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Chi Onwurah MP
Chair, Science, Innovation and Technology Committee

10th April 2025

Dear Chi,

RE: Methodology behind £45bn estimate in the State of Digital Government Review

Thank you for your letter of 28 March regarding the estimate cited in the *State of Digital Government Review* and *Blueprint for Modern Digital Government*, which refers to over £45 billion per year of unrealised savings and productivity benefits through the full potential digitisation of public sector services.

I am pleased to enclose a methodology note that outlines the underlying analytical approach in full. This note provides a breakdown of how these figures were derived across the three core areas of potential impact:

1. **Simplifying and automating delivery across the public sector** (£36 billion);

2. **Migrating service processing to cheaper online channels** (£4 billion); and

3. **Reducing fraud and error through digital compliance solutions** (£6 billion).

For transparency, the annex provides a detailed explanation of the assumptions, data sources, modelling approaches, and caveats applied. In each case, conservative estimates have been used to ensure the robustness of the overall figure. This includes drawing primarily from internal analysis by the Central Digital and Data Office (CDDO), validated by departmental experts and underpinned by publicly available data wherever possible.

We welcome the Committee's interest in this area and would be happy to discuss this analysis in more detail during the forthcoming evidence session. We also look forward to sharing updates on our ongoing work to further refine and strengthen the evidence base behind digital transformation across government.

Yours sincerely,

Feryal Clark MP
Parliamentary Under Secretary of State at the
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Maximum Technical Productivity Gains - Methodology Note

Summary

To estimate the maximum technical productivity gains to the UK public sector annually, DSIT conducted comprehensive, bottom-up analysis based on three core areas:

1. **Simplify and Automate Delivery Across Public Sector (£36bn):** estimated through detailed analysis of public sector roles using Civil Service data, scaling productivity savings from automating or augmenting routine tasks to the wider public sector workforce.
2. **Migrate Service Processing to Cheaper Online Channels (£4bn):** identified by examining transaction costs from a sample of government services, and applying these findings broadly across the public sector through detailed simulations of digital adoption from existing offline channels.
3. **Reduce Fraud and Error with Digital Compliance Solutions (£6bn):** calculated based on proven reductions from digital compliance improvements seen in specific case studies, particularly within welfare benefits.

These individual pieces of analysis sum to £45 billion in potential savings and benefits from digital transformation across the public sector. As outlined below, in each case we have selected the lower bound estimate for conservatism when calculating the £45bn. This figure is referred to in the State of Digital Government Review and the Blueprint for Modern Digital Government [1] [2], both published by the Government on 21st January 2025.

A high level summary of the methodologies used to calculate each benefit can be found below. Annexes A and B outline the detailed methodologies for levers 1 and 2, which are primarily based on previous internal analysis by CDDO.

1. Simplify and Automate Delivery Across Public Sector (£36bn)

Baseline and Methodology:

- Initial potential savings were calculated by the Central Digital and Data Office (CDDO) on the maximum technical productivity gains achievable through the use of AI on an initial smaller total baseline of spend (£79bn covering central government, NHS, and police personnel). This analysis found that the current baseline spend could be reduced by 31% through the use of AI.

[1] State of Digital Government Review
[2] A blueprint for modern digital government

- This saving was extrapolated to a broader public sector employee cost baseline (£240bn), assuming the same logic that productivity savings will be generated from full automation of routine tasks and speeding up non-routine tasks.
- Given the previous analysis by CDDO looked to estimate the maximum potential productivity benefits, for conservatism in this scaled up analysis we assume that the 30% reduction in baseline spend is the upper bound of potential productivity savings, and 15% as the lower bound. This results in a value of **£36-72bn annual total saving**. For clarity and conservatism, the lower bound of £36bn was selected for inclusion in the final £45bn figure.
- This estimate is based on internal analysis completed by CDDO, scaled up across the public sector. The full end-to-end methodology for this internal analysis is outlined in annex A. This analysis uses a bottom up assessment at role level to assess the theoretical upper bound for automation exposure / potential from Civil Service roles.

Key References:

- Internal analysis by CDDO on the maximum technical productivity gains achievable through the use of AI
- Institute for Fiscal Studies (IFS) public sector spend[3]
- Annual Civil Service Employment Survey [4]

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2. Migrate Service Processing to Cheaper Online Channels (£4bn)

Baseline and Methodology:

- Initial potential savings were calculated by CDDO on the maximum potential savings from digitising service delivery on an initial smaller total baseline of spend (£3.6bn covering central government). This analysis found that the current baseline spend could be reduced by 42-46% by increasing the proportion of transactions completed through online channels, reducing the reliance on costly offline routes.
- This analysis was based on analysis of GOV.UK service pages, and the channel routes offered by each service.
- This saving was extrapolated to a broader public sector front-end service delivery spending (£9.5bn), assuming the same scale of savings could be achieved across the public sector. The total estimated savings from this lever range between **£4.0-4.4bn**, using the percentage reduction from CDDO's analysis. For clarity and conservatism, the lower bound of £4bn was selected for inclusion in the final £45bn figure.
- This estimate is based on internal analysis completed by CDDO, scaled up across the public sector. The full end-to-end methodology for this internal analysis is outlined in annex B. This analysis uses a bottom up assessment of service delivery routes to estimate the potential savings from digitising transactions.

Key References:

[3] IFS - What does the Government spend money on?
[4] Civil Service Statistics 2024

- Internal analysis by CDDO on the potential benefits of service digitisation (outlined in annex B)
- Internal data collected from the Top 75 services[5]
- HMRC customer service baseline

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3. Reduce Fraud and Error with Digital Compliance Solutions (£6bn)

Baseline and Methodology:

- The baseline used here was the total fraudulent proportion of Annual Managed Expenditure (AME), estimated between **£33-59bn**.
- A savings assumption of an **18% reduction** in fraudulent spend through compliance automation was applied, based on a specific Department for Work and Pensions (DWP) benefits fraud case study. This study showed an 18% saving (£1.5bn) on an £8.4bn fraud baseline.
- These savings were then scaled up using a multiplier to align with the broader fraud and error spend baseline across the public sector, resulting in savings estimates of **£5.9-10.5bn**. The conservative estimate (£6bn) was included in the final figure.
- Unlike levers 1 and 2, this estimate is not based on underlying internal analysis. As such there is no annex with further details and methodological information for lever 3.

Key References:

- Public Sector Fraud Authority (PSFA) estimated fraud baseline spend [6]
- DWP benefits fraud case study

[5] Data was collected by CDDO as part of the previous Transforming for a Digital Future Roadmap
[6] Public Sector Fraud Authority 2024/2025 Delivery Plan

ANNEX A: Simplify and Automate Delivery Across Public Sector

1. Introduction

This methodology note details the process used in CDDO's analysis of the maximum technical productivity gains achievable through the use of AI. This analysis aimed to quantify the maximum potential productivity gains achievable through the automation or augmentation of routine tasks using AI or related technologies - within the Civil Service and broader public sectors (education, health, and police services). The analysis adopts a task-based framework to evaluate the extent to which individual tasks, and subsequently entire roles, can benefit from AI integration. This analysis aims to improve on existing literature by attempting a bottom-up, task-based approach.

For clarity, this document primarily describes the methodology applied to the Civil Service, with the same methodology extended to the broader public sector to estimate the wider potential of AI. The only difference between the Civil Service and wider public sector analysis is the granularity of the input data used, outlined in section 2.

2. Input Data

The primary dataset for this analysis is sourced from organogram data available on data.gov.uk. This dataset encapsulates information on 12 departments, comprising 67,000 job titles and covering 350,000 full-time equivalents (FTEs)[7]. The comprehensive nature of this dataset facilitates a review of job roles within the Civil Service, thereby enabling a detailed exploration of potential for automation or augmentation of routine tasks.

The same level of role based data is not publicly available for the wider public sector. The input data used for these sectors is therefore clusters of professions or role types. As a result each sector has a much lower number of role types in comparison to the Civil Service data [8].

3. Role Mapping

In this analysis, Civil Service job roles are aligned with the closest job role defined within the International Standard Classification of Occupations (ISCO)[9]. The ISCO framework is designed to systematise job roles into a globally standardised schema, facilitating comparative analysis. For each standard job title, the framework provides:

- Index of occupational titles: a list of common job titles that are similar in scope and can be summarised using the standard job title.
- List of tasks: a list of tasks that an individual in this job role would typically expect to perform as part of their daily work.

[7] Example of MoJ organogram data - all department data is in the same format, including job title; grade and number of FTE
[8] Education has 5 unique job clusters; healthcare has 20 and the police has 68.
[9] ISCO-08 Framework is the most recently published version of the framework.

Using a large language model, we matched each job title from the public sector organogram data to the nearest corresponding job role within the ISCO framework. CDDO's analytical team manually validated the matches made by the model for the 200 most prevalent roles in the organogram data, to ensure the accuracy of the automated outputs produced. The matches reviewed covered 80% of total FTE. This process yielded a standardised list of tasks for each civil service role.

Role mapping using the ISCO framework is a common methodology in academic literature which attempts to answer similar questions around automation and augmentation potential of different public sector roles, for example in similar research papers produced in Holland[10] and Italy[11].

4. Task Categorization

The Alan Turing Institute provided a human labelled task dataset, which manually assigned a subset of tasks from the ISCO framework as either routine or non-routine. Each unique task statement was encoded using the sentence-BERT (sBert) model and mapped to the nearest semantically related task using this human-labelled task dataset. As with the role mapping, the decisions made using the sBert model were reviewed by analysts and adjusted where necessary to ensure robustness. Given there were less than 300 unique tasks in total, all task matches were reviewed. This method allowed us to quantitatively determine the proportion of routine tasks within each role, which are deemed to have higher automation or augmentation potential.

5. Estimating Potential Savings

Using the proportion of routine and non-routine tasks for each role, we then used the following methodology to quantify the potential productivity gains achievable through the automation or augmentation of tasks using AI or related technologies:

- In the absence of granular data on the proportion of time spent on different tasks, we assumed that each FTE spent an equal amount of time on each task associated with their job role.
- To estimate potential productivity gains for each role, we multiplied the proportion of time spent on routine tasks by the average salary for each role, sourced from Civil Service Pay Bands for each department[12] (other sources are used for the wider public sector, including NHS and Glassdoor.com).
- This analysis only assumes salary costs - we have not considered the additional contributions made for pension and National Insurance. Given these typically equate to 41% of salary, the inclusion of these costs would significantly increase the total benefits.
- Productivity gains are calculated using the assumption that 100% of routine tasks and 10% of non-routine tasks can be automated.

[10] Measuring the Routine and Non-Routine Task Content of 427 Four-Digit ISCO-08 Occupations
[11] Automation in public sector jobs and services: a framework to analyse public digital transformation's impact in a data-constrained environment
[12] All departmental salary data is taken from the July 2023 Civil Service Statistical Bulletin

We also applied a grade scalar to each role, with the assumption that staff at a higher grade are more likely to spend their time on tasks which require either complex decision making; innovative thinking or leadership and management. Given that the ISCO framework gives a set list of tasks for each job role, this variation in responsibilities by grade is not reflected in the underlying data. For each grade, we applied the following scaling percentages to estimate productivity gains:

- Senior Civil Service (SCS): 20% of estimated benefits within scope
- G6 and G7: 60% of estimated benefits within scope
- SEO and HEO: 80% of estimated benefits within scope
- AA, AO and EO: 100% of estimated benefits within scope

6. Validation Process

As discussed throughout this note, each step of the methodology was verified and quality assured by the CDDO analysis team, to ensure that automated decisions and matches made using models are accurate and robust.

To enhance the credibility and reliability of the analysis, additional layers of external validation were implemented. We engaged with experts from the Department for Education (DfE), the Department of Health and Social Care (DHSC), and the police service to validate the methodology and final estimates specific to their respective domains. This collaborative validation process helps ensure that the estimates reflect a comprehensive understanding of the caveats across different sectors and the reality on the frontline, which have been factored into the presentation of the analysis.

7. Caveats

It should be noted that this analysis does not forecast forward the rapidly evolving and accelerating capability of AI tools, each interaction of more powerful AI off the shelf tools only increases the scope of tasks that can likely benefit from AI, as well as the likelihood of these benefits being realised.

That being said - this is an inherently complex research question to attempt to quantify, particularly in the vastly differentiated landscape of Civil Service roles and their activities, as such the following caveats are required:

- This analysis concludes that there is substantial potential for AI adoption within the public sector, with the opportunity reaching multiple billions. GDS is currently working to strengthen the underlying methodology behind this analysis and develop the evidence base around the potential impact of AI on the Civil Service further. We are working with relevant academics in the field to utilise the latest analytical methodologies and intend to publish peer reviewed findings.
- This analysis solely considers the routine nature of tasks and does not assess the current feasibility of automating them using existing AI capabilities - given the system challenges of delivering in the public sector, specific implementation assessments should be at a local level - factoring the current digital maturity of each organisation;
- The benefits outlined in this analysis do not have a specific timeframe for realisation, but they are anticipated to be realised over the long term.

- The implementation of these benefits will necessitate substantial investments, with actual AI projects varying in size and deliverability - bespoke economic appraisal should be conducted at a project level.
- Further work with departments will be required to understand the cost of implementing these projects and refine the benefits estimates - bespoke economic appraisal should be conducted at a project level.
- Additionally, the job roles in the organogram data used are not fully specific, and therefore do not accurately depict the full scope of tasks associated with those roles - this could be overcome by using job description data for Civil Service roles, or conducting more specific assessments of tasks like Time-Motion studies.

ANNEX B: Migrate Service Processing to Cheaper Online Channels

This analysis estimates the potential annual savings achievable by transforming and digitising government services. It uses a full list of all services available on GOV.UK, of which there are more than 7,100 pages [13]. Whilst these services have a linked GOV.UK page, the majority of these services can be accessed through a variety of channels, and not all of these services can be accessed online. This analysis specifically quantifies the financial benefits of shifting transactions from costly offline channels (e.g., phone, post, in-person) to cheaper online channels.

To estimate these savings comprehensively, the CDDO employed a Monte Carlo-style simulation approach. This approach involves generating thousands of scenarios (5,000 simulations) by randomly assigning costs, transaction volumes, and digital adoption rates based on observed distributions from existing Top 75 (T75) services data.

Step-by-Step Methodology:

1. Assign Cost per Transaction

A randomised CPT was assigned to each service using a distribution derived from actual Top 75 (T75) service data. To avoid skewing caused by outliers, a cap of £100 per transaction was applied.

2. Estimate Completed Transactions for Each Service

For transactional services, estimated transaction volumes were randomly assigned based on the actual distribution of T75 transaction data. A maximum cap of 2.5 million transactions per service was used, acknowledging that most services outside the T75 are smaller in scale. For publication services, which are primarily lower-volume, page views were converted into estimated transaction volumes using a conversion rate of 72%, based on a sample of T75 services. The remaining services were assigned random transaction volumes, with a maximum cap of 150,000 transactions per service.

3. Channel Availability Assessment

Given the scale of this analysis, covering more than 7,100 services, a Large Language Model (LLM) was used to assess the content of each GOV.UK service page and categorise the transaction channels available. Channels assessed included online, email, phone, letter, in-person, and form. A subset of these categorisations were manually assured to ensure model accuracy.

[13] https://www.gov.uk/search/services?page=1

Where online channels were available, each service was assigned a random online uptake percentage. These were drawn from observed digital adoption distributions in T75 data.

4. **Distribute Transactions Across Channels**

For services offering an online channel, the remaining transactions (after applying online uptake) were randomly allocated across the other available offline channels. For services without an online channel, transactions were randomly distributed across offline channels only. The distribution was proportioned towards lower-cost channels, such as phone or email, to reflect observed user behaviour in real-world service usage.

5. **Assign Cost Per Transaction by Channel**

Each service was assigned a cost per transaction for each available channel. These were randomly selected within realistic thresholds based on prior analysis from the T75 data and desk research on industry examples. Online channels typically incurred low costs (e.g., £0.10–£1 per transaction), while offline channels such as phone, post, or in-person interactions were associated with significantly higher costs. The random assignment within these ranges aimed to reflect real-world cost variation.

6. **Calculating the Benefits**

The model estimated savings by calculating the difference in cost between online and offline channels for each service and multiplying this by the transaction volumes for each channel. A standard assumption of 90% maximum digital uptake was applied to account for realistic upper limits to digital adoption, informed by benchmarks such as the 2021 UK Census (which achieved approximately 89% online completion). A further 10% reduction was applied to the savings estimates to conservatively reflect limitations in achieving full adoption.

7. **Simulation and Aggregation**

This entire process was simulated 5,000 times to produce a distribution of potential outcomes. The central estimate of this analysis found that the current baseline spend could be reduced by 42-46%. This represents an estimate of the total baseline spend on service delivery that could be achieved from digitising services delivered by central Government departments.

8. **Caveats**

This analysis attempts to quantify the significant potential savings by reducing the number of costly offline transactions and failure demand associated with Government service delivery. This specific methodology and the outputs should be considered with the following context:

- This methodology has been chosen given we do not have a full suite of data outlining service performance metrics across all listed 7,100 services. In absence of this, we have used the distribution of key T75 metrics, to randomise metrics across all other services. Given this, the full list of services on GOV.UK are likely to significantly vary by size and scale - in reality some of these services have very minimal, if any, annual transactions.
- A subset of the services are delivered by Local Authorities, and the GOV.UK page requests a user to input their post code to read further information on their Local Authority website. In these cases we have not reviewed all local service websites and service offerings, so the channel is considered to be offline. Most of these services are likely to be low in transaction volumes.