

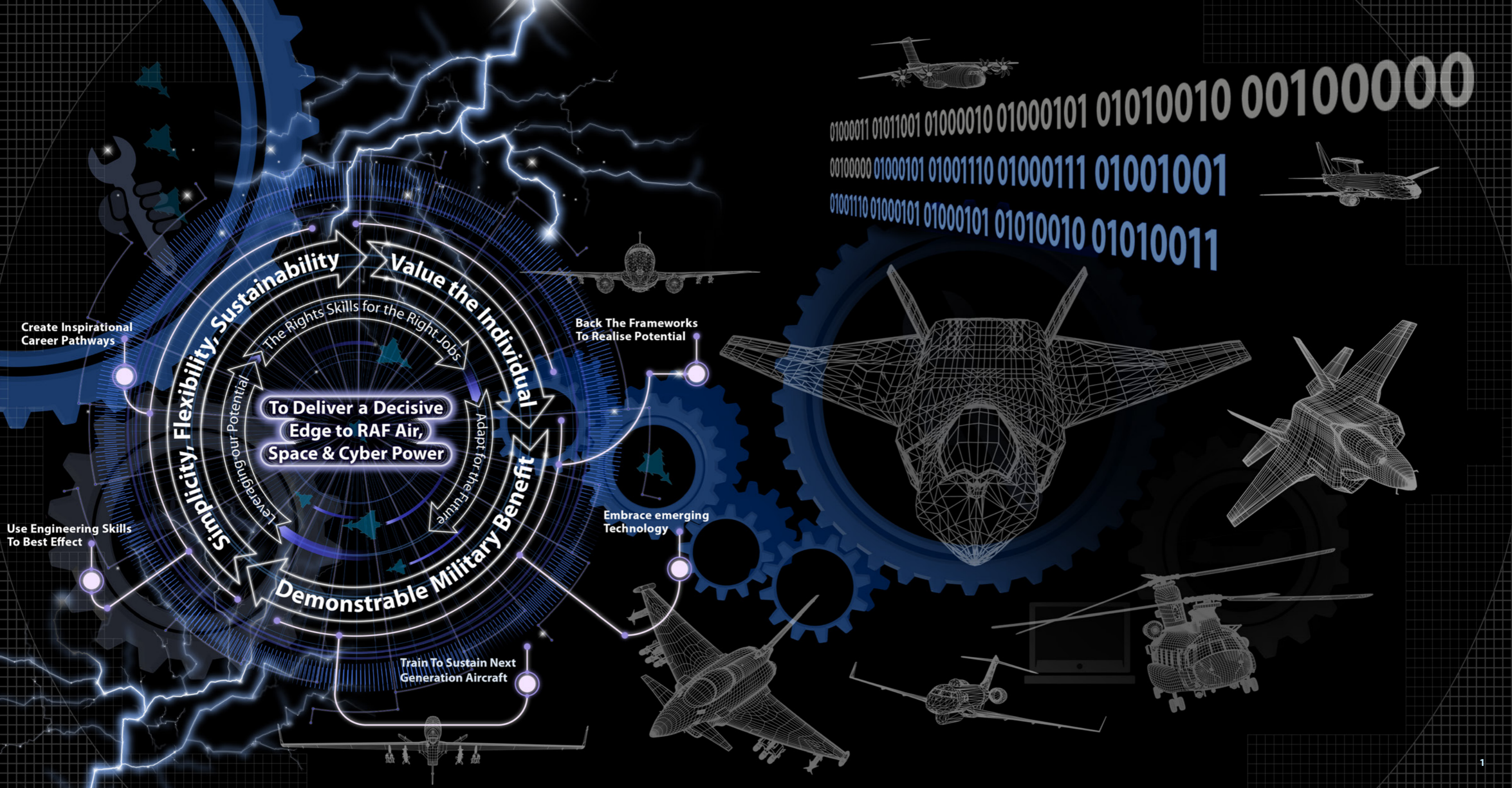
Engineering our Edge

Enabling Decisive Air and Space Power



ECS 2019

Engineering Capability Strategy





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Foreword

The opportunities facing the Royal Air Force over the next few decades are profound – an increasingly opaque and ambiguous global setting will adjust our frames of reference and operating locations, technology will never be changing as slowly as it is today, the dynamic shifts brought about by the 4th industrial revolution will adjust how and with whom we interact. An increasing dependence upon information and space will initiate change on who we are and how we work. Our nation will increasingly want and require Air and Space power to act as the point of the sword ahead of 'main events' and closely working alongside our Armed Force partners.

Our past is a fabulous list of reference points where we have led on technological adaptation in contact with adversaries and between successive conflicts. We will draw on this strength as we migrate to the

next generation RAF through 'Astra'. Astra will drive change in all aspects and areas of our business to ensure that we remain ahead of our adversaries, exploiting every opportunity possible and drawing on the wisdom, insight and energy of all of our people. As much top down as bottom up, Astra seeks seismic empowerment of our people and the democratisation of change and ideas in all parts of the Service and Command.

The Engineering Capability element of this is substantial and will underwrite all other aspects. This means harnessing and adapting our people, our processes, our training, our resources and our constructs – collectively they must continue to deliver us advantage on the battlefield as much as in the hangar and boardroom. New technologies are central to this approach too - not only in advancements in raw capability, but accelerations in acquisition, certification, fielding, maintenance and system upgrades (hard and software). We must seek to remove constraints and limitations, reduce the

effort and investment to make things happen and scale up the lethality, persistence and utility all, of course, whilst remaining safe.

This will demand skilled engineers and technologists, who we must nurture. We need to prepare our people for a life-long journey in the engineering domain. We need to skill them for their next step, but just enough and just in time. We must grow them in their roles, reward them with opportunities, new skills and career alternatives within the Service. When they want to change tack, we must facilitate commercial employment that retains them in the engineering enterprise. And should they want to return, we must welcome them with open arms and fully reintegrate them back into the business. We need to facilitate zig-zagging careers, skilling them to leave, but leading them so they stay.

This Strategy, which commissions this journey, is wholly aligned with the RAF Strategy and is a

major flagstone in succeeding on operations, building a resilient workforce and delivering the next generation Royal Air Force. It sets the direction to ensure we continue to be served by the best engineering and technology capability with competent, credible and professionally adept people at its core. It will deliver the right skills for the right jobs to enable us to leverage our engineering potential and make certain of our competitive edge by adapting for the future.





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Introduction

Engineering and technology underpin the Royal Air Force. Our personnel make up approximately a third of the Service and whether they be AeroSystems or Communication Electronics officers, or technicians of Trade Groups 1, 4, 5, 13 or 14 they are fundamental to operations right across Defence. This fundamental nature requires a strategy that will direct their effort and shape the Royal Air Force to ensure we can harness the very best from them and allow them to flourish.

There are different ways to construct a strategy, but at its core a strategy is a choice about how to respond to a challenge. This one has been designed to comprise of 3 elements: a diagnosis of the critical engineering challenge we face; a set of guiding principles to inform our approach to that challenge; and coherent actions shaped by our principles, co-ordinated with one another to improve our engineering capability and deliver a world-class air force.

"To realise this Strategy, I need you to play a part. Guided by this Strategy, we all must work together to deliver the change we need."

The Royal Air Force Strategy summarises the challenge as follows: 'We need to deliver the technology and people for the Next Generation Air Force.' This Engineering Strategy supports both parts of this challenge – the technology and the people, with its origins rooted in an SAC to Air Marshal crowd-sourced assessment of how we do just that.

The diagnosis is that our engineering challenge is actually 3 inter-woven challenges: where should we employ engineers; how should we employ engineers; and how can we inspire our engineers. The action plan will rightly evolve; hence this strategy is not prescriptive on the plan's content, rather it points to the further work we need to do to design, develop and deliver the actions required. It recognises the importance of our engineering values, our creativity, our shared purpose and gives our engineering community a single voice.

The Royal Air Force Engineer

The military engineer¹ of today's Royal Air Force is formidable. A leader who is highly trained, highly capable and highly respected.

The history of the Royal Air Force is entwined with the technology advances of the last 100 years and we have always had a need for technically minded leaders and gifted engineers. Our engineers are leaders, technically astute, dependable and trusted to maintain and deliver a multitude of capabilities in harsh, contested and challenging conditions in both the physical and virtual worlds. However, being technically proficient is only half the story; we must not confuse what we do with what we are for.

As Royal Air Force Engineers we understand the single service and joint military context in which we operate. We understand the operational imperative and our commander's intent. We understand how to safely and appropriately balance operational need with operating risk. We combine technical, military and operational knowledge. Our purpose is to combine this knowledge to deliver a decisive edge to our air, space and cyber power.

"This is how Royal Air Force Engineers make the difference."

We have the moral courage to lead through setting and maintaining standards. We have the humility to listen to the expert. When the manuals have run out of ideas, or indeed where there is no manual, it is the highly trained and authorised Royal Air Force Engineer who keeps us in the fight. We enable and deliver battle winning capability.

"Our edge comes from who we are and knowing what we are for."

From Sopwith Camels on the Western Front in 1918, to today's F-35B Lightning, Royal Air Force Engineers always have been central to leading the Service through technological change. This will not change, our skills will remain essential to our Nation's defence.

And today's engineers are no different to past generations in their leadership, courageous attitude, ability to solve problems and willingness to embrace adversity. This Strategy will lay the firm foundations on which to build the future engineering capability of the Royal Air Force, a capability that is ever more exciting.

We have low observable attack aircraft, a dynamic range of air mobility platforms, complex C2, ISR and ISTAR networks and ever more sophisticated weapons. Remotely piloted and autonomous air vehicles are becoming more prevalent, space power is growing in importance, cyber proliferates and traditional boundaries between the physical and virtual worlds are blurring.

So where should engineers and engineering contribute for best effect to the next generation Air Force?

Information is the lifeblood of operations, but would an investment in artificial intelligence and innovative data management increase the speed of commanders' decision-making to offer information advantage? Could robotic process automation conduct many of our support functions? Will the pace of logistics replenishment be significantly accelerated by autonomous logistics delivery systems and widespread 3D printing? What is certain is that advantage will be achieved through embracing new and disruptive technologies at pace through innovation, integration and transformation of our processes and practises.

Our success will continue to be determined by our ability to operate safely, securely, efficiently and effectively. So, whilst we must remain highly trained, highly capable and highly respected, we must also be highly adaptable – ready to transform our organisation and methods for the ever-evolving world.

¹ The term engineer throughout this Strategy is inclusive of all engineers and technologists and covers both AS and CE officers and airmen of Trade Groups 1, 4, 5 and 13.

The Challenge

We need to deliver the technology and people for the Next Generation Air Force.

We will focus on where and how the Royal Air Force should utilise engineering to create advantage for the Next Generation Air Force. We will need to make clear what engineering skills are required and valued, what engineers are for as part of the Whole Force and what military engineers can offer. Royal Air Force engineers do not exist for the sake of engineering as an end in itself. We exist to enhance our Operational Capability through deft application of engineering and so create advantage for Defence.

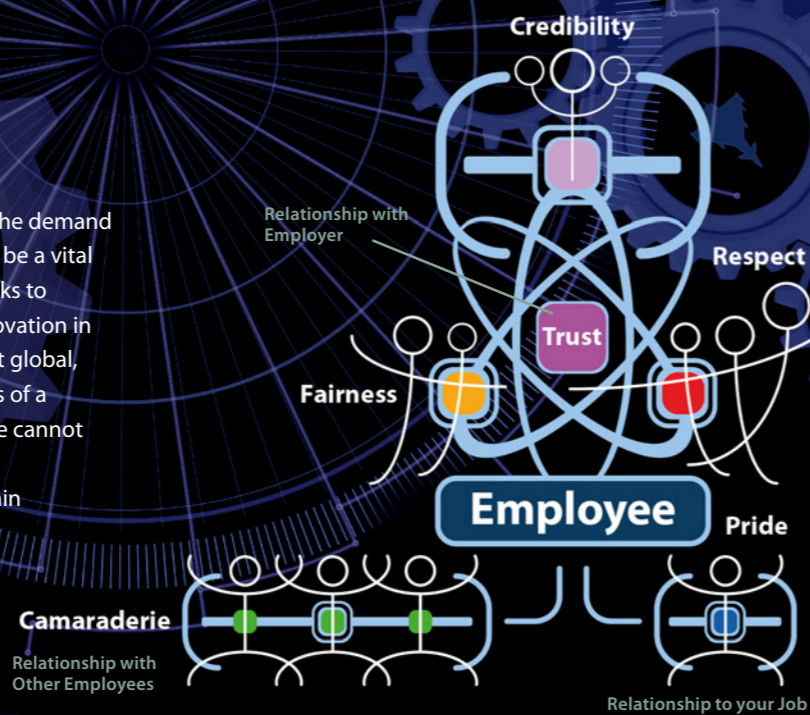
The approach is based upon a diagnosis that our engineering people challenge is actually 3 related and inter-woven challenges:

- ▶ Where should we employ engineers?
- ▶ How should we employ engineers?
- ▶ How can we inspire our engineers?

Royal Air Force capability growth is increasing the demand for engineering skills. The military engineer will be a vital component of the Combat Air Strategy as it seeks to position the UK globally for excellence and innovation in high technology. We are also in a national, if not global, competition for engineers and the expectations of a modern workforce are changing. In addition, we cannot ignore the financial pressure the MOD is facing which further compounds our challenge to retain competent engineers.

To maintain a technological advantage will require the Royal Air Force to ensure it has the right people with the right skill sets to allow it to think creatively and lead us to deliver the technological change we need.

This Strategy seeks to shape how we think about engineering: how we should educate and train for the future; how we embrace emerging technology; and how we implement models to provide exciting, rewarding and fulfilling careers. In short, to embrace this Strategy will transform the way we do business.



The Response

To deliver the Royal Air Force's Engineering Capability all engineers need to be proud of who we are and what we are for. We all need to understand that we do not exist to simply maintain equipment. We exist to deliver a battle winning edge, and we can do it better.

This strategy describes the direction of travel, a statement of intent, a handrail to guide the action of all leaders at all levels, from SAC to Air Marshal. It has not been designed as a prescriptive set of actions required to declare success, nor does it contain a lofty vision of what Royal Air Force engineering will look like in the future.

At the core of this strategy is a belief that we can deliver engineering differently. That we can find new ways to evolve our engineering capability to provide the Royal Air Force a competitive advantage. The focus of this strategy is simple, to build our engineering capability on function, value and competence.

- ▶ *The Right Skills for the Right Jobs*
- ▶ *Leveraging our Engineering Potential*
- ▶ *Adapting for the Future*

The Right Skills for the Right Jobs Leveraging our Engineering Potential Adapting for the Future:

As stated by CAS, "There can be no higher priority than ensuring we have the people we need." A blended Whole Force approach will be needed to realise the Next Generation Air Force, but to be successful that blend must play to the strengths that each element can bring. For those in uniform we must invest in the roles where military engineers can make the difference and focus on the skills those roles require. The opposite is also true. By focussing on the right skills - those that make us who we are and those that enable what we are for - we will ensure a Royal Air Force engineering workforce that is configured to harness the potential of every engineer.

Having the right skills for the right jobs is fundamental to leveraging the potential of the engineer workforce, but there is more we can do to unlock even greater potential. Our structures, rank construct and career pathways should be re-configured to realise the very best of the engineer workforce and achieve an even greater competitive advantage for Defence. We value leadership that sets, maintains and assures standards to safely deliver our operational outputs, whether they be physical, virtual or cognitive. To achieve those outputs needs competent, qualified and adaptable personnel who are resourced correctly. Risk informed decision making by authorised personnel is key to maintaining our competitive edge with skilled, valued and accountable engineering leaders at all levels being crucial for this capability. These skills must be nurtured.

We need to start leveraging the potential of data science, to exploit the linkages and patterns we can't currently see in our myriad information systems. Be it in the field of continuing airworthiness or cyber defence, engineers are key to interpreting, understanding and then acting on information to enhance our military capability.

To remain militarily and technologically relevant, to ensure we win, we must continuously adapt for the future. We must continue to attract and retain the right mix of people. We must invest in today's workforce, so they are ready for tomorrow's fight. We should also invest in technology to give us the capacity to reinvest in our workforce, stay ahead of our adversaries and grow new capabilities. By believing that we can transform how we deliver engineering, we can strive to explore what is possible, to discover what we can achieve for the Royal Air Force if we unshackle ourselves from constraints, both real and perceived.



Our Guiding Principles

To guide our thinking and shape the actions of all leaders at all levels, we need a set of guiding principles and values that can be taken to heart and acted upon at all levels of our organisation. They should reduce complexity in our decision making and help create policies and actions that are coherent and in harmony with this Strategy. Consistent with the ambition described in the Royal Air Force Strategy, our guiding principles are:

Value the individual

There can be no higher priority than ensuring we have the people we need. We should adopt policies to ensure we employ the right person in the right job and value them appropriately for their contribution. We should provide leadership, investment and development opportunities open to all individuals to enable a full and rewarding career. We should actively seek to build a diverse workforce as this will improve innovation, creativity, productivity, resilience and so our operational effect. We should encourage an adaptable mindset. We should seek and value the opinions of our workforce; reasonable challenge should always be accepted to explore diversity of thought and test alternative options. Leaders must create the conditions to allow empowerment of the experts in our midst.

Simplicity, Flexibility and Sustainability

We should seek simplicity, flexibility and sustainability in our organisations, our hierarchy, our models and our processes. Where consistent with this strategy, we shouldn't be afraid to create unique solutions, but we cannot afford for them to increase complexity, induce constraints or reduce the sustainability of our effort.

Demonstrable military benefit

Having already described the value of the Royal Air Force Engineer, they should predominantly be employed where their presence has a demonstrable benefit to the military commander. For those on the front line, or in direct support of it, this is easier to do than for those roles further removed. However, if we are to design a Whole Force that draws on the benefits each cadre can bring, then military necessity must be foremost in that design.

By ensuring we have the right skills for the right jobs, so we can leverage our engineering potential, and by continuously adapting for the future, Royal Air Force Engineering will play a central part in achieving the goal of the Royal Air Force to harness the full potential of our people, our aircraft and our systems.



A Single Voice

To help unlock the potential of the Royal Air Force's Engineering Capability requires us to have the freedom to think differently, but the discipline to implement new ideas in a controlled and coherent manner to achieve the best effect. The Royal Air Force Engineering Capability cannot be allowed to wither from underinvestment, nor can it be allowed to develop haphazard or chaotically. We must allow for creativity in problem solving and be better at sharing what we have learned in the process. To defend this level of freedom and assure that our actions are coherent with this Strategy we need a central and executive body to uphold our guiding principles, take a strategic view and direct shaping action on behalf of the Royal Air Force with a single voice.

The Royal Air Force Engineering Board will:

- Own the Royal Air Force Engineering Capability Strategy.
- Advocate for engineering and military engineers as fundamental to current and future air and space power delivery.
- Build trust and create an enhanced work place which is fair and respectful.
- Safeguard our guiding principles and shape action in line with the strategy.
- Bring coherence to the Engineering Capability across the Royal Air Force.
- Prioritise the investment of engineering resource.
- Give a united voice to the 10,000+ engineers in the Royal Air Force.
- Provide a single body to champion the needs of Royal Air Force Engineering across Defence.

The Royal Air Force Engineering Board will operate in tandem with an Shadow Engineering Board created from a representative cross section of the engineering workforce from the most junior upwards, who can shape the future, bring diversity of thought to the fore, provide feedback and importantly hold the Engineering Board to account for their actions.

To realise this requires the creation of a Royal Air Force Engineering Board

Responsible to the Air Force Board Executive, it will be chaired by Chief of Staff Support and be composed of senior representatives from engineering, with perspectives from logistics, human resources, capability, acquisition, duty holders, reserves and, on occasion, invited partners from sister Services, industry, academia and our regulators.

Strategy to Action

There is much we should and could do to enhance our Engineering Capability. This Strategy focuses on the ends and we must resource them with the appropriate ways and means. Unlike previous strategies we will resource a programme, with a dedicated programme manager, to discover, plan, coordinate and support projects that will be designed to realise the benefits that operational advantage demand. This programme cannot run in isolation. We need a coordinated programme with inputs from our people and in addition contributions from: the wider Royal Air Force; our sister Services; academia; the commercial sector and other stakeholder groups. This will ensure we continue to deliver what the Royal Air Force requires and engineer a better future.

The Royal Air Force Engineering Board will steer the Programme and its projects. It will support delivery by identifying and releasing personnel to contribute and it will campaign for funding where necessary.

Our Strategy Objectives

To shape coherent actions, in line with our guiding principles, to address the challenges we face, 5 strategic objectives for the Engineering Capability have been defined. They aim to protect our unique culture, identify and values as Royal Air Force Engineers whilst adapting our employment for the Next Generation Air Force.

Use our Engineer Skills for Best Effect

We will establish where our skills add the most value then prioritise our training and employment accordingly.

It is about employing the right person for the right job; using military engineers where there is demonstrable benefit and blending our skills within the Whole Force driven by military necessity.

Our skills also make us widely employable in other roles; this variety is to be maintained to maximise development and retention.

Build the Frameworks to Realise Our Potential

We aim to simplify our structures and maximise the potential of the engineering workforce.

We will assess options to better manage the latent talent within our workforce and how to attract the best and most diverse talent to join us.

We will examine how we exploit increasing areas of A4 and A6 overlap in the fields of systems, airworthiness and data management.

Create Inspiring Career Pathways

We should adopt a talent and competency-based career management system for engineers.

We should define career pathways for officers and airmen that provide for mastery, autonomy, purpose and sufficient variety with means of reward and progression other than by rank.

Flexible employment models should be supported to maximise retention and cater for the changing needs of our personnel to help maintain a healthy work life balance.

Train to Sustain Our Next Generation Workforce

We will establish better access and availability of through career learning, focussing on adding the most value for our evolving engineering capability.

We will establish the breadth of skills our people need at all levels and select the training that best meets that specialist or generalist need.

We need to improve our air power, digital, airworthiness and logistics education for all.

Embrace Emerging Technology

We need to embrace digital technology, skills and the automation of our workplace.

We need to exploit at pace the potential for workforce efficiency and capability enhancements that can be gained from the adoption of artificial intelligence (AI), machine learning (ML), virtual reality (VR), augmented reality (AR) and robotics.

We must start exploiting the potential of our data and instil our personnel with a cyber resilient mentality.

The Strategy Workplan

Within the 5 strategic objectives there are a number of projects to be co-ordinated by Royal Air Force Engineering Capability's Programme Office to provide outcomes consistent with our guiding principles to improve the delivery of Royal Air Force Engineering. These have been bound as sub-objectives. These sub-objectives are not exhaustive, nor are their benefits defined, however they

offer great potential to transform how we do our business to realise the potential of the RAF Engineering Capability. The plan will adapt and evolve as we learn more and create further opportunities to be explored for the Royal Air Force Engineering Capability of the Next Generation Air Force.

Objective (1)

Use our Engineer Skills for Best Effect

Sub Objectives:

- Identify the essential engineering skills needed for the Next Generation Air Force.
- Identify the roles and functions that need these skills and invest in them accordingly.
- Deliver the Continuing Airworthiness Improvement Programme.
- Deliver on engineer aspects of Prog SOCRATES.

Objective (2)

Build the Frameworks to Realise Our Potential

Sub Objectives:

- Establish the RAF Engineering Board and Shadow Board.
- Examine the structure of RAF Engineering against a simpler framework (producer, supervisor, manager, director), linked to the potential introduction of appropriate licensing models.
- Work with RAF Talent Futures to identify how to manage our latent talent, attract new talent and retain the best talent.

Objective (3)

Create Inspiring Career Pathways

Sub Objectives:

- Establish career pathways linked to competencies in a single model for both officers and airmen.
- Work with RAF Career Management to introduce effective competency based career management.
- Pursue and champion competency based remuneration, reward and recognition policies.
- Examine alternative training for the skills our senior leaders need at OF4 and beyond.

Objective (4)

Train to Sustain Our Next Generation Workforce

Sub Objectives:

- Identify the training and education required to equip engineers with the skills they need for the Next Generation Air Force.
- Focus on continual professional development through 'Just-In-Time' Phase 3 training.
- Provide airworthiness awareness training for off-aircraft engineer trades.
- Improve supply chain awareness through training.

Objective (5)

Embrace Emerging Technology

Sub Objectives:

- Provide digital, data and cyber training.
- Identify where and then pursue how we will introduce AR, VR, AI, ML into our workplace to provide capacity.
- Create through disinvestment in legacy technology the roles to invest in emerging technology.
- Educate in emerging technology and position ourselves within the R&D environment.

The Right Skills for the Right Jobs Leveraging our Engineering Potential and Adapting for the Future

