Cognizant

Solution Overview

Accelerating IoT Programs at Scale:
Connected Reference Architecture & Toolkit

How enterprises can deliver successful IoT programs with proven enterprise grade architectures, tools and time-tested practices while avoiding common implementation pitfalls.

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Despite the increased adoption of IoT across industries, nearly 75% of IoT programs fail.[1] Why?

Many of the challenges to operationalizing Internet of Things (IoT) span people, process and technology. IoT pioneers must ask themselves a myriad of questions, including:

- "Do we have the right skill-sets in-house?"

- "How fit and scalable is our IT infrastructure?"

- "What development processes are required?"

- "How do we integrate IoT to our existing information and operational systems, and with other IoT solutions?"

- "How do we connect our internal IoT processes with those of our business partners and other industry players?

- "What IoT technologies do we use?"

- "How do we measure success?"

- "Where do we start?"

Whether to cut costs, improve the customer experience or re-imagine products and services, organizations across industries are exploring the potential of the IoT. Yet many projects never make it past the pilot phase because they were designed only to quickly solve one problem for one business unit. Without the proper attention to broader enterprise requirements such as interoperability, security and scalability, these experiments are abandoned before they can deliver a return on investment.

Tapping our experience with implementation of multiple IoT projects of all sizes and across industries, our Connected Reference Architecture & Toolkit can help reduce the time and cost required to bring new IoT solutions to market. It provides a consistent framework each business unit can use to quickly leverage the right mix of technologies and practices to achieve first-mover advantage, while providing an enterprise-strength foundation that assures the solution's long-term viability.

Enterprises need proven methodologies and practices that combine rapid time-to-market with the robust capabilities needed for long-term success.

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[1]   Cisco Survey Reveals Close to Three-Fourths of IoT Projects Are Failing, May 2017 https://newsroom.cisco.com/press-release-content?articleId=1847422

Deeper understanding of complexities can prevent failures

Achieving a sustainable competitive advantage with IoT requires overcoming many of the unexpected complexities and challenges. Business decision makers must think beyond their current definitions of products and services to imagine how the data those solutions generate can drive revenue, profits and market share. Their IT counterparts must integrate, secure and manage torrents of data from new classes of devices, and learn the tools to analyze that data and deliver the resulting insights in near real-time. They must also learn how to manage, secure and scale these new technologies.

Given this level of change, it's only natural that organizations let their most forward-thinking business units start slowly with proofs-of-concept (PoC) that test the potential and limits of IoT. But taken too far, such limiting thinking almost guarantees failure. Rushing to be first to market, the business unit may lock itself into one vendor's technology or create an entirely custom solution — either of which make it difficult and expensive to maintain or enhance over time.

By focusing on solving one narrow problem, the business unit often fails to build in capabilities required for long-term enterprise use, such as security, scalability and the sharing of data with other enterprise systems.

The last thing any business needs is to be hobbled by siloed, inefficient and expensive IoT pilots that never reach production. Beyond the new technologies required by IoT, enterprises need common IoT platforms and structured, consistent processes for designing and implementing end-to-end IoT solutions across the business over time.

Companies have no shortage of IoT technology that can be better utilized across the enterprise. Too many IoT projects fail because they are designed in silos to solve isolated problems.
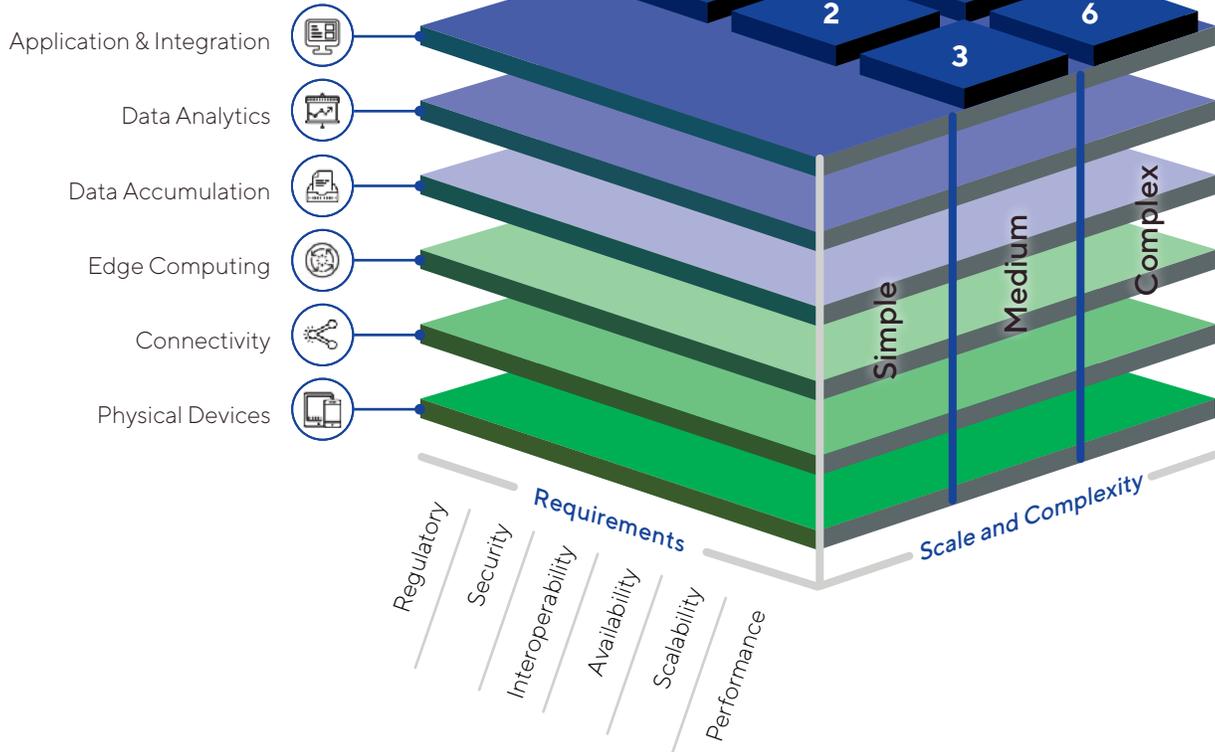
Connected reference architecture & toolkit

Our Architecture & Toolkit gives organizations a proven blueprint for quickly delivering secure, scalable and interoperable IoT products, services and solutions. Its detailed recommendations, best practices and sample code assure a consistent, enterprise-wide approach to everything from interoperability and edge computing to industry-specific applications such as connected factories, connected vehicles and connected medical devices.

IoT Reference Architecture Stack

Industry-Specific Blueprints

1. Conncected Places
2. Digital Field Servicing
3. Trace and Track
4. Conncected Medical Devices
5. Conncected Car
6. Connected Factories

IoT Layers

- Application & Integration
- Data Analytics
- Data Accumulation
- Edge Computing
- Connectivity
- Physical Devices

Simple · Medium · Complex

Requirements: Regulatory, Security, Interoperability, Availability, Scalability, Performance

Scale and Complexity

*Platform-specific version available on AWS and Microsoft Azure.

Four key components

1. **The Reference Architecture** is a comprehensive set of architectural patterns that address both common IoT requirements and broader enterprise needs. Ready-to-use templates are based on the size and complexity of IoT programs as illustrated in the reference architecture stack. Organizations can select components and services to implement a specific use case. These templates meet industry-specific needs such as connected factory, smart medical devices, digital field services and track and trace for shipments as well as non-functional requirements to ensure scalability, performance, maintainability and security.

2. **Technology Frameworks** that help organizations choose the right future-proof technology for everything from the IoT cloud platform to device connectivity and data analysis. Our IoT Readiness Assessment Framework identifies gaps in IT and engineering that could hold back IoT efforts, while its total cost of ownership analysis framework assesses the cost of building and sustaining the solution over time.

3. **Reference implementations** in the form of re-usable, sample code that requires only minimal customization to implement complex architecture patterns such as large-scale data ingestion and routing and managing device configurations on leading IoT cloud platforms.

4. **Proven best practices and ready-to-use scripts** for managing solution development and deployment using continuous integration/continuous delivery and DevOps on leading cloud platforms. Our BlueLink simulation and automation tool reduces delays and costs through virtual tests of various devices, scenarios and loads.

Typical benefits to expect in using the Architecture & Toolkit are:

❚ Significantly reduced costs to develop, deploy, maintain, scale and secure IoT solutions, increasing their ROI.

❚ Significantly faster development and deployment of IoT solutions, allowing companies to save money, drive revenue and increase customer satisfaction sooner.

❚ Reducing the risk of siloed, one-off IoT solutions that are too expensive and difficult to integrate with wider enterprise applications.

❚ Reducing long-term costs by avoiding lock-in to specific vendor technology platforms or creating multiple proprietary IoT platforms in house.

Avoid common pitfalls

❚ Over-reliance on specific technology vendors before putting a holistic architecture in place causes vendor lock-in and inflexibility at early stages of the development process.

❚ Avoiding vendor lock-in by building a completely custom solution, significantly increasing the time and cost required to deliver the solution.

❚ Architecting and procuring an IoT solution that addresses only one problem, making it harder to integrate with other IoT solutions, increasing complexity and support cost.

❚ Failing to address the required integration with enterprise applications from the earliest stages of development, causing unexpected challenges and time/cost overruns.

Getting started: how the architecture overcomes IoT challenges

Our Architecture can help enterprises throughout the IoT journey to accelerate their time-to-market by designing a foundational architecture properly from the start.

Time-tested tools to advance each phase of the IoT journey

Create the Vision > Translate the Vision > Pilot & Learn > Build & Scale > Commercialize

IoT PHASES	OBJECTIVE	ARCHITECTURE VALUE
Create the Vision	Identify business goals and use cases to achieve defined results. Educate key stakeholders on IoT opportunities and their expected outcomes.	**Reference Architecture** can help articulate scenarios and use cases and provide a common language for communication with key stakeholders.
Translate the Vision	Create a technology roadmap and high-level solution architecture to execute on the strategy.	**Reference Architecture** can help map industry scenarios to the architecture blueprint. **IoT Readiness Assessment** framework can help evaluate internal IT and engineering assets and processes and recommend ways to close technology gaps and leverage strengths in IoT development. **Vendor-Agnostic Technology Selection Framework** helps identify technologies and build vs. buy decisions.
Pilot & Learn	Validate use cases and technology blueprint in order to test PoCs and pilots that may require emerging technologies and operational changes.	**Architectural Blueprint** enables teams to implement components during a pilot and identify challenges upfront to assure realistic timelines and budgets. **TCO Analysis Tool** estimates the cost of building and sustaining a solution over time taking into account everything from technology cost to development, connectivity and support. This helps enterprises to validate solution concepts, technology choices, costs and the expected ROI.
Build & Scale	Align and integrate the enterprise grade IoT architecture with IT regulations and compliance standards. Build a solid foundational architecture before incrementally building out modules and applications in Agile mode.	**Ready-to-Use Blueprints** for delivering IoT solutions with extensions to implement top industry use cases. Architectural patterns address security, high availability and integration with enterprise apps to deliver a capable architecture in the first iteration. **Microservices** allow enterprises to develop and deploy applications using reusable code built on reference implementations of commonly required functionalities. **Pre-defined Templates and Ready-to-Use Scripts** for cloud platforms (Microsoft Azure and AWS) to bootstrap speedy development of IoT solutions using DevOps. Our **BlueLink Workbench** speeds continual testing and deployment by simulating real-world devices and test environments.
Commercialize	Deploy the solution into commercial environments, support it with corrective and adaptive maintenance, and periodically assess how to leverage new technologies to add-on functionality and extend its life.	**Pre-Built Microservices** to streamline the delivery of easier maintenance as well as introduce new capabilities without shutting down production or re-architecting the solution. **Architecture Assessment Framework** to identify gaps in the existing architectures and tipping points for re-architecting a solution or migrating to new technologies, including the TCO of a technology refresh.

CASE STUDY

Enabling IoT at Scale

Challenge

A $30 billion industrial conglomerate needed a common set of enterprise-grade services any of its business units can use to develop and deliver connected products and services. This will help the manufacturer capture economies of scale, protect its brand through consistent policies and governance and speed the delivery of new connected solutions.

Solution

Delivered a cloud-based platform that onboards and manages devices and users, provides public and private key encryption for connected devices, applications and data, and log management to track and manage security and performance across connected systems. We leveraged our Connected Reference Architecture & Toolkit as an accelerator throughout the program and it allowed us to provide the necessary guidance for everything from technology selection to improved development and deployment.

Making your IoT vision a reality

Connected Reference Architecture & Toolkit helps enterprises meet the dual needs of improving time-to-market and building enterprise-level capabilities. With our best-in-class reference architecture, time-tested best practices, ready to use templates, and sample code, you can make your IoT vision a reality.

Whether you're building a brand new solution or re-imagining a legacy application, each aspect of the Architecture & Toolkit enables you to quickly deliver new IoT capabilities on an enterprise-ready foundation that can meet changing market needs.

To learn more visit www.cognizant.com/enterprise-iot-solutions.

About Cognizant Digital Business | Connected Products

Cognizant Digital Business helps our clients envision and build human-centric digital solutions — fusing strategy, intelligence, experience and software to drive industry-aligned transformative growth. As emerging technologies like IoT extend across the enterprise, factories, supply chains and beyond — as well as become more pervasive throughout our everyday lives at home, school and work — clients across industries are seeking Cognizant's expertise to advance and implement their IoT strategies. IoT, combined with applied analytics and intelligence, is helping them deliver greater business performance, products and service offerings — all leading to superior customer experiences. To learn more, please visit www.cognizant.com/iot or join the conversation on LinkedIn.

About Cognizant

Cognizant (Nasdaq-100: CTSH) is one of the world's leading professional services companies, transforming clients' business, operating and technology models for the digital era. Our unique industry-based, consultative approach helps clients envision, build and run more innovative and efficient businesses. Headquartered in the U.S., Cognizant is ranked 195 on the Fortune 500 and is consistently listed among the most admired companies in the world. Learn how Cognizant helps clients lead with digital at www.cognizant.com or follow us @Cognizant.

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