

# How the Gill Framework Can Help to Realise the Cloud Adoption Strategy for Traditional Banking Transformation

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## Abstract

*A common trend in the banking industry is that cloud computing is more than just a technology, it's an innovator for business operations in the future. The challenge for the banking industry is how to better realise the cloud adoption strategy and cloud-driven changes. To resolve this challenge, it requires adaptive processes and a comprehensive adaptive framework. This paper proposes applying The Gill Framework for cloud adoption in the traditional banking context. The Central Bank of Ireland is used as a case study to demonstrate how the Gill Framework helps navigate successful cloud adoption.*

## 1. Introduction

The global banking industry operates in a dynamic, strictly regulated and complex environment. Information technology (IT) is a core part of the operating environment that provides banking with essential support (Nicoletti, 2013). The emergence of cloud technology laid the foundation for subverting traditional banking service delivery methods (European Banking Federation, 2020). Cloud technology enables the banking industry to take advantage of new service models and use its technological advances to provide customers with better and new services, improving productivity, cost-efficiency and flexibility of internal business processes (European Banking Federation, 2020). Traditional banks need to take steps toward adopting the cloud, which helps them meet with the IT and business's diverse and changing needs (Nicoletti, 2013). The challenge is how to carry out the adoption of cloud-based technology better. This paper proposes to use adaptive-driven and agile methods that apply in cloud-driven Enterprise Architecture (EA), to achieve a cloud strategy in the traditional banking environment. This paper also takes the Gill Framework to demonstrate the methodology to develop and implement a cloud-based adaptive EA in the Central Bank of Ireland.

The structure of this paper is organized as follows. Firstly, it reviews the current situation of IT, cloud computing, and banking. Secondly, the Gill Framework is applied. Thirdly, it introduces the Central Bank of Ireland as a case study and presents how the implementation of the Gill Framework could help to better adopt the cloud in the traditional banking industry.

## 2. Literature Review

### 2.1 IT Challenges in Banking

At present, IT-based financial innovation for banks has become mainstream. In 2019, worldwide IT spending in the bank and securities market reached \$605.5 billion (U.S. dollars) (Narisawa et al., 2019). The banking industry

has transformed into a service-centric, digital-first landscape (Scardovi, 2018). The emergence of fintech/non-bank startups stimulates the customer's requirements for intuitive, personal, and round-the-clock service (Wingard, 2020). That forced traditional banks to reconsider how they conducted business. Outdated business management applications or isolated systems in traditional banks lack a solid and forward-looking technical foundation, which will cause organisations to miss key business developments. The occurrence of disasters like the COVID-19 pandemic and the number of IT resources required for disaster management is unpredictable (Gill & Livingstone, 2012). Hence, speed and agility are crucial for banking, which are the factors that determine the retail bank's success today (Wingard, 2020). Technologies such as cloud computing show significant advantages that reduce cost while improving customer retention, growing wallet share, and meeting flexibility and scalability needs for IT on demand (Wingard, 2020).

## **2.2 Cloud Computing and Banking**

Cloud computing can provide IT services, applications, and data using dynamically shared pools for users to break through the time and geographical restrictions to meet customers' needs (Sehgal & Bhatt, 2018). Through the application of cloud computing, organizations can focus on the application layer and reduce cost by sharing infrastructure (Sehgal & Bhatt, 2018). About 89% of banks had adopted more than one cloud application by 2015 (Capgemini & Temenos, 2015), and there are three factors that impel banks to adopt the cloud. Firstly, banks prefer to outsource ICT to IaaS or PaaS providers, rather than purchasing IT infrastructure themselves to achieve cost-effectiveness and agility (Hon & Millard, 2018). Secondly, banks need to move on from the legacy system, which is becoming obsolete, as there are not enough human resources to maintain the outdated system (Hon & Millard, 2018). Thirdly, with the integration of mobile payment technology and the financial sector, the bank needs to provide banking services to customers through various interfaces. However, cloud adoption is challenging because it necessitates major disruption to existing ICT infrastructure and management within organisations (Sehgal & Bhatt, 2018). Thus, cloud adoption requires an agile EA framework that allows developers to adapt migration projects to their context (Gill et al., 2014).

## **3. Introduction to the EA Framework for Cloud Adoption**

Effective information management and utilisation and digital transformations are vital factors for business success, as well as an indispensable means to gain competitive advantage. However, the big data reference architectures developed by cloud vendors are too general to be used in conjunction with companies' information systems (Kein et al., 2016). The EA meets this demand by sharing typical information architecture and providing a strategic environment for expanding digital capabilities (Masuda & Viswanathan, 2019). EA is defined as a blueprint that shares a united goal and strategy to business structure, behavior, technology, and facilities (Bernard, 2012). It is typically implemented as a framework.

Some EA frameworks, such as Zachman, FEAF, TOGAF, and The Gill Framework, can support cloud computing and Mobile IT (Cameron & McMillan, 2013; Gill, 2013). Zachman Framework is a two-dimensional matrix and it does not provide an EA development process. Federal Enterprise Architecture Framework (FEAF) is very specific to the federal government and lacks relevant management such as mobile device managers (Masuda & Viswanathan, 2019; Bente et al., 2012). The Open Group Architecture Framework (TOGAF) provides comprehensive methods for building, managing, and implementing EA (Josey, 2018). However, it is complex to maneuver, slow, documentation-driven, and lacks agility (Masuda & Viswanathan, 2019; Desfray & Raymond, 2014). According to Gill (2015), the Gill framework is driven by adaptive business architecture and is light-weight and human-focused. Therefore, The Gill Framework is proposed to be applied in this report.

### 3.1 The Gill Framework

The Gill Framework (Figure 1) is an Adaptive Enterprise Architecture Framework. Additionally, it is a meta-framework used to tailor organisational needs in a specific enterprise context. The Gill Framework cannot substitute the existing traditional EA frameworks (e.g., TOGAF, FEAF) (Gill, 2015). It supports the development and management of adaptive or agile enterprise architectures in the cloud-driven context (Gill et al., 2014). It also allows organisations to review and guide the impact of long-term and short-term changes (Gill, 2015), improving the enterprise adaptation capability. The Gill Framework, a two-layered framework, has been collectively developed based on the ADOMS approach (Figure 2). The outer layer includes the Adapting capability, and the inner layer consists of the Defining, Operating, Managing, and Supporting capabilities.

According to Qumer and Henderson-Sellers (2008), an agile enterprise is responsive, flexible, speedy, lean, and learning. The Gill Framework defines the agile enterprise as an Adaptive Enterprise Service System (AESS) (Gill, 2015). The AESS model is a part of the Gill Framework (inner layer) (Gill, 2013), and it describes an AESS at three different levels: service level, capability level and enterprise level (Gill, 2015).

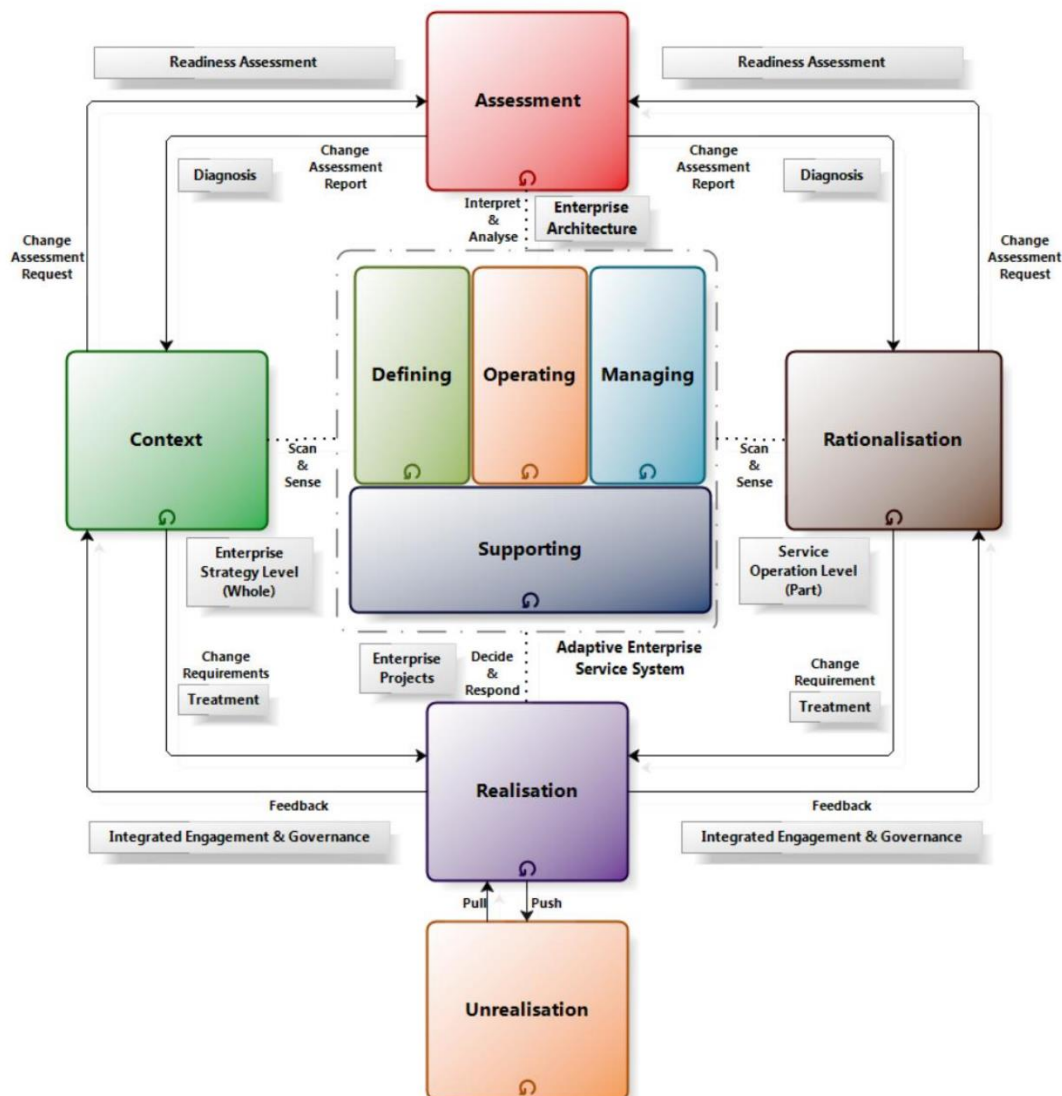


Figure 1. The Gill Framework (AdaptInn, 2020)



Figure 2. The ADOMS Lifecycle Management Approach (AdaptInn, 2020)

### 3.2 Why the Gill Framework Suits Cloud Adoption in the Traditional Banking Industry

Cloud adoption is not merely converting applications, documents, information, and data to a cloud. A context-specific Adaptive EA needs to be developed by enterprises for supporting their iterative adaptation (Gill, 2015). The Gill Framework will provide a platform for creating an agile or adaptive enterprise that is centered on cloud services (Gill, 2015). In addition, the Gill framework provides solutions within the overall context of the enterprise, rather than adopt the cloud from the perspective of individual and independent business units (Gill, 2015). In the banking industry, traditional EA frameworks may take months or even years to develop an appropriate and fixed EA to realise a cloud adoption strategy. (Gill et al., 2014).

#### 3.2.1 Comparison of the Cloud Elements in Different EA Frameworks

The following Table 1 illustrates some cloud elements in traditional EA and The Gill Framework (Adaptive EA). Numerous elements of the Mobile IT-related Cloud Category, including SaaS, PaaS, and IaaS, are found in the form of metamodels in The Gill Framework. However, SaaS, PaaS, and IaaS are identified in the document form in FEAF, and no elements can be identified in any form in TOGAF (Masuda & Viswanathan, 2019). Adopting the Gill Framework to support the existing traditional EA will help enterprises be better able, and more agile, to implement the cloud strategy.

EA Frameworks		Traditional EA		Adaptive EA
Key elements of Mobile IT/Cloud Computing and services		TOGAF	FEAF	
Mobile IT-related Cloud Category (TA)	SaaS	N/A	Document	Meta-model
	PaaS	N/A	Document	Meta-model
	IaaS	N/A	Document	Meta-model
	Cloud Interface	N/A	N/A	Document
	Other	N/A	Document	Meta-model

Table 1: Mobile IT/Cloud elements in EA Framework (Masuda & Viswanathan, 2019)

#### 3.2.2 Benefits of the Gill Framework

- **A service-oriented approach**

According to Crosman (2010), it is proven that 80% of banks have used a service-oriented approach when

building their applications. In addition, the Gill Framework has a service-centric and contemporary view of the enterprise rather than using a traditional product-centric method, which is suitable for the banking industry (Gill, 2015). Moreover, cloud technology is usually offered as a service, such as SaaS, PaaS, IaaS, etc. (Gill, 2015).

- **Keeping up with the changes in customer requirements**

Keeping up with the changes in customers' requirements and expectations is one of the challenges that the traditional banking industry is facing (Bellens & Meekings, 2020). The Gill Framework can enable the banking organisations to respond to external and internal changes quickly, as well as to provide further defining, operating, managing, and supporting services (Gill et al., 2014).

- **Reducing risks for cloud adoption**

In the assessment service stage of the Gill Framework, it reviews and assesses the request for new adoption opportunities, which have been identified during the previous services (Masuda & Viswanathan, 2019). It can enable banking organisations to identify and assess risks of duplicate and inconsistent adaptation throughout the whole architecture. Then organisations can address and mitigate these risks during the development of the cloud adoption strategy in the realisation service (Gill, 2015).

- **The Gill Framework is agile, speedy and resilient for cloud adoption**

The foundation of the Gill Framework is "adaptive thinking", which has six key elements: agility, design thinking, model thinking, resiliency, service thinking, and systems thinking (AdaptInn, 2020). Resiliency is an adaptive entity's ability to operate well under pressure and adapt and recover from disruption or unexpected disaster states (Gill, 2016), such as the COVID-19 pandemic. Meanwhile, cloud computing has the characteristics of being speedy and agile, which matches the agility of The Gill Framework.

## **4. Case Analysis - the Central Bank of Ireland**

The Gill Framework seems to be suitable for applying service-oriented banking cloud-enabled adaptive EA. This article intends to use a case study to demonstrate how the Gill framework is developed and implemented in a traditional bank. The case analysis can show the role of each part of The Gill Framework in helping to realise the cloud adoption strategy for the traditional banking transformation intuitively. This paper uses the Central Bank of Ireland as an example to demonstrate how to develop and implement The Gill Framework. The Central Bank is a traditional bank that was founded in 1943, it operates in both local and international markets (Central Bank of Ireland, 2020). According to Central Bank of Ireland (2019), the Central Bank provides banking services to individual customers, small businesses, and companies through online and branch channels. Its three-year vision includes enhancing its data strategy, and a sounder financial system to adapt financial and technological innovation (Central Bank of Ireland, 2020), making cloud computing the unavoidable choice for the Central Bank. Assume that the Central Bank is an agile enterprise and already has EA capabilities. Due to the challenges of cloud adoption, it requires the creation of an adaptive cloud EA capability within existing EA capabilities to navigate the systematic adoption of the cloud across the organisation. This section applies the AESS metamodel and ADOMS lifecycle management method to adapting, defining, operating, managing and supporting the Central Bank's adaptive cloud EA capability, which is organised into the outer layer and the inner layer.

### **4.1 Outer Layer (Adapting)**

The outer layer (Figure 1) aims to identify cloud opportunities or the change requirements from the banking organisation's perspectives, which may become initiatives or future enterprise projects (Gill, 2015). Context, rationalisation, assessment, realisation, and unrealisation are the five services of the adapting capability that support identifying the cloud opportunities in banking organisations (Gill, 2015). Furthermore, the adapting capability

offers services to continuously scan, sense, understand, analyse, assess, decide and respond to internal and external changes (AdaptInn, 2020). This capability can help Central Bank identify the initial initiatives or ideas, and those initiatives will be defined and handled through the inner layer (Gill, 2015).

#### **4.1.1 Context**

The context service is to continuously monitor (scan and sense) the internal and external environment of the Central Bank for the identification of cloud adoption opportunities at the enterprise level, and it is a horizontal approach (Gill, 2015; Gill et al., 2014). It can also generate a change assessment request at the enterprise level to the assessment service based on the identified opportunities of cloud adoption (Gill, 2015). After receiving the assessment reports from the assessment service, the change requirements are sent to the realisation service for making decisions and taking actions (Gill, 2015).

#### **4.1.2 Rationalisation**

The rationalisation service provides similar services and has similar subsequent processes to the context service. However, unlike the context service, which is under the whole-of-bank view, the rationalisation service focuses on the opportunities of cloud adoption from a part-of-bank view and provides treatment from the capability and service level (Gill, 2015). It is a vertical approach (Gill et al., 2014).

#### **4.1.3 Assessment**

Assessment service assesses, analyses and determines the cloud adoption opportunities, which have been identified at the enterprise and capability service levels, to determine the potential risks, value, and influences of these opportunities on the Central Bank's existing projects or initiatives (Gill, 2015). The assessment services will use the adaptive capability maturity model to assess Central Bank's adaptive capability (Gill et al., 2014). At this stage, assessment reports will be provided to the context and rationalisation services to develop the strategic and operational change requirements (Gill, 2015).

#### **4.1.4 Realisation**

The realisation service involves the decision-making process, and the actions to be taken (Gill, 2015) based on the change requirements received from both the context service and the rationalisation service. The realisation service helps the Central Bank to focus on specific cloud service adoption by providing the cloud adoption roadmap, strategy and portfolio, integrated engagement, governing the cloud implementation management, and technological and economic improvement of the bank cloud environment (Gill et al., 2014). It identifies the capabilities and services of adaptive cloud EA, which could further guide the Central Bank's cloud adoption.

#### **4.1.5 Unrealisation**

The unrealisation service is to store the rejected or deferred cloud adoption requirements, which are pushed from the realisation service (Gill, 2015). These requirements might not be relevant at the current stage, nevertheless, they can be tracked and reconsidered by the Central Bank for future adoption (Gill et al., 2014).

### **4.2 Inner layer**

The inner layer (Figure 1) and outer layer of the framework are connected, and they present a banking service architecture, which is called AESS Architecture (Gill et al., 2014). This layer of The Gill Framework helps to define, operate, manage, and support complex organisation as an AESS, in response to demands or changes from the outer layer (Gill et al., 2014).

### 4.2.1 Defining

The defining capability refers to establishing the identified project details with agile or adaptive capabilities (AdaptInn, 2020). This capability focuses on identifying the adaptive cloud EA capability as an adaptive service system that contains architectural principles (design principles), which is under the direction of guiding elements (Gill, 2015). It involves understanding the boundaries and scope of the banking cloud architecture before it is developed and implemented (Gill et al., 2014). The Central bank's context-specific metamodel can be tailored using AESS's generic guiding elements: enterprise cloud strategy, existing architecture and financial system, legal policy, standards, etc. (Gill, 2015).

### 4.2.2 Operating

The operating capability helps The Gill Framework in conjunction with the operating environment of the overall enterprise service system (Gill, 2015). The adaptive cloud enterprise architecture conceptual model is shown below (Figure 3). The guiding element and design principles are defined in the above layer. The cloud interaction architecture identifies dynamic interaction between internal and external sources such as human, IT, and facility architectures in the system (Gill, 2015). This architecture can help the Central bank be aware of the changing demand of its cloud services, and supply adaptive cloud services. The cloud factory architecture, which focuses on developing re-usable cloud service and service sources, includes human architecture, IT architecture, and cloud solution architecture. Human architecture concerns human information interaction and business culture (Gill, 2015). By giving reference suggestions such as investigating current social capability and key social actors, and pursuing the mutually agreed goal, the Central Bank can achieve human-IT alignment step by step (Gill, 2015). IT architecture involves the application, platform, and infrastructure and various supporting enterprise strategy models to augment IT. Cloud solution architecture guides cloud solution implementation at the context-specific portfolio (Gill, 2015). This architecture guides the Central bank to develop high-level cloud solutions to address the stakeholders' concerns by combining human and IT domains. The cloud facility architecture is a distributed network to manage geographically dispersed facilities (Gill, 2015). The Central bank may have different cloud service providers, and these cloud service systems and services should be mirrored or replicated in different facilities, so cloud facility architecture plays a role.

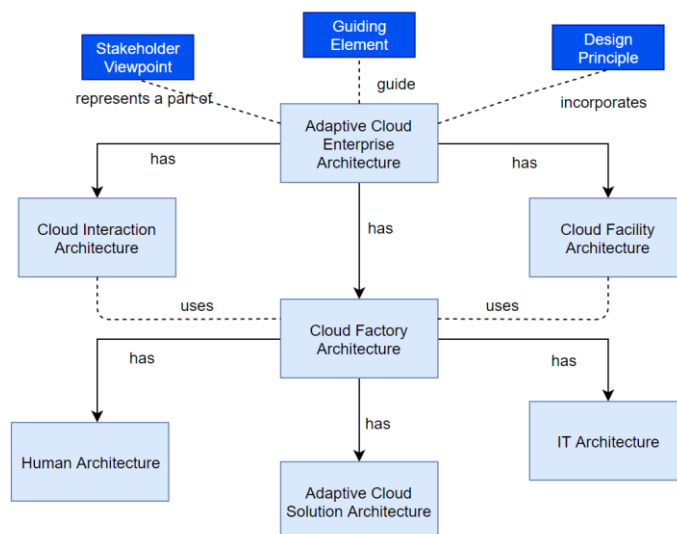


Figure 3: Adaptive cloud enterprise architecture model

### **4.2.3 Managing**

The managing capability can handle change initiatives and integrate requirements, strategic, architecture, project, and service management (Gill, 2015). These managements are linked through a two-way feedback loop, and it automatically triggers other capabilities to change when one aspect changes. This mechanism can improve the Central Bank cloud system responsiveness. For instance, project management includes portfolios, programs, projects, and iterations layers (Gill, 2014). Each layer has a different level team that offers planning, analysis, architecture, design, and deployment (Gill, 2015). The strategy and design they give is ultimately correlated to enterprise-level consideration. It is an excellent insight for the Central Bank to follow. Additionally, the Central Bank can establish a requirement management repository to link and trace every requirement. According to Ellis (2013), an efficient repository should include who, what, why, how, and outcome. It helps the Central Bank to improve the requirement management in every iteration.

### **4.2.4 Supporting**

This capability supports defining, operating, and managing capabilities via architecture model, intelligence, and asset library (Gill, 2015; Gill, 2014). The Central Bank can apply the change model to balance technology innovation and efficiency. Cloud transformation is the big innovation (Gill, 2015), but too much innovation may lead to less efficiency and lost competitive advantage (Gill, 2015) so the Central Bank change initiatives should consider the daily running effort. Moreover, adaptive enterprise intelligence involves monitoring the environment, identifying data, and turning data into insight and actions (Gill, 2015). This mechanism can improve the Central Bank data delivery, and solve traditional bank system challenges.

## **5. Recommendations and limitations**

Traditional banks should tailor and integrate their existing enterprise architecture frameworks to pursue adaptive capability. This report analyzes Gill Framework's outer layer and inner layer capabilities to help banks establish an adaptive cloud enterprise architecture capability and integrate it into enterprise strategic, project, requirement, and service management capabilities. However, the use of cloud technology in the banking industry must consider the industry's highly regulated nature and pay special attention to stability and security, and the Gill Framework shows some limitations in this regard. Moreover, this paper only focuses on the context of the traditional banking industry, and the applicability of The Gill Framework to other industries needs further research.

## **6. Conclusion**

Cloud computing has become a crucial technological-driving force for the development of innovative services. Adopting the cloud requires a holistic strategic approach rather than focusing on a single agency or department. This paper's adaptive architecture method provides a comprehensive framework for traditional banks to adopt cloud technology for practical solutions to adaptive enterprise service systems based on theory. This paper also demonstrates how to utilise an adaptive EA-driven method to support the cloud adoption of the Central Bank of Ireland. The Gill Framework provides a service-centric view and service-oriented approach for the banking industry, helps banks respond to internal and external changes quickly, reduces the risk of cloud adoption, and controls costs more efficiently. Hence, it is recommended that other security-focused EA frameworks can be combined together with the Gill Framework in future research, to discover and provide a more sophisticated support for cloud adoption in banks.



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