SUPPLY CHAIN

Supporting Supply Chain Management
with process digitalisation and innovative solutions

ENGINEERING
THE DIGITAL TRANSFORMATION COMPANY

WHAT ARE WE DISCUSSING?

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in Andrea Mastinu

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Mattia has 10 years of experience in Supply Chain processes, obtained by holding roles in both business and consulting. Following the Degree in Management Engineering, he initially worked in Logistics and Production Planning in companies in the food and steel sector, holding roles of responsibility. Subsequently, he switched to consulting following projects related to the implementation of tools to support Supply Chain processes. He is currently part of the Supply Chain Management Business Unit of Engineering, supporting customers in the Digital Transformation process by analyzing Supply Chain processes and implementing of IT support tools.

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1 TRENDS, CHALLENGES AND OPPORTUNITIES

Globalisation is a phenomenon affecting all companies, regardless of their sector, geographical location or size.

Supply Chain is one of the business processes that has, in recent years, undergone a market revolution, that has overturned the old logic of supply chain management and planning of internal company operations. This has forced the various players in the sector to "take cover", implementing a transformation process that had only just started before the Covid-19 emergency.

During the crisis generated by the pandemic, we have witnessed an acceleration in terms of the Digital Transformation, which is profoundly changing supply chain models and processes. As we describe in our Engineering White Paper entitled "The New Normal", **during the most critical phase of the pandemic, only digitally savvy companies were able to ensure business continuity**, creating new ways and new virtual spaces to overcome the limitations imposed by social distancing and the inability to work on non-computerised media. In addition, the explosion of e-commerce has led to a new model that is changing the rules of the game and making demand forecasting increasingly unstable. But this same "success" has also highlighted the limitations of all players in the sector: indeed, if fashion brands and luxury brands were not ready to transfer their services online completely, large-scale distribution (in particular the food sector) has been subjected to a stress test, which has shaken e-commerce platforms and, consequently, the entire Supply Chain. Other sectors that had only just begun to adopt digital platforms were also forced to move quickly into this new model, effectively disrupting the production model that had been consolidated over the years.

Supply chain responsiveness has therefore become a key factor for all companies. Having access to the key indicators of the internal processes of Sales and Operations Planning, procurement methods and timing, as well as the mapping of their distribution, has become a necessity for all companies faced with demands that are increasingly wide and less predictable.

New technologies, such as AI & Advanced Analytics or Machine Learning, have certainly helped (and are still helping) organisations to recognise "disruptive" events that can create "disturbances" that are no longer easily intercepted in sales planning. But once the Covid-19 emergency is behind us, it will be necessary to transform "running for cover" into a process of innovation that doesn't simply mean increasing technological facilities, but rather entails an **evaluation of the entire business model in the light of new technologies, redesigning core models and processes.**

The New Normal we are building must represent a period of awakening for market players, who - in order to be successful - will have to come to terms with the fact that many of the old rules will no longer work in the new paradigm taking shape around them.

Therefore, in order to remain competitive in the market, the efficiency of internal processes alone is no longer sufficient. Instead, it becomes essential to take a close look at the entire distribution chain, through correct Supply Chain Management.

The Supply Chain can be defined as the production and distribution structure which enables companies to deliver the finished product to the end customer. The term therefore does not merely consider the activities of a single organisation. It includes the entire network of customers and suppliers, which starts from raw materials and extends to the finished product that reaches the end customer, through the flow of services, information and money.

Supply Chain Management, on the other hand, can be defined as the planning, execution and monitoring of Supply Chain activities, which optimises the flows of the individual links, as well as of the entire chain, in order to generate profit and competitive advantage and to ensure that the product is delivered to the end customer on time and at the right price.

Supply Chain Management therefore represents a highly strategic process within a company, in order to provide the customer with the highest level of service (demand), while contextually balancing production (supply) through the effective management of warehouse stock.

Indeed, coordination and synchronisation between processes are the objectives to keep in mind when undertaking a Supply Chain project, which will touch on the following aspects:

– **process mapping,** not only internal but also upstream and downstream of its Supply Chain, to highlight inefficiencies attributable to an increase in the time-to-market

- **the monitoring, forecasting and control of sales phenomena,** to predict the evolution of consumption and market trends (seasonality, trends, etc.)

- based on previous constraints, **production planning** in order to respond to market needs within the timeframes requested by the customer, ensuring consistency with the availability of materials and production resources

- **the definition of a procurement plan** consistent with production needs, as well as with suppliers' lead times and constraints

- **the definition of a deployment plan,** in other words, a transfer plan towards distribution centres for finished products, ensuring that these are available within the timeframes requested by the customer.

As previously described, regardless of their size, today's companies are faced with a global market and consequently with a continuous intensification of competition, which in the Supply Chain world translates into increasingly complex processes and in the ever shorter response times required by the market. It is therefore essential for a company to ensure correct supply chain management, relying on the support of a solid ERP system and on data, stored in the same system, that is homogeneous and always up to date.

A good ERP system however, is no longer sufficient to manage all the disruptions and rescheduling that characterise today's business environment, while not being able to guarantee a trade-off between the objectives of different business functions (e.g. purchasing and manufacturing), as the system does not have visibility of the process in its entirety.

As the complexity of the processes increases, manual or "out of system" management of contingencies is no longer possible, it is therefore indispensable to rely on systems known as APS (Advanced Planning & Scheduling). These systems rely on the use of algorithms and mathematical logics to support the various processes related to the Supply Chain, taking into account several constraints such as production capacity and the availability of raw materials.

APS systems communicate with the corporate ERP solution:

- receiving, as inputs, the personal and transactional data necessary to perform the simulations

- outputting the result of the simulation to the Management System.

These systems are therefore not designed to replace the ERP, as they have to receive input data from the latter to ensure adequate results. Their aim, instead, is to complete the Management System with specific features that the latter is not able to natively satisfy. It is therefore key that an APS system is integrated with the corporate Management System to ensure that it always has updated and consistent data from the company's various business functions.

Another strong point of an APS system compared to an ERP system is its ability to parameterise and manage very complex and realistic models. Thanks to a high data processing speed, it also makes it possible to generate, in a short period of time, a series of simulations that the user can compare, in order to select the one closest to the optimum solution. This very important element **helps manage the strong uncertainty of demand and the many other variables** that can impact on Supply Chain processes.

The **main benefits** that are obtained by adopting a corporate APS systems therefore are:

- an improvement of the customer service level

- a reduction of stock-outs

- a reduction of inventories

- an increase in warehouse turnover

- an increase in production efficiency and plant saturation

- greater visibility of the business situation

- correct production planning, consistent with the constraints of capacity and materials

- correct planning of purchases, making it possible to plan the arrival of materials when they are actually needed

- the quick identification of bottlenecks

- the ability to carry out what-if analyses quickly

- an increased agility in responding to disruptive events and in understanding the possible impacts of these events on the various company KPIs

- the simplification and schematisation of processes

- a reduction in the time spent by users to carry out activities with low added value

- a reduction in the circulation of data outside the corporate ERP system (e.g. via Excel sheets), therefore maximising the use of the ERP itself

- a continuous improvement of the data stored in the ERP, since in order to obtain a realistic simulation, the starting data must be good.

The introduction of IT tools to support people's work is part of a Digital Transformation path: in other words, it is a cultural shift in companies which changes the way people think and work, simplifying and saving time and using technology to rely on different solutions according to the specific requirements.

Digitalizing means:

– **abandoning traditional tools** to streamline and automate business flows and procedures, be they related to the production and distribution of products and services, to marketing and sales, to customer care, etc.

– **sharing information in real time,** as part of a single connected and collaborative environment, accessible on-site or remotely

– **taking advantage** of the large amounts of data circulating in the company, the so-called Big Data, to improve and increase process efficiency.

It is necessary to analyse the processes in detail to be able to digitalize them, in order to understand whether it is necessary to introduce one or more IT tools and if so, how these tools could adequately support the processes. Generally though, the re-engineering of such processes is complex, as often they have not been adequately documented within the company. This makes it necessary to conduct long interviews with the people involved in the process, with the risk of obtaining biased information, tainted by each individual's personal interpretation.

To address these problems, specific methodologies have been introduced, defined as **Digital Maturity Assessment** and **Process Mining**.

Once the processes have been mapped, once it has been objectively determined that the implementation of an APS software brings benefits to the company and once the project perimeter has been clearly defined in terms of deliverables, the model must be configured on the basis of the needs and the specific production and organisational qualities of the individual company. Each company, in fact, has specific characteristics, such as how they respond to the market (Engineering to Order, Make to Order, Assembly to Order, Make To Stock), its size, processes, products, etc.

In order to take full advantage of these tools, adequate user training is clearly also required.

2 ENGINEERING IN THE SUPPLY CHAIN

Thanks to our consolidated and cross-industry skills and expertise related to the Supply Chain processes, as well as to our extensive knowledge of the latest technologies, Engineering is in a position to help improve the collaboration between companies and their customers and suppliers.

The growing need to synchronise production processes in order to respond to market changes, leads to the need to introduce Digital Transformation concepts into companies, moving towards **automating manual and non-strategic activities and increasing decision support capabilities,** to enable companies to react quickly to the new daily scenarios.

ENG4SCM aims to support customers for the duration of this process of change, through projects organised in multiple steps.
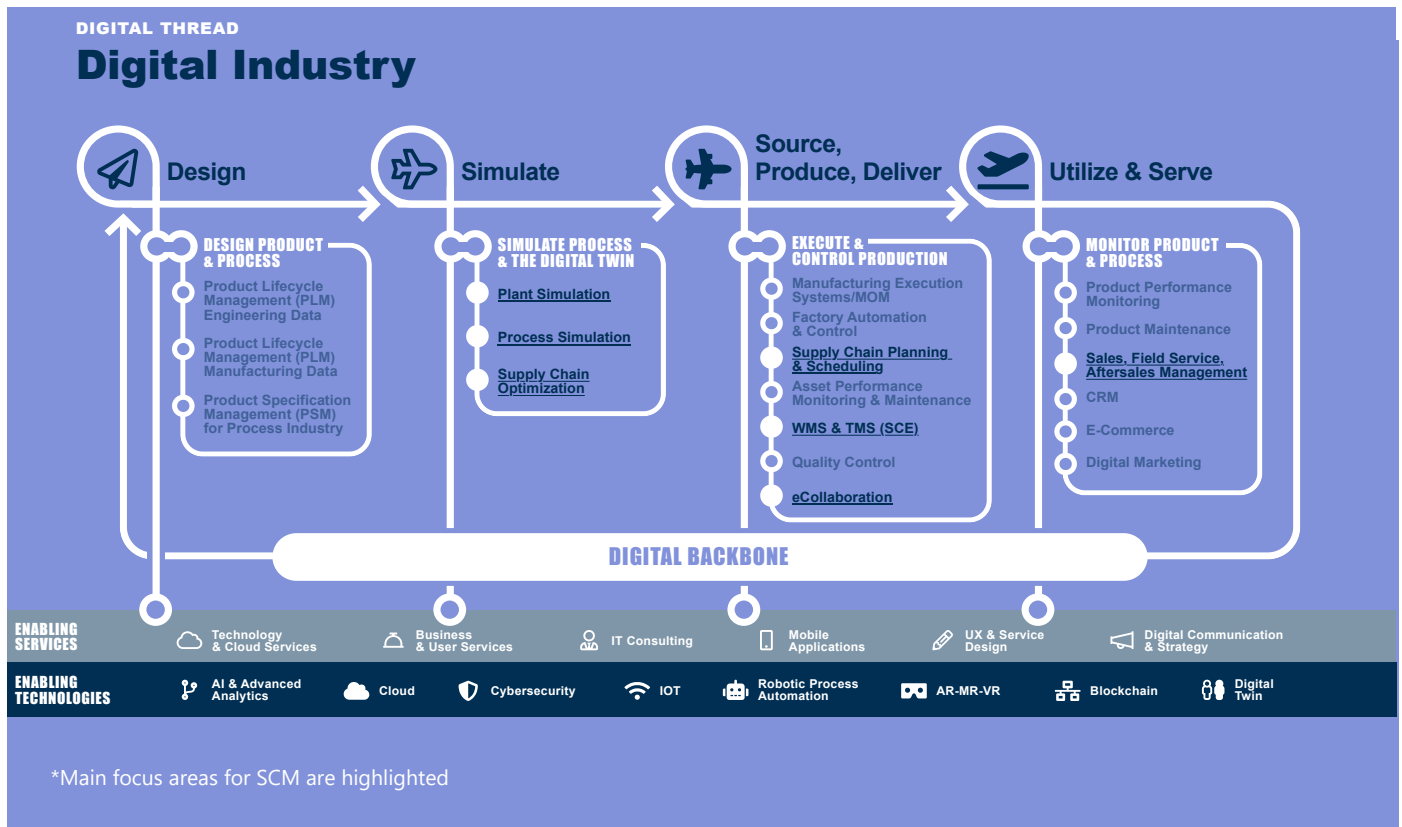
ENG4SCM
in Digital Industry

Digital Maturity Assessment

The Digital Maturity Assessment process identifies a structured analysis of a company's processes, technologies and organisation and, in relation to its complexity, provides an assessment of its readiness for Digital Transformation.

The technique is based on structured questionnaires and targeted insights used to map the critical aspects associated with existing processes and to define the requirements for a new model. It also makes it possible to compare the results obtained, relying on benchmarks from companies operating in similar sectors and of similar sizes, in order to highlight the main gaps with respect to best practices.

DIGITAL THREAD
Digital Industry

Design

Simulate

Source, Produce, Deliver

Utilize & Serve

DESIGN PRODUCT & PROCESS

Product Lifecycle Management (PLM) Engineering Data

Product Lifecycle Management (PLM) Manufacturing Data

Product Specification Management (PSM) for Process Industry

SIMULATE PROCESS & THE DIGITAL TWIN

Plant Simulation

Process Simulation

Supply Chain Optimization

EXECUTE & CONTROL PRODUCTION

Manufacturing Execution Systems/MOM

Factory Automation & Control

Supply Chain Planning & Scheduling

Asset Performance Monitoring & Maintenance

WMS & TMS (SCE)

Quality Control

eCollaboration

MONITOR PRODUCT & PROCESS

Product Performance Monitoring

Product Maintenance

Sales, Field Service, Aftersales Management

CRM

E-Commerce

Digital Marketing

DIGITAL BACKBONE

ENABLING SERVICES

Technology & Cloud Services

Business & User Services

IT Consulting

Mobile Applications

UX & Service Design

Digital Communication & Strategy

ENABLING TECHNOLOGIES

AI & Advanced Analytics

Cloud

Cybersecurity

IOT

Robotic Process Automation

AR-MR-VR

Blockchain

Digital Twin

*Main focus areas for SCM are highlighted

This process consists of four main streams:

Project
perimeter

In the first project stream, the aim is to study and design the current business model, in other words to define the organisational and strategic solutions that enable the company to create, distribute and acquire value. This, in turn, makes it possible to understand the main characteristics of the customer through the application of the Business Model Canvas methodology, a strategic tool that relies on a diagram to help grasp and visually illustrate how a specific company functions. Once the current business model has been fleshed out, the first stream aims to define, together with the customer, the perimeter of the analysis and the expected improvement goals.

Analysis of the maturity of processes,
technologies and organisation

Based on the information collected in the previous stream, it will be possible to measure and evaluate, via targeted questionnaires, the level of process development, of IT systems and of organisation in relation to the complexity of the context in which the company operates (business, organisation, products and markets, company size, etc.), which is divided into three types: structural, relationship-focused and emerging.

The type of complexity identified will make it possible to define the degree of attention to be paid to the 3 areas of improvement. These areas are:

- **processes,** in other words the degree of development of the planning, execution and monitoring of the business processes and the degree of the company's drive towards excellence

- **technologies,** in other words if support tools and automatisms are in place, and how efficient and integrated they are

- **organisation,** in terms of communication and values, governance, leadership, learning and development.

The collected data will then be analysed and processed. Based on the comparison between the level of maturity obtained and the complexity of the context, it will be possible to define the specific areas to be prioritised during the re-engineering process and for which a more in-depth analysis will be required.

Definition of the requirements
of the new model

Starting from the data collected in the previous phase, the goal of this stream is to investigate the current state of processes, technologies and organisation, mapping the relevant critical aspects, in order to define the requirements that the new model must fulfil.

Definition of the model
and the implementation roadmap

Starting from the requirements collected in the previous step, the goal of the last Stream is to define and design the new model in terms of processes, IT architecture and organisation, specifying the implementation priorities and creating a detailed roadmap that illustrates the process of interventions to be put into practice in order to close the gaps identified with respect to best practices.
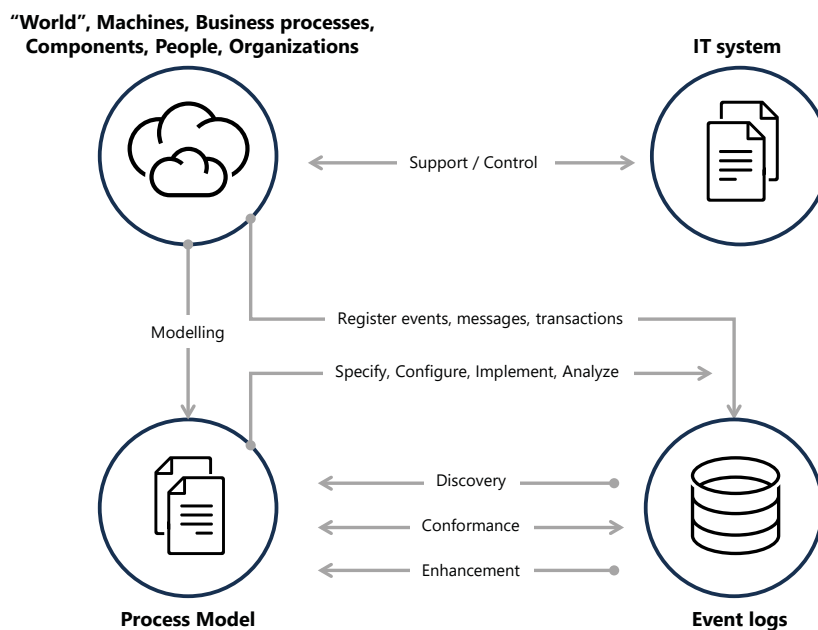
Process Mining

Process Mining is a modern, data-driven approach to process analysis, based on the principle that, in order to carry out daily activities, each company uses one or more IT tools that log a series of events in data logs. Utilising increasingly more accurate and efficient algorithms, a model of the real process is quickly and objectively determined, based on these logs, which is subsequently used to analyse times, costs, necessary resources and therefore to measure performance.

Through modern software solutions that implement Process Mining algorithms, we have the opportunity to create a so-called Digital Twin of the process (DTO, Digital Twin of the Organisation) which makes it possible not only to have a static view of the overall process structure, but above all to objectively simulate how the process may potentially behave when specific variables are changed.

The main applications of Process Mining are:

– **Process Discovery:** as previously explained, once the necessary data has been defined, Process Mining software makes it possible to quickly and easily map the structure of a process and the relationships between individuals within the process; it will be possible to carry out the procedure whenever necessary, in order to verify the presence of any changes to the same process

– **Process Compliance (or Conformance Checking):** the ability to compare a "standard" process model, previously introduced into the system as a reference model, with that derived from the reality acquired in the Digital Universe, thus making it possible to identify non-compliant, unauthorised activities, carried out by unauthorised persons, etc. This ensures the availability of objective data, for example in case of process-related regulations, in order to highlight non-conformities and address them before they can lead to sanctions

– **Process Performance (or Process Enhancement):** information deriving from a Process Mining analysis, such as times, resources, costs, can be used to carry out analyses on the process, highlighting for example process times, correlation between events, supplier performance, process errors, bottlenecks and providing KPIs to monitor efficiency. Process Mining software also makes it possible to carry out what-if analyses: by varying some of the model parameters (for example allowing for two sequential activities to run in parallel, increasing the resources allocated to a certain operation) it will be possible to run a new simulation and to get an idea of how the Digital Twin behaves, which, since it is modelled from real data, will return a result similar to that of reality.

ENG4SCM aims to study and objectively map out its customers' business processes, laying the foundations for defining a Digital Transformation roadmap and adopting the process mining methodology, which offers the following benefits:

- objective process modelling

- a quick and objective measurement of process performance

- the ability to highlight process bottlenecks in a simple and intuitive way, and to understand quickly the causes that generate inefficiencies

- the identification and eventual elimination of unnecessary steps

- the ability to highlight quickly any potential non-conformities, making it possible to intervene in time and to ensure faster and cheaper audits

- predictive analysis results, obtained by changing the Digital Twin variables based on real data and not on subjective parameters.

Technology consulting

Once the processes and the corresponding critical aspects have been mapped and once the need to introduce a new IT tool to assist Supply Chain activities has been established, ENG4SCM will support its customers in the selection and the subsequent integration of the software that best suits the needs of the specific company, thanks to its extensive knowledge of the sector and of the Supply Chain related technologies, as well as to its partnerships with leading software firms on the market.

In terms of technology, the ENG4SCM offer allows customers to cover and support all areas of the Supply Chain, as briefly described below, through the Production Planning and Control scheme (Manufacturing Planning & Control - APICS):
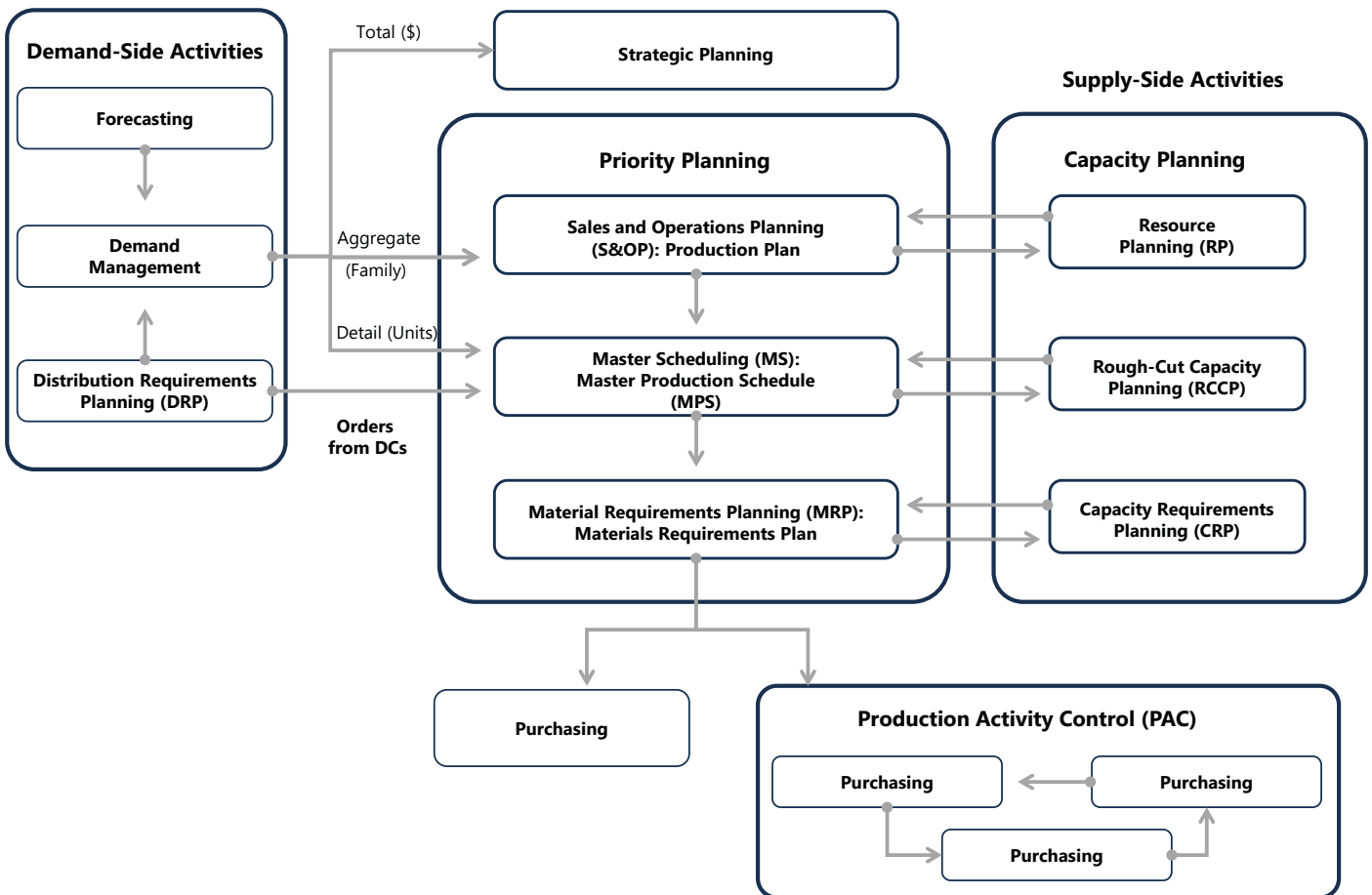
Manufacturing Planning and Control (APICS)

Demand management

Through Demand Management software, it is possible to determine the market's requirements and to make sure that all demand is met, thereby maximising the company's revenues.

First, historical sales trends are analysed by means of mathematical algorithms, trying to simulate a future trend that takes into consideration the trend and seasonality components related to sales.

Based on a collaborative approach, the mathematical calculation is adjusted on the basis of other factors, such as business goals, external factors that are expected to alter the forecasts, etc.

In fact, visibility, synchronisation and collaboration between the various nodes of the Supply Chain are fundamental, in order to avoid the so-called **"Bullwhip effect" or "Forrester effect"**: an increase in the demand forecast and consequently of stock, which is generated to cope with a minimal variation in demand from the end customer, moving gradually away from the market and up the supply chain. The greater the accuracy of the demand forecasting process, the lower the need to maintain high inventories.

| Supplier | Manufacturer | Distributor | Retail | Customer |

BULLWHIP EFFECT
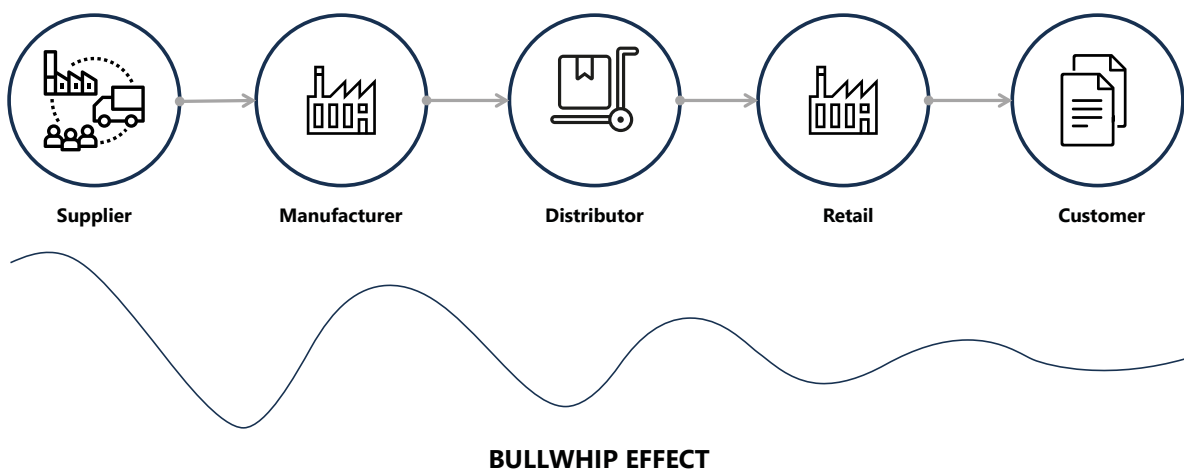
Another fundamental aspect of the definition of demand concerns its distribution, in other words the activities related to the handling of finished products from the production plant towards the end customer. The main objective of a Distribution software solution is to ensure that the finished product is available where it is required by the market and in the required timeframes, through transport and stocking activities.

As previously stated, the market is becoming more and more global, which entails an increasingly complex distribution network that needs to be properly structured to ensure that delivery lead times are in line with market expectations, while keeping costs under control. The balance that needs to be assessed is between having a few centralised distribution centres to reduce the total amount of stock needed, while increasing the delivery lead time, or having many small distribution centres, in order to respond to customers faster, but with a higher level of stock.

The function of a Distribution software is therefore two-fold:

- on the one hand, the definition of a transfer plan for finished products to the various distribution centres in order to fulfil the market demand

- on the other, the allocation of availability based on the configured rules (customer priority, market priority, requested date, etc.) in case of stock-outs, in other words when needs exceed availability.

Production planning

In this phase, the goal is to determine the priority of the demand and to define a production and inventory plan that can satisfy demand in the best possible way, by analysing production cycles and bills of materials to obtain feedback regarding production times and the availability of raw materials respectively.

During this phase, it is essential to correctly size stocks, which must be used with the aim of supporting and guaranteeing production efficiency (stock of raw materials, semi-finished products and WIP) and to guarantee the service level to the customer (stock of finished products). At the same time, however, these stocks must not be too high in order to avoid excessive quantities of fixed assets in the warehouse, with the consequent financial costs.

To address this need, we offer Inventory Management software, characterised by two main features:

- **the determination,** via a mathematical calculation, of the correct level of safety stock to maintain, based on the variability of the historical demand and the desired level of service

- **the definition** of an infinite capacity replenishment plan based on independent needs (expected demand and/or customer orders), on stock policies and on procurement and production lead times, with regard to both finished products and to components and raw materials, generating production order offers and purchase offers.

Until now, requirements have not been compared with production capacity, which may not be enough to satisfy all the demand within the required timeframes. We therefore offer Production Planning software, designed to enable customers to carry out finite capacity planning in order to define a production and purchase plan that is consistent with the constraints in stocks, supply lead times and production capacities. These software solutions cover all the planning steps:

- **in the S&OP and Resource Planning process,** planning is carried out by product families with a very long time horizon and the only resources taken into consideration are those that require long acquisition times

- **in the Master Production Schedule (MPS) process,** the plan is created at item code level, with a detailed production plan of the finished products to be subsequently generated, which will take into account the priority of demand, of warehouse stock, of planning logic (e.g. production batch and minimum stock) and the capacity of critical resources.

The production plan for finished products is then exploded for all the individual components, up to the raw materials using the bills of materials, inventory, the production or purchase lead time and other planning parameters (production or purchase batch, minimum stock, etc.): based on this approach, the company can determine its production and purchase proposals.

The plan obtained is compared with the productive capacity of the resources available, exploding the production cycles and levelling it on the basis of available capacity or highlighting eventual overflows. Based on this approach, the management system receives feasible proposals, to be used as inputs for the MRP calculation.

The main outputs of the Production Planning systems therefore consist of:

– the definition of a finite capacity production plan, subsequently used as input for the MRP calculation carried out by the Management System, in which the production proposals can be converted into issued production orders and become inputs to the Scheduling and Execution phases

– the determination of purchase proposals, which can then be converted into purchase orders

– warnings in case of delays and the ability to respond quickly to disruptive events.

Production Planning software also makes it possible to cover topics such as:

– **allocation:** the need, whether in relation to a customer order (independent need) or needs generated by the explosion of the bill of materials (dependent need), is tied to a current availability (inventory) or a future availability (production or purchase); this makes it possible to manage the priority of the demand correctly, thus ensuring that if the availability is lower than the need, priority orders are served first

– **ATP (Available to Promise):** refers to the portion of stock or of the planned production of finished products not yet allocated to a sales order, therefore offering an indication of the time period and of the quantity of finished product that can be promised to a possible new sales order that is not yet entered in the system

– **CTP (Capable to Promise):** refers to an evolution of ATP consisting of being able to provide an indication of when a new order can be processed, considering not only stock and planned orders of the finished product, but also simulating a new production order that takes into account the different constraints (production capacity, availability of components at each level of the bill of materials, component lead times, etc.).

Scheduling and Execution

Production orders generated downstream of the MRP process become inputs of the Scheduling and Execution phase, which must respect the following objectives:

– executing production orders authorised at the MRP level

– optimising the use of resources

– ensuring that these resources are available when needed

– maintaining the desired level of service.

We therefore offer the following types of solutions:

– **Scheduling software solutions,** which make it possible to sequence in detail every operation needed to complete production orders, taking into account their priority, the productive capacity of resources (both man and machine) and the setup times, with a view to respecting the dates requested and to using productive resources in the most efficient way possible

– **MES (Manufacturing Execution System) software solutions,** which make it possible to manage the progress of production orders, i.e. the determination of man and machine times, as well as the quantity produced, for each single phase of a production order.
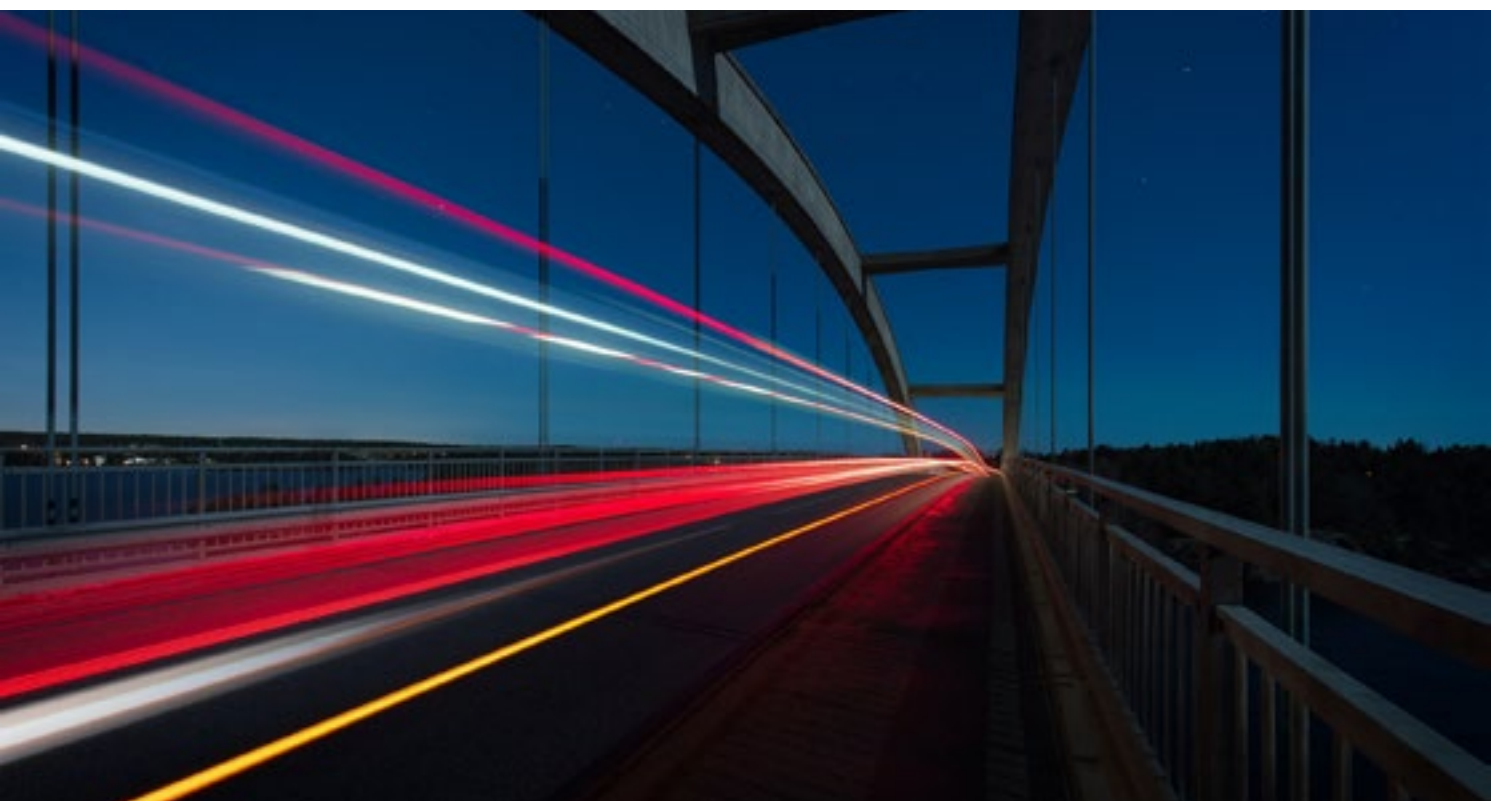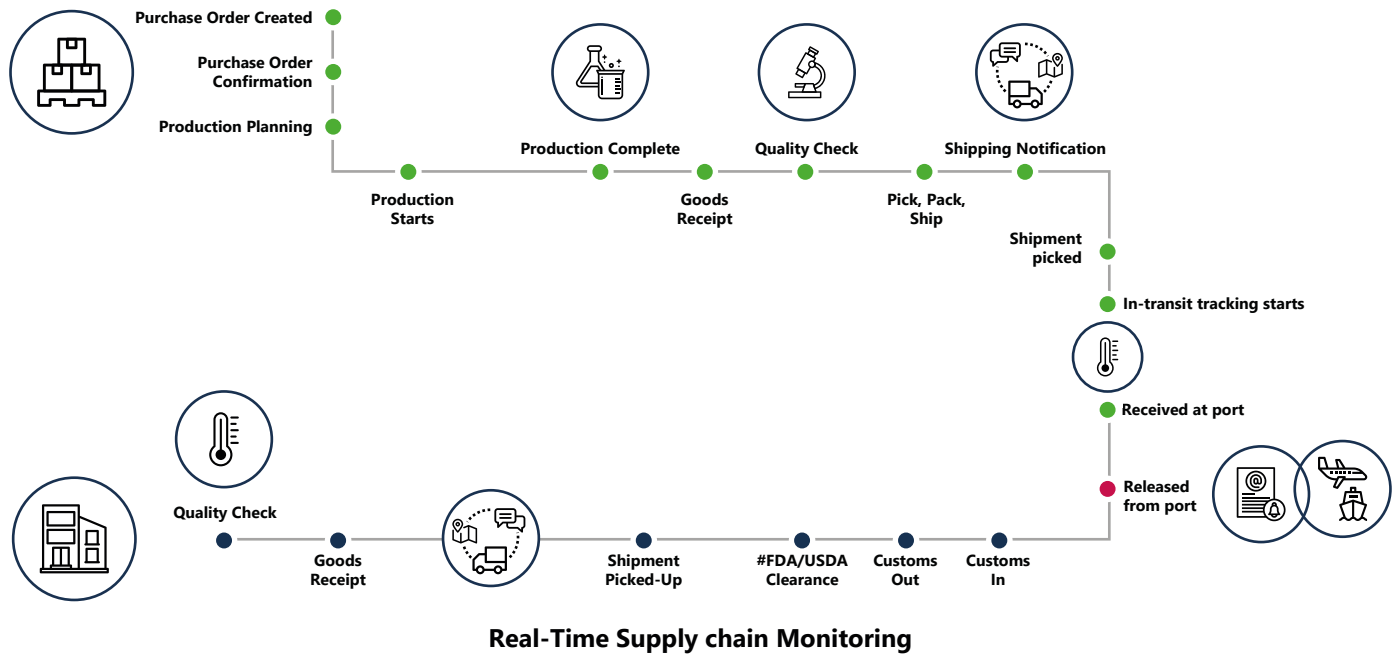
Serialization and Track & Trace

Modern day supply chains are increasingly complex and demanding. They are no longer linear; they are multi-tiered, multi-faceted, and multi-supplier. Moreover, the individual parts keep accelerating, and the overall coordination becomes increasingly tighter. Fragmentation, missing supply chain visibility, and inflexibility can lead to cost-intensive disruptions, non-compliance, and major inefficiencies.

The industry is at a tipping point as companies adopt accelerated approaches with digital and next-gen technologies and processes. Companies are connecting their entire supply chain with serialization and track & trace technologies for a holistic view.

– **Serialization**: the process of generating and applying unique serial numbers to individual physical objects

– **Track & Trace**: the process of determining the current and past events, locations, and other information about a unique item, including the tracking and managing of data as the product moves from point of origin to point of consumption

The comprehensive, integrated data helps satisfy many parallel goals, such as managing compliance, product integrity, visibility, anti-counterfeiting protection, and risk reduction. Digital transformation enables companies to address these challenges and reinvent their supply chains in order to stay competitive today and in the future.

Real-Time Supply chain Monitoring

Serialization and track & trace solutions help manage supply chain velocity and provide demand intelligence to address:

– **Compliance:** efficiently integrate with business processes and effectively manage serialized products at the individual, batch, and aggregate levels. Legislation across various countries and industries demands products to be tracked and traced across the supply chain and to report the movement to government agencies or supply chain partners.

– **Visibility:** a holistic, transparent view of all logistics. Track & trace solutions help trace material provenance from raw ingredient origin within each batch to finished product to consumption across the material value chain.

– **Brand protection:** the trust built with consumers that conveys the product is safe because of brand image, past experiences, source authenticity, and more. Without traceability, there is the risk of one misstep damaging this confidence and having a financial impact.

– **Value beyond compliance:** leverage investment in serialization and track & trace technologies to build a flexible and efficient operation to maximize the return on investment. New technologies unlock data for greater visibility and efficiencies.

The digital approach connects stakeholders across the value chain. Complete end-to-end visibility with harmonized information is critical for a transparent, resilient, and sustainable supply chain.

ENG4SCM
in Digital Retail & Fashion

We help companies in the Retail and Fashion world to implement their Digital Transformation through an assessment that defines the roadmap of interventions and, subsequently, by implementing and integrating technological solutions with the aim of optimising and monitoring processes, reducing costs and increasing revenues.

We focus on five main areas of intervention:

– **Design & Prototyping:** we put our skills into play to create solutions that bring benefits in terms of quality, efficiency, control and the containment of time/costs, starting from the initial stages of product design and prototyping, until its launch, subsequent revisions and retirement: all this is achieved through the application of tools that collect, organise, share and distribute, in an efficient and controlled way, all the information needed to follow the product at every stage of its life cycle and to respond to market needs, as quickly and effectively as possible

PORTFOLIO MAP
Digital Retail & Fashion

Design & Prototyping	Planning & Forecasting	Sourcing & Manufacturing	Deliver & Supply	Customer Engagement & Selling
CONCEIVE, DESIGN VALIDATE	**SUPPLY CHAIN**	**SUPPLIERS, COSTS & REALIZATION**	**INVENTORY & DISTRIBUTION**	**FULFILLMENT & SUPPORT**
Product Development	Budgeting	Suppliers identification and negotiation	Supply chain optimization	Omni channel sales
Project Management for product life cycle	Retail planning	Category Management	Warehouse management	CRM & Clienteling
	Demand planning	Plan manufacturing	Transport management	In store traffic analysis
	Business process management	Manufacture build / assemble		Promotions management
				PoS & Store Operations
				Work force management
				Digital marketing

Cost Modeling & Control   Real Estate Management   HR (Time & Travel Management, Payroll, Compensation & Benefits, Learning, Onboarding)

ENABLING SERVICES   Technology & Cloud Services   Business & User Services   IT Consulting   Mobile Applications   UX & Service Design   Digital Communication & Strategy

ENABLING TECHNOLOGIES   AI & Advanced Analytics   Cloud   Cybersecurity   IOT   Robotic Process Automation   AR-MR-VR   Blockchain   Digital Twin

*Main focus areas for SCM are highlighted

– **Planning & Forecasting:** we support our customers by offering consulting services and application solutions for the management of the Planning and Forecasting process, which includes setting a budget (in relation to the product, time period, market, season, etc.), the construction of the product mix tailored to the needs of each store and purchase planning, in order to better understand demand and align production and restocking

– **Sourcing & Manufacturing:** we support companies in all the phases of the industrialised/wholesale commercialised process and retail commercialised process through solutions that enable:

  – the definition of medium- to long-term aggregate production planning

  – the subsequent definition of OTB consensus values, following the updates of the collection structure defined during the Merchandise Planning phase

  – the definition of the share of retailer orders corresponding to individual SKUs to cover the first plant or the first sales period

  – the definition of a detailed production plan

  – the declination of OTB towards the individual SKUs for each of the company's stores

  – the definition of finite capacity scheduling

  – the definition of the Main Replenishment Plan.

We also support the Sourcing function in the GDO world, focusing on the management and optimisation of all the stages of the procurement process; moreover, we assist companies in evaluating category performance through the application of the Direct Category Profitability (DCP) methodology

- **Deliver & Supply:** we oversee the optimisation of processes across the entire distribution chain (Supply Chain Optimisation), Warehouse Management and Transport Optimisation

- **Customer Engagement & Selling:** we accompany companies in the evaluation phase of existing scenarios, in the design of new omni-channel relationship strategies (Customer Relationship Management & Customer Experience Management Strategy Design) and in the selection of software tools best suited to the identified needs and in line with market best practices; all this is possible thanks to proposals based on leading application platforms, extended by proprietary application components, which enable the specific needs and business practices of the sector to be addressed.

3 WHAT IS THE FUTURE OF THE SUPPLY CHAIN?

The Supply Chain is increasingly oriented towards the Digital Transformation process, which aims to create innovative solutions designed to assist people and companies to work efficiently, by providing tools that improve their ability to recognise signals, analyse the information collected and automate the activities to be carried out.

The main trends in this sector are related to the increasing availability of Big Data, namely that large amount of data which is constantly processed and recorded in the various corporate information systems, also thanks to the growing use of connected systems (IoT - Internet of Things), and which can be processed through the adoption of extremely powerful algorithms. Thanks to this data, it is possible to carry out a series of analyses using Process Mining and Machine Learning tools. These will be increasingly utilised in the supply chain, as they allow companies to model a Digital Twin of real processes, optimising them and reducing their complexity, automating decisions of daily operations and facilitating the creation of structured and increasingly more accurate forecasts on possible future scenarios. Indeed, simulating business practices in predictive environments represents a key strategy for allowing companies to adapt to changes in demand and to meet customers' wishes.

Another trend destined to gain traction in the supply chain is **the interconnection between the different actors in the distribution chain,** through shared platforms accessible on-site or remotely, which allows companies to face increasingly demanding consumers and consequently increasingly complex processes, with a view to collaboration and information sharing between customers and suppliers, leading to benefits in terms of both efficiency and productivity. Suppliers can thus benefit from greater visibility on sales, which enables them to optimise production and to adapt stocks according to the real needs of the distributors, while customers benefit from a better, faster and more efficient service from their suppliers.

In general, the main benefits of using shared platforms are:

- the automation and optimisation of all the processes across the entire distribution chain, with an overall reduction in costs

- improved communication between the various parties, taking into account that these platforms enable real-time access to updated data relating to customers and suppliers, making the entire supply chain process much more responsive and effective, by monitoring demand in a far more accurate manner, thus improving the forecasting process.

Within this framework, **Blockchain**, a technology based on distributed databases consisting of blocks of data that store transactions, is developing more and more. In fact, the data is not stored on a single computer or server, but on a series of machines connected via the internet through a dedicated application. To be consolidated within a block, each piece of data, and subsequently each block, undergoes a validation process before being inserted in the "chain". Blockchain is an immutable technology, meaning that any transaction that takes place within this system is permanently registered and anyone who uses it is able to see and check the recorded data.

With the adoption of Blockchain, it is possible to guarantee better data sharing between the various actors in the Supply Chain, making it easier for manufacturers, suppliers, distributors and sellers to share information, which in turn prevents delays along the chain and improves product tracking.
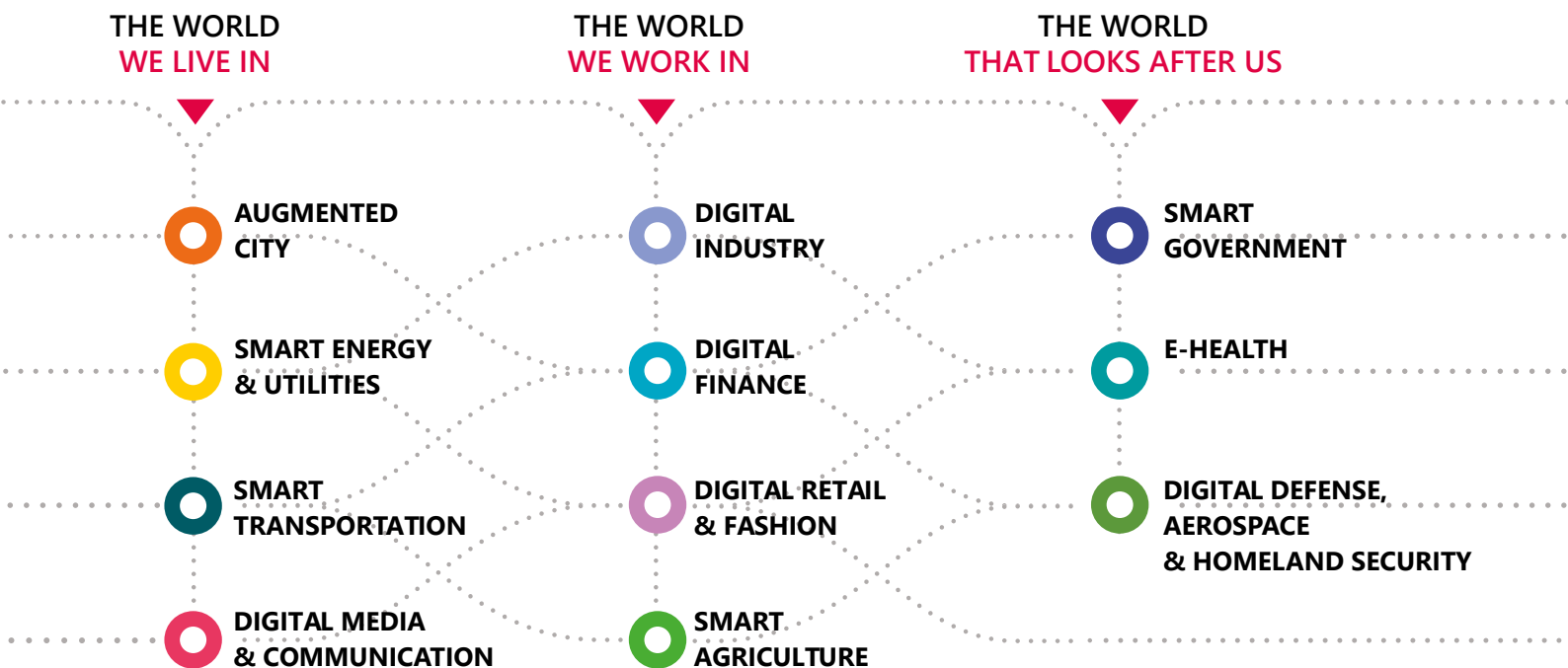
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Engineering Group is the Digital Transformation Company, leader in Italy and expanding its global footprint, with around 12,000 associates and with over 40 offices.
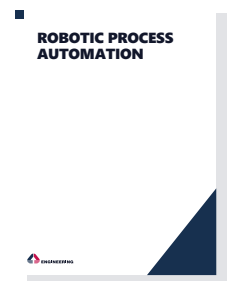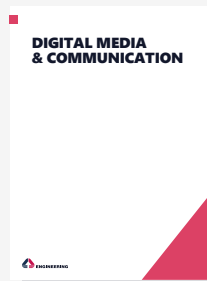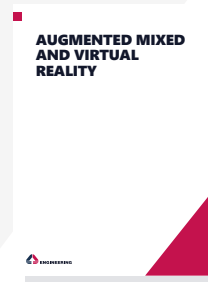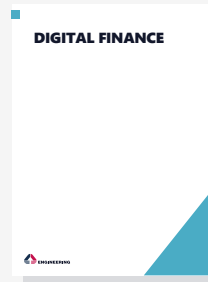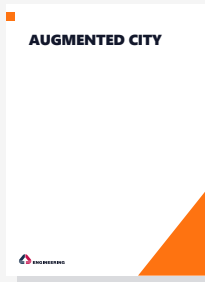
The Engineering Group, consisting of over 20 companies in 12 countries, has been supporting the continuous evolution of companies and organizations for more than 40 years, thanks to a deep understanding of business processes in all market segments, fully leveraging the opportunities offered by advanced digital technologies and proprietary solutions.

It integrates best-of-breed market solutions, managed services, and continues to expand its expertise through M&As and partnerships with leading technology players. The Group strongly invests both in innovation, through its R&I division, and in human capital, with the internal IT & Management Academy. Engineering is a key player in the creation of digital ecosystems that bridge the gap between different markets, while developing composable solutions that ultimately foster a continuous Business transformation.

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AUGMENTED CITY	DIGITAL INDUSTRY	SMART GOVERNMENT
SMART ENERGY & UTILITIES	DIGITAL FINANCE	E-HEALTH
SMART TRANSPORTATION	DIGITAL RETAIL & FASHION	DIGITAL DEFENSE, AEROSPACE & HOMELAND SECURITY
DIGITAL MEDIA & COMMUNICATION	SMART AGRICULTURE	

Our point of view on

DIGITAL TRANSFORMATION

ENGINEERING INNOVATION

ENGINEERING THE NEW NORMAL

WHERE BUSINESS MEETS TECHNOLOGY

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DIGITAL DEFENCE, AEROSPACE & HOMELAND SECURITY

DIGITAL FINANCE

AUGMENTED MIXED AND VIRTUAL REALITY

BLOCKCHAIN

DIGITAL INDUSTRY

DIGITAL MEDIA & COMMUNICATION

DIGITAL RETAIL & FASHION

CLOUD

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