Sustainable Supply Chain Management

MODULE 3 Session 1
Supply Chain Redesign
Lecture

DIGITAL ENTERPRISE

Using digital technologies and networks in the activities of buying and selling goods and services, servicing customers, collaborating with business partners, conducting communications and transactions within the organization *[Turban, E.; Sharda, R.; Delen, D. Decision Support and Business Intelligence Systems (Required); Prentice Hall Press: Upper Saddle River, NJ, USA, 2010.]*

Types of digital enterprise:
- Categorizing: digital business; digital commerce; electronic business; online business; Internet-based business
- Degree of digitization: measured by the product/service sold; the process and the delivery method
- Pure online; digital or click-and-mortar business: both digital; online and non-digital; offline operations; channels
- Type of transaction: business to consumer (B2C); business to business (b2b); e-services (including B2C services, E-learning, E-government, E-publishing, E-health and other e-services); digital platforms (including consumer to consumer (C2C) sites/platforms, online communities, social networks and online portals (including corporate and customer portals).

[*SOURCE*]

DIGITAL ENTERPRISE

Effective management of digital enterprise requires close attention to various elements of digital enterprise, including:

- Understanding current status, challenges/issues and future directions of digital enterprise

- Addressing digital enterprise enabling technologies (including hardware, software and networks)

- Recruiting, developing and retaining required talent and skills

- Having good management practices (e.g. strong leadership, effective strategy planning and execution, right business processes, fostering organizational culture and structure

- Managing chosen digital enterprise model(s)

- Ensuring the delivery of associated support services for digital enterprise

[*SOURCE*]

DIGITAL ENTERPRISE

Significant challenges and issues associated with digital enterprise/digital business including:

- Security
- Privacy
- Value of personal data
- Digital divide
- Internet governance
- Less-human and work-life balance
- Long tail versus power law
- Integration challenge

[*SOURCE*]

DIGITAL ENTERPRISE

Emerging technologies and technological trends include:

- Inexpensive industry robots for industrial and life purposes
- Real time voice recognition and translation software and digital assistants
- Sophisticated automated response systems, Automatic computing and Smarter computers trained by machine learning
- Autonomous vehicles (e.g. self-moving cars and trucks)
- Social computing
- Mobile computing
- Big Data and advanced Analytics

[*SOURCE*]

DIGITAL ENTERPRISE

Emerging technologies and technological trends include:

• Business intelligence

• Cloud computing

• On-demand and Internet-driven enterprise systems (e.g. Customer relationship management, Enterprise resources planning systems, Enterprise application integration, Supply Chain Management and Knowledge Management

• Security and Disaster Recovery tools

• Collaboration tools

• Digital platforms

[*SOURCE*]

DIGITAL ENTERPRISE

Emerging technologies and technological trends include:

• Virtualization

• Web services and Service-oriented Architecture

• Laser and other open-space wireless networks

• Bring Your Own device (BYOD)

• Open source software and standards

• Integration and lean management tools

• Grid computing

[*SOURCE*]

DIGITAL ENTERPRISE

Emerging technologies and technological trends include:

- Green computing

- More innovative (e.g. wireless charging, using body heat to power mobile devices, solar panel for charging mobile devices) and powerful batteries

- Digital currency

- Wireless and automatic Biometric Identification Systems

- Smart home/building, smart meters and other smart appliances

- Hybrid human body with digital implants and/or digital parts

[*SOURCE*]

DIGITAL SUPPLY CHAIN (DSC)

The traditional supply chain consists of a series of largely discrete, siloed steps. Transforming a traditional supply chain into Digital Supply Chain (DSC) breaks down these walls so that the chain turns into an integrated system that runs flawlessly. DSC is not about whether the products or services are physical or digital, it is the way how supply chain is managed.

[*SOURCE*]

DIGITAL SUPPLY CHAIN (DSC)

Is composed of those systems (e.g. software, hardware, communication networks) that support interactions between globally distributed organizations and orchestrates the activities of the partners in supply chains. These activities include buying, making, storing, moving and selling a product.

[*SOURCE*]

Intelligent, value driven network that leverages new approaches with technology and analytics to create new forms of revenue and business value.

[*SOURCE*]

DIGITAL SUPPLY CHAIN (DSC)

Digitalization has the potential to transform supply chains by making services more valuable, accessible and affordable. Accordingly, a different perspective is needed for digital technologies to create new supply chain opportunities. Organizations should reimagine their supply chains as a digital supply network that not only unites physical flows of products and services, but also talents, information and finance. In an abstract sense, people and data, as well as materials, products and supplies, must travel together across the extended enterprise.

[*SOURCE*]

DIGITAL SUPPLY CHAIN (DSC)

Bestfit technologies that support and synchronize supply chain processes – including warehouse and transportation systems Radio Frequency Identification (RFID), advanced picking technologies, and innovative planning and scheduling systems to quickly alleviate areas of "pain," such as waste in the supply chain, in a world where demand is volatile and risks are high.

[*SOURCE*]

DIGITAL SUPPLY CHAIN (DSC)

Customer centric platform that captures and maximizes the utilization of real-time information emerging from variety of sources. They suggest that DSC enables demand stimulation, sensing, matching and management in order to have an optimized performance and minimized risk.

[*SOURCE*]

DIGITAL SUPPLY CHAIN (DSC)

Supply chain whose foundation is built on Web-enabled capabilities. Many supply chains use a mix of paper-based and IT-enabled processes. A true DSC goes far beyond this hybrid model to fully capitalize on connectivity, system integration and the information-producing capabilities of "smart" components.

Nowadays, supply chains require a significant size of complex activities all of which need to be coordinated and tracked. Thus, digitalization enables the evolution of the next generation of supply chains offering both flexibility and efficiency. Since digital solutions are disrupting traditional supply chains, there are some distinct features associated with virtually every DSC. These distinct advantages are compiled into the following eleven main features that DSC aim to achieve.

[SOURCE]

DIGITAL SUPPLY CHAIN (DSC) - features

Speed: The speed at which goods are delivered is central for both suppliers and those involved in DSC.

Flexibility: Digitalization in supply chains implies the need for operational agility with ease in adaption to changing circumstances.

Global connectivity: The internet has made the world a smaller place. Organizations need to deliver goods and services throughout the world quickly.

Real-time inventory: DSC provides the means to ensure that the stock on hand is sufficient, but not excessive, to meet the demand.

DIGITAL SUPPLY CHAIN (DSC) - features

Intelligent: New generation technological enablers provide smart products that are equipped with enough computing power so that self-learning and autonomous decision-making could be enabled based on defined algorithms.

Transparency: In a transparent supply chain, links in the chain do comprehend and act according to other links' behaviors and needs.

Cost-effective: Digital technologies are essentially reducing the cost in almost every area.

DIGITAL SUPPLY CHAIN (DSC) - features

Scalability: Scaling supply chains up or down according to the required circumstances often creates a colossal struggle for organizations.

Innovative: Excellence in DSC is a key feature so that DSCs are always open for a change.

Proactive: DSC imposes proactive actions to prevent potential disruptions.

Eco-friendly: Supply chains have a certain level of impact on the environment. Next-generation DSC can be able to extend eco-friendly process capabilities.

There are many significant digitalization trends that could be applied in a supply chain to greatly improve the future.

Several different digitalization technologies are explained in Table.

DIGITAL SUPPLY CHAIN (DSC) - components and technologies

DSC Technologies	Augmented Reality
Description	AR is described as the extension of physical reality by adding layers of computer generated information to the real environment. Information in this context could be any kind of virtual object or content, including text, graphics, video, sound, haptic feedback, Global Positioning Systems (GPS) data, and even smell.
DSC Challenges in Supply Chain	The challenges AR in DSC include social acceptance, addressing privacy, and profitability for businesses to use it. Other challenges include optimized picking operations and virtual testing of new supplier parts and packages to reduce distribution of physical sample products.

DSC Technologies	Big Data
Description	BD is an evolving term that is used to describe any large amount of structured, semi-structured or unstructured data that has a potential to be mined for information.
DSC Challenges in Supply Chain	For millions of shipments made every day, their origins and destinations, sizes, weights, contents, and locations, etc. are all tracked across global delivery networks. But does this data tracking fully exploit value?

DSC Technologies	Cloud Computing
Description	CC delivers a network of virtual services so that users can access them from anywhere in the world on subscription at competitive costs.
DSC Challenges in Supply Chain	DSC, enabled by the CC, have clear challenges which, together, drive unprecedented visibility, insights and flexibility while operating rapidly and at scale. Losing the control over the data that was previously housed on internal servers and/or computer hard drives, safety of the data on the web and service outages situations are also some challenges.

DSC Technologies	Internet of Things
Description	IoT refers to the everyday objects that feature an IP address for internet connectivity allowing them to send and receive data, and so communication occurs between these objects and other network devices and systems.
DSC Challenges in Supply Chain	The use of unique identifiers for various types of assets among different industries on a global scale, seamless interoperability for exchanging sensor information in heterogeneous environments, establishment of trust and ownership of data and overcoming privacy issues.

DIGITAL SUPPLY CHAIN (DSC) - components and technologies

DSC Technologies	Nanotechnology and 3D Printing
Description	N is the engineering of functional systems at the molecular scale and 3DP, also known as additive manufacturing, refers to various processes used to synthesize a three-dimensional object.
DSC Challenges in Supply Chain	To successfully implement N and 3DP in logistics requires strong collaboration, along with high levels of participation between different players and competitors within the supply chain, and a common willingness to invest

DIGITAL SUPPLY CHAIN (DSC) - components and technologies

DSC Technologies	Omni Channel
Description	OC is a multi-channel approach to sales that seeks to provide the consumers with a seamless shopping experience whether the consumers is shopping online from a desktop or mobile device, by telephone or in a bricks and mortar store
DSC Challenges in Supply Chain	Direct sales to users and consumers with smaller lot sizes and different central and regional warehouse needs.

DSC Technologies	Robotics
Description	R technology in Logistics is a branch of engineering that involves the conception, design, manufacture, and operation of R.
DSC Challenges in Supply Chain	Challenges on R includes it is not the speed of development, but the fear humans, governments and regulators have towards the technology. Flexibility, automated systems to have the ability to keep up with changing demands, or worries on robots taking over all the jobs and whether they are secure.

DIGITAL SUPPLY CHAIN (DSC) - components and technologies

DSC Technologies	Sensor Technology
Description	ST is essential for robust detection and filling status, product quality, packaging quality, equipment status in a wide range of field conditions.
DSC Challenges in Supply Chain	Real-time analysis of data originating from sensors. Improved transaction efficiency due to ubiquitous process control and factory optimization. Necessity of deploying extensive and expensive infrastructure in geolocation.

DSC Technologies	[Self-Driving Vehicle](#)
Description	SDV is a vehicle that is capable of sensing its environment and navigating without human input.
DSC Challenges in Supply Chain	To achieve a vehicle capable of driving itself, four basic interdependent functions are required. These are navigation, situational analysis, motion planning, and trajectory control. Beyond technological capability, some key challenges include regulatory pressures, public acceptance, and liability.

DIGITAL SUPPLY CHAIN (DSC) - components and technologies

DSC Technologies	Unmanned Aerial Vehicle
Description	UAV is an aircraft with no pilot on board, commonly known as a drone. UAVs can be remote controlled aircraft or can fly autonomously based on preprogrammed flight plans or more complex dynamic automation systems.
DSC Challenges in Supply Chain	The regulatory environment, privacy concerns, and integration into existing networks are substantial challenges for UAV. In addition to the tangible (and technically controllable) challenges of congested airspace and inherent risks, there is another, less defined area of concern in the public domain.

DIGITAL SUPPLY CHAIN (DSC) - challenges

- **Lack of planning**: Deficiency of proper demand plan and guidelines and tools

- **Lack of collaboration**: Deficient collaboration with external associates and deficient input from internal functions

- **Wrong demand forecast**: Inaccurate over optimistic forecasts for demand, inventory, production and other data

- **Lack of information sharing**: Companies' reluctance on information sharing

- **Silver bullet chase**: The belief that everything will be fine

DIGITAL SUPPLY CHAIN (DSC) - challenges

- Lack of knowledge: Deficiency of supply chain management training and skills

- Agility and Flexibility: Lack of required flexible and agile supply chain management

- High volatility: Lack of knowledge and skills in dealing with volatility in supply chain management

- Over confidence on suppliers: Relying on certain suppliers in certain parts of the globe

- Lack of integration: Deficient view on the integration of digital and non-digital supply chain management

DIGITAL SUPPLY CHAIN (DSC) - critical success factors

- Real-Time Visibility

- Continuous collaboration

- Alignment of suppliers

- Integration

- Shared information

- Highly evolved operating models

- Adopting advanced analytics and analytics tools

DIGITAL SUPPLY CHAIN (DSC) - critical success factors

- Automated execution

- Enhanced and accelerated innovation

- Maximum efficiency

- Organizational flexibility

- Personalized experiences, Customer-centricy

- Enhanced responsiveness

- Proactive prevention

- Last mile postponement

DIGITAL SUPPLY CHAIN (DSC)

Digitalization

Digitalization often begins with a digitalization strategy and then extends to additional three areas: digital organizations, digital operations, and digital products & services and ends with the customer experience
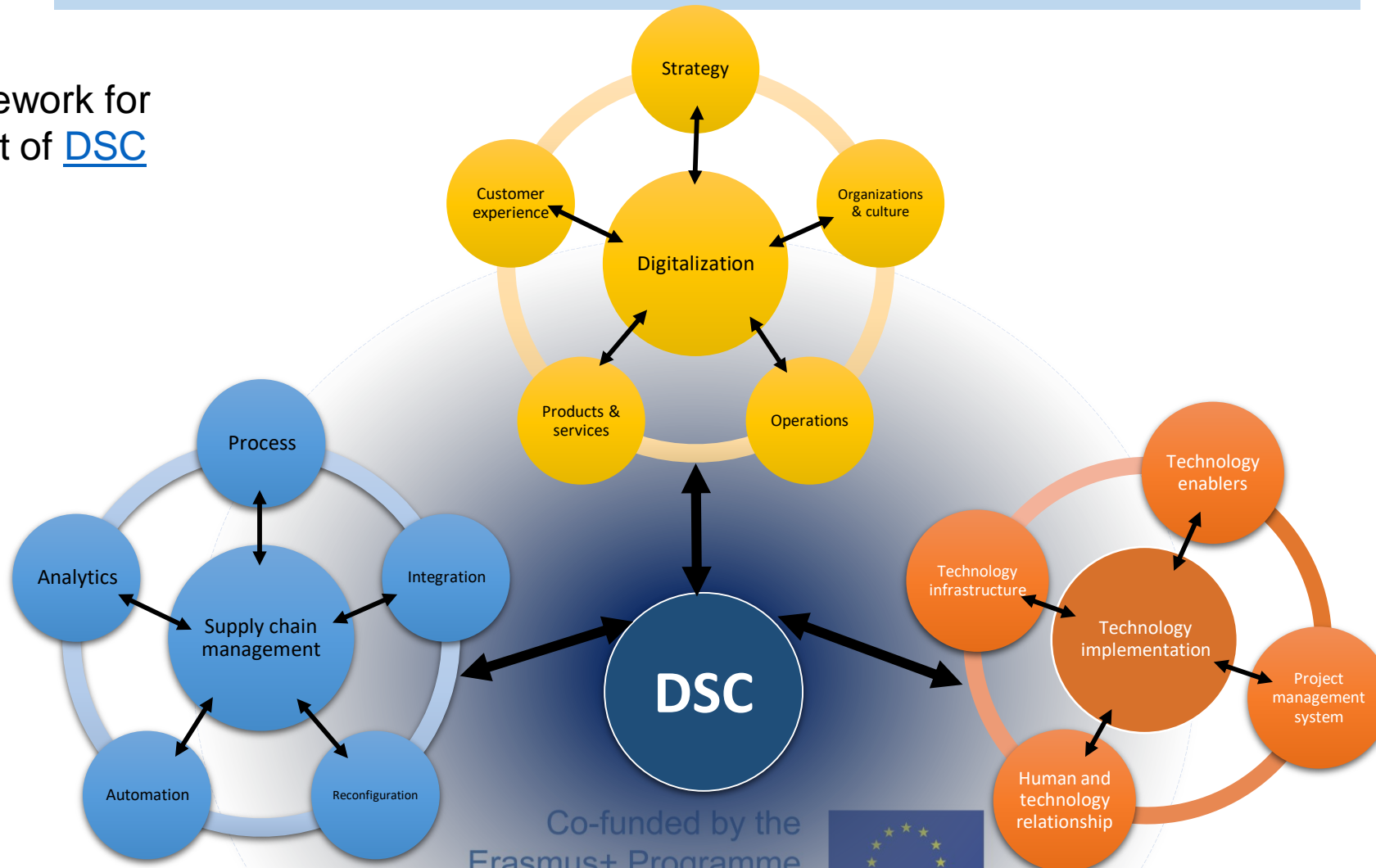
Technology Implementation

The building blocks of effective technology implementation process branches to technology enablers, project management, human and technology relationship and formation of technology infrastructure
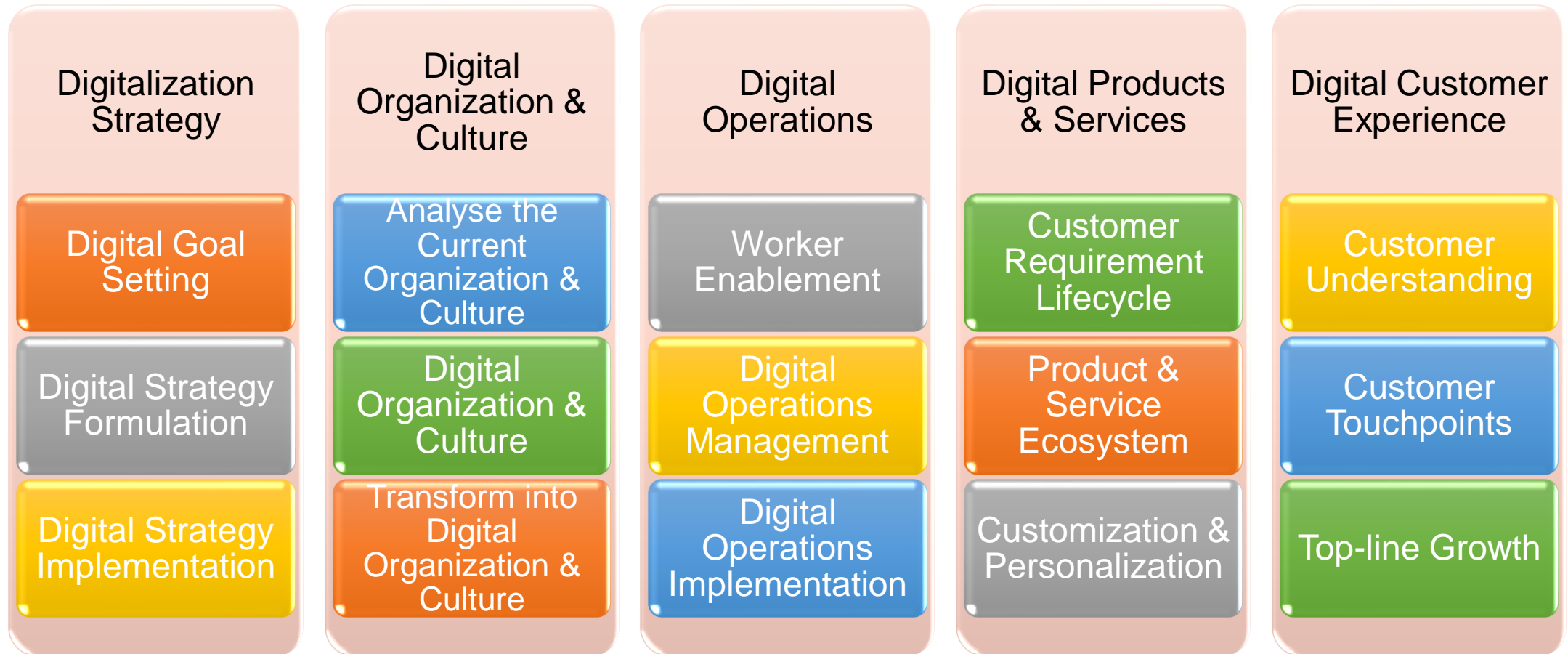
Supply Chain Management

An effective supply chain management process focusing on the main goal of DSC transformation is enhanced with integration, analytics, automation, reconfiguration and digital processes on plan, source, make, deliver and return

A framework for the development of DSC

DIGITAL SUPPLY CHAIN (DSC)

Project Management	Human & Technology Relationship	Formation of Technology Infrastructure	Technology Enablers
Initiate Process	User Training	Organization Infrastructure	Process Enablers
Implement Process	Human & Technology Interaction	Process Infrastructure	Product Enablers
Evaluate Process	Human & Technology Collaboration	Product Infrastructure	Technological Solutions
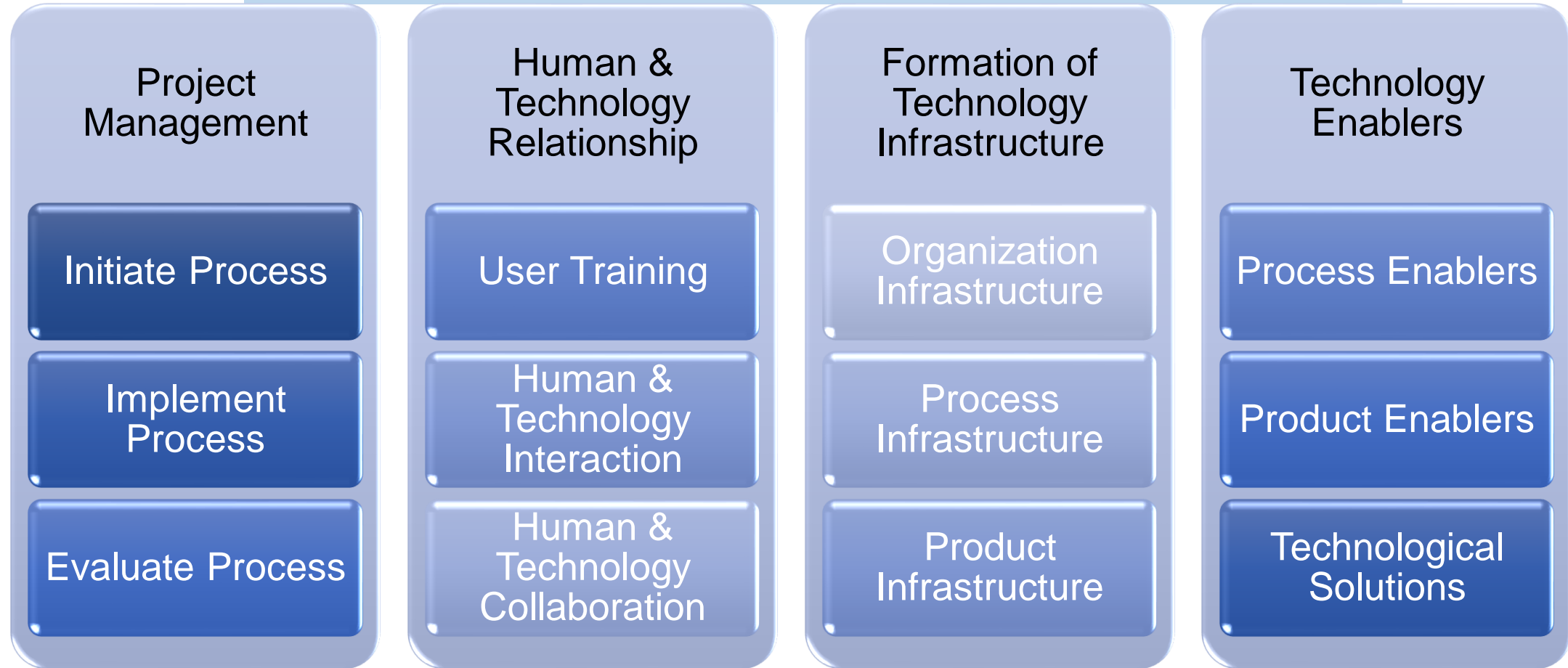
Decomposed framework for the technology implementation of DSC

DIGITAL SUPPLY CHAIN (DSC)

Supply Chain Integration	Supply Chain Automation	Supply Chain Reconfiguration	Supply Chain Analytics	Supply Chain Process
Information Sharing	Robotic Technologies	Organizational Reconfiguration	Real-time Execution Decisions	Plan
Coordination & Resource Sharing	Process Automation	Supply Chain Network Reconfiguration	Process Optimization	Source
Organizational Linkages	Intelligent Processes	Interoperability	Advanced Forecasting	Make
				Deliver
				Return
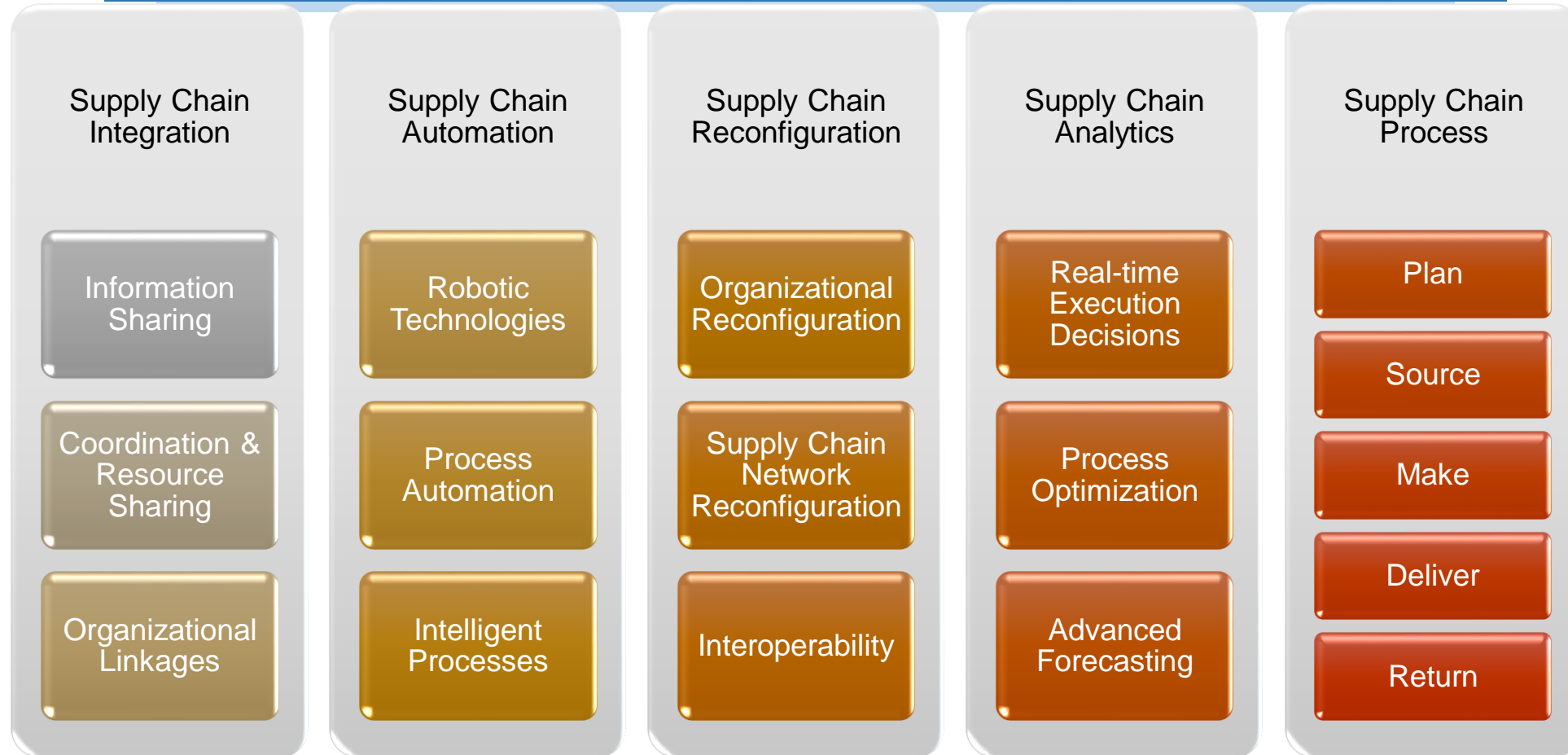
Decomposed framework for the supply chain management of DSC