sky4.0

Soft skills in Aviation 4.0

TOWARDS SUCCESS

Industry 4. 0 Soft Skills White Paper

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CONTENT

INDUSTRY 4.0

The Industrial Revolution

The Industry Revolution started in 18th century with using water and steam power to mechanize production. This was one of the most important inventions of the Industrial Revolution, steam engines powered the first trains, steamboats, and factories. Later in the Industrial Revolution 2.0, the electric power is used to create mass production. During the third Industrial Revolution, electronics and information technologies entered into our lives and changed the industry by Smart Automation. Today, we are in the Fourth Industrial Revolution which is characterized by fusion of technologies such as artificial intelligence, robotics, the Internet of Things, 3D Printing, nanotech, bio-tech, etc.

Let us show you the revolution steps in the picture below.

Industrial Revolutions

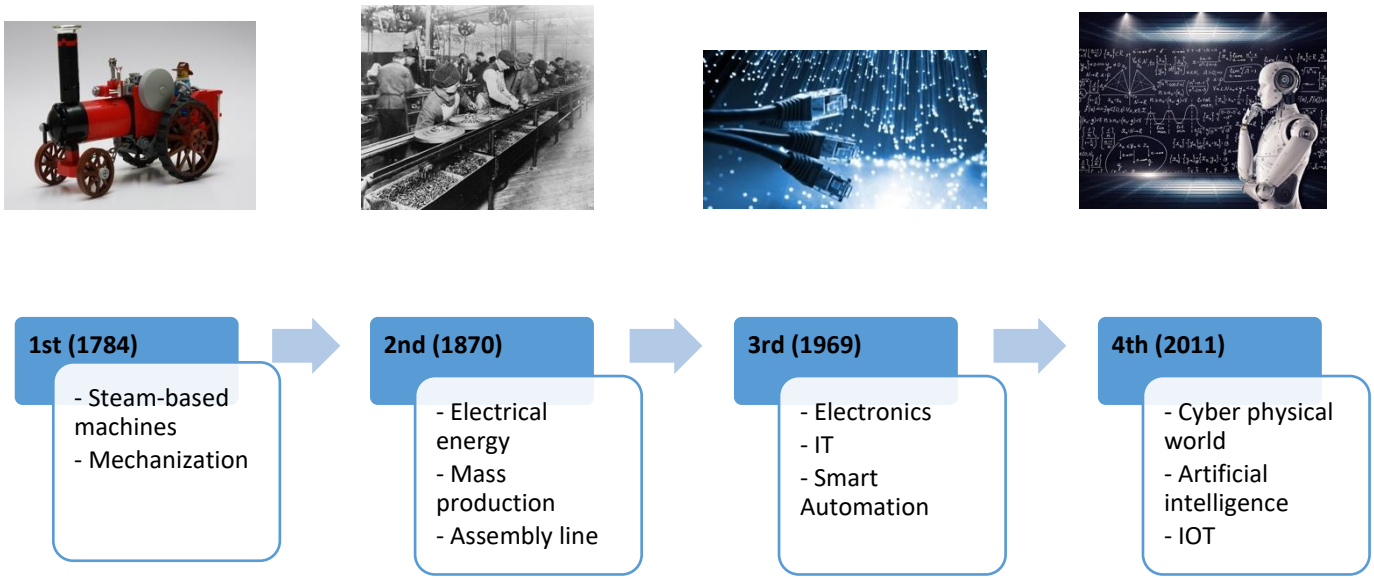


Figure 1: Industrial Revolutions

Sources: (Gislam, 2020) (Naseeb, 2020) (Roser, 2015)

The complexity and exigence of the aerospace industry make it a perfect target for these technologies. The framework for the digital transformation of the aerospace industry stretches from mobile technology; to the use of augmented reality, big data analytics and advanced human/machine interface.
New technologies will place greater demand on all members of the workforce in terms of managing complexity, abstraction thinking, and problem-solving. Employees will have to act more independently and possess better communication skills and ways of organizing their own work. Aeronautical production chains will increasingly rely on soft skills, such as interpersonal and character traits.
As the aerospace industry is one of the sectors most affected by the changes brought about by Industry 4.0, many airlines and companies within this sector have begun to invest in developing and applying Industry 4.0 technologies. These changes are going to affect these companies' revenues and the ways they interact with each other and with their customers.

In particular, looking at the technologies that come along with Industry 4.0, (Motyl, Baronio, Uberti, Speranza, & Filippi, 2017) there are several that can make a real difference on how things are done in the Aerospace industry.

Industry 4.0 Technologies

I4.0 is built on nine technology elements (pillars). These technologies bridge the digital and physical worlds and make autonomous and smart systems possible. It might be considered that some of those elements are actually used in manufacturing. But with the I4.0, all of them will operate together and this has the potential of leading to more efficiency and changing production and services relationship between suppliers, producers and furthermore customers.

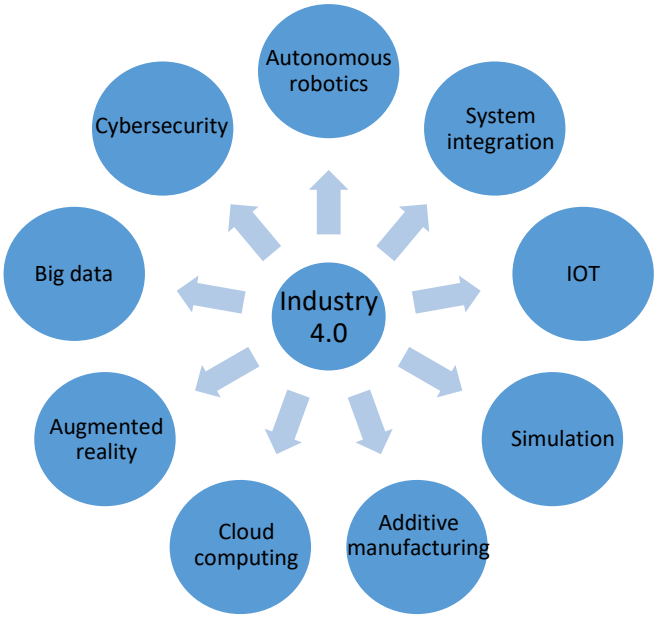


Figure 2: Industry 4.0 Technologies

Sources: (Dubedi, 2019) (Keiluhu, 2018)

What are the Industry 4.0 Technologies?

- **Autonomous Robotics:** Autonomous robots are intelligent machines capable of performing tasks in the world by themselves, without explicit human control. Examples range from autonomous helicopters to Roomba, the robot vacuum cleaner (Bekey, 2021). Autonomous robots are in a growing category of devices—including drone aircraft (aerial robots)—that can be programmed to perform tasks with little to no human intervention or interaction. They can vary significantly in size, functionality, mobility, dexterity, artificial intelligence, and cost, from robotic process automation to flying vehicles with powerful image and data capturing capabilities. Increasingly, autonomous robots are programmed with artificial intelligence to recognize and learn from their surroundings and make decisions independently (Fitzgerald, 2021).
- **System Integration:** System Integration is a process commonly implemented in the fields of engineering and information technology. It involves the combination of various computing systems

and software packages in order to create a larger system, and this is what drives Industry 4.0 to work at its optimum. System Integration increases value to a system by creating new functionalities through the combination of sub-systems and software applications (Hydac, 2021).

- **IoT:** At the heart of Industry 4.0 is the Internet of Things (IoT). Put simply, IoT refers to a network of physical devices that are digitally interconnected, facilitating the communication and exchange of data through the Internet. Industrial IoT is a subset of the Internet of Things, where various sensors, Radio Frequency Identification (RFID) tags, software and electronics are integrated with industrial machines and systems to collect real-time data about their condition and performance (AMFG, 2019).
- **Cybersecurity:** In Industry 4.0, companies are now hyper-connected with their smart devices and smart networks. The result of this technological progress is often a higher productivity of companies. However, it also increases the opportunities for cyber-attacks (CORA Project, 2021).
- **Big DATA:** Big data analytics is the use of advanced computing technologies on huge data sets to discover valuable correlations, patterns, trends, and preferences for companies to make better decisions. In Industry 4.0, big data analytics plays a role in a few areas including in smart factories, where sensor data from production machinery is analysed to predict when maintenance and repair operations will be needed. Through application of it, manufacturers experience production efficiency, understand their real-time data with self-service systems, predictive maintenance optimization, and production management automation (RGBSI, 2020).
- **Augmented Reality:** AR is a technology that gives the real world an extra dimension by superimposing information like text, images, and sound on the world as we see it. And then there is the Industry 4.0, also known as Smart Industry or the Fourth Industrial Revolution. Here you can also speak of an 'augmentation' of sorts. The machines are interconnected and in turn, linked to a smart system that can oversee the entire production process. This allows it to make its own decisions based on a big quantity of data to ensure that the process is as optimal and cost-effective as possible. So instead of operating the machines in a factory, it will be more like communicating with them (ONIRIX, 2021).
- **Simulation:** The word "simulation" is defined as "the imitation of the operation of a real-world process or system over time." With this definition in mind, it is easy to understand why simulation is ubiquitous in engineering and industrial organizations; imitating a real-world process or system allows experts to study the process or system they are interested in within a controlled, repeatable environment (Scanlan, 2021).
- **Cloud Computing:** With the advent of IoT and Industry 4.0, the reality is that data is being generated at a staggering speed and at high volumes, making it impossible to handle manually. This creates a need for an infrastructure that can store and manage this data more efficiently. Cloud computing offers a platform for users to store and process vast amounts of data on remote servers. It enables organisations to use computer resources without having to develop a computing infrastructure on premise. The term cloud computing refers to information being stored in the "cloud", accessed remotely via the Internet. In itself, cloud computing is not a solution on its own, but enables the implementation of other solutions that once required heavy computing power (AMFG, 2019).
- **Additive Manufacturing:** Alongside robotics and intelligent systems, additive manufacturing, or 3D printing, is a key technology driving Industry 4.0. Additive manufacturing works by using digital 3D models to create parts with a 3D printer layer by layer. Within the context of Industry 4.0, 3D printing is emerging as a valuable digital manufacturing technology. Once solely a rapid prototyping

technology, today AM offers a huge scope of possibilities for manufacturing from tooling to mass customisation across virtually all industries (AMFG, 2019).

The impact of the development of the Industry 4.0 technologies has many dimensions. These technologies are central to securing business locations and social welfare from a European perspective. At a company level, it will affect their technological innovations, standards, interfaces, and new safety requirements that will be developed to adapt themselves to the upcoming changes. At a societal level, the labour market and (vocational) education are directly affected, which could lead to associated social impacts; either positives (new job positions and opportunities) or negatives (unemployment) for those that do not adapt. Moreover, the way new professionals and current ones are trained should change, to assure that they can cope with this new environment. These new educational needs are one of the key aspects of industrial development. To accomplish the adaptation to new sets of technologies, it is important that everybody involved within the process is familiarized with them, as vertically and horizontally as possible, inside any company that wants to overcome the challenges of Industry 4.0. To accomplish this, it is required that the new set of skills that are needed to acclimate to the upcoming industrial context are established.

Now companies are intensively preparing for implementation of above-mentioned technologies related to Industry 4.0. This was confirmed by aviation companies from the project's partner countries during the last project International Multiplier Event. Some of the technologies are being more exploited (Big DATA) than others (Augmented Reality). Nevertheless, each technology is associated with change introduced in almost every aspect of the company's operation. Therefore, there is a great need to promote the role of soft competences in balancing social, personal, and mental skills in implementing changes and common goals, both among management and lower rank employees.

As it is mentioned above the I4.0 brings a fundamental change in the way we live, how we work, and relate to one another and even with machines and robots. With its nine major elements, it is a new phase in human development, enabled by extraordinary technology advances and merging the physical, digital and biological worlds (Sarosh Bhatti, 2020). Actually, the main elements of the I4.0 concept so far are related to the aerospace manufacturing processes such as robotics, additive manufacturing, augmented reality, IoT and simulation (Valdés, Comendador, Sanz, & Castán, 2018).

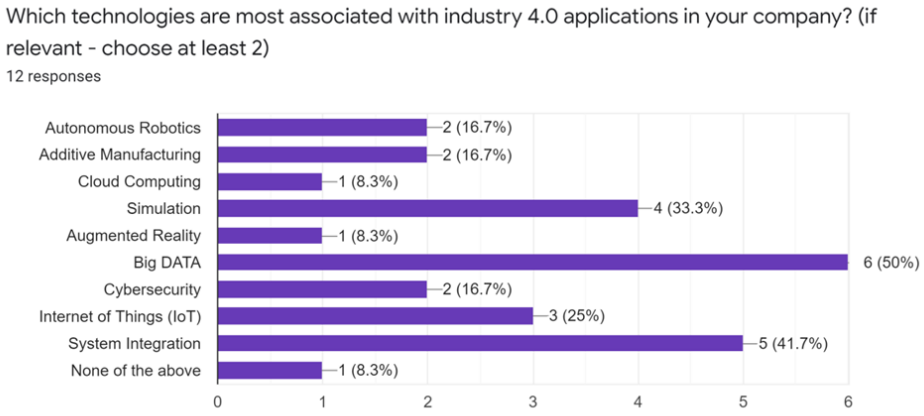


Figure 3: Gata gathered from participants who attended International Multiplier Event on July 1,2021

The framework for the digital transformation of the aerospace industry stretches from big data, IoT and system integration; to the use of simulation, augmented reality, smart sensors, location detection technologies and advanced human/machine interface. The nature of these new technologies will place

higher demands on all members of the workforce in terms of managing complexity, abstraction thinking and problem-solving. Employees will have to act more independently and possess better communication skills and ways of organizing their own work. The soft skills, those related to the human character and interpersonal relationships, will have a more prominent role inside the aeronautical production chain.

Soft skills, such as initiative, critical thinking, or intellectual curiosity, will require an adequate training and supervision that will ensure that every part involved in the production chain know how to use and apply those soft skills. Thus, new personal competences and qualifications will be needed. The lack of these preparation may lead to fatal human errors and financial losses that can be avoidable.

Assessing Industry 4.0 readiness

It is very important to support managers in identifying the strategic actions that can be adopted in order to improve a company's Industry 4.0 readiness level, especially when the goal is to increase competitiveness. Several established models are available that help companies assess their Industry 4.0 readiness; they include the Online Self-Check for Businesses (VDMA) and the Advanced Manufacturing company scan (ADMA). These allow companies to assess their overall status in various areas:

- 6 dimensions: strategy and organization, smart factory, smart operations, smart products, data driven services and employees (VDMA, 2021)
- 7 transformation levels: advanced manufacturing technologies, digital factory, eco factory, end-to-end customer focused engineering, human centred organization, smart manufacturing, value-chain oriented open factory (ADMA, 2021).

Both models provide managers with information on the general position of their company within Industry 4.0. VDMA ranks and evaluates companies in comparison to groups of other companies. The ADMA model presents the overall score as quantitative result.
But what if managers want to know how to support the changes which arise because of new technologies (autonomous robots, system integration, IoT, simulation, additive manufacturing, cloud computing, augmented reality, big data, cybersecurity)? In this case, they should look for qualitative assessment of their company's Industry 4.0 readiness. The best way to do this is to define a customized problem-solving scenario which makes it possible to deal with changes within the company. The changes that occur because of Industry 4.0 have several features:

- changes do not apply to individual departments or positions but to the entire organization;
- areas of adaptation to changes are difficult to define because they are so quick and comprehensive; therefore, an internal shift in the thinking and personal development of the employees involved is essential;
- the scope of changes requires comprehensive development of several key soft skills which are needed to understand the company's new vision;
- digital changes in companies, which are the fastest in recent business history, require skills such as cognitive flexibility, intellectual curiosity and adaptability to change;
- professional skills in an automated manufacturing company rapidly change from easy, repetitive tasks such as watch & call monitoring and standardization, to monitoring, error detection, decision making and prevention; this change both triggers and depends on the development of Sky4.0 soft skills.

All these changes require involving employees in Aviation 4.0! Are they ready? How to implement this change by inviting them on board? We would like to propose concrete and practical steps to follow, and all 6 Sky4.0 soft skills will be needed.

Industry 4.0 - Implementing the change in practice

The transformation of companies that aim to be effective within the framework of Industry 4.0 requires not only a clear vision and strategy for change but also effective communication of this strategy to company employees. Usually, the change process starts with a vision and strategy that is conceived at the top level of company management and then goes top-down through all levels of the firm. During this process, it is of utmost importance to know how to communicate these changes to company employees.
Any change that is imposed on the lower levels of a company's staff will usually result in resistance that might undermine the expected results. Positive results cannot be expected when the change process is communicated through neutral information which only states what is going to be done. Such an approach will not engage employees in the change process.
In order to overcome these difficulties, there is a need to promote an open dialogue within the organization in which all employees are considered as contributors to the company's future. Therefore, we propose a simple 4-step model that can effectively motivate company staff to implement the changes. The model consists of a set of questions and can be used by management when preparing and communicating the changes, which are often related to digitalization of work, introduction of new technologies, and giving feedback during any stage of the change process.

STEP 1: VISION and STRATEGY

The successful implementation of this model requires a clear understanding of the company's vision and strategy. We propose treating the strategy as a transformation from the state of the company now to a future state specified in the company's vision. Thus, answering the question "Where are we now and what are we going to be?" is crucial for success. Here is a set of complementary questions that enable management to conceive a clear strategy:

OUR SITUATION TODAY	OUR SITUATION TOMORROW
Who are my key customers?	Who will be my key customers?
What are their expectations concerning my company/department?	What will their expectations of my company/department be?
What values do our products/services bring to our customers?	What values will our products/services bring to our customers?
What do we do to give them these values?	What will we do to give them these values?
How are we able to find and maintain our customers?	How will we be able to find and maintain our customers?

STEP 1 is almost the sole responsibility of senior management. It states WHAT should be done. The next steps will broaden our understanding of HOW things should be done. In order to increase the motivation of staff to engage in the change process, there is a need for an open dialogue between management and employees. We can achieve this by using questions that enhance interpersonal communication.

STEP 2 – GOAL

The goal of this step is to incorporate the company's strategic aims in a measurable way. The complexity of the change process requires the active contribution of company staff. However, this has to be done under strict supervision of the management because it has to be linked to the strategy established in Step 1. Here is a sample of questions that encourage cooperation in establishing company goals.

- What would be the ideal solution to our problem?
- What exactly should we accomplish?
- How will we know that our goal has been implemented?
- How will we measure the expected results?
- When will we be able to say that our goal has been implemented?

Once there is a mutual understanding of the goals necessary to implement the strategy, the next step is to find a way to achieve these goals.

STEP 3 – OPTIONS TO ACHIEVE THE GOALS

The more we go into detail with our model, the more staff cooperation we need. In this step, we have to find as many ways of implementing our goal as possible and then choose the best one. The following questions can be used to do this:

- What have we already done to implement our strategy?
- What can we do to accomplish our goal(s)?
- What can be the role of our staff in the implementation of the strategy?
- What else can be done?
- Who could do it?
- What and who could help us?
- Taking into consideration all we have said, what is now the best way to implement our goal?

STEP 4 – ACTION

Once we have chosen the best option, it is time for action. Similarly, to the previous section, we will use questions to maintain staff engagement:

- What action will we take now?
- What will be the first step?
- What will be the next step?
- How will we measure the results of our activities?
- When will we finish?

SUMMARY

The implementation of the 4 steps above should enable company managers to fill the blank spaces in the following statements:

STARTING SENTENCE	To be filled by company managers:
Our company's problem is:	
Therefore, we aim to:	

In order to do this, we need to implement the following goal:	
This will be done through activities such as:	
In order to ensure the successful implementation of our strategy, we need to *(who will do what and when)*:	

All the statements in this table should be the result of the dialogue between managers and employees. When this discussion has been done, the chances of the company successfully transforming into the Industry 4.0 environment increase considerably.

Industrial Revolution 4.0 & Employees (Workforce)

Why I4.0 is changing the way we work and its implications to the workforce:
Industry 4.0 technology innovations—such as cloud computing, big data and analytics, Internet of Things, and artificial intelligence (AI)—are enabling new products, services, and business models, and fueling a new era of digital transformation. This is changing the organization working style and the skills they seek. They now are not focused on people who has knowledge of IT and Electronics but software engineers and developers to write codes. The organizations are vying for the best talent to innovate rapidly.

But that's only part of the story.

When developing a talent strategy for innovation, companies may want to look beyond the hunt for technical superstars. Savvy innovators should also consider how to build up their workforce's non-technical proficiency, especially in soft skills.
Let's continue the next title to have more understanding of the project and how it can help your organization to adapt IO 4.0.

1. SKY 4.0 PROJECT

1.1 What is SKY 4.0

The new Industrial revolution is now the reality in all sectors of the European Industry (Industry 4.0). This revolution is more visible in lead sectors like the Aerospace sector which is now implementing the most technologically advanced systems developed to answer the new industry challenges. Therefore, there is the need to develop a number of skills for the workers from the Aeronautic sector, namely in Maintenance and Manufacturing. These skills are actually not technical, but soft skills instead. The ability to make the best decision in a mind-balanced state could be the difference between an uneventful operation and human errors that may lead to fatal consequences. Thus, the importance of workers' soft skills to keep up with the technology development remains a challenge.

According to some European studies roughly 30% of companies consider "inadequate qualifications of the employees" a major problem for the transition to Industry 4.0. Looking at the pertinent research literature, there is no doubt that the operation of digitally networked manufacturing methods and systems based on data-driven processes will, above all, require new, cross-functional IT skills – skills that touch all professional fields and activities. Digital transformation needs more than new skills. It also produces entirely new professions and job profiles as well as changes in didactic methodology and forms of qualification.
To answer the question of how the developments bundled under the keyword of "Industry 4.0" would impact professional qualifications and what type of competence expectations this would generate specifically, the German MMB Institute (Industry 4.0 is originally a German initiative) analyzed a total of 26 studies, analyses, and research reports from the past 2 to 3 years and produced the following findings:
The industry 4.0. will need new competencies to be implemented in whole modern sectors of industry.

COMPETENCIES 4.0 = IT + SPECIALIST KNOWLEDGE x SOFT SKILLS

Many studies differentiate among multiple competency levels (with these levels receiving different designations in some cases), which are:

- **Technical skills:** Basic and specialist knowledge from a person's own specialty/discipline
- **Data and IT skills**: Control, use, checking of data-based systems, data analysis, data security/data protection, etc.
- **Social Competence:** Interdisciplinary cooperation, project management, communication skills, organisational and leadership competence, decision-making competence, etc.
- **Personal Skills:** Self-initiated learning skills, analytical thinking, problem solver mindset, capacity for abstract thought, openness, flexibility, etc.

While the special relevance of data and IT skills will surprise no-one in view of the technological challenges of I 4.0, it is the urgency with which many studies point out the importance of the social and, above all, the personal skills that is truly remarkable: the readiness for life-long learning, creativity, or analytical thinking. Naturally, this is directly linked to the question how especially such "soft" skills and mindsets can be systematically developed within the framework of personnel development and professional qualification. Also, there is a widespread consensus that continuing professional development will have to tread new paths to achieve a workplace-based and process-oriented.

In the Aerospace sector, there is also a lack of training modules focus on workers' soft skills development and social competencies. This absence may lead to serious consequences such as accidents related with human error, namely in duties related with MRO and CNC machinery usage in manufacturing. The consequences from a misplaced decision may vary from serious financial loss and fatal accidents.
Therefore, the main objective of this project is to help Aerospace companies from different European countries to meet the challenges of Industry 4.0 by improving the soft skills of their human resources. Therefore, the project is carried out internationally.

The project's aim is to build curricula and training modules around soft skills required by Industry 4.0 implementation, namely Character- Building Skills, Social Competencies and Personal Development skills. To do that, Sky 4.0 project focused on three main strategic priorities:

- Development and improvement of relevant and high-quality skills and competences by supporting the different project target groups in acquiring and developing KEY SOFT SKILLS, in order to foster employability, socio-educational and professional development. These key target groups are:
    - Aerospace companies and their workers; Sky 4.0 training activities target the needs of white collar and blue-collar workers, and the project will design a joint soft skill training programme to address the needs of both target groups. They will benefit from materials and resources developed by the Intellectual Output (O1).
    - Trainers and VET providers;
    - Young students of secondary and technical schools in the aerospace sector; that could become future workers in aerospace industry 4.0 companies. The project aims to increase the employability of these young people by promoting the acquisition of skills and competences that students might need in their future employment at industry 4.0 companies. They will benefit from materials and resources developed by the O2.
    - Human resource and team managers in aerospace companies; Those who manage teams or have HR responsibilities and who may have more difficulties to face the new challenges of this new industrial revolution and are able to share and promote new procedures among other workers. They will benefit from materials and resources developed by the O3.
- Implementing innovative practices and developing partnerships aimed at promoting work-based learning in all its forms, within the project new training materials was elaborated, both for current and future aviation sector workers, including Joint VET qualifications. The idea is to apply knowledge in practical training materials, based on real life and workplace situations, and embedding international experience (mobility).
- Further strengthen key competences in VET, including common methodologies for introducing those competences in curricula, as well as for acquiring, delivering and assessing the learning outcomes of those curricula. In this way, companies will be able to build a strong and effective skill set through personal development and character-building skills, and these will contribute to make relevant and positive choices and decisions and to have not only the best technicians but also level-headedness and wholeheartedness workers. At last, the improvement of employees' skills in the Aerospace Industry, will contribute to develop human resources well prepared to respond the Industry 4.0 challenges.

All the new Curricula and training materials produced under the project are introduced and promote work-based learning. Training and training materials are based on practical projects and Text and Workbooks contains "real life" workplace situations.
The main result of the project is generated around the development of the 3 main Intellectual Outputs, which provides a set of training and awareness materials to develop the required soft skills for industry 4.0 challenge, namely Character-Building Skills, Social competence, and Personal Development skills.
The development of these skills and mind-set will lead to much prolific work environment, more satisfied workers, and well-balanced teams. This way, companies will be able to build a strong and effective skill set through personal development and character-building skills, and these will contribute to make relevant and positive choices and decisions and to have not only the best technicians but also level-headedness and wholeheartedness workers. Finally, the improvement of employees' skills in the Aerospace Industry will contribute to develop human resources well prepared to respond the Industry 4.0 challenges.

As part of this innovative approach, the project:

- Implement a dynamic, interactive and innovative methodology.
- Takes on board the state-of-the-art training needs and offers regarding industry 4.0. It was based on the newest reports and studies to fix the state of the art and the current level of knowledge of the different target groups and aerospace aeronautical companies affected by industry 4.0
- Addresses the training needs of CURRENT but also FUTURE WORKERS.
- Designs and produces an offer to the aerospace workers, "CURRENT WORKFORCE", by producing a Curricula and different training materials to cover the needs of this target group inside the aviation industry 4.0 companies.
- Generates also training materials and lessons for "FUTURE WORKFORCE", i.e. young students at secondary or technical schools and vocational schools, that could face in their future the challenge of working and finding a job into this industrial revolution.
- Compiles the training materials into self-containing TEXT & WORKBOOKS, specifically developed to cover the needs of the various target groups involved. Each book is conceived as a single document that integrates the outcomes of O1 and O2. The project produced information for current workers, like a kind of a student book that integrates all information, Curricula and training material produced at O1. Consequently, there is also a Book for futures students that integrates all the lessons and materials produced at O2.
- Trains HR managers and trainers trough a blended mobility activity for VET Learners: Training the trainers of current and future workers.
- Finally, generated an AVIATION INDUSTRY 4.0 SOFT SKILLS WHITE PAPER with Guidelines for the aeronautical companies regarding Industry 4.0 implementation.

1.2 The Main Soft Skills that are Needed and Why Do We Need Them

Some of the most recognized soft skills for the new workforce in the era of Industry 4.0 are as follows:

- Critical Thinking
- Analytical Thinking
- Initiative
- Intellectual Curiosity
- Change Adaptability
- Cognitive Flexibility

For business leaders, these technologies hold tremendous potential to transform business models and create new value in an increasingly competitive world. But the proliferation of Industry 4.0 technologies also demands that organizations rethink the roles that humans and machines play. As businesses embrace automation, many are coming to realize that advanced technologies complement—rather than replace—human skills and often require human oversight. Indeed, with the rise of Industry 4.0, uniquely human traits like curiosity, creativity, empathy, problem-solving, communication, change adaptability, critical thinking are more important than ever. In a continually changing landscape, workers who possess these soft skills can help their organizations adapt and compete in ways that machines can't.

Industry 4.0 calls for leaders who possess strong interpersonal skills and an understanding of the complex interplay between people and advanced technologies. As organizations increasingly adopt these tools, business leaders would do well to rethink their talent and leadership development strategies. By prioritizing the development and advancement of ethical, inclusive leaders—and fostering technical and human skills across the enterprise—organizations can better position themselves for the challenges and opportunities this new era is likely to present.

As an example, Digital Workforce Productivity can be achieved by Augmented Reality which enables employees to become more skilled, more quickly, while improving knowledge and skill retention. They can also switch between tasks more easily with the use of digital work instructions as a guide. The incorporation of more automated processes also eliminates the margin for human error as machines consistently perform at a higher standard (Gourley, 2020).

Aviation companies from partner countries recognize that implementation of the Sky4.0 Soft skills definitely bring added values to the companies.

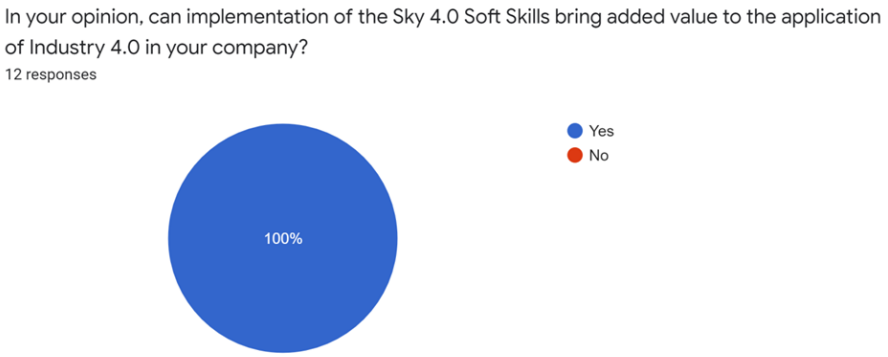


Figure 4: Gata gathered from participants who attended International Multiplier Event on July 1, 2021

These added values are related to companies' goals such as improved innovation (7 out of 12 responses) and increased productivity (6 out of 12 responses). Nevertheless, the key requirement which would allow to achieve these goals and have better team cooperation or more effective problem solving, is having well balanced employees with high level of Change Adaptability or Initiative, for example.

2. IMPLEMENTATION OF SOFT SKILLS IN INDUSTRY 4.0

2.1 Definition of Determined Soft Skills

2.3.1 CRITICAL THINKING

It's the ability to interpret, analyze, evaluate, make inferences, explain and clarify meanings. It is based on logical reasoning, the ability to work with concepts, the awareness of perspectives and own and other points of view, and systemic thinking. A progressive development of knowledge about one's own thinking and effective thinking strategies is necessary. It can contribute to improve understanding of situations and processes, avoid failure and it is important for finding out the weak points of the industrial process.

It is stated in (Rusman, 2018, s. 2) that: "Industry 4.0 requires students to have certain competencies and a critical thinking skill is one of the essential skills that students in higher education should be equipped with.

Many scholars (Paul & Elder, 2005; Giancarlo, Blohm & Urdan, 2004; Silverman & Smith, 2002; Glaser, 1985; Piaw, 2010) viewed critical thinking as the intellectually disciplined process of actively and skillfully conceptualizing, applying, analyzing, synthesizing, and evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication, as a guide to belief and action (Kargar, et al., 2013)."

Critical thinking skills are the basic competence that leads current workers and future workers (today's students) to sharpening their analysis and reasoning skills which next help students in higher education practicing their problem solving, creative thinking skills, and even motivate them to be more innovative (Hupfer, 2019).

It can be pointed out that having critical thinkers in key roles in the organization is an important factor to increase profit margins and become recognized as a brand. This is backed by industry experts: one of the top skills outlined by the World Economic Forum for organizations to be successful in the Fourth Industrial Revolution is critical thinking (Gray, 2016) .Critical thinking is the ability to think clearly and rationally about what to do or what to believe. It includes the ability to engage in reflective and independent thinking (philosophy, 2020).

Critical thinking can help aerospace organizations by improving business ideas, challenging traditional processes and systems for new improved customer friendly processes, assessing realistic market demand, enhancing operational efficiencies, innovating, and creating new products and services, improving employee productivity and organizational culture, and cutting through the biases (Bhatti, 2020). With the I4.0 revolution, aerospace companies need critical thinkers in key roles to ensure that decisions are based on due diligence, logical reasoning, data, analytics, and creativity.

2.3.2 ANALYTICAL THINKING

It is the ability to understand a situation, disaggregating it into small parts or identifying its implications step by step. It includes the ability to systematically organize the parts of a problem or situation, make comparisons between different elements or aspects and establish rational priorities. it also includes the understanding of temporal sequences and the cause-effect relationships of actions. It can help to coordinate and plan tasks and thus, by understanding a process, the trainee can gain more independence and responsibilities. It is important to optimize solutions and keep high the expertise levels within the employees.

Empowering analytical thinking skills in the era of industrial revolution 4.0 is absolutely necessary. Analytical thinking skills are one of the high-level thinking skills that must be trained and require special attention. It greatly influences the formation of student conceptual systems. Analytical thinking style is included in type A thinking style, which includes logic, factual, critical, technical, analytical, and qualitative. Analytical thinking skills are one of the determinants of the success of learning in this century. They are very necessary in scientific reasoning to prove the concepts that are built are really supported by parts of the concept states that empowering analytical thinking skills influences how current and future workers think and provides research-based theories to help HR to improve workers thinking. Analytical thinking is very important for the success of professional and future workers in the future.

2.3.3 INITIATIVE

It is the willingness to act, create opportunities and improve results without the need for an external requirement that pushes them to do so, to act proactively and to think about what needs to be done in the future. When trained it improves proactiveness, openness, and assertiveness. This skill is important because of its contribution to development and innovation, growth and the build of company culture.

Initiative is the ability to be resourceful and work without always being told what to do. It requires resilience and determination. Initiative is a self-management skill, and self-management is one of five key life and work skills for Young Professionals.

In Europe and the United States, for example, demand for physical and manual skills in repeatable and predictable tasks is expected to decline by nearly 30 percent over the next decade, while demand for basic literacy and numeracy skills would fall by almost 20 percent. In contrast, the demand for technological skills (both coding and especially interacting with technology) is expected to rise by more than 50 percent, and the need for complex cognitive skills is set to increase by one-third. Demand for high-level social and emotional skills, such as initiative taking, leadership, and entrepreneurship, is also expected to rise by more than 30 percent.

Initiative has become increasingly important in today's workplace. Organizations want employees who can think on their feet and take action without waiting for someone to tell them what to do. After all, this type of flexibility and courage is what pushes teams and organizations to innovate, and to overcome competition.

2.3.4 COGNITIVE FLEXIBILITY

It is the ability to modify personal behavior to achieve certain objectives when difficulties arise, new data or changes in the environment. Versatility is associated with behavior to adapt to different contexts, situations, means and personnel in a fast and adequate way. Flexibility is more associated with cognitive versatility, the ability to change convictions and ways of interpreting reality, it is also closely linked to the capacity for critical review. This soft skill helps to walk in someone else's shoes, adapting communication methods to each situation.
Based on the different levels of workers, the skills can be segregated according to levels of competency. For example, workers at the operator level may require the skills of coordinating with others, whereas at supervisory level may require skills of negotiation, people management and emotional intelligence. Workers at executive levels that are required to conduct designing and engineering work may require skills of cognitive flexibility, service orientation, critical thinking and complex problem solving. Personnel at management level may require all the skills above but at a high degree of application.
Cognitive flexibility is all about being a mental gymnast with the ability to utilize different ways of thinking (e.g. the creative brain, mathematical brain, critical thinking brain etc.).

Cognitive Flexibility can be developed by learning new things and in particular, learning new ways of thinking. If you've got the soul of a creative, but your eyes glaze over when you hear words like 'financial markets' or 'the economy', make it your mission to read, think, understand, analyze and step beyond the bonded rationality.

2.3.5 INTELLECTUAL CURIOISTY

It is the inquisitiveness and the constant curiosity to know and learn more about things, facts or people. It involves looking for information, new concepts, new ways of doing and always going beyond routine questions or what is required by the position. It implies always going one step ahead. It may involve questioning the current ways of doing or simply the desire to move forward learning and deepening, always in order to get extra value to the tasks of the position. This skill has more value for research and development and innovation.
Intellectual curiosity (also called epistemic curiosity) is curiosity that leads to an acquisition of general knowledge. It can include curiosity about such things as what objects are composed of, the underlying mechanisms of systems, mathematical relationships, languages etc.

Due to the changes imposed by the 4th Industrial revolution, current and future workers need to learn new technologies and how they are implemented for success. Internet is a large pool of information waiting to be filtered into useful knowledge and only the people with competencies like intellectual curiosity may succeed in this journey.

2.3.6 CHANGE ADAPTIBILITY

It is the ability to adapt and get used to changes, modifying if necessary, their own behavior to achieve certain objectives when difficulties arise, new information or changes in the environment, which are from the outside environment, the organization itself, the client's or the requirements of the work itself. This skill can bring flexibility, good assessment of implications and low resistance to the upcoming changes. The importance of this skill lays on the need of keeping competitiveness and up to date with the aerospace industry needs.

Industry 4.0, especially when coupled with machine learning and artificial intelligence, will substantially change conditions for workers: “Many jobs will disappear while we will gain a lot of new jobs, and many repetitive tasks will shift from manual labour to automation. It will have a big impact.”

Workplace flexibility is a strategy of responding to changing circumstances and expectations. Employees who approach their job with a flexible mindset are typically more highly valued by employers. Similarly, employers who cultivate a flexible work environment are attractive to employees.

Workers with an orientation towards flexibility don't say, "It’s not my job" or "Do I have to?" when they are asked to take on a new assignment. Instead, flexible employees modify their approach to tasks based on the preferences of stakeholders and the unique demands of each situation.

With the advancement of technology, comes a wave of constant change. As an employee looking to excel on the job, if you cannot adjust to those changes, you won’t advance as quickly as you’d like. Economic times have been tough, and many managers are seeking to increase office efficiency. Such alterations to processes may mean a change in your job tasks. Being able to accept such changes without complaint will show your flexibility. That gets the attention of management and can benefit your professional career with future advancement. If you can be a problem solver who can come up with creative solutions, that will also get the attention of management.

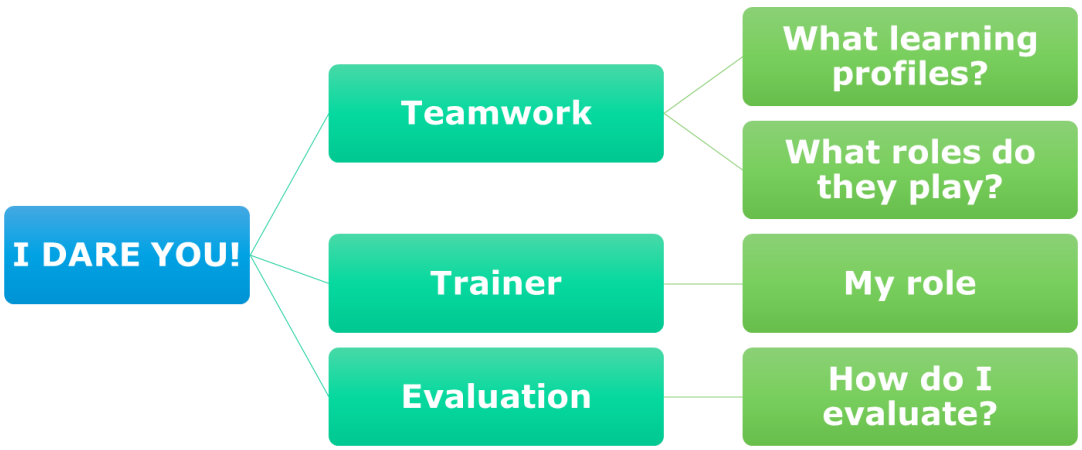
3. GUIDELINES FOR SOFT SKILLS TRAINING IMPLEMENTATION IN COMPANIES

There are different learning methodologies. In this section, we will focus on those methodologies as well as learning types and groups.

3.1 Learning Methodology

The learning methodologies are used to stimulate people in reflection and in developing problem-solving skills, help them to improve technical skills and social relations.

- **The Knowledge-Centered Learning Methodology:** Information is presented to students in an appropriate way, both sequenced and organized.
- **The Student-Centered Learning Methodology:** The content presented refers to prior knowledge and is relevant to student's lives.
- **The Assessment-Focused Learning Methodology:** Opportunities are created for formative feedback from students and teachers. Students benefit by checking their own understanding and teachers by evaluating the effectiveness of their teaching.
- **The Community-Centered Learning Methodology:** An environment is created that allows for collaborative learning/teamwork.
- **Challenge-Based Learning Methodology**: It is a pedagogical approach that actively involves the person in REAL, SIGNIFICANT and RELATED problematic situations with their ENVIRONMENT, which implies defining a challenge and implementing a solution for it, using collaborative learning as a basis (decision making, conflict management, communication, leadership).



LEARNING TYPES

Technique / Feature	Project-based learning	Problem-based learning	Challenge-based learning
Learning	Students build their knowledge through a specific task (Swiden, 2013 (The acquired knowledge is applied to carry out the assigned project)	Students acquire new information through self-directed learning in designed problems (Boud, 1985; Savin-Baden and Howell Major, 2004). The acquired knowledge is applied to solve the problem posed	Students work with teachers and experts in their communities, on real issues, to develop a deeper understanding of the topics they are studying. It is the challenge itself that triggers the acquisition of new knowledge and the necessary resources or tools
Focus	It confronts students with a relevant and predefined problematic situation, for which a solution is demanded (Vice-Rector's Office for Academic Regulations and Student Affairs, 2014)	It confronts students with a relevant and usually fictional problem situation, for which no real solution is required (Larmer, 2015)	Faces students with a relevant and open problem situation, for which a real solution is demanded
Product	Students are required to generate a product, presentation or execution of the solution (Larmer, 2015)	It focuses more on learning processes than on products of solutions (Vice-rectory for Academic Regulations and Student Affairs, 2014)	Students are required to create a solution that results in a concrete action
Process	Students work with the assigned project so that their approach generates products for their learning (Moursund, 1999)	Students work with the problem in a way that tests their ability to reason and apply their knowledge to be evaluated according to their level of learning (Barrows & Tamblyn, 1980)	Students analyze, design, develop and execute the best solution to address the challenge in a way that they and others can see and measure it
Teacher role	Facilitator and project manager (Jackson, 2012)	Professional facilitator, guide, tutor or consultant (Barrows, 2001; Ribeiro and Mizukami, 2005)	Coach, co-researcher and designer (Baloian, Hoeksema, Hoppe and Milrad, 2006)

THE ROLES IN THE TEAM

A role is a set of behavioral characteristics. We are not talking about personality but about behaviors. A role is characteristic way of behaving on the team. For a team to be compensated, all possible roles must be present.

TEST BELBIN

OF ACTION	Shaper
	Implementer
	Completer Finisher
SOCIAL	Co-ordinator
	Teamworker
	Resource Investigator
MENTAL	Plant
	Monitor Evaluator
	Specialist

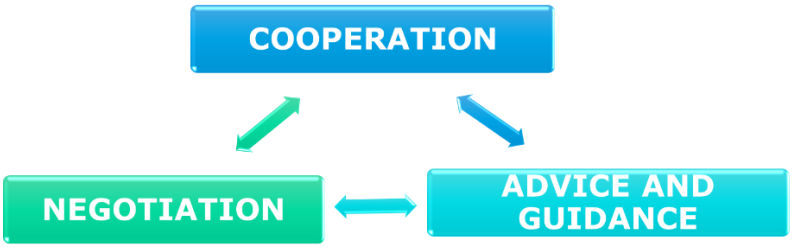
This Study is focused on series of winning and losing teams competing in management games held at Henley Management College, England. The managers who participated in the games were subjected to a battery of psychotechnical tests and were later assigned to a team, all of them of different composition. As time passed, a series of behavior patterns were identified as the basis for the success of the teams. A name was then attributed to each of these behavior patterns, and thus the nine roles emerged.

Let's look into the roles:

- **The Shaper:** Challenging, dynamic, works well under pressure, has initiative and courage to overcome obstacles.
- **The Implementer**: Disciplined, loyal, conservative, and efficient. Transforms ideas into actions.
- **The Completer/Finisher**: Waited, conscientious, anxious. He looks for errors and omissions. Completes the tasks on time.
- **The Co-Ordinator:** Mature, self-confident, clarifies goals, promotes decision-making, delegates well.
- **The Teamworker**: Cooperative, gentle, perceptive and diplomatic. Listens and avoids confrontations.
- **The Resource Investigator**: Outgoing, enthusiastic, communicative, seeks new opportunities, develops contacts.
- **The Plant**: Creative, imaginative, unorthodox, solves difficult problems.
- **The Monitor Evaluator**: Serious, insightful, strategist, perceives all options, judges accurately.
- **The Specialist**: Only interested in one thing at a time, achiever of duty, provides technical knowledge.

As the project progresses, different team roles can be required. Therefore, all of the roles defined above have importance depending on the job and the project.

TEAMWORK COMPETENCES



The Dimensions that show the most effectiveness in the measurement and implementation of teamwork competences.

- **Cooperation:** This dimension entails the ability to adapt to the way of being of others, of having the capacity to change considering the interests and ways of being of the members of the group. It also involves important elements: Interpersonal Emotional Intelligence, self-esteem that allows you to understand the feeling and interests of the other members of the team. Knows how to capture the type of help they need and takes them account.
- **Advice and Guidance:** This dimension contains the ability to influence the other components of the group. Integrates the ability to define goals, plan, and coordinate.
- **Negotiation:** It is the ability to grasp the logic in which the other components work and find strategies to resolve conflicts or associate people with the objective. It has a communication component and the ability to take into account the interests of other people.

PROBLEMS TO TAKE INTO ACCOUNT

- Not everyone learns the same elements of the topic studied, especially if the team's tasks refer to different very specific components of the topic
- Some students prefer to work and be assessed independently
- There is a high level of risk, since the uncertainty factor is higher than in other types of classes
- Students can feel lonely and frustrated if they don't get the right support
- Some students DO NOT work according to their ability
- Individual notes can be affected by the average note of the group
- Some students may try to dominate others in the group and this can interfere with planned tasks
- The internal dynamics of the team can block the work and the objectives to be achieved

3.2 Trainer's Role

Trainer has a role of determining the key behaviours for the development of competitions, group development and teamwork as a basis. In this part we will focus on them.

KEY BEHAVIORS FOR THE DEVELOPMENT OF COMPETITION

- **Affection, Estimate and Safety:** The TEAM must provide each employee with feelings of security, support and recognition of their worth.
- **Groups and Shared Goals**:
  - ✓ **Norms, Group Cohesion**: What gives cohesion to a group, sense of cooperation and desire to work together, is the existence of a series of known, agreed and accepted norms.
  - ✓ **Communication and interaction**: Communication and interaction within the group is a basic component for the development of a sense of attachment to the group. Sometimes this does not occur due to lack of an adequate communication procedure in the group.
- **Roles Assumed and Desired:** There is a conflict of interest, a lack of willingness to listen, accusations, a lack of agreements; individualistic attitude persist, and it is not possible to focus on a common task; indecision in the face of disparity of interests; group representatives without prestige in the group.
- **Standards, Group Cohesion:** Existence if explicit and implicit codes and norms that regulate the operation of the group.

KEY BEHAVIORS FOR GROUP DEVELOPMENT

- **Communication and Interaction**: Existence of minimum levels of relationship between all members of the group and between the different subgroups that usually exist within a class.
- **Belonging:** Manifestation of pride and satisfaction for belonging to a certain class group

3.3 Group Dynamics

The Purpose of group dynamics it to support trainers to improve the quality of their processes aimed at achieving meaningful learning. It causes positive emotional states and dynamism that helps to develop in the student a physical and mental state more suitable for learning.

If there is a need of activating group participation, promoting and environment of trust, respect and openness towards other, group dynamics can be used. Some group dynamics that can be used are Brainstorming, role-playing, group work, case-studies, guided arguments.

- ❖ **ADVANTAGES**
  - Encourages learning in decision making.
  - Encourages analytical skills.
  - Encourages debate and improves communication between the group.
  - Promotes NEGOTIATION, COLLABORATION.
  - Encourages the participation, exchange and elaboration of ideas.
  - It allows to know different points of view.

- Promotes attitudes of understanding, acceptance and tolerance.

❖ **DISADVANTAGES**

- Difficulty reaching consensus on conclusions.
- Lack of information for analysis.
- Difficult to apply in large groups.
- Requires some preparation on the part of the person in charge.

3.4 Typology of groups to be Trained

There are 5 types of groups that trainers should be prepared for: Noisy, Silent, Indifferent, Aggressive, Participatory.

➢ **Noisy Group**

✓ **Behavior:** Murmurs and conversations in low voices, cause the instructor and the rest of the classmates to be distracted.

✓ **Treatment:** The instructor must be very attentive to these types of interruptions. Look at the participants who are talking. Throwing a question at them or standing very close to them. If the noise is generalized, it may be best to switch to a much more participatory technique or take a break.

➢ **Silent Group**

✓ **Behavior:** If the group shows complete silence, investigate the causes. The tension breakdown process may have failed, there is no confidence to participate or they are not sufficiently interested in the topic.

✓ **Treatment:** Using more participatory techniques will strengthen integration. Investigate the causes; act.

➢ **Indifferent Group**

✓ **Behavior:** They are not interested in the seminar or its contents. The topics covered were simple and are known to the group. There was nothing new. You have the certainty that you are wasting your time.

✓ **Treatment:** Before the course, research the level and experience of the participants. Express your willingness to incorporate topics of interest to the participants with the course content. Change techniques to encourage participation. Handle examples appropriate to the needs of the company and positions.

➢ **Aggressive Group**

✓ **Behavior:** The authoritarian and arrogant attitude of the instructor causes an aggressive and hostile reaction from the group towards the instructor himself and the session becomes a struggle of forces that only leads to the failure of the course. Sometimes aggression is combined with irony and causes the desertion of participants.

✓ **Treatment:** Act with simplicity, modesty and humility, as it will be necessary to remember that you are not the total possessor of the truth and that you are also learning with the group.

- **Participatory**
  - ✓ **Behavior:** This is the ideal group that the instructor would like to develop a course. If what really interests the group is pointed out, if their motivations are known, if the appropriate techniques are used and they are constantly evaluated, the interest and participation of each of the group members is guaranteed.
  - ✓ **Treatment:** Make the most of participation, keeping the interest of attendees.

Evaluation Methods to Measure the Impact

To evaluate that all team members have mastered the contents studied;

- ❖ Gather the team and randomly ask an integrating question to one of the team members, performing the same operation to another 2 members and if none of them know, the work is returned to them.
- ❖ Apply individual tests to all members at the time of completion of the dynamic, containing 1 or 2 questions in which it is necessary to integrate the different parts of the dynamic, the work or the activity itself.
- ❖ Confrontation talk

To evaluate teamwork Dynamics;

- ❖ Self-Assesment

Name	
Group number or identification	
Work title	

Rate your performance at work, using this scale: **5=Always 4=Often 3=Sometimes 2= Rarely 1=Never**

I was ready to contribute to the group	
I was dedicated to the task	
I listened to others	
I participated in the dialogues	
I encouraged others to participate	
In general, I think my performance in the group should be valued	

- ❖ Co-Evaluation: Participants evaluate each other against a series of criteria specified by teachers.

	Needs improvement=1	Enough=2	Outstanding=3
The team member ...			
Prepares			
Listens			
Contributes			
Respects others			
Demonstrates following competencies ...			
Critical thinking			
Problem resolution			
Communication			
Decision			
Subtotals			

❖ Self-Assessment of the group to which they belong.

1. Overall, how effectively has the group worked on this task?
Insufficient Sufficient Good Remarkable
2. Of the five members of the group, how many participated actively most of the time?
None One Two Three Four Five
3. Of the five members of the group, how many were fully prepared for the activity?
None One Two Three Four Five
4. Give a concrete example of something you learned from the group that you probably would not have learned working alone:
5. Give a concrete example of something the other members of the group have learned from you that they probably would not have learned otherwise:
6. List one change the group could make to improve their performance:

❖ Observation Guide: The teacher establishes a series of criteria to be observed regarding group work in the classroom and draws up a file per group. It should include criteria translated into observable behaviors so that the score is as objective as possible.

FIELDS	GROUP MEMBERS								
	1	2	3	4	5	6	7	8	9
Expresses ideas									
Emits feelings									
Opposes with ideas									
Collides personally									
Accepts ideas									
Provides solutions									
Tries to direct									
Does not intervene									
Remembers goals									
Summarizes others									
Wants to impose									
Reasons and listens									
Does not listen, does not reason									
Is frequently supported									
Disorientates the subject									

4. GUIDELINES FOR SOFT SKILLS TRAINING IMPLEMENTATION IN SCHOOLS AND VET PROVIDERS

4.1 Communication Laws and Principles

Communication is a basic process for the survival of any organism. All beings, in their biological and social aspects, depend on the information exchange processes. Information exchanges do not occur in a fortuitous way but are regulated by certain laws.

➢ Communication Laws:

- ✓ It's not possible to NOT communicate.
- ✓ The true is not what A says but what B understands.

- ✓ When B misinterprets a message from A, the culprit is always A.

➢ Communication Principles:

- ✓ It is a two-way process.
- ✓ It is not an intermittent event, but something continuous like breathing.
- ✓ We not only communicate with verbal language, but also with body language.
- ✓ There must be synchrony between verbal and non-verbal communication.

The impact on communication depends on 55% of Body Language, 38% of Voice and 7% of words. Thus, the important part is not about what you said but how you said it.
There might be obstacle to transmit the information which affects the communication:

- ❖ Organizations with many hierarchical levels.
- ❖ Possible conflict of loyalty.
- ❖ Lack of formal information channels.
- ❖ Disobedience to the company's communication strategy.
- ❖ The temptation to tell the boss what you think he/she wants to hear.

COMMUNICATION KEYS

- ➢ **Sympathize:** Establish a link with the interlocutor in order to make communication more effective
- ➢ **Encourage:** Maintain the interlocutor's attention and encourage them to participate in the conversation
- ➢ **Ask:** Force the interlocutor to think about the answer, and allow obtaining high quality information
- ➢ **Confirm:** Make explicit the progress of the interview, meeting, etc.- summarize by repeating schematically what the receiver has said and verify that the receivers agree
- ➢ **Inform:** Convey information clearly, concisely and specifically- check each stage before moving on to the next.
- ➢ **Listen:** Listen actively by evaluating content and avoiding distractions.

TEAM BUILDING IN THE CLASSROOM

Social psychology tries to explain and understand the phenomena of social influence. To do this, researchers are constantly asking questions about the many aspects of people's social behavior.

- ❖ **Interpersonal Level VS Group Level VS Intergroup Level**
  - **Interpersonal Level:** This level is concerned with our interactions with others, our relationships with our peers as well as our patterns of influence (attraction, love, aggression, altruism).
  - **Group Level:** Groups can range in size from a couple people working together, to a large group with dozens or hundreds of members. They can impose a set of norms on their members, at the same time some members can influence the rest of the group.

- **Intergroup Level:** This level focuses on relationships between different groups, seeing for example how the prejudices of some groups arise and are maintained in relation to others (racial, religious etc.) how you can fight against such prejudices or how some are marginalized from society (social deviation).

4.2 Group Techniques (Dynamic Design)

The traditional conception of education aims to improve the student as an individual and rational entity, not conceiving the class as a group.

Current pedagogical trends consider the group as a specifically educational means that aims to help the student to reach his integral formation, since it is considered as a personal, intelligent whole, immersed in a social environment.

Today's education increasingly uses the class group as a means to achieve objectives, and employs a new discipline: GROUP DYNAMICS, which studies groups, their structure, their development and their goals.

The trainer, with this new auxiliary discipline uses the class as an educational means and applies laws and techniques to achieve its activity, lead the student and obtain the maximum performance from him/her.

GROUP WORK TEACHING OBJECTIVES AND CRITERIA FOR THE CONSTITUTION OF GROUP

- Complementary aspects of intelligence, by offering the possibility of a more reflective thought by contrasting with other colleagues.
- Active, creative and personal thinking for requiring the participation of the individual and being subject to the urgent direction of the teacher.
- The ability to work in a group for a common goal and the habits of exchange, coexistence, cooperation, dialogue and the feeling of "us".
- The sense of individual responsibility towards the work team.
- The spirit of tolerance and mutual respect for the contrast of opinions.
- The approach of the didactic act to the reality of our professional life.

Numerous conditions that will affect the way in which work groups can be constituted in a class. Teachers can choose among the followings.

GRUOP INTERNAL COHESION	OPERATING TIME	▪NUMBER OF COMPONENTS VARIES AS A FUNCTION
Psychogroups: when affectivity predominates; the instinctive sympathy between the components **Sociogroups:** when the objectives to be achieved predominate; efficiency in their tasks	**Permanent**: groups formed at the beginning of the course, after reasonable time for the students in the class to meet. Stability is sought. If the objectives and the desired efficiency are not achieved, it is advisable to restructure them **Transitory**: they are constituted to carry out a certain job	Of the technique to be used Of the maturity of individuals Of the subject or activity in question

WAYS TO ASSIGN AND PERFORM GROUP WORK

As in the organization of groups, there are various ways of assigning the work to be done. The choice of one or the other depends largely on the type of student and the subject. The main ones are:

- The trainer offers a list of topics to be selected by the teams.
- The teams suggested the work topics.
- The trainer and the teams jointly choose the work topics.
- The trainer presents some mandatory topics and some optional ones.

The choice of the appropriate technique in each case will depend on the following factors:

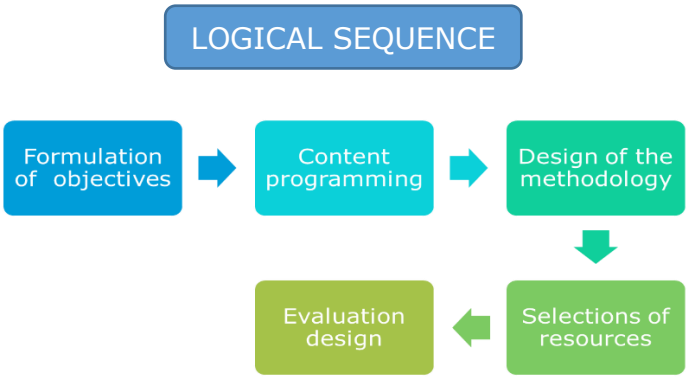
- Pursued objectives. Objectives must be chosen with a clear and well-defined purpose.
- Maturity and training of the group, which determine the degree of complexity of the technique to be used.
- Number of students in the class: big groups will use more formal techniques or those based on subdivision into small groups; small groups (15-20 members) where relationships are closer and more friendly, informal techniques are suitable.
- Available premises, time and auxiliary materials (blackboards, tables, pictures).
- Age and background of the members.
- Skills, training and experience of the trainer.

You should start with the simplest or more similar to traditional teaching (guided discussion, seminar).

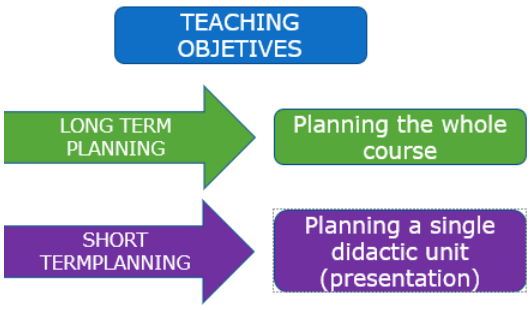
Group work techniques are classified as follows:

THE WHOLE GROUP PARTICIPATES ACTIVELY	EXPERTS PARTICIPATION
▪Guided discussion ▪Debate ▪Assembly ▪Brainstorming ▪ Study of cases ▪ "Phillips 66" ▪ Simultaneous dialogues ▪ Forum ▪ Rumor technique ▪ Commission ▪ Dramatization ▪ Seminar	▪ Symposium ▪ Round table ▪ Panel ▪ Colloquium ▪ Public dialogue or debate ▪ Interview or public consultation ▪ Collective Interview

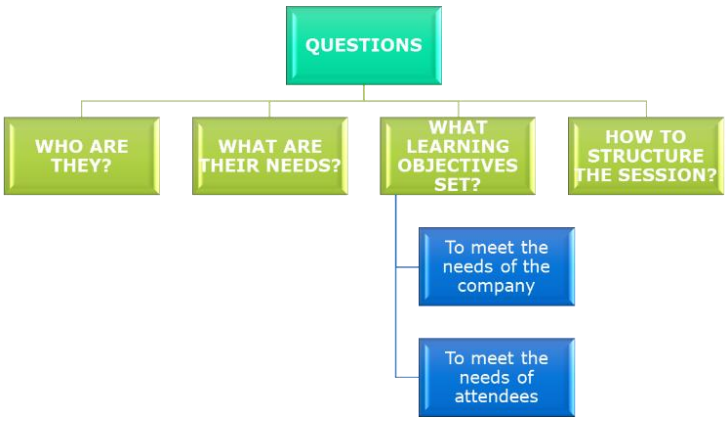
4.3 Planning the Training



he logical sequence of the planning the training is to start with formulation of the objectives which gives trainer to define the purpose of the training.



The second step on the sequence is content programming which is important for determination of the information that should be provided. Information considered essential at the different training levels: facts, data, principles, values, laws, concepts, procedures etc.



The next step on the sequence is design of methodology. In this section we will mention 2 methods one of them is Didactic Method. A didactic method is a teaching method that adheres to a scientific approach or educational style. The approach or method is often researched or studied and adopted by the teacher in order to engage the student and ultimately stimulate a virtuous learning process and transfer of knowledge in any given field of study (Leon-Henri, 2021).

There 2 types of Didactic Method:

- **Passive**
  - Master Class: The use of language to explain a topic without the intervention of the audience. It should be used if there are concepts, theories or laws that are difficult to understand, there is a time limitation, or to end and summarize a topic.
    - Caveats: Believe that the concepts are as clear to the participants as they are to the speaker
- **Active**
  - Elaborative Interrogation: The use of questions to create atmosphere, obtain information, maintain initiative or control. It should be used if it is intended to arouse or maintain interest, if there is a need to focus attention on important aspects or as a means of involving the group.
    - Caveats: Asking questions that lead to poor or rote responses, ridiculing people who don't give the right answers
  - Brainstorming: It should be used if you need to activate group participation, if you want to create an environment of trust.
    - Caveats: Takes too much time, might not draw attention to important ideas that appeared
  - Role-play: Theatrical interpretation of a problem or situation. Informal performance by group members. It should be used if it is needed to delve into a problem in greater depth, to test hypothetical solutions to real problems, to provide an opportunity to practice reality and to reaffirm knowledge.
    - Caveats: Forcing participants to play a role, might promote attacks and ridicules among the group members, analysing aspects not corresponding to the subject of experimentation

- Group Work: Exchange of opinions among the members of the same for the development of a task. It should be used if it is wanted to motivate the participants, to develop the spirit of collaboration, to encourage the participation of all.
    - Caveats: Not clarify work enough, not give an opportunity for each group to present their results.
- Study of Cases: Description of a problem or situation consistent with the purposes of teaching. It can cover the modalities of real case and simulation. It should be used if it is wanted to analyze problems, introduce a solution technique, to practice or develop the ability to solve problems or make decisions, to give the opportunity to apply theory to practice
    - Caveats: might choose banal cases that disperse the group, failure to clearly give instructions on what you are trying to achieve and studying very long cases in short period of time

On the other hand, Pedagogy is more related to the correlation between the teaching material (resources) or theoretical information (methods) and the intellectual capacity of students, as well as their individual needs.
Pedagogy is transversal in nature and pertains to the correlation between methods and practices of teaching and instruction, in particular in terms of the ability to match theoretical concepts with practical methods of knowledge transfer in education.

Didactics refers to the science of teaching and instruction for any given field of study. Based on theoretical foundations, a didactic approach involves a very structured and informed approach to teaching and instruction (Leon-Henri, 2021).

HOW TO PROGRAMME A COURSE

Any type of teaching or course has purpose or goal. When planning a course, it is essential to start by clearly defining the final results to be achieved. If you do not know where you are going, you can never know if you have arrived. These final learning outcomes are called didactic objectives.
Didactic objective is what the student is expected to be able to do at the end of a learning experience, or at the end of their training. It is the product-result of learning the change in the student.

4.4 Evaluation by Rubrics to Measure The Impact of Training in Soft Skills

An Assessment Matrix (Rubric) is an instrument that facilitates the Evaluation of student performance, especially in complex, imprecise or subjective subjects.

This instrument could be described as a matrix of specific criteria that allow assigning or granting a value (assessing), improving on a scale of performance levels and lists of aspects that show the learning, knowledge and/or skills achieved by the student on a particular topic. We invite you to know the basic outline of a Rubric and some examples of Rubrics.

It is an evaluation guide that describes the traits and qualities of a specific product or performance at different levels of execution. It is a double entry matrix that specifies the aspects to be evaluated and the possible degrees of achievement, it aims to:

- Specify what is expected of the student's work.
- Assess execution.
- Facilitate feedback.

Types of Rubrics:

- **Holistic:** Values the student's commitment as a whole from. Presentation aspects at work to the attitude they have when exposing it. It is designed in a way that students can be evaluated objectively and consistently.
- **Analytics:** Each detail of the task to be performed is specifically considered (only the task is taken into account, not attitudes or values). Allows the teacher to specify what they expect from the student and what are the criteria with which an objective will be rated.

Basic Elements in a Rubric:

- **Evaluation criteria** (content, originality, requirement, organization, etc.)
- **Performance levels** (excellent, good, adequate, needs improvement)
- **Values or score according to the Scale** (1 point, accredited, not accredited)

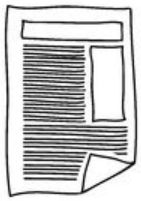
EXAMPLE OF A RUBRIC

ESCALA				
Aspects to consider	**LEVEL 1**	**LEVEL 2**	**LEVEL 3**	**LEVEL 4**
		accurate description of performance		
Aspect 1	from aspect 1 on level 1	from aspect 1 on level 2	from aspect 1 on level 3	from aspect 1 on level 4
Aspect 2	from aspect 2 on level 2	from aspect 2 on level 2	from aspect 2 on level 3	from aspect 2 on level 4
Aspect 3	from aspect 3 on level 1	from aspect 3 on level 2	from aspect 3 on level 3	from aspect 3 on level 4
Aspect 4	from aspect 4 on level 1	from aspect 4 on level 2	from aspect 4 on level 3	from aspect 4 on level 4
Aspect n	from aspect n on level 1	from aspect n on level 2	from aspect n on level 3	from aspect n on level 4

STEPS TO CREATE A RUBRIC

IDENTIFY

- The learning objectives
- Describe the work or project to be carried out



OBSERVE

- The learning objectives
- Describe the work or project to be carried out
- Quality models of the final product
- Define the characteristics that make it an excellent model and a good quality product

CREATE

- The criteria that count
- They are the learning objectives that the student has to demonstrate
- Organize the criteria in categories

DESCRIBE

- The characteristics of each criterion in each of the quality levels

ADVANTAGES OF THE RUBRICS

- ✓ Clarify and specify the objectives of the teacher.
- ✓ Clarify and specify how students can achieve them.
- ✓ Describe the level of achievement that the student must achieve.
- ✓ Allows students to know the qualification criteria.
- ✓ Allows students to evaluate and make a final review of their work.
- ✓ Promotes responsibility in one's own learning.
- ✓ Promotes the development of thinking as it helps metacognition.

HOW TO EVALUATE RUBRICS

Evaluation for Holistic Rubric: Instrument, that consists of defining in a general way what should be included in each instrument.

- ➢ **Formative Evaluation:** Evaluation strategy focused on process performance through the use of instruments that demonstrate what is done and how it is done. Observe the process to develop competence.

TOOLS:

- Portfolio-folder.
- Points of reference.
- Behavior observation inventory or specific behavior checklists.
- Chores.
- Product.
- Anecdotal record.
- Field diaries.
- Process self-assessment using specific questions.

Evaluation for Analytical Rubric: Instrument, that consists of defining in a specific and broken-down way of the responses that are in each of the instruments, as well as what they should include by each item or by each topic.

- ➢ **Summative Evaluation:** Strategy to evaluate focused results through the use of instruments that involve observable and measurable responses. Observe the result obtained in the didactic situation in the achievement of the competence.

TOOLS:

- Written exams with short-answer questions, long-answer questions, multiple-choice questions by cases or complex multiple-choice problems.
- Products.
- Oral tests.
- Interviews.
- Self-assessment of results through checklists.

EXAMPLES OF RUBRICS

CONCEPTS	1	2	3	4
50%	0,5x1=**0,5**	0,5x2=**1**	0,5x3=**1,5**	0,5x4=**2**
25%	0,25x1=**0,25**	0,25x2=**0,5**	0,25x3=**0,75**	0,25x4=**1**
25%	0,25x1=**0,25**	0,25x2=**0,5**	0,25x3=**0,75**	0,25x4=**1**

Highest Rating is 4=10

CONCEPTOS	1	2	3	4
25%	0,25x1=**0,25**	0,25x2=**0,5**	0,25x3=**0,75**	0,25x4=**1**
25%	0,25x1=**0,25**	0,25x2=**0,5**	0,25x3=**0,75**	0,25x4=**1**
25%	0,25x1=**0,25**	0,25x2=**0,5**	0,25x3=**0,75**	0,25x4=**1**
25%	0,25x1=**0,25**	0,25x2=**0,5**	0,25x3=**0,75**	0,25x4=**1**

If the same percentage is applied, it is easier

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