



UK Atomic
Energy
Authority

Mission and Goals 2017/18



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UKAEA's Director's objectives for 2017/18

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- 4** Design the first fusion power plants
- 5** Develop Harwell and Culham sites as Science and Innovation Centres

Enabling Environment

Performance Measures 2017/18

Future proofing

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The research done at Culham Centre for Fusion Energy is rightly recognised as world class and it has driven UK leadership in fusion R&D for many years. The Government has no intention of compromising this position following the decision to withdraw from the Euratom Treaty.

Maintaining and building on our world-leading fusion expertise and securing alternative routes into the international fusion R&D projects such as the Joint European Torus (JET) project at Culham and the ITER project in France, will be a priority.

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Jo Johnson MP, Minister for Universities, Science, Research and Innovation – February 2017

Introduction

Mission: To lead the commercial development of fusion power and related technology, and position the UK as a leader in sustainable nuclear energy.

This mission reflects national needs and covers both fusion and research relevant to the resurgence of UK fission, and other spin-off and growth technologies.

Increasing energy demands, concerns over climate change and limited supplies of fossil fuels mean that we need to find new, cleaner ways of powering the planet. Nuclear fusion – the process that drives the sun – could play a big part in our sustainable energy future. Harnessing fusion power is a major challenge for mankind and one of the most promising options for generating large amounts of base load carbon-free energy in the future.

We aim to maintain our status as a world-class fusion lab and expand our technology-based R&D to progress key technology issues for the next steps in fusion reactor design. We are working with national laboratories, universities and industry to improve the UK's wider nuclear capability and exploit synergies in areas such as advanced nuclear materials, robotics in hazardous environments, nuclear modelling, integrated systems and virtual engineering.

These collaborations will directly support the government's emerging industrial strategy, placing the UK as a market leader in the growing fusion market and supporting high tech jobs nationally.

Our mission and vision for UKAEA are encapsulated in five headline goals:

- 1** Maintain the UK's position as a world leader in fusion research
- 2** Enable skills and jobs growth in UK industry
- 3** Grow the UK's nuclear materials and technology capability
- 4** Design the first fusion power plants
- 5** Develop Harwell and Culham sites as Science and Innovation Centres

Summary of ExCo Objectives



Ian Chapman
Chief Executive Officer
CEO

Engage with government on developing government policy including departure from the EU and the industrial strategy.

Secure new sources of income for all parts of the current UKAEA programme.

Provide leadership of the R&D programme, clearly define and communicate the UKAEA's overall strategy.

Ensure appropriate good governance for UKAEA.

Ensure high standards of delivery and thereby the achievement of UKAEA's Goals and performance measures



David Martin
Chief Operating Officer

Responsibility for operational activities including JET Operations and ensuring that the right capabilities and resources are available to support delivery of UKAEA programme/projects.

Ensure the requirements of the Safety, Health, Environment and Quality policies are adhered to within operational areas, and that sufficient resources are available to do so.

Deliver Oxford Advanced Skills.

Engage with Industry to support UKAEA Goals delivery.

Improve leadership and management skills to support UKAEA's growth and long-term strategic capability requirements.



Catherine Pridham
Director of Finance and Corporate Affairs

Complete the U4BW ‘post implementation’ plan and stabilise operations. Deliver the system update and drive benefits from the U4BW system.

Complete the Annual Report & Accounts, with no audit qualifications.

Complete the pension scheme transfer to Alpha and establish the longer-term administration arrangements.

Optimise use of new external funding in fulfilment of UKAEA’s strategic aims.

Oversee the Culham site strategy to guide the management, use or redevelopment of existing / new buildings. Support the Harwell Property Business Plan.



Martin Cox
UKAEA Director and MAST-U Project Sponsor

Complete the full upgrade of MAST to deliver novel solutions for DEMO, in addition to its wider research role.

Play a key role in ensuring the success of ITER through advisory roles at 4FE.

Develop strategies for continued fusion involvement with EURATOM, F4E and ITER post Brexit.



Rob Buckingham
Director of RACE

Represent RACE within central and local government.

Develop a clear RACE vision, mission and strategy aligned with the UK’s robotics strategy.

Manage RACE operations and oversee successful completion of all RACE commercial activities.

Oversee RACE business development and increase RACE turn-over.

Increase work in non-fusion areas to enhance capability for fusion.

Goal 1

Maintain the UK's position as a world leader in fusion research

Realising fusion as a future energy source will take an international effort and we want to ensure that the UK remains at the forefront. The Culham Centre for Fusion Energy (CCFE) is recognised internationally as a world-leading fusion lab. Our impact in terms of papers, citations and invited talks are comparable with the best international labs.

We operate JET, the world's largest fusion experimental device and lead large parts of the scientific campaigns. The MAST Upgrade (MAST-U) project will provide a unique capability, especially for plasma exhaust and offers a potential route to smaller and cheaper fusion reactors. The UK government and EURATOM have recently agreed to fund a £21m programme of further enhancements to MAST-U.

To achieve this goal we aim to:

- Secure a JET extension to 2020 and continue to position JET as a world facility including application of operational knowledge and insight into the commissioning and operation of ITER.
- Successfully complete the MAST Upgrade project in 2017 and realise its scientific potential.
- Drive the tokamak performance improvements for JET, ITER, DEMO and promote a fully predictive capability.
- Develop the role of technology towards DEMO, resolving key challenges and developing enabling techniques to meet them.
- Work at the forefront of material science and technology together with UK and international collaborators.
- Apply our unique computational and modelling capability to support fusion research programmes.

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For nearly 40 years the flagship JET project has led the world in the development of fusion energy. Based at the Culham Centre for Fusion Energy in Oxfordshire, the advances made possible by JET have taken us closer towards one of science's greatest prizes; a clean, safe and virtually inexhaustible energy source – the power of the Sun harnessed on Earth. JET represents the very best of what international scientific collaboration can achieve.

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Letter from UK government to the European Commission – April 2017



Goal 2

Enable skills and jobs growth in UK industry

Our specialist skills and fusion experience can help make ITER a success and act as a catalyst for UK economic growth. To date we have helped enable UK companies to secure €500 million in ITER contracts, including the largest fusion robotics contract, enabled by RACE, the UKAEA's centre for Remote Applications in Challenging Environments.

Our capabilities also have synergies with other business sectors including wider nuclear and hazardous application markets. Through development of skills and exploitation of technology facilities we can help address government concerns about the UK's nuclear capability and support the government's emerging Industrial Strategy.

One of the areas we are addressing skills is via a new apprentice centre at Culham called Oxford Advanced Skills (OAS), which will deliver high tech apprentices to the local supply chain as part of the national apprentice strategy. Phase 1 of OAS opened in September 2016 and we have won government funding for Phase 2 – a £12m facility, which will train around 250 apprentices per year.

To achieve this goal we aim to:

- Continue to support UK industry to secure crucial ITER contracts.
- Exploit the potential of RACE to secure business for the UK by using unique operational know-how.
- Facilitate the national industrial strategy in robotics & artificial intelligence, digital technology, advance material & manufacturing and clean energy.
- Foster academic networks to develop graduates and doctoral students to ensure the next generation(s) of scientists and engineers.
- Expand Oxford Advanced Skills and open Phase 2 by 2019.

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UK industry has already won €500M of business from ITER, in large part facilitated by the world-leading fusion R&D expertise at Culham. Hosting an integrated nuclear design centre would provide the testing and validation facilities and in silico design capabilities that would give UK industry a market advantage in securing over €1B from ITER and significant business from international fusion reactor design programmes. Consequently, the NIA and our members are keen to participate to maximise near-term business for the UK and place the country at the forefront of the future fusion economy.

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*Tom Greatrex, CEO, Nuclear Industry Association
– Letter of support February 2017*



Goal 3

Grow the UK's nuclear materials & technology capability

Over the past few years we have been transitioning from a plasma physics research focus to expanding our technology and engineering programmes. This transition will continue with a view to solving technological challenges required to deliver fusion, and also exploiting potential spin-off opportunities.

The Materials Research Facility (MRF) will aid the development and testing of new materials for nuclear (fusion and fission) together with other applications. This work is part of the National Nuclear Users Facility (NNUF) initiative and we are a partner in the Henry Royce Institute, both of which are investing in further development of the facility.

RACE has already won, with industry, major ITER contracts, and is leading the delivery of the Hot Cell Remote Handling Facility for the European Spallation Source (ESS). The UK government and ITER are jointly funding the £9m ITER Remote Handling Test Facility at RACE.

To achieve this goal we aim to:

- Develop RACE and MRF to fulfil their technology, scientific and financial potentials.
- Meet near term technology challenges such as managing tritium in a power plant environment.
- Increasingly apply our strengths in modelling nuclear materials damage, activation and radiation transport to fields other than fusion.
- Win contracts and grants from outside fusion to further develop skills and capabilities, particularly where these benefit fusion.
- Work with industry, national labs and universities to foster innovation and exploit synergies.

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As nuclear power looks set for a resurgence, designers and engineers are looking for an understanding of the effect that long term exposure to radiation has on materials. Categorising properties and defining behaviour is vital to both next generation nuclear fission power plants and future nuclear fusion reactors. This is why the UKAEA has decided to bring about fresh focus on materials for nuclear applications in its all-new £10 million Culham Materials Research Facility.

*Justin Cunningham, technical journalist
– Engineering Materials magazine March 2017*

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Goal 4

Design the first fusion power plants

A fusion power plant is a complex system requiring a wide range of plasma and materials science, innovation, technology and engineering, integrated with systems engineering at an unprecedented level. To provide the full range of skills and expertise to design and build power plants, we are building a network with universities, national labs and industry.

UKAEA is one of very few organisations in Europe that have the skill base to act as the core for a multi-disciplinary nuclear design centre. We already play a key role in EUROfusion's DEMO activities and have a number of key facilities at Culham. We are actively seeking funding for new facilities in particular in tritium technology and integrated design. As an interim step, a small virtual engineering centre was opened at Culham in Spring 2017, to enable interaction and co-location of high power computing, science and engineering staff.

Many of the challenges for a fusion plant, such as virtual engineering, integrated design, advanced materials & manufacturing, safety regimes and remote operations, are also applicable to other areas for example the next generation of nuclear reactors. There will be opportunities to exploit these synergies and bring practical experience to the design process.

To achieve this goal we aim to:

- Develop technology facilities and programmes for power plant development.
- Continue to play a central role in the integrated design of DEMO through skills, knowledge, facilities and networks.
- Partner with industry to bring best industrial practice to fusion and inform the design work requiring the gamut of expertise a power plant will need.
- Increase our high power computing capability by partnering with other expert organisations
- Apply cutting edge techniques to the nuclear design sector.

“

The CCFE work programme is extremely well aligned to the EUROfusion roadmap, and indeed CCFE plays leading and essential roles in many of the work programmes.

MAST Upgrade will be an essential part of the EUROfusion mission to understand plasma exhaust and develop solutions for future fusion reactors. CCFE plays an integral role in the power plant physics and technology programme, for instance, providing 17% of the manpower and the leaders of the remote maintenance, safety and socio-economic programmes.

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*Tony Donne, EUROfusion Programme Manager
– Letter of support June 2016*



Goal 5

Develop Harwell & Culham sites as Science & Innovation Centres

Culham Science Centre and Harwell Campus are already thriving science, innovation and business centres. They are important employment centres in Oxfordshire, but have scope for further development.

The current South Oxfordshire Local Plan targets significant growth at Culham with an additional 1,000 new jobs. We are currently engaging with potential investors about commercial development opportunities. The site plan also includes a zone for strategic UKAEA development and we are planning for a number of potential new facilities.

Harwell Campus, already home to 200 organisations employing over 5,500 people, is being developed as a global science and innovation centre by a joint-venture with Science & Technology Facilities Council (STFC) and a private sector partner. Ambitious plans for the campus include significant commercial and amenity development and ancillary residential development. The government is investing a £100m in the Rosalind Franklin Institute, for which Harwell will be the main hub.

To achieve this goal we aim to:

- Promote visions for the Culham Science Centre and the Harwell Campus.
- Attract businesses to the Culham Science Centre, particularly those in synergetic technologies and sectors.
- Attract private sector investment and involvement in the development of the Culham Science Centre and the Harwell Campus, exploiting our land interest.

“

The UK has always been a pioneer in the world of science, technology and medical research. It's this excellence we want to continue to build on and why we made science and research a central part of our Industrial Strategy - strengthening links between research and industry, ensuring more home-grown innovation continues to benefit millions around the world.

The new Rosalind Franklin Institute will inspire and house scientists who could be responsible for the next great discovery that will maintain the UK's position at the forefront of global science for years to come.

Greg Clark, Secretary of State for Business, Energy and Industrial Strategy – February 2017

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Stakeholder Engagement

To ensure we communicate effectively and efficiently with a wide range of stakeholders on the world changing potential of fusion, the UK's leading role and our mission to ensure the UK is at the forefront of delivering fusion power plants, we will:

- Strengthen links with UK Government, national laboratories and funders to ensure all of UKAEA's activities succeed and aspirations for fusion power plant design activities are realised.
- Showcase our major technology activities (especially RACE and MRF) to UK industry and academia – ensuring they succeed and grow.
- Maximise media coverage of all of our activities.
- Undertake outreach activities to inspire the next generation of scientists and engineers.

Capability

To ensure UKAEA has the right people and facilities to achieve our goals, we will:

- Resolve our skills requirements and plan to fulfil our needs whilst also contributing to national STEM skill demands and promoting diversity in the workforce.
- Identify and pursue key future facility requirements that maximise our ability to deliver our goals.
- Employ good practice in the way we manage projects across the organisation.
- Replace aging and obsolete systems to improve our effectiveness and competitiveness.
- Ensure that our governance is fit for purpose.

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What an achievement to be crowned apprentice team of the year. The Culham apprentices have shown how getting stuck in and learning on the job gives you the skills to achieve great things. I hope their hard work in going out into the community and showcasing the opportunities an apprenticeship offers has inspired more young people to see it as their fast-track to a top career.”

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Nick Boles MP, ex-Skills Minister – press release upon the UKAEA team winning the 2016 Brathay Apprentice Challenge – June 2016



Culture

We want a culture that promotes research, innovation and leading edge technological excellence, through a highly motivated, valued and diverse workforce, We will:

- Promote a safety conscious approach in the workplace using a behavioural based safety programme.
- Require staff to take ownership for performance and work together to deliver on our commitments.
- Encourage and support continuous personal development in the work force.
- Champion a culture of Passion, Innovation, Accountability, Business-minded, Leadership and Delivery.

Passion

Nurturing science and technological excellence, remaining determined, flexible and positive to the challenges we face. Open to new ways of working. Proud of who we are and enthusiastic about the pursuit of our mission.

Innovation

Seeking creative ways to change, solve problems and push scientific & technical boundaries. Collaborating with academia and industry at the frontier of knowledge, being curious, building on ideas and challenging status quo.

Accountability

Taking ownership to achieve quality outcomes. Fostering a sense of urgency in delivering against our commitments. Dedicated to our work, working safely, admitting mistakes and learning from them. Honest and always acting in the best interest of UKAEA.

Business-minded

Commercially astute, seeking out new business opportunities and managing potential risks. Being cost conscious, acting with integrity doing what we say we will do and challenging what doesn't add value.

Leadership

Setting direction, supporting and encouraging our people to do great work. Developing and sharing knowledge, ideas and expertise. Embracing change, championing diversity and constructively driving performance improvement.

Delivery

Working together cooperatively to achieve the best possible result. Demonstrating a 'can do' approach which delivers 'fit for purpose' quality in all that we do. Following the process, and responding positively to change and continuous improvement.



Performance Measures

Science & Technology

S1) JET: Deliver the JET operations and maintenance milestones agreed with the EU Commission, including restart activities with campaign 38 starting in early 2018 as well as preparations for DT – a key campaign for international fusion development and crucial for ITER.

S2) UK Fusion Programme: Deliver the milestones agreed with EPSRC, including tokamak science, technology, materials research, advanced computing, modelling and outreach activities.

S3) MAST Upgrade: Complete the MAST Upgrade project and integrated machine commissioning leading to the start of operations in the last quarter of 2017/18.

S4) Technology & UK nuclear capability: Develop technology growth activities required to advance fusion and also enable wider nuclear and UK growth.

Financial Measures

F1) RACE: Achieve 2017/18 external income and operating balance targets for 2017/18, with RACE turnover targeted at doubling comparing with last year.

F2) MRF: Achieve external income and operating balance targets for 2017/18, with a view to breaking even by 2020.

F3) Business Development: Achieve external income target from commercial work in Fusion Consultancy, Tritium & Waste handling, Special Techniques and Culham Publications

F4) Culham Property: Obtain target profit from commercial tenants, which can be reinvested back into the site/infrastructure.

Process & cultural measures

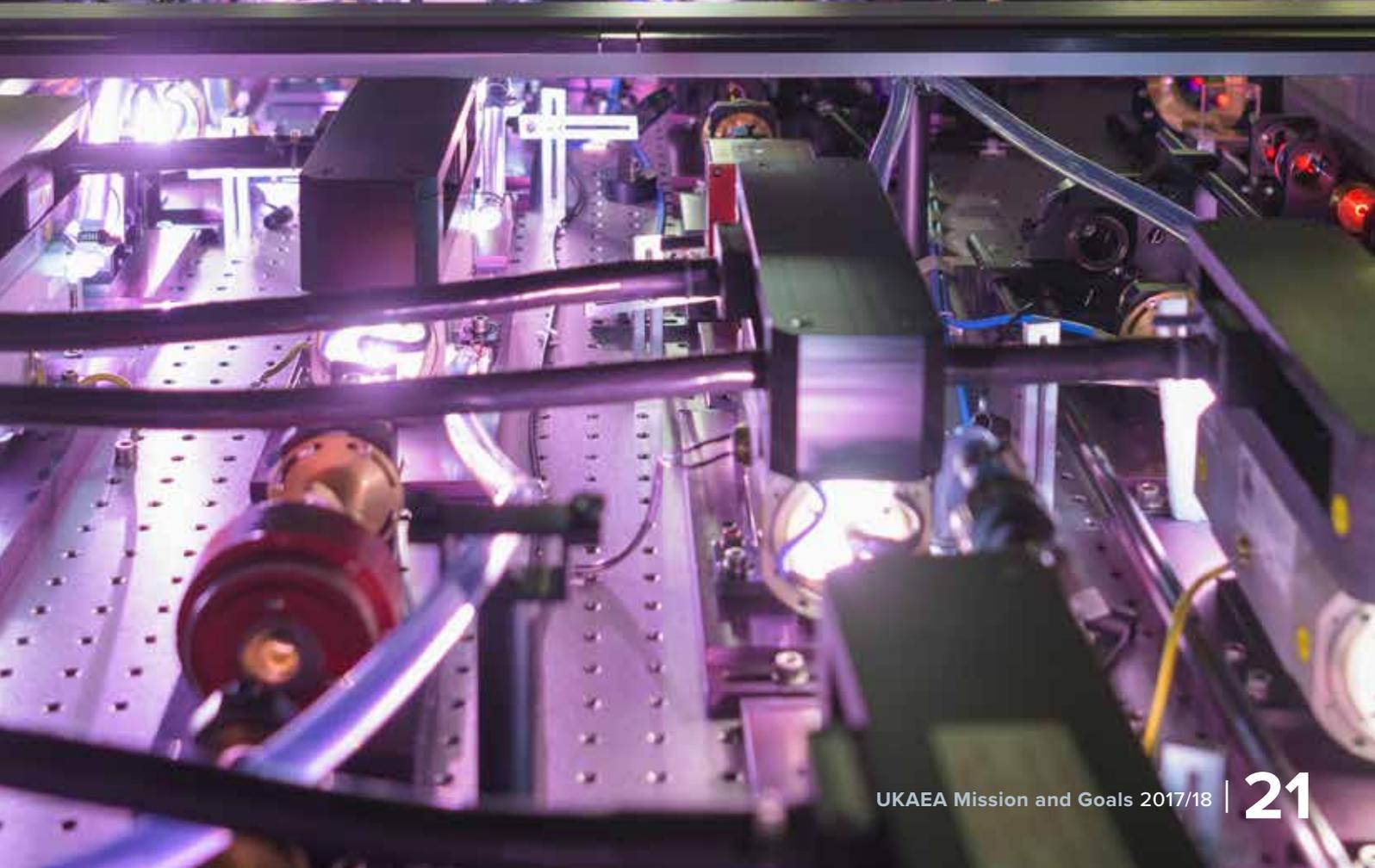
C1) Safety & Assurance: Deliver the safety, health, environment, quality & security improvement programme for 2017/18.

C2) Process: Deliver improvements in programme management, cost estimating & plant maintenance and roll out the Integrate Delivery Process (IDP).

C3) Capability: Fill up to 100 new positions by the end of 2017/18, drive personal performance and improve equality (Athena Swan).

C4) CSR: Deliver the CSR funded projects, enabling us to invest in new IT and infrastructure.

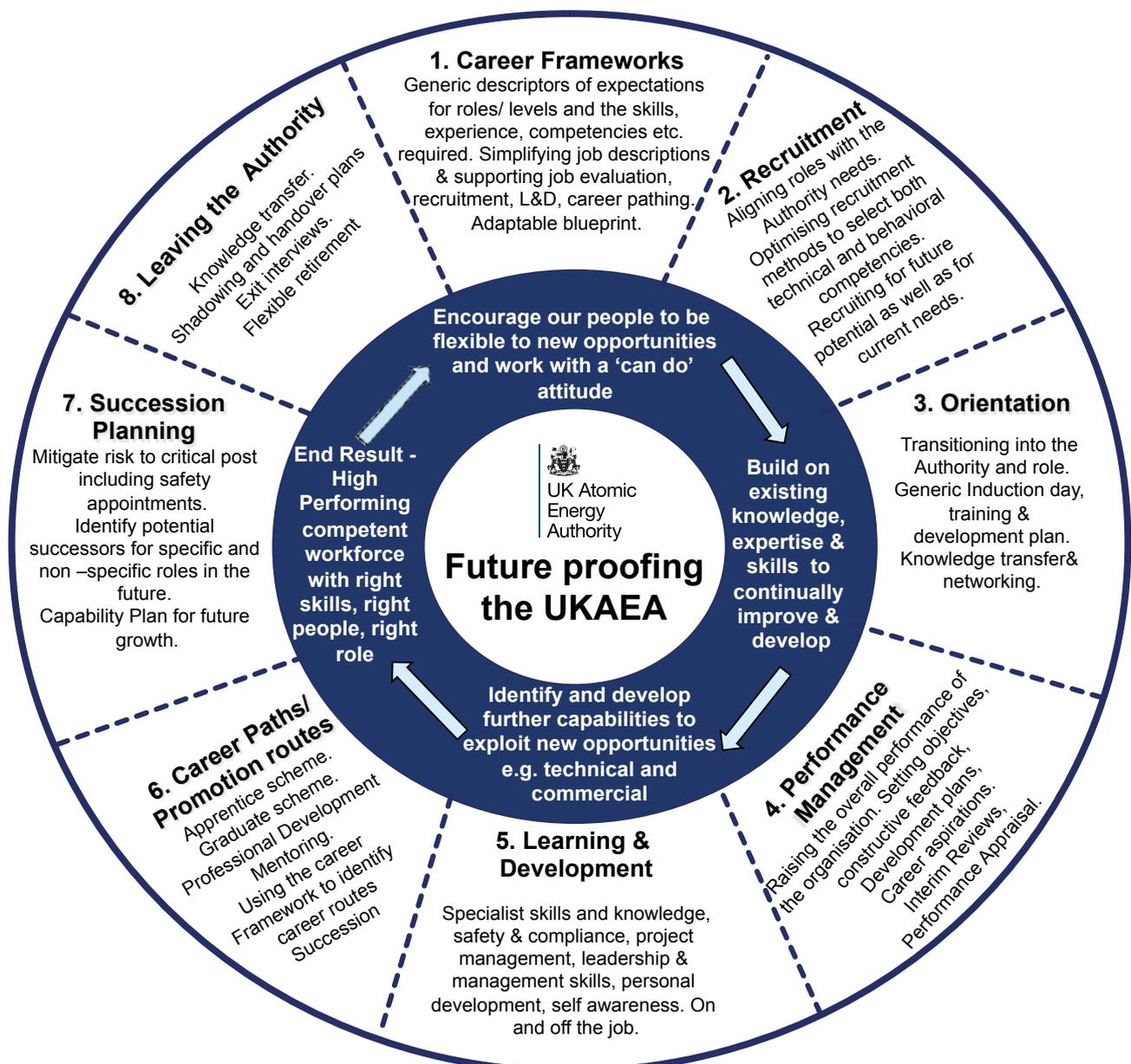
C5) Audit: Complete internal and management system audit actions on time



Future Proofing UKAEA

As the UKAEA moves from its current state through to the future, it is a priority to expand our activities into areas - both technical and commercial – where we can supply expertise and skills, whilst maintaining our world class status as a science, engineering and technology R&D organisation and centre of excellence for fusion and the wider research community. This requires the organisation to retain its present skill base as well as building up skills in key growth areas including exploiting the synergies between fusion and fission.

The diagram below demonstrates the UKAEA’s commitment to supporting its people throughout their employment life-cycle to enable individuals to reach their potential within their current role and pursuing their careers, but being insightful of the organisational needs.







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