

# **A framework to assist in the governance and management of data in the digital ecosystem**

**by Avirup Dasgupta**

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under the supervision of:

Dr Asif Q.Gill

Dr Farookh Hussain

University of Technology Sydney  
Faculty of Engineering and Information Technology  
School of Computer Science  
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## **Certificate of Authorship**

I, Avirup Dasgupta, declare that this thesis is submitted in fulfilment of the requirements for the award of Doctor of Philosophy in Information Systems in the Faculty of Engineering and IT, School of Computer Science at the University of Technology Sydney.

This thesis is wholly my own work unless otherwise referenced or acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis. This document has not been submitted for qualifications at any other academic institution.

This research is supported by the Australian Government Research Training Program.

**Signature:** Production Note:  
Signature removed prior to publication.

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## List of Abbreviations

<b>Abbreviation</b>	<b>Description</b>
APP	Australian Privacy Principles
DE	Digital Ecosystem
DG	Data Governance
DGM	Data governance and management
DM	Data Management
DSR	Design Science Research
FEIT	Faculty of Engineering and IT
GDPR	General Data Protection Regulation
IoT	Internet of Things
RO	Research Objective
RQ	Research Question
RSQ	Research Sub Question
SLR	Systematic Literature Review

## Publications

Publication #	Reference	Source
Publication-1	Dasgupta, A. & Gill, A.Q. 2017, 'Fog Computing Challenges: A Systematic Review', paper presented to the Australasian Conference on Information Systems, Hobart.	<a href="https://opus.lib.uts.edu.au/bitstream/10453/124785/1/ACIS2017_paper_182_RIP.pdf">https://opus.lib.uts.edu.au/bitstream/10453/124785/1/ACIS2017_paper_182_RIP.pdf</a>
Publication-2	Dasgupta, A., Gill, A. & Hussain, F.K. 2019, 'A Conceptual Framework for Data Governance in IoT-enabled Digital IS Ecosystems', Data Science Technology and Applications (DATA), pp. 209-16.	<a href="https://www.scitepress.org/Papers/2019/79243/79243.pdf">https://www.scitepress.org/Papers/2019/79243/79243.pdf</a>
Publication-3	Dasgupta, A., Gill, A.Q. & Hussain, F. 2019, 'Privacy of IoT-Enabled Smart Home Systems', IoT and Smart Home Automation, IntechOpen	<a href="https://www.intechopen.com/chapters/65738">https://www.intechopen.com/chapters/65738</a>
Publication-4	Dasgupta, A., Gill, A.Q. & Hussain, F. 2020, 'A Review of General Data Protection Regulation for Supply Chain Ecosystem', Innovative Mobile and Internet Services in Ubiquitous Computing, eds L. Barolli, F. Xhafa & O.K. Hussain, Springer International Publishing, Cham, pp. 456-65.	<a href="https://link.springer.com/chapter/10.1007/978-3-030-22263-5_44">https://link.springer.com/chapter/10.1007/978-3-030-22263-5_44</a>

## **Abstract**

The digital ecosystem (DE) continues to grow with the proliferation of new digital offerings every day, a trend that is expected to accelerate rapidly in the next few years. The digital ecosystem involves several players, platforms and industries that provide solutions based on advanced technologies such as the Internet of Things (IoT), cloud computing, analytics and artificial intelligence. The data-driven digital ecosystem provides organisations with the information they need to make better insightful decisions for monetary benefits. However, there are a few challenges. There is limited guidance available on how to effectively establish integrated data governance and management for the data-intensive digital ecosystem. The existing approaches focus on individual organisations rather than the ecosystem. There is a need to look beyond the boundary of a single enterprise. To address data governance and management concerns, this thesis applies the design science research (DSR) approach to develop a framework that can be utilised to create an integrated data governance and management capabilities for a focal enterprise in the DE. Rather than having a fixed one-size-fit-all approach, the framework focusses on the adaptability approach to address the changing business and regulatory landscape.

The framework has three major components: Drivers, Elements and Stages. The driver has four key purposes (e.g., Data Compliance, Data Protection, Monetisation and Operational Efficiency). Drivers provide justification to conduct data governance and data management activities. The element component comprises of six elements (e.g., Data Asset, Data Risk, Guidance, Processes and Procedures, Ecosystem Actors and Technology) and the underlying attributes. Elements provide stakeholders key toolkits to govern and manage data. There are four key stages: 1) Identify, 2) Insulate, 3)

Inspect and 4) Improve. The stages provide guidance to achieve objectives of drivers with the elements. The framework is evaluated through scenario-based testing and survey. The results indicate that the framework is reasonably suited to support integrated data governance and management activities in different organisational contexts.

**Keywords:** Data governance, Data Management, Framework, Compliance, Digital Ecosystem, GDPR, Australian Privacy Principles, Data Breach