

## An Architectural Approach to Responsive Manufacturing



### The Problem of Information Silos

For manufacturers, shorter lead times, faster turnaround, and better service are critical customer-centric measures that make a difference in attracting new business and retaining existing business. Lack of responsiveness perpetuates inefficiencies that can adversely affect the level of customer service, drive up costs, limit visibility and flexibility, and increase time to market. These factors, in turn, can hold back gains in revenues and profit.

To bolster efficiency and competitive advantage, manufacturers must achieve new levels of responsiveness and flexibility throughout the entire chain of operations. A manufacturing company needs real-time access to integrated information from all departments in the company, from customer channels through the supply chain to the manufacturing lines to engineering and R&D departments. This degree of visibility fosters collaboration and allows for faster decision-making, communication, and response to changing customer demands and floor conditions, not in weeks but in hours or even minutes.

However, today's manufacturing processes, administrative systems, and even control systems are usually isolated in separate "information silos" on different proprietary networks. These information silos limit the availability and integration of data needed to quickly make time-sensitive decisions.

### Solution: An Architectural Approach

Manufacturing organizations can bridge these silos by adopting an architectural approach that describes business processes and the IT interfaces and interactions that work together to support them. This approach also defines reusable IT services such as compute, storage, application and network communications that support business processes and can be utilized across an organization. Among the benefits are cost savings, fast deployment of new capabilities, and more innovative approaches to solving business challenges.

Businesses are increasingly using a form of enterprise architecture, whether an industry standard framework such as The Open Group Architecture Framework (TOGAF) or Zachman or an internally developed architecture, to improve the linkage of business objectives to a technology architecture. Cisco provides the network infrastructure and services to integrate business tools and devices across silos. Working with your existing enterprise architecture framework, Cisco® network-based services are among the reusable assets that help to lower operating costs, increase productivity, and generate new revenue streams.

## Enhance Business Applications with Network-Based Services

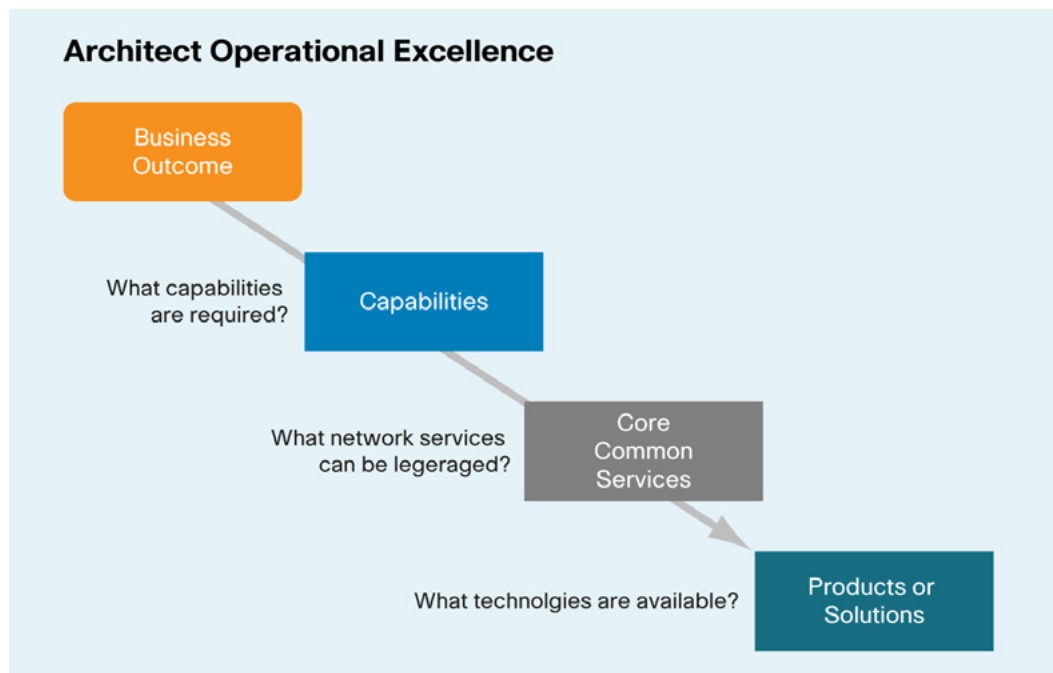
Manufacturing companies deploy a diverse set of applications that perform a designated function for the business, many of which are mission critical – everything from controlling conveyer belts and robotic manipulators, to monitoring and capturing events, to working externally with suppliers and supply chains.

Using services to replace or enhance common application features has long been a proven strategy for application development and deployment. The use of services allows for greater standardization and centralization or control over the application environment, an improved user experience, and new capabilities and integrations not available previously.

Cisco technologies provide common network-based services that are available across the manufacturing enterprise and can be used and reused by different business- and manufacturing-specific applications, as well as the suite of Cisco Manufacturing Solutions.

The Cisco Service-Oriented Network Architecture (SONA) is an open framework for network-based services used by enterprise applications to achieve business results. This top-down architectural approach focuses first on business objectives, and then identifies what business capabilities are available in the form of applications and business services. Next, understanding what functional services are common across the business capabilities and finally deploying the foundation to deliver the required services.

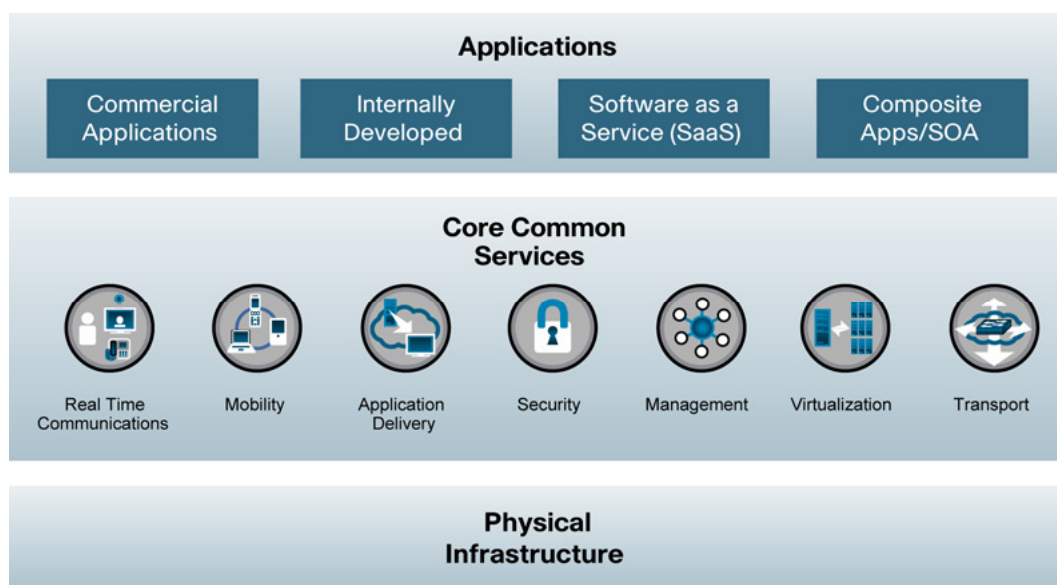
**Figure 1.** Steps of a Top-Down Architectural Approach



The Cisco SONA framework consists of seven core service groups that deliver consistent and robust capabilities throughout the network. A core service group is a collection of one or more functional services that create a common quality, ability, or feature that can be used or developed by higher-level applications such as SCM or ERP. The core services are delivered by physical infrastructure, which may include one or more products or solutions. The core service groups consist of the following:

- **Real-Time Communication Services** offer session and media management capabilities to enrich communications and collaboration from the factory floor to the corner office.
- **Mobility Services** offer access to location information and provide connectivity for wireless devices and sensors.
- **Application Delivery Services** help ensure that applications perform to users' expectations whether on the floor or at a satellite location.
- **Security Services** help protect the infrastructure, data, and application layers from constantly evolving threats, and also offer access control and identity functions.
- **Management Services** offer configuration and reporting capabilities across the infrastructure from the floor to the corner office.
- **Virtualization Services** increase the utilization and efficiency of infrastructure for manufacturers seeking to optimize their investments and limit space usage.
- **Transport Services** are the common foundation that enables the breakdown of manufacturing silos and integration of disparate systems.

**Figure 2.** Common Services Categories



### Utilizing Cisco Core Services in Your Manufacturing Technology Architecture for Improved Efficiency

Cisco offers a number of core services that can be used and reused among multiple business applications in support of manufacturing solutions. This drives efficiency, lower time to deployment and better capitalization as services deployed for the initial manufacturing solution are used again by subsequent solutions and applications. Cisco Core Services are pervasive across the networked environment and manufacturing domains. The portfolio of Cisco Manufacturing solutions are focused on integrating operational silos and improving efficiency with greater flexibility and responsiveness. The services used across the solutions include: real time communications, mobility, security, virtualization and transport as shown in the table below

Figure 3. Common Services Reuse

## Build Upon Existing Services and Solutions

### Cisco Manufacturing Solutions

UC Voice Picking	X		X	X	X		X	Supply Chain Agility	↑
Distributed Manufacturing	X	X	X		X		X		
Unified Communications	X		X		X		X	Operational Excellence	
Location Based Services	X		X	X			X		
Secure Wireless	X		X	X			X		
Ethernet to the Factory	X	X	X				X		
Common Network Services	Transport	Virtualization	Security	Mobility	Real-time Communication	Application Delivery	Management		

### Cisco Connected Manufacturing Solutions

Cisco Connected Manufacturing solutions give your business better access to more accurate and timely information throughout your organization and supply chain. These solutions support business goals that may pertain to a specific domain within manufacturing – such as engineering, security, or production – but also enable communication across domains to facilitate metrics such as: regulatory and safety compliance, vendor management, time-per-unit, production yields, on-time delivery, quality and inventory control, and minimizing downtime with improved mean time to repair (MTTR).

The following Connected Manufacturing Solutions utilize Cisco Core Services described within the Cisco SONA framework to address many of the key operational issues facing business leaders today.

For more information on Cisco Connected Manufacturing Solutions please visit:

[http://www.cisco.com/web/strategy/manufacturing/intelligent\\_networked\\_overview.html](http://www.cisco.com/web/strategy/manufacturing/intelligent_networked_overview.html)

### Ethernet-to-the-Factory Solution

Cisco Ethernet to the Factory provides increased efficiency, highly secure real-time visibility, and integration of automation systems with business applications. This allows manufacturers to make more strategic business decisions that are backed up by real-time information from the plant floor, and increases overall operational efficiency through the use of standard network technologies and increased access to production systems. The solution incorporates Cisco's industry-leading network-based security solutions to protect critical manufacturing systems while allowing secure access for authorized personnel, regardless of location.

To learn more about how Cisco Ethernet to the Factory solution enhances visibility, productivity, security and flexibility, visit: [http://www.cisco.com/web/strategy/manufacturing/ettf\\_overview.html](http://www.cisco.com/web/strategy/manufacturing/ettf_overview.html)

### **Secure Wireless Plant Solution**

The Cisco Secure Wireless Plant Solution gives your business up-to-the-minute information to improve operational processes. Advanced wireless and sensor technologies give managers and administrators greater insight into complex processes by securely networking sensor data from companies such as Emerson and making the data available to business and control systems throughout the company. This solution supports the goal of connecting all devices, all individuals, and all steps of a product's manufacturing lifecycle to increase visibility and collaboration – without compromising security.

To learn more about the Cisco Secure Wireless Solution for Manufacturing, visit:

<http://www.cisco.com/web/strategy/manufacturing/secure-wireless-plant.html>

### **Location Based Services for Manufacturing**

Cisco Location Based Services solutions help you manage and control all the material goods, people, and products created within and throughout the supply chain. Integrated with Cisco networking technologies, this powerful solution helps you control costs, streamline processes, operate more profitably, and respond rapidly and flexibly to new demands.

To learn more about the Cisco Location Based Services for manufacturing solution, visit:

<http://www.cisco.com/web/strategy/manufacturing/lbs.html>

### **Unified Communications for Manufacturing**

Manufacturing operations play a critical role in a company's profitability. Efficiency and high productivity enable manufacturers to better meet increasing customer expectations while managing costs and supply chain processes. Today, information—immediate, current, and actionable—is the most important element of profitable manufacturing operations. With instant access to data and people, companies can provide customers with the product information they seek. The enterprise gains deep visibility into its supply chains, enabling it to minimize time and rework throughout its processes. It communicates better with employees, leading to higher-quality products and higher company morale. Decisions can be made with greater confidence. Delays can be reduced or eliminated. And high manufacturing performance enables the company to rise above its competitors in the market. Cisco® Unified Communications for Manufacturing solution can help you reach these goals.

To learn more about the Cisco Unified Communications for manufacturing solution, visit:

<http://www.cisco.com/web/strategy/manufacturing/uc.html>

### **Distributed Manufacturing Solution**

The Distributed Manufacturing platform from SAP and Cisco provides global businesses with real-time visibility of, and collaboration among, widely distributed processes to help them address critical needs rapidly. Delivering end-to-end oversight of the manufacturing process, the platform is based on proven technologies from two of the world's most recognized technology companies. Cisco and SAP combine their industry-leading capabilities to extend visibility throughout your manufacturing environment and supply-chain partners.

To learn more about Cisco and SAP's Distributed Manufacturing solution, visit:

[http://www.cisco.com/web/strategy/manufacturing/distributed\\_mfg\\_solution.html](http://www.cisco.com/web/strategy/manufacturing/distributed_mfg_solution.html)

## Unified Communications (UC) Voice Picking Solution

In today's competitive manufacturing and supply chain operations, companies are intensifying their focus on improving shipment accuracy and distribution agility while reducing the costs associated with manual labor and human error. Such costs are increasingly incurred in warehouse environments that manage up to thousands of SKUs in every shipment. The Cisco UC Voice Picking for Manufacturing is a flexible, mobile voice solution that increases mobile worker productivity and moves goods quickly through the supply chain with high accuracy.

To learn more about Cisco Voice Picking solution, visit:

[http://www.cisco.com/web/strategy/manufacturing/voice\\_picking\\_solution.html](http://www.cisco.com/web/strategy/manufacturing/voice_picking_solution.html)

## Closing

The portfolio of Cisco Connected Manufacturing solutions helps address many of the key operational issues faced by manufacturers today. Starting with a robust foundation of wired infrastructure and extending it to enable wireless connectivity delivers access to more accurate and timely information throughout the organization and supply chain. This creates new abilities to make better-informed decisions quickly and at a lower risk. Next, enabling real-time collaboration across the entire supply chain helps your business manage increasingly complex product lines and introduce new and updated products more quickly and efficiently.

By deploying these solutions, your business not only benefits from increased operational efficiency, but accrues additional cost savings and faster time to capability through the use and reuse of Cisco Core Services. Because Cisco Connected Manufacturing solutions utilize the network-based services described in the Cisco SONA framework, these solutions support business goals while achieving rapid return on investment.

## Next Steps

To better understand how your network can become a strategic asset through reusable services, contact your local Cisco representative for more information on Cisco's Business Transformation Services or visit: [http://www.cisco.com/en/US/products/ps8222/serv\\_group\\_home.html](http://www.cisco.com/en/US/products/ps8222/serv_group_home.html).

Cisco Connected Manufacturing solutions are in widespread use by manufacturing organizations worldwide. For more information on successful implementations and best practices, visit: <http://www.cisco.com/go/manufacturing>.



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