

# **Project Development Phase**

## **Code-Layout, Readability And Reusability**

Team ID	NM2023TMID04427
Project Name	Project – Tracking Public Infrastructure And Toll Payments Using Blockchain

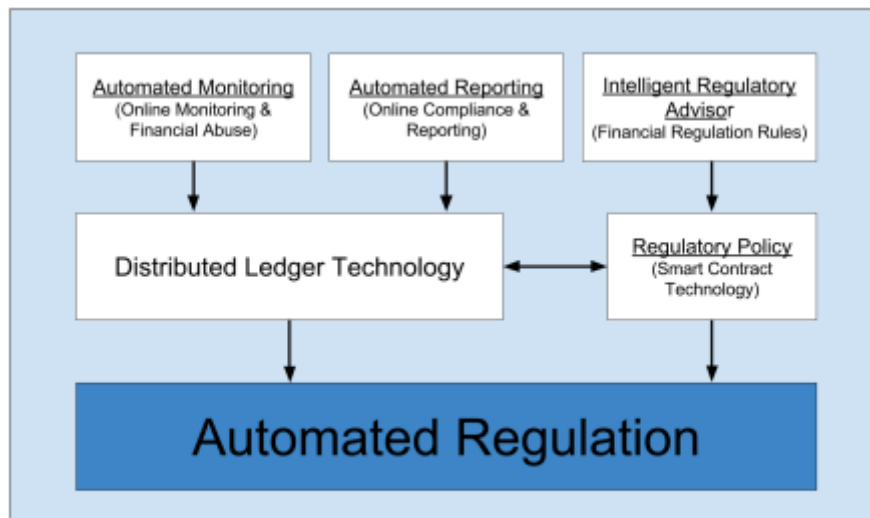
### **Introduction**

The objective of this chapter is to present an overview of this thesis by discussing the motivation behind the research problem, the objectives, experiments and contributions of this study and the structure of this thesis. The chapter starts by briefly introducing some background information on the growing problems financial regulators are facing, Distributed Ledgers and Algorithmic Regulation. The chapter then outlines the objectives, experiments and contributions of this work and concludes with the thesis structure.

The majority of the work in was conducted in collaboration with the FCA, RegulAltion and Santander, facilitating expert guidance, validation and further confirming the relevance of this study.

### **Automated Regulation**

Figure 1.1 provides an overview of the platform and the interdependencies of each component. A long term research objective is to develop a proof of concept system that integrates all the components to carry our algorithmic regulation systemically. We first require a sub-system that is capable of reasoning with regulation.



**Figure 1.1:** Algorithmic Regulation, adapted from [76]

## The Problem of Reporting Data For Regulation

There are a number of reasons why the process of supplying regulatory reports is increasingly complex [12]. The process of building reports from the FCA Handbook is difficult and open to interpretation by legal departments in [79]. Moreover the entire set of instructions for compiling a report can be spread across many different areas of interlinking regulation. At times, the wording found in the Handbook is insufficient or unclear for firms to understand. On the other side, regulators struggle to provide precise reporting instructions for about 50,000 firms that operate across financial services [12] [13]. Often times firms need to make judgements based on their practice that makes it difficult to provide unambiguous, definitive requirements. Additionally, firms could be operating across several jurisdictions, forcing them to repeat the reporting process in multiple regimes and jurisdictions. This repetition is often across the same data sets with similar requirements.

## Data Regulation Compliance And Collaboration

The debate around Data Regulation is amplifying and the need for policies and mechanisms to manage data compliance, governance and regulation is growing. There are growing political, commercial and social challenges concerning data that have resulted in the need for the Algorithmic Regulation of data [79, 89, 77, 86].

## **Research Objectives**

The motivation of this thesis is to investigate the application of blockchain technology and artificial intelligence to the domain of Algorithmic Regulation. The intention is to explore the problems with regulatory compliance and supervision in financial services as well as an emerging form of regulation- the regulation of data, with close industry collaboration. The understanding and findings from these will then be used to architect Algorithmic Regulation solutions, which could realistically be adopted by industry, that automate regulation and compliance. All the work has been validated by industry partners and collaborators. To this end, the thesis explores 3 investigations:

1. Using AI to Automate the Regulatory Handbook
2. SmartReg: Using Blockchain for Regulatory Reporting
3. RegNet: Using Federated Learning and Blockchain for Privacy Preserving Data Access

## **Using AI to Automate the Regulatory Handbook**

This study has a number of sub-objectives:

- Study the semantic structure of regulatory rules and how they can be encoded as machine readable rules
- Propose a formal specification for a regulatory reasoning system
- Implement the design of this reasoning engine for use by the regulator as a recommender system
- Assess the suitability and accuracy of automated guidance from this system

## **SmartReg: Using Blockchain for Regulatory Reporting**

The following objectives were established:

- Identify problems with regulatory reporting currently from the perspective of each entity ()
- Establish systems design constraints based on these
- Propose a solution architecture that addresses these design constraints
- Implement, analyse and iterate the proposed solution
- Test the solution in the “real world” with an actual reporting use case pilot
- Analyse and compare the proposed solution to the current system

## **RegNet: A Framework for Privacy Preserving Data Access**

The following objectives were established:

- Identify relevant technologies and fields of research in data science and information security to support trusted data access for a singular algorithmic purpose
- Architect a framework based on these technologies that facilitates data access for industry applications
- Implement, analyse and iterate over the design of this framework and its emerging infrastructure
- Test and validate this infrastructure with the collaborators
- Analyse the proposed solution and its efficacy in governing data in a secure, compliant manner for algorithmic purposes