1. ECS7025P – Group 32


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Agenda

- Data Science Accelerator Project (q1) - Darya
- Data Visualisation Accelerator Project (q2) - Darya
- Engineering the data of the future (q3) - Deepak
- UK Data Ethics Framework Principles (q4) - Berkay & Melissa
- UK Data Ethics Framework Action Points (q5) - Harsh & Simon
- Teamwork and reflections
- References

Data Accelerator Project

The Accelerator is a capability-building programme that gives analysts from across the public sector the opportunity to develop their data science or data visualisation skills. It is delivered by the Office for National Statistics (ONS), Data Science Campus and is open to UK public sector employees including central and local government. (GOV.UK, 2022a)

Programme format:
Participants work on their own project for one day a week over 3 months, supported by a mentor.
Aimed audience:
Experienced analysts, preferably with some knowledge of coding but without previous data science experience.
Usefulness:
We believe that data accelerator is a very useful for data analysts to deepen their expertise, solve complex business problems, and advance their careers and a great way to increase data literacy among UK public sector employees and a clever method of engaging government sector in data science. (datasciencecampus.ons.gov.uk, 2022)
During the program participants will:

- learn new skills and gain exposure to advanced analytical methods (machine learning, natural language processing and languages like python and R)
- collaborate with others pears and build their professional networks
- embed data science skills in their organisation
- gain new career prospects

Data Science Accelerator Project in the context of government and governments commitment to increasing data literacy

Government commitment to Data Science:

- Data Improvement Across Government (Local Data Accelerator Fund for Children and Families: Prospectus, 2021)
- National Data Strategy (GOV.UK, 2022b)

Data literacy: (Tarrent et al., 2022)

- data literacy for governments own workforce (the focus of Mission 1 of the NDS)
- impact on the wider economy (Mission 3 of the NDS)

Governmental data science related initiatives aimed at private sector

- Make data usable, accessible and available across the economy, while protecting people's privacy. (GOV.UK, 2022b, www.ons.gov.uk, 2021)
- Collaboration with companies to publish and share data and offer data visualisation and analytics as services (GOV.UK, 2021b)
- UK Innovation strategy and private sector investments (GOV.UK, 2021)
- Setting up Laws and Guides for data regulation (legislation.gov.uk, 2018)
- Funded educational opportunities for individuals: Apprenticeships (Institute for Apprenticeships and Technical Education, 2021), Educational Courses, Summer Schools and so on, from which can be business oriented and where companies can educate their employees

Application of data science skills

Data Science for Next-Gen Statistics (dataingovernment.blog.gov.uk, 2023): up to date data science skills help to speed up the decision making and create a comprehensive picture of life which empowers governments, businesses, and individuals to make informed decisions and plan for the future.

Examples:

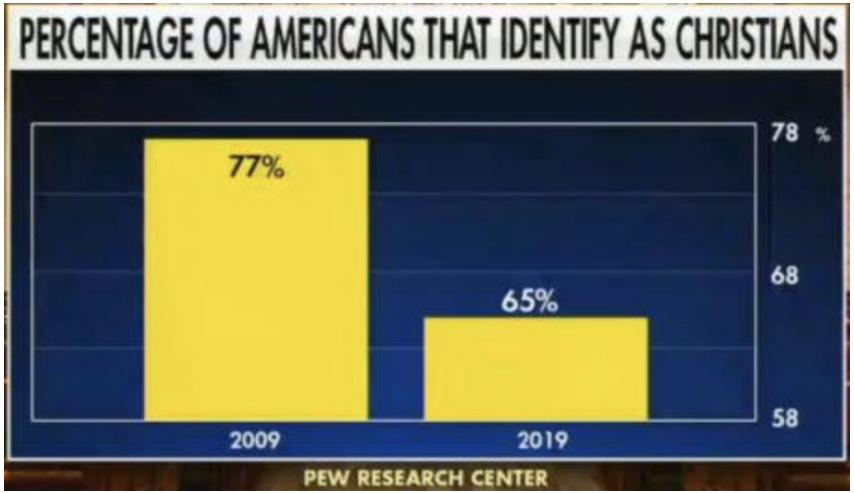
- Modernised a RAP for Highways England Road Traffic Flow
- Deployment of RAP on Google Cloud platform

Data Visualisation Accelerator Project

Data Visualisation accelerator aimed on data visualisation project, learning to represent data through common graphics. Gives opportunity to experiment with different visualisation techniques and open-source software(datasciencecampus.ons.gov.uk, 2022), (dataingovernment.blog.gov.uk, 2021)

Relation to Data Science:
Representing the data with an unbiased point of view is an important responsibility for analysts, this project will educate professionals on processing, transforming and visualising the data with an ethical and professional manner.

Relation to Data Ethics:
Interpretability of data is also GDPR requirement. Ethical data visualization requires that data be presented in a way that is honest and relevant, and that it does not mislead people, because there are many opportunities to manipulate viewers with untruthful representations of data (legislation.gov.uk, 2018)



(Kelly, 2021)

Engineering The Data of The Future

Brief:
The MOJ wants to use data more effectively by the use of cloud services to replace legacy systems.

Why the project is taking place:
The use of legacy systems when dealing with data doesn't comply with UK GDPR/Data Ethics Framework. A number of issues were identified:

1. Lack of version control
2. Lack of audit trails
3. Insecure systems
4. Duplicated data
5. Inability to access data when needed
6. Manual data manipulation

Project outcomes:

1. Automatic version control
2. Automatic audit trail
3. Secure AWS S3 buckets
4. Data version control
5. Immediate cloud/local access to data
6. Automatic data manipulation

(Central Digital and Data Office, 2020)

Government Working With Legacy Data

Legacy data handles by government in a variety of ways to inform policy decisions, improve public services, and ensure transparency and accountability. Here are some ways in which the government works with data:

1. **Data Cleansing –** (Wheeler, 2022) stated that ‘‘All ‘red-rated’ legacy systems identified through an agreed cross-government framework will have an agreed remediation plan in place.”
2. **Data Integration -** Several government organisations are already using artificial intelligence or machine learning in different ways. For example, GDS is using machine learning to process large amounts of legacy data to aid human decision-making (GOV.UK, 2017).
3. **Data Sharing –** According to (Taylor, 2021), the Troubled Families Programme, administered by the Ministry of Housing, Communities and Local Government (MHCLG), is designed to help local services improve the way they support families experiencing problems such as poor health, domestic abuse, addiction, poor school attendance and unemployment.
4. **Data Standardization -** The Data Standards Authority was established in April 2020 which leads the cross-government conversation around data standards, engaging regularly with the wider data community to address challenges together.

Government Use of Legacy Data

To succeed as a government we need to transform the use of legacy data to drive efficiency and improve public services (Dowden, 2020):

1. **Quality, availability and access**
2. **Standards and assurance**
3. **Capability, leadership and culture**
4. **Accountability and productivity**
5. **Ethics and public trust**

By ensuring data integrity, the government can improve service delivery by making informed decisions based on reliable and accurate data. This will further help the government to increase public trust and confidence in government decision-making.

Government Initiatives for Safe & Ethical use of Data

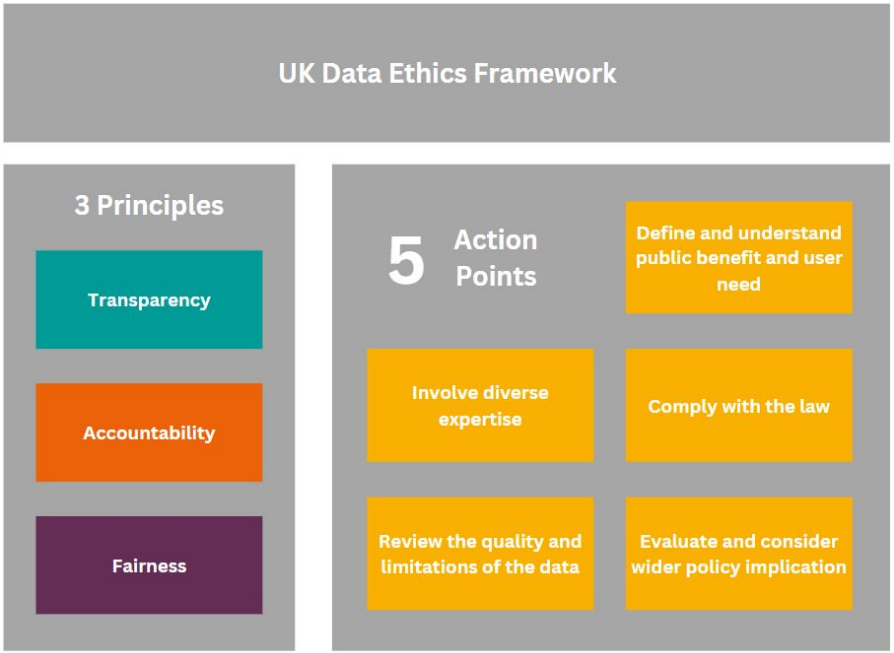
Public Sector

- **National Information Infrastructure (NII) (2012)** - Established to improve data sharing between government departments and between the public & private sectors.
- **General Data Protection Regulation (GDPR) (2018) –** is a regulation designed to protect the privacy rights of individuals and establish rules for the protection of personal data by the European Union and the UK.
- **Secure Data Access Service (SDAS) (2018)** - Established to allow approved researchers to access sensitive data in a safe and controlled environment.
- **Data Ethics Framework (2018)** - is a framework developed by the UK government's Department for Digital, Culture, Media and Sport (DCMS) to help organisations make ethical decisions about the use of data.

Private Sector

- **Open Data Institute (ODI) (2012)** - Established to promote the use of open data across various industries, including the private sector.
- **GovTech Catalyst (2017)** - aims to stimulate innovation and improve public services, while also creating new business opportunities for UK-based companies.
- **Centre for Data Ethics and Innovation (CDEI) (2018) –** helps promote the safe and responsible use of data and AI while promoting innovation and economic growth.

UK Data Ethics Framework



Central Digital and Data Office, 2020)

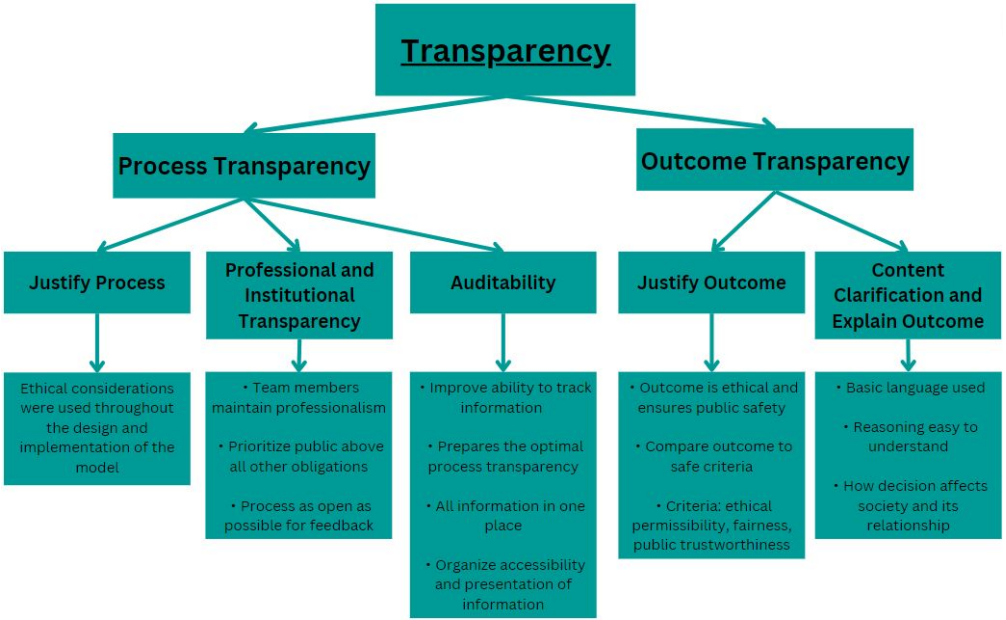
	Principles	Score 0	1	2	3	4	5
■	Transparency						
▲	Accountability						
●	Fairness						

	Specific actions	Score 0	1	2	3	4	5
1	Define public benefit and user need						
2	Involve diverse expertise						
3	Comply with the law						
4	Check the quality and limitations of the data						
4.1	Check the quality and limitations of the model						
5	Evaluate and consider wider policy implications						

(Central Digital and Data Office, 2020)

Data Ethics Framework Principles: Transparency - Definitions

Interpretability is the ability to understand why a model performed in a certain way specific to the situation.
Justifiability is the ability to demonstrate that a system is designed and operates in a way that is ethical and trustworthy. (Leslie, D. 2019)



Data Ethics Framework Principles: Transparency

Before Project

Transparency Problems

1. Lack of version control/duplicate copies
2. Doesn't meet criteria for outcome justification

Process Transparency

A. Decisions at risk of being made with false data (Tazzyman, S. 2019)
B. Unable to know how data is being used Tazzyman, S. 2019)

Outcome Transparency

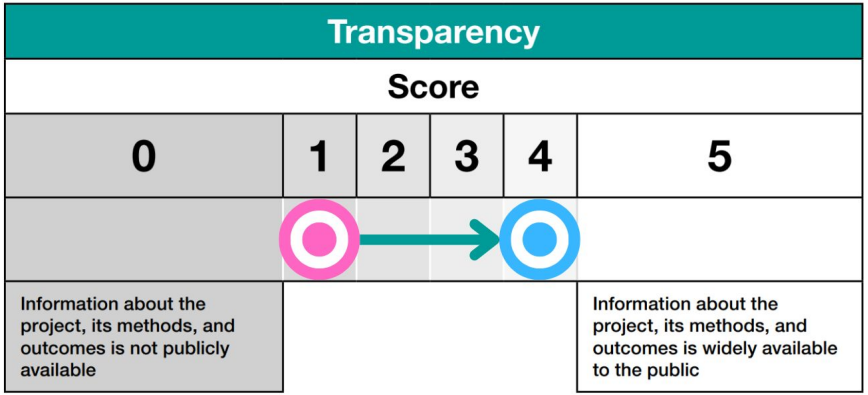
A. Security - data cannot be commented on (Leslie, D. 2019)
B. Ethical Permissibility - transferred via email (Leslie, D. 2019)
C. Fair - obtained at specific times (Tazzyman, S. 2019)
D. Basic language used and easy to follow Tazzyman, S. 2019)

After Project

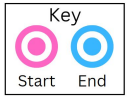
Transparency Problems Addressed

1. Lack of version control
   a. Data in chronological order and different versions accessed easily (Tazzyman, S. 2019)
   b. Single pipeline processed automatically (Tazzyman, S. 2019)
2. Doesn't meet criteria for outcome justification
   a. Security - multi-factor authentication, data encryption and backups(Amazon, 2023)
   b. Ethical Permissibility - access anywhere (Amazon, 2023)
   c. Fairness - compliance reports (Amazon, 2023)

Data Ethics Framework Principles: Transparency Chart



(Central Digital and Data Office, 2020)



Ministry of Justice

Disclosure Team
Ministry of Justice
102 Petty France
London
SW1H 9AJ

data.access@justice.gov.uk

Wednesday 22 March 2023

Melissa Doci
ah18174@qmul.ac.uk

Dear Ms Doci

Freedom of Information Act (FOIA) Request – 230301066- FOI

Thank you for your request dated 01 March 2023 in which you asked for the following information from the Ministry of Justice (MoJ):

Reference to the article below, I would like to learn a bit more about how the UK Data Ethics Framework and GDPR was applied to this project. Specifically, about the overarching principles – transparency, accountability and fairness and how they have been applied before and during this process. What is the expected outcome and how would this benefit the public? Are there any potential risks or negative consequences if you did not pursue this process?

Any articles or documents that you have in regards to this will be extremely helpful to me. https://dataingovernment.blog.gov.uk/2019/10/30/engineering-the-data-of-the-future/.

Your request is being handled under the FOIA.

I have considered your request for information but I am unable to answer it without further clarification. Section 1(3) of the FOIA does not oblige us to answer requests where we require further clarification to identify and locate the information requested.

So that I provide you with the right information, please can you identify the search location you are require the information for? On receipt of this information I will continue to process your request.

Yours sincerely

(Email sent from Ministry of Justice)

Name
Disclosure Team

Data Ethics Framework Principles: Accountability

"Accountability means that there are effective governance and oversight mechanisms for any project."
(Central Digital and Data Office, 2020)

2 Challenges of accountability for responsible AI:

1. **Accountability gap** - Automated decisions aren't self-justifiable
2. **Complexity of AI production process** - Human answerability in AI systems is difficult to implement

(Leslie, 2019)

Case Study: Barings Bank


The Guardian

Receivers called in after £500m goes walkabout ☐ Mayhem feared in markets

Barings Bank goes bust

(Rodrigues, 2019)

2 Special requirements for Accountability:

1. **Answerability** - Who is accountable for an automation supported system?
2. **Auditability** - How are the designers and implementers of AI systems being held accountable?

(Leslie, 2019)

Accountability by Design: All AI systems must be designed to facilitate end-to-end answerability and auditability. This requires both ***responsible humans-in-the-loop*** across the entire design and implementation chain as well as ***activity monitoring*** **protocols** that enable end-to-end oversight and review.

Data Ethics Framework Principles: Accountability

Start of project:

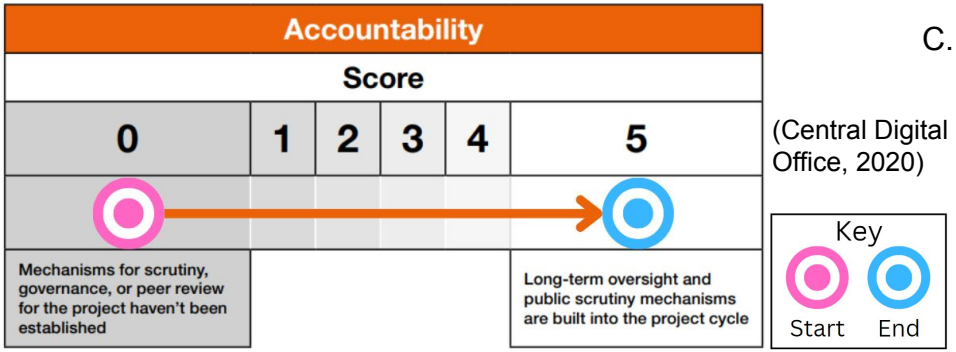
Accountability problems:

1. Lack of version control
2. Lack of audit trails
3. Insecure systems

Potential Issues:

A. Difficult to recreate the data analysis process

B. Difficult to determine who made what changes and who accessed the data.



(Central Digital and Data Office, 2020)

End of Project

Problems Addressed:

1. Lack of version control - automatic version control
2. Lack of Audit trails - automatic auditing
3. Insecure systems - AWS S3 Buckets

Potential Issues Addressed:

A. Automatic auditing and version control means that the data analysis process is much easier to reproduce.

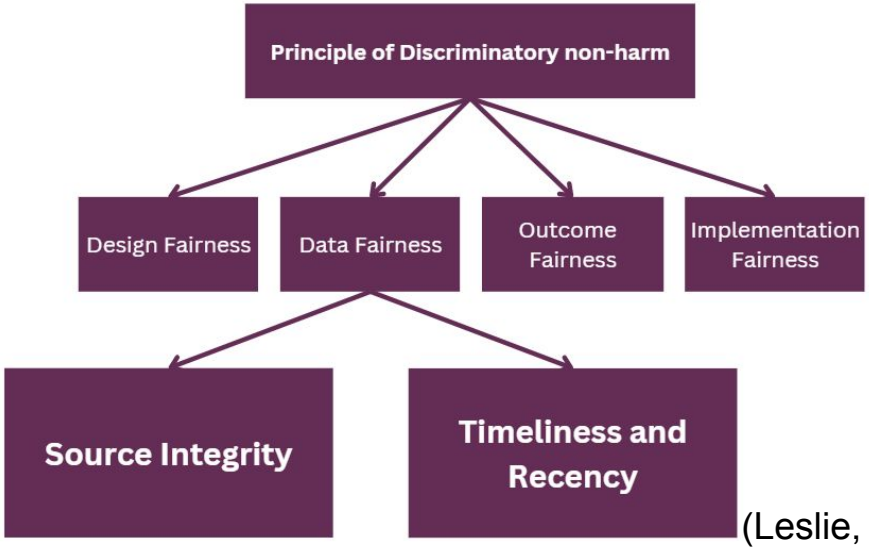
B. All of the above means that it is easy to determine who made what changes and who accessed the data

C. Bias due to lack of accountability is mitigated

Data Ethics Framework Principles: Fairness

"Fairness - It is crucial to eliminate your project's potential to have unintended discriminatory effects on individuals and social groups..."

(Central Digital and Data Office, 2020)



(Leslie, 2019)

Timeliness and Recency

Is the dataset generalizable to the now?

Source Integrity

Is the dataset in its rawest most optimal form?

(Leslie, 2019)

<u>Case study: Amazon hiring</u>

Amazon used an AI system to screen applicants but the model negatively ranked female applicants due to biased historical and complex social patterns. This would have negative effects on the gender gap in tech.

(Dastin, 2018)

Data Ethics Framework Principles: Fairness

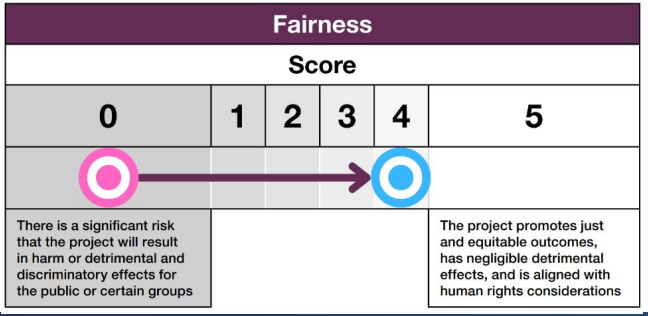
Start of project:

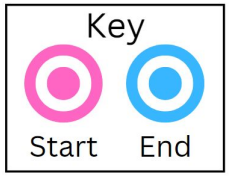
Problems:

1. Lack of version control
2. Multiple copies of data
3. Inability to access data when needed

Potential Issues:

A. Easy modification of datasets to introduce bias
B. Multiple copies of data could skew the data and introduce bias
C. Infrequent access to data means that some models could be trained on stale data, introducing bias





(Central Digital and Data Office, 2020)

End of Project

Problems Addressed:

1. Lack of Version control - automatic version control
2. Single source of truth for data
3. Authorized immediate access to data

Potential Issues Addressed:

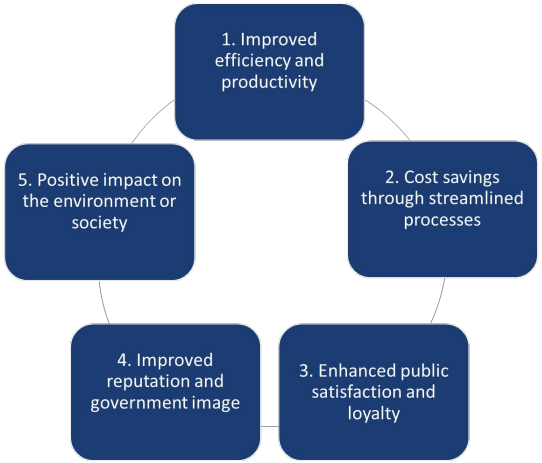
A. Automatic version control means that modifications to datasets are viewable
B. With a single source of truth for the data, less likely to introduce bias
C. Immediate access to data means models can be trained on the most recent data

(www.superannotate.com, 2022)

1. Define and understand public benefit and user need

1.1 Understand the wider public benefit

- A more streamlined system enables the usage of machine learning (ML) and analytical techniques.
- Examples from the article: Automation of monthly forecasting of court demand, Providing a daily assessment of prison violence risk to frontline prison staff (dataingovernment.blog.gov.uk, 2019).



1.2 Understand unintended and or negative consequences of your project

- Data used in the ML pipeline might not have been intended for this use (legislation.gov.uk, 2018,. Gov.uk, 2021).
- **Case study:** Policing predictive system LASER and how dirty data might have influenced it. (Currie, 2020,. Leslie, 2019,. OJJDP.GOV, 2020,. Richardson et al. 2019,)
- The risk in not proceeding with the project depends on the problems they aim to address.

1.3 How does the algorithm respect human rights and democratic values?

- Providing opportunities for underrepresented groups
- Promoting transparency and accountability → making decision makers more accountable

(The Guardian, 2021)

2. Involve diverse expertise

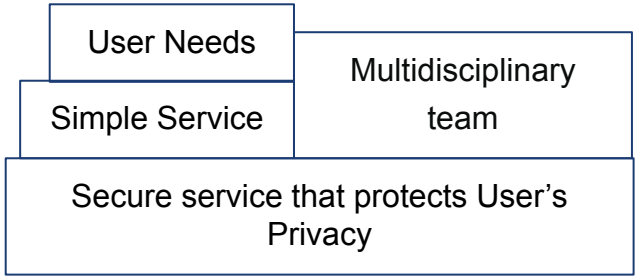
Fairness

(Gill,2020) Announced that internally the data, analysis, and digital teams will work together in this project to encourage collaborations and diversity.

External Experts

MoJ are looking for a digital partner in launching HMPPS Intelligence Management Service (IMS) which securely processes and handles intelligence reports originating from prisons and probation (DigitalMarketPlace.GOV, 2022)

(AWS, 2021)



(Yusaf, 2021)

Diverse and Open transparency

- In a blog (Yusaf, 2021) introduced the service design playbook which helps designers and digital engineers design public services.
- They carried out workshops across MoJ and approached external colleagues for guidance. They also welcomed feedback in an open transparent manner.
- In a roadmap blog update (Gill,2021) discussed how recently MoJ deployed laptops and digital services within prisons where offenders can manage their own admin related tasks.

3. Comply with the law

Accountability

Failed to respond to over 8,000 Subject to Access requests (SARs) Information Commissioner's Office (ICO) launched a former complaint (ICO, 2022).

Data Governance panel

(GOV.UK, 2023) announced MoJ have formed a data governance panel that will offer independent expert advice on Open Justice, Independence of the Justice, Rule of Law, and Maintaining the Public Confidence.

Other regulations

The technology code of practice (TCoP) is a cross government agreed standard for government technological projects. This defines how government bodies design, develop, and buy technologies.

Data protection responsibilities

Schrems II Case

This ruling means that MoJ who are now severely using AWS for operating their updated services will be responsible for verifying the data protection laws in USA where data is being transferred to, and as well as document the risk assessments (European Parliament, 2020).

GDPR and Protection

The Data First Project (MoJ,2021) Describe how the data is used and processed within MoJ. Legislations such as GDPR, Data Protection Act and HMG security Framework.

ico. Information Commissioner's Office

Ministry of Justice

4. Review the quality and limitations of the data

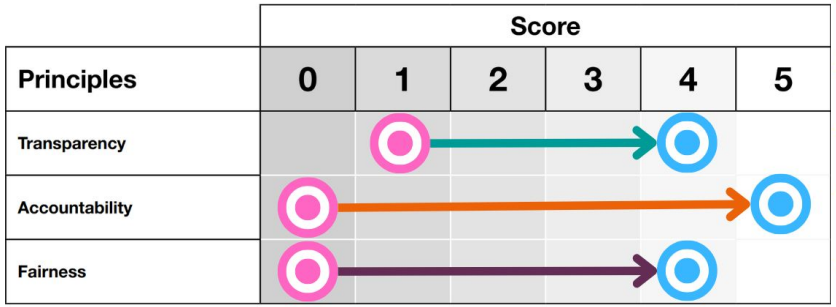
- Data science tool in order to ensure consistency and improve accuracy
  - Audit trails: increased transparency and fairness

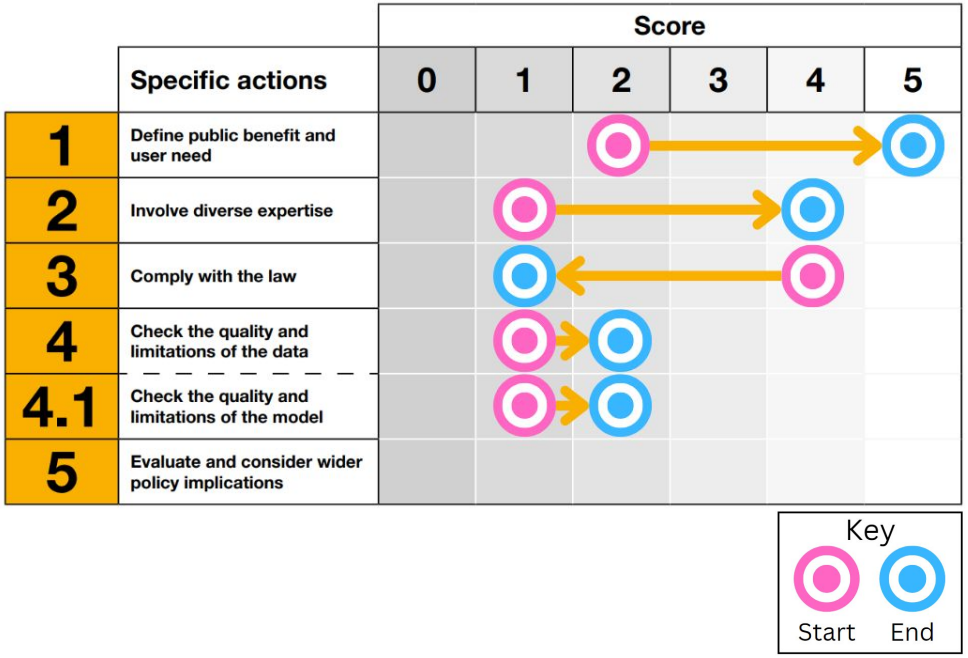
(hireamir, 2017)

5. Evaluate and consider wider policy implications

- Project does not discuss evaluation criterias
- Comprehensive evaluation of the digitalisation programme: HM Courts and Tribunals Service (HMCTS) reform (GOV.UK).

Conclusion





(Central Digital and Data Office, 2020)

Teamwork and Reflections

Self reflection - Darya Baranouskaya

During the group project, I always stayed in touch with my team and actively participated in the assignment. I demonstrated effective communication, made sure to actively listen to my team members and provide feedback and ideas when needed. I was also proactive in identifying areas where we could improve and suggesting solutions. I was able to use my strengths, such as research skills and attention to detail, to contribute to the project. However, I also recognize that there are areas where I can improve. For example, I could have been more efficient with my time management and be more aware of how much time various tasks take. I also could have been more assertive in some situations where we were discussing ideas or making decisions.
Overall, I learned a lot from this team project and am grateful for the opportunity to work with my peers.

Self-Reflection – Deepak Verma

Reflecting on the group work of the ethics, regulation and law module, I had the opportunity to work collaboratively with my team members and contribute my skills and knowledge to achieve our project goals. Together, we created an environment of mutual respect and trust that allowed us to freely share our ideas and provide constructive criticism to improve the quality of our work. But time management was a significant challenge for our group during the project, as we struggled to adhere to our established deadlines and complete tasks on schedule.

I personally identified an area for personal development in terms of my reading and data-collecting skills. Through this experience, I realized the importance of setting aside dedicated time to research and collect data, as well as managing my time effectively to ensure I could contribute fully to the project. Moving forward, I plan to implement better reading strategies and time management techniques to improve my productivity and ensure I can bring my best self to future collaborative projects.

Self-Reflection - Melissa Doci

We performed well as a team during our group project, offering helpful criticism to enhance our work. However, I identified an area for personal development - my ability to extract the most relevant details from large amounts of information. This caused some delays during the research stage because I had trouble with it. I want to improve my information-gathering techniques and just take out the most crucial facts to streamline our work. I displayed strong research abilities and effective communication throughout the project. I appreciated our team's willingness to work together and be flexible since it helped us accomplish our objectives quickly. Looking ahead, I plan to enhance my time-management skills, ensuring timely delivery of tasks.

Self reflection - Berkay Dur

I was able to work well in a team setting and I stepped up whenever a leading role was needed from me. I was able to provide and receive constructive criticism that has resulted in a better made and more thorough presentation. I think that I was a proactive member of the team, always involving myself in the discussion and asking questions. I was able to research thoroughly and to a high standard. However, I still see a lot of room for improvement. I think I need to get better at scheduling. I spent a lot of time on research which I think could have been better spent on making the powerpoint and helping other members of the team. I also think that I need to work on my communication skills as sometimes I stumble over my own words, making my explanations convoluted.

Self reflection - Simon Vetter

During the group assignment, I worked collaboratively with my team members to ensure that we completed our tasks efficiently and effectively. One of the key skills that I demonstrated was helping to organise the work through clarifying roles and responsibilities. I would also say that I was proactive and flexible when it came to the work we had to do. I made sure to actively identify areas where we could improve and help out finding relevant and informative material. Despite these strengths, I recognise that I have developmental areas as well. I could get better managing time as I delayed the creation of the presentation to the end and it showed to require more work than what I initially thought.

Self reflection - Harsh Purohit

Overall, I am very much pleased with this group coursework assessment, and it has been a knowledgeable experience throughout where I have very much enjoyed working alongside my group members. Personally for me, working together with different individual ideas was one of the more difficult challenge that I encountered as there were several opportunities where as a group we could have taken a different creative approach for example from selecting the presentation format to the project case study. However, during this process I have learned to effectively manage my expectations and have learned to take a more collaborative approach. Getting a study space appropriately to everyone's busy schedule was another logistical challenge that as a group we faced. In the future to overcome this issue I believe additional planning is required where we propose a throughout working schedule before hand that includes meetings and deliverables.

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