

<b>Institution: University of the West of England, Bristol</b>		
<b>Unit of Assessment: 17</b>		
<b>Title of case study: Setting national and international standards for data governance</b>		
<b>Period when the underpinning research was undertaken: 2012 – 2020</b>		
<b>Details of staff conducting the underpinning research from the submitting unit:</b>		
<b>Name(s):</b>	<b>Role(s) (e.g. job title):</b>	<b>Period(s) employed by submitting HEI:</b>
<b>Felix Ritchie</b>	Professor in Economics	2012 - present
<b>Elizabeth Green</b>	Lecturer in Economics	2015 – present
<b>Kyle Alves</b>	Senior Lecturer, Information Systems and Operations Management	2019 - present
<b>Period when the claimed impact occurred: 2014 – 2020</b>		
<b>Is this case study continued from a case study submitted in 2014? No</b>		
<b>1. Summary of the impact</b>		
<p>Governments acquire much information on businesses and people. Re-using this information for research brings substantial public benefit in the form of better health care, improved policy-making and better services. Where the data is confidential (for example, healthcare or tax receipts), its value is not fully realised because governments are generally wary about re-use. Work conducted by UWE researchers has dramatically changed the way the public sector exploits data by:</p> <ul style="list-style-type: none"> <li>• changing attitudes to risk;</li> <li>• developing statistical and management tools to improve implementation; and</li> <li>• providing a universal framework for managing data.</li> </ul> <p>UWE's research has been accepted as best practice in many countries, including the UK, Australia and New Zealand. In Australia and the UK, the 'Five Safes' framework has directly shaped primary legislation.</p>		
<b>2. Underpinning research</b>		
<p>The theory around re-use of confidential government data for analysis has historically been very cautious, driven by fear of mistakes rather than a desire to maximise value. Research was commissioned and promoted by statistical agencies and focused on the risk of using confidential data to produce aggregate statistics such as inflation or crime figures. UWE research has developed and challenged this by:</p> <ul style="list-style-type: none"> <li>• showing how different attitudes to risk around data governance can significantly affect outcomes;</li> <li>• developing new statistical and management tools and the theory and evidence to justify them;</li> </ul>		

- providing a standard framework for risk management – the ‘Five Safes’.

### **Changing attitudes – a new conceptual model**

Governments are encouraged to be defensive when considering re-use of confidential data. This leads to outcomes designed to minimise risk to the data holder. UWE research identified that this leads to sub-optimal outcomes and inefficient decision-making. The research recommended that: problems be considered from the user’s perspective, not the data owner’s; that credible evidence be the basis of decision making, not hypothetical ‘worst-case scenarios’; and that governments should be ‘default open’ – using data unless there is a compelling reason against it. This leads to risk management, not minimisation, and acknowledges the wider gains to society. UWE research showed how this leads to more efficient outcomes, both in theory (**R1, R2**) and in applied work (**R3, R4, R5, G1**).

This radically different agenda was first presented in 2014 (**R1**), and has now evolved into the epistemological perspective called the EDRU (Evidence-based, Default-open, Risk-managed, User-centred) approach (**G2, R5**). This is characterised by the question “what are we trying to achieve and how do we do it best?” rather than the traditional “what are we allowed to do?”

The EDRU approach is less dogmatic in its approach to risk management, causing problems for the rules-based processes used to regulate data access. The UWE team demonstrated that effective regulation is better achieved by ‘principles-based’ regulation matched to accreditation processes, rather than rigid rules. Together, the EDRU approach to decision-making and the principles-based approach to objective-setting form the ‘UWE model’.

### **New statistical and operational tools**

Before our work, almost all government research data access was based upon rules designed for the production of official statistics by organisations such as the Office for National Statistics (ONS). The literature was dominated by statisticians proposing technical measures to preserve confidentiality and IT literature focusing on hacking attacks. We found this was inappropriate for research purposes. As a result, UWE researchers developed tools or guidelines for all aspects of the research data process: the best way to train researchers (**G3, G4**); dealing with ‘impossible’ risks; anonymising datasets for research use (**G1, R5**); and cost-effective delivery mechanisms (**G5, R2**).

For example, statistical disclosure control (SDC) is a major research field in statistics, concerned with the risk that statistical outputs may inadvertently disclose some confidential information about an individual. We were the first to demonstrate in research papers that SDC rules for official statistics are wasteful, ineffective and unsafe when applied to research outputs. An entirely new field of ‘output SDC’ was proposed which incorporated previous research as a special case. This new perspective led to new operational theory (**R3**) and new statistical theory (**R4**).

### **The ‘Five Safes’ framework**

Professor Ritchie devised the Five Safes framework as a way of describing data management choices (**R6**). This sees effective use of data for research as a problem of managing five dimensions: the project; the people; the setting; the data and the outputs. The Five Safes integrates statistical, ethical, managerial and behavioural perspectives into a single coherent framework that can be applied to any confidential data management problem.

This also helped structure research by the group. It was clear that most research in each of the Five Safes was siloed and did not follow EDRU principles. Accordingly, our research programme was developed to address the methodological and technical gaps in each of the elements.

## Impact case study (REF3)

Together these three elements (conceptual model, specific tools, 'Five Safes' framework) have created an integrated research programme which have changed the way that confidential data management is perceived.

### 3. References to the research

**R1** Ritchie F. (2014) 'Access to sensitive data: satisfying objectives, not constraints,' *Journal of Official Statistics* 30(3) pp.533-545 <https://doi.org/10.2478/JOS-2014-0033>

**R2** Alves K. and Ritchie F (2020) 'Runners, repeaters, strangers and aliens: operationalising efficient disclosure control,' *Statistical Journal of the IAOS* 36(4) pp.1281-1293 <https://doi.org/10.3233/SJI-200661>

**R3** Ritchie F. and Elliot M. (2015) 'Principles- versus rules-based output statistical disclosure control in remote access environments,' *IASSIST Quarterly* 39 pp.5-13 <https://uwe-repository.worktribe.com/output/833838>

**R4** Ritchie, F. (2019). 'Analyzing the disclosure risk of regression coefficients.' *Transactions on data privacy*, 12(2), pp.145-173 <http://www.tdp.cat/issues16/tdp.a303a18.pdf>

**R5** Ritchie, F., Hafner, H., & Lenz, R. (2019). 'User-focused threat identification for anonymised microdata.' *Statistical Journal of the IAOS*, 35(4), pp.703-713. <https://doi.org/10.3233/SJI-190506>

**R6** Ritchie F. (2017) 'The 'Five Safes': a framework for planning, designing and evaluating data access solutions.' *Data For Policy Conference 2017*, London <https://zenodo.org/record/897821#.X5rSe3d2tpw>

#### Evidence of the quality of the supporting research

This case study has been underpinned by 19 research grants worth £367,000 (UWE net project funding) since 2013. The most significant grants in terms of advancing research have been:

**G1** Ritchie, F. *Enabling data linkage sharing for research*, Wellcome Trust 2016, £41,654

**G2** Ritchie, F. *Anonymisation of the Community Innovation Survey*, Eurostat 2016, £5,472

**G3** Ritchie, F. *Safe researcher training*, Office for National Statistics 2017 £38,950

**G4** Ritchie, F. *Output checker training* Office for National Statistics 2019 £23,315

**G5** Ritchie, F. *Automated checking of research outputs*, Eurostat 2020 £26,513

### 4. Details of the impact

#### Changing attitudes to risk

Prior to this research, public sector organisations paid lip service to improving data access, but in practice followed models based on a defensive methodology that discouraged innovation.

UWE research provided the organisations with a new conceptual framework and the research evidence to support new ways of thinking about data access. This approach is popular because it generally leads to outcomes with lower costs but better data protection and user satisfaction.

The broad messages of the Evidence-based, Default-open, Risk-managed, User-centred model (EDRU) are increasingly accepted as best practice in public sector organisations, and in international meetings on confidentiality, such as those organised by Eurostat (**S1**). The value of the research to organisations is widely recognised. A Principal Information Development Manager at Public Health Scotland noted that: '*Felix's research has been influential in changing mind-sets across the board*' (**S2**). Whilst a Data Integration Partnership manager for the Australian Bureau of Statistics (ABS) revealed that:

*'The ABS has moved away from being a 'default closed' to a 'default open' organisation. Felix's research has allowed us to reassure the public and other government agencies that data is being handled, shared and distributed in a safe and effective way...Moving from a data-centred to a user-centred approach marks a considerable change in attitudes in our organisation's data focused mindset' (S3).*

The principles-based approach to regulation has been increasingly influential with lawmakers. This approach underlies the GDPR, and both the UK (the Digital Economy Act 2017) (S4) and Australia (2020) have introduced primary legislation which is explicitly principles-based and founded on UWE work:

*'Our Bill is a full implementation of a principles-based approach to data sharing...Felix's approach has become the standard method of viewing the sharing of data in the Australian Government' (S5).*

### **Developing statistical and operational tools**

UWE researchers have trained users and managers of confidential data. We have been repeatedly commissioned by the Office for National Statistics (ONS) and Eurostat to develop courses, and have advised statistics offices in Canada, Mexico, Germany, New Zealand and Australia. Training based on UWE's user-centred model has been replicated around the world (S3) and seen as an exemplar: *'The training courses he's [Professor Felix Ritchie] helped develop are...widely accepted as the gold standard for researchers hoping to get accreditation' (S4).*

Research using confidential data must be checked for confidentiality risks before being released for publication. UWE research on the statistical issues directly translates into output checking guidelines (S1, S6) in most OECD countries, irrespective of whether those countries use the rest of the UWE model. UWE researchers provide guidance and training to all the UK secure research facilities. UWE research into operational issues has also had a substantial impact, with principles-based output checking being adopted across the UK, Australia, Canada, New Zealand, Mexico, Norway, Germany, Luxembourg and the Netherlands.

*'We have similarly made amendments to our disclosure control policies in accordance with Felix's research. We have developed check lists and procedures for both us, as outputs checkers, and for researchers to use' (S2).*

### **Adoption of the Five Safes framework**

The Five Safes is increasingly common across the world. It is particularly popular with 'data enclaves' (secure facilities for more confidential data) such as those run by the Bundesbank, the European Central Bank, Eurostat, and the statistical offices of a number of European countries, as well as in Australia (S7, S8) and New Zealand (S9).

In the UK, organisations such as the ONS, UKRI, NHS Digital, NHS Scotland, and Cancer Research UK, among others, all now explicitly use the Five Safes to define their data access policies. The ONS won the 2017 Cyber Security award for its implementation (S4). The Digital Economy Act 2017 means that all UK government data sharing for research is effectively required to use the Five Safes. According to the Deputy Director for Research Services and Data Access at the ONS:

*'Felix's design of the 'Five Safes' framework has played a hugely significant role with regards to the secure sharing of data both in the UK and across the world...Felix's creation of the Five Safes has demystified the way data is used. One of the strengths of*

*Felix's research has been to take a dry and technical concept and make it accessible whilst also reassuring' (S4).*

The same source also noted the impact on data sharing during Covid-19, with the Five Safes crucial in making the ONS's weekly Covid Infection Study possible. The work with the Joint Biosecurity Centre, the sharing of 'Track and Trace' statistics from the Department for Health and Social Care, data acquired in one place from multiple sources '*...all of this made possible in the context of Felix's Five Safes'* (S4).

The Australian Bureau of Statistics (ABS) adopted the Five Safes in 2015, after being heavily criticised for their data management in 2014, and coming across the UWE research in search of a solution (S3). After its successful adoption by ABS and the Australian Department of Social Services, private sector organisations and universities in Australia increasingly used it. The 2017 government sponsored Productivity Commission report (S10) recommended wholesale adoption of the UWE model across all of government, including the Five Safes. The bill implementing this is now making its way through the Australian parliament. According to the Acting National Data Commissioner in the Department of the Prime Minister and Cabinet:

*'Felix's work has formed the cornerstone of a key Australian Government reform agenda which is to be enshrined in legislation. His work has captured the attention of key decision makers, who are now familiar with the Five Safes approach. Taken together, I can give no stronger endorsement of the relevance and importance of Felix's work to us' (S5).*

#### 5. Sources to corroborate the impact

**S1** [How to use microdata properly: self-study material for the users of Eurostat microdata sets](#), European Commission, Eurostat, July 2018

**S2** Testimonial from Principal Information Development Manager, Public Health Scotland

**S3** Testimonial from Manager, Data Integration Partnership for Australia: Australian Bureau of Statistics (ABS)

**S4** Testimonial from Deputy Director, Research Services and Data Access: Office for National Statistics (ONS)

**S5** Testimonial from Acting Interim National Data Commissioner, Department of the Prime Minister and Cabinet (Australia)

**S6** [Handbook on Statistical Disclosure Control for Outputs](#), October 2019 (pp.7, 27, 85, 87)

**S7** [Data Sharing and Release Legislative Reforms Discussion Paper](#), Department of the Prime Minister and Cabinet (Australia), September 2019 (see pp.8, 29, 30, 58)

**S8** [The Five Safes Framework](#), Australian Institute of Health and Welfare, Australian Government

**S9** Stats New Zealand: [Integrated Data Infrastructure](#), 2<sup>nd</sup> June 2018

**S10** Australian Government Productivity Commission, 31<sup>st</sup> March 2017: [Data Availability and Use: Inquiry Report](#) (see report pp.158, 185, 419, 611, 637)