection Services, part of AWE**





Management of EMF / RF Safety in Defence

Jonathan Dudley - Defence Radiation Protection Services





Contents

- About me
- Sources of EMF in MOD
- EMF safety prior to 2016
- MOD approach to compliance
- Incidents

About me

- Graduated Uni of Portsmouth in 1997 (MPhys) and 1998 (MSc Microwave Communications and Solid State Physics)
- Joined DERA in 1998
 - Maritime Communications
- Joined Northrop Grumman in 2010
 - Tactical C2
- Joined Dstl in 2012
 - Radiation Protection Adviser
 - MOD lead SME for EMF Safety





MOD Facts

- 190,000 service personnel
- 63,000 civilians
- Hundreds of sites including
 - Army camps
 - RAF bases
 - Ships and Naval bases
 - Ranges
 - Research and logistics establishments etc. etc.

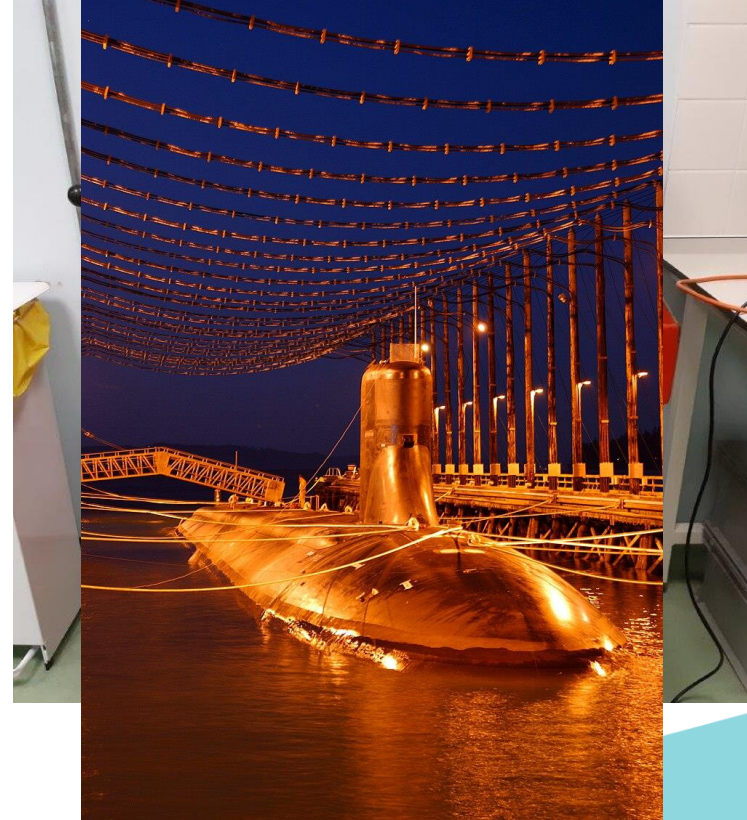
EMF Sources in MOD

- Radar
- Radio (tactical and strategic)
- Electronic warfare systems



EMF Sources in MOD

- Impressed Current Cathodic Protection
- Degaussing / deperming
- Magnetic particle inspection
- And almost everything else you might think of.....!



MOD EMF Safety Policy

- JSP 392 – Management of Radiation Protection in Defence
 - Chapter 35 – Electromagnetic Fields 0-300 GHz (Including Radio Frequency Radiations)
- EMF Safety Roles including training requirements
- EMF Exposure Assessments
- EMF Risk Assessments
- EMF Local Orders
- Invokes the military exemption from CEMFAW 2016 Reg 4

35 Electromagnetic Fields 0 Hz – 300 GHz (Including Radio Frequency Radiations)

Scope

1. This Chapter provides guidance for the hazards from electromagnetic radiation in the frequency range 0 Hz - 300 GHz. This frequency range includes:
 - a. static electric fields and magnetic fields;
 - b. Low Frequency (LF) radiation;
 - c. Radio Frequency (RF) radiation;
 - d. microwave radiation; and
 - e. Millimetre Wave (mmWave) radiation.
2. The electromagnetic radiation and Electromagnetic Fields (EMFs) mentioned in this Chapter, only refer to radiation and fields in the frequency range 0 Hz – 300 GHz. Higher frequency electromagnetic radiations in optical and ionising radiations are covered elsewhere in JSP 392 (See Figure 1 of Part 2) or specific JSP. The Defence requirement is in DSA01-2 Chapter 11. Applicable Statutory and Defence Regulations are referenced where practicable so to do.
3. This Chapter explains requirements for the keeping and using of equipment emitting Electromagnetic Fields (EMFs), or equipment containing components which emit EMFs. Such equipment includes (non-exhaustive):
4. Systems designed to emit EMF:
 - a. communications systems (voice and data);
 - b. diathermy;
 - c. dielectric heaters;
 - d. electronic countermeasures;
 - e. gaussing / de-gaussing / de-perming;
 - f. induction heaters;
 - g. magnetic non-destructive testing;
 - h. metal detectors;
 - i. mobile telephony, Wi-Fi and Bluetooth;
 - j. Radar; and
 - k. RFID.



Risk Assessment

- DEMA test all new systems designed to emit EMFs
- Radio Site Clearance Certificates provide safe distances
 - Personnel and members of the general public
 - Fuels and flammable atmospheres
 - Explosives – military and civilian
- HIRTA
- Medical Systems
- Vehicles



Unit Level EMF Protection Requirements

- Appointment of an ESO
- Conducts EMF Exposure Assessment using questionnaire(s)
- Updates risk assessments
- Generation of local orders
- Appoints appropriate ERPS or WPS(E)
- Support and training throughout provided by DRPS
- Assurance provided by DRPS



Controls

- Use of permit to work systems / SHIPHAZ boards overseen by SQEP
- Occupied areas where overexposure is reasonably foreseeable may undertake monitoring
- Some workers may be issued with personal monitors



What if it goes wrong

- All suspected EMF overexposure are reportable incidents
 - Each service has its own process
- Local investigations with reporting to
 - DRPS, DEMA Radhaz, CESO, INM (or equivalent) etc for provision of SME to support investigation and advise on response.
- All incidents are reviewed at service level RADHAZ committees



Example Incidents

- Workers topside on warship in the vicinity of Satcom emitter
 - No injury
 - SHIPHAZ procedures reviewed and additional training provided
- Personal monitor went into alarm on hangar roof at an RAF Station
 - No injury
 - Processes put in place to bring hangar roof under the 3m rule
- Reported symptoms when working on Nuclear Quadrupole Resonance experiments
 - No injury
 - Only 0.5 W presented to coil
 - Training and lone working issue

Example Incidents – not UK

- Exposure of a Norwegian ship to a SPY-1D radar on a US ship in 2012 (Moen et al, Uni of Bergen)
 - Some crew topside experienced warming, one instance of jaw pain
 - A number of crew became symptomatic over next few days
 - Hospital examinations showed no issues
 - Likely symptoms caused by stress/anxiety



Public Domain, <https://commons.wikimedia.org/w/index.php?curid=884603>

Heat Injury from a Patriot Missile Radar (US Army)



- Soldier carrying out maintenance in vicinity of operation Patriot Missile radar for approx. 10 minutes
- A range of symptoms was reported including sweating, headache, vomiting, blurred vision
- Estimated that the soldier received a 10x overexposure
- Symptoms resolved and soldier was discharged the following day with no further issues



Courtesy of the US Air Force Research Laboratory

Mild Skin Burn from Electronic Countermeasures Pod (USAF)



- Worker overexposed when ECM pod activated without a RAM hood. Supervisor entered room and immediately noticed and placed the hood on the ECM
- Approx 30s exposure leading to skin erythema to ear and face of the supervisor. Worker reported nausea
- Suspected 10x overexposure against limit
- Confirmed overexposure with injury for supervisor – full recovery in a few days
- Confirmed overexposure with no injury for the worker



Courtesy of the US Air Force Research Laboratory



US EMF Incident Stats

- 35,000 USAF personnel working with high power EMF emitters
- 2015-2022 – 146 suspected overexposures in 41 investigated incidents
- 1 documented injury
- Symptoms described with no evidence of overexposure in 75/113
- Symptoms described with inconclusive evidence of overexposure 25/113
- No documented cases of long lasting injury/illness solely attributable to EMF overexposure (1965 – 2023)



Thanks for listening – Any Questions?



'EMF – A HSE perspective'

Presented by

**Karen Fuller,
HM Specialist Inspector of Health and Safety
(Radiation),
Health and Safety Executive**

EMF: A HSE Perspective

Karen Fuller

HM Specialist Inspector of Health and Safety (Radiation)

Introductions

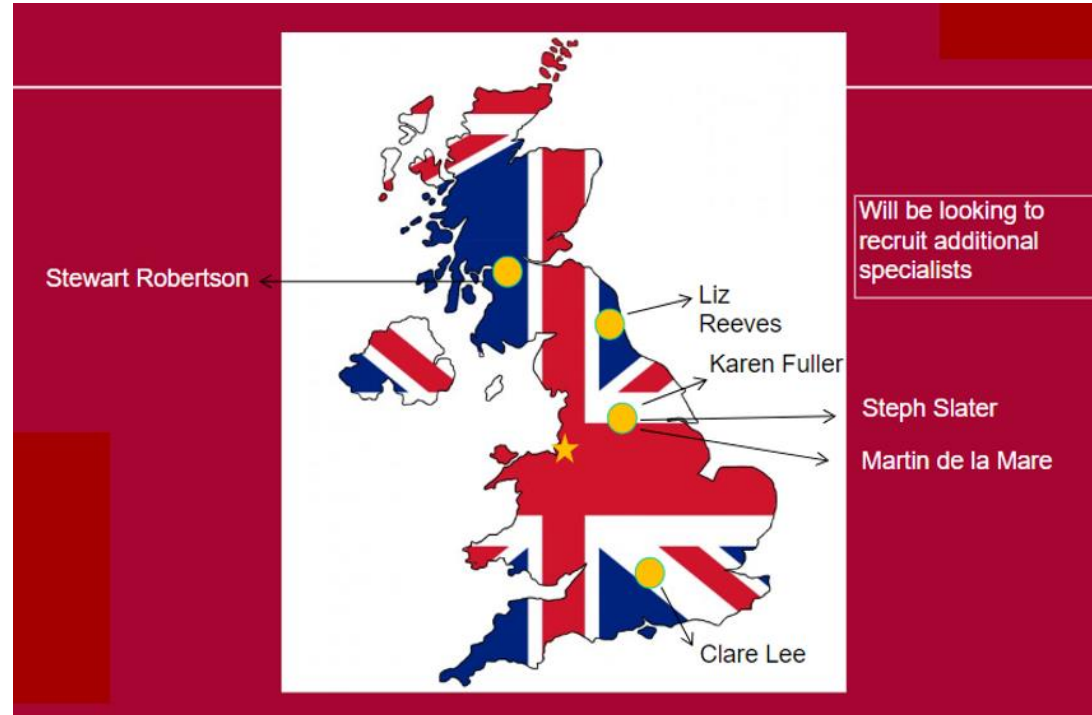
My background

HSE

Radiation Team

Policy support

Sector



Relevant Regulations

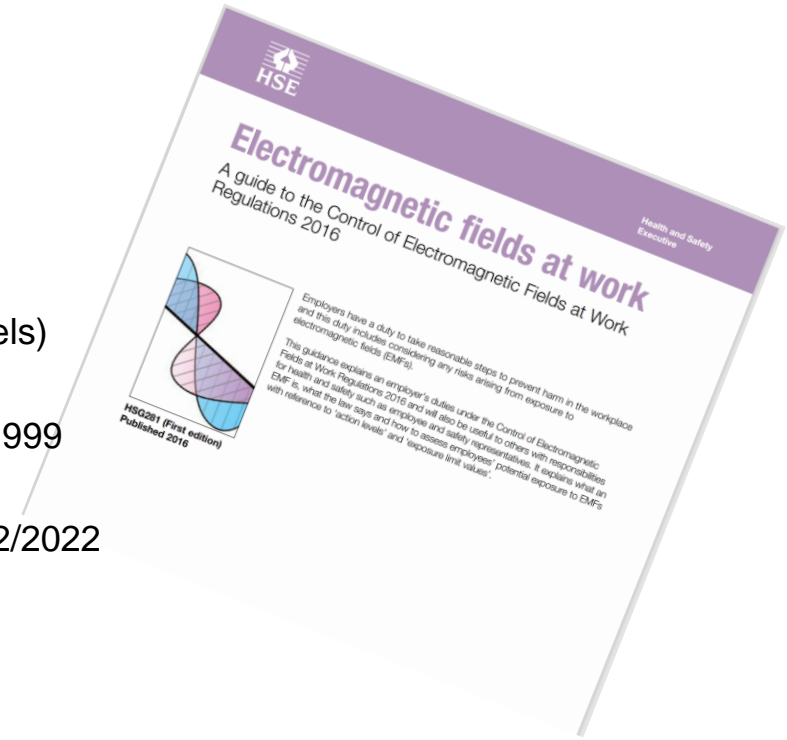
Health and Safety at Work, etc Act 1974

Control of EMF at Work Regulations 2016

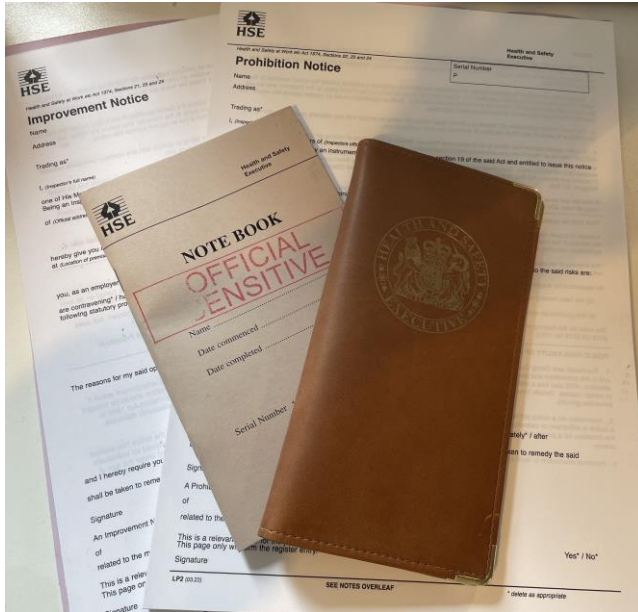
(European Non-binding Guide and ICNIRP reference levels)

Management of Health and Safety at Work Regulations 1999

Personal Protective Equipment at Work Regulations 1992/2022



How HSE regulates



Proactive v's reactive

Enforcement tools

Prosecution

Prohibition Notices

Improvement Notices

Notification of Contravention

Advice - written or verbal

Employer vs Employee

Concerns and Advice,
RIDDORS, Notifications,
Intelligence

Investigations vs PLIs

Example re-active real case

Concern raised by employee/contractor

Telecoms work on pylons

Alleged no outage

MHSW99, Reg 5

Health Surveillance, Reg 6

Mobile phone base stations: regulatory overview

UKHSA – advise government

Local Authority – planning permission

OFCOM – license to operate

HSE – COEMFWR2016

Operators – HSAW74, Section 3(1)

New exemption to the Control of EMF at Work Regulations

Transcranial Magnetic Stimulation

Onus on applicant
External expertise

Applies to 4(1) and 7(1) only



HEALTH AND SAFETY EXECUTIVE

CONTROL OF ELECTROMAGNETIC FIELDS AT WORK REGULATIONS 2016

CERTIFICATE OF EXEMPTION No. 1 OF 2023

In accordance with the powers conferred upon it by regulation 13 of the Control of Electromagnetic Fields at Work Regulations 2016 ("the Regulations") the Health and Safety Executive ("the Executive") grants the following Certificate of Exemption ("exemption").

EXEMPTION

1. Where the conditions in paragraph 3 are met, employers are exempt from the requirements of regulations 4(1) and 7(1) of the Regulations in relation to exposure which occurs during the following work activities:
 - a. electrolysis as part of a manufacturing process;
 - b. the use of dielectric heating equipment;
 - c. the use of induction heating equipment;
 - d. the use of manually-operated resistance welding equipment;
 - e. the use of magnetic resonance imaging equipment other than for patients in the health sector; and
 - f. magnetic stimulation.

DEFINITIONS

2. In this certificate:

"dialectic heating" means heating material by means of dielectric polarisation;

"electrolysis" means the process by which direct current electricity is used to drive a non-spontaneous chemical reaction to separate elements in naturally occurring materials;

"induction heating" means heating material by means of electromagnetic induction;

"magnetic stimulation" means stimulation of nervous tissue by means of magnetic fields for the purposes of medical diagnosis and treatment, and neurophysiological research;

"resistance welding" means welding materials together at one or more points by means of heat generated via the electrical resistance of those materials.

Guidance Documents

Utilities Sector – industry guidance

Department for Culture, Media and Sport



'RF risk perception, mitigation and precaution, an overview'

Presented by

Sami Gabriel
Distinguished Engineer,
Vodafone



'UK activities in the field of EMF and Health: BioEM and COMARE'

Presented by

Azadeh Peyman

**EMF Dosimetry Group UK Health Security Agency,
BioEM President and Secretary of EMF and Health
subgroup of COMARE**



'EMF Compliance Modelling Methods & Challenges'

Presented by

Sundar Ali
Senior Design Manager,
MBNL



MBNL

Infrastructure Management Services

Managing the mobile infrastructure to enable Digital Britain

EMF Compliance Modelling & Challenges

By Sundar Ali, CEng, BEng, MIET

Senior RF Design Manager at MBNL, a Joint Venture company between BT/EE and Three



- UK EMF Compliance Legislations & Standards
- UK Mobile Operators Licensed Frequency Bands
- ICNIRP 2020 Limits
- Assessment Methods & Considerations
- 2D CAD Blocks
- 3D Modelling
- EMF Compliance Modelling Challenges

Legislations & Standards	Occupational Workers	General Public
Health and Safety at Work Act 1974	The basis of British health and safety law is the Health and Safety at Work Act 1974. The Act sets out the general duties which employers have towards employees and members of the public, and employees have to themselves and others.	
Management of Health and Safety at Work (MHSAW) Regulations 1999	MHSAW generally makes more explicit what employers are required to do to manage health and safety under the Health and Safety at Work Act. For example, operator has a duty to carry out a risk assessment at each site which covers the risks to the health and safety of employees and non-employees.	
Control of Electromagnetic Fields at Work (CEMFAW) Regulations 2016	Defines minimum H&S requirements related to EMF compliance	Refers to European Council Recommendation 1999/519/EC
	Compliance to ICNIRP Occupational Exposure Level Values (ELV)	
Construction Design and Management CDM 2015	Defines roles and responsibilities in construction and aims to improve health and safety in the industry. For example, when preparing or modifying designs, designers have duties to eliminate, reduce or control foreseeable risks that may arise during or post construction.	
Ofcom License Conditions	Refers to pre-existing H&S legislations	Compliance to ICNIRP Public Exposure Level Values (ELV)
International Commission on Non-Ionizing Radiation Protection (ICNIRP)	Defines Occupational Exposure Level Values	Defines Public Exposure Level Values
DCMS Code of Practice (2022) for Wireless Network Development in England	Operators agreed to provide ICNIRP certificate declaring compliance to ICNIRP guidelines and EC Recommendations	
Health and Safety Executive (HSE)	Leads on occupational health	Refers mainly to other bodies
UK Health Security Agency (UKHSA)	Refers mainly to other bodies	Leads on public health and enforced by Ofcom



UK Mobile Operators Licensed Frequency Bands



Freq (MHz)	Max EIRP	EE	VF	H3G	TEF
700	64dBm/5Mhz	10Mhz	-	10Mhz	10Mhz
800	64dBm/5Mhz	5Mhz	10Mhz	5Mhz	10Mhz
900	62dBm/200Khz 65dBm/5Mhz	-	17.4Mhz	-	17.4Mhz
1400	68dBm/5Mhz	-	20Mhz	20Mhz	-
1800	62dBm/200Khz 65dBm/5Mhz	40Mhz	5.8Mhz	15Mhz	5.8Mhz
2100	65dBm/5Mhz	20Mhz	15Mhz	15Mhz	10Mhz
2300	61dBm/5Mhz	-	-	-	40Mhz
2600	61dBm/5Mhz	50Mhz	20Mhz	-	25Mhz
3400	65dBm/5Mhz	40Mhz	50Mhz	60Mhz	40Mhz
3600	65dBm/5Mhz	40Mhz	80Mhz	80Mhz	80Mhz
3900	60dBm/5Mhz	-	-	84Mhz	-

Freq Band (MHz)	Occupational Exposure Level (W/m-2)	Public Exposure Level (W/m-2)
700	17.5	3.5
800	20	4
900	22.5	4.5
1400	35	7
1800	45	9
2100	50	10
2300	50	10
2600	50	10
3400	50	10
3600	50	10
3900	50	10

Technologies and Power levels

- Maximum Transmit Power (Restricted by licensed EIRP limits)
- Technology Duty Cycle (Varies with Technology)
- Power Reduction Factor (Depends on Technology & Power control features)

Antenna Characteristics

- Gain, Vertical & Horizontal beamwidths
- Frequency & tilt range
- Combined composite envelope patterns for full operating range

Safety Margins for Public and Occupational compliance

- Other 3rd party sources not covered
- RF diffractions etc.

Multi-operator co-operation

- Multi-operator forum shares maximum deployed configurations
- Site specific information where necessary

Stuart Report precautionary approach

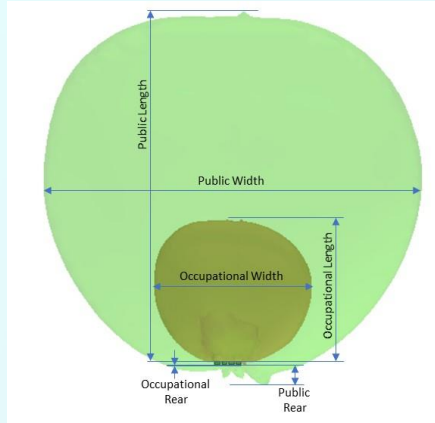
- Safe by Design approach
- Modelling based on worst case scenarios

2D CAD Blocks

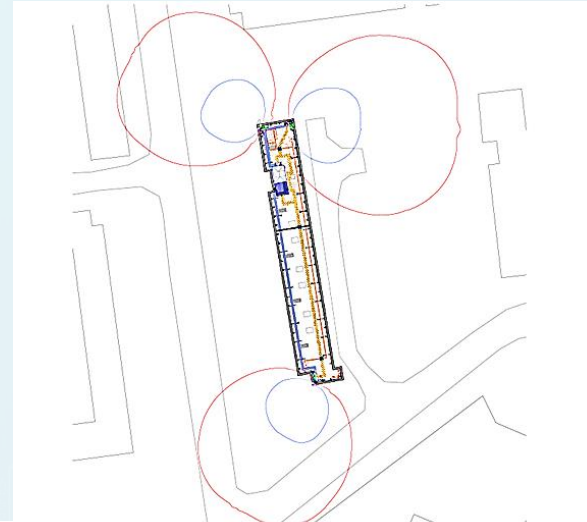
- Used for standard cases

3D Modelling

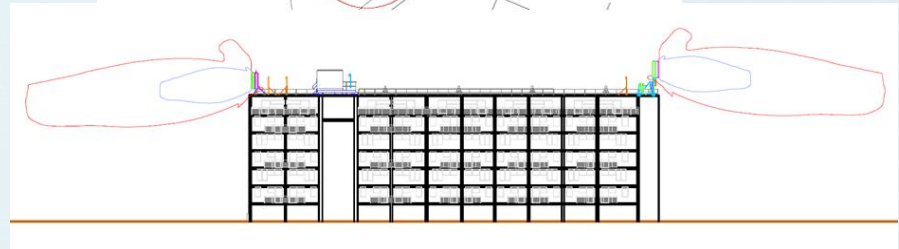
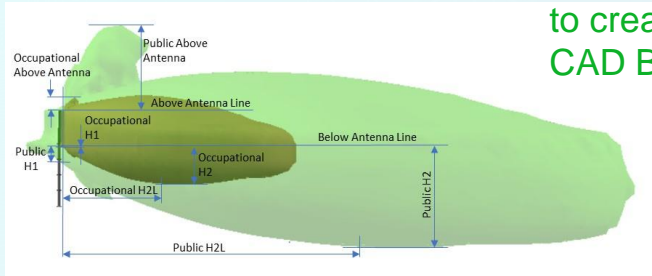
- Used for non-standard and complex cases

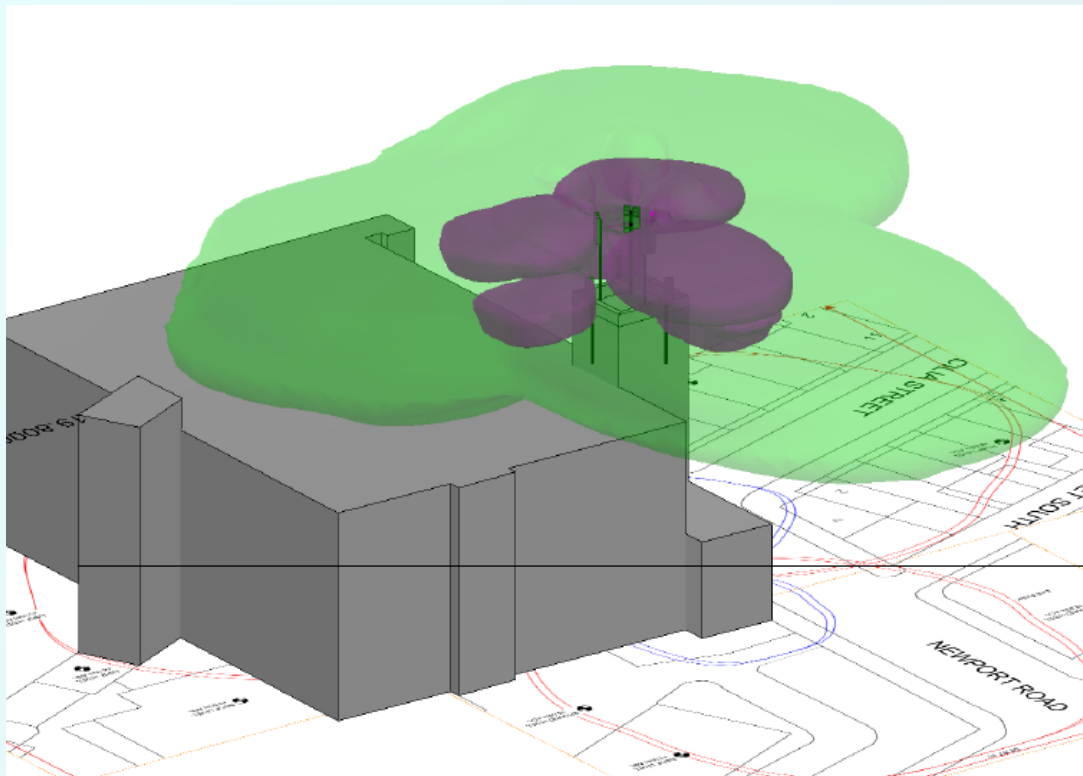


The 3D EMF modelling output is used to create 2D CAD Blocks



On most standard sites these 2D CAD blocks can be used to assess EMF compliance





Mainly used on non-standard or complex sites

- Easily assess compliance using 3D birds eye views

Suitable on multi-operator sites

- Assess multiple antenna at different heights and on different levels

3D buildings and surrounding environment

- Draw building and objects using dimensions from drawings or other sources

EMF Compliance Modelling Challenges

Power Control Functionalities

- Many RAN vendor features are early in development cycle and further validation required

Challenges with Spatial Averaging

- Different schemes require averaging over a large number of points
- Boundary line for compliance zones require interpretation

Realistic Powers

- Published papers by IEEE and IEC recommends realistic powers to be less than 25% of Max Tx Power but application of this varies in the industry
- More research and field measurements needed on maximum versus realistic powers

Buildings Materials & Propagation

- Ofcom published a report on building materials and propagation which found data relating to domestic buildings are poorly represented
- While this report is focusing on the impact of building materials on propagation of radio waves, more research on different building materials and propagation could improve EMF modelling accuracy



Q&A



'The promises of 5G - are they fulfilled according to business and industry stakeholders in Europe and the United Kingdom?'

Presented by

**Paige Hulls,
Senior Research Associate,
Bristol Medical School,
University of Bristol**



GOLiAT

5G EXPOSURE, CAUSAL EFFECTS, AND RISK PERCEPTION THROUGH CITIZEN ENGAGEMENT

The promises of 5G – are they fulfilled according to business and industry stakeholders in Europe and the United Kingdom?

Dr Paige Hulls, University of Bristol

The GOLIAT Project

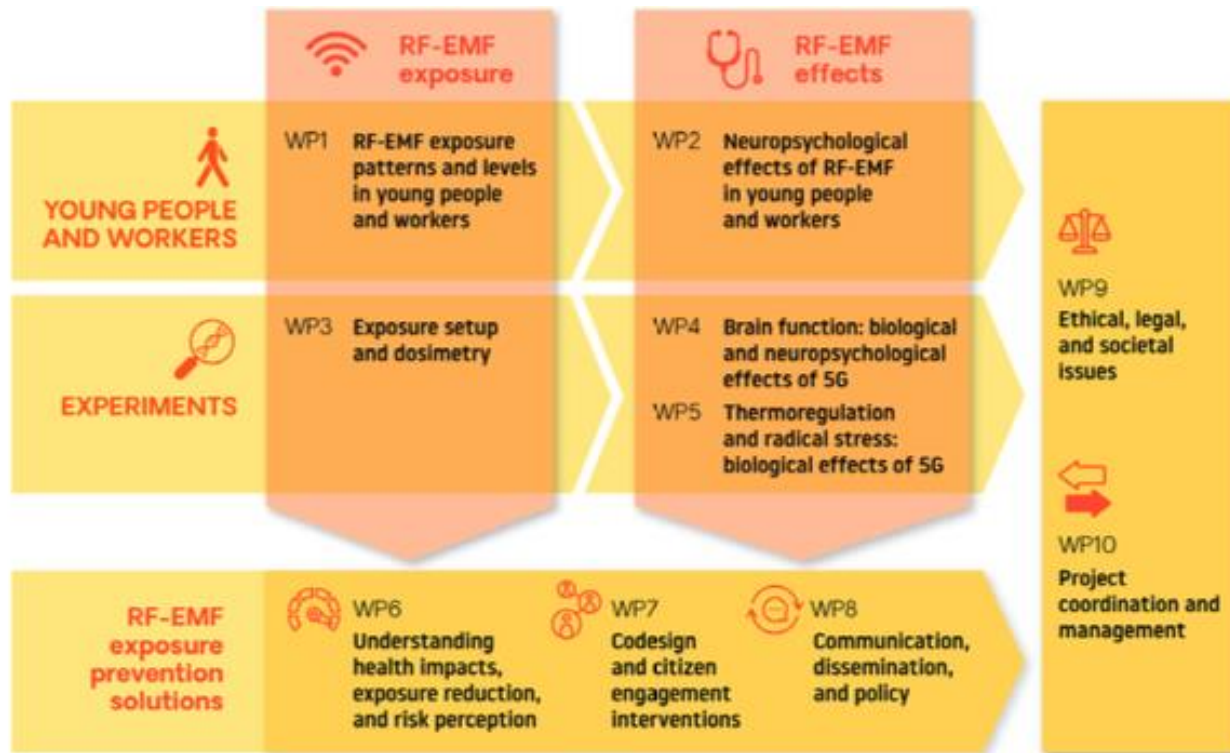


A new research programme on 5G communication, effects and risk communication has been funded by the European Union Horizon Programme; GOLIAT.

The aims of GOLIAT are to **monitor radiofrequency electromagnetic fields (RF-EMF) exposure**, particularly **from 5G**, provide **novel insights** into its **potential** causal **health effects**, and **understand how exposures and risks are perceived** and best communicated using citizen engagement.

The University of Bristol is one of the 25 institutions from 12 countries collaborating on this European project.

The GOLIA Project



Stakeholder scoping exercise

AIM: Conduct detailed semi-structured interviews from representatives (20 from 5 countries: UK, Belgium, Poland, Spain, Switzerland) to obtain individual perspectives on where important implementations of 5G technologies are occurring or are expected to occur, and contacts to follow up for additional detail.

We interviewed 14 professionals and/or stakeholders, who were involved in or had knowledge regarding the development, implementation, or use of 5G and/or associated technologies from the UK, Belgium, Spain, Switzerland, and Poland.

Interviews were conducted on Microsoft Teams between March and August 2023.

Stakeholder scoping exercise

Participant country	Number of interviews	Participant gender	Employment sector	Years of experience
UK	7	Males: 5 Females: 2	Government: 3 Private: 4	10-19 years: 1 20-29 years: 3 30-39 years: 1 40-49 years: 2
Spain	2	Males: 2	Government: 2	10-19 years: 1 30-39 years: 1
Switzerland	1	Male: 1	Private: 1	10-19 years: 1
Belgium	2	Males: 2	Government: 1 Private: 1	10-19 years: 2
Poland	2	Males: 2	Government: 1 Private: 1	20-29 years: 2

Overview of the main 5G trends

- For businesses, there is now the opportunity to incorporate 5G into working practices, to deliver contextual information in real time and connect large numbers of devices, alongside artificial intelligence applications.
 - Although work on 5G began in 2015, 5G deployment is still continuing across Europe.
 - Participants had mixed opinions about 5G as “it will not be the solution to the problems that we thought”, but that “5G is still developing”.
-

5G in the workplace

- The introduction of 5G in workplaces was viewed as “pretty small” and in several countries “it hasn’t been taken up very well”.
 - Occupational settings where 5G had been taken up including farming, airports and university campuses.
 - Introduction was also influenced by government-funded schemes to pilot 5G within businesses.

Future of 5G

- Participants felt that it could lead to a “natural evolution in factories”. However, this would require continuing investment in user equipment and resources, as “all equipment would need to be able to connect to the 5G network”.
- Experiences varied, but participants acknowledged that COVID-19 had had an impact on public perception, with misinformation being a prominent factor.
- There appears to be a lack of clarity with respect to who is responsible for delivering this type of information – government, operators or companies using 5G. Lack of engagement led to “a lot of anxiety with the people and also a lot of applications for measurements in their homes”.

Moving forwards

- Despite the existing literature regarding 3G and 4G, working around 5G and addressing public concerns continues to be a challenge.
- Future research needs (and in coming years, this may change) to prioritise engaging with businesses, to understand their decision-making processes, and to explore why uptake has been lower than expected.
- Businesses should have access to clear cost-benefit models to help them fully understand the financial investment required and possible return, alongside the identification of any relevant financial support.
- Researchers should engage with employees working in 5G-implemented areas to ensure that any health concerns they may have regarding 5G exposure can be addressed.

AIM: Conduct measurements of worker exposure in 5 countries (UK, Belgium, Poland, Spain, Switzerland) to characterize and assess new exposure sources and scenarios.

The University of Bristol is responsible for identifying new occupational RF-EMF sources resulting from 5G deployment and estimate RF-EMF exposure levels and patterns in workers.

We have struggled to recruit companies since ethical approval was granted in April 2024. Have completed limited data collection with a Cambridge company and are now in talks with a company in Bath, with the aim of completing some data collection before end of January 2025.

Next steps: Data collection

We would like to conduct personal exposure measurements among workers who are exposed to radiofrequencies, for a short period of time during working hours.

The personal exposure measurement meter (ExpoM-RF 4 device) will be provided for you to wear in a waist belt bag for the duration of your shift.

If you are happy, we would like to return at a later date and repeat the measurements.



More information



To find out more information about the GOLIAT Project: <https://projectgoliat.eu/>

For further information about our data collection plans:

Dr Paige Hulls - paige.hulls@bristol.ac.uk

Prof Frank de Vocht – frank.devocht@bristol.ac.uk



Thank you!

 **GO LiAT**

projectgoliat.eu