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Australian Judo Bank executed an "everything-as-a-service" (EaaS) technology strategy and was privately valued at A$1 billion within 12 months of obtaining its banking license. This strategy required orchestrating an ecosystem of external service providers to deliver a secure, scalable, flexible and resilient set of IT services at a small fraction of the "normal" cost of ownership for in-house IT. We describe the benefits and risks of Judo Bank's approach and provide recommendations for others seeking to implement and apply an EaaS technology strategy.[1,2]

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Background to Judo Bank and Its "Everything-as-a-Service" Technology Strategy

The case study reported in this article describes how Judo Bank became a billion-dollar[3] bank without owning or operating any IT systems. (For details of the research we carried out for this case study, see the Appendix.)

In the 1980s, the Australian banking sector was one of the most profitable lending markets globally,[4] mainly because of substantial barriers to entry. Indeed, Australia's big four incumbent

1 Iris Junglas is the accepting senior editor for this article.

2 Christoph F. Breidbach and Amol M. Joshi contributed equally to this article and share first authorship. The research for this case study was funded in part by Amol Joshi's Kauffman Foundation Junior Faculty Fellowship Grant for Entrepreneurship Research. The authors thank Iris Junglas and the review team for useful comments and suggestions, as well as Rick Watson and Gabe Piccoli for important guidance during the early stages of the research process. Graham Dickens was CTO of Judo Bank when this research was conducted. He is now working across multiple organisations as an advisor. Alex Twigg is a Co-Founder of Judo Bank and was CIO when this research was conducted. He is now Co-Founder and Executive Chairman of Appeggio.

3 Unless otherwise stated, all dollar amounts in this article refer to Australian dollars. As of April 2022, A$1 = $0.74.

4 For a comprehensive analysis of the profitability of the Australian banking industry and the process of regulatory change, see Rushdi, M. and Tennant, J. "Profitability of Australian Banks: 1985-2001," *Agenda* (10:3), January 2003, pp. 229-243.

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banks (ANZ, Commonwealth Bank, National Australia Bank and Westpac) had benefited from preferred access to domestic and international payment systems[5] and earned protected margins through oligopolistic[6] practices and opaque pricing.[7] But the global financial crisis in 2007-2009 resulted in much greater public scrutiny of Australian Banks. Later, the Australian Government's Royal Commission into Misconduct in the Banking, Superannuation and Financial Services Industry[8] revealed a series of scandals involving money laundering, abuse of customers and lax lending standards. Subsequent political action by the Australian Prudential Regulation Authority (APRA), the nation's chief banking regulator, identified the need to reduce market entry barriers, promote competition and improve service quality.

One regulatory pathway APRA pursued was to allow fintech startups to enter the market. At the time, regulators felt that fintechs could challenge the position of incumbent banks through innovative uses of technology and accelerate the broader digital transformation of Australian banking.[9] In 2019, APRA therefore granted four new banking licenses, one of which went to Judo Bank.[10]

To date (2021), Judo Bank is the only one of the four to achieve profitability, reaching a $1 billion private valuation within 12 months of obtaining its banking license.[11] When Judo Bank was granted its banking license, the prevailing trend in financial services and the approach chosen by its competitors was to deploy self-service technologies that replace human interaction at the frontline, thus reducing operational costs. In stark contrast, however, Judo Bank's business strategy was to automate back-office tasks, so that its frontline employees would be able to complete essential tasks more effectively, thus increasing the time for interpersonal contact between bankers and customers. To enable this business strategy, Judo Bank relied on an "everything-as-a-service" (EaaS) technology strategy. EaaS meant that Judo Bank neither owned nor operated any of its IT systems. Instead, the bank orchestrated an ecosystem of external providers to deliver a secure, scalable, flexible and resilient set of IT services at a fraction of the "perceived-normal" cost of ownership.

Below, we describe how Judo Bank developed and deployed its EaaS technology strategy and highlight the trade-offs and risks associated with this approach. Drawing on Judo Bank's experience, we provide recommendations on how to implement EaaS in financial services and other service industries.

Forming a Bank Inspired by an Ancient Martial Art

Judo Bank was originally founded in 2016 when a group of banking executives became frustrated with the state of the Australian banking industry.[12] From their perspective, the pressure within incumbent banks to flatten cost structures in the aftermath of the global financial crisis resulted in two critical constraints. Internally, Australian incumbent banks focused on extending their residential mortgage lending portfolios, which had become profitable growth engines

5 As reported in Williams, B. "Factors Affecting the Performance of Foreign-Owned Banks in Australia: A Cross-Sectional Study," *Journal of Banking & Finance* (22:2), February 1998, pp. 197-219, "The regulations resulted in Australian banks earning high profits by international standards … and having monopoly access to the domestic and international payments system."

6 An oligopoly is a market structure with a small number of firms, none of which can keep the others from having significant influence.

7 A formal inquiry conducted by the Australian Competition and Consumer Commission (ACCC) in 2018 found "signs of a lack of vigorous price competition" and observed that "opaque discretionary pricing by the Inquiry Banks stifled price competition during the price monitoring period." For more information, see *Mortgage Price Inquiry—Final Report*, ACCC, December 11, 2018, pp. 5-11, available at https://www.accc.gov.au/system/files/ACCC%20Residential%20mortgage%20price%20inquiry%20-%20Final%20report%20November%202018_1.pdf.

8 The Royal Commission's final report is available at https://financialservices.royalcommission.gov.au/Pages/reports.html.

9 For an overview of how fintechs may challenge mainstream financial institutions, see Breidbach, C. F., Keating, B. W. and Lim, C. "Fintech: Research Directions to Explore the Digital Transformation of Financial Service Systems," *Journal of Service Theory and Practice* (30:1), May 2020, pp. 79-102.

10 The other three firms that obtained banking licenses in 2019 were Xinja Bank (ceased to operate as a bank in December 2020), 86400 Ltd (acquired by incumbent National Australia Bank in January 2021) and Volt (not yet profitable).

11 For additional information on Judo Bank's rise within the Australian financial sector, see High, M. "SME Challenger Bank, Judo Bank, Attains Unicorn Status," *FinTech*, June 1, 2020, available at https://www.fintechmagazine.com/venture-capital/sme-challenger-bank-judo-bank-attains-unicorn-status.

12 For an in-depth look at the banking crisis in Australia from the viewpoint of Judo Bank's co-founder and CEO, Joseph Healy, see Healy, J. *Breaking the Banks: What Went Wrong with Australian Banking?*, Simon and Schuster, 2019.

with attractive margins and limited competition.[13] Externally, the incumbents were forced to operate within an inflexible regulatory regime—the political response to decades of industry scandals and misconduct unearthed by the Royal Commission. Some Australian banking CEOs, including the founders of Judo Bank, viewed the industry's ongoing crisis as an opportunity to be exploited.[14]

Applying Judo Principles to Seize an Opportunity Created by the Banking Crisis

Judo Bank's founders based their business strategy, corporate ethos and company name on two core principles of the martial art of Judo: 1) *moving to where your opponent isn't*, and 2) *using your opponents' size and strength against them*. The relevance of these principles to business strategy was first described by Yoffie and Cusumano:[15]

> *"In the martial art of Judo, a combatant uses the weight and strength of his opponent to his own advantage rather than opposing blow directly to blow. Similarly, smart internet startups aim to turn their opponents' resources, strength and size against them. Judo strategy is based on three elements—rapid movement, flexibility and leverage—each of which translates into a competitive principle."*

Moving to Where Your Opponent Isn't. In accordance with the first principle, Judo Bank's founders initially positioned the firm in a market segment that was significantly underserved by existing competitors—i.e., moving to where their competitors were not. Judo Bank focused exclusively on small- and medium-sized enterprises (SMEs), a segment that was underserved by Australia's incumbent banks,[16] rather than the traditional residential mortgage lending segment dominated by the incumbents. Judo Bank offered business loans, including credit lines, equipment loans or business accounts, and term deposits exclusively to SMEs rather than competing in the residential mortgage market:

> *"We focus on the SME segment of the banking market, and we do that because we saw that in the SME banking market, there had been serious market failure in that incumbent banks had shifted quite aggressively toward household lending, mortgages and investment property lending ... [and] the SME market is ... unattractive for many of the large banks."* Executive, Judo Bank

Using Your Opponents' Size and Strength Against Them. Judo Bank applied the second Judo core principle[17] by tailoring services to the unique needs of SMEs. Specifically, Judo Bank pursued a personal, relationship-driven approach to banking, which deviated from the industry norm of using self-service technologies as a

13 According to ACCC's 2018 official inquiry, 80% (by value) of outstanding residential mortgage debt in Australia was held by the big four incumbent banks. A key finding was that "the Inquiry Banks, particularly the big four banks, do not have a strong incentive to reduce borrower costs (including their time and effort) to discover price information; largely because they are profiting from the suppression of borrower's incentives to shop around." For more information, see *Mortgage Price Inquiry—Final Report*, ACCC, December 11, 2018, pp. 21-22.

14 See Liu, H. "Constructing the GFC: Australian Banking Leaders during the Financial 'Crisis,'" *Leadership* (11:24), May 2015, pp. 424-450. A textual analysis of this article shows that Australian banking CEOs made frequent use of natural disaster metaphors to describe the unfolding events, while simultaneously attempting to exploit the crisis to bolster their own public images (p. 440) as "cautiously optimistic" (p. 442) leaders "who were in control of the situation" (p. 441).

15 Yoffie, D. A. and Cusumano, M. A. "Judo Strategy: The Competitive Dynamics of Internet Time," *Harvard Business Review*, January-February 1999, pp. 72-81. The core principles of Judo and their applications are elaborated further in Kwak, D. B., Yoffie, D. B. and Kwak, M. *Judo Strategy: Turning Your Competitors' Strength to Your Advantage*, Harvard Business Press, 2001.

16 For a more recent account of the finance challenges faced by Australian SMEs and a description of the COVID-19-related policy response, see Bank, J. and Lewis, M. "Australia's Economic Recovery and Access to Small Business Finance," *Reserve Bank of Australia Bulletin*, March 2021, pp. 43-49.

17 Yoffie and Cusumano refer to this as the third principle (exploit leverage that uses the weight and strategy of opponents against them). Their second principle is to be flexible and give way when attacked directly by superior force. For Judo Bank, this principle is reflected in its small, tactical adjustments in response to competitors' moves and changing market conditions. For example, Judo quickly served Australian SMEs that were devastated by the twin disasters of wildfires and COVID-19 during 2020.

substitute for human contact between customers and bankers.[18]

Although moving to an unoccupied market space could be easily implemented, leveraging competitors' large size and slowness posed execution challenges. Judo Bank's emphasis on human interaction required bankers capable of establishing and managing personal relationships with SME owners. This approach to financial services is difficult to scale because of the limited number of human customer relationships an individual banker can manage. This suggests that scaling usually requires increasing rather than decreasing the number of bankers and therefore increasing the cost of operations proportionally. In addition, scaling Judo Bank's business strategy by automating traditional banking processes through digital technologies (i.e., self-service) would not be possible, as this contradicted the bank's ethos.

Judo Bank therefore decided to use digital technologies to *augment* the capabilities of its human workforce, aiming to increase bankers' capacity to productively engage with customers and solidify relationships. Developing the technology strategy needed to accomplish its business strategy required Judo Bank to deviate from existing best practices in banking. It also required rethinking the role of IT in a strictly regulated environment that faced closer scrutiny from government authorities, and skepticism from the public after the financial crisis.

Facing Skepticism and Resource Constraint Challenges

Reflecting on the challenges Judo Bank initially faced, a co-founder observed that "We didn't have the $200 million required to create a bank in the normal way. So, we had to find another one." Government authorities and industry experts were initially dismissive of the vision to develop an entirely service-driven organization. Judo Bank's proposal to deploy a technology strategy in which every technical function and IT system would be a distinct service, owned and operated by an external provider, was perceived as a high-risk proposition:

> *"Under APRA rules, cloud-based platforms are considered at the extreme end of the risk curve, so most banks attempt to put minor systems in the cloud first. Judo's entire technology ecosystem from core banking, through regulatory reporting, treasury to CRM, was born in the cloud, which was a world first for a fully licensed operating bank. ... Almost everyone said we were mad [and it] couldn't be done, and even if it could, the regulators would never accept it. ... With just six people, you might as well throw your money away."* IT Executive, Judo Bank

Prospective investors considered Judo Bank's chances for success slim, which made raising funds difficult. However, the founders remained convinced they would ultimately succeed precisely because of the firm's small size:

> *"Because it was a new venture, because it was [a heavily regulated industry] ... that was dominated by powerful players, a lot of investors were quite skeptical about the prospects of the business succeeding, so capital raising was one of the most difficult things to do, and it required a huge amount of resilience and our belief in the business case."* Senior Executive, Judo Bank

In 2018, "Judo Capital" officially launched and, after a year of consultation with APRA, obtained its Australian banking license. Now a full-fledged bank governed by the Australian Banking Act 1959, the firm rebranded as "Judo Bank" and commenced operations. By June 2020, it had taken in deposits of $1.5 billion, served over 700 customers across three Australian states, and employed over 200 staff, which led to a private valuation of $1 billion in subsequent funding rounds. In early 2021, Judo Bank reported its first profit.

18 See Hoehle, H., Scornavacca, E. and Huff, S. "Three Decades of Research on Consumer Adoption and Utilization of Electronic Banking Channels: A Literature Analysis," *Decision Support Systems* (54:1), December 2012, pp. 122-132. This systematic and comprehensive review of 247 published research articles indicates that the banking industry continues to focus on the adoption of automated self-service technologies to reduce operational costs and to cross-sell other related financial products and services.

Executing the Everything-as-a-Service Technology Strategy

To execute its EaaS technology strategy, Judo Bank had to become a service orchestrator and rethink the concepts of IT ownership and operations.

Becoming a Service Orchestrator

Judo Bank was built on the central premise that ownership of IT does not confer a unique competitive advantage. As a consequence, the bank did not directly own or operate any of the IT platforms, systems, infrastructure or tools needed to run its business. Instead, it became the architect of an ecosystem of services, acting as a service orchestrator for connecting, combining and coordinating multiple layers of software and support systems that were designed, developed and delivered by external service providers.[19]

Judo Bank applied EaaS to every aspect of its business that required IT—including the computers and mobile phones of its staff. For example, employee onboarding involved automatically requisitioning a laptop from a third-party provider. No capital expenditure was needed to buy or configure the computer; instead, the bank simply paid for a subscription to reserve the computer for its employee's use. Judo Bank arranged for the provider to ship the preconfigured computer directly to the employee's home so that the employee would be up and running on day one. When faced with the urgent need to quickly hire and equip remote workers around the country at the onset of the COVID-19 pandemic, this process enabled the bank to scale, adapt and apply leverage during the early days of an unpredictable and unfolding crisis.

Rethinking IT Ownership and Operations

From Judo Bank's perspective, the fourfold benefits of executing EaaS as a service orchestrator were the ability to: 1) *rapidly scale* to meet sudden shifts in customer demand, 2) *flexibly adapt* to unexpected changes in the operating environment (e.g., Australian wildfires, the global COVID-19 pandemic), 3) *creatively leverage* incumbent competitors' size and strength against them, and 4) *reap cost advantages* associated with on-demand services by using best-of-breed technology. The EaaS strategy enabled Judo Bank to make a deliberate trade-off between owning IT and "back-sourcing"[20] the delivery of IT assets to the manufacturer as a service to the business. Rather than having high upfront capital expenditures for system acquisitions and in-house development (as did most incumbent banks), the EaaS technology strategy allowed Judo Bank to treat services as an operational expense, paying only for what the firm used and only when necessary.

Of course, acting as a service orchestrator within an ecosystem of external service providers is rare, and even more so within the highly regulated, risk-averse and legacy-system-laden banking sector. The absence of legacy systems made it easier for Judo Bank to execute an EaaS technology strategy. According to one of Judo Bank's co-founders, the biggest risk of EaaS was that "when you're a young company, any damage to your reputation could be serious … so reputation is something I worry about. It's hugely intangible, it's hugely valuable, and a big risk if you don't protect it." Thus, Judo Bank's reputation was only as good as the reputation of its service providers.

How Everything-as-a-Service Enabled Judo Bank's Business Strategy

EaaS enabled Judo Bank's business strategy by supporting the three core objectives defined by the bank's founders: 1) *providing relationship-oriented technology*, 2) *delivering banking from anywhere*, and 3) *implementing lean automated processes*. These core objectives are depicted in Figure 1, along with the security principles, design principles and technology principles of the EaaS technology strategy.

19 For an overview of service orchestration, see Breidbach, C., Sunmee, S., Ellway, B. P. W., Keating, B., Kormusheva, K., Kowalkowski, C., Lim, C. and Maglio, P. P. "Operating without Operations: How Is Technology Changing the Role of the Firm?" *Journal of Service Management* (29:5), November 2018, pp. 809-833.

20 We use the term "back-sourcing" to highlight that EaaS is distinctly different from outsourcing. EaaS "pushes back" the provision of a service to its provider. One may compare this idea to leasing a car from a manufacturer on a fully serviced basis, rather than buying a car and then organizing insurance, maintenance and repairs.

Figure 1: Judo Bank's EaaS Technology Strategy

Providing Relationship-Oriented Technology

The first objective of Judo Bank's business strategy was to "ensure that people—rather than technology—form, support and maintain responsive relationships with customers." Technology choices were made with the customer experience in mind. While Australia's incumbent banks mainly deployed self-service technologies to reduce costs, Judo Bank's stated intent was to grow personal relationships with customers, keeping technology in the background rather than the foreground of its customer interactions. For example, after concluding a customer engagement, the bank's frontline employees were advised to use a digital dashboard to generate a 360-degree view of customer business activities over time. During customer engagements, however, each banker aimed to build personal knowledge and rapport without the use of technology. To support this high degree of personalization, the key performance indicators

Vignette 1: Software-as-a-Service Enabled Customer Relationship Management

Judo Bank used a cloud-based software-as-a-service (SaaS) offering to enhance its customer relationship management (CRM) capabilities. CRM was essential for capturing customer data and interactions, as these are critical to fostering productive customer relationships and coordinating every step of the lending process. Using a SaaS CRM solution allowed Judo Bank to enter the SME lending market very quickly, with little upfront investment in IT development, while providing bankers with the tools needed to build a customer base, manage the lending process and generate reporting of KPIs. Initially, Judo Bank relied on a CRM SaaS offering by BankSight Software Systems, a U.S.-based startup. However, after BankSight was acquired by Bottomline Technologies, the BankSight team pivoted its service offerings toward a different market segment. As a consequence, Judo Bank switched to nCino, a digital banking platform based on Salesforce.com. This sudden change in the strategic direction of a service provider highlights that market disruption is a potential risk of following an EaaS technology strategy. Through this experience, Judo Bank learned that relying on fast-moving startups as service providers can create challenges when these startups merge, are acquired, go out of business or otherwise change the focus of their service offerings.

(KPIs) associated with customer relationships were measured and made available at the team member level, while the EaaS technology strategy enabled the bankers to perform their roles in line with corporate objectives. A brief description of how the EaaS strategy supported the customer-relationship business objective is given in Vignette 1.

Delivering Banking from Anywhere

Judo Bank's business objective of delivering banking from anywhere was rooted in its focus on serving SMEs. The bank's founders recognized that SME owners preferred to meet with bankers on the SMEs' premises, mainly to save time. Hence, Judo Bank's frontline employees needed to be able to operate from anywhere and at any time, Similarly, customers demanded full access to Judo Bank's systems from anywhere, at any time and with high levels of security. Therefore, all of Judo's technology services had to be available from any device connected to any network, whether on-site or at a customer's office. This approach was vastly different from the best practices in the financial services industry, where employees, or even external service providers, typically only access systems using secure workstations within the banks' own internal networks.

The ability to bank from anywhere also enhanced Judo Bank's business continuity and contingency planning. For example, when both the bank and its customers became less dependent on physical offices during the recent Australian wildfires and the COVID-19 pandemic, the EaaS strategy meant that banking services could continue uninterrupted. A brief description of how the EaaS strategy enabled banking from anywhere is given in Vignette 2.

Implementing Lean Automated Processes

Achieving Judo Bank's first two business objectives also required eliminating labor-intensive back-office processes, thus freeing up time for individual bankers to focus on the tasks needed to build meaningful relationships with customers. Lean automated processes enabled the bank's staff to remain focused on customers' needs instead of getting bogged down in bureaucratic processes and complicated and confusing paperwork—as is typically the case in the lending processes used by major retail banks. As a consequence, bankers were able to allocate more time to scouting and seizing promising new opportunities as they emerged, which went some way toward alleviating the scaling constraints underpinning Judo Bank's relationship-driven approach to banking. A brief description of how the EaaS strategy enabled Judo Bank to implement lean back-office processes is given in Vignette 3.

Vignette 2: Authentication-as-a-Service Enabled Banking from Anywhere

Judo Bank used an "authentication-as-a-service" (AaaS) solution called zero *trust networking* (ZTN)[21] to enable its customers and staff to access the bank's systems via any internet connection and, therefore, to bank from anywhere. Using this solution meant there was no need for security hardware, VPNs or alternative security measures because ZTN is based on centralized identity and access management (i.e., customers choose from multiple trusted third-party providers, such as Google or LinkedIn single sign-on to access their accounts). As such, Judo Bank's AaaS solution not only enabled its customers to choose how to log in to the bank's services, which was convenient but also improved the security of the EaaS ecosystem and reduced the risk of cybersecurity breaches that, according to one of the co-founders, represented "the one thing that we spend a lot of time thinking about and worrying about [because] the cybersecurity risk is associated with reputational risk."

Vignette 3: Function-as-a-Service Reduced Back-Office Processes

Judo Bank eliminated labor-intensive back-office processes using a "function-as-a-service" (FaaS) approach. One noteworthy example was loan settlement. Judo Bank shifted all legal aspects of settling a new loan (e.g., reviewing documentation, creating contracts for customers to sign) to a third-party provider. Both Judo Bank and its customers benefited from the FaaS approach because it increased the speed of loan settlement processes and reduced the bank's overhead and the fees it charged. The necessary data was exchanged between the FaaS provider and Judo Bank's systems, such as CRM, via a representational state transfer[22] (REST)-based web service using the Australian "LIXI" industry standard for lending applications. Once the FaaS provider had generated all loan settlement documents, they were returned via a secure and encrypted data transfer process for Judo Bank to finalize.

How Judo Bank Designed Its Everything-as-a-Service Ecosystem

In designing its everything-as-a-service ecosystem, Judo Bank needed to establish an ecosystem of self-contained services and ensure that data is an enabler.

Establishing an Ecosystem of Self-Contained Services

To realize the promise of EaaS, Judo Bank initially designed an ecosystem in which all services were self-contained, running independently of each other, yet managed and owned by external IT service providers. To facilitate the replacement of old or unwanted services with new ones, and to incorporate new best-of-breed services as they became available, Judo Bank had to provide a framework for adopting any new service irrespective of its type and means of delivery. To meet these needs, it specified the definition, means of adoption and governance for every service (e.g., functions such as loan settlement, CRM and user authentication are all specified as distinct ecosystem services).

Judo Bank's founders had observed that incumbent banks usually organized IT projects around legacy technologies that were typically siloed in separate business units. This often resulted in IT systems that spanned multiple disparate units and depended on incompatible technologies. Although in-house IT operations can be less susceptible to market disruptions caused by external providers, by treating services as standardized "utilities" within a larger ecosystem and by limiting the customizability of each service, Judo Bank not only mitigated market disruption risks but also created the capability to adapt and evolve the composition of its services within its ecosystem over time. This ensured that the bank's services worked together

seamlessly and increased the scalability and flexibility of operations.[21][22]

Ensuring Data Is an Enabler

Judo Bank's EaaS technology strategy needed to facilitate the exchange of highly sensitive data between bankers and customers. The cornerstones of the data component of the EaaS technology strategy were data confidentiality and customer consent, both of which were important for developing trusted personal relationships with customers. Judo Bank therefore explicitly included consent management in the design of its services and developed policies for the ethical use of data, with access to data managed on a need-to-know basis. Similarly, data quality and integrity were seen as crucial for guaranteeing high standards for service, enabling, for example, Judo Bank to make evidence-based strategic decisions. Moreover, to serve customers effectively, access to these insights was made available to all relevant members of Judo Bank's teams via dashboards and reports. In the spirit of developing lasting and personal relationships with customers, all bankers shared their own insights about market trends and economic developments with their customers directly, so they could also benefit from the aggregated data-driven insights generated by the firm.

Over time, Judo Bank aimed to establish a centralized corporate memory that could be migrated from one service to another or from one external provider to another, as needed. To some extent, this approach mitigated the impacts of external service providers changing their data management or privacy policies, or of data protection regulations differing from Australian standards when service providers were headquartered in foreign jurisdictions.

Managing the Risks of an Everything-as-a-Service Technology Strategy

Relying exclusively on an ecosystem of external service providers to operate and manage IT systems is not without risk. One of Judo Bank's co-founders explained: "When you're a cloud-based bank, relying on third-party arrangements has its advantages, but also creates risks—because you're relying on the viability of a range of third parties … if they get into difficulty, it could have a significant impact on your business."

Based on our observations of Judo Bank, we identified three sets of risks associated with an EaaS technology strategy—preventable risks, external risks and strategic risks (see Table 1). Preventable risks are best mitigated through *active prevention*, including the monitoring and management of key performance indicators and personnel. External risks are best mitigated through approaches that rely on *identification and forecasting* and through reducing their impact on the organization should they arise. Strategic risks are best mitigated through approaches that reduce their *probability to materialize* while simultaneously putting countermeasures in place that enable an organization to respond to these risks.[23]

Pursuing an EaaS technology strategy is not risk-free, but as Judo Bank illustrates, even highly risk-averse government institutions (e.g., APRA) may approve such approaches if risks are identified beforehand and appropriately mitigated. No single risk should be viewed in isolation. Organizations must respond to the risks identified, adapt to the changing environment and recognize the recursive and interdependent nature of the service ecosystem underlying an EaaS technology strategy.

Recommendations for Executing an Everything-as-a-Service Technology Strategy

From our analysis of the Judo Bank case, we have identified a set of actionable recommendations for executing an EaaS

21 For a technical overview of ZTN, see Haddon, D. and Bennet, P. "The Emergence of Post COVID-19 Zero Trust Security Architectures," *Information Security Technologies for Controlling Pandemics*, Springer, 2021, p. 335.

22 Representational state transfer (REST) is a software architecture designed to ensure interoperability between different internet computer systems. Services that conform to the REST architecture can more easily communicate with one another.

23 For an introduction to a general risk management framework, see Kaplan, R. S. and Mikes, A. "Managing Risks: A New Framework," *Harvard Business Review*, June 2012, pp. 1-23.

Table 1: How Judo Bank Mitigated Risks Associated with an EaaS Technology Strategy

Risk Type	Risk Event	Risk Description	Risk Impact	Risk Level	Risk Indicators	Risk Mitigation
Preventable Risks	Gatekeeping	Senior IT leaders internalize service development and delivery to maintain relevance and power.	Intended benefits of EaaS cannot be achieved.	Medium	Increase in FTE technical staff	• Monitor and contain expansion of IT team. • Focus on select services as starting point for EaaS rollout.
	Internal fraud	Employees may behave in illegal or unethical ways (e.g., steal funds).	Financial costs due to legal liabilities and penalties.	Low	Increase in customer complaints	• Profile operators with relevant access. • Remove manual processes that are susceptible to fraud.
	Staff turnover	Loss of IT functions (e.g., software development) that are necessarily associated with an EaaS technology strategy may increase disengagement and staff turnover.	Financial costs due to staff burnout and the need to rehire and retrain staff.	Low	Low staff engagement	• Establish succession planning for key technical staff. • Retrain technical staff. • Shift technical staff roles from operations into the integration of services.
External Risks	Natural disasters and political conflict	Unforeseeable natural disasters (including pandemics) and/or adverse political events affect the operations of one or multiple service providers. This is especially true when events are driven by unexpected changes in legislation or when providers operate in less geopolitically stable areas.	Business disruption through outages. Increased financial costs, regulatory fines or legal liabilities possible.	Low	Nearly impossible to predict	• Ensure resilience of the service ecosystem by creating business continuity plans. • Ensure external service providers have business continuity and disaster recovery plans in place. • Specify requirements in a contract. • Meet leadership of current service provider(s).

Table 1. How Judo Bank Mitigated Risks Associated with an EaaS Technology Strategy

Risk Type	Risk Event	Risk Description	Risk Impact	Risk Level	Risk Indicators	Risk Mitigation
External Risks	Market disruptions	Service provider ceases operation due to bankruptcy, merger/acquisition or technological changes.	Business disruption through outages. Increased financial costs, regulatory fines or legal liabilities possible.	Medium	Changing market sentiment and/or industry rumors	• Acknowledge that no relationship with any service provider is permanent. • Estimate financial viability of service provider as part of due diligence/ assess market sentiment. • Create business continuity plans by identifying alternative service providers.
	Legal and regulatory changes	Service provider fails to comply with relevant legislation, and/or new regulation makes EaaS infeasible or unviable.	Regulatory or legal liability can increase financial costs or lead to negative reputational impact.	Low	Changing political sentiment or climate	• Identical to market disruptions. From the perspective of an organization pursuing EaaS, the question is not about "why" a service is disrupted but "how" to replace it once it fails.
Strategic Risks	Service degradation	A service provider's poor operations handling and management deficiencies may cause interruptions as well as performance issues.	Financial costs, regulatory or legal liability, or reputational impact.	High	Service interruptions and performance issues increase	• Define service-level agreements for each service and service governance mode. • Acknowledge and accept that technical outages occur frequently.
	Insufficient access and control	Inappropriate or insufficient access to and control of a service provider's networks, systems or applications limit the ability to engage with the service provider.	Limited ability to intervene during fraudulent activity, resulting in financial costs, regulatory or legal liabilities.	Low	Service provider changes protocols or processes	• Create "step-in" rights for critical services. • Define contractual obligations.

Table 1. How Judo Bank Mitigated Risks Associated with an EaaS Technology Strategy

Risk Type	Risk Event	Risk Description	Risk Impact	Risk Level	Risk Indicators	Risk Mitigation
Strategic Risks	Security and data breaches	The service provider may execute transactions over insecure interfaces, be subject to a security vulnerability event, fail to implement appropriate security controls, or fail to monitor and respond to security incidents in a timely manner.	Unauthorized disclosure, modification, loss or destruction of information assets or interruption of business activities, resulting in financial costs, fraudulent activity or regulatory or legal liability.	Medium	Public disclosure of compromised technologies or log file analysis and penetration testing reveals weaknesses	• Do not depend exclusively on the service provider. Be proactive. • Perform penetration testing. • Monitor log files via "step-in" rights. • Be prepared to shut down compromised services/have contingency plans as part of an incident response plan. • Keep backup data in-house (i.e., not EaaS).

technology strategy. We have organized our recommendations into three categories: 1) designing EaaS operations, 2) managing EaaS technology ecosystems, and 3) ensuring EaaS security. Each category represents a distinct issue that managers need to consider when developing and implementing an EaaS technology strategy. Within each category, there are three insights from the Judo Bank case (see Table 2), and we provide specific recommendations relating to each of these insights.

Recommendations for Designing EaaS Operations

Not Owning IT Requires Orchestrating IT Service Providers and their Operations. IT is merely an enabler of a business—not a core capability. The EaaS strategic approach to IT might be perceived as contradicting best practices, especially in conservative industries such as financial services. Most firms in such industries assume that IT is a proprietary source of competitive advantage and must therefore be owned and cultivated to maintain relevance in a postdigital world. For example, many observers of and participants in retail banking believe that banks are evolving into technology companies that offer banking services.[24] Conversely, Judo Bank believed IT represented a significant competitive advantage—but unlike the advantage it had provided in the past. In a public cloud and SaaS world, the dogma that organizations must completely "own" their technology infrastructure for controlling and delivering customer experiences is outdated. If the old dogma were true, then Judo Bank's internal IT team would have to be far more innovative, effective and efficient than any external IT service provider. For example, large incumbent banks employ legions of employees to handle their IT needs. However, Judo Bank was neither able to, nor did it have to, directly hire the best IT talent and computing minds on the planet, because it could purchase the required knowledge and skills from top global IT service providers such as Amazon. By rejecting IT ownership, Judo Bank leveraged the

24 See Arner, D. W., Barberis, J. and Buckley, R. P. "The Evolution of Fintech: A New Post-Crisis Paradigm," *SSRN Electronic Journal* (47:4), January 2016, pp. 1271-1319. The authors say (p. 1271) that "Since 2008, a new era of FinTech has emerged in both the developed and developing world. This era is defined not by the financial products or services delivered but by who delivers them and the application of rapidly developing technology at the retail and wholesale levels."

Table 2: Recommendation Categories and Insights from the Judo Bank Case

Category	Insights
1. Designing EaaS Operations	1.1 Not owning IT requires orchestrating IT service providers and their operations 1.2 Adapting to constant change requires flexible IT providers 1.3 Designing for long-term success requires short-term trade-offs
2. Managing EaaS Technology Ecosystems	2.1 Keeping technology invisible requires user-centered design 2.2 Using cloud-based services requires business-centered design 2.3 Leveraging open standards requires data-centered design
3. Ensuring EaaS Security	3.1 Managing user identities requires orchestrating identity management 3.2 Ensuring privacy and confidentiality requires controlling the movement of data 3.3 Making security responsive requires constant monitoring and updating

scale advantages of global IT providers against its larger incumbent competitors.

When executing an EaaS technology strategy that avoids IT ownership and instead emphasizes the orchestration of external IT service providers, we recommend that organizations:

- Build a team capable of developing and orchestrating the service ecosystem, including roles such as IT architecture, delivery, and management and governance.
- Minimize in-house development and focus instead on the interoperability of services within the ecosystem.
- Recognize that an EaaS strategy relies heavily on operating expenses rather than capital expenditure and that financial modeling must account for higher operating expenses than would otherwise be the case.

Adapting to Constant Change Requires Flexible IT Providers. Many new market entrants claim that their technology systems are "legacy free." However, it is quite easy for companies, even new ones, to quickly create their own technology legacy. Focusing on function and form over security, agility and cost of ownership often results in imperfect architectural integrity and significant technical "debt." Both problems compound rapidly in a fast-growing business and, as a result, commercial opportunities may be missed. In addition, markets, products and processes change constantly, requiring IT systems to change. Although its approach took a bit longer, Judo Bank built a service ecosystem "from the foundations up," layering its technical capabilities in a way that enabled new services to be added "on top" without interfering with existing capabilities. This layering allowed for services to be unbolted and replaced with little effort.

Tight relationships between developers and product owners are usually seen as the de facto standard for building digital capabilities. The paradoxical challenge with EaaS is that, because services are bolted together in the ecosystem through open standards, little to no software development is involved. In fact, following an EaaS approach requires unlearning and rethinking well-established organizational behaviors and processes. For example, Judo Bank avoided the creation of legacy technology systems by feeding change requirements to its service providers, which, in turn, delivered new capabilities as enhancements to existing services, not as new bespoke developments just for Judo Bank. Although this approach may take longer, the advantages in terms of change costs and cost of ownership far outweigh short-term commercial or customer experience gains.

When developing an EaaS strategy able to cope with constant change, we recommend that organizations:

- Ensure that contracts are kept to monthly or at most yearly subscriptions, enabling change and minimizing service supplier lock-in.
- Ensure that each service provider makes available a full snapshot of the data included in its service on a regular basis.
- Choose service providers that are focused on extensibility, specifically exposing

their full functionality via application programming interfaces (APIs) and having a high investment in R&D; a service provider with zero or a slow pace of change will not adapt to evolving business needs quickly enough.

Designing for Long-Term Success Requires Short-Term Trade-Offs. The coevolution of a business and its digital capabilities is unavoidable. Therefore, the development of any digital capability needs to be viewed holistically, with future changes anticipated and tactical or short-term solutions avoided, as these can create legacy issues that compound into ongoing, unnecessary costs. For example, firms may develop ad hoc Microsoft Excel dashboards to address immediate information needs, but these tactical solutions are then not replaced by more viable long-term systems, thus resulting in legacy issues and the need for ongoing maintenance when business circumstances change.

Although undesirable, tactical solutions are sometimes unavoidable. By using the EaaS approach, Judo Bank tackled this challenge strategically. EaaS not only reduces the need for tactical solutions but also allows firms to integrate and release ad hoc tactical solutions, thereby minimizing legacy and related costs. As a case in point, Judo Bank's philosophy of designing systems with the end user in mind enabled it to avoid bespoke systems. This approach minimizes the risks, such as overspending, resulting from project overruns typically seen in large-scale IT development projects, thus reducing time to market and creating little or no lock-in effects.

When developing a "future-proof" EaaS technology strategy, we recommend that organizations:

- Take a holistic and strategic perspective of the evolution of the business and technology environment when designing solutions. Most of the complexity and value-added in a system is driven by only a portion of the processes supported by that system. Reaping the benefits of EaaS and achieving high-quality service involves attempting to automate every service that does not fit a core value proposition.
- Construct a functional representation of the entire organization before choosing which services to include in the EaaS ecosystem. This blueprint can help guide the selection of services while minimizing functional overlap.
- Update the blueprint regularly and create maps of how the ecosystem services overlay the blueprint.
- Design EaaS operations with an expectation of change and recognize that selection of services is rarely a straight line. Some trade-offs will be necessary, but recognizing which trade-offs are acceptable will help ensure alignment of the overall strategy.

Recommendations for Managing EaaS Technology Ecosystems

Keeping Technology Invisible Requires User-Centered Design. Any technology should help individual employees perform their roles effectively by automating their tasks in the background. In other words, the technology should be "invisible:" the simpler technology is to use, the more it fades into the background of an employee's consciousness, allowing greater focus on value-generating tasks. In the case of Judo Bank, IT enabled bankers to build personal relationships with customers. One of the most invisible features underpinning Judo Bank's EaaS strategy was the single sign-on approach. Employees needed only one username and password to access over 50 systems, with all identity and access rights maintained centrally and access granted through a combination of environmental factors that included location, device signature Wi-Fi network and behavioral use patterns. This approach differed significantly from the prior experiences that Judo's bankers had when they worked in incumbent banks, where they sometimes had to log in and rekey data into multiple systems to complete loan transactions.

When developing an EaaS technology strategy to implement intentionally invisible technology, we recommend that organizations:

- Focus on the user experience and remove impediments to the use of technology.
- Minimize the need to push system updates and make updates seamless.
- Minimize the number of different technology choices, keeping the environment as homogeneous as possible

(from laptops to conference systems) so that employees need to understand and master fewer services.
- Provide constant, consistent and cohesive training; digital literacy is important for technology systems to appear invisible.

Using Cloud-Based Services Requires Business-Centered Design. Most organizations, including banks, can now be viewed as part of larger and more complex technology-driven ecosystems. The reality of running a business today means that these ecosystems need to be extremely secure, highly resilient, always available, fully accessible to customers and staff, and able to be restored in the event of a disaster without any loss of data. Traditionally, organizations fulfilled these requirements through complex, bespoke and capital-intensive on-premise IT systems. Setting up a new business therefore required millions of dollars of capital expenditures, and it took many months to commission and configure the systems. Using a public cloud, Judo Bank created a full end-to-end technology infrastructure that could be dynamically scaled to meet growth requirements, as well as cyclical demand periods, yet with almost zero incremental capital expenditures. Moreover, because every system represented a service in the EaaS ecosystem, there was no need for any customized software development. Thus, Judo Bank was able to choose, integrate, test and deploy over 50 individual systems that complied with regulatory standards in just 18 months, without owning a single physical server or employing any software developers.

When developing an EaaS technology strategy that relies largely on cloud infrastructure, we recommend that organizations:
- Look first at cloud-based services; consider other alternatives only as a last resort.
- Understand which elements of the business need to be directly controlled and managed, and which can be handled by external partners.
- Understand how business continuity and disaster recovery will operate if a service fails; treat each service as transient rather than permanent.
- Develop a federated and in-depth approach to security and privacy that identifies the risks and enables the controls needed to manage the use of cloud-based services.
- Build a shared information model, focusing on the information that must be shared between services to ensure seamless interoperability.

Leveraging Open Standards Requires Data-Centered Design. Underpinning any EaaS approach is the premise that contextual data can be shared between each technological component (i.e., service) in the ecosystem. Without the ability to share contextual data, any cloud-based infrastructure is merely a collection of stand-alone systems that replicate existing models, just at a lower cost of ownership. Executing an EaaS technology strategy requires that data sharing is constrained by access rights. This is true even if the individual services trust each other. To derive benefits from EaaS, an organization has to manage the secure transfer of user identities and corresponding access rights.

To address this issue, Judo Bank used a "hub-and-spoke" model in which all external service providers (i.e., the spokes) agreed to use open security standards that were handled through a centralized access and identity management system (the hub). This approach ensured a high level of interoperability in the ecosystem. In the long term, the inherent flexibility and low cost of ownership of the entire ecosystem are commercially more valuable than benefits potentially provided by any single system or vendor in the short term.

When managing an EaaS technology ecosystem that leverages open standards, we recommend that organizations:
- Engage with open standards bodies to understand the frameworks and standards that each service in the ecosystem should adhere to, structuring the service ecosystem to enable semantic and syntactic interoperability among services.
- Rely on open standards to manage interoperability of individual services in the ecosystem.
- Focus on data—rather than technology—as the main differentiator. Creating enduring value from the EaaS approach involves curating data in a way that enables service collaboration through

open standards and service innovation through machine learning.

Recommendations for Ensuring EaaS Security

Managing User Identities Requires Orchestrating Identity Management. The fundamentals of "zero trust" make EaaS possible. Judo Bank's implementation of a zero trust networking (ZTN) solution (see Vignette 2) exemplifies how centralized identity and access management can improve the overall security of an EaaS ecosystem. ZTN can be used to roll out EaaS in any environment in which data is critical or sensitive (e.g., healthcare) or in which access to digital services needs to be restricted only to authorized user groups (e.g., government).

Judo Bank's ZTN solution enabled both customers and employees to choose how to log in to services (i.e., their accounts) and to seamlessly transition between systems. For example, Internet banking customers could choose between multiple trusted third-party providers, such as Google or LinkedIn, to access their accounts. Although many might resist the idea of logging into bank accounts via third parties, the implementation of open standards (see recommendations above) made this approach significantly more secure than the sole-provider approach used by most banks. It also meant that customers had to remember far fewer username and password combinations and that Judo Bank could be certain that the individuals logging into its system were always actual customers.

ZTN also ensured business continuity for Judo Bank throughout the COVID-19 pandemic and related lockdowns because it enabled employees to access the bank's systems via any internet connection. In addition, because a ZTN/single sign-on approach uses open standards, Judo Bank was able to provide identity and access tokens to third-party systems in future applications.

To ensure EaaS security through identity management, we recommend that organizations:

- Establish user identity management procedures that support the organization, partners and, most importantly, customers.
- Ensure that conditionally based access can be implemented across all identity realms.
- Understand how to seamlessly manage the digital identity of the organization, partners and customers across systems.

Ensuring Privacy and Confidentiality Requires Controlling the Movement of Data. Judo Bank held both personally identifiable data of its customers and financial data regarding its business. This data was kept private and confidential, to ensure that the bank complied with regulatory and legal requirements. Data is most vulnerable when being moved between services ("data in transit") and less so when stored in databases ("data at rest"). By definition, an EaaS technology strategy requires data to be passed constantly between systems and providers using the public internet, which makes encryption essential. The first step taken by Judo Bank to ensure privacy and confidentiality was therefore to encrypt data—both in transit and at rest across—across its entire service ecosystem using military-grade encryption.

Judo Bank also ensured it met Australian regulatory requirements. For example, whenever a new service was included in its ecosystem, the bank carried out a security control assessment that covered all aspects of the confidentiality, integrity and availability security procedures, including background checks of external employees. Finally, the bank used private and direct optical fiber-based networks to remove traffic from the public internet whenever possible.

Judo Bank's data security procedures differ starkly from those used by incumbent banks, which rely on physical security (i.e., "the vault"), locked server rooms and firewalls to protect data held in internal systems. Any attacks that breach these perimeter defenses have almost free access to any data held inside.

When considering the privacy and confidentiality requirements of an EaaS strategy, we therefore recommend that organizations:

- Follow best practices of information classification to understand which services have access to what level of classification; the higher the classification, the more controls must be put in place.
- Control how services are integrated and ensure communication between providers is fully encrypted.

Making Security Responsive Requires Constant Monitoring and Updating. Ensuring

the security of business operations is integral to meeting regulatory and compliance requirements. Because requirements for securing business operations are of ongoing concern and because new threats continue to emerge, security measures in any EaaS ecosystem will need to be able to change quickly and will evolve over time. Hence, the EaaS service ecosystem should be designed with security and privacy as functional requirements for every component. Judo Bank ensured that its security systems had appropriate and timely data to evaluate any threat by implementing a real-time logging capability (configured as a distinct service operated by an external provider) to generate alerts and help evolve security rules. The bank managed and assessed the virtual IT infrastructure by constantly reviewing audit logs for patterns of behavior that were markers of security breaches. This enabled Judo Bank to define security requirements for every service within its ecosystem and provided access to a wider variety of information security controls than just a standard and limited set, as would be the case with most large incumbent banks.

We recommend that to make security responsive, organizations should:

- Manage change across all services, as each has its own "defense in depth" implementations and vulnerabilities.
- Rely on an external body to run security scenarios and tests as often as can be afforded, in terms of both cost and risk appetite.

Concluding Comments

In this article, we have described how Judo Bank quickly achieved profitability and grew to a $1 billion private valuation without ever owning or operating any IT systems. Instead, it adopted an everything-as-a-service technology strategy. The case of Judo Bank illustrates novel technology-enabled shifts that are currently taking place, not only in the financial services industry but also in many other industries, and highlights the use of EaaS as a unique and somewhat counterintuitive technology strategy.[25] It shows that the EaaS approach enables entire new businesses to be created faster and cheaper than traditionally organized businesses by "bolting together" third-party owned and operated services. Though there is no single "one-size-fits-all" approach to implementing and managing an EaaS technology strategy, we have provided recommendations based on our analysis of Judo Bank's EaaS experience. These actionable recommendations will guide practitioners in implementing an EaaS technology strategy within the unique context of their own organizations.

Appendix: Research Method

The research for the Judo Bank case study involved collaboration between academics and practitioners.[26] Specifically, the CIO and CTO of Judo Bank were fully engaged throughout the research project. Starting in February 2017, the lead academic author of this article conducted weekly in-depth, face-to-face interviews and meetings with both these practitioners, documenting the growth and ongoing development of Judo Bank, while also interacting with other employees and senior leaders at its Melbourne office. To understand the strategic trade-offs and risks that Judo Bank faced over its history, we conducted a series of focused interviews with executives involved in obtaining regulatory approval from APRA. Moreover, the academic authors were provided with access to internal documents, regulatory filings, presentations, investor statements used in multiple external funding rounds and technical documentation. In addition, the authors reviewed relevant publications and news reports from public media sources (e.g., Australian financial newspapers and magazines).

Data analysis followed a process that iterated between the academic authors and the practitioners. The academic contributors initially

25 For some recent examples of how SMEs are adopting cloud-based services in response to the COVID-19 pandemic, see Akpan, I. J., Udoh, E. A. P. and Adebisi, B. "Small Business Awareness and Adoption of State-of-the-Art Technologies in Emerging and Developing Markets, and Lessons from the COVID-19 Pandemic," *Journal of Small Business & Entrepreneurship* (34:2), September 2020, pp. 1-18.

26 We followed a similar process to Du, K., Yu, G., Li, G. and Zhang, W. "Applying Modular Design in Architecting Interorganizational Information Systems," *MIS Quarterly Executive* (18:3), September 2019, pp. 175-189.

reflected on the data collected, related emerging findings to the literature, and presented distilled findings and potential lessons learned to the practitioners, who then provided clarifications or additional information as needed. We continued this process until we reached agreement on the facts, findings and conceptual interpretation of the case. During the review process, further clarification was sought, and the review panel made additional recommendations.

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