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# MANAGEMENT OF CROSS-FUNCTIONAL IT PROJECTS IN THE IMPLEMENTATION OF IOT SOLUTIONS IN THE FINANCIAL SECTOR

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## ABSTRACT

The article examines the management of cross-functional IT projects during the implementation of IoT solutions in the financial sector, focusing on aligning architecture, risk, and organizational accountability under high integration density. The study's relevance lies in the fact that IoT in finance is becoming an infrastructure technology. Telemetry supports service continuity and reduces operational losses in payment infrastructure, physical security, engineering systems, and insurance models of observable risk, while simultaneously increasing the complexity of device life cycles and tightening requirements for traceability and regulatory correctness. The purpose of the article is to identify patterns in cross-functional management of IoT implementation and to describe a practical framework for coordinating business, IT, security, compliance, operations, and suppliers throughout the device and data life cycles. The scientific contribution lies in synthesizing fragmented requirements into a unified management model. This model incorporates a steering layer for prioritisation and risk appetite decisions, a linkage between the roles of product owner and program manager, a responsibility matrix for grey zones, and a risk register that converts threats into verifiable tasks. The main conclusions can be summarized as follows. The success of IoT implementations in finance is determined by the management of interdependencies between layers (devices–connectivity–data–integrations), by disciplined version and configuration control in edge scenarios, and by the transition to a service-oriented operating model during scaling. The article is intended for program managers and product owners, architects, information security specialists, and compliance specialists responsible for the industrial deployment of IoT in financial organizations.

**KEYWORDS:** Internet of Things, financial sector, cross-functional management, device life cycle.

## 1. INTRODUCTION

The financial sector is among the industries where the Internet of Things is rapidly becoming an infrastructure technology, as it provides a continuous stream of observations on the state of physical objects and processes that are directly linked to service continuity and risk levels. Connected devices

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are used in the maintenance of payment infrastructure, monitoring of equipment condition, physical security monitoring, and control of engineering systems. They are also used in insurance, where telematics data support a more granular assessment of behaviour and the probability of an insured event. A review of telematics for insurance notes that studies based on such data show reductions in accident rates and hazardous manoeuvres, demonstrating the potential for measurable effects from continuous monitoring [1]. At the same time, research on financial technologies emphasizes that the internet of things is embedded in a broader set of digital tools that transform processes of verification, fraud detection, credit assessment, and transaction servicing, thereby affecting the core operational circuits of a financial organization [2].

The relevance of the internet of things for the financial sector is amplified by requirements for resilience and traceability, because modern financial services rely on complex chains of interactions involving remote service points, contractors, and distributed computing infrastructure. This creates a need to align the development of digital ecosystems with internal changes in the allocation of powers, responsibilities, and resources that accompany digital transformation in large organizations [3]. In this logic, the internet of things serves as both a source of real-time managerial information and an object of life-cycle management, since fleets of devices must be commissioned securely, maintained, updated, and decommissioned in a controlled manner. Synthesizing studies emphasize that the practical effect of the internet of things is associated with growth in operational efficiency and improvement in managerial decision quality, while requiring architectures capable of withstanding the growth of observation volumes and the rising complexity of integrations [4].

The implementation of the internet of things in a financial organization by its nature corresponds to a cross-functional information technology project, because the final result emerges at the intersection of several professional domains, each with its own acceptability criteria. Business units define the target effect and economic constraints. Technical teams are responsible for integration with banking and insurance systems, network connectivity, processing observation streams, and operational readiness. Security and compliance units define acceptable regimes for device identification, access control, software updates, and activity auditing, because these elements delineate architectural boundaries and determine the pace of scaling. A review of approaches to constructing protective frameworks for internet of things applications demonstrates that robust security measures must permeate all stages of development and deployment, otherwise a gap emerges between functional outcomes and an acceptable level of risk [5]. Consequently, the management of such projects requires a unified model of accountability, harmonized decision-making rules, and coordination mechanisms between functions that are usually weakly interconnected in traditional IT initiatives.

## 2. MATERIALS AND METHODOLOGY

The research materials included nine relevant sources selected according to the criteria of applicability

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to the financial sector and to cross-functional management of IoT implementation. The theoretical basis consisted of works describing the impact of IoT on insurance and financial practices and the formation of measurable effects from telemetry, where telematics data are linked to changes in behaviour and road safety indicators, as well as to the transformation of fintech processes for verification, fraud detection, and transaction servicing [1, 2]. To contextualize the managerial dimension, the study employed research on digital transformation of organizations that documents the need to redistribute powers and align resources when digital ecosystems change, together with survey materials on the potential of IoT for resilience and efficiency, which provide a frame for discussing architectural growth and integration complexity [3, 4].

In addition, the corpus includes works on IoT security frameworks, practical scenarios for ATM monitoring and security, IoT-oriented risk prevention in insurance, energy management based on sensor circuits, and architectural principles of access control and monitoring. Taken together, these sources describe requirements for trusted identification, logging, and operational predictability [5–9].

The methodology relied on qualitative synthesis and the coupling of several analytical procedures to identify managerial patterns in cross-functional IT projects for IoT implementation. First, a comparative analysis was performed for classes of IoT scenarios in finance. The analysis contrasted payment infrastructure and ATM networks, insurance models of observable risk and loss prevention, and building and data centre engineering systems as critical continuity assets. This enabled the derivation of typical configurations for device dependencies, connectivity, data platforms, and integrations [1, 6–8]. Second, content analysis was conducted of requirements for security, privacy, and operational readiness, formed at the intersection of IT, security, compliance, and operations. The focus was on embedding protective measures into the life cycle and on the consequences of failures in edge environments, where variable conditions reinforce the need for disciplined versioning, key management, and controlled updates [5, 9]. Third, conceptual mapping of roles and zones of accountability was carried out. Managerial findings were linked to organizational preconditions of digital transformation and to technological constraints on scaling. This ensured interpretation of the results through the lens of functional coordination, decision-making, and risk controllability during industrial deployment of IoT solutions in financial organizations [3, 4].

## 3. RESULTS AND DISCUSSION

In the financial sector, the internet of things manifests above all where a digital service depends on a physical point of presence and on material assets. For banks, this includes ATM and payment terminal fleets, branch engineering infrastructure, physical security assets, cash logistics, and cash collection controls. In such circuits, tamper, vibration, movement, and temperature sensors, together with video surveillance, generate telemetry that enables capturing risk events and equipment degradation before failure, and then triggering regulatory actions and notifications. The engineering logic of such

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solutions is described in detail using the example of an ATM monitoring and security system with sensors and remote control, with emphasis on continuous observation, signal transmission, and response scenarios [6].

In insurance, the internet of things is most frequently embedded in models of observable risk and loss prevention. Telematics data from vehicles is used to analyse driving style and construct tariffs, as well as to provide feedback that modifies driver behaviour and lowers the likelihood of accidents. This dynamic is reflected in a systematic review of automotive telematics research. In parallel, real estate scenarios are evolving, where leak, smoke, and air quality sensors, together with security devices, enable a shift from damage recording to prevention, as the insurance organization receives signals of deviations before a major event unfolds. This line is clearly traced in a systematic review of the internet of things in insurance, where IoT is considered as a data source for new insurance products and risk prevention measures [7]. Wearables in such a context function as a channel for the voluntary transmission of physiological and behavioural indicators, which reinforces the need for consent, data minimization, and access control. Otherwise, the project rapidly enters a zone of regulatory uncertainty.

For the infrastructure of a financial organization, the internet of things is particularly significant in data centres and access control systems, because the availability of computing resources and the protection of premises are directly associated with operational continuity. Sensor circuits for temperature, humidity, energy consumption, and engineering system state enable more precise control of cooling and load, which, in synthesizing studies on energy management based on the internet of things, is associated with a substantial potential for reducing energy consumption and operating costs under conditions of correct integration of sensors and automation of control [8]. Access control and video surveillance in such environments introduce additional requirements for identification and rights management, as devices become participants in a trusted environment. Corresponding approaches to access control and monitoring are described for household scenarios, although their architectural principles scale to corporate facilities through the same mechanisms of attestation, logging, and rights segregation [9]. As a result, the business value of the internet of things in finance is more often expressed through higher service availability, lower operational losses, accelerated incident response, and improved asset manageability. This directly leads to the thesis that such implementations are cross-functional and require coordinated management across the entire life cycle of devices and data.

IoT projects in the financial sector create a system in which technical outcomes arise only when devices, communication channels, data platforms, and integrations with application systems are simultaneously ready. Devices provide primary signals. The value of these signals depends on correct transmission, normalization, storage, and association with the operational context. In practice, this implies numerous couplings with accounting systems, monitoring systems, ticketing, asset registers,

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and response mechanisms. Each coupling adds data reconciliation rules, quality requirements, and latency constraints. An error in one layer quickly propagates to another. Consequently, the project becomes a task of managing interdependencies, where architecture and implementation sequence determine reliability.

Edge computing introduces a distinct layer of complexity because some processing is moved to the point where the data originates. This approach reduces latency and eases the load on central circuits. The network must also be resilient in a resource scarce heterogeneous environment. At the real location, connectivity can be intermittent, congested and affected by interference, such that buffering, local decision rules, and mechanisms to recover from the channel going down are required. Implementation of strong versioning, as well as configuration discipline, is required. Updates must be secure and deterministic in the case of a partial network failure. Different outcomes of the same logic due to environmental differences impose important challenges in the testing and acceptance phase.

In addition to handling fleets of devices, scaling involves commissioning, registration, remote configuration and updates, diagnostics, and decommissioning/replacement of devices throughout their life cycle. As the number of devices grows, the organization acquires a distributed system that must be observed and serviced as a mission-critical service. The attack surface expands as each device and its communications become potential entry points. Security requirements encompass device identification, key management, access control, network segment isolation, software integrity verification, logging, and tamper-resistance. In the financial sector, these requirements assume a particularly stringent character, because a loss of trust in the IoT layer can trigger a chain of events that affect operational processes and reputation. As a result, the success of such projects depends on the alignment of engineering decisions, operational procedures, and security regimes. This reinforces the importance of cross-functional management introduced in the Introduction. Challenges in IoT Projects in the Financial Sector are depicted in Figure 1.

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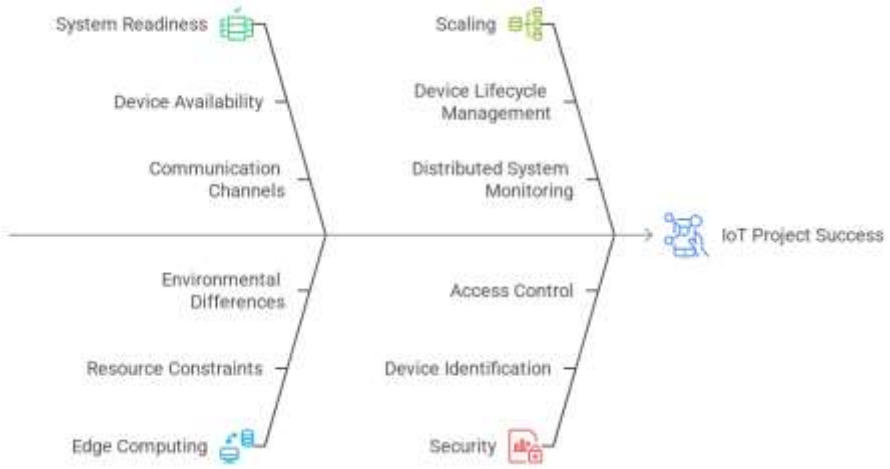


**Figure 1:** Challenges in IoT Projects in the Financial Sector

The cross-functional organization of an IoT implementation project in the financial domain emerges from the very nature of the solution, where technical components and risk management processes are interwoven with operational realities. Business defines objectives, economic rationale, and boundaries for acceptable change, since it is accountable for client value and financial outcomes. Information technology teams design architecture, integrations, and operational contours that transform signal flows into a robust service. Security units formulate requirements for trusted device identification, channel protection, key management, and incident response. Compliance teams and legal departments ensure adherence to regulatory requirements, data retention rules, and consent conditions, especially when data can be linked to clients' or employees' behaviour. Operational units are responsible for the physical installation, maintenance, and procedures that determine the solution's actual availability. Suppliers of devices, connectivity, and platforms are integral to the system because their maturity influences reliability and supply chain risk.

To keep this multilayered structure within manageable boundaries, a management model is formed that separates strategic decisions from day-to-day delivery. At the upper level, a steering layer is established. It aligns priorities, budgets, risk appetite, and scaling sequence and resolves conflicts between functions. Within the project, ownership responsibilities are assigned separately for the product and for the implementation programme. The product owner maintains the link to business impact and safeguards the integrity of usage scenarios. The programme manager ensures that targets for schedule and resources are met, maintains a unified plan, and coordinates dependent workstreams. This linkage reduces the likelihood of divergence between the solution's utility and operational feasibility, especially under strict requirements for resilience and security.

A responsibility allocation matrix becomes an instrument that converts interaction from informal agreements into verifiable commitments. It records who performs the work, who bears ultimate

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accountability, who is consulted, and who is informed about outcomes. The matrix is most valuable at interfaces where grey zones typically arise. Such interfaces include device registration and its lifecycle, software updates, network configuration management, data quality and incident handling, and the boundaries of accountability between internal teams and external suppliers. When roles are formalized, decision-making in emergency situations becomes easier because powers and escalation paths have been defined in advance. This is directly related to the previously described characteristics of the internet of things, where an error in one layer rapidly propagates to others. The IoT Project Roles Range is shown in Figure 2.


**Figure 2:** IoT Project Roles Range

The implementation life cycle begins with the initiation and preparation of a business case, where measurable effects, total cost of ownership, and implications for processes are documented. Requirements are then collected, and architecture is designed, with security and privacy requirements embedded as initial constraints that influence the choice of protocols, identification schemes, logging mechanisms, and access models. A pilot stage follows. At this stage, end-to-end scenario performance, resilience under communication failures, integration readiness, and the ability of operational teams to support the solution in real conditions are tested. Success criteria for the pilot include technical metrics, adherence to control requirements, and the capacity to provide predictable service. After the pilot, scaling and transition to industrial operation begin. At this stage, standardization of installation, fleet management, observability, and change procedures becomes central. The final stage is expressed in support and improvement, because the internet of things remains a dynamic system that requires regular reconfiguration, updates, and refinement of analytical models based on accumulated data and incident experience. The IoT Implementation Lifecycle is shown in Figure 3.

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**Figure 3:** IoT Implementation Lifecycle

A hybrid approach to managing IoT implementation in a financial organization arises from the combination of high technological uncertainty and stringent risk control requirements. In such a project, some decisions fall within the realm of engineering exploration. Another part is constrained by regulatory requirements and internal policies. Management is therefore structured as a sequence of controlled transitions between states of readiness. At each transition, the admissibility of further progress is confirmed against criteria of security, compliance, and operational feasibility. These transitions serve as alignment points among functions because they require joint decisions from business units, IT teams, security, compliance, and operations. This framework reduces the likelihood that a team will deliver a technically complete component without readiness for integration and support.

Within each period between control transitions, iterative development and analytical work with short cycles prove effective. They enable requirements to be refined as data from pilot sites become available and as real operating regimes are revealed. Teams maintain a single backlog that reflects functional scenarios, reliability requirements, observability requirements, and access constraints. The iterative approach is particularly important for data streams and anomaly detection models, because the usefulness of algorithms depends on signal quality and on context that only emerges after deployment in a real environment. Prioritization discipline must remain connected to business impact and to the responsibility matrix described earlier. Otherwise, iterations degrade into local optimization without influence on outcomes.

When the solution enters stable operation, management shifts toward a service-oriented perspective, where incidents, changes, configurations, and service levels become primary concerns. For a financial

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organization, it is important that changes in devices, network settings, and data processing follow a controlled approval path and remain observable for audit. The operating model includes configuration item registration, version management, update schedules, rules for emergency changes, and mechanisms for returning to a stable state. At this stage, the interests of operations, security, and product ownership converge because any change affects both risk and availability. Therefore, the corpus of documents and artefacts becomes a shared memory of the project. It records the development roadmap, descriptions of support scenarios, and the list of anticipated changes.

Risk management in IoT projects in the financial sector must be embedded in everyday decision-making, as risks arise at the interfaces among technology, supply, and process. Technological risks include incomplete and noisy data, connectivity failures, device degradation, and unpredictable behaviour during updates. These risks manifest as false positives, missed events, and accumulation of technical debt in configurations. A separate group of risks is cyber-related, amplified by device fleets and supplier dependence. Here, significant factors include vulnerabilities in embedded software, component substitution, key compromise, and expansion of access through network channels. Regulatory and privacy risks arise when data intersects with identifiable subjects and when processing logic influences decisions about the client. For organizations, risks from such failures include resistance to change, conflicting departmental aims, and unprepared support lines.

The risk register is the project risk management work product that contains a record of the risk owner, trigger, potential impact and response. Effectively, risk management becomes checking architecture, testing, supplier selection and operational readiness, while tracking risk response actions, as the risk register is part of the project work plan. Those include reviewing the architecture to determine compliance with policy constraints, testing resiliency against failure scenarios, testing for readiness to be patched, auditing the supply chain and rehearsing the incident response. In practice, this loop needs to be repeated continuously, with new vulnerabilities discovered, models evolving and device fleets growing. As such, it becomes a way of communicating between functions that moves discussions from talking about things to verifying acceptance criteria.

Integrations and data form the connective field that turn the fragmented signals from devices into operational and managerial signals. The data flow begins with collection and preliminary filtering at the edge, then proceeds to transport and processing, and finally reaches storage for operational analytics and long-term analysis. In the financial sector, it is particularly important to link these flows with core accounting and servicing systems and with security and operations circuits. This ensures that device events can result in ticket creation, access revocation, the initiation of investigations, and adjustments to service regimes. Integration with security operations centres enables event correlation and improves the ability to detect complex attacks in which an individual signal appears benign. Integration with configuration management and ticketing systems ensures traceability from a device to a specific installation location, responsible unit, and change history.

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Data management requires rules that encompass quality, access, and life cycle. Data quality is defined through feature definitions, acceptable ranges, missing-data controls, and mechanisms for resolving conflicts when signals are received from different sources. Access is governed by the principle of least privilege, because telemetry can reveal operating modes of assets and behaviour of process participants. The data life cycle includes retention periods, anonymization procedures, and rules for analytical use. However, because they relate to regulatory and internal policies, they need to be agreed to early and then checked for during operations.

Operation and service management complete the life cycle by transitioning the project to a production service. Observability provides metrics on devices, data channels, data processing, and integrations so one can detect when any of these components are degrading the service. Alerting should relate to operational procedures so that support teams can quickly triage incidents, establish ownership, and invoke runbooks. Incident management should have service levels and escalation rules agreed across all departments and suppliers. Configuration and update management covers remote software updates, integrity control, secure key distribution, and version accounting. Staff training and standard procedures for working with devices reinforce reliability at field locations where installations, replacements, and initial diagnostics occur. This operational layer closes the life cycle described earlier by ensuring reproducible outcomes as scale grows and requirements evolve.

## 4. CONCLUSION

The study presents the internet of things in the financial sector as an infrastructural technology that simultaneously expands observability of physical objects and processes and increases the complexity of managing the digital ecosystem. Applied value is revealed in areas where digital services depend on material assets, including payment infrastructure, engineering systems, physical security, data centres, and insurance scenarios of observable risk. Telemetry from sensors and devices can support early detection of degradation and risk events, accelerating responses, increasing service availability, and reducing operational losses. The practical effect depends directly on the architecture that can withstand growth in observation volume and integration complexity, and on the correctness of life cycle organization for devices and operational circuits.

The results and discussion of the paper highlight that IoT in a financial institution consists of the interdependencies of IoT devices and connectivity, data platforms and application-system integration to account, service and monitor the IoT. However, owing to the dominance of edge computing, the responsibility of resilience is shifted to a heterogenous environment where connectivity is intermittent, conditions variable and resources constrained. This increases the need for buffering, local decision rules and recovery after failures and disciplined version and configuration management. Scaling moves the project into the domain of managing device fleets as a mission-critical service, because the expanding number of nodes enlarges the attack surface and requires strict regimes of identification, key management, access control, segmentation, integrity verification, and logging. For the financial

sector, this is critical due to the risk of cascading operational and reputational consequences.

The findings can be summarized as follows. The success of IoT implementation in the financial domain is determined by the quality of cross-functional management throughout the entire life cycle of devices and data. The proposed management model confirms the necessity of a steering layer for aligning priorities, budgets, and risk appetite, as well as the linkage of responsibilities between the product owner and the programme manager, which preserves the unity of business impact and operational feasibility. Formalization of roles through a responsibility matrix renders interactions verifiable at critical interfaces, including device registration, updates, configurations, data quality, and incident handling. The risk register transforms heterogeneous threats into tasks for architecture, testing, supplier selection, and operational preparation. As a result, an IoT project in a financial organization appears as a hybrid management loop, where readiness checkpoints, iterative development, and a service operating model together form a unified mechanism for aligning decisions across business, IT, security, compliance, operations, and external suppliers.

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## Author Profile

**Aditya Agarwal** is a seasoned Senior Technical Program Manager and digital banking expert with over 15 years of experience driving large-scale enterprise platforms and customer-facing digital solutions across global financial institutions. He has a strong track record of leading complex technical programs and delivering mission-critical digital initiatives in areas such as customer service automation, payment systems, and regulatory compliance. Aditya specializes in architecting and executing end-to-end technology programs, aligning cross-functional engineering, risk, and compliance teams, and ensuring the scalability, security, and operational reliability of high-volume banking systems. Through his leadership at Citibank, he has significantly contributed to digital transformation efforts, including the development of chatbot platforms, digital payment products, and next-generation microservices-based architectures. Aditya also serves as a Council Member at AITEX and holds a Fellowship with Hackathon Raptors.