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How can business transformation be driven by a new ERP implementation: the Nice case study

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1. INTRODUCTION

In the last years, Nice has carried out several Mergers and Acquisitions operations. For the most part, acquired companies are still operating with their own industrial methods, tools and operating processes, configuring a situation of overall fragmentation in terms of Application Landscape within the Group, and generating various issues like timeliness and granularity of data availability and difficulties in processes integration across companies.

Given such context, Nice Management would like to evolve its current Application Landscape, in order to enable the transformation into an integrated "One Company", operating on the new Microsoft D365F&SCM as the common ERP platform. Furthermore, with the aim to reduce infrastructural complexity and rationalize related costs, such evolution will include switching from an On-Cloud "private" ERP setup to an On-Cloud totally outsourced ERP. This ERP implementation project starts from the revision, optimization and formalization of the business processes as fundamental requirement to then reproduce them on the Microsoft platform and this thesis will focus on the analyzed processes during the project.
Taking into account the context and the needs, with the aim to perform a digital transformation of his business, Nice requested support to Deloitte in order to:

- Define a Global Template to be applied to all Group's countries standardizing the ways of working and adopting processes based on best practices as first step to prepare the ERP implementation.
- Upgrade the Group's Application Landscape to the new Microsoft D365F&SCM release.
- Rationalize the overall IT architecture, to reduce the related cost and to improve the efficiency of it.

This project is being followed by three Deloitte teams:

- A supply chain team, which has in charge the Global Template definition and so the study and revision of all company's processes

- A Microsoft team for the implementation of the ERP after the definition of formalized processes. This one is the team of which I am part and in the first part of the project will support the supply chain team for the definition of feasible processes for the implementation inside the ERP and in a second moment will actively implement the system for the company. In particular, for the ERP side I will be in charge of the definition of the production processes, from the planning based on forecast to the production lines.
- A Finance team that study and revise financial processes.

Considering the focus that I had during the project and the objectives defined, the Global Template will be characterized in this thesis with reference to following end to end processes. These processes are part of one of the frameworks, based on best practices, used by Deloitte for the analysis and improvement of the processes of a company:

- Forecast to inventory (FTI): is intended the process of forecast and demand management and in particular the main phases considered are statistical forecast generation, sales plan generation, demand plan generation and management of demand signals. For Nice company the two critical processes analyzed were demand planning and replenishment planning.

- Plan to schedule (PTS): is intended the process of planning based on forecast and in particular the main phases are supply and capacity planning, production planning, master planning (MPS and MRP) and production scheduling. In Nice case the main processes studied were the production plan definition and the raw material procurement planning, due to the criticality of these processes in their context.

- Make to deploy (MTD): we intend the set of process that, starting from the planning and purchasing processes, aim to manage the flow of material throughout the whole production and distribution process to cover the demand of

the Customers and/or Subsidiaries. In particular the main processes that has been analyzed are production and logistic.

These frameworks are not intended as a faithful representation of Nice processes but are the base that has been used during the meetings to go through their processes and analyze them, to find out the main pain points and propose solutions based on best practice.

Then, to support the themes treated in this thesis by a theory point of view and to have all the knowledge for the understanding of the arguments, three main management dimensions that represents the job that has been done are analyzed: how the revised processes work, ERPs and their capabilities and project management.

The ultimate goal of this thesis, through the Nice case study, is to demonstrate how the implementation of a new ERP system is closely related to the review and formalization of business processes, and the two activities must go hand in hand. Companies must seize this opportunity to improve the way they work by learning from the best practices of leaders in various industries in order to improve themselves and remain competitive in today's complex and challenging economic system.

2. HISTORY OF NICE AND BUSINESS CONTEXT

Nice S.p.A. is a young Italian company based in Oderzo (Treviso). It was founded in 1993 by Lauro Buoro, manufacturing transmitters and accessories for the automation of gates and garage doors and has introduced a new way of producing and communicating in the home automation sector. It was founded with a clear objective expressed in its mission statement: 'Our mission is to improve people's quality of life by simplifying the everyday, while making experiences enjoyable and places more sustainable'.

The company in these years began its rapid development that would soon lead it to be a world leader and a reference in its fields of expertise. His market, in fact, in the early 1990s did not have a very wide offer and communication around its articles was rather anonymous and focused only on functional characteristics, leaving out design, convenience and simplicity. The innovations Nice brought to the business were based on integrated systems, simple and easy to be installed, understand and used by both experienced installers and simple end-users.

In 1995, the company began expanding its product portfolio to include electrical and electromechanical products that together could offer the market complete and integrated automation solutions for gates and garage doors.

In the 2000s the rapid growth continued with further expansion of the portfolio offered to customers, thanks to the strategic acquisition of a company producing automation systems for awnings, rolling shutters and solar screens. In this way Nice became one of the few organizations worldwide able to offer such a wide range of products that can be integrated with each other and used in both industrial and residential contexts, all managed by a single transmitter.

Subsequently, in 2006, the company was listed on the Italian Stock Exchange in the STAR segment, confirming its strong growth. The debut was excellent, with a strong rise in share value from the very first hours.

In the following years Nice's strong growth and expansion into new markets continued. In 2008 the alarm systems business unit was opened and work began on industrial

applications, the company also entered the US market. Then in 2009 the Nice Home product line was created, offering wireless automation and alarm systems.

To accelerate growth in 2010 Nice continues the series of strategic acquisitions that will lead it to establish itself more and more as a world leader in its sectors. These acquisitions allowed the company to leverage on already well-structured markets and expertise to provide a strong and solid foundation for its future development. In the same year, a large part of the share capital of FontanaArte, a famous Milanese company, known also abroad for having made 'lighting and furnishing history', was acquired. This was followed in 2011 by the Elero group, a market leader in automation systems for sun shading and blinds, and KingGates, a company specializing in gate automation.

A new expansion of the range offered to the market takes place in 2013 with the presentation of the NiceEra line, which continues the importance of innovative design and the use of cutting-edge technology for the group. It then continues in 2015 with the acquisition of the South African company E.T. Systems, specialized in gate automation, thus Nice also enters the African market. The same year also saw the birth of ThePlace, an area of 3,000 square meters next to the Italian Headquarters: a place of inspiration, open to new experiences and participation, where everyone can be a protagonist, contributing to the development of innovative ideas and opportunities for growth.

Figure 2.1. "The Nice Place", the new building next to Headquarter

Then, in 2016, the group completed the acquisition of HiSecurity, a leading company in North America in the design and production of gate automation for industrial and commercial use with high security standards. This confirms Nice's desire to concentrate in the automation sector with a dual focus, private homes and industrial buildings, expanding more and more globally, also considering the subsequent acquisition of Nortek Security and control in 2021, an American company.

Later, in 2018, other important strategic takeovers are made: the American Silicon Valley company Abode Systems, active in home security; Fibaro, a Polish multinational active in the smart home sector; and two Italian companies specialized in the automation of home systems and industrial applications, V2 and Acm.

The latest example of how Nice is still growing strongly and increasingly present in its markets is the new production facility opened in Limeira (Brazil) in 2022. It is a 20,000 square meter complex that, like other sites of the group, always attentive to the design of both its products and its premises, has been designed by a well-known firm of architects. The new Brazilian headquarters is a benchmark to date for sustainable industrial architecture and has been conceived as a smart factory that follows the founding principles of Industry 4.0.

Figure 2.2. Nice Brazil, the new South American plant

These are just the main and most important examples of acquisitions made over the years, but they make it clear how we have arrived to the today's situation with the need to unify many realities that work separately within a single system that can manage and support all the various business processes and the enormous amount of data, considering also the current economic context that sees great difficulties like the procurement of electronic components necessary for the development of the solutions offered by Nice.

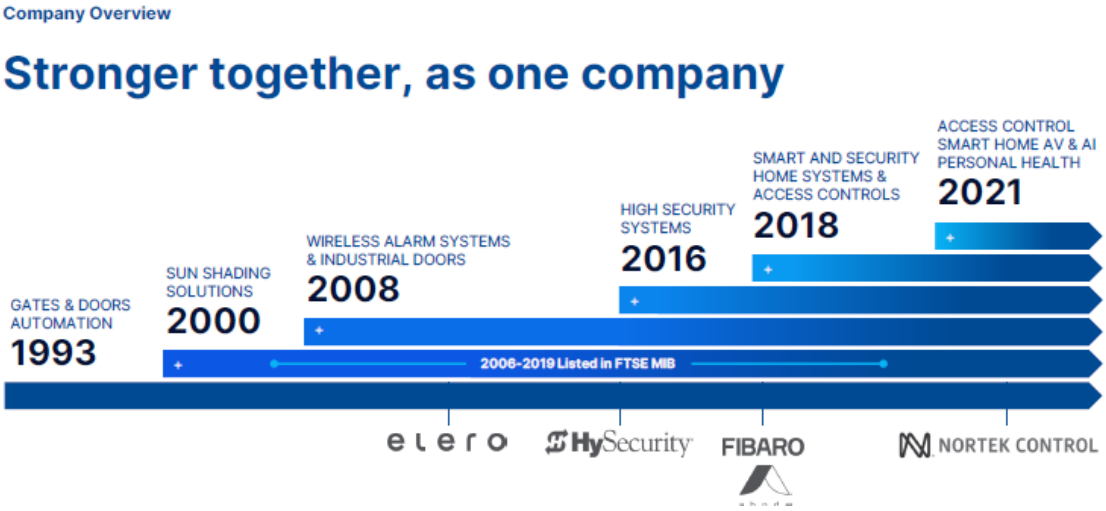


Figure 2.3. Nice history timeline

Today Nice S.p.A. is a leading group worldwide in its sectors, which are characterized by five different Business Units: Sun shading solutions, Gates and Barriers, Doors, Security, Smart Home. The company is now trying to structure itself in a solid way with detailed processes designed for each individual Business Unit. Depending on the country and market, the BUs can be more or less developed to better follow customer requirements. Today, the group has a direct presence in 23 different countries and has 13 industrial production sites and 16 technology centers at the forefront of research and development.

Human capital is also of fundamental importance to the group, which today employs more than 3,000 people spread across 5 different continents, being able to leverage different skills and cultures to increasingly establish itself globally as the only company

able to provide the most complete and integrated ecosystem of products for the home and industrial buildings, with an eye always towards the future following the development of new technologies such as artificial intelligence and digital personal health.

Some of its most famous customers are Apple, Tesla, SpaceX, the FED and the US Navy.

2.1. Business context

Nice S.p.A today is active in several sectors, all related to automation systems for private homes and industrial buildings. Following the strong growth and expansion in its first 30 years of life, the future purpose is to structure itself by business unit and no longer by geographical area as today, in order to achieve greater coordination between the various markets, changing the strategic plan.

The five business units into which the company is structured are sun shading solutions, which is currently the most mature and the reference for the others, gates and barriers, doors and industrial doors, smart security and smart home, the most recent that was established thanks to acquisitions made in recent years, such as the American company Abode.

The Nice Group today consists of more than 40 legal entities that are structured to serve markets worldwide as they are present in all continents.

Figure 2.4. Nice presence around the world

Today are served both the Business to Business market, which brings the majority of the group's revenues (around 90%), and the Business to Customer market, which although covering a small percentage of Nice's offer will become increasingly important and structured in the future.

The B2B market includes manufacturers of home solutions who integrate Nice solutions such as electric motors into their finished products, specialized distributors, wholesalers who represent a key market because most distributors buy from these large centers, manufacturers with a structure of at least fifteen employees and retailers such as Leroy Merlin.

The B2C market, on the other hand, is less structured and in a rump-up phase. In particular, to date the geographic area in which it is most present is North America, but in the future it will become increasingly important thanks also to the development of an e-commerce site.

Today, the market of smart solutions for buildings, both industrial and private, is growing strongly in Italy and worldwide. In particular, as far as smart solutions for the home are concerned, after a normal stop due to the covid pandemic, the trend is back on the rise. To cover this market Nice presents the two business units smart home and smart security.

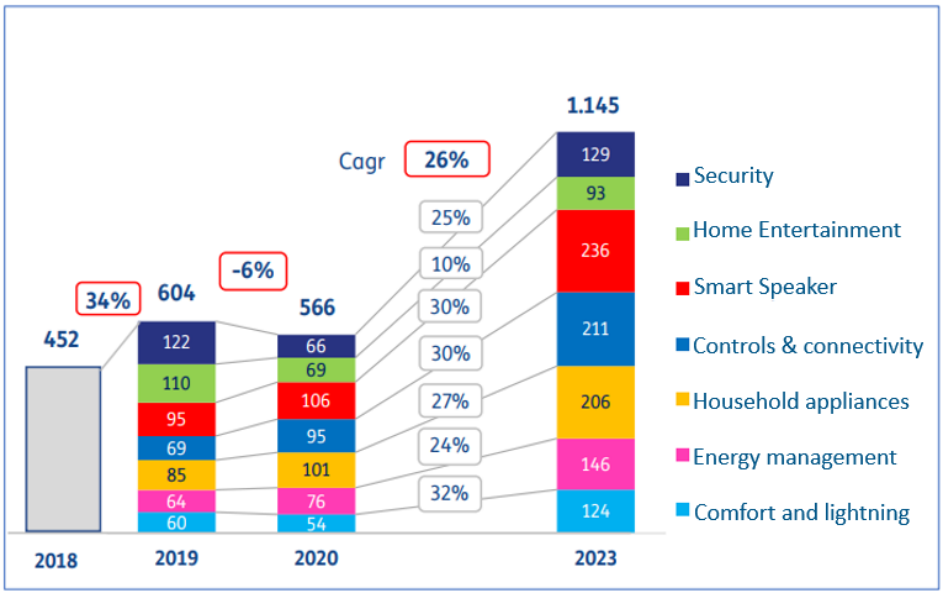


Figure 2.5. Growth of Smart Home market

In Italy, however, despite the strong growth, volumes are still small compared to other countries such as England, Germany and especially the United States. It is enough to think that in 2019, considering a period prior to the pandemic in which the markets were not affected by all the problems associated with it, total expenditure in the United States was USD 18.8 billion compared to the USD 0.6 billion spent in Italy. Even today this marked difference is visible. These numbers also explain why Nice completed the acquisition of Abode in 2021, securing a strategic position in this market.
The competitor landscape then is very fragmented and there is no leader who can exploit significant economies of scale to beat the competition. Large investments in research and development are therefore needed, but the future prospects are good.

On the other hand, as far as the smart building market is concerned, both for industrial and home applications, the data remain encouraging and the conclusions that can be drawn are comparable to the smart home market. Today, in fact, thanks to important investments made both in Italy (think for example of the SuperEcoBonus) and abroad, the market trend is clearly growing. To cover this market Nice presents three business units: Sun Shading Solution, Gate and Barriers, Doors and Security doors.

However, all these business units are characterized by a common problem, the difficulties in the electrical components market. These problems have three main causes: the strong growth in demand for electronic components due to the evolution of technologies in many different sectors, the political tensions between the various countries of the world to conclude trade agreements that meet everyone's needs and the difficulties in recovery following the pandemic period.
Today, there are several components in the Nice raw material portfolio with lead times of up to two years, forcing the company to maintain high inventories to meet the demands for make to stock products, that compose most of the offering of Nice. This will be one of the major challenges to be faced during the process revision project to find the right trade-off between the enormous costs and difficulties of maintaining a high stock and the need to procure materials that need such long lead time.
Despite the great difficulties due to the pandemic and the current socio-political context, this market is now showing some signs of improvement, thanks also to legislative interventions such as the EU Chips Act and important investments resulting, for example, from the PNRR in Italy. All this is fundamental because these components are the basis for advancing the ecological transition to an increasingly sustainable world.

Lastly, another problem related to these business units is that most of products from the business units shun shading, gate and barriers and doors can be considered commodities. For this reason, the company needs to reduce as most as it can the lead time to market and also the price, in order to reach the market before other competitors. Thus, warehouse management is even more a big challenge for Nice.

3. HISTORY OF DELOITTE AND METHODOLOGY OF WORK

Deloitte is a global consulting firm that integrates a broad range of talent and skills to offer a multidisciplinary approach that is the key success factor of the company. It is the bigger and the older of the so called BigFour, the main four consultancy firms around of the globe.

It is divided in five main portfolios offering, to take to the market a complete offer of professional services that can help companies' growth in every aspect of their business. These five offerings are: Audit and Assurance, Financial Advisory, Tax and legal, Risk advisory and Consulting. Deloitte Consulting, that is carrying over this project, provides Strategy & Operations, Human Capital and Technology services, aligned to the needs of clients' industry sectors.

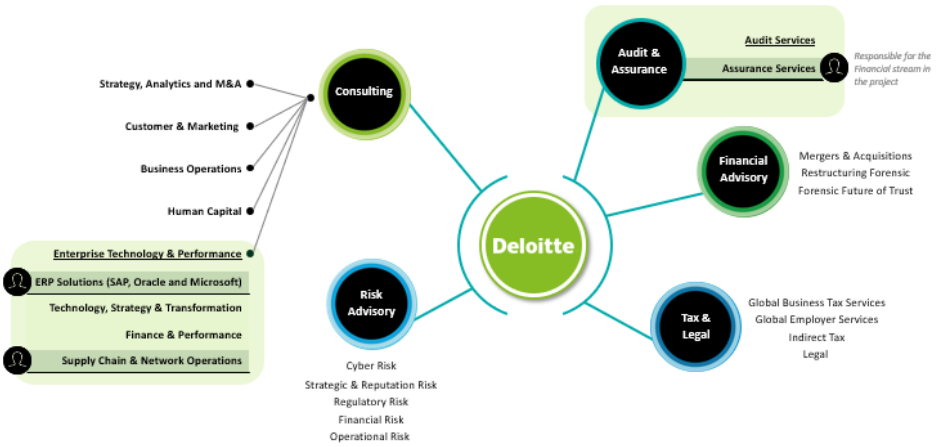


Figure 3.1. Deloitte structure with evidence of the teams involved in the project

Deloitte TTL employs more than 300.000 people in more than 150 countries, serving more than 80% of the world's largest companies, as well as large national enterprises, SMEs, public institutions, and successful fast-growing companies.

Deloitte is present in the national territory with 23 offices, of which those of Deloitte Consulting are located in Milano, Roma, Treviso, Vicenza, Torino and Bologna. Among different professional services, Deloitte Consulting is specialized on End-to-End supporting for business transformation programs and implementation on processes, organizations and digital solutions.

In Italy, Deloitte is among the most important professional services companies for enterprises and has been present for about 100 years. There are more than 11,000 professionals supporting the network's 8,000 clients, most of whom are people under 30 years of age who give a dynamic and innovative boost to the company's activities. Demonstrating the quality of the services offered and Deloitte's strong presence in Italy, during Fiscal Year 2022 the turnover for Deloitte Italy alone was more than one billion dollars.

Figure 3.2. Some numbers of Deloitte Italy

All Deloitte's activities are guided by its purpose: Make an impact that matters. This means generating added value, making a difference, leaving a distinctive mark to support not only clients in the realization of their business objectives, but also to make a positive contribution to society, the environment and the people who are the beating

heart and distinctive element of the organization. Supporting this purpose are Deloitte's values: serve with integrity, lead the way, take care of each other's, collaborate for measurable impact and foster inclusion.

3.1. History of Deloitte

In 1893, in the context of an economic decline in the United States that had various causes but was mainly due to government inefficiencies that soon became the subject of criticism, two consultants were commissioned to investigate the causes and seek a solution to the nation's problems: Charles Haskins and Elijah Watt Sells. Over the next two years, they managed to save the government $600,000 a year by significantly improving the quality of their work and then decided to open an office in New York to offer accounting services to the public, soon expanding to Chicago and London.

In the preceding years in England, the Industrial Revolution gave rise to a new type of business that raised capital by selling equities to the public. One of the first major companies to follow this trend was the Great Western Railway (GWR), which in 1849 enlisted the help of an independent accountant, William Welch Deloitte to audit the company. Mister Deloitte's contribution was so important that GWR advised other companies to do the same. Large British companies slowly began to follow GWR's example, but it was 84 years before the United States adopted the practice. The boom in joint stock companies created a strong demand for the audit industry to solve complex business problems. So, in 1898 George A. Touche, a Scottish man, founded an accounting firm in London to try to meet this demand. Two years later he opened the first office of Touche, Niven & Company in the United States.

Between 1900 and 1930, the United States experienced the income tax era that generated a huge demand for professional accountants. In those years, John Ballantine Niven founded a Touche Niven office in New York, in the same building where Haskins & Sells worked.

In 1913, Niven opened the organization’s first branches in Minneapolis and Chicago. In the same year, the 16th Amendment to the Constitution allowed for the first time in the United States the imposition of an income tax. This tax led hundreds of people to feel

the need for a system of accounting in order to meet the demands of the government, as they had never before needed a proper accounting system. For this reason, the Journal of Accounting created a section on taxation issues, written by Niven himself. Revenue for the federal government was the mainstay of expenditure during the two wars and led to accounting professions becoming increasingly in demand.

Between 1930 and 1950, in a difficult economic context due to the two World Wars and the stock market crash of 1929, the independence of accounting became increasingly important, which by following structured and regulated practices could have prevented certain bankruptcies and the related problems. Thus, in 1933, Colonel Arthur Carter, president of the New York State Society of CPSs, testified before the US Senate and Congress and succeeded in convincing them that an independent compulsory audit process was essential in order not to relapse into the crises of the past.

Between 1950 and 1970, in the growth spurt following World War II, a Detroit accountant, George Bailey, founded his own company, which got off to such a good start that in less than a year it made a name for itself and merged with Touche Niven, forming Touche, Niven, Bailey and Smart. Led by Bailey, the organization saw tremendous expansion due in part to the contribution of a dedicated Management Consulting service. It also began to have increasingly close relationships with Mister Touche's other Canadian and British companies. In 1960 it was renamed Touche, Ross, Bailey & Smart, becoming Touche Ross in 1969.

In 1935, John William Queenan joined Haskins & Sells and led the company through significant improvements until his retirement in 1970.
Then, in the 1950s, information technologies became increasingly important in companies and accounting in particular was one of the professions most affected by these changes. Touche Ross took the profession into this uncharted territory and became in 1952 the first major accounting organization to automate its books. In 1964, Touche Ross' work on statistical sampling led to the Auditape System, the first software to apply computer technology to accounting. The organization did pioneer work for many major corporations and government agencies. At Touche Ross, the discipline matured during the 1960s and 1970s under the leadership of Rubert Trueblood and Michael Chetkovich.

In the 1980s, the Deloitte and Touche firms played a leading role in American business during a decade characterized by an unprecedented number of mergers and acquisitions (M&As).

The organization's M&A expertise emerged in the 1970s, when a new management style became important for American companies. The new managers were financially sophisticated and aware of the synergies and economies of scale offered by M&A. They relied on accountants for tax and audit expertise, consulting, technology skills, global operations, and support for their M&A activities.

Russell Palmer and Charles Steele, partners at Touche Ross and Haskins & Sells, pioneered this new business world without sacrificing their technical audit expertise or ethical standards. Accountants began to focus on business consulting, offering a full range of accounting services and actively seeking new ways to help their clients.

In those years, a new generation of leaders emerged at the helm of Touche Ross and Deloitte Haskins Sells. In 1982, David Moxley and W. Grant Gregory took over from Russell Palmer as leaders of Touche Ross. In 1985, Edward A. Kangas, who had a reputation in management consulting, became a partner at Touche Ross. In 1984, J. Michael Cook became a partner at Deloitte Haskins Sells.

As mergers and acquisitions increased, American companies became increasingly globalized and sought auditors with broader expertise in all areas of accounting and experts in solving problems around the world. Many turned to Deloitte & Touche for assistance even in part. In 1989, to crown a decade of mergers and acquisitions, Touche Ross and Deloitte Haskins Sells merged.

The new firm, called Deloitte & Touche, was headed by J. Michael Cook and Edward A. Kangas. Both shared the idea that the auditors of the future had to possess strong professional skills and a deep understanding of the industry in which their clients operate, their needs and the dynamics of the business.

Globalization has been a revolution that has brought ever greater and more diverse challenges in the field of information. Events such as the fall of the Berlin Wall, the growth of trading regions such as the European Union, the rise of economic power in the Pacific Rim and the increase in cross-border trade through agreements such as

NAFTA have prompted Deloitte & Touche's clients to demand increasingly multifunctional solutions.

As a result, Deloitte & Touche decided to provide global services and solutions in response to its clients' needs. In order to do so, the firm needed more sophisticated technological solutions and greater knowledge of international markets. As James E. Coperland Jr., then a partner in the firm at the time, stated in 1994, it was necessary to combine expertise from different functional disciplines across national borders to create solutions for clients.

To achieve this, it was necessary to hire high-level professionals in each country and teach them the use of tools such as Excel. Deloitte aims to maintain the highest ethical standards in the world and, as its corporate mission states, strives to be 'the professional services firm that consistently exceeds the expectations of its clients and employees'.

In 1995, one hundred years after its foundation, the partners of Deloitte & Touche decided to establish Deloitte Consulting with the aim of providing optimal service to their multinational clients. Despite the changing specificities of global business compared to a century ago, the organization’s overall commitment and goals remained the same as when Haskins and Sells joined forces and Touche sent Niven to New York to open an office for the firm. As Haskins stated more than a hundred years ago, 'our study and interest is in the soundness of the business world'. Deloitte's goal continues to be to simplify work so that it can be done more efficiently and quickly.

Between 2003 and 2005, Deloitte LLP reorganized its structure to better align with the way it conducts business. Currently, the company consists of the following four subsidiaries: Deloitte & Touche LLP, Deloitte Consulting LLP, Deloitte Financial Advisory Services LLP and Deloitte Tax LLP.

As Deloitte's companies expand, the firm continues to be regarded as a top employer in their respective professions. Deloitte has a unique internal environment that enables it to offer high-quality services to market-leading companies.

3.2. Approach of Deloitte to projects

In the process towards the One Company ERP landscape, Deloitte propose two different approaches that can be identified and evaluated: the first one is characterized by a technical upgrade of the actual application solution, while in the second one a business process improvement will lead the Global Template definition and system implementation phases.

The technical approach focuses on the migration from the existing application solution to its new release, aiming primarily to make the new version suitable for supporting business processes, referring to as-is operating ways of working and existing business requirements.

On the other side, the Business transformation approach consider the upgrade of the application solution as a point of discontinuity, an opportunity to review not only the system but also processes, ways of working and operating rules in a Global Template, to be configured and implemented into the new ERP. In the Nice case, the second path has been chosen due to the management choice to unify also the way of workings after the several acquisition that has been done during the years and also because this approach is the winning one in comparison with the "Technical Upgrade" because it facilitates the business choices maximizing the processes benefits and minimizing at the same time impacts on the systems.

Deloitte considers Business Transformation as an End-to-End integrated journey, enhancing the entire Company in terms of processes, people and systems.
As regard processes, the Target Operating Model is the main deliverable that will be produced for Nice company and defines how to deliver and execute the strategy by defining the structures in which to operate and the capabilities required. Deloitte' approach helps companies navigate and accelerate change by prioritizing focus areas that drive significant value and facilitating up-front discussions to guide detailed process, organizational, and technology design.
Talking about IT Transformation supported by Deloitte, it means to evaluate and eventually adopt the correct emerging disruptive technologies (e.g. IoT, Data Analytics, …) redesigning company's application architecture able to satisfy the business requirements as enabling factor of the Operating model.

Finally, the starting points are always people, the key driver to business benefit realization through transformations.

Deloitte offers a comprehensive approach to business transformations that helps leaders achieve smooth transitions with minimal disruption to the business. To execute Business Transformation initiatives, Deloitte relies on a top-down approach, starting with the vision & strategy of the Business Model, and then identifying areas for improvement in the future Operating Model, leveraging enabling Technologies.

The starting point is the formulation of Vision and Strategic Guidelines to consolidate the Business Model and to define the Guiding Principles as useful inputs to coherently design the Operating Model. Then comes the analysis of the As-Is state in order to identify critical issues and opportunities for improvement and design the Target state in terms of processes, organization and enabling technologies, to be achieved according to a clear and sustainable Roadmap. Finally, there is the alignment of IT Application Landscape as enabler of the Target Operating Model, through the implementation and/or integration of new enterprise systems, vertical tools or emerging-disruptive technological solutions.

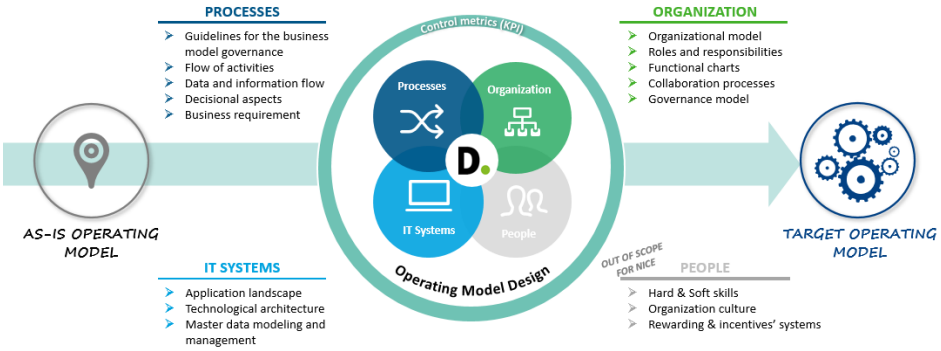


Figure 3.3. Deloitte methodology of work

When the client's goal is to integrate different operating models in a unique Global Template to be scaled to the entire Group, as in this case, the Deloitte approach foresees to combine functional and technical aspects during the Target Operating Model design leveraging on own multidisciplinary Team. In particular in this project are included

three different Deloitte teams: a Supply Chain team, to revise processes and define the strategy, a Microsoft team of which I am part for the implementation of the ERP system and an Audit team for the financial side.

The Global template is composed by two main documents that are different but strictly connected:

- Target operating model (TOM) that design and model how the company can operate at the best in terms of organization, processes and systems, to manage the business more efficiently and effectively.
- Functional design document (FDD) that is a key document that translates in detail TOM outcomes (operating rules, business requirements, etc.) into processes and functionalities for the ERP.

The definition of a Global Template allows to create a Group common baseline in terms of processes, organization, supporting systems and metrics to be adopted by all the legal entities. The Global Template also includes the internal business knowledge and the best practices developed during the years by the group. Typically, the Global Template covers the 80% of business processes definition postponing the finalization of system configuration during the roll-out phases with the final goal to include also local requirements such us fiscal, legal and business peculiarities.

Generally, the Global Template allows to strengthen the group governance and control, measure group legal entities performances simplifying the comparison, harmonize processes leveraging on legal entities commonalities and complementarities especially from a supply chain and operations standpoint, enable the adoption of a Group scalable model facilitating and sustaining the further grows and speed-up potential changes or updates adoption of group operating model across the legal entities. Starting from the baseline framework of the Global Template design, the approach for Nice can be configured according to an “holistic-integrated” perspective, providing standardization and harmonization among the legal entities

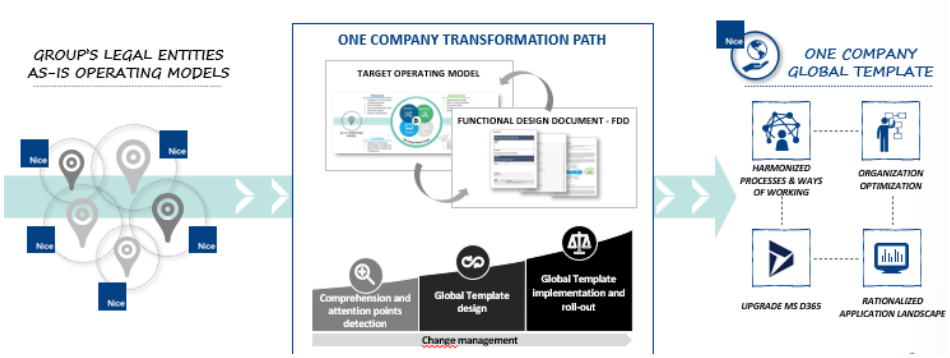


Figure 3.4. Project representation

Starting Throughout the entire Transformation Journey, from the Global Template design phase to the subsequent implementation and roll-out execution, it is essential to put business people at the forefront, understanding their needs and attitude to change, therefore recognizing their fundamental role in achieving a successful transformation.

The main advantages related to people involvement are:

- Sponsorship, engagement and communication: communication activities that emphasize goals, organization responsibilities and commitment, spreading a strong sponsorship on results according to a top-down approach.
- Pro-active participation: execution of project activities assuming a pro-active and continuous involvement of internal resources, with the final goal to create a sense of ownership towards the transformation and valorize resources as promoters of change and main actors of transformation.
- Project activities as experiential path where people can share expertise and best practices, co-design models and solution, present to colleagues' ideas and evolutionary scenarios.
- Change agent network: identification of change agents inside the organization as internal connectors to support the transition, to acknowledge and address issues and to facilitate the achievement of objectives.
- Active contribution in the analysis of the Nice context and in the development of ideas and solutions for the business process re-engineering, sharing of project results and greater awareness of the new methods to be adopted.

Talking about key success factors, it is fundamental that engaged resources understand and internalize the reasons behind the change and are aligned with purpose and goals, develop the requested skill set needed to perform the change, feel part of the change with a pro-active approach during both phases of analysis and design of the Target Model and lastly, it's very important to support these people while the new ways of working are adopted.

Considering the success factors enlisted, the main activities to be performed starts from the identification of key stakeholders to review and implement new processes creating a change agent network and change promoters. Then bidirectional communication channels must be opened in order to enable both an efficient distribution of contents and gathering of suggestions, questions and eventual fears on the project. It's also fundamental to define communication contents able to create a sense of trust and to define a change activation path to guarantee the transition towards the model and respecting the experience of any engaged resource.

Typically, Change Management is strictly integrated with project management in order to guarantee a consensus in approach and collaboration through all the project initiatives.

The main phases of the project, as regard the processes' part, are discovery to study the as-is situation and Target Operating Model design to define the to-be situation. In parallel with these activities the technical analysis for the implementation of the ERP solution is performed.

In the first six months of the project are carried out the activities of the discovery phase and of the Target Operating Model definition by the supply chain team and my team, the Microsoft one, that is in support in order to design formalized processes based on the capabilities of the ERP.
After these first six months, my team will play a primary role in the implementation of all the designed processes. This is one of many examples of how the multidisciplinary approach of Deloitte can help companies and make an impact that matters.

The key activities of the discovery phase are:

- Preliminary meeting with the Top Management to align on Group companies background, integration objectives and strategic "Guiding Principles" to orient and guide the project activities.
- For the four main companies in scope, Nice Italy, Nice France, Nice Polska and Fibaro, performing of interviews and workshops in order analyze their current Operating Models.
- Country Comparison Matrix to frame commonalities and main divergences among Italian, French and Polish companies' processes, organizations and systems.
- Formalization of the emerged findings and improvement opportunities.
- Sharing of Summary Report with Nice management.

The main deliverables of this phase are:

- Strategic "Guiding Principles".
- Attention points of the current operating models *(*classified in the dimensions of processes, organization and systems and based on the impact).
- Opportunities for improvement to be addressed in the Target Operating Model design.
- Country Comparison Matrix.
- Industrial Accounting Model (AS-IS).

The key activities for the definition of TOM are:

- Quick assessment of Elero model (German company) and identification of best practice to be reused. This is done because in this company the new ERP system has already been developed and now is working.
- Starting from the results of the first phase of analysis on Italian, French and Polish companies, development of processes and organization alternative scenarios with detail of pros and cons and execution of workshops for validation.

- Co-design with Microsoft Team of the Target Operating Model for each end to end specific process.
- Identification of potential gaps with Elero Model, that has already implemented the ERP and is used as benchmark.
- Listing of business requirements to lead Functional Design Document drafting.
- Definition of main KPI to monitor and control processes performances.
- Sharing with Nice Management to validate the Target Operating Model.

The main deliverables of this phase are:

- Target Operating Model including new Industrial Accounting Model.
- Potential Gaps with Elero Model.
- Business requirements.
- Organizational improvements.
- KPIs.

The key activities for the technical analysis are:

- In parallel with the “Discovery” phase, detailed mapping of current application landscape and integrations among systems.
- Assessment of Elero Model configuration in Microsoft D365.
- Co-design of Global Template verifying the business requirement coverage and proposing alternative technical solutions leveraging the standard functionalities.
- Presentation to Nice Process Owner and Nice IT Team of specific Microsoft D365 functionalities and capabilities with dedicated demos.
- Evaluation of landscape rationalization opportunities deep diving alternative scenarios and related pro & cons.
- List of Fit & Gap as result of coverage analysis.
- Drafting of Functional Design Document.
- Define business case data for supporting system walkthrough workshops.
- System Walkthrough.
- Configuration refinements post walkthrough.
- Begin of data migration and code upgrade

The main deliverables of this phase are:

- As-Is application landscapes.
- To-Be application landscapes.
- Fit and Gap list.
- FDD (Functional Design Document).
- List of projects for code upgrade.
- Data Migration Strategy Document.
- Integration Strategy Document.

4. ERP – ENTERPRISE RESOURCE PLANNING

In this first theoretical chapter, Enterprise Resource Planning (ERP) systems themes will be discussed, a fundamental tool for companies today that has many advantages for data management related to processes such as reducing lead times to market, increasing on-time deliveries, increasing stock rotation, reducing cycle times and decreasing WIPs, but brings with it many challenges to face and many problems to solve.

In the Nice project, in fact, the first phase of the business process overhaul discussed in this thesis is strongly based on the capabilities of the Microsoft Dynamics 365 ERP system and is necessary for the formalization of processes that can be supported by it. Business transformation therefore has the ERP system as a solid foundation and could not take place without it.

After an initial overview of business informative systems in general, ERP systems will be discussed in more detail with a particular focus on the one offered by Microsoft that will be implemented in Nice. This will be followed by an analysis of the advantages and disadvantages of adopting an ERP system and best practice recommendations for implementation, concluding with a special focus on the most relevant processes addressed in this thesis, that are production and procurement planning through to actual production and how these are managed in the various system modules.

4.1. Introduction to informative systems

Information is a key resource for any company or organization, on the same level as human resources, machines and all other company assets. In fact, every activity performed, whether manual, operational or decision-making, will have information as input and output. This is why it is essential to have a system that can manage all these information needed to support the various processes, a company Informative System.

A definition of an Informative System is the one proposed by Camussone (1998): "an ordered set of elements, even very different from each other, that collect, process,

exchange and store data with the aim of producing and distributing information at the right time and in the right place to the people in the company who need it".

An Informative System will therefore comprise many heterogeneous elements such as people, procedures, hardware and software infrastructures, but strongly linked and integrated, so as to collect data from various sources to process it and produce useful and valuable information for the business. The valuable information produced must then be provided to those who need them within the business and when they need them. Thus, an Informative System is the set of methods and tools used to manage information, which we remember is one of the most valuable assets within the company.

It is necessary, however, to make an initial distinction between an Informative System and an Informatics System, since these are two concepts that are closely related and strongly overlap in some points but are different. An Informative System, in fact, has as its basis the computer resources and the technical means to support it, but it is much broader and also includes the data used, the processing procedures, the people who use it in various capacities and the principles that inspire and aim of the system. The Informative System, therefore, is a broader concept than the Informatics System, which simply represents the technical part where data are collected, stored and processed, hence the hardware and software infrastructure. This is why the Informatics System is a sub-part of the Informative System.

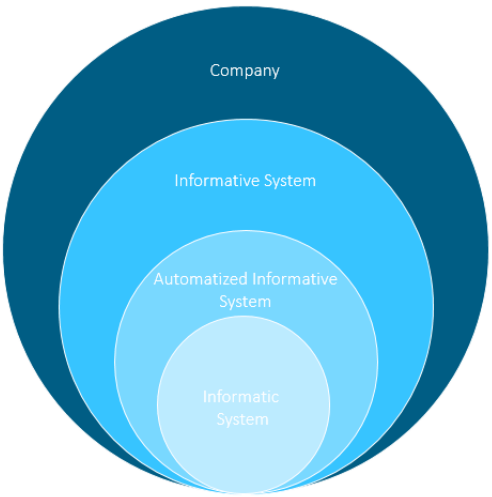


Figure 4.1. Informative system and informatic system

Going into greater detail, the inputs of the company's Informative System will be data relevant to the organisation, such as measurements of internal processes, the occurrence or non-occurrence of certain events, and external events of interest to the organisation. All these data, which will be in different formats and from different sources, will therefore have to be selected and processed through structured and shared criteria, mechanisms and procedures.

On the other hand, as far as outputs are concerned, the information produced will have to be supplied to the users of the system who require and need it, i.e. offices, individual operators, machines and even external users. Here too, structured processes will be required to define who can have access to what data and how they can be accessed.

Finally, the models used for the collection, processing and distribution of data and information by the company's Informative System will be those typical of company management such as accounting schemes, operations management practices, typical order cycle management procedures. The Informative System thus reflects all typical business processes in a structured and formalised manner.

4.2. Informative system components

An Informative System, therefore, will be composed of several heterogeneous but integrated elements, of which the five most relevant according to Camussone are:

- The technical means, i.e. the hardware and software infrastructure that will form the basis of our system for the collection, processing and distribution of business data. These, as mentioned above, form the Informatics System that is part of the Informative System itself.
- Data that are the raw material used by the system to produce information of business value.
- Data processing procedures that define ways and methods to process and transform input data into information, following the business processes of value creation. Thus, calculations, technical algorithms and business management

methods typical of individual realities and based on economic-management disciplines must be defined.

- People, who may be the planners and managers of the system's operating logic, and users, who use the system as the basis for their work tasks.
- The last component is then formed by the inspiring principles and objectives of the system. Indeed, a company Informative System may have different objectives and uses depending on the principles defined by the company management. An Informative System may therefore pursue the objective of automating certain processes, it may simply be a decision support, it may facilitate communication between various company areas or even simply store the results of company activities.

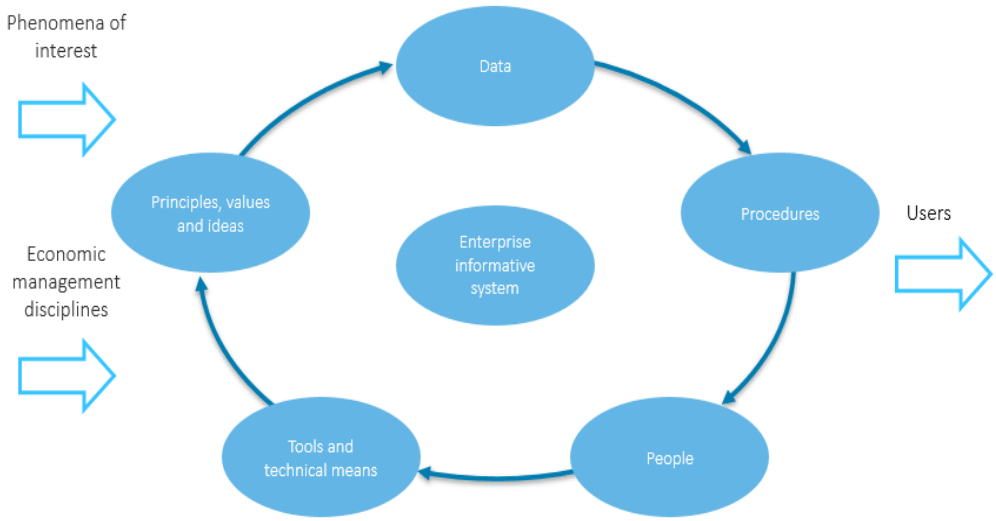


Figure 4.2. Informative system's components (adapted from Camussone 1998)

It is even clearer, therefore, after an analysis of the components of an Informatics System, that technical Informatics System knowledge and skills alone are not sufficient for its implementation and management, but that management and human as well as technical skills are also needed.

4.3. Informative system classification

Informative Systems can be of many different types, even very different from each other. This is why it is useful to identify certain criteria for classifying them. These can be divided into two main types: technological criteria, i.e. linked to individual technologies and technical standards, and organizational criteria, which are linked to economic management disciplines and are therefore more relevant for the purposes of this thesis.

It is possible to identify three distinctive types of organizational elements for an Informative System:

- Classification based on the business activity supported.
- Classification based on the functional area concerned.
- Classification based on the business process in question.

4.3.1 Informative system classification based on business activity level

For a complete analysis of the classification of Informative Systems based on business activities, it is useful to start from the classification of business activities proposed by Anthony and Simons in the 1960s. Business activities can in fact, according to Anthony, be of three main types:

- Operational activities, which form the base of the pyramid and concern the execution of executive tasks and operations, following defined methodologies and procedures. These activities can be for example logistical, physical-production, bureaucratic.
- Then there are the management-type activities that plan, program and control the operational-type activities. These can be strategic, i.e. with a medium- to long-term vision, and run by the management part of the company. Or they can be tactical, somewhere between strategic and operational activities, which aim to translate medium- to long-term objectives and activities into shorter-term decisions to implement the company strategy in detail.

Figure 4.3. Company's representation based on Anthony's pyramid

Based on this structure, Simons then defines the nature of the activities carried out at the various company levels. This classification is based on the more or less marked structuring of the company's activities. At the highest levels of the pyramid, we will have activities that are unstructured, not very repetitive and characterized by high uncertainty. On the contrary, in the operational levels we will have well-structured and detailed activities that are not particularly ambiguous or uncertain.

Therefore, as a consequence of the type of activities and their structuring and formalization, we will be able to identify the type of data and information needed for support. There will therefore be marked differences between strategic and operational activities in terms of data sources, degree of detail needed, degree of certainty, domain of interest, type of information, time horizon, timeliness, frequency of use and flexibility.

In view of the classifications just made, we could therefore have two main types of Informative System: operational activity support systems and management systems.

Operational business support systems should present well-structured and repetitive activities. The objective, therefore, is to achieve automation of various processes so that they become efficient and save time and money.

Managerial systems, on the other hand, will necessarily be less structured and structurable, the objective for this will be the support of managerial activities and not the automation of a process. They will include, for example, reporting, simulation and forecasting systems.

4.3.2 Informative system classification based on business function

A second classification of Informative Systems is that based on business function. Each business function has its own information needs and processes. This requires an Informative System to have various subsets or specialized modules for each functional area, which may or may not be present and have different degrees of detail depending on the type of organization and its needs.

This distinction is necessary because today many companies are still structured by functional area, each with its own needs and processes. However, it is always necessary to find the right degree of integration and communication between the various areas because, especially with regard to strategic activities, the distinction between functional areas is not marked.

4.3.3 Informative system classification based on business processes

This last classification of Informative Systems is becoming increasingly important as processes are becoming more and more important at company level and without a review and formalization of these, the implementation of an Informative System is impossible.

Moving to a process-based perspective requires a transversal, as opposed to a functional, view. This change is facilitated by the parallel between a business process and a process seen as a sequence of activities that the Informatics System must perform to produce the necessary information. However, there are also difficulties. In fact, to formalize a process in an Informative System, it will be necessary for it to be well-structured and precisely defined, which may be easier in the case of operational activities but will be complex if we consider strategic activities.

4.4. ERP systems

Gartner group defines ERP (Enterprise Resource Planning) as follow:

“A collection of applications that can be used to manage the whole business. ERP Systems integrate sales, manufacturing, human resources, logistics, accounting, and other enterprise functions. ERP allows all functions to share a common database and business analysis tools.”

An ERP system is therefore an Informative System that integrates different software modules and programmes with the aim of supporting the management of the information required for the processes of each business area, in an integrated manner. A fundamental characteristic of an ERP system is the management of a single, integrated database of data, which allows the company's information to be managed in a unified and unambiguous manner. The ultimate goal of an ERP is the end-to-end management of all business processes, across functions.

Figure 4.4. An overview of ERP capabilities

4.4.1 History

The origins of ERP systems correspond to the emergence of the first systems for the management of production materials, around which other modules were later added for the co-ordination of processes of various related company functions that made these systems as integrated as they are today.

The first systems of this type were the MRP (Material Requirement Planning) and MRP II (Manufacturing Resource Planning) systems in the 1980s, which were used for the integrated management of production and material procurement data and are one of the modules within ERPs today. The idea behind MRP and MRP II, which is also a founding and distinguishing factor for ERPs, is to keep operational business information in one centralized database for use in business processes and decision-making. They were born to address a specific need, the calculation of requirements based on sales forecasts in order to manage the time required for purchasing, logistics and production. This remains one of the biggest challenges for a company over time due to the difficulty of the algorithms and mathematical modelling required by these systems.

MRP II systems represent an evolution of MRP systems and in particular differ in the integration of much more information such as machine and human resource capacities, scheduling, maintenance. The computing power required by these systems, however, is very high, so it has taken time to arrive at truly effective solutions that can give reliable answers while respecting business times, such as those offered today. However, they remain a fundamental evolution in the field of Informative Systems as they were the forerunners of the idea of integrating all the data necessary for business.

From the 1990s onwards, companies producing Informative Systems began to integrate other modules within them, such as accounting, financial statements and tax documents, and then the modules for managing relations with suppliers and customers, increasingly broadening the offer to the market until today's situation in which through an ERP system it is possible to manage the processes of each company function in an integrated manner, leaving it up to the end customer to decide which processes to computerize and support and which not.

This market today represents a real sector of corporate IT and is dominated by a few major players, such as Microsoft, SAP and Oracle, although there are also solutions designed for small and medium-sized enterprises and developed by smaller companies, since the implementation and maintenance costs of these systems are very high, although not comparable to the benefits they bring.

4.4.2 ERP characteristics

ERP systems share some basic characteristics that distinguish them from other Informative Systems and make them unique and fundamental in today's business. These five characteristics, which will be analyzed below, are:

- Uniqueness of information
- Focus on processes
- Transactional event-driven approach
- Modularity and extendibility
- Prescriptiveness

4.4.3 Uniqueness of information

It forms the basis of an integrated system and it is understood that, whatever operation is carried out within it, the database from which the input data is taken is unique and contains a single piece of information, thus consisting of a single value. To do this, it is necessary to organise the database in an appropriate manner, centralizing the information but defining for each of them who will be responsible and have competence over it.

The advantages deriving from this feature of ERPs are the presence of data that are always up-to-date and reliable if maintained in the correct manner and shared by the entire organization that will work on it; the possibility of managing permissions, always having clear who will have the possibility of modifying, creating and managing what data; the possibility of controlling the operations carried out to always have clear who has made changes.

For this to be possible, however, certain precautions will be required, such as the precise and accurate definition of access criteria to the system and of permissions to the various users; data back-up systems to cope with the risks associated with maintaining a single corporate database with critical and valuable information within it; a fast connection so that the data is always up-to-date and available to the various users.

Focus on processes

For the design of an integrated system, the management of end-to-end processes is necessary and for this reason a departmental logic for business functions cannot be applied as it would require the use of separate tasks, data and information activities going in the opposite direction to the first defined characteristic, the uniqueness of information.

In ERP systems, therefore, a process-oriented view is adopted, taking care of information flows across the organization. For this reason, it will be necessary to identify the critical business processes, to then formalize and reproduce them in the system in a detailed manner and respecting their logic. It will then also be important to define a shared working method between the offices involved in the various processes, precisely in order to move towards a process-based vision.

Figure 4.5. Business process view of the company

Transactional event-driven approach

Adopting a transactional view within an Informative System means that each significant event generates a transaction that is recorded by the system and automatically updates the shared database, ensuring the uniqueness of the information. To make this updating possible, the ERP database is made up of hundreds of relational tables, which when properly linked allow the system to be updated on time with each transaction

performed. It is therefore essential that each transaction corresponds to an update of all tables containing the updated information.

Considering an Informative System classified by functional area, this feature would be difficult to apply due to the need to update all company functions following each recorded event, obtaining data from different company sources. ERP systems, on the other hand, overcome this problem by focusing on the event and not on the business function involved, by updating the centralized database.

Modularity and extendibility

ERP systems have been presented as single, centralized software, but in reality they are organized in different modules to meet the specific needs of each company. An ERP system will therefore, in addition to the centralized database for the unified management of company data, have several modules each specialized in certain processes or functionalities. Each module will therefore have specific characteristics and interact in a different way with the database.

Figure 4.6. Overview of main Microsoft Dynamics 365 modules

The main reason for the modularity is the flexibility to adapt to individual companies, who can choose which modules to implement according to their needs, their way of working and the budget available for implementation. This feature also allows for extensibility, leaving the possibility of future expansion of the system if necessary. Finally, it will be possible to integrate ERP modules offered by different providers, leaving the end customer with a large degree of flexibility to meet their needs.

Prescriptiveness

Prescriptiveness is defined by Bracchi as the formalization of business processes to a pre-configured management model for implementation in an ERP system.

This has certain advantages in that the standard processes of ERP systems are based on the best practice of leading companies, i.e. on structured and functioning processes that can be used as virtuous examples by implementers. However, it also has disadvantages in that changing working methods and flows within an organization may create problems, as the concept of best practice must always be contextualized and weighed against the realities in which it is adopted.

To minimize this problem and make the systems even more flexible, they are parameterized, i.e. through a series of set-ups it is possible to adapt process flows to the needs of individual companies. It is also for this reason that when implementing an ERP system, it is necessary to have the support of a functional team, of which I am a part in this project, for the set-up of all the parameters required to structure the various processes.

4.4.4 Architecture of an ERP system

ERP systems work in client-server mode, so there will be a centralized computer that contains a shared database with which the various client computers will communicate to enter or obtain the information required by the process at hand. This centralized server in the past was maintained by the organization itself, adding to the implementation costs those of maintenance, which are significant. Today, on the other hand, most companies rely on external server solutions for which the service is paid according to the capacity

used, because compared to the past, there is more confidence in entrusting one's company data, which is a fundamental asset for companies, to external servers in order to take advantage of the numerous benefits and cost savings of external solutions.

It will then be necessary to define communication protocols between client and server, which to date are mainly web-based, to achieve the same advantages in terms of system speed and savings mentioned above. To these advantages must be added those of obtaining a user-friendly system, which can be accessed from any device in any location, and also facilitates interoperability with any external systems that are integrated with the ERP, which especially today is often necessary (examples could be the integration of a CRM system for customer relationship management or a WMS system for warehouse management).

Another important feature of ERP systems then is the organization in levels, which leaves a certain degree of flexibility in implementing the system at different times. An example of a layered architecture is as follows: a lower level that will manage access to the centralized database, an intermediate level for applications that will process the data supporting the processes, and finally a higher level for presentation and user interaction. In this way, it will be possible to have control over all system levels through their interaction and in a simplified manner.

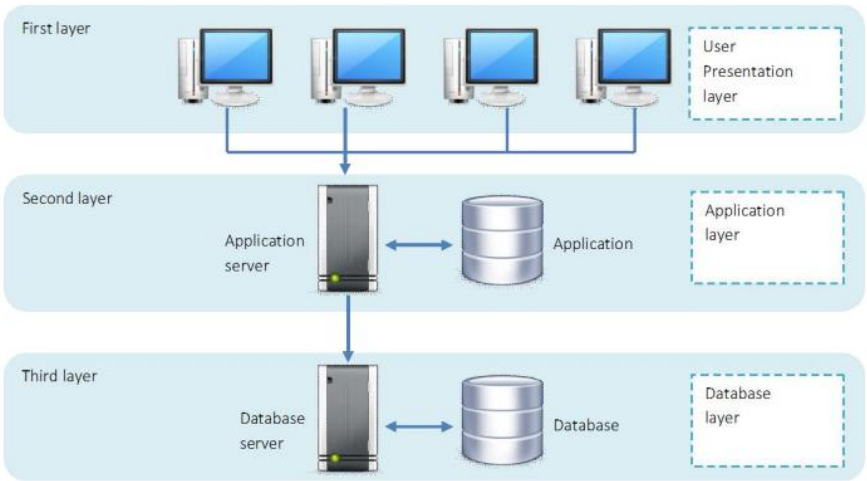


Figure 4.7. Structure of an ERP on three level

4.5. Microsoft Dynamics 365

Now that an overview of ERP systems and their importance in today's business has been given, the software offered by Microsoft, Dynamics 365, will be presented. Microsoft is currently one of the 3 main players in the ERP market, together with SAP and Oracle, and its offering will be characterized as it will be the one implemented in the Nice context.

To date, Nice uses the previous version of the system, Microsoft AX 2012, which has been improved by Microsoft to make it primarily web-based, with all the associated advantages that will be discussed later. Many processes have also been improved to make the system more flexible and able to serve the increasingly sophisticated needs of today's businesses. One of the main examples of this evolution is the planning process with a new MRP system, Planning Optimization, which is able to generate a proposal to cover requirements in a matter of minutes as opposed to the hours required by the previous MRP now deprecated thanks to the support of the Microsoft Azure cloud platforms.

Figure 4.8. The main modules of Dynamics 365

The main modules in the system with a more detailed view are:

- Finance
- CRM and sales
- Purchase management
- Warehouse management
- Production control
- Project management
- Human resources
- Master planning

4.5.1 Finance

The first module analyzed allows the integrated management of general and analytical accounting for the entire company, with specific processes and rules depending on the country in which the company is located and the tax laws in force. This module, like every part of the ERP system, is suitably integrated with the other processes in which it is involved such as warehousing, purchasing and sales.

Through this module, it is also possible to manage the company budget and company assets during their useful life, from acquisition to amortization and their disposal. Finally, it will also be possible to create financial reports for a complete view of the processes addressed and the outputs.

4.5.2 CRM and sales

Sales channels are managed by monitoring various elements, such as business transactions, customer messages, sales opportunities and potential business volume. In addition, CRM data is synchronized to automatically generate prospects. A specific module is able to create leads using e-mail enquiries, which are then assigned to the appropriate sales manager.

All negotiations are carefully tracked to identify the most important and profitable ones to focus on. Considering the marketing campaigns, automatic actions are set up to optimize the information and decide how to invest in marketing, taking into account the actual data. These actions can then be confirmed or modified by the managers.

Finally, the sales cycle is customized to the company's organizational processes in order to monitor the potential volume of business and the performance of the sales network. Real-time reports provide an up-to-date picture of sales.

4.5.3 Purchase management

This module automates material procurement requests and manages minimum stock levels according to predefined criteria. Purchase orders, deliveries and payments are tracked in the system maintaining unique information.

In addition, importing and updating of supplier lists is managed, allowing quick comparison and optimizing the issuing of orders to suppliers thanks to the existing master data. Real-time reports then provide purchasing statistics and offer a complete overview. Finally, it allows you to keep track of complaints information.

4.5.4 Warehouse management

The warehouse module gives the possibility to automate warehouse operations to the level required by the individual company. In fact, it will be possible both a high level management, for the visualization of the present stock and the relative quantities, and a more precise and punctual management thanks to the advanced warehouse, which manages both the optimization of the individual locations in which to store materials and the routes to be followed by the warehouse operators in order to make picking operations more efficient. Like the other modules, it is integrated with the other parts of the system on which it has an effect, such as sales, production or accounting.

Total traceability is ensured by the various reporting systems that grant a view of all movements made in the warehouse.

Thanks to this module, it is possible to achieve various advantages such as the reduction of stock and material handling times both within and outside the company.

4.5.5 Production control

This module firstly allows the management of bills of materials and work cycles, which form the basis of production. It then allows you to manage production progress, from the confirmation of an order planned by the MRP system to the closure of production, all in the same way as for each module integrated with the company areas concerned, such as the warehouse, sales and accounting.

It will then be possible to have control over production times, inefficiencies, waste and other useful reports to study production processes and improve them.

4.5.6 Project management

The project management module is mainly used for two purposes: the production of Engineer To Order articles, which are similar in scope to real projects, and the management of research and development projects.

This module contains all the basic tools for project management, such as GANTT charts, resource calendars, work progress and budgets. With this information, integrated project management is possible in all respects.

4.5.7 Human resources

This module also allows a structured and comprehensive management of the subject matter, human resources. In fact, it will be possible to manage contracts, recruitment, appraisals, efficiency, attendance, holidays and much more information related to human resources.

4.5.8 Master planning

The production and procurement planning module is the one that has been most updated and improved by Microsoft with the latest software release. In fact, the proposal offered today, called Planning Optimization, is highly competitive in the marketplace because it solves the main problem of the old, now deprecated MRP, the planning generation time. Thanks to the support of azure Cloud in fact, the system is able to generate a planning proposal in a few minutes, allowing the organization to simulate different scenarios in the future going then through some business evaluations to follow the path deemed best. This module then contains all the basic set-ups for generating planned orders, such as master plans and coverage groups.

4.6. Advantages and challenges of ERP solutions

The adoption of an ERP system for integrated business data management certainly has many advantages, which will now be discussed, but it brings with it many challenges that must be taken into account in order for the implementation project to be successful and truly support business processes.

With regard to the advantages of ERP systems and the main motivations in adopting them we must mention:

- Efficient information management. Data are in fact unique, updated in real time and with clear identification of responsibilities (who entered the data, when, to do what). This generally makes business processes more efficient, avoiding misalignments and allowing control over which activities have been carried out and by which resources.
- In general, there is better integration and communication between the various functional areas of the company following implementation, allowing for a faster and more present exchange of information. The same considerations can also be made for inter-company communication, significantly improving and simplifying the relationship with the other components of the supply chain, be they suppliers or customers.

- The need to review business processes can be seen as an advantage in those business contexts where they can be streamlined and simplified, and the implementation of an ERP system can be the right opportunity to carry out such activities based on the best practices of leading companies worldwide in order to learn from their processes.
- There are also several practical and process-related advantages linked to the individual modules that the individual company decides to implement such as reducing lead times to market, increasing on-time delivery, increasing stock rotation, reducing cycle times and decreasing WIP.

Speaking instead of disadvantages, it is important to emphasize that the implementation of an ERP system is much more complex than a simple software installation and will lead to numerous challenges to be faced such as:

- Certainly the cost of the software, implementation and maintenance. Given this, an ERP system is normally adopted to manage most of the critical business processes and not for specific individual needs. This certainly leads to major design complexities and also increases implementation costs. Today, however, the web-based solutions on offer make it possible to significantly reduce maintenance costs.

Implementation cost breakdown		
Cost category	Average cost	Range
Consulting	30%	20-60%
Hardware	25%	0-50%
Implementation	15%	5-20%
Training	15%	10-20%
Software	15%	10-20%

Figure 4.9. ERP projects cost breakdown

- It is important to emphasize separately the project complexity of implementation, which results both from the percentage of costs allocated to it

on average in the consulting and implementation categories, and from the long time normally required by these projects (on average between 12 months and 4 years). Numerous factors influence the project duration such as the size of the organization and the amount of system customization required, without taking into account after the project go-live the time needed to reach a maximum degree of system confidence and efficiency.

- The need for correspondence between the real company and its reproduction within the system. For this reason, the system must be as flexible as possible, but the company itself must formalize and precisely structure its processes in order to be able to recreate them virtually. This formalization can in some situations be an advantage as mentioned above, but in any case it represents an additional cost for the company in terms of studying processes, training and involving resources to avoid problems of internal resistance to change. Moreover, if the company in question makes flexibility its strength, this may be an even greater problem.

4.6.1 Advantages and challenges of cloud solutions

In the current situation, an open issue for ERP systems concerns the decision on whether to implement them in company-internal and company-managed servers, with all the attendant burdens, or whether to outsource the software infrastructure to third parties. It is therefore important to analyze the advantages and challenges of cloud solutions, as they were also part of the evaluations made in this project.

Cloud solutions therefore retain the same functionality as on-premises versions, but the applications and database are hosted in the cloud as software-as-a-service (SaaS). This market is expanding as various blocking elements, analyzed in the remainder of this discussion, are being resolved, and furthermore there is an increasing focus on the benefits of this solution rather than the now minimal risks.

As far as the benefits are concerned, we must emphasize the following as being the main ones:

- Lower infrastructure and management costs. This represents the main advantage of cloud solutions in that the company does not have to bear the significant

infrastructure costs but can rely on providers such as Microsoft who, thanks to the exploitation of economies of scale, are able to offer the service at a much lower price.

- Scalability. Cloud services are very elastic and can be easily and instantly scaled to greater or lesser computational capacity and occupied space, only paying for what is actually used.
- Use of advanced technologies. By leveraging the cloud resources of companies that make IT infrastructure their core business, it will be possible to rely on the best available technology and performance at all times, without the need to constantly upgrade their servers and without being able to rely on economies of scale.
- Improved accessibility. Thanks to the use of cloud solutions, the system can be accessed from any device, wherever you are. In the current situation, where the business world is increasingly using smart working as a working solution, simplified accessibility is crucial.
- Simplified integration. Today, the market offer of cloud solutions for business is becoming more and more important, and integration between web-based systems is much easier than with systems located in delocalized servers.
- System availability and risks. In cloud-based solutions, it will be possible to have various back-ups of business data almost eliminating the risk of losing them. In contrast, by adopting on-premise solutions, in the event of problems in the company's servers, the system will not be accessible in the first place and there will still be a high risk of data loss.

Speaking instead of the main challenges for web-based solutions, the main open points are:

- The issue of privacy. One of the greatest sources of resistance to date, given that most of the solutions proposed keep data on servers outside the organization involved, is precisely the insecurity on the part of managers to keep their company data on external servers not directly controlled by them. However, this

problem is being resolved over time because the benefits of such solutions are far greater than the risks incurred.

- The performance risk. The performance of a cloud solution is highly dependent on the available internet connection, as servers are located thousands of kilometers away, so in some cases this could be a problem.
- Compliance risk. To date, the environmental impacts of this type of solution are underestimated and should be considered in view of their increasing importance.
- Loss of IT skills. By outsourcing an activity previously carried out in-house, one faces the problems of loss of skills in that field that are characteristic of any type of outsourcing.
- Service level agreement. Defining a service level appropriate to the company is often complicated and unpredictable, often leading to underestimating the capacity required of the system for cost savings.

4.7. Guide to implementation

An ERP system, unlike other simple software systems we are used to, is not a package that one simply downloads and installs on one's computer. In fact, it requires a whole series of parameterizations and customizations, the importance of which was discussed earlier, to ensure that the system itself represents a faithful reconstruction of the business processes that it must digitally reproduce.

In the past, systems of this kind were built from scratch according to the needs of individual companies, making ERPs difficult, time-consuming and expensive to implement. For this reason, there was often no return on investment and the systems were not implemented. However, through the use of parameterization, customization and by exploiting the basic similarities of companies today, standard solutions have been arrived at that can subsequently be adapted to the needs of individual companies.

4.7.1 Critical success factors for the implementation

In general, it is possible to identify eleven critical success factors in the implementation of an ERP system, which must be taken into account in order to achieve a successful

project and not waste resources due to the high costs and long lead times involved. These eleven factors, which will be analyzed individually below, are:

- ERP teamwork and composition
- Change management program and culture
- Top management support
- Business plan and vision
- Business process reengineering with minimum customization
- Project management
- Monitoring and evaluation of performance
- Effective communication
- Software development, testing and troubleshooting
- Project champion
- Appropriate business and IT legacy systems

ERP teamwork and composition

The first determining factor in the implementation of an ERP system is certainly the project team. Indeed, given the complexity of carrying out activities of this type, it will be essential first and foremost to have the support of specialized consultants, who are able to bring past implementation experience and numerous ideas for solving the problems encountered. It will then be equally important to involve the company's human resources, so that the system does not represent something new and unknown to be tackled unprepared, but rather to train the key users themselves in the change by showing them why it is necessary and the benefits obtained. This team should be multifunctional to cover all critical aspects of the analyzed processes.

Change management program and culture

An ERP implementation project involves changes that affect people, organization and corporate culture. This is why a focus on change management is crucial at every stage.

It is therefore essential to share common values and goals to achieve success, emphasizing the importance of change and the benefits that can be obtained. From a

practical point of view, on the other hand, it will be necessary to organize training sessions with key users and listen to their needs in order to fully involve them in the project.

Top management support

For a project to be successful it must be aligned with the strategic objectives of the company, which is why the involvement of top management is necessary. The most experienced managers will therefore have to sponsor the project within the organization, emphasize the importance of such a change, deploy the necessary resources for the required time, and be ready and willing to make all the required changes.

Business plan and vision

Drawing up a business plan and defining the vision are essential to keep a guide along the project and define the right direction to take. In the business plan, it will be important to emphasize the benefits, resources needed, costs, risks and timeline.

Business process reengineering with minimum customization

As emphasised above, a review of the processes is necessary for the development of an ERP as reproducing them digitally can be complicated. The new processes designed will inevitably be based on the capabilities and capacities of the ERP, which is why it is essential to choose the system best suited to the processes of the individual company.

This correspondence is also necessary in order to reduce the customizations of the system as much as possible, which are always possible and are fundamental in many cases in order to faithfully reproduce a process, but if too much are present, they can significantly affect the basic logic of the ERP and make the system slower and more prone to interruptions.

Project management

Since to implement an ERP system is a project, it will be necessary to apply project management practices that will be discussed in the following chapter. First, the project scope will have to be defined, precisely delimiting it. Then it will be necessary to have clear milestones and related deliverables, to define a precise project timeline that must be adhered to in order to avoid excessive cost increases. Finally, it will be important to involve and coordinate the assigned resources, defining precisely the responsibilities, activities and effort required.

Monitoring and evaluation of performance

As emphasized above, one of the critical factors for success is the performance monitoring and evaluation system. The starting point are the milestones defined by the project management activities, which will give us a basis for comparison between the forecast and the actual implementation.

Performance will be assessed mainly on two criteria. The first concerns project indicators, such as cost, time and quality control of the activities performed. The second concerns process indicators by analyzing how they have been made more efficient and improved.

Finally, it will be necessary to carry out these activities during all project phases in order to keep track of the results and motivate the resources involved.

Effective communication

Communication during a project is crucial at every level and between every level. Expectations, milestones, benefits achieved and the importance of the project must be communicated in the right way. A change of this magnitude will be impossible if it is not communicated in the right way and to all those involved.

Software development, testing and troubleshooting

Software development, testing and troubleshooting activities are fundamental. The architecture of the system must be designed as a first step, taking the most important requirements into account. This is done to avoid having to reconfigure or even change the system.

The functionalities must then be tested to see whether they meet the company's requirements and to study possible errors in the system. At this stage, it is also necessary to evaluate the use of software other than the ERP for specific processes (such as the use of a CRM or WMS) and to study possible interfaces between systems.

Finally, troubleshooting activities should be considered in order to minimize the criticalities that emerge during the test phases.

Project champion

In order to achieve consensus around the project and to maintain a high level of interest in the project throughout its life cycle, a project manager must be appointed who will take over the leadership and sponsoring activities.

This manager should be part of the top management and be the bearer of change, objectives and resolution of conflicts and problems.

Appropriate business and IT legacy systems

Appropriate business and legacy systems are crucial in the early project phases to prepare the ground for implementation. For this reason, it will be necessary to study the current situation in terms of IT-related or IT-supported processes in order to identify critical issues and how best to prepare for change.

4.7.2 Implementation steps

This section will present guidelines for the implementation of a sustainable ERP system that can strongly support business processes. Only by thinking and building a

sustainable system will we be able to reap the above-mentioned advantages of this type of technology, keeping pace with the dynamism required of today's businesses.

It will therefore be necessary to use a series of expedients from the pre-implementation preparation phases through to post-go-live support, to ensure that the system is designed and functions in the right way, being an advantage for the business and not a source of problems.

In general, it is possible to identify 5 macro-steps to support each phase of an ERP implementation. These 5 steps, which will be characterized below, are:

- ERP organizational readiness
- ERP selection
- ERP implementation
- ERP final preparation
- ERP live-run

ERP organizational readiness

To start any project of this magnitude, not only the implementation of an ERP, an assessment of the company is necessary to understand whether it is ready for the change and has the right resources to carry it out. Critical success factors and KPIs must then be defined to give the green light to the change. At this stage, it is also useful to analyse the company's needs, technical aspects and develop an initial idea of the processes to be digitized, in order to have a clear idea when selecting the ERP provider.

ERP selection

Before the actual decision on which system to invest in and develop the project, it is necessary to identify the requirements of the company's business sector and the processes to be digitized. Once this has been done, an analysis of the solutions offered by the market will begin, identifying system functionalities, references, implementation support, verticalization and solutions for one's own sector.

Following this analysis, a more precise investigation will be carried out on a limited number of vendors, and then the results will be proposed to top management as the basis for the final decision.

The most important factors to be considered during the selection phase are ease of use, cost, customization, efficiency, accuracy, the presence of comprehensive and flexible standard reports, external integrations, support and security. This phase is fundamental because the more the processes proposed by the system are similar to the ones performed by the company, the less the effort for customization and adaption will be, because the final aim is to reduce as most as possible changes in the system in order to make the implementation easier and less costly.

ERP implementation

This phase, which is the core of the project and must be followed with particular care to ensure that the efforts made lead to excellent results, beyond all project management activities will cover the activities of defining the project scope, configuration (including parameterization and customization) and software cut over. Project team members will then have to be identified, considering both internal and external resources, a business blueprint will have to be drawn up to identify functional requirements, and processes will have to be reviewed in order to reproduce them digitally. Finally, technical activities will be required such as configuration, definition of responsibilities and roles, creation of control elements, study of data relationships and evaluation of the need for specialized software in specific processes to be added and integrated into the system. All these activities will be based on and supported by testing and training.

ERP final preparation

The final preparation phase is critical because it will be necessary to make sure that systems, processes and people are ready, prepared and studied in detail, so as not to make mistakes in the go-live phase. The main activities to be carried out in this phase are integration and system stress tests to get a clear idea of the system's potential, a disaster recovery test to simulate a problem situation and the ways to deal with it, and

finally a comprehensive user training to show them the functionality and prepare them for use.

ERP live-run

Once the system has been sent live, the stages of monitoring its performance will begin, analyzing technical data and user feedback. This activity must be carried out periodically, in order to anticipate and solve future potential problems. Using the results obtained, it will be possible to schedule updates to add new capabilities that were not initially considered important.

4.8. Manufacturing plan and control systems – a deep dive into the processes analyzed

For an analysis of the business processes involved in this thesis, it was decided to place a special focus on Manufacturing Plan and Control Systems, as they have been the subject of important discussions during the project to define their logic and which system to rely on. In addition, ERP systems as outlined in the history chapter originated and came from early material planning systems. Manufacturing Plan and Control Systems (MPCS) refers to those systems designed to plan and control the production system in terms of materials, resources and suppliers. Their goal is to maintain production capacity to meet market demand by going to plan ahead for supplies, time and resources. MPCS systems include tools that can work over different time horizons, going to refine the degree of detail for requirements closer in time. In the long run, in fact, the focus will be on hypothesized orders generated by statistical demand forecasting algorithms appropriately fed by historical data. As for the medium term, we will talk about planned production and purchase orders, which will have to be confirmed in the short term and become actual production and purchase orders.

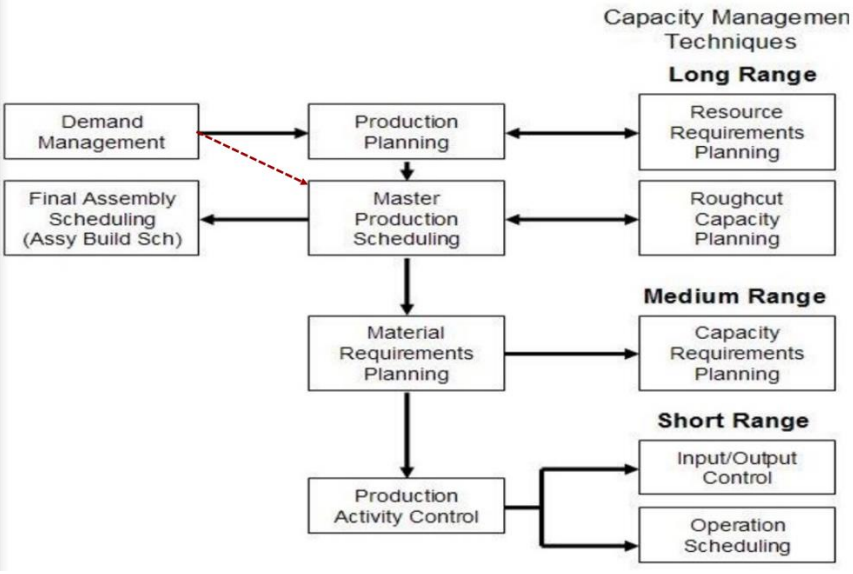


Figure 4.10. Manufacturing Plan and Control Systems tools

The first tool used is production planning (PP), which presents a rough estimate of the production resources needed in the long term, such as facilities, labor force, and financial resources. At this stage, assessments will be needed on whether or not investment is needed to increase production capacity to meet increases in demand.

The PP will be the input used by the next planning tool: the Master Production Scheduling (MPS). This plan will have a medium-term focus and will aim to plan the production of finished goods only by disaggregating the PP in more detail. By doing so, including input from demand management, it will be possible to produce the Roughcut Capacity Plan that goes into calculating how many and what resources are needed to meet the MPS plan.

The MPS then represents the input to the Material Requirements Planning (MRP), which uses more detailed data such as requirements to be met, inventories, and bills of materials to define planned orders. In fact, the MRP will include planning not only for finished goods as in the case of the MPS, but also for semi-finished goods and raw materials. The MRP will then act as input to Capacity Requirements Planning (CRP), which will establish the load of each work center.

All these records are updated with rolling and frozen period logic. Although the planning covers a long period, in fact, it is constantly updated as new data become

available, while only those planned in the short term are confirmed and become actual production or purchase orders.

4.8.1 Master Production Scheduling (MPS)

The MPS record represents the output of the medium-term planning processes. It will contain information regarding forecasts, actual orders, quantities in stock, and coverage logic that will be used to calculate MPS orders and Available to Promise (ATP), which is the calculation of how many products can be promised to the end customer in a certain period.

Period	1	2	3	4	5
Forecast	10	10	10	10	10
Orders	7	8	9		
On-hand	30	20	10	30	20
ATP	16			30	
MPS orders	30	0	0	30	0
Starting on-hand = 10			Fixed batch strategy = 30		
Safety stock = 10					

Figure 4.11. Example of MPS record

One of the coverage logics present in the example given concerns the production planning strategy, which normally in business practice can be of three types:

- On-demand. In this first case, the assumption is to produce the expected quantity in a certain period within the same, MPS orders will then be equal to requirements.
- Level production. The goal of this approach is to achieve level production across periods, avoiding large discontinuities that can be costly or even unsustainable for an organization, but at the expense of maintaining a higher level of inventory on average. Planned orders will then be calculated as an average of requirements over the reference periods. With this strategy, however, the risk of stock

breakage increases and precautions will therefore have to be taken, for example by setting an appropriate level of safety stock.

- Batch strategy. This strategy allows orders of a fixed quantity to be launched, calculated based on constraints imposed by the production system.

In the proposed MPS record then, there is a row called ATP that represents the Available to Promise. For many products, in fact, the customer does not expect immediate delivery, but an order is placed. To plan a deferred delivery then we will need the information about the finished products that can be promised to the customer, the ATPs precisely. These will be calculated by adding to the on-hand and planned orders, then going on to subtract the actual orders already confirmed. Based on this result we will be able to tell whether or not the organization can meet the customer's request. It is important to note that in order to apply an ATP logic in a business context that is certainly more complex than the example given, a lot of input data on which to rely is crucial, so it is complex and expensive to reason with this logic, and each individual company will have to make assessments based on its own market.

4.8.2 Material Requirements Planning (MRP)

This second tool represented, the MRP record, presents a more detailed planning than the previous one in that it is designed for the short term, where it is necessary to have a clear idea of what the actual production will be in order to be able to procure the materials and resources needed for it. The ultimate goal is the calculation of planned orders, which once confirmed will become actual production or purchase orders to be scheduled and started. As inputs instead we will have requirements, open orders already entered, inventories and coverage logic such as safety stocks, lead time and safety lead time, and coverage strategy.

This way of managing requirements is considered look ahead because the starting data used is sales forecasts, thus a future data, as opposed to look back techniques such as using reorder point.

Period	1	2	3	4	5
Gross requirements	0	22	10	15	23
Open orders	0	12	0	0	10
On-hand	10	0	0	0	0
Planned orders	0	10	15	13	0
Lead time = 1 period			Safety stock = 0 pcs		
Start on-hand = 10 pcs			Order on requirements		

Figure 4.12. Example of MRP record

Even in the case of MRP records, different reordering policies will be possible, the advantages and disadvantages of which will be evaluated according to the type of product offered:

- Order on requirements. As in the case of MPS records, following this strategy will produce or purchase in each period exactly what is needed, without any grouping logic.

- Reorder with minimum quantity. This logic involves a minimum quantity that can be ordered, which may be due, for example, to constraints imposed by the supplier or to batch-based production logic.

- Reorder with maximum quantity. In contrast to reorder with minimum quantity, in this case the constraint specifies a maximum quantity that can be ordered, which is often due to logistical or transportation or storage problems.

- Reorder with multiple batches. This logic is also influenced by the company's suppliers or production systems and involves reordering with batches of a fixed quantity and its multiples.

- Coverage period. This last logic is designed to reduce the proliferation of the number of production and purchase orders by bundling them into multiple periods for production or transportation efficiency reasons. We will then go on to define a number of periods, chosen based on some business judgment, within which MRP orders will be merged at the beginning of the first one.

For a complete analysis of MRP records, however, it is necessary to introduce some concepts and logic used by them.

The first process presented is that of requirement netting. The formula for netting is used to move from gross to net requirements, going to consider not only the coverage in the various periods, but also inventories and open orders already in place.

Another key process will then be gross to net explosion. In fact, as already pointed out, the greater degree of detail in the MRP results compared to those of the MPS is also due to the calculation of semi-finished and raw material requirements. Therefore, it will be necessary to calculate the net requirements of all components in the bill of materials, which is the starting point of this calculation process as it allows us to link MRP records of parent and child codes, considering quantities and lead times needed. In this way it will be possible to plan everything necessary for the production of the finished product code, starting with the purchase of components and going through the production of semi-finished products.

Thus, it is clear how the process of requirements netting serves the calculations of individual MRP records linked to a code, while the process of gross to net explosion aims to tie together the various records belonging to the same bill of materials.

Finally, it is important to present the concept of low-level coding. In fact, it often happens that a BOM presents the same code at different levels of the BOM; it will then be necessary to "recode" these to the lowest level, since it would not make sense to split orders just because they are at different levels of the BOM. In this way it will be possible to obtain a unique MRP record for each code, which presents the aggregate schedule of the various BOM levels.

In business reality MPS and MRP coexist and are integrated with each other and often are not clearly distinguished, but simply a single record is calculated to cover a long period that is updated using the rolling with frozen period technique presented in this chapter. This is the case in the project that is the subject of this thesis, as in the Microsoft Dynamics 365 ERP there is no distinction between the two records.

4.8.3 DDMRP – Demand Driven MRP

Today, MRP techniques are evolving to meet the ever-changing and more complex needs of supply chains. In fact, they are often expanded globally, which requires timely, precise and certainly more complex planning than in the past. In reality, with the use of past tools, there are poor inventory management performance, inadequate service levels, and high carrying costs to address these issues.

One of the new techniques used, and the one on which the Planning Optimization presented in the ERP chapter is based, is Demand Driven Material Requirements Planning (DDMRP). This method aims to better manage uncertain situations and to reduce bullwhip effect in the supply chain than the old MRP systems, going to extend their functionality rather than replace it. DDMRP is based on pull techniques with respect to demand; thus, instead of depending on the accuracy of forecasts the calculation will be based on the actual utilization of materials, and procurement is managed through a simple color visual system. In fact, strategic buffers will be placed along the supply chain for each of which three different stock levels will be specified. Based on the actual level of the buffers we will be able to prioritize some buffers over others.

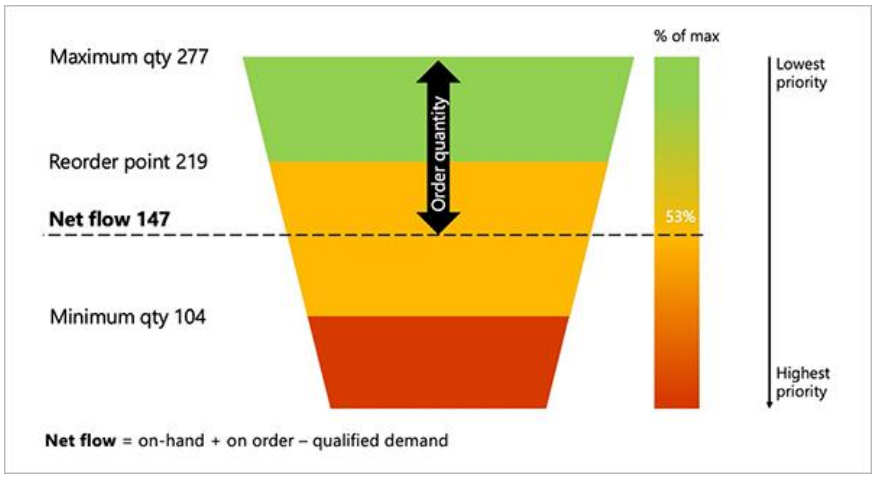


Figure 4.13. DDMRP logics

The main activities to be carried out in using these logics will therefore be five:

1. Strategic Inventory Positioning. Represents the evaluation of the convenience or not of placing a buffer of a certain code at a point in the supply chain. The critical positioning factors considered are customer tolerance time, market potential lead time, variable rate of demand, variable rate of supply, inventory leverage and flexibility and the protection of key operational areas.
2. Buffer Profiles and Levels. Consists of the sizing of strategically placed buffers based on the needs of the specific items under consideration. The output will consist of the division into the three levels presented above, red, yellow and green, which will help the decisions of the next steps.
3. Dynamic Adjustment. Given that this technique aims to manage materials in an unstable environment, it will be necessary to periodically review the calculations made on buffers and adapt them to a changing context.
4. Demand Driven Planning.
5. Visible and Collaborative Execution.

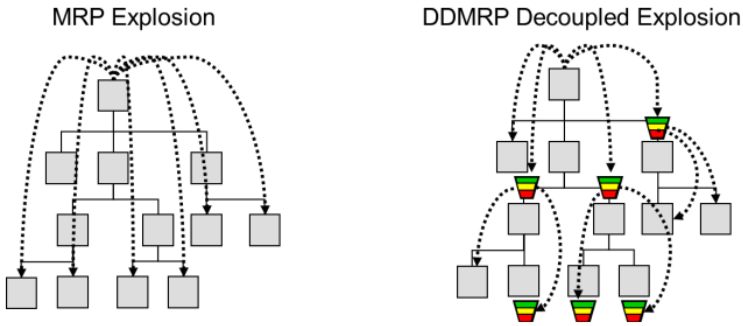


Figure 4.14. Differences between MRP and DDMRP

It is important to note that specific assessments of the industry of the company under consideration and its issues are necessary to understand whether the use of DDMRP, hence demand management pull logics, is the most appropriate choice.

Finally, there are several examples in the literature of how DDMRP systems are very efficient and stable in managing business contexts characterized by instability along the supply chain, but also peaks due to seasonality by allowing the company to level them out within longer periods.

5. PROJECT MANAGEMENT AND CHANGE MANAGEMENT

This second theoretical chapter will deal with another fundamental management issue in the success of the Nice project, project management. Without project management practices, as well as those of change management which we will see are of fundamental and indispensable support for the success of activities, it would in fact not be possible to achieve certain objectives, despite having qualified and competent resources.

Let us therefore start with the definition of a project:

"A set of activities that are interconnected, unique and complex and have a purpose; they must be completed within a certain time range (date of start and date of end) respecting requirements referring to time, costs, quality and resources".
ISO10006 (a standard for quality in project management)

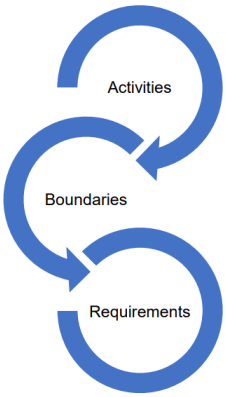


Figure 5.1. Three main dimensions of a project

It is even clearer now that the one carried out by Deloitte in Nice is to all intents and purposes a project as it has many activities to be carried out, over a six-month period, respecting a prefixed budget and leveraging the skills of the human resources of the Deloitte network. For this reason, it is necessary to pay special attention to this subject, which will be analyzed starting from the methodology used in this project explaining

the reason why has been chosen a waterfall methodology compared to an agile one, to then deep dive in project management practices thanks to the Project Management Body of Knowledge (PMBOK) book, which is the guide published by the Project Management Institute that represents the standard and reference point for this profession. After an initial general overview, the importance of change management in relation to project management will be discussed with the support of a framework proposed by Kotter, emphasizing why they must be integrated for successful activities.

5.1. Agile versus Waterfall project management

In the project object of this thesis, the decision taken was to use a waterfall approach to project management, instead of an agile one. In this paragraph the difference between the two methodologies are explained in order to understand the reason why this decision has been taken.

The waterfall approach is the most classic approach to planning and executing a project and involves the precise definition of objectives and deliverables at the beginning of the project. In this way the various project steps can be planned in a precise and timely manner, emphasizing objectives, responsibilities, deadlines, costs and expected benefits. During the project then the goal is to follow this planning as best as possible to achieve stability and a process that is well structured, predictable and documented.

The agile approach, on the other hand, changes the conventional methods of working and approaching a project by providing only high-level planning, rather than defining a more detailed plan that must be strictly followed. The solution, then, is developed step by step by the project team, defining them through short cycles based on previous outputs. Normally this methodology is used when the project objectives are not clearly specified at the outset, and therefore only a vision of the project is defined rather than a detailed plan. However, this can lead to difficulties related to the lack of clarity of the subsequent project phases and the objectives to be achieved, but it greatly increases flexibility.

For a proper choice between the two methods, a methodology is presented that includes some initial steps to exclude the agile methodology route, as it is not appropriate for some projects, and then presents factors for making the most appropriate decision.

Regarding the exclusion criteria they are:

- Nature of the project includes the analysis of the decomposability of the project, technical or legal constraints and the criticality of the project. In the case of agile methodology, the same can lead to several difficulties in particularly critical projects in which various changes and instability are not acceptable, as in the Nice case.
- Nature of the organization that has to face and carry out the change, as the agile methodology represents a radical change in the way of working. In Italian companies to date, the corporate culture is often still tied to standard working methodologies, while abroad agile practices are used more often.

As for the selection criteria, on the other hand, they are:

- Project constraints: these relate to the project from a practical point of view and measure complexity, criticality and variability of the following project dimensions scope, quality, risk, time and budget. If the project has low variability but high complexity, as in the case of the Nice project, a waterfall methodology is more appropriate to achieve the objectives.
- People and culture: this point concerns both the organization in which the change is proposed and the project team and aims to measure whether the people involved share new and innovative working methodologies or are tied to traditional working methods.

5.2. Project Management Body of Knowledge – ten areas

In recent years, the business environment and the way of doing business have greatly changed and developed from stable, production-focused markets with low variability of demand to much more unstable markets with constant demand for novelty, new products and extreme flexibility.

This change has been driven by new emerging technologies and new approaches that have given rise to the need for renewed ways of working and facing the challenges of today's dynamic world. This gave rise to the idea of shifting the focus from functional areas to individual end-to-end processes, to achieve greater control over activities and coordination between resources, increasingly pushing for interdisciplinary competencies and the management of activities through projects.

In response to these many challenges, the Project Management Institute (PMI) has published the Project Management Body of Knowledge, a guide to best practice in project management, aimed at documenting and standardizing the activities to be carried out for a successful project. This guide, of which the first version was published in 1987, is constantly being updated and revised to keep up with the dynamism of today's world (the latest version dates back to 2021).

The considerations made in this chapter are applicable to every sector and type of project, are therefore of a high standard and characterized in particular in ten different knowledge areas. These areas, which will be detailed below, are:

- Project scope management
- Project time management
- Project cost management
- Project quality management
- Project human resources management
- Project communication management
- Project risk management
- Project procurement management
- Project integration management
- Project stakeholder management

5.2.1 Project scope management

Project scope management is about defining a project scope, differentiating the activities that are included from those that are not, in order not to lose focus and avoid lengthening time and increasing costs.

This first area of knowledge is aimed at producing three main outputs: a project charter, a work breakdown structure (WBS) and a project plan. These tools will be a fundamental support to project planning activities, without which the project would surely fail.

The project charter is a document that formalizes the start of the project and goes on to identify what are the fundamental requirements for meeting or not meeting expectations. It will then characterize the organization's expectations and the expected results. In the case of projects carried out by external companies, as in the case of Nice with the consultancy of Deloitte, it corresponds to the contract that is signed. Going into more detail about the contents of this document, as they are the basis and starting point of the project, the following must be detailed: purpose and rationale of the project, measurable goals and key success factors, requirements, description, risks, milestones, budget and project manager.

Once the project charter has been concluded and signed, the project can be considered to all intents and purposes to have started, and the project work breakdown structures (WBS) will then be produced. A WBS is a hierarchical tree structure that can describe activities and/or human resources responsibilities. WBSs are essential because they allow planning and control over project activities, keeping a formal, written record of them and eliminating the risk of forgetting; because they divide the project into various parts and trace the main deliverables and the most important milestones; because they allow the aggregation of data in terms of time, costs and earnings at different levels of the hierarchy.

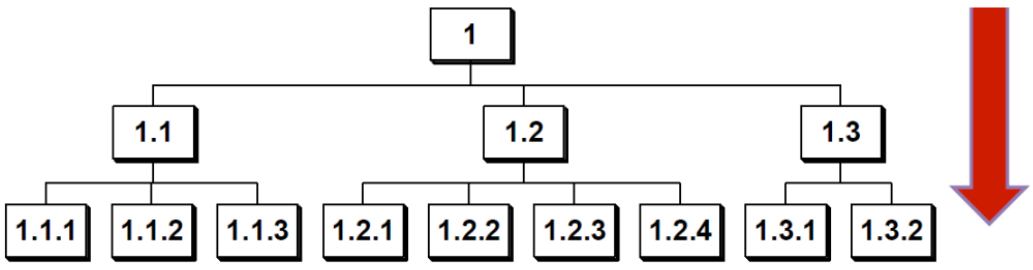


Figure 5.2. Work Breakdown Structure

Finally, the project plan allows the control of progress in terms of scope, going hand in hand with the approvals of deliverables by the project manager.

5.2.2 Project time management

The ultimate goal of this second knowledge area proposed by the Project Management Institute is to ensure that the project is completed by the deadline. Procedures and documentation must therefore be established to plan, develop, manage, execute and control the project schedule, following a guide.

It will therefore be necessary, firstly, to know all the activities to be carried out, taking this information from the project WBS, to understand and define milestones, necessary resources, time and costs.

Once this is done, it will be necessary to sequence the activities by taking into account various factors, the most important of which is the relationship between the activities. In order to define these relationships, two main constraints must be taken into account: the first concerns the start and end dates of the activities, which often depend on the conclusion of the previous ones or have other influences; the second concerns compliance with project milestones. Another important analysis to be performed prior to a final sequencing definition concerns the criticality or non-criticality of the activities in question. A critical activity will have to be started as soon as possible and will not have any degree of time flexibility, formalizing the critical path that will dictate the project timetable. Non-critical activities, on the other hand, will have a greater degree of freedom and we will be able to define a slack time for them, i.e. a delay allowed without affecting the project deadline.

Finally, we will be able to produce a detailed estimate of the resources required to carry out the activities in the required time.

To support the definition of project times, the GANTT chart is used, a graph representing the project timeline in abscissas and the aggregation of activities to be carried out in ordinates, in order to represent project phases, milestones and deadlines.

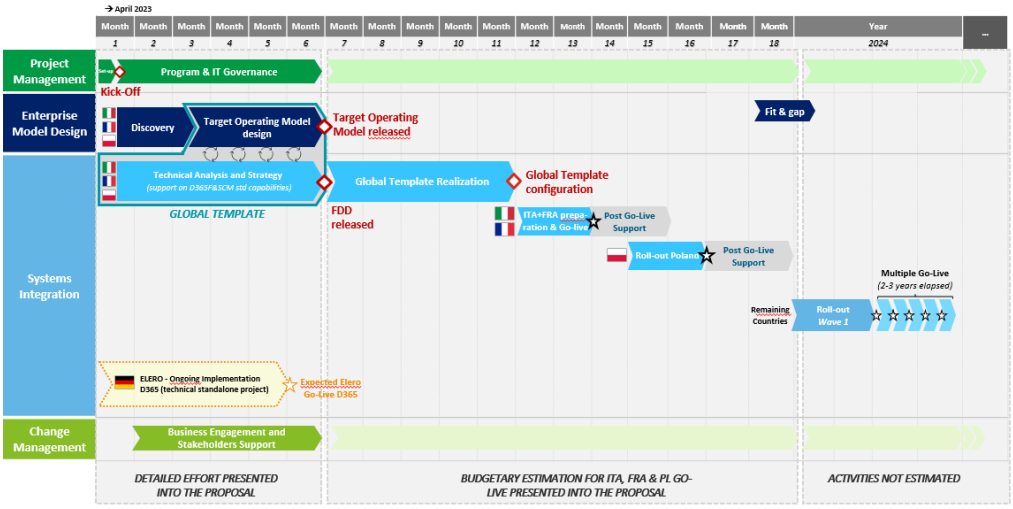


Figure 5.3. GANTT chart of Nice project

5.2.3 Project cost management

Cost management, together with time management, is one of the most critical activities influencing the success or otherwise of the project. The first activity will concern the definition of a project cost, based on the activities to be performed, the resources and the time required. To this first estimate, safety margins for project risk management will be added. These margins are the contingency reserve, for the management of known risks, and the management reserve, to face possible unknown risks. The sum of the project cost, contingency reserve and management reserve will be the project budget, which will be compared with the total revenues to calculate the profit margin.

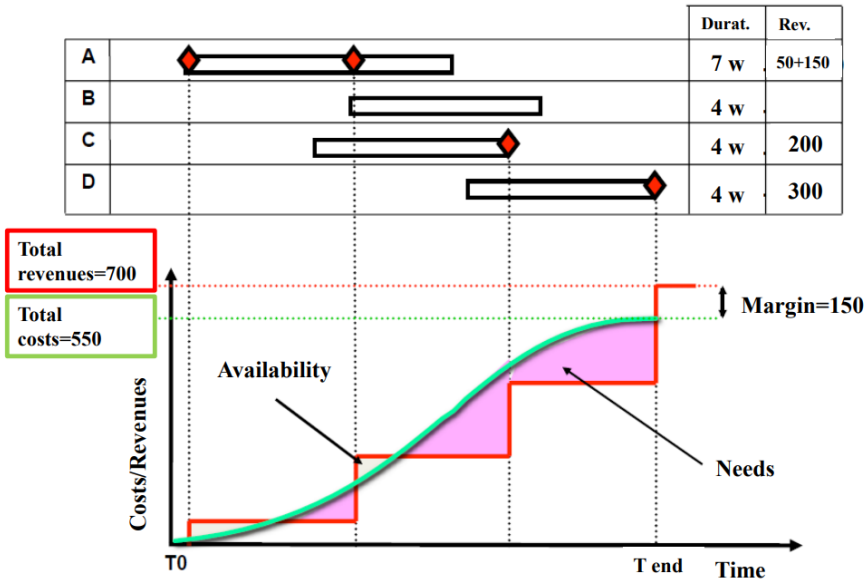


Figure 5.4. Project costs management

5.2.4 Project quality management

Quality management encompasses all activities that are performed to ensure that the proposed deliverables meet the required and defined quality and that the proposed performance meets the project requirements.

The fundamental aspect to be taken into account is not an absolute level of quality or otherwise, but the comparison with the level of quality and performance required and defined during the drafting of the project charter.

Quality will then be defined at various levels and considering different points of view. At the highest level, analyzing the strategic plan, an analysis with respect to the corporate vision and mission is necessary. Going into more detail, project goals and requirements will be analyzed, and finally the stakeholder needs will be listened to. Thanks to these considerations we will be able to define primary goals, which will be necessary to achieve the required degree of quality, and intermediate goals that will have deliverables as output.

5.2.5 Project human resources management

Human resources management is a critical activity in any business context, which deserves special attention.

Like any other type of resource, human resources are limited. The project manager will therefore have to make assessments in terms of their capacity and capabilities, in order to define how many and which people are needed to bring the project to completion.

Finally, it will be necessary to manage these resources and their relationships in the best possible way, to motivate them and make them feel part of the success of the project.

5.2.6 Project communication management

One activity that occupies a large part of a project manager's time is communication with internal resources and stakeholders. Good communication is often underestimated, but it is fundamental to the success of the project because it allows resources that are very different in nature and interests to be linked together.

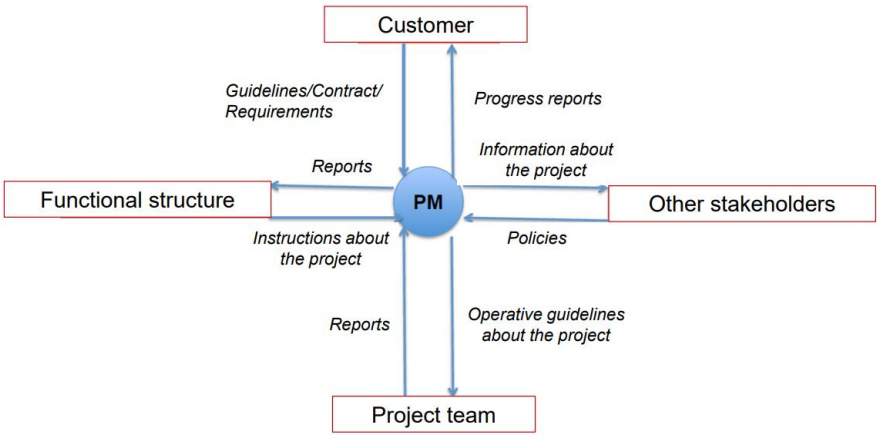


Figure 5.5. Project communication management

5.2.7 Project risk management

The risk of a Project is represented by uncertain events and conditions that may have different impacts on the business, both negative and positive. Obviously it is necessary

to try to anticipate and mitigate, as far as possible, the risks that will always be present within a project, in order to be prepared in the event that these could lead to a negative impact.

To support these activities, it is possible to define a matrix that will characterize the probability of the risk and its possible impact and consequences. By weighing up these two factors, we will be able to take appropriate initiatives with the aim of concluding the project without any particular problems.

Probability	Probability and Impact Matrix								
0.9	0.09	0.18	0.27	0.36	0.45	0.54	0.63	0.72	0.81
0.8	0.08	0.16	0.24	0.32	0.4	0.48	0.56	0.64	0.72
0.7	0.07	0.14	0.21	0.28	0.35	0.42	0.49	0.56	0.63
0.6	0.06	0.12	0.18	0.24	0.3	0.36	0.42	0.48	0.54
0.5	0.05	0.1	0.15	0.2	0.25	0.3	0.35	0.4	0.45
0.4	0.04	0.08	0.12	0.16	0.2	0.24	0.28	0.32	0.36
0.3	0.03	0.06	0.09	0.12	0.15	0.18	0.21	0.24	0.27
0.2	0.02	0.04	0.06	0.08	0.1	0.12	0.14	0.16	0.18
0.1	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
Impact	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9

Risk value	Meaning	Actions
Up to 0,15	Low risk	Registering and monitoring
From 0,16 to 0,30	Moderate risk	Monitoring attentively and be ready to act
Above 0,30	High risk	Immediate actions to mitigate the risk

Figure 5.6. Impact-probability matrix

Risks to be considered include scope, time, cost and quality.

5.2.8 Project procurement management

Procurement management refers to all those activities aimed at purchasing or acquiring products and services from outside the organization that will be needed to achieve project objectives. The key elements will therefore be price, quality of the product or service and adherence to the defined timeframe.

5.2.9 Project integration management

Integration between activities and resources is critical to the success of a project. The project manager is primarily responsible for this area of the project and will need to make sure that everything is integrated in the right way and that resources are in the best condition to perform their activities.

5.2.10 Project stakeholder management

Stakeholders represent all the people and organizations that for various reasons have an interest in the success of the project. This is why it is essential to identify all of them, to then understand their needs and expectations and if possible to satisfy them in the best possible way.

As an example, the stakeholders of a project may be the top management, the sponsors, the project manager, the project team or even the suppliers. In order to prioritize their needs and understand how to communicate with them, however, it will be necessary to define their importance and possible impact. For this purpose, the impact-importance matrix may be useful.

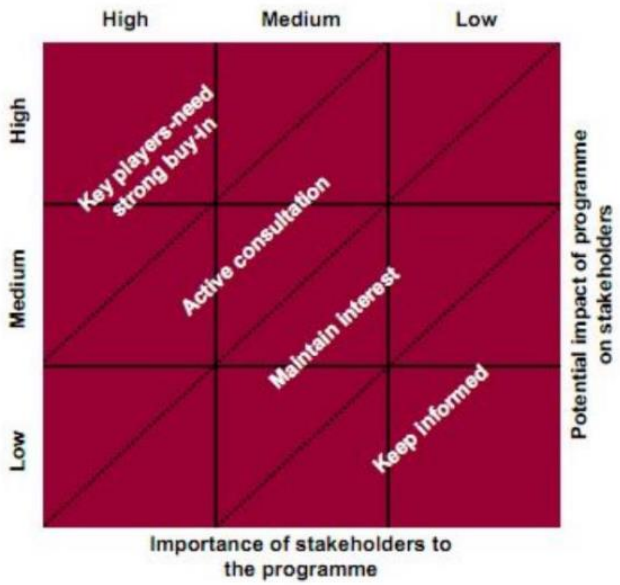


Figure 5.7. Impact-Importance matrix

5.3. The integration of project management and organizational change management is now a necessity

In the first section of this chapter, ten tangible dimensions were analyzed during the course of a project, which are certainly to be taken into consideration but do not represent the complete picture to be looked at. Until the 2000s, in fact, during the analysis of failed projects, the main responsibilities were always assigned to factors such as the lack of defined criteria for success, the poor definition of the project activities, the technology relied upon, the strategy, the support of top management or even difficulties in the business environment. All of these represent practical elements that are closely linked to tangible activities on the part of the people involved. Hardly ever considered were factors related to change management, such as the impact of corporate culture, the communication of the project manager, the involvement of key users and process owners in evaluations. Today, however, these elements are held in high regard and must be taken into account in order for the project to be successful and achieve the desired benefits. For the reasons mentioned above, there are still fewer studies in the literature about the important impact of leveraging workers and managers to convince them to accept and implement changes, rather than simply planning, performing and controlling activities.

However, going back as far as 1995, Kotter in an article for the Harvard Business review pointed out that change cannot be something that is imposed from above, deciding how employees should work. This testifies to the fact that in the past, change management issues were greatly underestimated and considered to be of little importance, although some studies on the subject were nonetheless present. Kotter pointed out that change often failed due to inattention to the corporate social system rather than technical inefficiencies, so it is important to pay attention to factors such as leadership, organizational resistance, corporate culture and ethics or user satisfaction.

Today, however, there is certainly more attention and there are more studies on these issues, although given the complexity of the subject and the particular nature of human relationships, change projects often encounter difficulties.

5.3.1 8 steps methodology of Kotter for change management

In his studies, Kotter identifies 8 steps to follow based on the fundamental factors to be taken into account and studied in detail in order to make the project successful from a change management perspective. The proposed steps, which will be detailed later, are shown in the image below.

Figure 5.8. Kotter 8 steps Change Model

Create urgency

The starting point should be to create a sense of urgency for change in both managers and employees. The aim is to make the reason for the change understood and the need for it felt, because without the support of the people involved the change would not be possible. In this way, people will be prepared and motivated for the support.

In order to do this, however, it is often not necessary to present simple and basic statistics, but a dialogue will have to be created from them to understand the causes of the difficulties and to start discussing the change, in this way the sense of urgency will create itself.

Some practical activities that can be carried out are the identification of potential threats and opportunities through SWOT analysis, the drawing of possible future scenarios or meetings with those involved in the change to open a two-way discussion.

Build a guiding team

Change is not feasible without a coalition of people committed to the project who can lead, coordinate, communicate with and convince others. It will therefore be necessary to put together a team of people with the right skills and who can be the bearers of change by influencing all those involved.

The size of the team will vary depending on the complexity of the project and the resources needed, but a team that can effectively drive change will need to have the following people:

- The sponsor. He/she will be responsible for the change initiative and will have to bring support and control the resources needed for the change.

- The senior guiding team. The members of this team are selected by the sponsor and will be people with sufficient influence to support the change in their areas of interest. This team will develop vision and strategy and guide the team through all difficulties that may arise during a project.

- Filed guiding team. This team will comprise influential people within the organization who will carry the strategy defined by the senior guiding team.

- Change teams. This team will follow the activities necessary for change management and ensure that they are carried out, placing themselves in a more operational role.

Some activities that can be carried out are identifying leaders and stakeholders, working on team building, asking for commitment and support for change from these people.

Form a strategic vision

Without a clear idea of the future of the project, detailed in the vision and strategy, change is not possible. A well-structured vision indeed helps the change to be

successful, but we will also need to define tangible and realistic objectives that allow us to keep track of the changes that have taken place.

Some examples of activities to be carried out in this phase are aligning with the organization's values, listening to the ideas of the organization's people, using and studying quantitative data to define a possible future, and developing a vision that is simple and easily understood.

Communicate the change vision

It is clear that without proper communication of the vision and strategy, they cannot be implemented. The objective of this step is therefore to involve people and make them enthusiastic and participate in the change.

To do this, some activities that can be carried out are to encourage feedback from employees on their misgivings about the change, to communicate in a simple way to avoid doubts and confusion, to use all company communication media to make sure that those who need to be reached are reached, and to communicate the change repeatedly.

Enable action by removing barriers

During a project involving change, there will certainly be barriers to overcome. These barriers may come from various sources such as processes, employees or managers for example. It will therefore be crucial to identify these blocking points in order to address and resolve them in the best possible way.

Some of the activities to be carried out in this phase are therefore to identify the obstacles and causes of resistance, to make sure that all those involved are aligned with the change taking place, and to think about rewards for those employees who bring the change.

Generate short-term wins

Creating one big goal can make people lose commitment to change and lead to less interest in it. On the contrary, with short-term goals every 'win' that is achieved will motivate people and make change easier. To do this, however, it will be necessary to find the right trade-off in order to avoid, on the contrary, creating overly simple and short-term objectives that can also demotivate staff and make them perceive change as something unimportant.

Some activities that can be carried out are the identification of objectives, the breakdown of high-level project activities in more detail and structuring a reward system for the achievement of these objectives.

Build on the change

One problem with short wins is that they can give the impression that the final goal has been achieved, when there is still a long way to go. Instead, each success must be an opportunity to discuss what has been done correctly and what can be improved.

The activities to be carried out in this phase will therefore be the analysis of the factors that led to the success or slowed it down, the definition of more accurate future goals based on the evolution of the project.

Make it stick

As a final step, it is crucial that the change once effected becomes an integral part of the corporate culture. To do this, it is important that leaders, following the conclusion of the activities, continue to be bearers and sponsors of change.

To do this, some activities that can be carried out are to convey the change to new hires, to create a replacement plan for the bearers of change who eventually leave the company, and also to continue to talk about the change and the positive effects it is bringing.

It is therefore now clear that 'The nature of project management is change', as Griffith-Cooper and King stated in 2007. Today's literature on the subject emphasizes with increasing force that without involving people, without being the bearers of change, without creating the right context for this change to take place, it will be much more complex and difficult to implement.

6. NICE PROJECT, AS-IS DISCOVERY

The implementation project of the new ERP in Nice S.p.A. starts and is closely linked to the review of business processes that took place in the first six months of the project, which is the subject of this thesis. The reason for the decision made by Nice's management to proceed with the business transformation path and not simply make a system upgrade is in fact linked to the assessments made in the theoretical chapter on ERP. As already highlighted, a new Informative System can and must be an opportunity to review and make business processes more efficient, both to discuss together with key users and process owners the major problems and how to solve them and to design activities that are feasible with the system's potential under consideration, evaluating the whole IT architecture to rationalize it and its related costs.

The project, therefore, was divided into two macro-phases, the as-is for the study of how activities are carried out today and the to-be for designing, together with Nice people, the future of the group. The following two chapters will analyze the main points emerged during the analysis done in these phases.

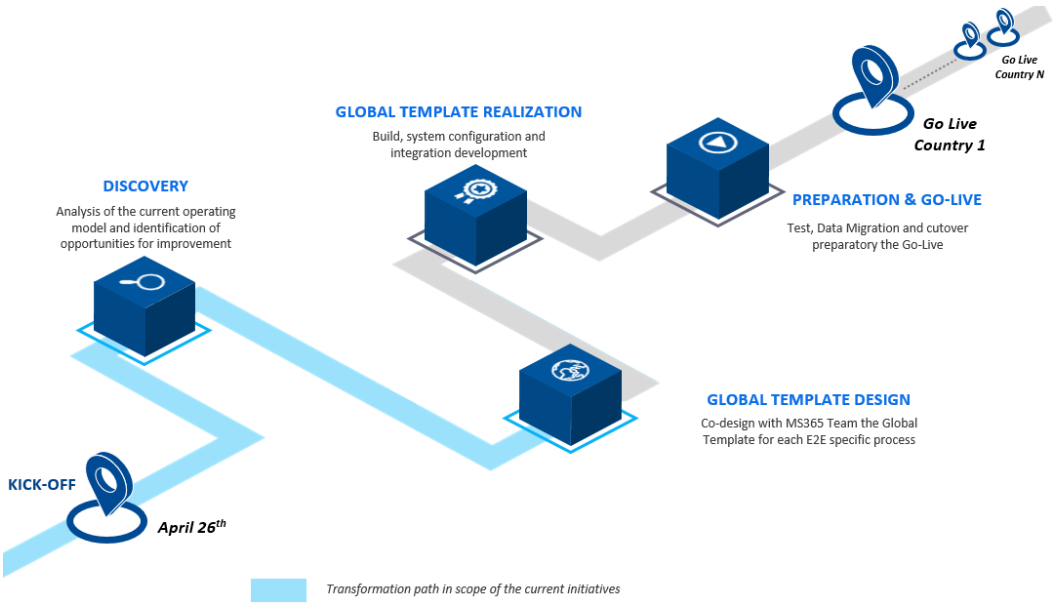


Figure 6.1. Project path

The first discovery part was the as-is during which the main flows concerning the processes covered by this thesis were mapped together with key users and process owners and then the main attention points that emerged were discussed, again together with Nice people to involve them and make them part of the change taking place. These attention points were weighed according to their importance and impact to propose possible directions of improvement for the future to be evaluated in the next phase. During these first months of the project, analyses were also carried out in the subsidiaries in the project scope, i.e. France Germany and Poland, as the ultimate goal of the deliverable produced and discussed in this thesis, the Target Operating Model, is to find solutions that can then be scaled up to the other group subsidiaries. This phase is particularly critical as they have major differences, the most glaring example of which is Fibaro, the Polish site that mainly manages the Smart home business unit, in which the electronics are produced in-house as opposed to the other subsidiaries of the group, bringing with it all the criticalities associated with this sector.

The analysis has been divided into the three major process that has been analyzed by the planning and production team of Deloitte, of which I am part: Forecast to Inventory, Plan to Schedule and Make to Deploy. These processes will be deepened and explained together with the main pain points emerged and the solutions proposed. In particular, most of the analysis has been carried out with the final aim of rationalizing the IT architecture and the related cost, carefully evaluating every tool used today to support the process to understand if its usage is fundamental for the group or could be substituted by the ERP with small impact.

6.1. FTI - Forecast to inventory

Nice meets the demand of its national and international customers through multiple subsidiaries located worldwide, leveraging on several subcontractors for the production activities and on a 3PL (third party logistic) for warehousing and distribution of finished goods. The subsidiaries are of two types, production plants and commercial. The production plants are located in Italy, Brazil, Poland, Germany, Australia, South Africa,

US and Canada while commercial subsidiaries are located in France, Spain, UK, Belgium, Singapore, United Arab Emirates, Sweden, Portugal, Romania, India, Morocco, Russia, Turkey, China and Tunisia. All these sites let the group cover the needs of most of our globe.

The generation of the forecast is the first activity analyzed and forms the basis for procurement and production planning, which will be analyzed in the following paragraphs. For the generation of forecasts, the Nice Group relies on a software external to the ERP system, which, together with the others used in the company, was the subject of evaluations as to whether or not maintain it with the ultimate aim of rationalizing the IT architecture to reduce costs. This software from Tools Group is called SO99 and was originally chosen because it integrates well with Microsoft systems.

The forecasting process is managed centrally by the Nice Group and focuses on demand planning and replenishment planning. The first activity consists in the generation of an unconstrained demand plan for the finished products through generation of a statistical forecast and coordination between demand planning and sales functions. Then, the second activity consist in the generation of a weekly distribution demand for the corporate finished products, calculated to cover the subsidiaries' demand needs and meet the agreed stock policies.

Based on the historical data of the subsidiaries integrated in the Microsoft ERP system, headquarters generates a demand plan by coordinating with them and integrating any needs that have arisen. To this are added the forecasts of those branches that are not integrated in AX2012 and prepare their forecasts via an excel sheet to be shared. All these data are processed by the commercial logistic and operations department to produce the replenishment plan to cover subsidiaries and customers' needs to comply with the defined stock policies.

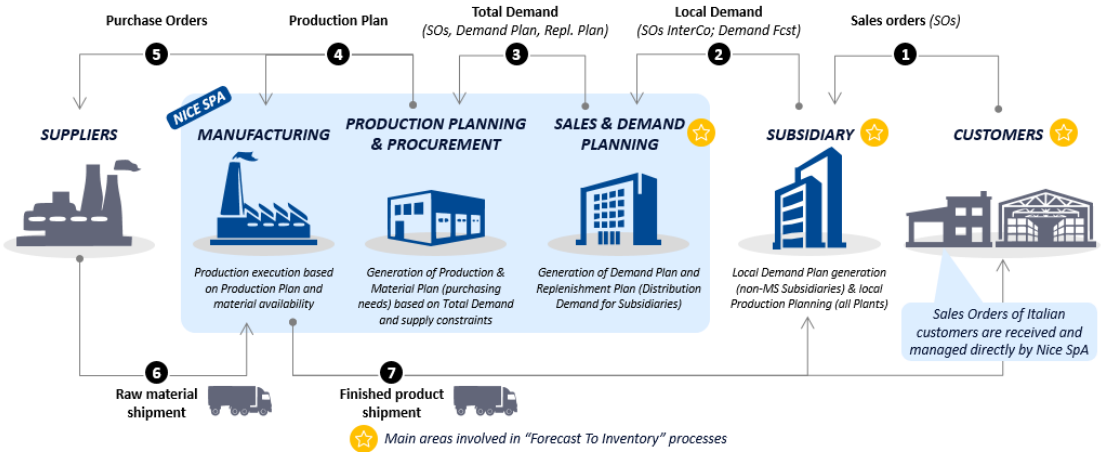


Figure 6.2. Overview of Nice group Supply Chain

All these activities are managed as mentioned by the commercial logistic operations office which is organized by geographical area and will therefore have the following responsibilities:

- Demand planning. Elaboration and validation of a demand forecast through the coordination with the sales business function.
- Demand plan analysis. Monitoring of forecasting process and analysis of demand plan accuracy over time.
- Replenishment planning. Generation of the distribution demand to fulfill the subsidiaries' replenishment needs.
- Transportation planning. Coordination with logistics function and customer service to plan the goods shipments to the subsidiaries.

6.1.1 Demand planning analysis

As already mentioned, the Nice headquarters collects demand data from the various subsidiaries to produce a forecast that will be the basis for production and procurement planning over a 24-month time horizon updated on a rolling basis. These data are contained directly in the ERP system for those subsidiaries using it, greatly simplifying the data collection process as they are available in real time, while it arrives via excel sheets for those subsidiaries not integrated in AX2012.

For this reason, the total demand will be the sum of the sell-out demand, which refers to the subsidiaries integrated in AX2012, and the sell-in demand, which refers to the subsidiaries not integrated in the ERP. The main difference between the two is that the sell-out demand is calculated on the basis of the actual sales to the end customer, as the data is readily available, whereas the sell-in demand is calculated on the basis of the products shipped to the subsidiary during the year, as the actual sales data is missing.

Instead, what is in common between sell-in and sell-out demand is that both are calculated based on sales and not on what was the actual demand during the year, losing that part that was not covered due to logistic or production constraints. The forecast is then calculated with a characterization at individual stock keeping unit (SKU) level, by geographical area covered from the subsidiary and by week. This demand plan, however, does not include spare parts, resulting in a slightly underestimated figure for production, also considering the demand that exist but is not covered for mentioned constraints.

Finally, the result of this calculation system will be the input for the replenishment plan to ensure that each subsidiary receives the necessary products to meet its demand.

Going into more detail about the process, several evaluations are made within the SO99 software on historical demand data before finally approving the forecast and starting with replenishment. First, sales are analyzed to identify peaks and outliers in the last 14 months due to situations that will not be repeated in the following year (such as promotions). These are identified by the software using certain previously set parameters. The demand planner then proceeds to manually correct those peaks (either upwards or downwards), not before aligning itself with the reference subsidiary. In any case, SO99 automatically and partially adjusts the statistical forecast estimating the intrinsic variability of the market demand based on the quantity and number of lines of the sales orders (demand patterns characterized by low number of sales orders lines of significant volumes are automatically levelled to cleanse the statistical forecast by potential outliers).

Then, to support the accurate generation of the statistical demand forecast, evaluation about product phase-in or phase-out are carried out through a set of product attributes and parameters. These parameters are manually managed and directly impact the

forecast generation, leveraging the date of starting and some parameters of the step function used to analyze the product. These parameters are manually defined centrally by corporate demand planner, prior alignment with sales function and subsidiaries, based on estimated sales and impacts on warehouse and products obsolescence (e.g. remaining stock of dedicated components). It's also important to align the ERP system updating the status code of these products, to have the clear information in the whole company that these products are in that phase and for this reason some transactions like sales or purchase are not permitted.

Promotions are another factor to be taken into important consideration during the forecast generation phase, as they will lead to peaks in demand that have to be managed in production. The promotions are defined by the corporate and/or local sales function and used as input to manually review the statistical demand forecast, generated in SO99, prior its release to MyPlan (the MRP software that will be analyzed in the next paragraphs) to anticipate to the production planning the expected increase of demand volumes. Promotions are managed and tracked in a dedicated Excel file not integrated with neither ERP nor SO99 and generally are planned during the commercial budgeting for the following 12 months and communicated to the business partners to anticipate the estimated volumes increase.

Another important evaluation to be done is about dummy products. A "dummy" code is a finished product still in the design phase characterized by a preliminary bill of materials. These items are included in the demand planning process to enable the planning of the products phase-in and signal to the procurement the need to purchase the required components to cover the prototyping activities and estimated future market needs. For these codes, marketing, sales and product managers estimate the market requirements for the new product and the expected date for introduction in the market. Then, the demand planner manually enters the volume of the new "dummy" product in MS AX as "Net Demand Forecast" to provide input to production planning (these codes are not imported in SO99 for generation of long-term demand forecast). Having the "Net Demand Forecast" as base and the preliminary bill of materials of the "dummy" code, MyPlan calculates the components requirements, which are validated by the purchasing department for generation of the purchase orders. The real problem with this process is that is characterized by a limited integration and communication among the

functions involved (R&D, data governance and operations) and by a lack of support of the planning system (e.g. alert or approval workflow), with potential impacts on the planning activities and overall performance (e.g. phase-in codes not included in commercial budget, purchasing of incorrect components or lack of visibility on medium-long term product requirements).

Lastly, throughout the monthly planning cycle, the demand planner monitors a set of reports and KPIs in QlikView (the business intelligence software used) to verify the accuracy of the forecasting process, support inter-functional coordination and evaluate the overall performance of Nice planning process. To produce these reports the data of the demand plan validated in SO99 are first imported in QlikView to enable the following export to Excel and sharing with the other functions. Then MAPE and Bias of the demand plan are calculated at monthly level through comparison of the demand plan, considering a lag of 3 months, and actual sales orders allocated on the "customer required date". Finally, is performed a comparison of sales order shipment date from Nice warehouse with the date requested by the customer taking into account the promised service level.

6.1.2 Demand planning attention points

The analysis of the main pain points is the most important part of the as-is phase, because based on this, evaluations for the Nice of the future will be done. These pain points are divided by process and for each of them are defined the impact on the company, the part of the company involved (organization, processes or system) and different opportunities of development that will be discussed with Nice people in order to find the best solution. For the demand planning process, the main activities for which the pain points have been found out are statistical forecasting, demand plan validation, phase-in and phase-out management.

Statistical forecasting

The first pain point regards the sales order perimeter for demand forecast generation. SO99 in fact generates the statistical demand forecast considering only the shipped sales

orders, leading to potential under-forecasting of future demand due to production or logistic constraints. It's important to note that is done due to the current Available to Promise (ATP) and sales orders management process that is not developed. This point has been evaluated with medium impact and regards processes and systems. Some possible solutions for the future are either evolve the current ATP and sales orders management, but this solution can be difficult and costly to be implemented seen the current situation, or review SO99 configuration to support forecasting based on demand profile.

The second point is about the lack of usage of different statistical algorithm having the demand type as base. In fact, SO99 adopts a single statistic algorithm to generate the demand forecast for all products, without considering the different types of demand profile (e.g. stable, seasonal, sporadic) and the different applicability of statistic algorithms to each demand profile. Also this point has a medium impact and is about the system, so a solution can be to simply extend the current algorithms library in SO99.

The third point regards the limited system support for data cleansing. In fact, SO99 does not automatically cleanse the historical sales based on the statistic distributions and/or analysis, leading to an increase of manual effort for the demand planner to manually analyze and review the demand baseline. This point has a medium impact and is again about the system. Two solutions can be either to configure additional SO99 modules to automate data cleansing, having in mind the costs of license and implementation of a new module, or to systematize promotion management, that are the main source of outliers, to support data analysis and cleansing.

The last point is about the allocation of the sales orders date. The statistical forecast in SO99 is automatically generated based on the sales orders allocated on the date confirmed by Nice instead of the date requested by the customer, leading to a potential incorrect forecast of demand profile. This point regard process and system and has a low impact and for this reason his solutions have not been prioritized. A solution could be to evaluate the possibility to review current sales orders allocation logics in SO99.

As conclusion, we can say that SO99 is a valuable tool to support the forecast generation and analysis but some processes inside it need to be revised in order to make them less manual and more precise.

Demand plan validation

As regard demand plan validation, the first point to be taken in care is the lack of an integrated demand planning tool that is the cause of additional manual effort for the review of demand plan through multiple excel, complex coordination mechanisms among the involved functions, limited visibility on the demand plan reviews and uncertain process timeline due to lack of formalized approval workflow. This point has a high impact and is about all the three dimensions: organization, processes and system. Some solutions could be to configure in SO99 a workflow for "Consensus demand planning" and to evaluate the possibility to grant access to SO99 to subsidiaries to have visibility.

The second point is about the limited analysis of deviation compared to commercial budget that is done. In fact, is difficult to analyze the demand plan volume that is developed in budget terms because the budget is generated in euros with top-down approach by product family and converted in units based on average and not actual price. The price variability over time and across different sales channel lead to wrong results. Then, items phase-in and phase-out are not considered, missing their requirements. This point has a medium impact and regards the process and the system. The best solution is to evolve budgeting logics to integrate profilation of phase-in and phase-out items and to support conversion of the quantities considering the price variations.

The third point regards the lack of system support for promotion management. In particular there is a limited possibility to support the data cleansing, statistical forecasting and demand validation processes taking into account the promotions due to the fact that promotions are managed in excel and not systematized. This point has a medium impact and is about the process and system. The solution is to systematize in the new ERP the management of promotions.

Lastly, the fourth point is about the lack of demand prioritization in the system. In SO99 there are no criteria to automatically segment the demand plan in clusters based on commercial priorities. This could be very important to enable advanced logics of order promising and stock allocation (ATP), support production and capacity planning in case of supply constraints and support the alignment between demand planning and customer

care to validate allocation of stock between intercompany and Italian market needs. This point has a medium impact and is about all the three dimensions analyzed. Some solutions could be to systematize drivers for automatic definition of demand layers or to evaluate logics for finite capacity planning based on demand priorities.

As regard the validation of the demand plan, is clear that the system is not supporting this part of FTI process, but it has the potential to do it. For this reason, the best solution is to maintain SO99 and improve it to cover in a better way the needs of Nice groups, also because the ERP has his own modules to cover the forecast part but this solution will never reach the level of accuracy of a specialized software set up in the right way. It's important also to consider the main challenge that Nice is facing today, raw materials with long lead times procurement. To support this is needed for sure high accuracy of the forecast, since most of the Nice portfolio comprehend make to stock products.

Phase-in and phase-out management

The first point analyzed for this activity is the complex cross-functional coordination and forecasting. In fact, the current process for items phase-in/out management is characterized by limited inter-functional coordination between the parties involved (R&D, data governance, quality, demand, operations), limited demand planner involvement for definition of phase-in/out date, lack of system support for forecasting (forecast volume for «dummy» code are manually input in MS AX and are not included in SO99). For these reasons this point has a high impact and regard organization and processes. Some solutions could be or to introduce a sales and operations planning process or to evaluate the inclusion of dummy codes in SO99 for phase-in planning.

The second point is about the management of item status and status code for items in phase-in/out. Product life cycle is managed through two distinct attributes (item status and status code), characterized by different levels of detail (cross-company in the first case and single Company in the second) and updated separately by demand planning and data governance functions, leading to potential misalignment and impacts on planning processes (e.g. items not imported in SO99, incorrect dismission of a corporate product on multiple companies). This has a high impact on the company and regard

organization and the system. For this reason, is fundamental to review logics for management of item life cycle attributes and to evaluate the possibility to review Dynamics 365 and SO99 integration for management of product phase-in/out.

To summarize, in phase-in/out management the difficulties emerged are due to the missing coordination between different involved teams and lack of a structured process, so not because of SO99. In fact, Nice group was already revising this process when the ERP project started because they felt the need to solve the issues related to it.

6.1.3 Replenishment planning analysis

The final aim of this phase of the forecast to inventory process is to produce the replenishment plan, that is the distribution demand based on subsidiary local demand, projected stock and target stock policies. This replenishment plan is generated at SKU, subsidiary and week level and is the sum of all the local demand, i.e. the sell-out sales from Nice subsidiaries to the local market, the target safety stock minus the on-hand and the intercompany sales orders already shipped.

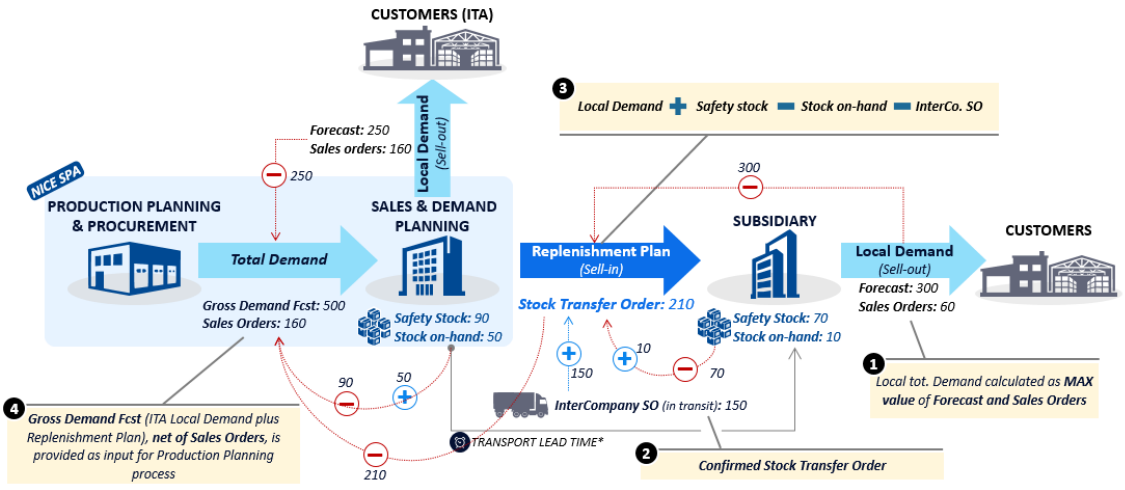


Figure 6.3. Example of the calculation of replenishment planning

The main inputs for the calculation of the replenishment plan in SO99 are subsidiary local demand (the maximum between sales order and forecast), subsidiary stock on-

hand, subsidiary target stock (defined at a corporate level by Nice HQ), incoming quantities (intercompany sales order in transit), projected stock, transport lead time and priority logics. Once SO99 has generated the replenishment plan at a corporate level, the demand planner manually validates it and release it to AX2012 for the creation of the intercompany sales order to replenish the subsidiaries. The most important evaluation that should be done during this phase is about the prioritization of certain orders over others. Sales orders are generally prioritized over forecasts because they represent actual demand to be replenished. Lastly, transportations are planned and managed using an excel file with 1 month rolling horizon, balancing the replenishment needs and logistic shipments saturation.

All these activities are performed for the subsidiaries that are integrated in Microsoft AX2012. The calculation of the replenishment needs process for non-MS AX subsidiaries is performed locally, providing the corporate demand planner an Excel file with the list of intercompany sales orders on 2 months horizon rolling, because corporate has no visibility on subsidiaries stock policies and calculation logics and on sales orders.

Going into more details about the safety stock logics used, for each combination of SKU and subsidiary of Nice network, it is defined a safety stock level to drive the replenishment plan calculation in order to cover the market requirements, while complying with the defined stock policies. The approaches used for the calculation change based on the category of stock cost and could be min-max stock levels, periods of coverage or fixed quantity. On the other side, it has already been pointed out that the subsidiaries operating in different ERPs than Microsoft AX are not managed in SO99. Therefore, each subsidiary autonomously defines the safety stock levels for both local and Nice Corporate products. Subsidiary communicates to the corporate plant through Excel the sales orders to cover local demand and replenishment needs, but the HQ has no visibility on these calculations.

As regard the priority logics for stock allocation, the rule defined is simple: the higher priority is given to sales order, then forecasts come and in the end safety stocks are covered. These rules should be applied at every calculation run in SO99 over the whole planning horizon (24 months), prioritizing by date the replenishment needs of the same

type. The problem is that priority rules currently are not considered in the replenishment plan calculation due to the incorrect stock projection, ascribable to work orders management in MS AX2012 (weekly quantities, in fact, are not coherent with actual production scheduling defined in Excel, a point that will be deepen in the Plan to Schedule paragraph).

Lastly, after the validation in SO99 of replenishment plan and the release in MS AX2012 of the intercompany sales orders, the commercial logistic outbound function, prior alignment with Italian customer service, manually creates in MS AX2012 the picking list to reserve the stock to be shipped to the subsidiaries, segregating it from the stock required to be shipped to Geodis (3PL) to cover the Italian local demand. The problem with the transportation planning is that is managed mostly manually using Excel files and emails, increasing the effort required for it.

6.1.4 Replenishment planning attention points

For the replenishment planning process, the main activities for which the pain points have been found out are replenishment plan generation and transportation planning.

Replenishment planning generation

As regard replenishment generation, the first pain point analyzed regard the lack of visibility on planned production orders and production scheduling (work orders are excluded from calculation since they are not coherent with actual production scheduling that is managed in Excel). The replenishment plan in fact is generated in SO99 based on stock on-hand and work orders released in MS AX2012 with a 2 to 6 weeks horizon, without considering planned production orders (visible only in MyPlan and not in the ERP), preventing generation of replenishment plan considering medium/long-term stock availability. Then, the replenishment plan is generated assuming “infinite stock availability” without taking into account the projected stock availability in Nice corporate plant, leading to additional manual effort for review of the intercompany sales orders and limited visibility on future supply constraints. This point has a high impact on the company and regard the process and the system on support. The solution is to

systematize in a single planning solution planned and scheduled work orders to enable generation of constrained replenishment plan with all the data needed in one platform.

The second point that has been found is about process KPIs and reporting. In fact, there are no KPIs to monitor the overall performance of the replenishment planning process leading to limited control on the process and increased effort for alignment with the subsidiaries. This point has high impact and regard all the three dimensions: organization, process and system. For this reason, is important during the to-be phase to discuss with Nice people the implementation of ad-hoc KPIs to enable the monitoring of this process.

The third point is strictly related to the second one and is about the limited analysis that is performed on safety stock policies accuracy. The review of the target stock policies, configured in SO99 for the calculation of the replenishment plan, is performed without a structured approach to verify their adequacy based on the demand profile (seasonal, sporadic, …), leveraging on analysis carried out on external systems (QlikView and Excel). This point has a medium impact and regard the actual process. Again, the solution is to discuss and implement some logics with people involved in this process.

The fourth point regard the non-MS AX2012 companies, for which there is lack of visibility on safety stock policies and a partial visibility on replenishment needs. The subsidiaries not integrated in MS AX define autonomously the safety stock policies with limited control of Nice corporate, leading to lack of visibility on the overall performance and potential cost inefficiencies. Then, these subsidiaries are excluded from the calculation of replenishment plan in SO99 leading to visibility of replenishment needs limited to sell-in demand forecast (with potential misalignment due to variations of safety stock policies) and manual effort for analysis and integration of sales orders provided in Excel. This point has a medium impact and regard the process and the system. The solution could be to strengthen a proactive corporate control on subsidiaries target stock policies or to integrate in SO99 the non-MS AX Subsidiaries to centralize replenishment calculation (this is enabled by integration in MS D365 as common ERP).

In general, all the underlined problems are ascribable to the fast growth that Nice group has seen in the last few years and is normal when you put together different realities

with different application landscapes and different ways of working. The important thing is to recognize the difficulties and work to uniform all these realities under the same software, as Nice group is doing, to have the right visibility on all the important data of the company to manage them in the right way.

Transportation planning

The first pain point about transportation planning is the lack of a system to optimize loads. This could lead to inefficiencies and costs for missed logistic saturation due to truck loading highly reliant on warehouse operators' know-how, lack of information on product stackability in the system and lack of optimization of loads. This point has a medium impact, regard the organization and the system and can be simply solved configuring a system to optimize load.

The last point about transportation planning regard the lack of a system to support transportation planning and carrier slot booking. The activities for transportation planning and carriers booking are carried out through Excel and/or mail with a consequent time-consuming analysis for periodic review of carriers' rates and limited possibility for definition and optimization of inter-modal transportation routes. This point has a low impact because Nice group is already moving to solve it, but a solution could be to implement a Transportation Management System (TMS) or the configuration of a carriers portal.

In general, for transportation planning activities there is a clear need of a system to support them that today is not present also considering the impact of transportation on sustainability of the company, a topic that is fundamental in this period. For these activities the open point is to whether implement a specialized software, a TMS, or to integrate them in the ERP system that can also manage them.

6.1.5 Subsidiaries in scope – fit and gap analysis of FTI

In the scope of this project, to help design a Global Template that can truly be applied and scaled to all Nice Group companies, four European subsidiaries were included, two manufacturing (Fibaro in Poland producing for the smart home and security business

units and Elero in Germany specialized in sun shading solutions) and two commercials (Nice Poland and Nice France). For these subsidiaries, a fit and gap analysis was carried out to identify the major differences to be taken into account in the to-be design phase and to listen to the needs not only of the headquarters but also of the subsidiaries. The main open points of each process were then identified and classified according to the different impact the analyzed issue has on the business processes using headquarter as a benchmark. For the purposes of the analysis in this thesis, only the main differences that emerged that have a great impact on the design of the to-be will be highlighted.

For Nice France and Nice Poland, the two commercial subsidiaries, we can see a complete lack of software support in the forecast to inventory process. Here in fact SO99 is not present and the demand forecast is carried out in Excel with no system support for data cleansing, statistical forecasting, aggregate planning, etc. The process is highly reliant on users' experience and characterized by an absence of KPIs for analysis of demand forecast accuracy. Another problem related to this is also the lack of visibility that these companies have on the replenishment plan, since they cannot access SO99. For this reason it's difficult for them to forecast the products that they will receive and sell on a medium-long term.

As regard Fibaro, the Poland productive plant specialized in smart home and security, two big differences can be noticed: the ERP system and the production of electronics that is done inside and not outsourced. Due to different ERP adopted compared to Nice HQ, Fibaro generates autonomously the local demand plan. Fibaro currently does not purchase or sell any Nice corporate products and, therefore, does not require the definition of the replenishment plan.

Lastly in Elero, the German production plant specialized in sun shading solutions that is already updated his ERP to MS D365, is used SO99 for FTI process, but with some differences. Data cleansing of historical sales orders is carried out manually in SO99 by demand planner and is supported by automatic alerts of SO99 which highlights the potential outliers based on statistical analysis of the historical sales. Then, the demand plan is not imported into MS D365, impacting the production and material planning process and leading to huge manual effort for the review of planned production and purchase orders.

6.2. PTS - Plan to schedule

Based on the demand requirements (demand forecast, replenishment plan and sales orders) the production planning and procurement functions carry out the generation of respectively the production plan for the finished products and the material plan for components (production, purchasing needs for semi-finished components, raw materials). These activities are part of the plan to schedule process that is divided in production and capacity planning, production scheduling and material planning.

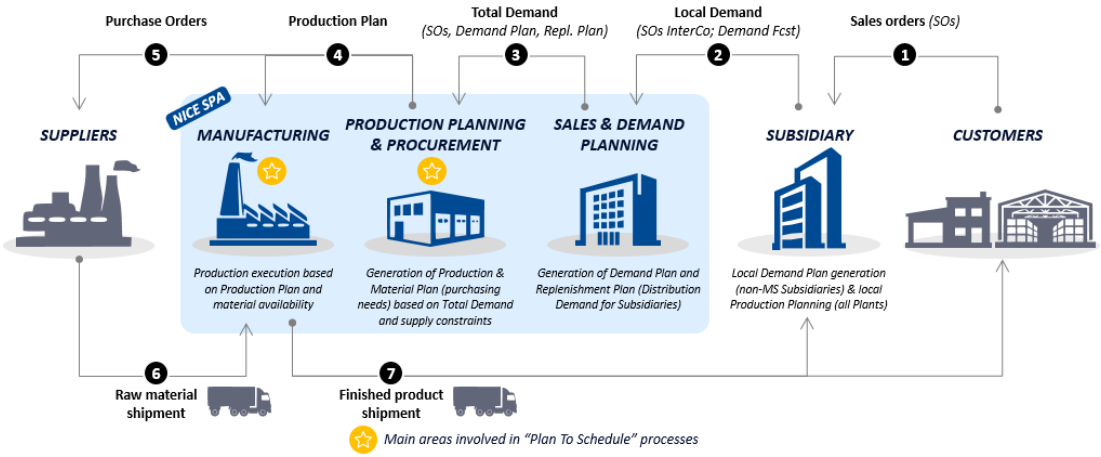


Figure 6.4. Main areas involved in plan to schedule process

During this process the replenishment plan become the input of MyPlan, the MRP software used. MyPlan today is run with infinite capacity because the capacity planning and production scheduling are performed in Excel files that take the data from MyPlan but are not integrated with it. Planners, once they have done all their evaluations in Excel, pass these data to Stock System (the WMS that will be deepen in the next paragraphs) for production execution and again in MyPlan for material planning. Lastly, the relationship with suppliers is managed using Iungo that contains all the information for purchases.

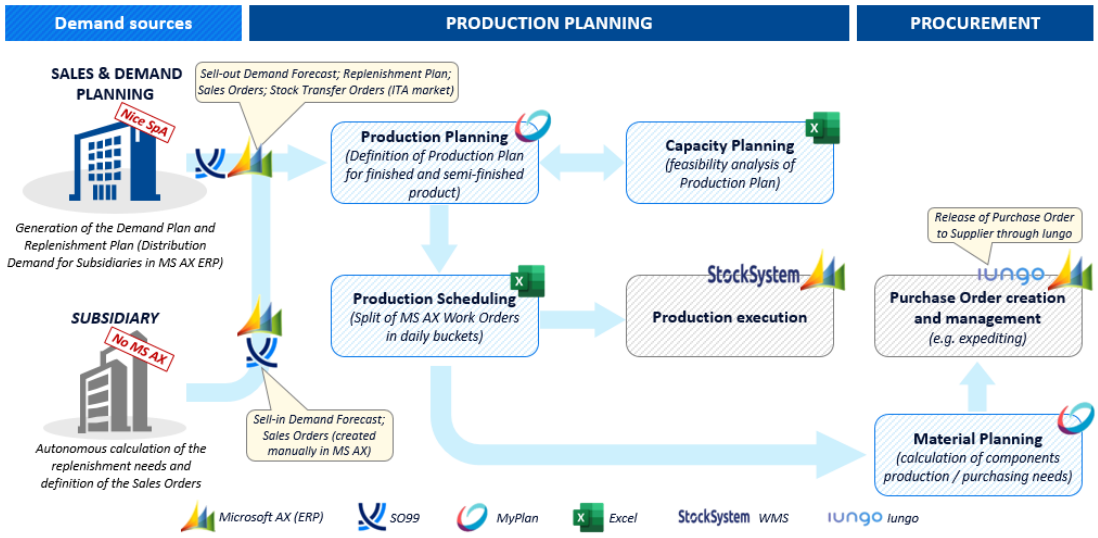


Figure 6.5. Overview of the process with the support systems.

Analyzing the plan to schedule process, it is clear why Nice Group feels the need to rationalize the IT architecture, as there are six different software packages for this process alone that work together but are not properly integrated. This situation leads firstly to considerable manual effort for integration between systems and secondly to high costs for maintaining different software licenses.

All these activities are managed by the operations office which is divided in procurement, internal production, external production and data governance and have the following responsibilities:

- Production and capacity planning. Calculation and validation of a feasible production plan for finished products and sub-components on 12 months rolling horizon in monthly or weekly buckets.
- Production scheduling. Detailed planning of the work orders for each product and production line at daily level with a 2-week horizon.
- Material Planning, Monthly calculation of production and purchasing needs for semi-finished products and raw materials (MRP calculation) with 24 months rolling horizon based on production plan, work orders and demand plan.
- Purchase orders management. Creation, validation and expediting (if required).

The activities related to the production plan definition are performed in HQ only for the internal production. Each production subsidiary is autonomous in the planning activities and generation of the production plan for the set of products managed in the specific plant considered.

6.2.1 Production and capacity planning analysis

MyPlan is the system used to generate the production plan (production needs of finished products) at SKU and month level on 12 months rolling horizon based on the total demand requirements (gross demand forecast and sales orders), the projected available stock and defined production and system parameters. This software was the subject of numerous meetings to determine whether it is still a useful tool today or should be replaced by the new MRP proposed by Microsoft Dynamics365, Planning Optimization. In the past, in fact, MyPlan had been chosen for its greater calculation speed compared to Microsoft's offer, but today this problem has been resolved by making MyPlan lack the differentiating element. MyPlan itself then internally has no articulated planning logic, as it was configured in the past when Nice business was limited to purchasing and resale activities, not having internal production.

Following the long-term production planning in MyPlan, that has a 12-months rolling horizon, the planner evaluates the production feasibility with a crescent level of detail (from production-line and month level to SKU and month level) with the objective of saturating the production lines. These analyses are performed in different Excel files with a huge manual effort. Based on the output of the capacity planning analysis, the planned work orders in MyPlan are manually adjusted, split in weekly buckets (limited to 6-10 weeks horizon) and confirmed prior successive release in MS AX (released work orders are input for production scheduling process).

6.2.2 Production and capacity planning attention points

The first and evident attention point for production and capacity planning is the lack of an integrated planning system. Planning processes is carried out through multiple Excel files, leading to significant manual effort for production plan adjustments; limited

visibility, control and scalability of the process; limited possibility to carry out detailed finite-capacity planning; complex inter-functional coordination mechanisms for review and validation of production plan in case of constraints. This point has a high impact on the company and is about organization, process and system. For this reason, is fundamental to find a solution to reduce costs and increase efficiency. To solve this problem an integrated tool to enable production and finite-capacity planning, process automation, stock optimization and reporting must be identified.

The second pain point is strictly related to the logics of MyPlan and regard the automatic postponement of planned orders. The planned production orders in MyPlan are automatically postponed in the first bucket after last confirmed production orders, leading to limited visibility on actual production requirements to cover demand needs and increased manual effort for analysis and review of the production plan. This point has a high impact and regard also the material planning process, but it can be easily solved by abandoning MyPlan for a new integrated tool.

The third point is about the absence of a formal sales and operations planning process for evaluation of demand and production feasibility, with consequent limited and complex inter-functional coordination mechanisms between commercial and operations departments and potential impacts on production efficiency due to sudden changes in demand needs. This point has a high impact and regard organization and process. For these reasons it's important to design a formalized and standardize process for sales and operations planning to drive cross-functional coordination.

The fourth point regard product attributes and planning parameters. The current product master data does not provide an adequate set of product attributes to enable planning and analysis at different aggregation levels (e.g. product family) and the required planning parameters (e.g. requirements aggregation period) leading to increased manual effort for review of the production plan. This point has a medium impact and regard the system, for this reason it's important to review and enrich the current product master data with for instance attributes, hierarchies and parameters. This point impact also material planning.

The fifth point regard the limited applicability of the current ATP system. The current ATP process, carried out in MS AX system considers only the stock on-hand and not the

projected availability (dependent on planned and confirmed production orders) and does not automatically postpone the sales orders based on product availability leading to increased manual effort for feasibility analysis of the sales orders and production plan adjustments. This has a medium impact and regard process and system. Some solutions could be to systematize production scheduling as in other cases or to evolve sales order management logics.

The sixth point regard again the system's logics and in particular the default allocation of confirmed production orders at start or end bucket. Confirmed production orders are automatically allocated at the start or end of the bucket depending on MyPlan setting and planning view impacting accuracy of "missing code" analysis. This point has a medium impact and regard the system. To solve it a solution could be to review logics for allocation of weekly demand forecasts or to enable automatic creation of production orders coherent with forecast allocation.

The last pain point of this activity regards the lack of analysis and reporting in production. The analysis of subcontractors' capacity in fact is carried out at high level based on rough estimation, periodically reviewed, of the number of units that can be produced per period. Then, there are no dashboard and reporting tools to control over production and capacity planning. In Nice case, with tact time very shorts and simple assembly activities to be performed, this point has a low impact, but can be solved in a simple way configuring some KPIs and dashboard to monitor this process and setting a periodic alignment with subcontractors about their capacity.

In general, is clear that this process is highly affected by the lack of system support and it is fundamental to find a tool that can cover it in an integrated way. this is due to the evolution and changes through which the Nice Group has passed over the years. For this reason MyPlan has been put in serious discussion also because the final aim is to rationalize the IT architecture.

6.2.3 Production scheduling analysis

Production scheduling is mainly based on two software: MS AX2012 and Excel.

This activity starts in AX2012 with the analysis of missing codes, that is carried out with a dedicated feature to verify materials needs of each specific work order and components shortages. This verification of material availability does not consider incoming purchase orders and/or stock available in warehouses different from the HQ and for this reason is quite limited. Based on the "missing code" analysis it is carried out an alignment with procurement to analyze the material shortages, plan eventual stock transfers from other warehouses and, if possible, expedite the purchase order.

Once the planner is sure that all the materials are ready for production, production scheduling is carried out in Excel over 2 weeks rolling horizon to split in daily bucket the work orders released in MS AX2012. Then, the daily production program is shared through Excel with the manufacturing function to enable the production process. Daily production schedule is not integrated in neither MyPlan nor MS AX (work orders in MS AX2012 are managed as weekly quantities allocated by default at the start or end of the week depending on MyPlan settings).

6.2.4 Production scheduling attention points

The first pain point for production scheduling regard the lack of integration of the process in the planning system and the lack of system support for finite capacity planning e scheduling. Production schedule is defined in Excel and is not reflected in production orders in MyPlan and MS AX, preventing the visibility of projected stock and leading to purchase of components not coherent with production program and to a limited applicability of ATP in MS AX and stock allocation rules in SO99 for replenishment planning. This is done leveraging the planner experience and with limited possibility to evaluate its actual feasibility. This point has a high impact and regard the process and the system.

The second point is about the missing codes analysis. The MS AX feature for generation of work order material requirements and analysis of missing codes considers only the stock available in the specific location, without considering the incoming purchase orders and stock available in different warehouses of the network, causing increased manual effort for analysis and potential delays in the production. This point has a high impact and it can be simply solved by improving this analysis.

Now is again clear how it’s important for Nice to identify in the to-be phase an integrated planning tool to enable definition of daily production scheduling supported by dedicated features. The decision to be made concerns the degree of detail the company wants to achieve in scheduling by the software, considering the costs and benefits of different solutions such as implementing the MRP system alone while continuing to leave the scheduling to the planners' expertise, or using an APS (advanced production scheduling) system to support this type of activity as well. In this case, it is also possible to define a roadmap to arrive at the APS system through a number of steps defined over time.

6.2.5 Material planning analysis

Material planning is managed firstly in MyPlan, running the MRP to generate the requirements, and then in Iungo for the relationship with suppliers.

The MRP run in MyPlan automatically generates the component requirements based on the production plan of finished product, bill of materials structure and components lead time, while production routes are not considered. For this reason, requirements generated by the MRP for semi-finished and raw materials fall in the same bucket as the finished product has no off-setting logics. Lastly, requirements of electronic boards are anticipated by 21 days compared to finished product due to the problems related to their procurement.

From this analysis we can clearly notice that this process is characterized by incorrect time off-setting of the dependent requirements, that leads to significant manual effort for the validation of the purchase order (this is carried out manually by SKU verifying its specific lead time). The key reasons of the issue are the following:

- The MRP does not consider the timing for assembling of the semi-finished components taking into account the production lot.
- Purchasing lead time of raw materials are excluded from the calculation, preventing the automatic generation of MRP proposal in the correct bucket for purchase orders release.

6.2.6 Material planning attention points

The first pain point regard the fact that MRP calculation is characterized by an incorrect time off-setting of the dependent production and purchasing requirements since production routes for semi-finished products and purchasing lead time for components are not considered in the calculation, leading to significant manual effort for review and validation of the material plan and limited scalability of the process. This point has a high impact and regard the process and the system. For these reasons is fundamental to review MRP logics to align to best practice and MS Dynamics 365 standards.

The second point is about the management of closed purchase orders for direct materials. These orders require approval in MS AX2012 by the purchasing function for the confirmation of the purchase orders generated by MRP after procurement validation, leading to several cases of purchase order submission to suppliers not coherently with agreed lead time and consequent need for purchase order expediting. This point regard the process and system and has a high impact. For this reason, is important to evaluate the possibility to manage direct materials with open orders (directly approving the MRP proposals) and to simplify the current purchase orders approval workflow.

The third point regard the management of open purchase orders backlog. In MS AX2012 there is presence of a backlog of open purchase orders not properly managed and closed, leading to incorrect calculation of projected available stock and therefore impacting the accuracy of the planning processes. This point has a high impact because it affects the planning process and could be solved reviewing the current procedure for purchase orders management or configuring system alerts.

The fourth point regard the safety stock definition. The safety stock for semi-finished products and raw material are defined with a fixed approach, not re-calculated dynamically and rarely reviewed, leading to potential under-over stock in case of variable demand. Then, safety stock requirements are currently excluded from MRP calculation with consequent increase of manual effort for review of MRP proposals. This point has a medium impact, regard the process and the system and underline the need to evolve the current safety stock definition process. It’s important to note that this evolution is enabled only after adopting advanced planning solution.

The fourth point is about the stock transfer orders. The MRP in MyPlan is segregated at warehouse level and does not automatically generate stock transfer orders from other warehouses of Nice logistic network depending on available stock. This leads to increased effort for analysis of the components' shortages and manual creation of the stock transfer in MS AX. This point has a medium impact and regard the system. Again, is clear how an integrated planning tool is fundamental in Nice context.

The fifth point is about the visibility of sources of components requirements. The current configuration of MyPlan provides limited possibility to verify the different sources that generated the items production and purchasing requirements increasing effort and complexity for inter-functional coordination and review of material plan (a manual analysis at SKU and bucket level is required). This limited visibility has an effect also on purchase for dummy products, leading to purchase of incorrect components and obsolescence costs. This point has a medium impact and could have several solutions like identifying a planning tool to enable the pegging of components requirements, reviewing logics for management of raw material life cycles, introducing two distinct BOM for design and planning or defining alerts or approval workflows for purchase of new dummy components.

The last point regard the spare parts planning process that is not structured. The material planning process for spare parts is managed through Excel by the service and planning departments without a structured process for calculation of future spare parts needs, resulting several cases of spare parts stock-out and lower service levels offered to the customer. This point has a medium impact and regard organization and process. Some solutions could be to strengthen the coordination mechanism between the functions and to structure a forecasting process for spare parts.

Material planning is the process that present the bigger issues, due to the lack of support of the system, difficult coordination between the functions involved and also because for Nice group is very critical for the long lead times of most of their components. For this reason, an integrated planning tool is even more fundamental for the company.

6.2.7 Subsidiaries in scope – fit and gap analysis of PTS

For Plan to Schedule process, only the two productive companies in scope have been analyzed, since Nice Poland and Nice France only resell finished product that are produced in the headquarter and for this reason has nothing to deal with Plan to Schedule stream.

In Fibaro case, the process is characterized by high systems fragmentation, with usage of multiple views of a web application, Excel and Access (the ERP system) leading to limited visibility and control. Each web app view contains a limited set of information causing increased manual effort for definition and review of the production and material plans. Going into more details, production plan is manually defined in the web app with no system support for automatic generation of planned production orders. This web app does not consider MOQ, maximum lot and items safety stock, causing significant manual effort for definition of the production plan and limiting overall process control, with consequent high reliance on users' know-how. Then, capacity planning is carried out in a dedicated view of the web app, providing an overview of the mismatches between available plant workers and total workers required, but no checks are performed on availability and saturation of production machines and lines. Lastly, missing codes analysis is carried out in web app through manual check of components projected stock based on scheduled production orders and product BOM, lacking a dedicated and automatic feature. A problem related to BOMs, is the fact that these are managed in the ERP through inclusion of all alternative components, causing the process to be highly reliant on knowledge of the products due to automatic generation of planned purchase orders for all components and inclusion of items replaceable only for a sub-set of finished products of specific a group or family.

As regard Elero, as already mentioned the demand plan generated in SO99 is not imported into MS D365, impacting the accuracy of the production plan and leading to significant manual effort for the review of it. This point impact also the material plan that start from a time-consuming analysis of all the planned orders in Excel to manually adjust the required quantities. Then, also stock transfer orders are managed in Excel to consider the demand forecast needs and the actual production scheduling (managed in

Excel), to ensure recall of raw materials coherent with actual production and limit the impacts on the warehouse.

6.3. MTD - Make to deploy

Make to Deploy stream involves the set of processes that, starting from the planning and purchasing processes, aim to manage the flow of material within the whole production plant and distribution network to cover the demand of the customers and/or subsidiaries. This stream in particular touches three main processes:

- Logistics. For this process the activities that has been analyzed are reception of incoming shipments of raw materials and semifinished goods, goods warehousing activities, supplying of the production lines and materials return to warehouse, management of outbound shipments and management of reverse logistic.
- Production. For this process the activities that has been analyzed are assembling of the semifinished goods, completion of finished products and management of raw materials consumption.
- Quality. This process is part of the make to deploy stream but is not analyzed in this thesis because it was already being reviewed by Nice management at the beginning of the project. For this reason, few evaluations were made during the project.

Nice HQ, that is called Nice3 and manage the business units of gate and barriers and doors, currently has a production facility organized as follows:

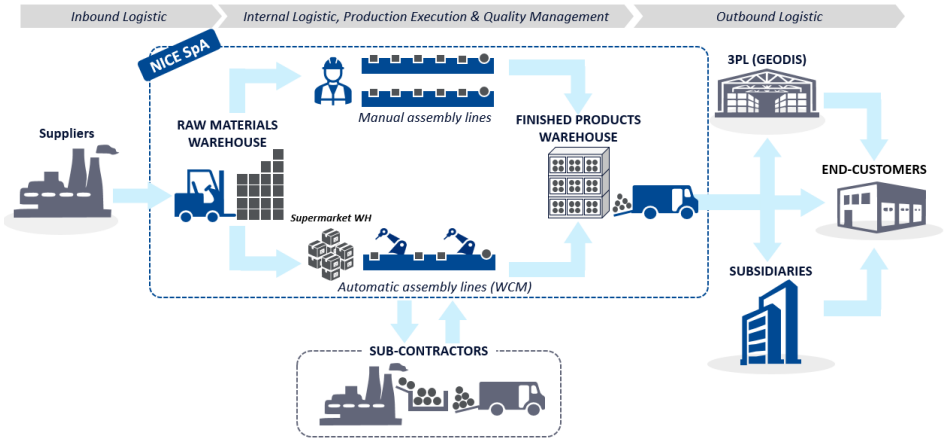


Figure 6.6. Nice HQ production plant

The raw materials are stored in the warehouse where they are picked to be taken, depending on the size, directly to the lines or in a supermarket. This supermarket has been dimensioned to serve the two automatic assembly lines that has been implemented in the last few years but also serve the small parts thanks to bins for the manual assembly lines. All these lines are fed also with subassemblies coming from subcontractors, that produce mostly electronic parts for Nice plant due to the complexity and specialization needed for this kind of production. At the end of the lines there is a small warehouse for finished goods, where products stay only for the time needed to ship them to Geodis, the 3PL used for warehousing and distribution. From here are served both the Italian market and some subsidiaries, while the nearer subsidiaries are fed directly from the HQ.

500 meters far from Nice3 there is also Nice2, another production facility specialized in sun shading solutions manufacturing. Here there are two production lines that are fed directly and daily by the warehouse in Nice3 and that ship the finished product again to the HQ. These two lines are partially automated and use an automatic warehouse system, not tracked in the ERP, to store semifinished goods.

6.3.1 Production and logistic analysis

Production and logistic are managed internally for each production plant and divided in teams organized by business unit. In Oderzo are managed gate and barriers, sun shading

solutions and doors, while there are other production facilities located worldwide for the two remaining business units, smart home and security.

The main activities of this stream are:

- Inbound logistic. Reception, registration and storage of raw materials and semi-finished products arriving in the warehouse.
- Internal logistic. Internal handling of the material needed to replenish the production lines according to production requirements.
- Production Execution. Assembling of components and finished product completion.
- Outbound logistic. Collection of goods and preparation of outgoing shipments (finished products and raw materials to Sub-Contractors).

Warehouse operators then are responsible to manage handling and warehousing activities to receive, store and move the goods within the warehouse while manufacturing function oversees the assembling process to realize the finished goods, the commercial logistic outbound is in charge of preparing the logistic documents for shipment of finished products to subsidiaries, customers and/or Geodis (3PL) and lastly warehouse operators manage the logistic activities and documents preparation for shipment of raw materials to subcontractors.

Also in Make to Deploy case, we can notice a vast landscape of software to manage the process. In fact, in MS AX2012 sales, production work and logistic documents are managed; in Stock System (WMS) are present stock transfer, production advancement and stock adjustments; then BarTender is used for the printing of bar-code labels; lastly, they use different PowerApps developed internally for product recall requests and replenishment of production lines.

Inbound logistic

Inbound logistic process is divided in four main phases: preparation for good receipt, inbound quality control (that will not be analyzed), good receipts and handling unit (HU) creation, physical goods storage and warehousing.

For the first activity, the supplier of raw materials and/or subcontractor provides to Nice by email or through an automatic data flow from Iungo the Packing Slip (the list of all products to be received, their quantities, the related purchase order (PO), etc.). Then, Nice warehouse department creates in MS AX the items journal, inputting all information included in the packing slip and enabling the following printing of the receipt list (that is required for goods receipt phase).

Later, during good receipt and HU creation phase, the warehouse operator prints the receipt list through Stock System to enable goods reception. The goods now are visible in MS AX with the status registered. The received goods, after the successful quality controls, are registered in Stock System through the palmtop tool and associated to a specific HU. The goods now are visible in MS AX and Stock System with the status received. The HU bar-code is created in BarTender system and applied to the whole stocking pallet. Then, the HU is uploaded in Stock System during the goods receipt phase, providing the WMS with the detail of the components stocked on the HU, their quantity and their stocking location in Nice warehouse. A first problem that can be underlined in this phase is that in MS AX2012 is not managed a hard block to prevent reception of the goods in status registered prior the completion of quality controls.

Lastly, there is the physical goods storage and warehousing phase. After the good receipt through the palmtop tool, the stock level is automatically updated in both Stock System (WMS) and MS AX2012 (ERP*)*. Then, goods are stored in any available warehouse position without clear guidelines for warehouse clusterization and optimization of items allocation based on logistic rotation index. All these information are contained in the WMS system, while MS AX2012 does not provide information about HU and location.

Internal logistic

As regard the internal logistic to feed production lines and in particular the management of raw material warehouse, we can identify three different types of products that are managed in different ways:

- Kanban HU. Each HU is constituted by a pallet containing multiple packaged and bins of different products. Then, in the warehouse supermarket bins are prepared to replenish the assembly lines. These units are labelled at pallet level and identified through a univocal bar-code printed through BarTender.
- Non-Kanban HU. The composition and labeling method of non-Kanban HU is the same of Kanban HU. What changes is that they are moved in full across the warehouse (both during material picking and return), while for non-Kanban HU the operator is enabled to pick only the bins required based on production needs.
- Bulky items. These items have bigger dimensions compared to the others and for this reason are managed separately.

Then, we can identify four different scenarios, managed thanks to PowerApps developed, for the management of material flows to production lines and the return to warehouse:

- Supply of automatic lines. The stock of the HU taken from the warehouse is arranged into Kanban bins that remain in storage in the supermarket to supply automatic lines.
- Supply of standard lines. The quantity of the HU taken from the warehouse is prepared into multiple Kanban within the supermarket to be sent to the production warehouse.
- Return as a bin. The HU quantity not supplied to production line and/or supermarket is arranged in Kanban bins and returned to the warehouse as a new HU-Kanban with the consequent printing of a new label.
- Return as a pallet. The HU initially retrieved is returned to the WH not before being reduced by the quantity supplied to production line and/or supermarket.

Production execution

Nice production plant is divided in two main types of assembly lines: standard production lines and automatic production lines (WCM). Today, they are planning to expand the current number of WCM lines, that are two, with a dedicated initiative that will not impact the ERP project. Each product is typically realized on one production line of a specific plant, but the decision of product allocation on a specific plant may be

reviewed, if required, based on the plant total available capacity during the budgeting process. The production logics can be considered comparable among the different production lines and Nice plants.

The assembling of finished products is managed as single-phase process (there is no intermediate progression of the work orders) leveraging on the systems MS AX and Stock System. When the assembling process is concluded, the totality of finished products is tested. After the tests are completed, a bar-code, printed through BarTender system and containing a univocal serial number, is applied to the specific product to enable tracking of the tests performed and key product characteristics (required for management of customer claims). The finished products are then assigned to a specific HU and the stock quantity is updated in both MS AX and Stock System. Contextually to the declaration of finished products completion, the raw materials in the production warehouse are consumed with a backflush logic based on work order quantity and product BOM.

Outbound logistic

The shipments of finished goods from HQ can be managed in three different ways: with intercompany sales orders to serve the subsidiaries, with stock transfer to Geodis (3PL) because the items stocked here are propriety of Nice until the selling is done and with direct sales orders to the Italian end customers. Information on the type of transports are communicated to warehouse operators through an Excel containing the production schedule and the defined split of work orders quantity, agreed by commercial logistic and customer service functions.

Transportation to Italian customers is managed daily with Bartolini and Susa as logistic operators. For both, partial loads are managed for the transport of products. As regard intercompany transportation to the subsidiaries then, they are managed with a full truck logic. Lastly, transportation to export customers are sized manually based on experience of the warehouse operators.

Starting from the sales orders in MS AX, the commercial logistic outbound function prints the picking lists to reserve available stock in Stock System and drive the outbound logistic activities:

- Stock reservation. Stock is reserved with the order lines reservation batch functionality, at the order line level.
- Evaluation of transport capacity. The commercial logistics operations department considers the logistic capacity to generate a sustainable number of picking lists.
- Picking list generation. From the production stock reservation in the deployment order, picking lists are generated manually.
- Picking list transmission. Picking lists are transmitted with a scheduled batch from MS AX to Geodis or Stock System to reserve the available stock for shipment to subsidiaries or customers.
- UDM collection. The warehouse operators identify the different HU and/or items to ship accordingly to the picking list or Stock Transfer Order (for transfers towards Geodis).
- UDS preparation and labeling. The items are collected in the shipping unit (SU), identified with a specific label applied at pallet level (with consequent loss of visibility of initial HU code). The SU is weighed and measured to determine its dimensions (width, depth, height) and physically moved to the warehouse locations for outbound shipments. The SU is prepared for shipment and the WH operator prints the packing slip prior loading of the vehicle and shipment.

6.3.2 Production and logistic attention points

The production and logistics attention points are divided in the same way as the analysis done: inbound logistic, internal logistic, production execution and outbound logistic. Also for this process we can notice a vast landscape of system that are not properly integrated and slow down the process, in particular Stock System is the one that could be substitute by the warehouse management module of the ERP system.

Inbound logistic attention points

The first point about inbound logistic regard rules and system support for items storage. The current process for storage of received items is characterized by absence of warehouse clusterization logics and/or system support for items storage, leading to the items typically stored in any available warehouse position with potential inefficiencies in following picking activities. This point has a high impact in logistic and regard the process but also the system. The solution could be to segment the warehouse in dedicated storage zones, based on the type of raw material, and to configure in MS Dynamics365 automatic put-away logics to support warehousing activities.

The second point is about the shipment comings from some specific suppliers. It happens that these suppliers ship their products without providing in the packing slip all the required information for proper goods receipt by Nice, like item code or purchase order number. This lead to an increased manual effort during inbound activities. This point has a medium impact and is about organization and process. Some solutions could be to support supplier training through a standard template with the information needed or evaluate the possibility to adopt “GS1-128” format to support systematization of additional information.

Internal logistic attention points

Internal logistic is the one that present the main pain points. The first one regard the high applicative variability for stock management and for material recall. In fact, today there are two PowerApps to manage recalls, the ERP and the WMS that manage this flow and are not properly integrated, leading to limited visibility, complex process control and an increased risk of stock misalignment on the different systems. This point has a high impact and regard all the three dimensions. A solution could be to rationalize the applicative landscape through adoption of advanced warehouse module in MS Dynamics365, systematizing the product recall logics and reviewing the logistic model.

The second point is about the picking inefficiencies that are due to lack of warehouse clusterization and clear guidelines for items storage and lack of system support to optimize picking routes. This point has a high impact and is about the system and the

process. To solve this point, the need that emerged is to configure automatic picking routes in MS Dynamics 365.

The third point is about the misalignment between physical and system stock. There are in fact incoherencies between the two, due to the mentioned problems, leading to incorrect visibility of materials availability, delays in production and additional manual effort required for stock adjustment. This point has a medium impact and is about the organization and the process. A solution could be to review logistic flow, warehouse configuration and procedures for stock movement to reduce the gap.

The fourth point is the consequence of the process problem underlined until this point. It happens that negative stock values are present in both the system, AX2012 and Stock System. This takes the company to a significant effort to carry out the stock adjustment, requiring two resources fully dedicated on this. This point has a medium impact and make again clear the need to rationalize the applicative landscape through the usage of the advanced warehouse. Together with the systema rationalization, it is needed to strengthen inbound quality controls to verify mismatches between purchased quantities and effective arrivals.

Production execution attention points

The first point about production execution regards the management of work orders that is not coherent with production. Work Orders in MS AX2012 are managed in weekly quantities not coherently with the actual daily production program for which the scheduling is managed in Excel, leading to incorrect projection of available stock, limited applicability of ATP and replenishment planning and potential incorrect movement of raw materials and components. This point has a high impact and regard the system. The solution is to systematize production scheduling into the ERP or using an APS system, but it depends on the planning tool identified and on the costs.

The second point is about production variances. In fact, there is a lack of visibility on the variances of hours and/or materials of the production orders due to the missing of the production module of the ERP, and the lack of management of standards hours consumption and costs. This point has a medium impact and regard again the system

used to support. Some solutions could be to integrate standard hours and costs in production routes or to adopt a MES system. The problem is that the tact times for Nice products are very short and for this reason the need for this kind of tool should be carefully evaluated, in order to avoid to create a system that slows down production activities.

The third point is about production reporting and monitoring of work order status. Since the production module is absent in the ERP, production advancements are not monitored and there are no report and KPIs of production activities. This point has a medium impact and regard the process and the system. Some solutions could be to review the actual work orders status management inside the ERP or to collect the production floor data in a data-lake, thought to be the starting point for reporting and KPIs.

Outbound logistic attention points

The first point about outbound logistic, regard items traceability. There is in fact a limited possibility to trace origin and characteristics of the items sold to the market due to the time-consuming analysis required for finished products, that is performed with a manual check in QlikView of the serial number generated during final product testing ,and to the lack of traceability of raw materials (supplier, batch) used in the specific unit of finished product. This point has a high impact because create problems for the customer care to understand the source of the problem and is about the system. To solve it, some solutions could be use serial numbers for end-to-end systems traceability, not before having evaluated the impact of this process and could be huge, or to track in MS Dynamics365 supplier batches for raw materials.

The second point is about the transfers to Geodis of spare parts. When sales orders for spare parts are linked to sales orders for finished products, the transfer to Geodis of spare parts for shipment consolidation with finished products is performed out of the system, with unclear goods' ownership. This point has a medium impact and regard the process and the system. The solution is simply to revise the process and internalize in the ERP his management. This demonstrate again that a rationalization of the IT architecture is needed.

The third point is about the lack of logistic reporting. There are in fact no dashboards and KPIs to monitor and control the overall logistic processes. This point has a medium impact and regard the system and the process. For the reason mentioned ad-hoc KPIs should be defined leveraging on standard MS Dynamics365 features and target reporting tools.

In general, as in Plan to Schedule case, it's clear that a real support from an integrated software is not present. In fact, having to deal with such a vast landscape of IT architecture, the processes are surely slow, inefficient and difficult to be integrated on each other due to misalignment between the information contained in each of them. For this reason, MyPlan and Stock System has been seriously evaluated during the project in order to assess if they are really helpful and needed in Nice context or they should be substituted by the dedicated modules inside the ERP.

6.3.3 Subsidiaries in scope – fit and gap analysis of MTD

For Make to Deploy process, consideration about logistic has been done for all the subsidiaries in scope, while the production is present only in Fibaro ed Elero.

As regard Nice France, the communication with the 3PL Geodis is more difficult and not integrated with MS AX2012 of the company for the automatic alignment of stock quantity. Geodis has no visibility of incoming shipments for non-Nice products because these purchase orders are not shared through the interface and for this reason a manual adjustment of stock quantities in Geodis is required. Then, here are managed some products that arrive from the headquarter as standard, but then are reworked by some subcontractors, and kit of products sold only here. For these products, Nice France manually adjusts in MS AX2012 the stock without an automatic process. All these problems are present because this subsidiary does not have a WMS system. Therefore, all items are stored without indication of warehouse position, negatively impacting also the picking efficiency.

In Nice Poland the situation is again different. In fact, logistic activities are carried out through MS AX2012 with no support of a dedicated WMS nor a 3PL party. For this reason, all logistic activities (internal logistic and good receipt in particular) are carried

out manually without the support of palmtop or other tools increasing the effort and time needed. Moreover, there is a lack of visibility of the products that are not branded Nice, due to the non-integration and non-communication between the ERP systems.

Fibaro is the subsidiary that present more differences and criticalities due to the different business units managed here compared to headquarter. Logistic and production activities are carried out through multiple, integrated systems (ERP, WMS, Trace 2) and characterized by high level of customizations and complexity of the systems integrations. The first big difference regards the management of traceability, that here is advanced to single component level and throughout the whole production and logistic network. In fact, through a univocal serial number, updated along the production process, Fibaro can track for each product unit the raw materials used, suppliers' batch, quality tests, etc. Then, inbound logistic activities for raw materials are carried out through the WMS module of Impulse ERP. The WMS provides visibility of the specific warehouse positions where the different handling units are stocked. During the goods receipt, the warehouse operator prints a label through Trace 2 system, which is applied at single package level, to track the supplier's product batch.
As regard production activities, the manufacturing process is managed step by step through Trace 2 tracking each production operation. After completion of each production macro-phase (automatic and non-automatic activities) the worker declares in Trace 2 the item completion and stock is automatically updated in all systems with backflush consumption of components based on actual production quantity, collecting also the information about time needed and so of variances. During the automatic production process then, the system automatically verifies the correctness of the components based on work order and item BOM. In case of mismatches, the production process is automatically blocked. For all the above mentions reasons, production activities performed here are more complex respect to the simple assembly activities performed in headquarter, requiring higher attention and more data to be managed. After completion of the manual final assembling phase, Trace 2 generates a univocal serial number, which is applied through bar-code to both the finished product and its primary packaging to enable the full traceability of the product sold to each specific customer.

Lastly, Elero is the company more similar to the headquarter because it has very similar tools and manage the same business unit, sun shading solutions. For this reason, no relevant differences about production and logistic activities has been noted here.

7. NICE PROJECT, TO-BE DESIGN

During the design of the to-be, Nice's people involvement approach did not change as the success of the project would not be possible without the right change management practices, held in strong consideration by the Deloitte team. During this second phase, opportunities for improvement were discussed in detail, going to identify the activities that require more urgency from those that can be planned in the future to refine the work done and thinking of solutions for each of them that can meet the needs of all the people involved. This was done to bring a sustainable change for the company and that will have to be implemented through various intermediate steps to avoid the risk of bringing an unmanageable innovation in the short term. As first steps therefore, it was decided to intervene more on the processes of Plan to Schedule and Make to Deploy since during the as-is study they emerged to be the most critical and in greatest need of change, particularly from the point of view of the application landscape that sees two systems such as MyPlan and StockSystem which can be replaced by the functionalities of the new ERP system.

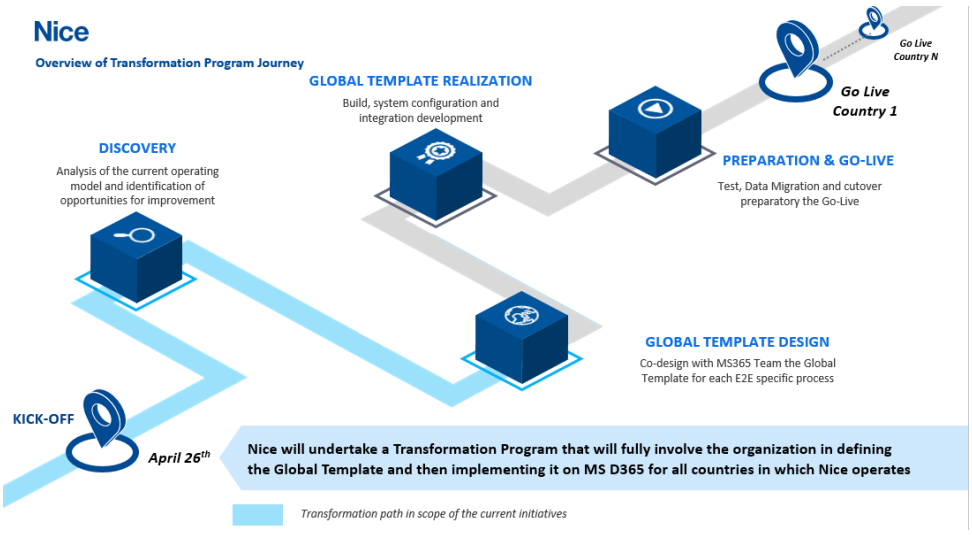


Figure 7.1. Nice transformation path

The design of the to-be model for Nice in each process started from the analysis of the main points of attention that emerged during the as-is study, which represent the input for this phase of the project. From these, various scenarios were drawn regarding the organizational structure, system and process with their pros and cons, which were analyzed and discussed with the main figures involved in the processes in question in order to find a solution that starting from best practice can be adapted in the right way to the internal needs of Nice and its business sector.

7.1. FTI & PTS - Forecast to inventory and Plan to Schedule

Regarding the Forecast to Inventory and Plan to Schedule processes, a high-level workflow for the supply chain planning model was first defined by dividing the entire end-to-end process into several sub-processes engaging the various parties involved to foster cross-functional integration.

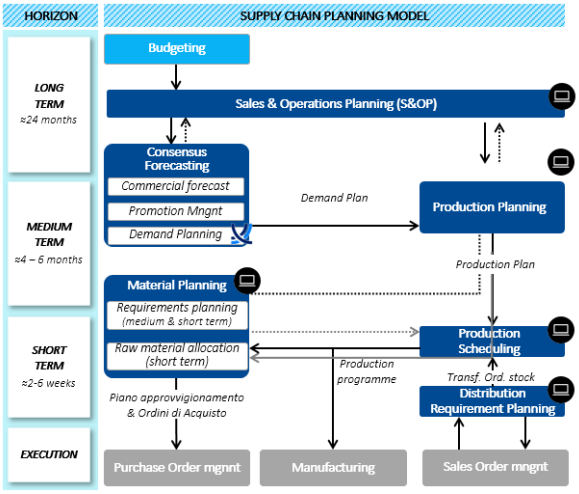


Figure 7.2. Supply Chain Planning model

In particular, the main innovation introduced is the Sales and Operations Planning (S&OP) process, a cross-functional coordination process with the objective of balancing the needs of sales with the priorities and/or constraints of planning and operations, purchasing and finance. In this way, since many of the difficulties in production

planning come precisely from the lack of coordination with the sales function, it will be possible in the future to achieve greater communication between the parties to meet the needs of all functions involved. To support this process, it is recommended to introduce a formal S&OP meeting to strengthen cross-functional coordination, maximize synergies, have shared visibility of the requirements and constraints, plan by focusing on the medium to long term to anticipate risks and opportunities and move from a reactive to a proactive and integrated approach to enable the achievement of organizational goals.

S&OP process is constituted by a series of formal meetings, carried out throughout the whole monthly planning cycle. Each meeting has a specific purpose, expects a different set of inputs and outputs and requires the involvement of different business functions and organization roles. These meetings are:

- Product review meeting: analysis of items performance and evaluation of products phase-in/out plan, supported by quantitative analysis (e.g. ABC classification), to validate the product portfolio considered during the following planning processes.
- Demand review meeting: certification of total demand needs insisting on the plant and subsidiary (sum of unconstrained demand forecast and replenishment plan) through cross-functional coordination between the involved functions (sales, demand, PM, …).
- Supply review meeting: certification of the medium/long term production and purchasing plans, identifying eventual constraints or risks and defining suitable solutions to address them in order to meet the demand requirements.
- S&OP executive meeting: Strategic review of the certified operational plans (total demand, supply, production, …) to evaluate the identified opportunities and risks, evaluate the potential economic impacts and validate the resolution actions.

Figure 7.3. Functions involved in S&OP meeting

The S&OP process takes as input the budget produced with a long-term vision (approximately 24 months) and represents the starting point of consensus forecasting and production planning, two processes that consider a medium-term period (about 4-6 months).

As for consensus forecasting, this represents a more complete and accurate model for defining the demand plan that will be used as input for production planning. In fact, this process, starting from the commercial sales forecast will integrate considerations such as promotions implemented on the sale, product phase-in/out, production or logistical constraints to produce a stable and feasible demand plan that can be used to give more stability to production planning. The demand plan will be generated monthly at the SKU, market, and week level with a 24-month rolling horizon.

This demand plan is then used to generate a production plan weekly based with a horizon of 4-6 months and updated based on demand signals. This process will be internalized in the ERP system and is the base for the effective scheduling of production and for material planning, a very critical process for Nice group.

All these processes were analyzed through SIPOC (suppliers, input, process, output, customers) analysis, that provides a high-level overview of the macro process from an operational perspective, helps clarify the inputs and outputs of each process, brings transparency and alignment on process throughout the organization and is a process summary tool easily usable by the organization.

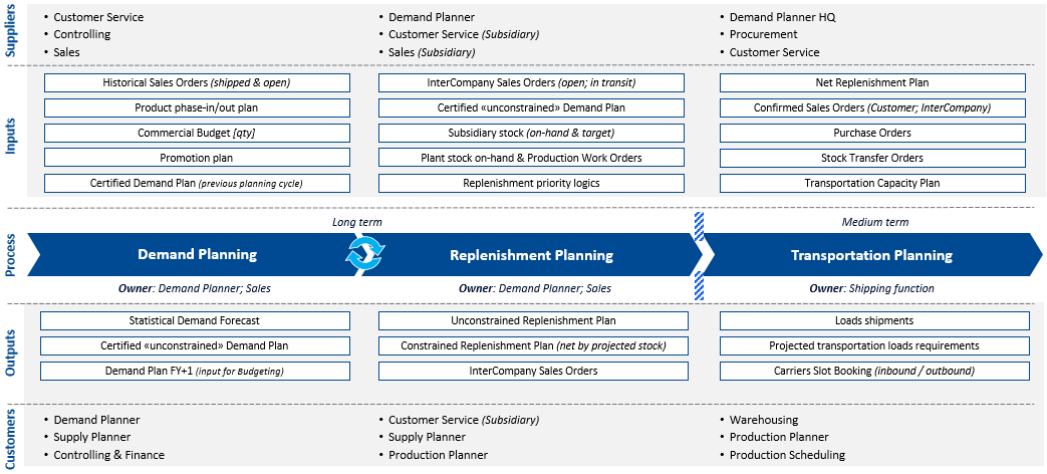


Figure 7.4. SIPOC analysis for FTI process

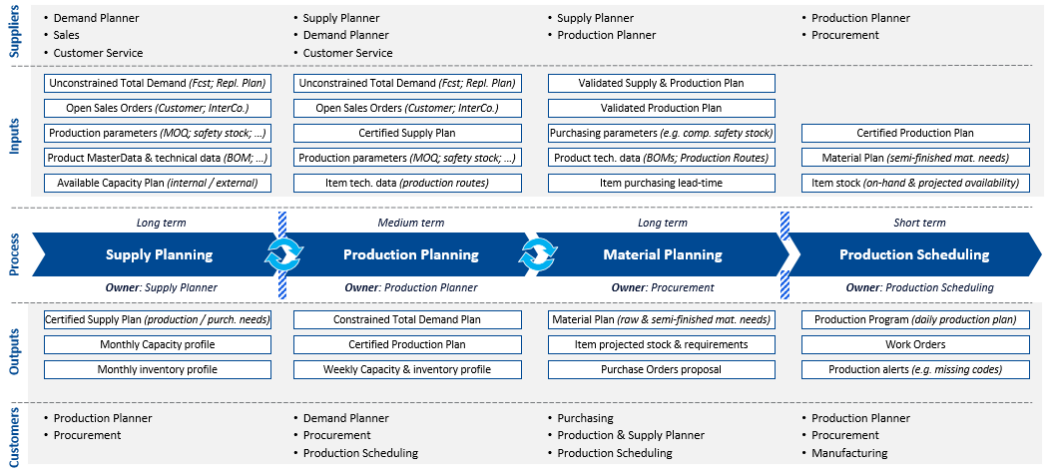


Figure 7.5. SIPOC analysis for PTS process

To support the new configuration of the supply chain planning processes abovementioned, the target organizational model of the operations business function has been designed in the following way:

- Identification of demand planners for each region (EMEA, USA, BRA) to support the S&OP process of the production subsidiaries and coordination between corporate demand planner and sales function. This can give more visibility on the overall demand of each region of critical issues and

opportunities specific of that region but the complexity of coordination with local demand planner of different regions can be more complex.

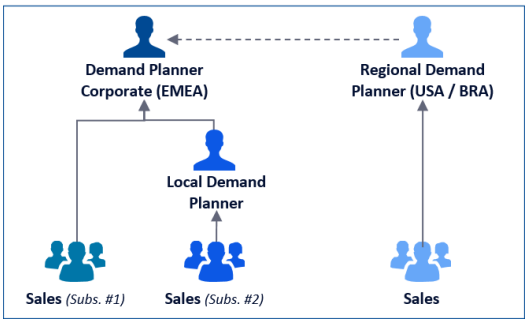


Figure 7.6. Regional demand planners

- Centralization at corporate level of the process for definition of target safety stock levels for all finished products across the different subsidiaries of Nice group. The target safety stock level is defined by the corporate demand planner leveraging on ad-hoc features of SO99 for calculation of safety stock based on agreed service level. The pros related to this choice are an increased visibility at corporate level of stock profiles and related costs and increased control on generation of the replenishment plan, supporting re-distribution of available stock among different subsidiaries based on commercial priorities. On the other side, this increase the complexity for periodic review of the target safety stock for each subsidiary and for this reason the effort required from the corporate demand planner is higher.

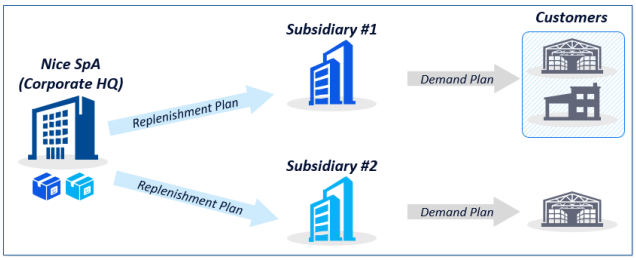


Figure 7.7. Centralization of inventory planning process

- Centralization at corporate level of the production planning activities, aimed at defining the long and/or medium-term production and purchasing needs, leaving the local plant in charge of carrying out the production scheduling activities. This choice led to high visibility at corporate level of production planning across the subsidiaries, standardization at group level of the planning procedures and increase the possibility for planning synergies and optimization across plants based on available capacity. At the same time, the visibility on local supply constraints is limited and the corporate planning function see an increased effort for reviewing production plans.
- Review of the roles involved in the production planning process and related coordination mechanisms to support the centralization of long-term production planning activities. This is due to the increased effort required by the centralization of the activities mentioned and in particular three different roles have been defined: a supply planner for the generation of long-term production and purchasing plans for all the plants of Nice group; production planners for the generation and weekly review of medium-short term production plan for a specific plant; production schedulers for the definition of detailed production program on the short term.

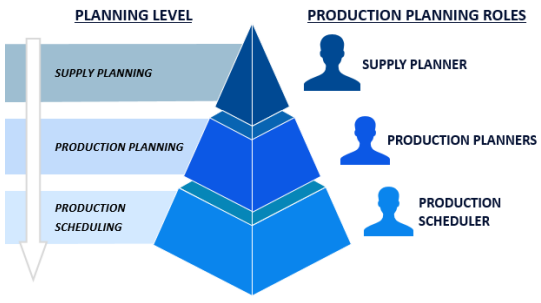


Figure 7.8. Supply and production planning roles

- Evolution of current cross-functional coordination mechanisms to support the alignment of the different departments and the validation of medium/long-term

operational plans, taking into account the constraints and requirements of each department. This is done thanks to the S&OP process.

7.1.1 FTI - Opportunities for improvements

Based on the in-depth meetings on the current operating model, the following opportunities for improvement were confirmed and explored across the entire organization for Forecast to Inventory process:

- Strengthen the process for products phase-in/out management through review of product master data, planning logics and coordination mechanisms.
- Review the sales orders management and allocation logics, leveraging on ATP (available to promise) features, to support the generation of the statistical demand forecast.
- Evaluate the need to enrich the existing algorithms library in SO99, in order to enhance the forecasting accuracy by differentiating the algorithms based on items demand profile.
- Systematize promotions management to facilitate the data cleansing process, support the generation of the statistical demand forecast and reduce manual effort for review of the demand plan.
- Configure a standard workflow in SO99 to enable a “Consensus Demand Planning” process and support cross-functional collaboration, supported by introduction of a formal S&OP process.
- Evolve current replenishment planning logics to enable the generation of a feasible and “constrained” distribution demand, taking into account the available projected stock to be shipped to the subsidiary (dependent on systematization of production scheduling process).
- Evaluate the need to evolve current logics for calculation of finished product safety stock through configuration of advanced logics and strengthening of coordination mechanism with the subsidiaries.

7.1.2 FTI - Analysis of the new process

The Forecast to Inventory process was the one that underwent the least change in Nice's to-be design, as it was considered consistent and the software used to support the generation of the statistical forecast, SO99, has features that cannot be replicated and matched by those offered by the ERP. This was also done considering the sustainability assessments of the change made to the Nice group, which must be implemented in several steps in order not to create discontinuity in the business.

Demand planning

Regarding the demand planning process, with the implementation of Microsoft D365 in all plants of the group, the problem of missing data from branches with different ERPs is solved. This will make it possible to produce the demand plan based only on sell-out demand, leading to a more accurate result. Sell-out demand forecast will be calculated at SKU, geographical area and week level based on historical sales of a specific subsidiary to all customers belonging to a certain geographical area. The generation and validation of the demand plan is carried out by Corporate Demand Planner, leveraging on periodic alignment with the sales function of both HQ and subsidiary, as needed.

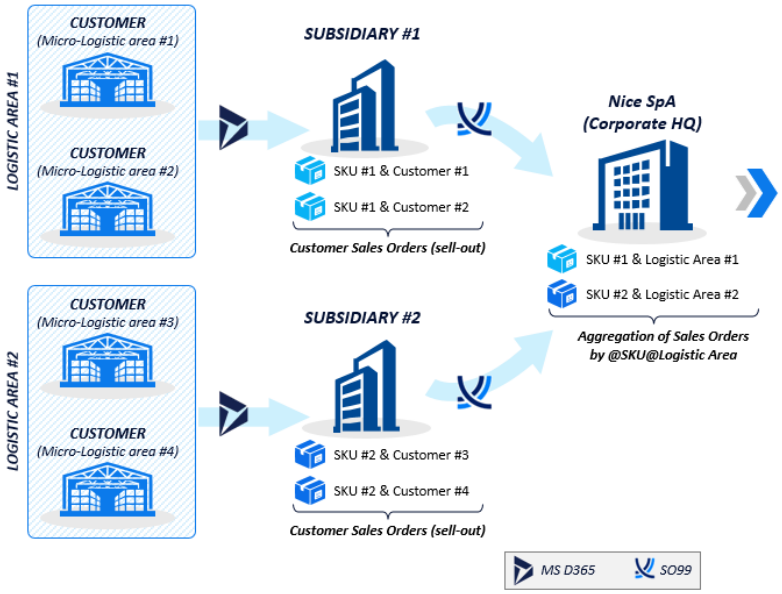


Figure 7.9. Demand planning

With respect to the data preparation process, it has been decided to include all historical sales orders (both shipped and open) for the statistical forecast generation, allocated on the client confirmed date by the ATP. This decision leads to several advantages like limited risk of under-forecasting due to the consideration of all actual market needs, demand baseline coherent with market requirements, capacity planning carried out based on actual demand. The only cons is that in this way there is a potential risk to generate a non-feasible demand plan for production, leading to an additional effort for production review. Then, also considerations about the product portfolio management have been included to make the forecast generation more accurate, like promotion calendars and a better profiling of phase-in/out products to also automatize the process of data cleansing of promotional sales orders. All these evaluations are carried out during the product review meeting of the S&OP process. The only codes evaluations that are not carried out in SO99 are the dummy codes for prototyping activities, that performed outside the system to avoid oversupply of components.

Another problem that was underlined during the discovery phase of the project was the presence of two different attributes for the lifecycle state of a product, managed by two different company's functions. This was due to the missing of a specific parameter in the old version of the ERP, a problem that has been solved by Microsoft in D365. So now using there is a unique attribute that for each item defines which transaction are allowed. Data governance has the ownership of this attribute and depending on it, different profiling will be done during the statistical forecast generation.

With all these measures used to clean up the input used to generate the statistical forecast, it will be possible to obtain a more accurate and reliable result. This forecast will be generated at the individual SKU level, without applying any sort of code aggregation, like geographical are, product family or sales channel. This is due to the advantages considered of this solution that are the possibility to analyze and review the demand plan at the greatest level of detail, focusing on the demand profile of the specific item, the logic that is consistent with current configurations of SO99 simplifying collaboration with sales department and the reduced manual effort for the revision of demand plan. The only cons is about some cases in which the demand

profiles are variable depending on the sales channel and this may impact the accuracy of the forecast.

Once the statistical forecast has been generated, some other activities are required in order to obtain the consensus demand plan. In fact, this forecast that will be the input of planning function will integrate eventual commercial inputs of sales departments and considerations of demand planners about logistic, production or material constraints.

Lastly, ABC-XYZ classification has been introduced to prioritize the demand for different items in order to support possible considerations during S&OP. ABC analysis is made at finished product level on the basis of demand volumes or revenues by multiplying the volumes of each product by its marginality while the objective of the XYZ classification is to identify, for each product, the relative variability of demand in order to support the definition of the demand plan and to size product safety stocks based on demand trends. These two analyses can be combined to cluster different products based on relative importance and variability of demand. To each clusters a different priority and/or service level can be assigned, which is useful for guiding production and material planning decisions in case of constraints.

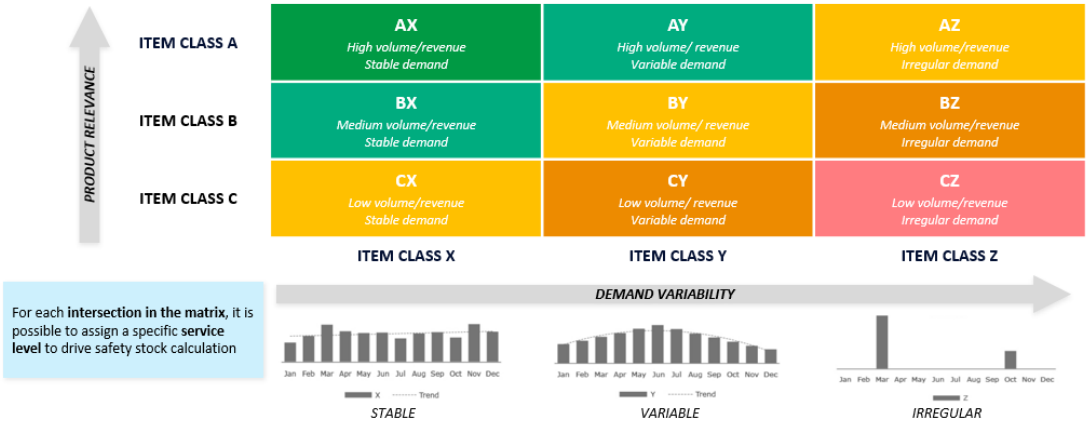


Figure 7.10. ABC-XYZ classification

Replenishment planning

As already underlined, the replenishment plan is the distribution demand automatically calculated in SO99 at corporate level on 24 months rolling horizon in weekly buckets based on subsidiaries distribution requirements, projected stock, prioritization logics and target stock policies. Its validation generates a release of feasible stock transfer orders across the network, coherently to commercial priorities. Then, corporate demand planner manually validates and releases the replenishment plan from SO99 to MS D365 for the different locations of Nice logistic network (subsidiaries, plants) for each specific product based on locations requirements and stock availability, leading to the generation of the intercompany sales orders for the whole network.

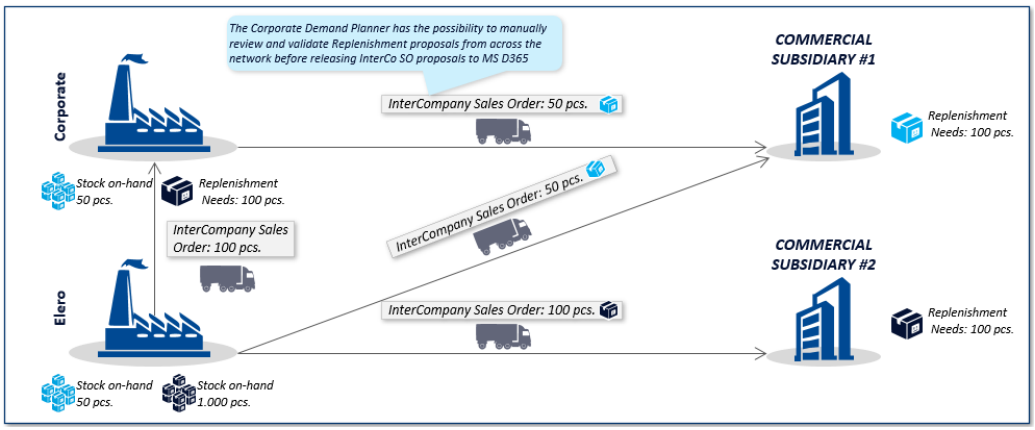


Figure 7.11. Replenishment plan

Opening stock (Subsidiary)	**3.000**
Transport lead-time [weeks]	**1**

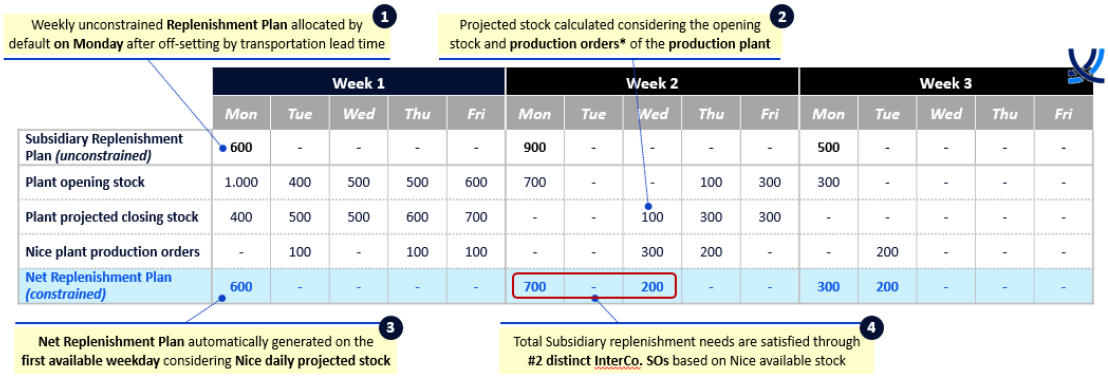
Product requirement (negative stock component)
Product availbale (positive stock component)

Key Figures	*Week 1*	*Week 2*	*Week 3*	*Week 4*	*Week 5*	*Week 6*	*Week 7*	*...*
Customer Sales Order (Subsidiary)	*850*	*800*	–	–	–	–	–	–
Local Demand Fcst (Subsidiary)	–	*300*	*1.000*	*1.500*	*1.250*	*1.200*	*1.350*	*1.500*
Total Demand *(Subsidiary)*	**850**	**1.100**	**1.000**	**1.500**	**1.250**	**1.200**	**1.350**	**1.500**
Target safety stock *(Subsidiary)*	**1.000**	**1.300**	**1.300**	**1.700**	**1.300**	**1.250**	**1.000**	**1.450**
InterCompany SO *(in transit)*	**500**	**350**	–	–	–	–	–	–
Replenishment needs (Subsidiary)	-	-	*400*	*1.900*	*850*	*1.150*	*1.100*	*1.950*
Replenishment Plan "unconstrained" *(SO99 automatic proposal)*	**0**	**400**	**1.900**	**850**	**1.150**	**1.100**	**1.950**	**150**
Projected closing stock *(Subsidiary)*	**2.650**	**1.900**	**1.300**	**1.700**	**1.300**	**1.250**	**1.000**	**1.450**

Figure 7.12. Calculation logics

As for safety stock calculation, the logics used has been clearly defined. Safety stocks are defined automatically in SO99 for all network locations, considering both production plants and commercial subsidiaries, and reviewed regularly by the corporate demand planner that monitors and analyze periodically out of stocks that have occurred to take them into consideration. It was agreed to maintain the current logic for calculating safety stock, weighted on the basis of product cost class, to balance the risk of fixed asset capital. Then, also the desired service level is set in order to define the right safety stock quantities.

Then, the replenishment plan is netted considering different information such as a set of demand priorities and the production schedule to generate feasible stock transfer orders, coherent with commercial priorities, production and planning constraints and sales opportunities of the period.



	Week 1					Week 2					Week 3				
	Mon	Tue	Wed	Thu	Fri	Mon	Tue	Wed	Thu	Fri	Mon	Tue	Wed	Thu	Fri
Subsidiary Replenishment Plan *(unconstrained)*	600	-	-	-	-	900	-	-	-	-	500	-	-	-	-
Plant opening stock	1.000	400	500	500	600	700	-	-	100	300	300	-	-	-	-
Plant projected closing stock	400	500	500	600	700	-	-	100	300	300	-	-	-	-	-
Nice plant production orders	-	100	-	100	100	-	-	300	200	-	-	200	-	-	-
Net Replenishment Plan *(constrained)*	600	-	-	-	-	700	-	200	-	-	300	200	-	-	-

Figure 7.13. Net replenishment plan

After that, in order to take into account the different types of subsidiary requirements during the calculation of the replenishment plan, a set of priority logics are used to generate intercompany sales orders. Coverage of sales orders will have the higher priority, then comes the coverage of net demand plan (remaining forecast after netting with sales order quantity) and lastly there is the coverage of the replenishment requirements to comply with target safety stock. All these priority rules for stock

allocation used during replenishment plan netting are applied bucket by bucket and aim to prioritize the most upcoming requirements.

The last decision that has been taken regard the adoption of load saturation logics. For the moment it has been decided to not use these logics, since the difficulties to manage them are higher than the benefits obtained and in order to prioritize in time shipments and maintain lower stock levels, fulfilling the subsidiaries on the base of actual requirements. However, this reduce logistic efficiency, even if in Nice case with low volume products is not a point with big impact.

The to-be operating model described for replenishment planning requires tactical coordination mechanisms between sales and commercial logistic operations, aiming at providing market intelligence for the demand forecast definition. This is done during the S&OP meeting that will align business and commercial priorities.

7.1.3 PTS - Opportunities for improvements

Based on the in-depth meetings on the current Operating Model, the following opportunities for improvement were confirmed and explored across the entire organization for Plan to Schedule process:

- Identify an ad-hoc planning solution to support the production, capacity and material planning processes, as well as the definition of a daily production scheduling.
- Introduce of a formal and structured S&OP process to drive cross-functional coordination and evaluate demand and production feasibility.
- Review the MRP logic used for the dependent production and purchasing requirements off-setting, to consider the need to consider the lead time.
- Identify a planning tool to enable the automatic generation of stock transfer during MRP, accompanied by the simultaneous review of the warehouse refilling logic.
- Evolve current logics for components safety stock calculation in order to assure their dynamic re-calculation and review to avoid the risk of causing potential under-over stock in case of variable demand.

- Enable the identification of different sources that generated each items production and purchasing requirements (sales orders, demand forecast, dependent demand, …).
- Evaluate the possibility to define distinct BOMs for design and planning/production and alternative production routes to enable the correct purchase of requirements and execution of articles under the prototyping phase.
- Support the scheduling activities through ad-hoc features (e.g. production Gantt; drag and drop of scheduled orders; capacity control charts, …).
- Evolve the feature that enables the missing code analysis to consider incoming purchase orders and stock available in different warehouses of the network.

7.1.4 PTS - Analysis of the new process

In order to evolve the current process of production and material planning and scheduling, it is required to identify a suitable planning solution to enable the calculation and analysis of the production and purchasing plan for finished goods and components. The solution must take in care the needs and difficulties specific of the business sector of Nice and their way of working but also be scalable to all the plants of Nice group spread worldwide. For this reason, three possible scenarios has been proposed to Nice, with the related pros and cons, in order to find the best solution to improve the process and ensure continuity to the business.

The first scenario is to continue with the current situation using MyPlan as MRP software. This solution, even if it has a limited impact on the current system configurations and technical interfaces and ensure high architectural continuity and low integration effort, does not cover all the requirements of Nice and ensure a limited support to the planning function. Then, it is also not scalable to the other countries and for these reasons has been discarded.

The second scenario is to integrate the MRP solution inside the ERP and leverage the functionalities of Microsoft D365. The advantages related to this solution are the possibility to leverage on D365 standard features based on best practice, high architectural continuity and reduced integration effort compared to a solution external to the ERP and high scalability of the solution. At the same time the problems related to

this solution are a potential lower coverage of Nice functional requirements and reduced possibility to customize the solution. For the mentioned reason this solution has been chosen as temporary, to prepare the company in the path to the third solution, the most complete one.

The third scenario comprehend the usage of an APS (advanced production scheduling) tool integrated with the ERP system. The pros related to this scenario are higher functional coverage of Nice requirements, increased support to the planning processes through advanced logics and ad-hoc reporting, possibility to limit implementation of the tool to a sub-set of processes leveraging on D365 for the remaining processes and high scalability of the solution. The problem related to the APS is that is required high economic and time effort for selection and adoption of this new and dedicated tool and for this reason this for the moment remain the target solution that will be implemented in the future.

Considering the solution that will be implemented in the short term, the architectural scenario has been strongly simplified in comparison to the as-is situation, reducing the cost related to the maintenance of different software solution and also the manual and non-value-added effort required to integrate several different solutions.

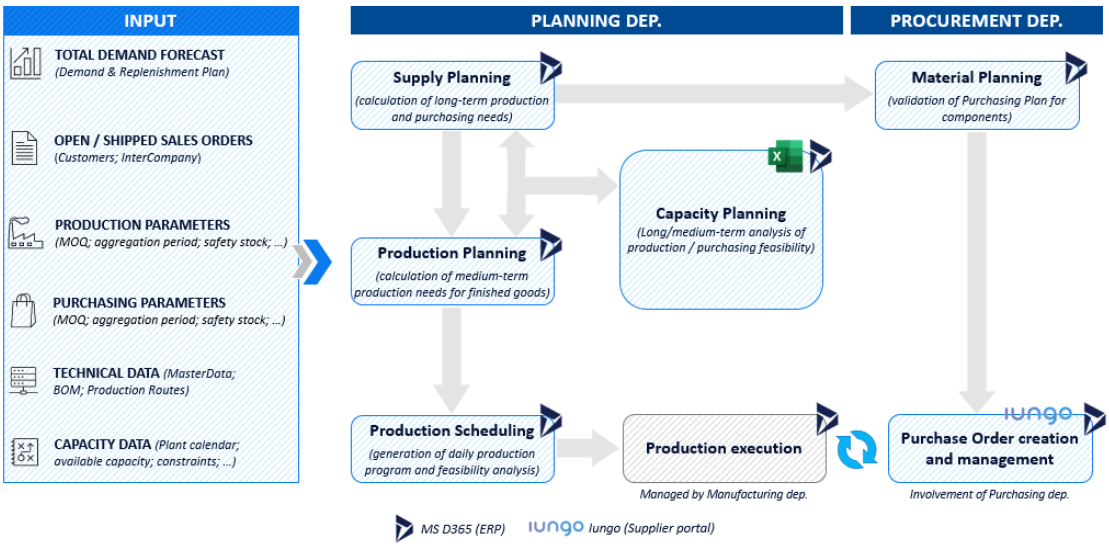


Figure 7.14. Architectural scenario

Going into more details about the second scenario, it changes the reactive logics used until this moment by Nice introducing the MRP logics explained in the theory chapter. In fact, D365 solution start from the requirement date (forecasts or sales orders) and go back in the time considering production lead time, safety lead time, set-up times, aggregation periods, production minimum order quantity and several other logics that today are not used, making this a proactive solution.

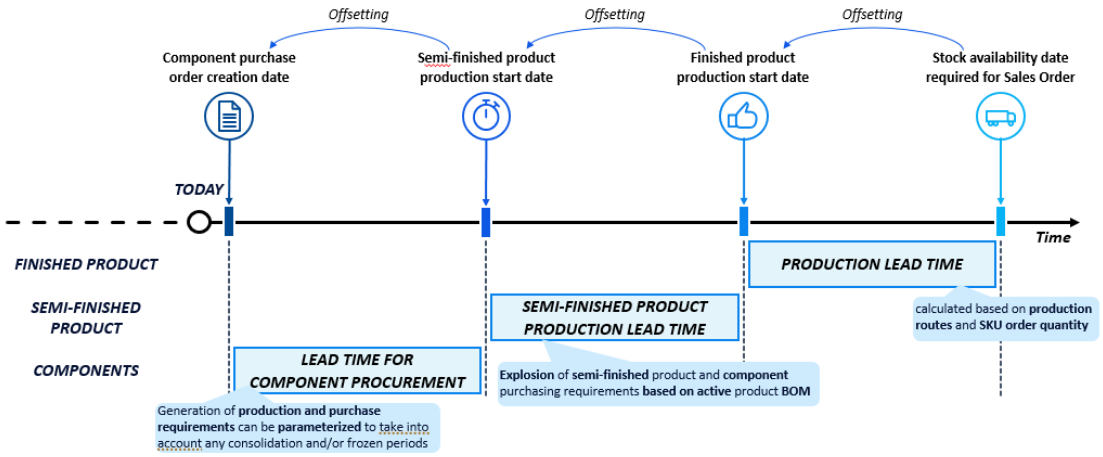


Figure 7.15. MRP logics

To make this possible, however, it is necessary to consider the historical reasons for choosing the MyPlan solution, which leaves enormous flexibility for planners because it does not implement any particular logic. This software was chosen primarily to deal flexibly with the enormous variability of the two main planning inputs: forecasts and sales orders. These, in fact, were always entered within the system without considering constraints such as, for example, production capacity or the presence of raw and semi-finished materials, bringing great difficulty to procurement and planning. To solve the problem related to forecasts, therefore, it was decided to use a forecast validated by planning that takes into account what is actually feasible, while for sales orders the standard D365 functionality for the use of ATP (Available to Promise) logic will be used by the sales function. In this way, having clean and stable data as process input, MRP logics can be implemented bringing numerous benefits to planning.

Then, two different Master Plans with different logics will be used. The first, with a long-term horizon, will be used as MPS plan for long-term production capacity planning and material procurement with long lead times and used as input for the short-term plan. The second, with a short-term horizon, will be used as MRP plan for production planning at short-term procurement and used as input for actual production scheduling.

Going into more details about the subprocesses of Plan to Schedule stream analyzed in the as-is chapter, the first analysis regard supply planning. In particular the logics for allocation of total demand forecasts between the different production plants have been discussed. It is expected to manage the production of a product on a specific plant and line and during S&OP should be performed a periodic assessment of the need to shift production of various products to different plants and production lines according to capacity loads. Then, the Rough-Cut Capacity Planning (RCCP) allows the calculation of the workload resulting from the system's proposed MPS and comparison with the available capacity projected over time without carrying out a reallocation of requirements. In this way Nice will be able to forecast capacity saturation (a very important data point since most of Nice's productive resources are human resources and therefore capacitive differences need to be planned in time), stock profiles, warehouse saturation and purchase and production volumes compared to budget. Once the peaks of overcapacity are highlighted, the planner is responsible for generating a feasible MPS by carrying out appropriate leveling and balancing assessments operating mainly on the following dimensions: activation of alternative production routes and BOMs, increasing internal production capacity, outsourcing production orders or advances or postponements of production. The output of this first phase of the process is a proposed long-term plan with possible identification of attention points to be discussed during the S&OP meetings.

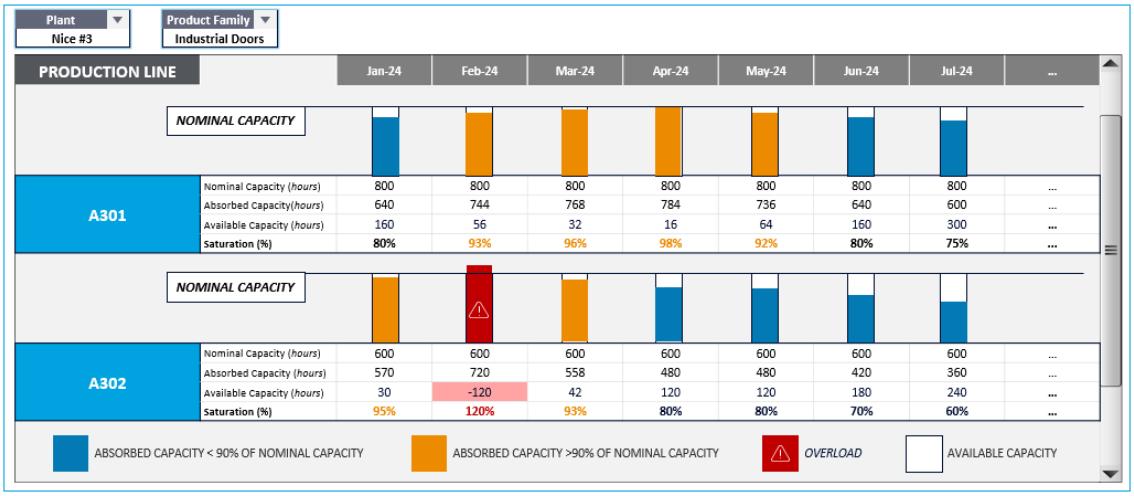


Figure 7.16. RCCP dashboard

Then in order to guide the activity of production planning and procurement, it is planned to manage a constrained demand plan over the short to medium term that takes into consideration the available production capacity. This demand plan must be approved by planning and production to clean the input of the MRP calculation, simplifying the process of planning and making it more stable.

As regard material planning, the material plan is generated through the MRP run on 4 months horizon, based on the constrained demand forecast, thus taking into account only confirmed work orders. This material plan aims to acquire material with short-medium lead time, while materials with long lead times are procured thanks to MPS plan. Related to this process there is also the calculation of safety stocks that will be dynamically sized based on the market demand profile, service level wanted, cost of maintaining the components and stock-out risk. All these parameters can be given as input in SO99 that will calculate the safety stock needed in each plant.

Finally, as far as production scheduling is concerned, three features have been proposed to facilitate it. The first is a Microsoft D365 add-on that presents graphical scheduling features. The scheduler allows production resources to be allocated efficiently between production lines, optimizing the use of available resources. Then, drag and drop functionality allows efficient movement of production orders between different periods, helping to find out the best scheduling program. The second is an improvement of the

current analysis of missing codes. The analysis of missing codes carried out in Microsoft D365 to verify the materials needs of different work orders and component shortages, in fact, takes into account the stock on-hand of different warehouses and also incoming purchase orders, making this analysis more complete and reliable. The last one is a standard functionality of Microsoft D365: multi-level pegging. The pegging refers to the possibility to identify a clear relationship or link between individual components or materials, corresponding production orders and the type of demand that initiated those orders. It enables tracking and tracing the origin and consumption of materials throughout the production process, making possible the prioritization of some orders over others based on the type of demand and on the customer served.

7.2. MTD - Make to deploy

With regard to the Make to Deploy process, the main focus was placed, in addition to outbound logistics, on the movement of materials within Nice S.p.A.'s production warehouse since the production processes themselves present low complexity being mainly assemblies. At the same time, however, a great deal of work was done on an internal logistics solution that would allow, thanks to the advanced warehousing capabilities of Microsoft D365, the internal movement between warehouse, supermarket and production lines to be made efficient by keeping only the necessary materials close to the lines, creating an internal lean flow that particularly leverages kanban logics. Moreover, the changes that the manufacturing plant itself is undergoing to embrace more of a lean perspective by focusing on kanban-based replenishment and automation of the lines themselves (WCM) to improve efficiency were also taken into consideration.

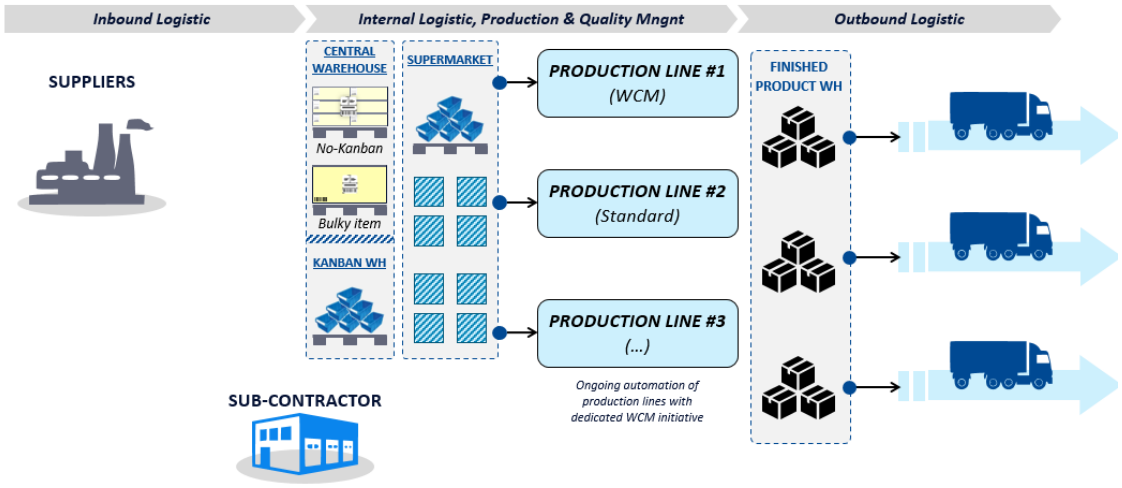


Figure 7.17. Nice S.p.A. production site scheme

The first decision made regarding the Make to Deploy process concerns the applicative to support the process. Nice as-is logistic and production processes are supported by multiple systems and tools, not properly integrated, leading to significant fragmentation of the applicative landscape, system misalignment, complex process control, high manual effort and potential inefficiencies in the process activities. For these reasons it has been decided to evolve the current logistic and production execution process through substitution of current WMS tool and Power Apps with the ad-hoc module of Microsoft D365. The advantages of this solution are high standardization and scalability of the model, the possibility to evolve current system configurations implementing advanced logics to support the processes and rationalization of the current applicative landscape, limiting potential sources of data misalignment across different systems. On the other side the problem is the potential need to review the current process in order to align it with Microsoft D365 features.

7.2.1 MTD - Opportunities for improvements

Based on the in-depth meetings on the current Operating Model, the following opportunities for improvement were confirmed and explored across the entire organization for Make to Deploy process:

- Presence of multiple systems that manage the same process and in some cases same data about the warehouse with the risk of misalignment between the two systems, leading to poor quality of data managed and inefficiencies in the process.
- Lack of rules and system support for item storage in the warehouse that cause picking inefficiencies and difficult recall for materials.
- Lack of controlling and reporting about the process due to management of software data not coherent with real activities performed in the factory.
- Tracking of production variances in terms of costs and materials.
- Lack system support for transportation planning and carriers booking, leading to logistic inefficiencies and higher costs.
- Complex traceability of critic raw materials and finished goods.

7.2.2 MTD - Analysis of the new process

As regard make to deploy organizational structure, Nice felt the need for change regarding in particular outbound logistic process, while they are already well structured as regard production and internal logistic. Shipping and transportation related activities are currently performed by different departments (commercial logistics operations and customer care export), according to the markets and customers. The target model foresees the introduction of a dedicated shipping and transportation function, based on the following main elements:

- Regulatory knowledge acquisition: there is currently a basic internal knowledge about transport regulatory compliance, customs regulations, international trade agreements and safety regulations that must be covered and integrated in a structured way.
- Direct control on outbound shipments: the medium-long term Nice's operating model foresees the direct management of outbound shipments (currently 95% of export shipments are performed ex-works). This solution will increase the overall operative effort of the customer care to manage these processes.

- Centralize skills and expertise: technical skills and subject matter expertise must be consolidated in a single function, to limit risks, avoid errors and mistakes related to the shipping process and the rise of inefficiency and costs.
- Tender management process: selection of logistic partners must follow a structured tender management process, based on the company's terms and policies and following a cost reduction logic (in collaboration with the purchasing department).

Internal logistic and production

As discovered during the as-is phase of the project, the productive warehouse of Nice S.p.A. is composed by three main areas: central warehouse, supermarket and production lines. Inside the warehouse are managed three types of handling units: non-kanban, kanban and bulky items. In the next future Nice management would like to increase the number of items managed with kanbans, in order to follow also the upgrade of the production lines in automatic production lines (WCM).

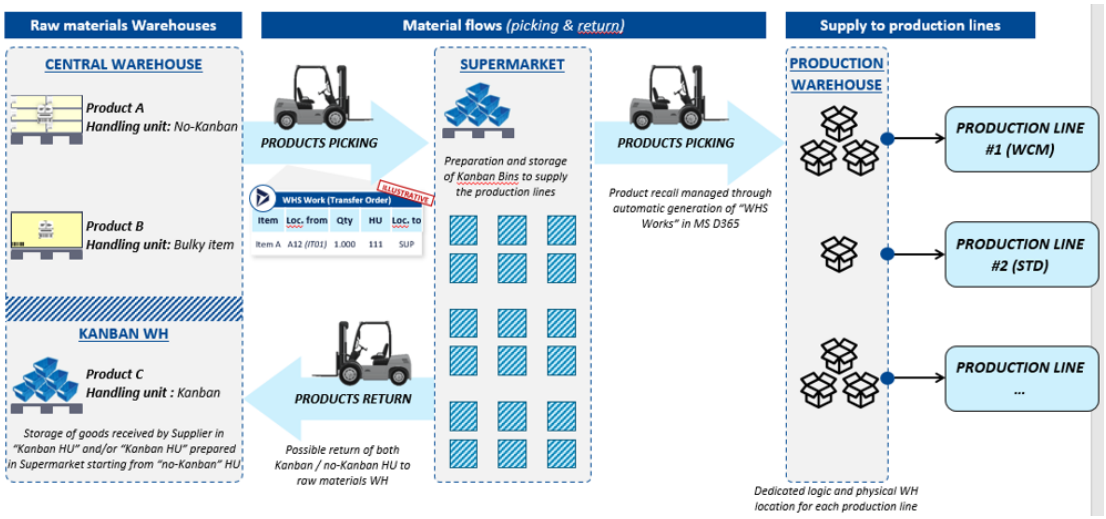


Figure 7.18. Nice S.p.A. production site

Depending on the specific item, it is expected the possibility to configure in Microsoft D365 ad-hoc replenishment methods to drive the generation of the "warehouse work" to

transfer the raw materials and components to the production lines. For this reason, two main flows have been designed: product recall through the supermarket or direct replenishment to production line.

As regard the product recall through the supermarket, it has been designed for components that are recalled in the supermarket prior supply to production line, like items recalled by WCM lines, fast moving goods and items managed in kanban handling units. Replenishment is then carried out through kanban bins located in supermarket.

Then there is direct replenishment to production line, that has been designed for component that are directly moved from raw material warehouse to the production line without passing through the supermarket. This is done for bulky items and items recalled by standard lines.

The basic structure inside the system to manage item replenishment and picking processes is the warehouse work, that is automatically created based on production order scheduling, in order to reduce as most as possible the materials near production lines (the target given is to have material that cover around two hours of production). Each warehouse work contains several information (like production line, production order start date and time, components needed with respective quantities, destination location and priority) that are used to define when and where the items must be moved, also optimizing the picking routes. After release of the production order, Microsoft D365 verifies the availability of materials in the production warehouse. The first check is done in the production warehouse, then comes the supermarket and in the end items are recalled from central warehouse to then pass through the supermarket for the preparation of bins. Microsoft D365 refilling rules automatically identify the handling unit to be picked or transferred based on specific priority logics in order to maximize the efficiency of the picking process. The criteria for the selection in descending order priority are: FIFO, handling unit type (Kanban bins ready are preferred for the lower time required, picking distance and handling unit position (lower position are preferred). Thanks to these new logics introduced it has been possible to significantly reduce the time required for picking activities and also the number of trips.

As regard effective production activities, current Nice production process is mainly constituted by a set of assembling steps**,** characterized by low cycle time (the completion of finished product unit is done within minutes) and currently managed in the ERP as a single phase. Due to these considerations and to not slow down the assembly activities having to declare as finished every single assembly phase it has been decided to maintain the as-is logic, even if in this way some tracking information are lost like variances. At the same time, in the future Nice management will discuss the implementation of a MES system to manage the single phases of assembly and to improve the production process and for this reason is important to design the current system in order to make these future implementation feasible and easier. After completion of assembly process, the items are manually reported as finished by manufacturing resources through Microsoft D365 standard features and made available in a specific end-of-line warehouse for each production line. After the final quality test on the assembly process, the finished product is labelled with a univocal bar-code to enable the traceability of the quality tests performed and related results. Upon declaration of finished product completion, the raw materials, logically allocated on the production warehouse, are consumed with backflush logic based on item BOM and production routes currently active.

Outbound logistic

Regarding the outbound logistics process, two main flows have been defined for the target model that will be managed thanks to advanced warehouse module present in Microsoft D365. Manufactured goods can be shipped by carriers either from headquarter warehouse in Oderzo to subsidiaries (intercompany) and export customers or transferred to Geodis' (3PL) warehouses. From Geodis, goods are then shipped by carriers to the final customers or subsidiaries. Then, inside the productive warehouse in Oderzo, goods are directly loaded inside trucks using cross-docking strategies.

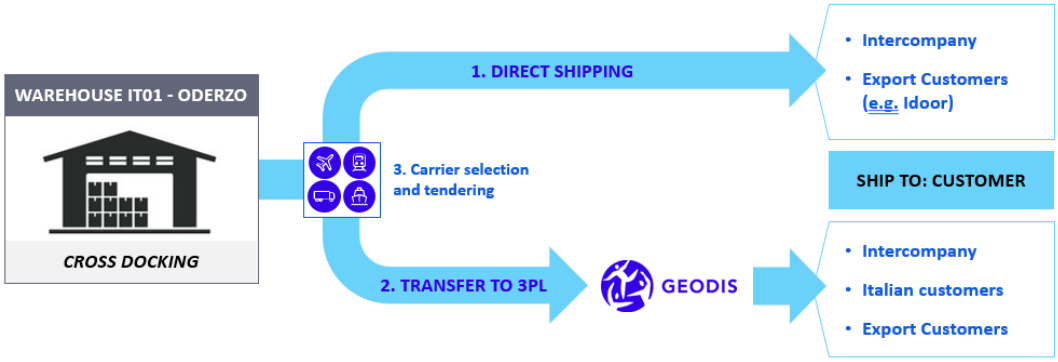


Figure 7.19. Outbound logistic strategies

The potential increase in volumes to be managed, together with the decision of Nice to take charge of the entire transportation for export shipments (as a medium-term goal), could increase the complexity of Nice's outbound logistics process. Considering the above-mentioned scenario, the following processes must be structured and revised, evaluating the internal or the outsourcing solutions having in mind costs and benefits:

- Carrier selection and tendering: identify and contract with reliable carriers, freight forwarders, and logistics service providers that can meet the company's transportation needs.
- Transportation planning: determine the most efficient transportation routes for moving goods in the network, choosing transportation modes, performing freight consolidation and optimizing loads.
- Custom management for export shipments: ensure compliance with international customs regulations, import/export documentation, and tariffs to avoid delays and penalties.

The process then is managed through two system objects with different aims, according to operative business need: shipments and loads. A shipment is a collection of one or more orders and/or order lines heading to the same destination address within a load (e.g. a subset of load but can be same as the load).

The shipment creation considers preliminary aspects in order to optimize the order delivery (e.g. volumes, lead times, destination geographical, ...) with the aim of managing efficiently the shipment process. A load is a collection of shipments transported simultaneously using a transport. Transport pricing is at the load level.

It identifies the physical orders shipment; the preparation process consists in the definition of the load building strategy according to single or multiple shipments, aiming at optimizing the carrier vehicle saturation and the route considering customer and lead time constraints.

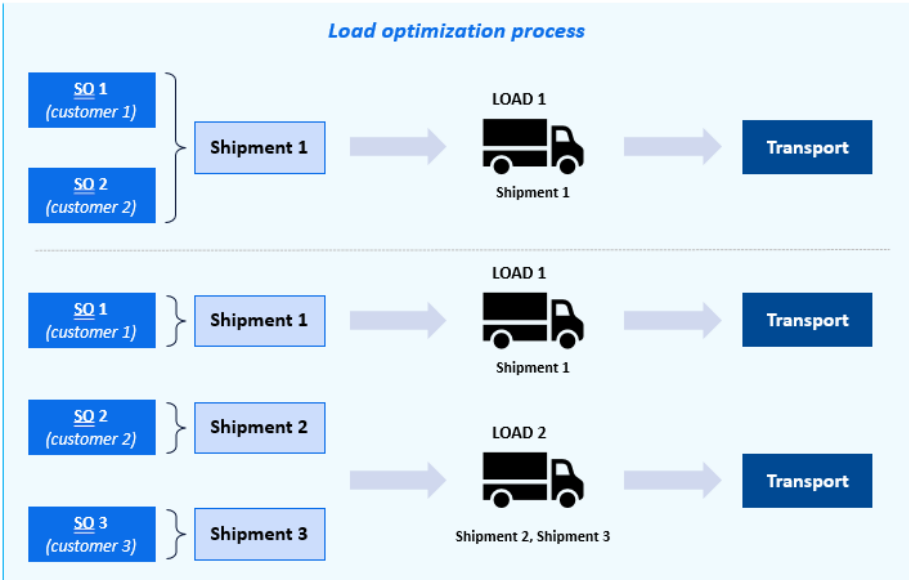


Figure 7.20. Load optimization process

There is then a functionality of appointment management for a load in Microsoft D365 that allows to schedule and register carrier arrival for goods and shipments.

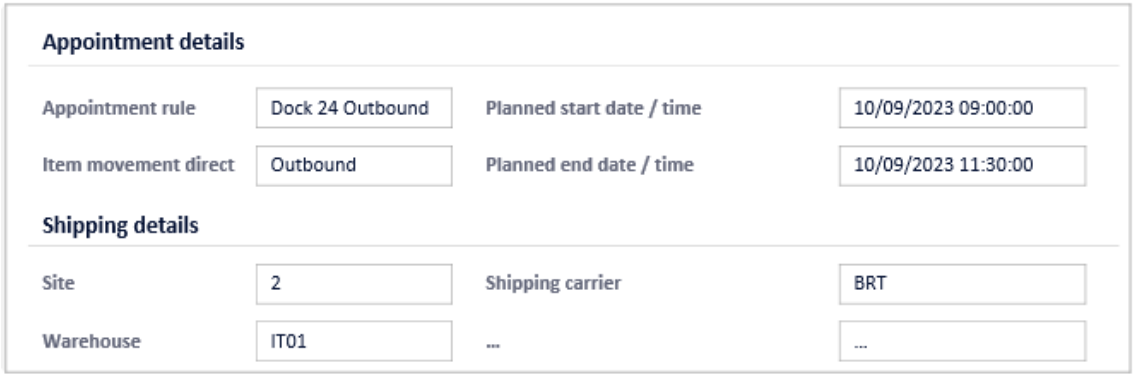


Figure 7.21. Carrier appointment management

In conclusion, having the support of a structured system like Microsoft D365, it is possible to solve most of the problems that has been underlined during the discovery

phase of the project, like low saturation of vehicles and low traceability of data related to the process. In particular, having trace of more and accurate information about the process, it is possible to introduce KPIs that help to monitor the customer service level, that in today situation could be improved. Some examples of these KPIs are the number of sales orders managed on time over the total, the number of sales order modified, the average order fulfilment time- by product category, the deviation of average delivery lead time by customer cluster or product family and many others.

8. CONCLUSIONS

Nowadays with an ever-increasing amount of data and transactions that companies have to manage, it is essential for the growth of a multinational group to have adequate software support that can automate repetitive transactional activities making them more efficient and accurate, providing reliable and quality data that represent an added value and not a blocking element for the work. Following then exponential growth of a group that occurred through acquisitions, a situation that is very common worldwide in order to make the same growth faster and increase corporate know-how by integrating established companies in the industry, it is necessary to unify the basic structures and ways of working of the various companies to make them work together toward a single goal. For these reasons, Nice Group's decision to pursue such a large, important and challenging project is far-sighted and necessary to be able to rely on a data system that is increasingly a high-value business asset, while at the same time taking advantage of the great opportunity offered by an ERP project to be able to revise its way of working by trying to align it with the best practices of large companies in the industry. Precisely this close link between the ERP system and business processes is what this thesis aims to demonstrate by presenting how in the Nice project the two were carried out in parallel achieving many benefits.

This thesis, following an introduction to the context of the business analyzed and the working methodologies used, presents from an academic point of view the theoretical foundations necessary for understanding the case study analyzed, covering first of all issues concerning ERP systems and analyzing in particular how an implementation of them can be the starting point for a business transformation with its advantages and disadvantages, and then going into more details of the processes under discussion. Next, it is analyzed how during a project, especially one of this size, it is essential to integrate change management activities to the project management practices in order to make sure that the change taking place occurs with as little resistance as possible and that the people involved understand the added value of the change brought. The Nice group's case study then analyzes a flow of closely interrelated business processes that, starting with the generation of a statistical forecast, passing through all the activities of

production planning and materials procurement, arrive at moving the materials needed for production and executing it in a manner that can best meet customer demands. Through the analysis of these processes and how they have been changed it is then demonstrated what has been said above and in particular that an ERP system does not represent a simple business software tool, but gives the possibility in the first place to rationalize the IT infrastructure of the company, reducing its costs and complexity by integrating different activities within it, and secondly it represents an important opportunity to map, study and improve all the core business processes, so it results in many cases including the one analyzed a starting point for the transformation of a business. It is precisely this second point that represents the first important choice of the Nice Group, which took the opportunity offered by the implementation of the new ERP system to become more efficient and optimize its processes. Finally, being able to rely on a well-structured and maintained ERP system leads to improved business know-how and greater control over the quality of the data present, a key factor for a business the size of the Nice Group.

This thesis then presents the steps necessary for the production of a global template, a fundamental document for a group formed by such heterogeneous realities which will have to share a general working methodology. This document aims to rationalize a corporate structure built precisely in several successive layers, designing a process and system template that is easily scalable to the same trying to reduce the effort required for the subsequent implementation activities in the various companies worldwide. A key point then in the production of the global template, concerns the sustainability of the change and attention to future developments and future growth of the company. In fact, it is well known that in order to achieve a sustainable change that is successful, it is important to plan it by successive and feasible steps, while not precluding at the same time possible future developments of applications and processes (such as the introduction of a MES for example) that at the moment may not be feasible but must not be impossible in the future due to choices made considering only the short term.

The last but fundamental element analyzed in this thesis concerns the dimension of project work, which, especially when related to such a major change, must be accompanied by change management practices that make it possible to involve the people in the company and make them the main proponents of the change taking place.

Thus, the main dimensions of a project such as time, resources, deliverables and in general how the organization of a well-coordinated multifunctional team can be a winning and differentiating factor for the success of a project were analyzed. As demonstrated in the fourth chapter and in the development of the project then, it turns out to be of fundamental importance for its success the involvement of Nice's people, who in addition to bringing the company's experience regarding the historicity of some of the choices made and the main internal and industry criticalities, represent those who will use the system and change the way they work according to the new model design and precisely for this reason they will first have to accept it as a source of improvement in their work and then be trained adequately on the new tools.

In conclusion, at the moment it is not possible to quantitatively define the benefits of the Nice project because the actual implementation has yet to take place and furthermore, when dealing with changes of this magnitude, a system run-in phase is necessary before the same can express its full potential; however, expected benefits have been defined based on the experience of past implementations and the work done. These are expressed in a qualitative manner, leaving room for future quantitative thesis work on the actual measurable results obtained, and cover the following points:

- Increased infrastructural and process homogeneity among the various group companies, with the goal of achieving a shared working methodology. This point also theoretically allows for greater flexibility in resource allocation among the various group companies, being able to rely on shared systems and methods.
- Improved internal cross-functional coordination in core processes due to the introduction of the S&OP process resulting in better decision-making quality on processes involving different business functions.
- Increased accuracy of the forecasting process with the production of an output shared by the various business functions involved, thus integrating needs and data from the different stakeholders in the process.
- Simplification and standardization of the production planning process due to an improved system that includes more data, such as cycle times and production operations to be performed, and improved process inputs i.e. forecast (as discussed in the previous point) and sales orders (due to the introduction of ATP).

- Improved accuracy of warehouse data through the use of a single system and the exploitation of the transactional integrity typical of an ERP system, resulting in efficient warehouse processes by reducing non-value-added activities such as adjustments or searches for part locations needed for production.
- Reduced infrastructure costs by integrating several systems such as MyPlan and StockSystem into the ERP system, of which licensing and maintenance costs will not have to be paid.
- Improved scalability of the proposed solutions thanks to the cloud solution used for the ERP system. In fact, thanks to the cloud solutions, in the case of future acquisitions of the Nice group, the implementation of the system in them will see much lower time and costs by not having to perform all the activities related to the installation of physical servers, VPNs and other IT tools.

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