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LEONARDO's IP Evolution

From a "sword and shield" posture to a mature IP rights management approach for coping with the new competitive landscape in the Aerospace & Defence industry

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"The main challenge for a company
which deals with aerospace, defence and security
is certainly that of managing technological innovation"
(Alessandro Profumo – CEO, 2020[1])

In recent years the Aerospace & Defence (A&D) industries have undergone significant technological, organizational and institutional changes that have profoundly altered their organizational architectures. These changes have introduced a new division of labour, bringing new opportunities for interaction and collaboration and leading to the creation of new valuable assets. In this context, the issue of protecting and exploiting innovation output has become central in the strategic agenda of the C-level board. Building and designing renew capabilities and governance for the shift from traditional policies and procedures to new models and practices is the real challenge to be met. This was the conviction of Alessandro Profumo, CEO, and Roberto Cingolani, CT&IO, of the Leonardo company when they resolved to make the IP evolution of the company a reality.

1. Sole 24 Ore e Luiss Business School, SustainEconomy.24 - La svolta dell'industria, Roma, 29 ottobre 2020, last retrieved in November 2020 and available at https://i2.res.24o.it/pdf2010/Editrice/ILSOLE24ORE/ILSOLE24ORE/Online/_Oggetti_Embedded/Documenti/2020/10/29/BOZZA_Finale_03_SustainEconomy_2020_10_29.pdf

Aerospace & Defence industry undergoing changes

The Aerospace & Defence (A&D) industry is unique. Governments are often the only end-customers and defence products must normally be sold to a company's parent government, which dictates whether and where products can be exported and under which restrictions. This is because export customers want operationally relevant and proven capabilities, with full confidence in the associated doctrine, training, and support services throughout the life cycle of the products. Hence, successful A&D product development depends on having a deep, trusted partnership between parent government, customer, and industry. This allows the customer (e.g. Ministries of Defence or international agencies and organizations) to reveal important operational know-how (in terms of technical parameters and constraints) to their industrial partners. They, in turn, can capitalise on acquired know-how and technology, built up through previous developments, research, and operational experience, in order to maximise existing product improvements and new product designs.

This accumulated know-how and technology can be referred to as "background" intellectual property (IP) assets that defence companies must build up and deploy in their management activities. Conversely, "foreground" IP is intended as the output from a specific research or development investment. Irrespective of who funds a specific activity, or when a procurement contract is in place, industry invariably contributes significant value to the foreground IP, which then feeds back into the base technology as background IP, forming the basis for subsequent R&D activities.

Hence, IP is the industry's lifeblood, which A&D companies traditionally used in order to fence through tight legal protections, including strict contractual terms, confidentiality requirements, extensive use of trade secrets, and other means to help prevent misuse/disclosures. In fact, A&D technologies are often too competition sensitive to be patented and published in the usual (commercial) way and, for this reason, A&D companies are usually more concerned than other sectors with ensuring IP assets are contractually watertight and free from any risk of involuntary disclosure. Additionally, as national security constraints and export controls are rigorously applied by parent governments, this circumstance engenders the proliferation of A&D technologies that also limit the ability of opponents to detect the real state of the art and range of use of the technological equipment possessed by governmental armed forces.

Within this scenario, for many years, A&D companies have considered IP to be a legal asset only, under the aegis of their Chief Legal Officer or General Counsel, whose duty was to defend existing rights rather than supporting the development or acquisition of new ones. However, in the last decade, A&D corporate leaders have faced significant changes in the global business ecosystem, including revolutionary developments in legal, judicial, economic and organizational domains, which have all affected the management of IP assets. Technologies and markets are converging more now than ever compared to the past, when companies minimized risk by owning or otherwise controlling the technologies needed to maintain their competitive advantages. Today, also the A&D world is shifting away from an industrial economy to a knowledge economy, intellectual property is increasingly becoming the coin of the realm for global competitiveness. But the big-

gest changes are coming in terms of how business leaders think about IP in a strategic way, when the old captive markets are becoming more open.
As a consequence, in the new competitive arena of A&D, IP assets can no longer be confined to a legal backwater. Rather, they should be seen as key drivers of new business lines and new streams of revenue, as the engine room of businesses growth and leaps forward and, finally, as creative tools to build new connections with customers, business partners and other stakeholders. How Leonardo, strong through its history of success, would be able to succeed in this new competitive landscape was the main issue for the company's top management at the dawn of the 2018-2022 Industrial Plan. And this was the beginning of the IP evolution that began unfolding in the years that followed, up to today.

Leonardo's history

"A history of success, a future in excellence"
(Leonardo Official Website, 2020[2])

In the beginning there was Finmeccanica...[3]

Leonardo Group (Leonardo, hereinafter) is at the leading edge of Italy's industrial development, yet its industrial roots date back to 1948. Many companies merged into the group over time. In some cases, they changed their names and specialization, and many of them trace their own origins back to the 19th century.

Founded in 1948, under the name Finmeccanica (a contraction of *Società Finanziaria Meccanica*), the company simultaneously played the role of witness and protagonist during the birth of a new chapter in the post-World War II history of Italy, characterized by brilliant and skilful industrial companies that were able to undertake unprecedented international expansion plans.

Right from its inception, Finmeccanica was tasked with a difficult mission: supporting and relaunching a large number of companies whose growth plans were no longer sustainable in the post-war reconstruction years. These industrial brands (among others, Ansaldo, Alfa Romeo, OTO Melara, Salmoiraghi, San Giorgio, and Officine Galileo) played a fundamental role in the Italian economic recovery and remained major players over the following 50 years and beyond.

During its first decade of activity, Finmeccanica prioritized the restructuring of shipbuilding, so more than 70% of its employees were workers from this sector, which was highly depressed at that time. Consequently, in 1959 a new spin-out company was created under the new name of Fincantieri[4] which is still operative as a standalone business.

During the 1960s, the group concentrated on sectors with a high emphasis on technology, undergoing a profound renewal of the scope of its activities. In addition to managing the existing businesses, new companies were founded, such as Selenia, which was established in 1960 to operate in the radar sector. After ceding the mechanical companies to the state-owned *Ente Partecipazioni*

2. Corporate website, available at https://www.leonardocompany.com, last retrieved in November 2020.
3. Detailed information is available on the corporate website at https://www.leonardocompany.com/en/about-us/history, last retrieved in November 2020.
4. Full information on Fincantieri is available at www.fincantieri.it, last accessed in November 2020.

e Finanziamento Industrie Manufatturiere (EFIM Group) and the electronics companies (Selenia, SGS Thomson and Elettronica San Giorgio - Elsag) to *Società Finanziaria Telefonica S.p.a.* (STET Group, part of the state-owned *Istituto per la Riconversione Industriale* - IRI), Finmeccanica focused on the automotive, thermoelectric and aerospace sectors. It is especially worth noting that, following this trend, in 1969 it undertook the ambitious project of a joint venture with FIAT to create a large company (Aeritalia) aiming to lead the aeronautics and space sector.
The 1973 energy crisis triggered a recession that affected the world economy for many years. Nonetheless, this period provided Finmeccanica with the stimulus and opportunity to refocus its strategic objectives. Consequently, between 1974 and 1987 Finmeccanica sold several companies in order to concentrate on the aerospace and defence sector. -

After these two decades of consolidation, the group relied on this strong technological base, built on electronics and system capabilities, which placed it at the service of companies belonging to other sectors. As a final step in this consolidation process, Alenia was founded by merging Aeritalia and Selenia. It operated in aeronautics, space, electronic systems, telecommunications, radar, missiles, air traffic control, electro-optical and electronic warfare systems, and naval systems.
At the beginning of the 1990s, the liberalization of markets put pressure on incumbent companies, which started facing increasingly tighter competition at the global level. Acquisitions and alliances were therefore used as the main routes to achieve growth, which shaped entire industrial sectors in the decades that followed. This circumstance constituted another turning point for Finmeccanica, which acquired, between 1994 and 1996, a group of companies operating in the defence sector from EFIM – which was in liquidation – including Agusta (helicopters), Breda Meccanica Bresciana (naval and terrestrial artillery), Officine Galileo (electro-optical systems), and OTO Melara (land and naval armaments). As a result of this acquisition, 70% of Italy's national industrial capacity for aerospace and defence was concentrated in the Finmeccanica Group.
The M&A strategy deployed in Italy, also resonated at the European level. Finmeccanica negotiated a number of significant agreements and acquisitions with international partners, taking advantage of the concurrent restructuring process undertaken by the European aerospace industry. Among others, the most important deals included the joint venture AgustaWestland (helicopters), with the British group GKN, followed by further agreements and acquisitions in the space (Telespazio), aeronautics (Aermacchi), electronics (Marconi Mobile), underwater (WASS) and missile (MBDA) fields.

Finally, by way of Space Alliance (with the French company Thales), Finmeccanica conquered the position of being a European leader in the space sector, along with the creation of Telespazio (satellite services) and Thales Alenia Space (space manufacturing). Moreover, the acquisition of the Italian company Datamat (electronics) and the U.S. company DRS Technologies, a major Pentagon supplier, opened the doors of the lucrative overseas market for Finmeccanica. The period closed with the acquisition of the Polish company PZL-Świdnik (helicopters).

By the beginning of the 21st Century, Finmeccanica had thus built a solid international profile, with four national markets (Italy, the United Kingdom, the United States and Poland) and consolidated partnerships worldwide, progressively concentrating on its core business of aerospace, defence and security. In terms of helicopters, it was a global player after the full acquisition of the joint venture AgustaWestland from GKN. Defence electronics were the focus of a further rationalization programme, by merging the Selex family under the new Selex ES. In aeronautics, all of the group's industrial capabilities were concentrated under the new Alenia Aermacchi brand, from aerostructures to complete aircraft, from trainers to the promising sector of unmanned aircraft. In the space sector, with the complementary expertise of Telespazio and Thales Alenia Space, Finmeccanica was present along the entire value chain, with a qualified presence in the most important international space programmes. As regards defence systems, thanks to OTO Melara and WASS, it boasted excellent products sold to Armed Forces worldwide.

The 2009 global financial crisis, however, triggered a recession that affected all the traditional aerospace and defence markets and accentuated global competitive pressure in the sector. Once again, Finmeccanica was forced to take difficult decisions which could affect its course of action in the future.

...Today it is the Leonardo Group

Starting in 2010, the company forged new partnerships in emerging markets and implemented actions to recover profitability and rationalize its industrial presence. This approach included divestment from two companies out of the aerospace and defence business: Ansaldo Energia and

Ansaldo Trasporti. At the beginning of 2016 the restructuring process culminated its final transformation in the form of a so-called "one company" (see Exhibit 1 for full accounts of all its M&A activities and, hence, the transition from Finmeccanica to Leonardo of today).
Its corporate evolution into one single company was dictated by the need for a more agile, integrated structure able to exploit synergies between various business sectors and to speak to global markets with one great voice.
The process of radical transformation that led to the creation of the group culminated in the adoption of a new brand name: "Leonardo". This name was chosen in honour of Leonardo da Vinci, a universal symbol of creativity and innovation, which was an ideal bridge between the historical, cultural and scientific traditions of Italy and the industrial future this artistic and inventive country was aiming for. The new name was incorporated into a new logo that was partially anchored to the distinctive brand used by the group in the past, while also introducing a novel element that shaped the new identity of the company. Specifically, the logo is now composed of eight converging lines (propellers) that represent the main pillars underpinning Leonardo's growth.
Today Leonardo is a global player in high technology sectors and one of the top 10 world operators in the aerospace, defence and security sectors. The group works every day to strengthen global security and provide essential defence services. In particular, by leveraging dual[5] application of technologies, it designs and manufactures products, systems, services and integrated solutions for both the defence sector and public and private clients in the civil sector, in Italy and the rest of the world.
The company operates in five sectors (helicopters, aeronautics, electronic defence, and security and space systems), which in turn are divided into divisions (helicopters, aircraft, aerostructures, electronics, and cyber).
In addition, Leonardo acts as parent company and corporate centre for the companies it controls – subsidiaries as well as joint ventures – but which are not included in the divisional perimeter; namely, these include: the US subsidiary DRS Technologies, which is active in the supply of products, services and integrated support to military forces, intelligence agencies and defence companies; ATR, the joint venture established with Airbus Group for the construction of regional aircraft; MBDA, the joint venture with BAE Systems and Airbus Group for missile systems; Telespazio and Thales Alenia Space, the two joint ventures established with Thales S.A. within the Space Alliance, respectively for satellite services and for the manufacture of satellites and orbiting infrastructures; Leonardo Global Services (LGS), a company providing real estate management and enhancement services, purchasing, and facility management; and SO.GE.PA, a company

5. Dual applications refer to the fact that technologies created for defence could also be used in commercial applications in the private sector, or vice versa, civil technologies may have applications in defence sectors as well.

that manages minority stakes and non-core activities, including the enhancement of the business complexes of investee companies (Exhibit 2).
Currently Leonardo is active on five continents, with its own offices and industrial plants (in about 20 countries) and it can count on a very extensive network of subsidiaries, joint ventures and partnerships at the international level, with a significant industrial presence in four main markets – Italy, the United Kingdom, Poland and the United States – and structured collaborations in the most important high potential markets in the world. (Exhibit 3).

Leonardo's innovation and intellectual property posture

"Faced with the increasingly fast pace of innovation,
it is necessary to create a mechanism
that allows society to metabolize it"
(Roberto Cingolani – CT&IO, 2020[6])

Innovation management posture

Quality, efficiency and continuous innovation are the principles that inspire the group's innovation management. The aim is to ensure an ongoing equilibrium between a process of (radical) technological development pursuing a medium- to long-term impact, on the one hand, and a process of (incremental) existing product improvement in the short term, on the other hand.
To this end, Leonardo has an excellent track record of investment in R&D, which culminated in 2019 with about 11% of its revenues re-invested in R&D, involving more than 10,000 highly qualified human resources (engineering graduates, mostly in aeronautics, aerospace, electronics, mechanics, IT and telecommunications, and physics, in addition to specialist technicians) (Exhibit 4). These resources belong to engineering departments and divisional facilities responsible for both technological and product innovation, allocated to the following areas of competence: technology management, engineering management, system engineering, aeronautics engineering, mechanical engineering, electronics engineering, software engineering and verification and validation engineering. The breakdown of R&D costs by segment is shown in Exhibit 5. These features place Leonardo among the top three companies in Europe in terms of R&D investment in the Aerospace e Defence sector.
Recently, along with this stable trend in R&D investments, which has contributed to building the company's internal knowledge strengths, Leonardo has also undertaken a process of progressively opening up innovation activities for its external networks of potential partners. Thus, from inside the company, internal technical human resources have played a leading role in this process; externally, they have been one of the key players in Leonardo's global network, made up of customers, research institutes, suppliers, and technological and industrial partners operating in different countries and sectors worldwide (Exhibit 6). In this way Leonardo's technological innovation (in terms of products, systems, and services), whether radical or incremental, has increasingly been pursued through constant interaction between various players and stakeholders in different contexts and along different trajectories, in line with new trends shaping A&D market evolution.
The designer of the company's innovation posture is the Chief Technology and Innovation Officer (CT&IO). In July 2019 Leonardo appointed Roberto Cingolani to this role. Born in Milan, he grad-

6. "Necessario creare un modello societario al passo con i tempi", Agenzia Nova, Rome, 20 January 2020, available at https://www.agenzianova.com/a/0/2775319/2020-01-20/ricerca-cingolani-leonardo-necessario-creare-modello-societario-al-passo-con-innovazione, last retrieved in November 2020.

uated with a degree in physics from the University of Bari and with a specialization diploma from Pisa's Scuola Normale Superiore, followed by solid national and international experience[7]. He took on the CT&IO role with the goal of strengthening the company's innovation position, by tackling the challenges involved in managing long- and medium-to-short terms objectives, as well as the synergies between the company's internal and external innovation efforts. In other words, his duties primarly focused on the mission of moving the company forward in the innovation arena, consistent with the speed and complexity of the innovation process taking place in the new competitive scenario of the A&D industry[8].

IP management posture

Given the huge amount of resources spent yearly on R&D, when it came to safeguarding the intellectual property (IP) generated within the company, it was straightforward for the company to embrace a conservative posture in its management of intellectual property (IP) rights, right from the start.
Protection, minimization of litigation, and design freedom had long been the foundations of company value, as companies traditionally considered IP to be a means of legal defence to protect ideas and keep others out of their market (the so-called "sword and shield" approach[9]). This also meant Leonardo's divisions were committed to produce innovation mostly in alignment with the ordinary evolutionary trajectory of their core businesses and mostly employing trade secrets rather than other forms of IP rights (i.e. patents), given the 'sensitive' nature of the technologies they developed[10]. As a consequence, serendipitous output falling outside the core perimeter of product development was not prioritized or even allowed to come into being. In contrast, it was mostly neglected, and maintaining a trade secret was usually preferred as the main means of defensive protection, rather than disclosing and publishing patented knowledge properties.

7. He was in the research team of the Max Planck Institute in Stuttgart (1988-1991), visiting professor at the University of Tokyo (1997-98) and adjunct professor at the electronic engineering faculty of the University of Richmond, Virginia (1998-2000). Before joining Leonardo, he was also Director of the Italian Institute of Technology in Genoa (2005-2019).
8. "Necessario creare un modello societario al passo con i tempi", Agenzia Nova, Rome, 20 January 2020, available at https://www.agenzianova.com/a/0/2775319/2020-01-20/ricerca-cingolani-leonardo-necessario-creare-modello-societario-al-passo-con-innovazione, last retrieved in November 2020.
9. Traditionally, managers have seen IP rights as either a "sword" or a "shield" to use against the competition. As a sword, intellectual property can be used to attack a competitor who seeks to exploit some aspect of your IP in a way that violates your rights. As a shield, it can help you to stave off the attacks of your competitors. This metaphor suggests that a company should control and exploit its intellectual property to the greatest extent allowed by the law in every instance, no matter the context and no matter who is involved.
10. Trade secrets and patents constitute two different types of IP that help inventors and owners to protect their IP, i.e. the outcome of their R&D investments. A trade secret – generally defined as information that derives economic value from not being generally known and that requires reasonable efforts to maintain its secrecy – is the perfect and opposite complement of the fundamental aspect of a patent, which is made publicly available for the purpose of encouraging and promoting further subsequent innovation.

The company lingered on with this conservative approach to IP for many years, in the belief that trade secrets were more suitable for protecting complex and long-life technology systems such as helicopters, aircraft, and avionics equipment (in the aeronautics sector), and in the knowledge that lawsuits for alleged infringements were a very rare event (especially in the defence sector) compared to what occurred in commercial sectors. However, as industry dynamics changed and as the company started opening its boundaries to external contributors, the need emerged to account for the risk of third party IP rights infringment as well as consider the enhancement of non-core solutions through licensing and collaborative practices with third parties.

However, in terms of governance, the management of IP relied for many years on the widespread and independent work of trusted professionals, typically located in the legal offices of each company and therefore with very limited technical skills in the specific technical subject matter, as well as limited freedom of action given their small sphere of influence. This fragmented governance generated very little value in terms of patenting activity (very little exploited by the company with very poor results compared to competitors), and it proved to be unsuitable in terms of unlocking the full potential of new ambidextrouos innovation processes.

Hence, starting in 2012, with the enactment of the first internal directive on "Valorization, management and protection of industrial property" (internally known as Directive 20/2012), and more recently, with the emission of the "Intellectual Capital Management" procedure (internally known as Procedure 18/2016), which endorsed a form of widespread but interlinked governance for IP management at the division level, the company has undertaken, under the guidance of the Corporate IP Office[11], a process of change from purely defensive IP management, based on cost control and protection of proprietary technology, to a much more advanced approach.

The effect of this change in IP management attitude was visible in terms of new patent registrations, which increased substantially in the timespan from 2004 to 2011. In this period, the group was able to catch up with competitors both in terms of new applications and with a broader scope of protection for its patenting activity. In the following four years, 2012-2016, its growth rate stabilized at levels close to average in the aerospace sector; from then on, the trend remained moderate, in line with the average of its main direct competitors.

However, despite these results, by the start of 2018 the feedback from company employees, at all levels, said an effective IP strategy for the company was still lacking and increasingly needed. A change in posture towards a more open approach[12] to the management of IP, including a full spec-

11. For example, the ordinary management of patent life cycle (e.g. cost control and prosecution of IP rights) is conducted on a daily basis by single business units (namely the divisions and the group's subsidiaries/investee companies) while the Corporate Centre monitors and verifies strategy for market exploitation and the quantitative and qualitative valuation of IP titles and opportunities to sue third parties for alleged infringements.
12. Leonardo's Open Innovation approach is available at https://www.leonardocompany.com/it/innovation/open-innovation, last retrieved in November 2020.

trum exploitation of IP – mostly patents – in support of the business strategy's long-term objectives, was still required.

Chief Executive Officer (CEO) Alessandro Profumo started to publicly champion this goal during the writing of the 2018-2022 Industrial Plan[13]. He pointed out the need for a complete redesign of the company's IP strategy, beyond the mere decision to affiliate IP professionals, scattered throughout the company, with the R&D unit linked to their own division[14]. Already aware of the CEO's appeal, Leonardo's internal and external stakeholders were eagerly waiting to know how the new IP path would unfold and what it would mean for the company in the near future. This was just the first step along the path to Leonardo's IP evolution.

13. Industrial Plan presented in 2018, available at https://www.leonardocompany.com/it/investors/industrial-plan, last retrieved in November 2020.
14. The objective of this shift was to put technical resources (e.g. engineers, rather than legal or para-legal professionals) with strong technological skills at the head of these units and make them responsible for IP management. They were expected to have a better understanding of the technological nature of and aspects inherent to the process of generation, sharing/acquiring new IP, and the business aspects of licensing and industrial offset (which is a typical IP transaction mode for the defence industry).

Leonardo's IP evolution

"The acquisition of intellectual property from the outside is
an option to consider in developing
new missiles and ballistic protections".
(Francesco Rogo, IP Manager, 2013[15])

Unlocking and displaying IP value

Two important projects heralded the process of change in Leonardo's approach to IP management, in alignment with the the company's business strategy and in compliance with the dictates of the 2018-2022 Industrial Plan.
The first one was the implementation of the Italian patent box (the tax rebate law for investments in R&D and IP); the second one was the establishment of a Corporate Patent Intelligence Unit, which offered centralized information systems for IP landscaping, put at the services of each of the IP division managers.
The two measures revealed the importance of economically enhancing IP, both internally, for balance sheet accountability (i.e. the patent box), and externally, whenever the IP asset became eligible for disposal, licensing, and transfer of technology (ToT) development. In this way, IP assets were no longer considered to be simply an economic burden for the company (generating filing and maintenance costs), but rather they were given both an internal value in terms of tax rebates and expected use in future business opportunities in both core and potentially non-core fields, and an external value in terms of additional revenue produced by excluding competitors from bids and running royalties through licensing. This aspect clearly emerged in the eyes of all Leonardo's people.

IP enters the C-suite

The strategic shift happened when, in 2019, the Chief Technology & Innovation Office Unit (CT&IO) was created under the responsibility of Roberto Cingolani. In compliance with the mandate he received from CEO Profumo and in fulfilment of the 2018-2022 industrial plan, he was put in charge of four crucial tasks (Leonardo 2030 Vision Innovation Masterplan[16]), as follows:

15. F. Rogo (2013) "Brevetti: la Miglior difesa è l'attacco.", FINMECCANICA MAGAZINE n.12/2013, Rome, internal distribution printed magazine of Finmeccanica SpA.
16. Alessandro Profumo (2020) "The road map ensures Leonardo [has] long-term growth prospects to face the challenges of the third millennium in key sustainable [areas]. The objective is twofold: on the one hand, [satisfying] market demand requires continuous innovation, and on the other, anticipating innovation which, in turn, generates new demand." Hence, Leonardo's roadmap aims to strengthen the company's technological research, including involvement in a network of external skills, with a view to opening up innovation, accelerating digitization processes and developing enabling technologies as drivers to compete effectively in international markets. More information is available at: https://www.leonardocompany.com/it/press-release-detail/-/detail/02-12-2019-leonardo-presents-a-road-map-for-the-company-s-innovation-and-research-through-the-launch-of-leonardo-labs-with-the-aim-to-strengthen-techn, last retrieved in November 2020.

1. setting up **the governance for basic R&D** and product/technology innovation plans, in order to optimize an external collaboration network, in response to the lack of coordination in previously deployed collaborative activities, which had generated overlaps and duplication of activities and developments among divisions (including multiple approaches to simulation platforms, unmanned platforms, engine electrification, electronic solutions, new materials, etc.). The optimization of the network of external collaborations (including start-ups) makes it necessary to adopt standardized evaluation, prioritization and selection criteria as well as the enhancement of synergies and strategic links between different initiatives across divisions. At the same time, the unit was committed to strengthening corporate R&D activities to develop strategic technologies of general interest for the entire company, reducing undesirable overlaps and helping divisions to maintain the competitiveness of consolidated products, update their portfolio of related technologies and mitigate the physiological processes of technological obsolescence.
2. setting up the **Leonardo Innovation Committee**, constituted by the CEO, the heads of CT&IO, the Head of HR, the Chief Financial Officer, the Chief Strategy and Equity Officer, the Chief Procurement Officer, and the managing directors of divisions. It is in charge of planning Leonardo's future and vision in terms of innovation strategy foresight, which is needed to prioritize Leonardo's efforts in addressing market needs in the coming decades (Leonardo 2030 Vision Innovation Masterplan[12]). With this objective in mind, the committee's most critical role is to drive consensus on the importance of emerging technologies for the business, such as artificial intelligence (AI), high performance computing, data analytics, the internet of things (IoT), cyber security, unmanned systems, autonomous and intelligent systems, and materials science. It is supported in its functions by an international advisory board with consultative powers, which helps in the process of evaluating ongoing initiatives and in the analysis of priorities, strategies and foresight, with particular focus on the identification of high-risk high-return initiatives that are visionary and designed to increase the readiness of Leonardo technologies and the competitiveness of its products in the future.
3. setting up a **Corporate IP Office** for the rationalization, maintenance, management and enhancement of Leonardo's IP portfolio. The office was institutionalized in April 2020 and inherited all the resources, experiences and best practices previously developed and diluted throughout the company. Whereas in the past the focus was more on legacy and on internal exploitation (offset compensation, fiscal laws, IP evaluation for programmes, including some technology transfer), the new mission revolves around opportunities for IP exploitation towards external markets, with the guidance of Francesco Rogo, to elevate IP reasoning to higher levels than in past.
4. setting up **Leonardo Corporate Laboratories** (**Leonardo Labs**) to explore/develop innovative technologies/ideas which are strategic for the whole company. The model envisioned involves the establishment of a central infrastructure that can become the place to concentrate not only laboratories and hardware but also high-level technical-scientific resources to create a critical

mass that will also be internationally visible and recognizable. The critical role of these labs was well explained by the company CEO, Alessandro Profumo, when he said, "The road map [for *Leonardo Labs*] ensures long-term growth which will address the challenges of the third millennium in a sustainable way. The objective is two-fold: satisfying market demands, which requires continuous innovation, and, on the other hand, anticipating innovation which, in turn, generates new demand. *Leonardo Labs* will also produce a continuous flow of talents to ensure flexibility and renewal, both in terms of capability and professional skills. This is based on an international scale model and our evolution of technological trends[17]". The centrality of their mission is also highlighted by CT&IO Roberto Cingolani, who stressed that "*Leonardo Labs* [...] will be responsible for working on cutting-edge programmes in the medium to long term, transversal to company business areas, able to develop future technologies and to anticipate market demands. The initiative is a key factor for Leonardo's competitive growth[18]".

IP Governance for a distributed interlinked IP organizational architecture

The time has come to make IP management a value-added activity for the company. The 2018-2022 industrial plan and Leonardo's 2030 Vision Innovation Masterplan[19] have provided this opportunity for CT&IO Cingolani. The establishment of the Corporate IP Office opened up the opportunity to design and deploy a new form of IP governance that ensures a distributed yet interlinked IP organizational architecture throughout company levels. This office was set up to allocate positions and units at different levels, dedicated to the management (identification and protection) and enhancement (or exploitation) of the company's IP assets, including (Exhibit 8):

- the IP Manager
- the Patent Office
- the Technology Transfer Office
- several IP Managers (at the divisional level)
- hundreds of IP Correspondents (at the division functions level).

Francesco Rogo (with a background in computer engineering and a PhD in business engineering, joined Leonardo in 2000) took the helm of the Corporate IP Office as IP Manager to demonstrate,

17. https://www.leonardocompany.com/en/press-release-detail/-/detail/02-12-2019-leonardo-presents-a-road-map-for-the-company-s-innovation-and-research-through-the-launch-of-leonardo-labs-with-the-aim-to-strengthen-techn, last retrieved in November 2020
18. https://www.leonardocompany.com/en/press-release-detail/-/detail/02-12-2019-leonardo-presents-a-road-map-for-the-company-s-innovation-and-research-through-the-launch-of-leonardo-labs-with-the-aim-to-strengthen-techn, last retrieved in November 2020.
19. https://www.leonardocompany.com/it/press-release-detail/-/detail/02-12-2019-leonardo-presents-a-road-map-for-the-company-s-innovation-and-research-through-the-launch-of-leonardo-labs-with-the-aim-to-strengthen-techn, last retrieved in November 2020.

under the guidance of CT&IO Cingolani, how the new IP management posture could bring value to the company. In his capacity as IP Manager, he is responsible for ensuring the protection and enhancement of the group's IP through the innovation of engineering processes, accelerating their digitalization, with a focus on increasing effectiveness and efficiency. He supports and coordinates the engineering, CTO and Innovation of the divisions' organizational units on IP aspects, and when needed he coordinates with the JVs/partnerships/subsidiaries.
The people under **IP Manager** Francesco Rogo's guidance are responsible for:

1. defining policies and processes to harmonize the management process for the Group's IP rights; defining technology transfer processes (e.g. industrial offset, licensing and open innovation), in coordination with the marketing/commercial units of the divisions; centrally managing the company's patent portfolio as well as the authorization and monitoring of technical and scientific publications; finally, performing patent showcases for third parties and identifying dual[20] applications of internal IP.
2. providing technical support and contributing to stimulate the application of the patent box and tax credits for R&D expenses, in close collaboration with the pertinent finance unit;
3. examining the inherent criticality of technologies subject to licensing or transfer to third parties, in order to comply with the requirements imposed by national regulations (e.g. the exercise of special powers by the state), or for the purposes of information duties in execution of statutory requirements, to the board of directors;

The **Patent Office** (PO) is responsible for the following: developing the culture and skills needed to protect and manage the results of R&D activities; defining the maturity model of IP practices, including a set of performance indicators, to be applied to the divisions and, where possible, to the companies/subsidiaries; identifying (in collaboration with the HR unit) policies, procedures and operating instructions for the Management of IP protection and support processess, including inventor rewards; managing the portfolio of IP rights (patents, copyrights, designs, trade secrets, and trademarks), in order to monitor their evolution, budget and use; and finally, protecting the technological and engineering know-how to be shared outside the company perimeter, through confidentiality agreements, the assessment of technical publications by employees, which may also be in collaboration with partners and research centres (e.g. at conferences, seminars, conferences or in technical and scientific journals, etc.).
The **Technology Transfer Office** (TTO)[21] constitutes the real novelty and operates as an "IP market sensor". It contributes significantly to the shaping and up-grading of IP strategy along the innovation cycle phases through the following steps: developing an outside-in culture and skills for external exploitation of the results of investments in R&D, open innovation initiatives and funded

20. Dual applications refer to the fact that technologies developed for defence could also be used in commercial applications in the private sector or, vice versa, when civil technologies may have applications in defence sectors as well.
21. TTO website available at https://techtransfer.leonardocompany.com/it/home, last retrieved in November 2020.

research (e.g. national and European); evaluating and enhancing the value of the group's intangible assets; and ensuring the technical supervision of business processes during the implementation of national and foreign tax regulations (i.e. the patent box, so-called transfer pricing, the so-called tax credit on R&D, and industrial offset compensation).

The **division IP managers** maintain the role of supervising daily tasks related to their IP assets at the divisional level, but under the direction of Corporate IP Manager Francesco Rogo. This direct functional link between corporate and department IP representatives, which was set out for the first time in the company's history, ensures that the organizational structures underpinning IP management activities will actually operate in unison and mutual balance. Moreover, it creates fertile ground for elevating the tactical management of IP pursued at the division level up to the strategic level, in line with long-term company goals where IP has the role of creating current and future value for the company.

As a reinforcing mechanism for this architecture, the plan created the positions of **Intellectual Property Correspondents** (IPCs), who support the division-level IP managers. In agreement with the heads of the function/hierarchical business line, they aim to do the following: promote and increase the culture of IP protection in their respective functions; ensure the correct deployment and applicability of corporate guidelines and directives, as provided by Leonardo's IP manager; assist the division IP managers in ascertaining the appropriate contractual framework governing the transfer/sharing of IP with third parties; carry out dissuasive actions in daily management and report potential infringement cases to the IP manager; and finally, contribute to the monitoring of all the initiatives put in place by identifying, formalizing and implementing lessons learned and best practices.

By having IP become part of the C-suite, thanks to the establishment of its new Corporate IP Office, Leonardo has paved the way to unlocking its increasing IP value by involving the company's top management, aligning it with business strategies, and integrating it into the company's operational framework. But how should the IP Manager and the CT&IO measure the progress of this evolution? How should they ensure the long-term orientation of the company's IP strategy?

IP maturity model

"If you can't measure you can't improve" (Druker). This was probably the quote that resonated in IP Manager Francesco Rogo's mind when he was challenged with the issue of accounting for all the progress achieved in the implementation of the new IP management approach, as defined and executed up to the beginning of 2020.

Borrowing from consolidated management disciplines (e.g. capability maturity model integration[22]), he came up with the idea of developing and implementing an IP "maturity model" (the

22. Capability maturity model integration is a well-known level improvement training and appraisal standard used to guide process improvement across projects, divisions, or even an entire organization. https://cmmiinstitute.com/cmmi, last retrieved on Nov 2020.

Leonardo Intellectual Property Management Maturity Model, or LIPM3) that would not only make possible to describe key processes and capabilities evaluated in terms of progressive levels of maturity, but also to identify possible areas for improvement and revision of the company's strategic IP management practices.

Thanks to the collaboration of Luiss University Professor M. Isabella Leone, and her research assistant Federica Forzano (who is also trainee at Leonardo), the LIPM3 was designed during the first COVID-19 lockdown and involved dozens of division managers, along with the support of external consultants. Every day, Francesco Rogo met (virtually) with Leonardo's people, but, most of all, he met with all the directors of the company's different industrial areas in order to detect, collect, discuss and catalogue all the IP innovation initiatives already undertaken or under development in each area. This brainstorming activity led to the integration of all the "potential areas/activities of interest" in the model, reflecting the full range of opportunities to improve technological applications and innovation that Leonardo may undertake in the near future.

The full version of the LIPM3 encompasses six areas of IP management practices (defined as IP goals) and four levels of IPM maturity. Specifically, the IP goals refer to: 1. **Valorization**, which is defined as the potential to exploit the assets available to the company and maximize the creation of economic value; 2. **Protection**, which includes all those monitoring and control activities aimed at protecting intellectual property from possible infringement; 3. **Governance**, which includes all organizational practices that promote effective and efficient know-how management, both internally and in relations with external parties (suppliers, customers, strategic partners, competitors, etc.); 4. **Strategy**, which highlights a series of activities aiming to maximize the strategic potential of intellectual property and its alignment with the company's overall business strategy; 5. **Education**, which involves staff training processes that build a uniform and conscious IP culture; and 6. **Enforcement**, which includes all the collateral activities carried out in collaboration with several entities and several countries to strengthen the protection of industrial or intellectual property rights.

The six goals are broken down into application domains, i.e. the thematic and process areas in which they are organized (or developed). Each domain is broken down into five capabilities (in other words, IP proficiencies, corresponding to **people, processes, technologies, third party support, and policies**). The levels range from basic (L1) to progressive (L2) to mature (L3) and, finally, advanced (L4) (Exhibit 9).

The intended aim of this model is to apply the analysis of all dimensions to identify the "current position" of each division (and each subsidiary), so that all divisional IP managers can prioritize key areas of improvement and, at the same time, encourage dialogue within the company and with employees and customers regarding the strengths and weaknesses of current IP processes, highlighting possible opportunities for change/acceleration.

Just after the 2020 summer break, the model was presented to divisional IP managers during several induction meetings, followed by training sessions for the respective IPC (IP correspondent) networks. The aim was to introduce the most important IP procedures for dissemination

and sharing throughout Leonardo divisions. In November 2020 the first round of divisional IP practices maturity assessments was carried out and it provided management with a detailed view of IP strategy achievement and its alignment with company strategy.

The future of Leonardo's IP is here

A visible sign of Leonardo's new course of action took the form of a new boost along its long path to innovation growth, in line with the ambitious goals set out by the 2018-2022 Industrial Plan[23], which had identified innovation development as a key element for company success. Far from being easy, the achievement of this result was made possible thanks to the significant campaign of change and awareness endorsed by CT&IO Roberto Cingolani, with the support of the HR unit (in charge of the change within the company's management dynamics).

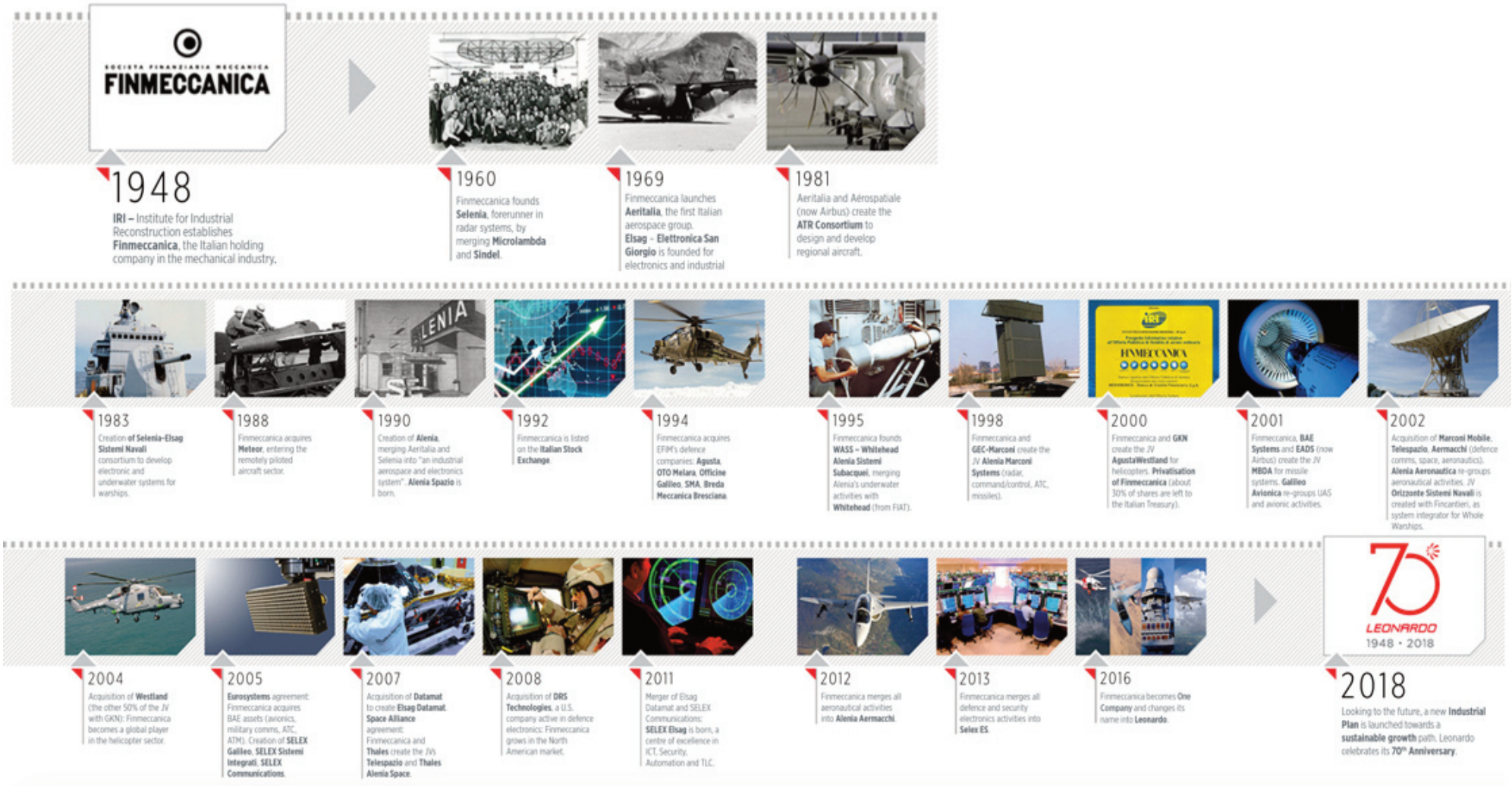
The centrality of the Corporate IP Office has gained momentum as it has allowed the governance of IP practices and processes to be sublimated and to create the culture and instruments required to approach and maximize the value of both the inward and outward exploitation of Leonardo's IP assets.

The challenge has now taken on a new shape. While the intended aim of the LIPM3 framework was to detect and measure the maturity of all initiatives in different company domains in terms of IP management, what it is more crucial now is how to ensure these measurements actually trigger real change and become sustainable in terms of the roadmap laid out in the 2018-2022 Industrial Plan and beyond.

Meanwhile, the web resonates with interesting news signalling the impact intellectual property (IP) generated by Leonardo has had in the economic recovery of the nations where it is located[24]. Hence, the road is open and has unveiled the potential of the new path of Innovation and IP management undertaken.

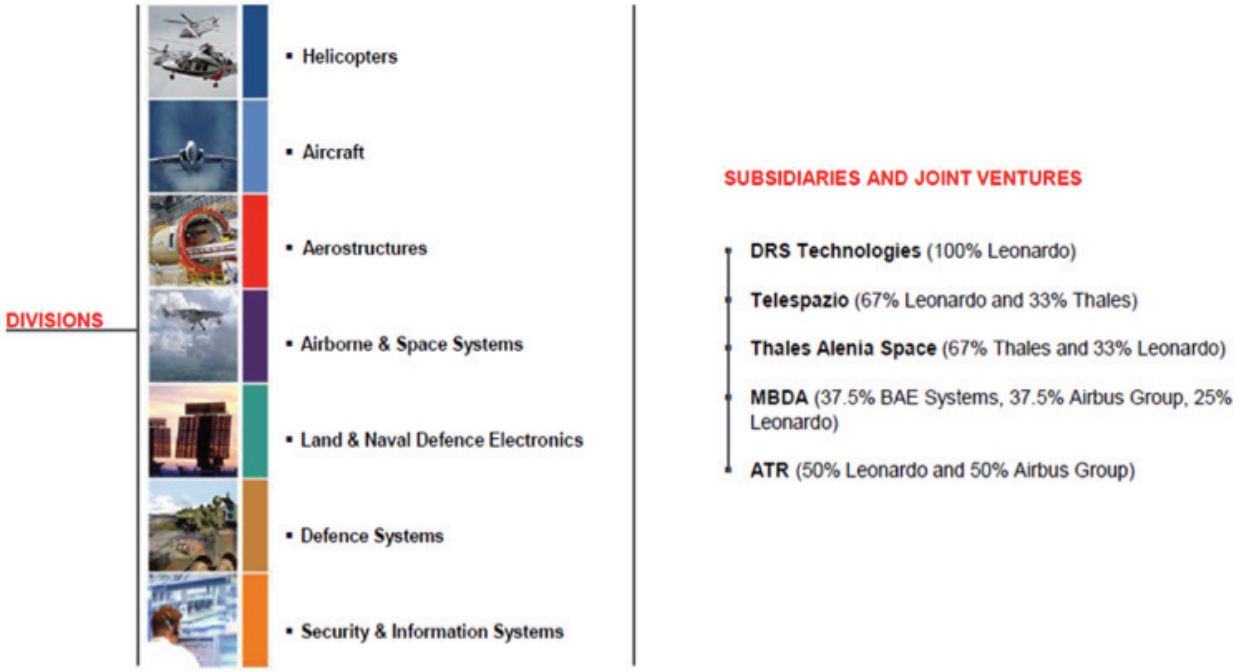
23. Leonardo's Industrial Plan 2018-2022, available at https://www.leonardocompany.com/it/investors/industrial-plan, last retrieved in November 2020
24. Leonardo press release (November 24, 2020), available at https://www.leonardocompany.com/en/news-and-stories-detail/-/detail/new-independent-report-highlights-importance-of-high-tech-uk-intellectual-property-in-recovery-of-british-economy-1, last retrieved November 2020.

EXHIBIT 1 History of Finmeccanica turning into Leonardo



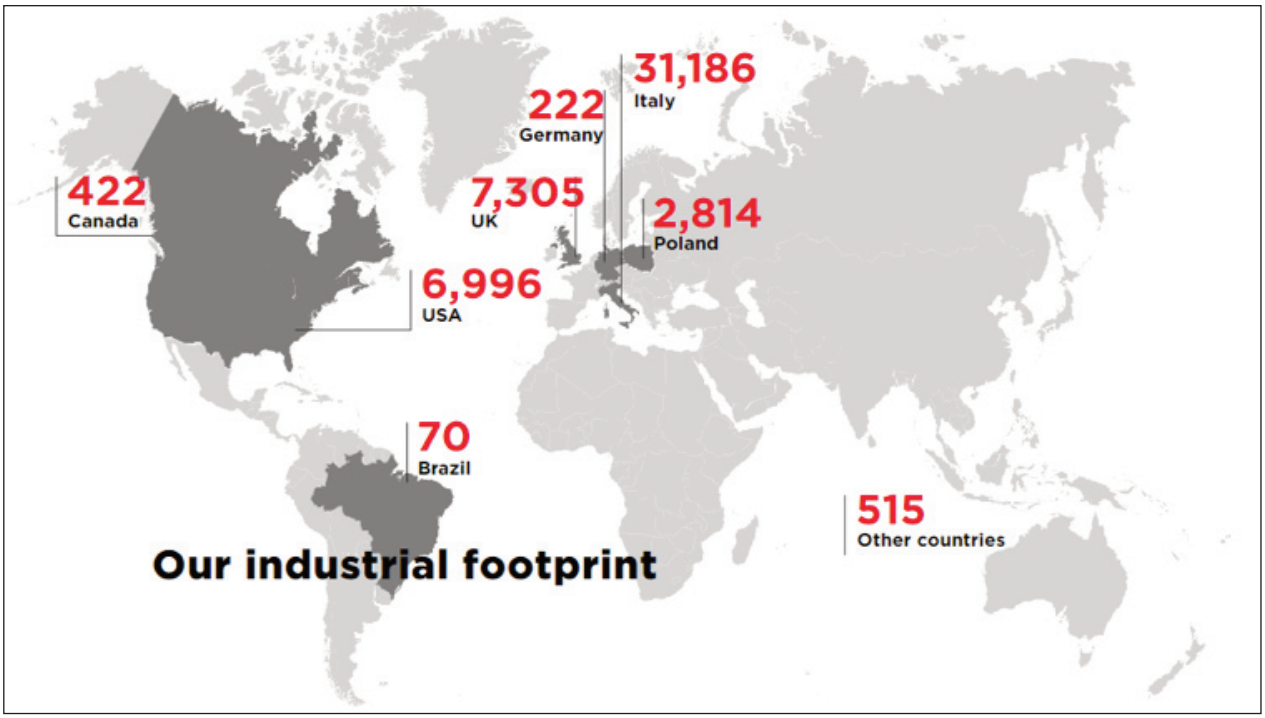
Source: Leonardo Internal Documents (2018)

EXHIBIT 2. Leonardo divisions, subsidiaries and JVs



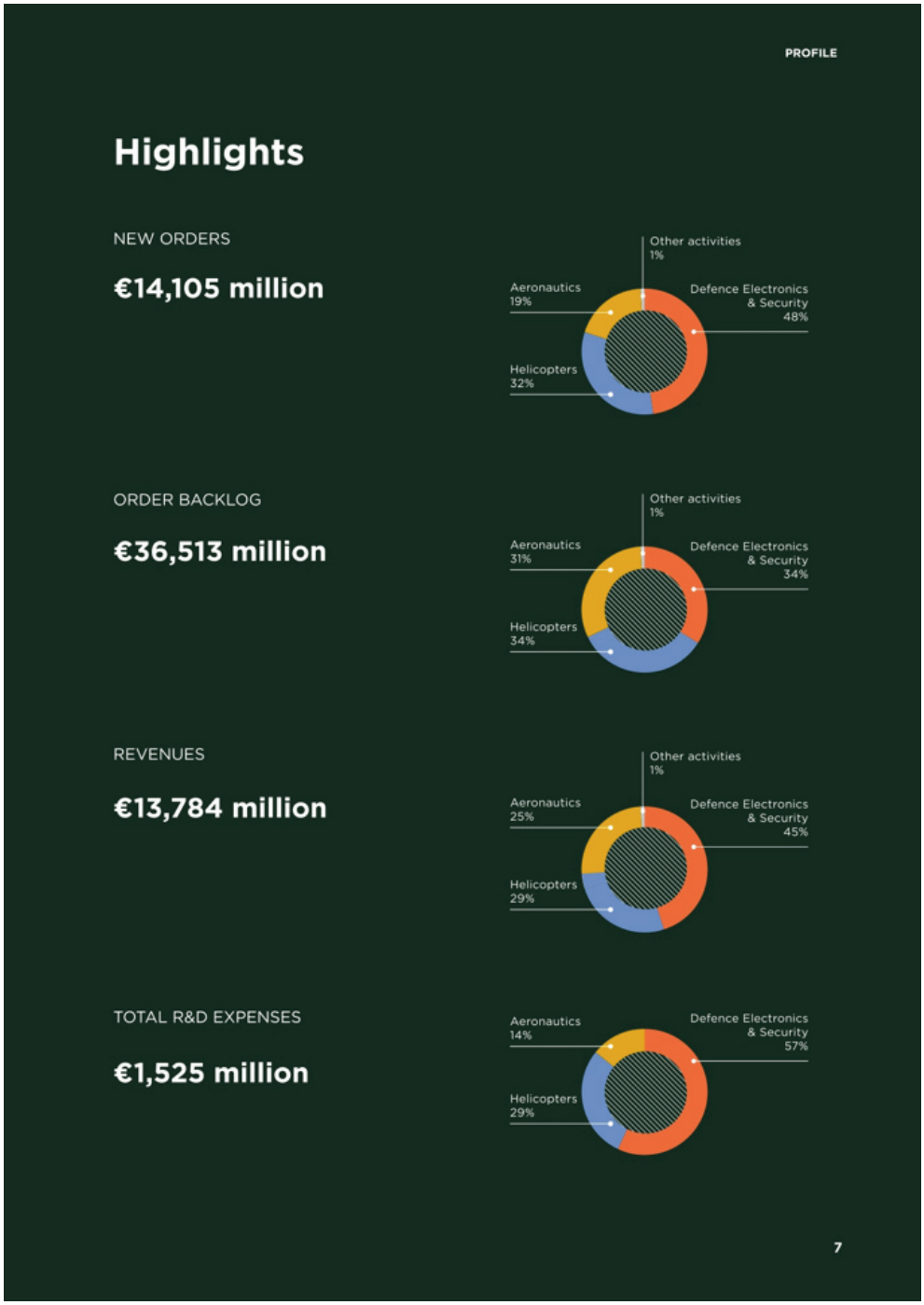
Source: Leonardo internal document (2016)

EXHIBIT 3. Leonardo's global coverage



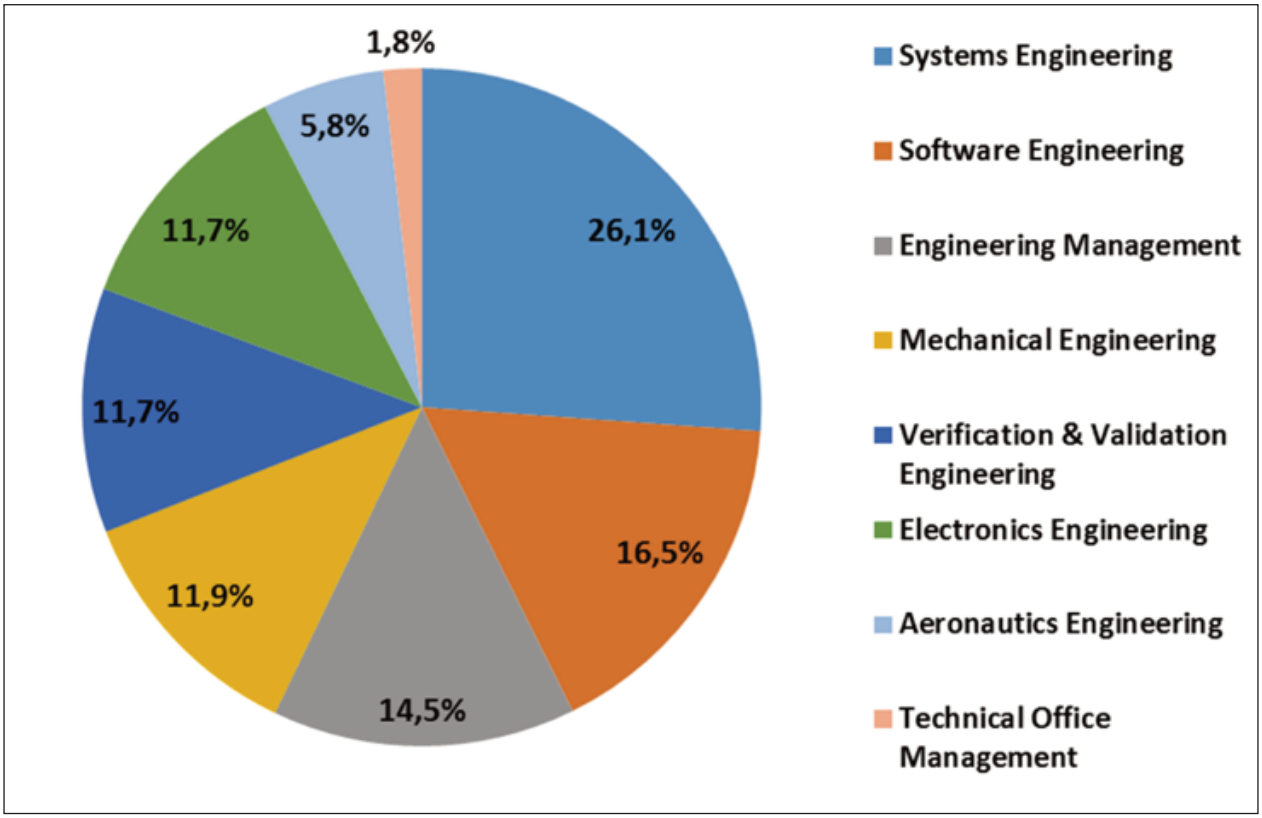
Source:
https://www.leonardocompany.com/documents/20142/115602/LEONARDO_AtGlance_ENG_140720.pdf?t=1594804832446, last retrieved in November 2020.

EXHIBIT 4. Leonardo's highlights



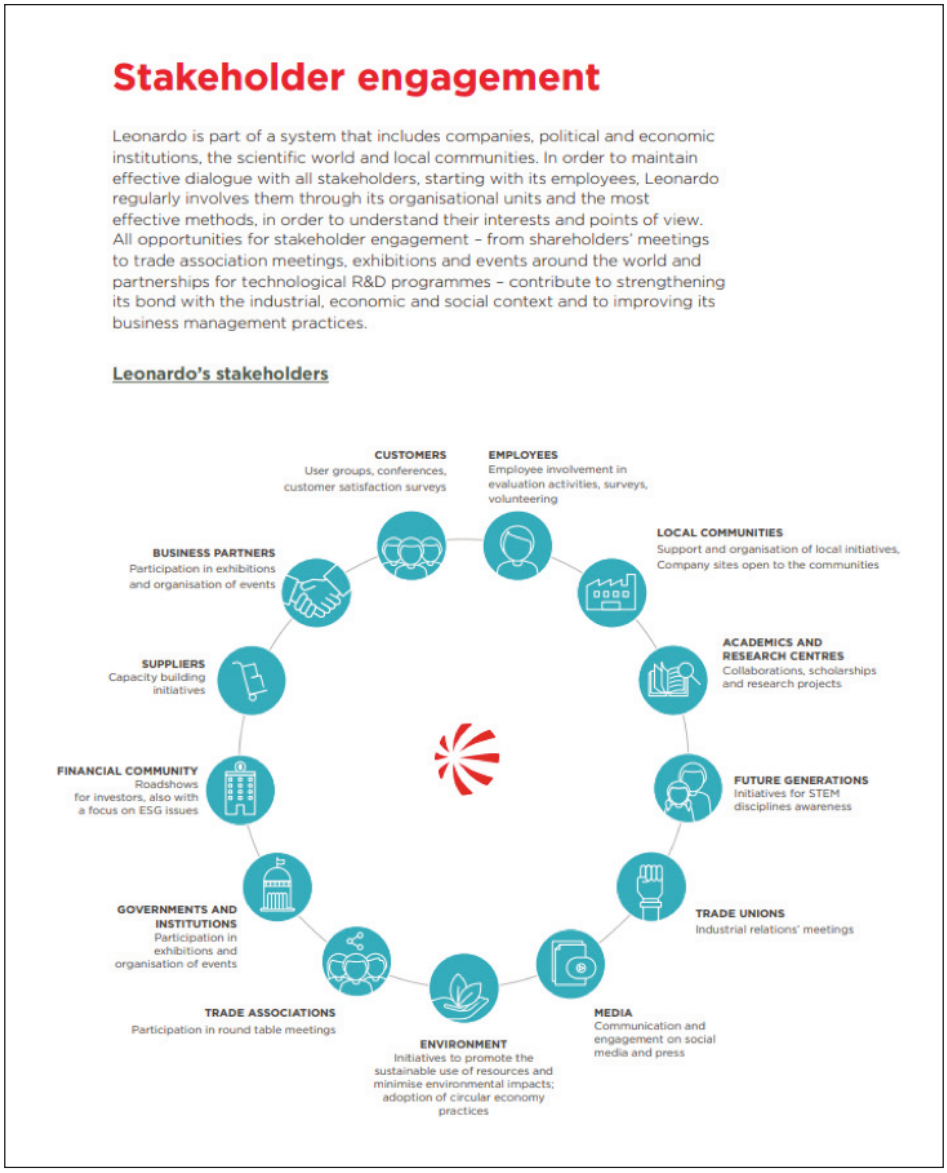
Source : Leonardo's Sustainability Report (2019)
https://www.leonardocompany.com/documents/20142/11180875/2019+sustainability+report+Leonardo.pdf?t=1592373952670

EXHIBIT 5. Leonardo's R&D investments – Sector breakdown



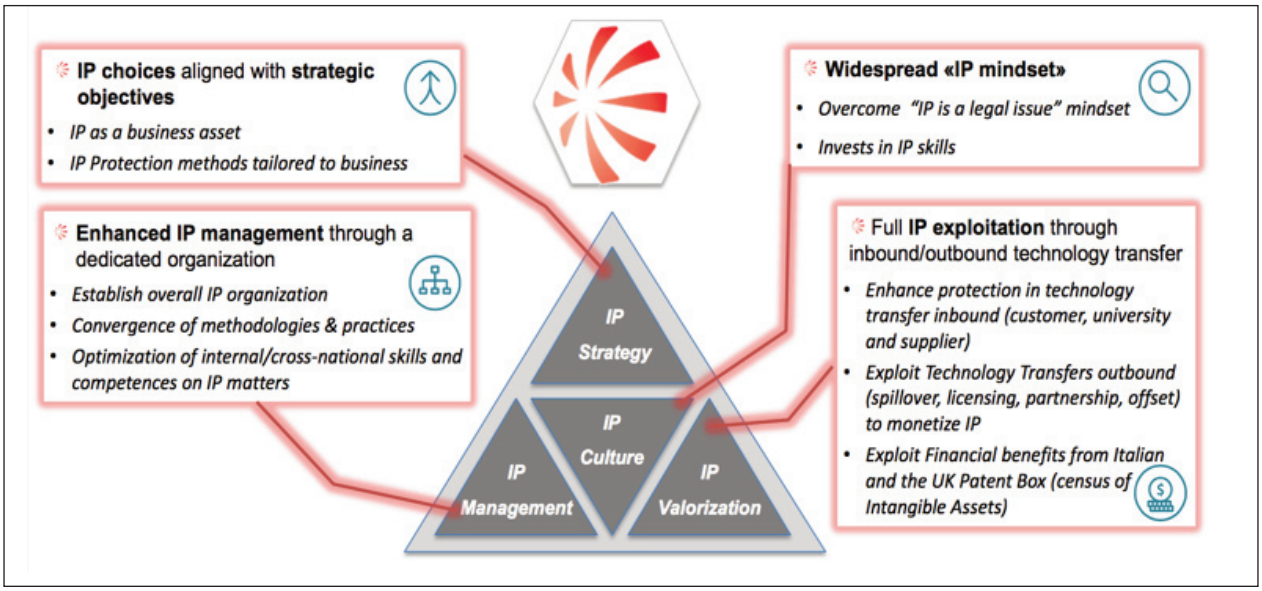
Source: Leonardo internal document (2020)
https://www.leonardocompany.com/documents/20142/116025/Bilancio+sostenibilit%C3%A0+2019+Leonardo+ITA.pdf?t=1592225720727

EXBIHIT 6 Leonardo's stakeholder engagement



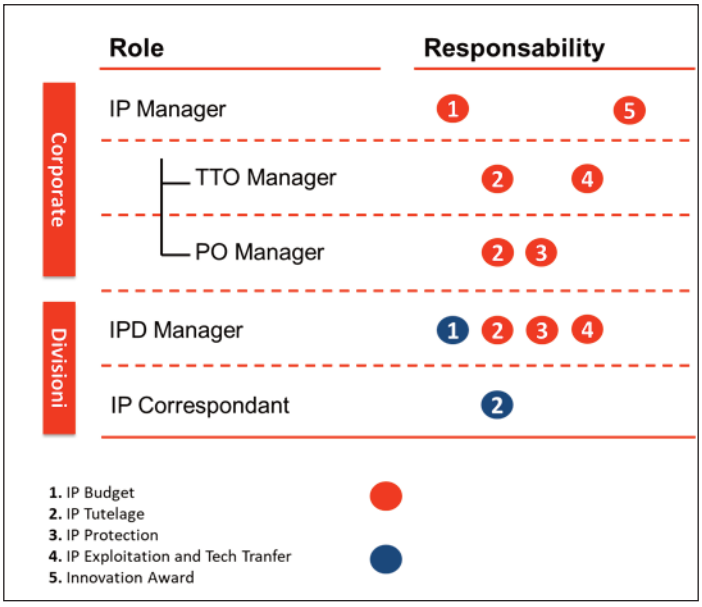
Source: Leonardo's Sustainability Report (2019) https://www.leonardocompany.com/documents/20142/11180875/2019+sustainability+report+Leonardo.pdf?t=1592373952670 , last retrieved in November 2020.

EXBIHIT 7 Leonardo's IP strategy pillars



Source: Excerpt from 2018-2022 Industrial Plan (internal document)

EXBIHIT 8 Roles and responsibilities of Leonardo's Corporate IP Office



Source: Leonardo internal document (2020)

EXBIHIT 9 Leonardo's IP maturity model structure and dimension

GOALS	Domains	Proficiencies	Basic	Progressive	Mature	Advanced
Valorization	IP Manager	People				
	IP valuation	Processes				
	Patent broker	Third parties support				
	IT support	Technology				
	IP guidelines	Policies				
Protection	x	People				
	x	Processes				
	x	Third parties support				
	x	Technology				
	x	Policies				
Governance	x	People				
	x	Processes				
	x	Third parties support				
	x	Technology				
	x	Policies				
Education	x	People				
	x	Processes				
	x	Third parties support				
	x	Technology				
	x	Policies				
Strategy	x	People				
	x	Processes				
	x	Third parties support				
	x	Technology				
	x	Policies				

Source: Leonardo internal documents (2020)