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ALL-PARTY PARLIAMENTARY GROUP

SCIENCE IN PARLIAMENT
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AUTUMN 2025

AUTONOMOUS INNOVATION

Re-imagining UK public services

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SCIENCE DIARY

Forthcoming discussion meetings

■ Monday 13th October 2025
DISCUSSION MEETING
Delivering the Industrial Strategy
In partnership with the Institution of Chemical Engineers
5.15pm to 6.30pm, Palace of Westminster
Chairman's Reception 6.45pm to 7.30pm, One Parliament Street

■ Monday 1st December 2025
DISCUSSION MEETING ONLINE
In partnership with the Centre for Climate Change, UCL
5.00pm to 6.00pm, online

■ Tuesday 20th January 2026
DISCUSSION MEETING
In partnership with the Newcastle Upon Tyne Hospitals NHS Foundation Trust and Newcastle University
5.15pm to 6.30pm, Palace of Westminster
Chairman's Reception 6.45pm to 7.30pm, One Parliament Street

EDITOR'S NOTE

The Parliamentary and Scientific Committee is delighted to welcome the following members who have joined us over recent months:

Parliamentary:
Ben Coleman MP
Julia Lopez MP (Shadow Secretary of State for Science, Innovation and Technology)
Lord Oates

Learned Societies/Universities:
Society for Endocrinology
Liverpool John Moores University

Individual:
Dr Stephen Byard
Joseph Greaves
Professor Virginia Murray
Dr Radouane Oudrhiri
Sylwia Wasiak

My thanks to all who have contributed to this Autumn edition of the journal.

Please can I ask members to promote STEM for BRITAIN 2026, our annual competition for Early Career Researchers, through your various networks and channels?
www.stemforbritain.org.uk

Many thanks,
Leigh

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George Freeman FRSA MP
Chair, Parliamentary & Scientific Committee

As I write on 21st September, the equinoctial winds are blowing and the weather changing – bang on time. A reassuring reminder of the reliable primacy of the planetary order in an era of tumultuous global geopolitical chaos.

We live in extraordinary times: as the planet faces existential challenges in climate, energy, biosecurity and agriculture, which demand huge deployment of science and capital to accelerate the discovery and development of technologies to meet the grand challenges, we see an American president trumpeting isolationism, protectionist tariffs, anti-science climate denial and withdrawal from a global stage in which the Chinese, Russians and Iranians are only too willing to replace a retreating West.

We are now at war in Europe. My teenage niece recently asked me nervously if we will see another world war. I explained that we are already in it – but because it's being fought in Eastern Europe, the Middle East and South China Sea, with satellites, drones and cyber-attacks, industrial espionage and Intellectual Property theft, energy and biosecurity supply threats it doesn't look like the wars in the old movies. But it's nonetheless real.

Which is also creating a new demand surge for defence science and technology – just as that which led to the creation of the P&SC in the 1940s as Churchill and Beaverbrook mobilised Science and Technology for the war effort.

For all the risks – there are also real opportunities for the UK to seize the opportunity to be a globalist convenor of allied nations who aren't and don't want to be members of the Beijing Brussels or Washington trading bloc: Canada, Norway, Switzerland, India, Japan, Singapore, Australia, New Zealand. We could mobilise a powerful New Commonwealth of countries still committed to defending the planet and the science. Research technology and innovation we all need for our shared security.

That's why as Minister of State for Science I headed straight to these nations to negotiate deeper Science + Technology collaborations.

And why as Trade Envoy to Singapore, Malaysia Brunei and Philippines I continue to push for deeper UK S&T partnerships.

Post-Brexit Britain has to define a new role in a dangerous new world.

Science and Technology are more vital than ever. Which makes the work of the Parliamentary & Scientific Committee even more vital.

We commenced our Autumn programme of discussions on 9th September when I was privileged to chair a wonderful meeting on 'Quantum Technlogies', with Professor Sir Peter Knight FRS and other distinguished speakers. Enormous thanks to the Institute of Physics for partnering with us in this event. We look forward to the 13th October and 17th November in cooperation with the Institution of Chemical Engineers and the National Measurement Laboratory at LGC, respectively.

I look forward to seeing you at the forthcoming AGM when I'm delighted to report that Sam Carling MP and I will be swapping roles, with Sam taking over as Chair and me stepping aside to become Co-Chair.

Very best,

George

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Science in Parliament has two main objectives:

Inform the scientific and industrial communities of activities within Parliament of a scientific nature and of the progress of relevant legislation

Keep Members of Parliament abreast of scientific affairs

Autonomous innovation:

Re-imagining UK public services

Professor Sam Medhat PhD MPhil CEng FIET FRAeS FRSC FCIM FCMI FRSA FIKE FIoD FIRL
Chief Executive, Institute of Innovation & Knowledge Exchange
Visiting Professor of Innovation and Digital Transformation, University of Westminster

Over the past 18 months, generative-AI agents, robotics and real-time digital twins have shifted the frontier from digital to autonomous public services. Governments are discovering that autonomy is no longer a moon-shot add-on but a cost-effective operating model.

Autonomous innovation – systems that can perceive, reason and act with minimal human intervention – is rapidly moving from laboratory pilots to mainstream operations inside UK public services. Where first-wave e-government digitised forms, new wave delegates an ever-larger slice of perception, reasoning and action to machines, while keeping humans in-command. Generative AI assistants draft procurement files, sensor-linked drones carry out bridge inspections, and city-scale twins simulate policy choices overnight.

Over the past two years the Government has tested large-language-model (LLM) 'copilots' with 20,000 officials, launched an AI Safety Institute, funded live autonomous-bus routes, and begun exploring national-scale digital twins for health and infrastructure. This article summarises the latest evidence, offers a detailed case study of the Civil Service 'Humphrey' AI suite, and proposes organisational models that could be considered as autonomy reshapes how the state is run.

A changing policy landscape

The UK has positioned itself as a 'safe-but-swift' test-bed for advanced autonomy:

Strategic leadership – the AI Safety Institute, the world's first state-backed frontier-model evaluator, launched in January 2024, signals the UK's intent to couple rapid deployment with rigorous risk science[1].

Responsible-use frameworks – the Central Digital & Data Office (CDDO) refreshed its Data Ethics Framework in March 2025, providing cross-Government guard-rails on transparency, accountability and fairness for AI projects[2].

Productivity mandate – Cabinet Office modelling suggests that generative AI could automate up to 41% of routine public-sector tasks – freeing roughly £45 billion by 2030[3].

Examples of world adoption patterns

The pilots outlined in the Table below show that autonomy is no longer a moon-shot add-on but an emerging default operating model for public services.

Trend	Public-sector use case	Why it matters (2025 view)
Generative AI copilots	Tokyo[4], Portugal[5] and Kelowna[6] civil-service teams use 'Copilot-style' assistants for citizen correspondence, code generation and benefits triage.	Early pilots show 30–60% cycle-time cuts on high-volume knowledge tasks.
Back-office Automation Surge	13–14% of OECD enterprises – and 39% of large firms– now deploy AI in core ops; Nordic public sectors exceed 25% adoption[7].	Adoption doubled in one year, widening capability gaps between leaders and laggards.
Urban digital twins (UDT)	Barcelona[8], Bologna[9] and Munich[10] run live UDT platforms that replay traffic, energy and climate scenarios every hour.	Allows planners to test policies before spending, cutting modelling costs by 40%.
Autonomous public-works robots	EU PIPEON sewer-inspection robots kick off[11]; a market report charts 2025–35 growth[12]; Florida waste-management installs WatchBot™ patrols[13].	Robotics slashes human exposure to hazards and is forecast to lift waste-sector productivity by 20% this decade.
Driverless public transport pilots	Helsinki begins public trials of a driverless bus[14]; UK CAM Pathfinder funds bus pilots for 2026[15]; Singapore forms a committee to scale AV deployment[16].	Real-world data on safety and rider behaviour accelerates standards and insurance models.
Risk-based AI regulation	EU AI Act bans "unacceptable-risk" uses from February 2025 and fast-tracks innovation sandboxes[17].	Sets the compliance playbook others are copying, balancing trust and speed.
Geo-political deployment race	China prioritises AI application-at-scale (e.g., crime prediction dashboards, smart infrastructure)[18] versus the US model of pure frontier-model R&D issued by the White House America's AI Action Plan[19].	Signals that public-sector implementation capability is becoming a strategic asset.

Using AI and drones for bridge inspection

CASE STUDY – Humphrey: generative AI in the UK Civil Service

Humphrey shows that early productivity gains arise primarily from low-risk administrative tasks; the next frontier is policy simulation, where stakes around accuracy and accountability rise sharply:

Scope – a suite of LLM-powered assistants (Redbox, Consult and Lex) gradually rolled out across Whitehall.

Pilot cohort – 20,203 officials in 34 departments (Jan–Apr 2025).

Tasks automated – email summarisation, consultation analysis, benefits-case drafting.

Headline results – 26 minutes average daily saving, equivalent to ≈1,130 full-time equivalents annually; 82% of users reported higher job-satisfaction, while 9% flagged accuracy concerns around policy nuance.

Governance features – human-in-command override; token-level audit logs stored for five years in the Government's Secure Cloud; vendor-agnostic model-switching to avoid lock-in.

Near-term horizon (2025–2030)

Agentic 'mission pod – low-code platforms will let agencies spin-up specialised AI agents (e.g., tax-fraud hunters, permit reviewers, emergency-response coordinators) that learn and act continuously.

Policy-as-code feedback loops – sensor streams feed AI models that rewrite 'micro-regulation' nightly (e.g., dynamic congestion pricing), with elected officials approving deltas.

Swarm robotics for maintenance – fleets of ground and aerial bots will patch potholes, inspect sewers and clear debris autonomously after storms[11].

Federated civic model – national 'sovereign models' fine-tuned on sensitive administrative data coexist with open-source community models, orchestrated through secure enclaves.

Quantum-boosted optimisation – pilots in revenue forecasting and grid management plug quantum annealers into AI agents for real-time scenario search.

Reimagined operating models for UK Government

In the UK there is a strong intent to convert the promise of autonomy into repeatable, accountable public value. The Table overleaf shows examples of patterns of newly reimagined operating models.

Challenges and possible actions

Digital skills gap – establish and launch a National AI Fellowship for mid-career civil servants, linking each fellowship project to a live departmental transformation goal.

Vendor concentration – bake open-standards APIs and independent model-audit rights into every AI procurement framework (e.g. the upcoming G-Cloud 14).

Ethical assurance – enact an Algorithmic Register covering all high-impact public-sector models, building on CDDO's ethics hub.

Regional inequality – create an "AI-as-a-Utility" marketplace through which smaller councils can procure shared autonomous capabilities.

Implementation guardrails

Human-in-command governance – pair every autonomous agent with an accountable official.

Audit-by-design tool-chain – bias tests and red-team drills embedded in CI/CD pipelines.

Model pluralism – contractual right to hot-swap between GPT-4o, Claude 5 and Gemini 3 mitigates single-vendor risk.

Examples of patterns of newly reimagined operating models

Model	How it works	What it unlocks
Autonomous Service Cells (ASC)	Each high-volume service (licensing, benefits, tax refunds) wrapped in a bounded micro-agent that owns data ingestion → reasoning → action, supervised by a civil-servant "mission owner".	24/7 responsiveness, traceable decisions, plug-and-play upgrades.
Civic Digital-Twin Platform (CDTP)	A shared, GPU-accelerated twin spanning mobility, utilities and climate; agencies publish APIs, and AI agents run policy 'A/B tests' before roll-out[8 9 10].	Evidence-based budgeting and faster multi-agency coordination.
Adaptive Policy Loop (APL)	Edge sensors stream data to an AI policy engine that proposes rule tweaks; elected officials approve via a dashboard; changes go live automatically.	Shifts regulation from static to living, improving outcomes in weeks not years.
Swarm-as-a-Service (SaaS-Robotics)	Councils subscribe to a robot fleet marketplace (road-mending drones, refuse bots, park mowing, surveillance). Procurement handled by autonomous contracting agents[13].	Converts cap-ex to op-ex, broadening access for smaller councils.
Federated Procurement Copilot	Large-language-model agent ingests framework contracts, market prices and ESG rules to draft tenders and live-score bids for bias/compliance.	Cuts procurement lead times by >50% and reduces protest risk.
Public AI Operations Centre (AIOps-Civic)	Cross-Agency Command Hub monitors all autonomous assets (software, drones, robots), with real-time model-risk dashboards and a 'kill switch'.	Centralises assurance, incident response and citizen transparency.

Regional levelling mechanism – shared-service marketplaces to prevent a two-speed public sector.

Conclusion

Autonomous innovation is no longer a fringe experiment; it is fast becoming the default way governments Sense, Decide and Act. Today, leaders treat autonomy as an 'Organisational Redesign' challenge, not just a tech upgrade. By piloting the models above – guarded by robust governance – public sector administrations can move from incremental digitisation to truly adaptive, evidence-driven government. Select Committees could commission an annual "State of Autonomy" Report to track impact, ethics and regional equity, ensuring that technological progress deepens – rather than dilutes – democratic accountability.

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