Definition

Site:	DTAM Online Training Platform		Printed by:	Ioanna Matouli
Course:	Transversal Skills		Date:	Friday, 8 December 2023, 4:17 PM
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1. Self-learning is defined as:

"a **process** by which **individuals take the initiative**, with or without the assistance of others, in **diagnosing their learning needs**, **formulating learning goals**, **identifying** human and material **resources** for **learning**, and **evaluating learning outcomes**" (Malcom Knowles).

2. A little history: Autodidacticism (self-learning) in ancient Greece

Two Greek philosophers, Socrates, and Plato loved self-learning. They viewed it as a form of wisdom. Still in use, the term "autodidact", meaning the **one who teaches himself**, was first used to explain this approach to learning.
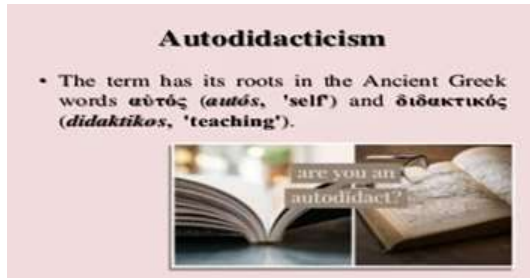

Figure 1. 1 The term autodidacticism. Source: [*https://www.slideshare.net/gauravhtandon1/autodidacticism*](https://www.slideshare.net/gauravhtandon1/autodidacticism)

3. Key concepts

self-learning	individuals take the initiative to achieve learning outcomes
autodidact	the one who teaches one's self

4. Even before compulsory school

For some, the use of autodidacticism has been the solution to inadequate education. If history has many famous autodidacts, it is important to remember that this means of personal development has emerged in **all strata of society!**

5. Self-training in adult education

In the late 1960s, the idea that the adult is a distinct learner emerged, giving birth to the concept of **andragogy**.

Malcolm Knowles, one of the founders of andragogy, published a guide to self-directed learning with the contract method between a student, called "student" and the teacher, now "facilitator".
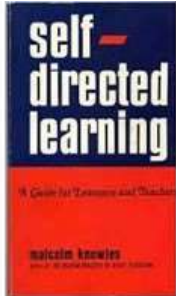

Figure 1.2. Self-Directed Learning: A Guide for Learners and Teachers (Malcolm Knowles, 1975). Source: https://dokumen.pub/self-directed-learning-a-guide-for-learners-and-teachers-0695811169.html

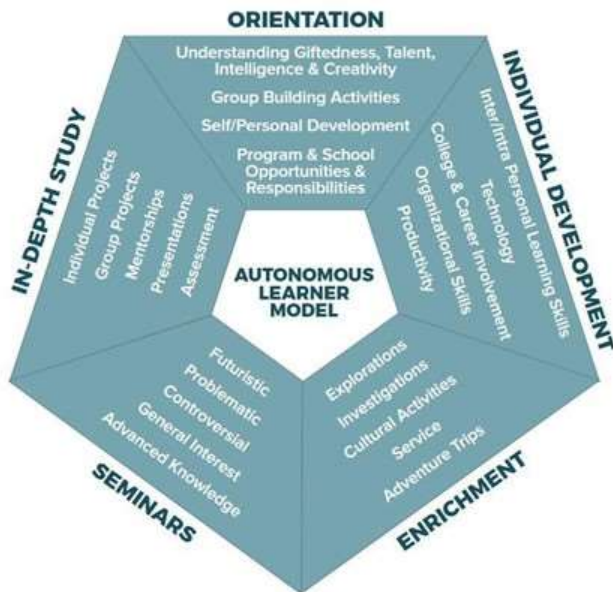To learn more about the evolution of the self-training concept: https://knowledgeone.ca/self-training-the-evolution-of-a-fundamental-concept/

Figure 1. 3 The Autonomous Learner Model (Betts & Kercher, 1999)

Source: https://munshing.com/education/autonomous-learning-as-a-sustainable-approach-to-learning

Benefits of self-learning

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1. Learning at your own pace

We are all different, we have different learning needs, but above all, each of us has a different pace in the learning process. Choose the method you feel most comfortable with and begin your self-study journey!

2. Enthusiasm for developing new skills

During the pandemic, we have all found ourselves struggling with feelings of anxiety or even depression. Starting to learn new skills online has been a solution for many people around the world. The more you learn, the more enthusiastic you become for even more knowledge and skills. Learning something useful and interesting creates feelings of excitement and fulfillment.

3. Chance to try different learning methods and models

During your self-study journey, you will obviously come across various methods and approaches. Being alone in choosing your learning tools and the way you teach yourself will make you try new learning patterns, techniques, and methods.

4. Raising awareness of one's skills

Before starting your self-study process, you will most likely have a general idea of your skills and weaknesses. Even if you thought you were more skilled than you are, realizing this fact is also a huge benefit, since you can work to improve these weaknesses and bridge the gap.

5. Stress-free educational process

Being alone, without having to face competition or judgment on one's performance, is anti-stress and beneficial for people who tend to feel easily intimidated. You are in control of the pace of learning, no one knows how good or bad you are, and you are free to be totally stress-free, since no one expects anything from you. It's just you and yourself, so no pressure.

6. Opens the way to new possibilities

The more skills you acquire, the more paths will emerge in front of you. You may understand a new talent you didn't know you had or come up with excellent ideas for combining your current profession with something unexpected.

Figure 1. 4 The benefits of self-directed learning

Source: https://discoverpraxis.com/13011/self-directed-learning/

Seven steps for an effective self-learning process

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1. Step 1: Self-evaluate your willingness and desire to learn

Figure 1. 5 The Self-Directed Learning Cycle

Source: https://www.summitlearning.org/approach/learning-experience/self-direction

To effectively initiate the self-learning process, it is essential to assess your willingness to learn. Above all you should stimulate your inner curiosity, so your self-learning process will be effective, to the point and productive.

2. Step 2: Set learning goals

Start by setting realistic goals and don't put too much pressure on yourself. It is better to achieve smaller goals and progress gradually. Having clear goals helps you to obtain specific plans, leading to actions and the wanted end learning outcome.

3. Step 3: Evaluate Learning Resources

- Verify every information you come across, as it might be outdated, fake or invalid.

- Make use of peer reviewed academic databases.

- Make use of online learning platforms.

- Find the most updated versions of digital tools, applications, or software.

4. Step 4: Commit to your learning process

The absence of a teacher can be liberating for some, but also translates into a need for discipline. We are called to become the teachers of ourselves, approach the deeper notion of knowledge and find our own learning path and method.

5. Step 5: Use your new skills and knowledge

The optimum way to retain your new skills and knowledge is to put them in use. Find a task or a project that acquires to put your new skills in practice.

6. Step 6: Join or create a network of "Co-Learning Peers"

Self-learning doesn't have to be a lonely process. Learning through internet resources offers the possibility to find other individuals with the same interests and learning subjects, as nowadays there are so many online communities.

7. Step 7: Share your gained knowledge

We all know Einstein's famous quote that only *"if we can explain a concept to a six-year-old, we are sure that we have understood it ourselves"*. Sharing your knowledge and teaching in this sense, is a great element of self-learning. We are all teachers and students at the same time.

8. Your Progress table

		Done/Not done ✅ or ❌
Step 1	Self-evaluate your willingness and desire to learn	
Step 2	Set learning goals	
Step 3	Evaluate Learning Resources	
Step 4	Commit to your learning process	
Step 5	Use your new skills and knowledge	
Step 6	Join or create a network of "Co-Learning Peers"	
Step 7	Share your gained knowledge	

The six C' s of Self Learning

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1. Collection

Figure 1. 6 Matrix of skills necessary for self-learning in a digital age

Source: https://hackernoon.com/education-is-the-key-to-a-better-future-but-6516903c547f

Self-learning requires from you to know how to collect information and which resources can be considered valid. Digital resources are of critical importance.

2. Consumption

After the collection of information, you need to "consume" the content that you have collected. Exposure to diverse information feeds your curiosity and helps develop better ideas and solutions.

3. Curation

You also need to be able to filter out ("curate") relevant information from the multiple sources that you "consume."

4. Co-creation

You need to be able to create new content based on the information you have read. The creation of new content helps build a unique and focused skill set and develop a personalized brand.

5. Communication

The communication of content is essential in our digital era. The ability to communicate in a clear and coherent way is extremely vital in the modern world.

6. Correction

You need to be able to reflect on and incorporate feedback. In our rapidly changing digital environment, the ability to adapt to new information or circumstances becomes essential. (Education is the key to a better future, but… check this out https://hackernoon.com/education-is-the-key-to-a-better-future-but-6516903c547f)

Figure 1.7 Necessary skills for digital age learning now and in the future

Source: Adapted from Grand-Clement (2017, p.5)

Self-learning after the pandemic

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1. Self-learning after the pandemic

COVID-19 posed great challenges for all actors in the educational context. The need for distance learning was more prominent than ever before. Distance learning in comparison to regular face-to-face lessons is characterized by greater flexibility in scheduling, the opportunity to individualize learning processes (to learn more check: https, 04 March 2021,://link.springer.com/article/10.1007/s11618-021-01002-x.)

Maybe one of the few benefits of the pandemic is that self-learning returned in our lives and is now a much more common practice.

Figure 1. 8 Self-learning after the pandemic

Source: www.elements.envato.com

Self-learning as a tool to boost creativity

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1. Self-learning as a tool to boost creativity

The information and plethora of online webinars, art classes, digital skills videos, cooking sessions, is overwhelming and never ending. Setting a goal to learn a new skill, be it singing or drawing, creative writing, or graphic design, enriches our daily life, offers possibilities for creative thinking, even new professional orientations. Imagine the possibilities we have if we link drawing with photography, writing with creating videos, cooking with singing, or anything else we can imagine. Self-learning supports us, highlights our strengths, and opens new adventurous pathways. Let's do it!

Self-learning for developing other transversal skills

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1. Self-learning for developing other transversal skills

Transversal skills have become tremendously sought after by companies and enterprises in search of new employees. After decades of hard skills' domination, today it seems that soft skills will prevail.

Soft skills are related to personal competence: the mental and psychological abilities we all own, and we practice them every day without consciously realizing it. We all have them in various degrees, and they help us establish relationships, create friendships, find jobs, work in harmony, be effective in our workplace, and function in our modern society with all its troubles and challenges. Transversal skills are the skills of communication, time management, problem resolution, creativity and innovation, leadership, conflict resolution, team bonding, self-development, adaptability to change, to name the most prominent ones.

Figure 1.10 What are Soft Skills?

Source: https://www.thebalancecareers.com/what-are-soft-skills-2060852

Self-learning as a process, enhances all the above transversal skills. Even though self-learning sounds as a lonely way to learn, it can create many opportunities to practice our communication skills, through online forums and platforms, where people exchange ideas and thoughts on their subject of choice. Especially after the pandemic, self-learning was a way not just to learn new skills, but also find new communities to share this knowledge. Besides online communication, self-learning can lead to new discoveries, new hobbies and skills, urging us to find more people with similar interests and communicate with them.

Time management skills can also be developed through our self-learning process, as we are called to find time for all our daily responsibilities and fit the learning process into the schedule too. Our desire to learn and our acknowledgment that we need some new skills, makes us more productive and time efficient, as we need to save time for self-learning.

Self-learning is a perfect supporting mechanism for creativity and innovation skills, as our learning possibilities are endless, a fact that leads to new ideas, new resources and creative paths. As there is no limit to self-learning and as resources are numerous, we can discover links combining physics with Art, digital skills with music, education with theater, management with psychology.

The unbreakable link between self-learning and self-development is obvious and needs not much explanation. Willingness for personal development and growth is crucial both for our well-being and our professional lives. Self-learning is the perfect mechanism to support and empower our development, especially during and after the pandemic of COVID-19. It was easy for everyone to fall into a depressive, self-isolating routine, under the global stressful reality. Self-learning proved to be a way out of mental isolation, a mental-health savior and a lifeboat for self-development and willingness to progress in such challenging times.
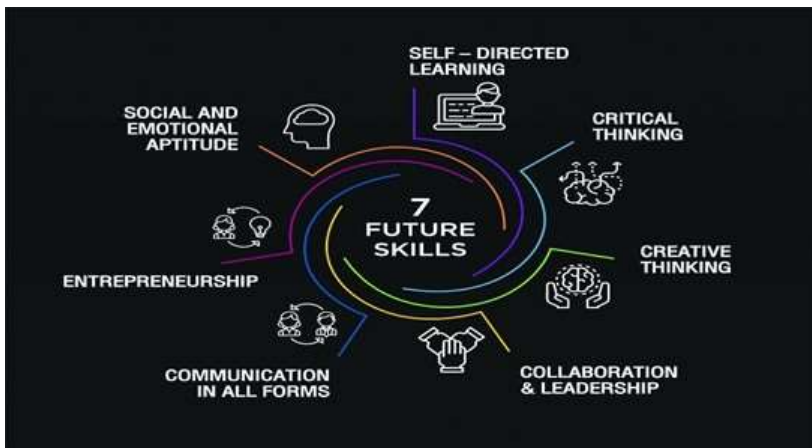
Figure 1. 11 WeLearn's 7 Key Soft Skills. Source: https://welearnthailand.com/future-skills/

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Flexibility and Adaptability

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Book:	Flexibility and Adaptability		

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1. Definition of the term

Workplace flexibility is the ability to respond to altering circumstances, prospects, and opportunities. Especially today, in our post pandemic era, flexibility has become one of the most valued, sought after and vital skills for employees, companies and organizations finding their balance again.

Figure 2.1 It's Undeniable…Job Flexibility is Critical to Your Success
Source: https://www.officelibations.com/importance-of-flexibility-in-the-workplace/

2. Flexibility and adaptability to new situations

No one imagined how the world would change last year, and how much working conditions would get affected and reformed on a global level. In the beginning, the new conditions that later became facts and reality, brought wariness and fear, destabilizing the economy and the psychological and mental health of most of the population. People felt lost and fearful. The pandemic is a major example of the need for adaptability and flexibility, but it is not the only case in history which caused the necessity of changes. The willingness to adapt is what kept the human species alive and brought us where we are today. We all faced uncertainty, anxiety, isolation, loneliness and disrupted working conditions alongside changes in school and family life. Adaptability became a necessity. This new reality revealed in every sense the importance of being able not to break but break through, and turn problems to opportunities and openings.

Figure 2.2 Adaptable Mindset in Business: [Definition](#)*, Importance & Examples*

Source: https://study.com/academy/lesson/adaptable-mindset-in-business-definition-importance-examples.html **(Suggestion: watch the video!)**

3. Characteristics of an adaptable and flexible person

1. **Keeping calm.** Adaptable people can keep their calmness and not panic in front of changes and challenges. Being able to remain composed when the thunder breaks, is vital and lifesaving.

2. **Focusing on solutions**. Instead of obsessively thinking of the problem, create a list of possible solutions, so you are prepared for the future.

3. **Seeing problems as new opportunities**. Flexible people can find themselves thriving or at least not panicking in front of new challenges because they perceive how they can deal and benefit from this new reality.

4. **Curiosity and personal interest.** Curious people tend to read, and be informed about innovation and new technology, but also show personal initiative and interest in many fields. All these attributes sum up in a person more ready and eager to adapt.

5. **Having a network of adaptable peers.** Adaptable people tend to have a network of peers with a similar attitude towards life and work. It is important to form bonds with people that are willing to try advanced solutions and groundbreaking alliances.

6. **Imagination.** Flexible people can imagine and materialize new solutions, creating a new comfortable reality for themselves, even under the pressure of the unknown..

7. **Soft skills and emotional intelligence.** Emotional intelligence helps them deal not only with their personal efforts to accept changes, but also helping others to adjust which leads to optimum results of collaboration.
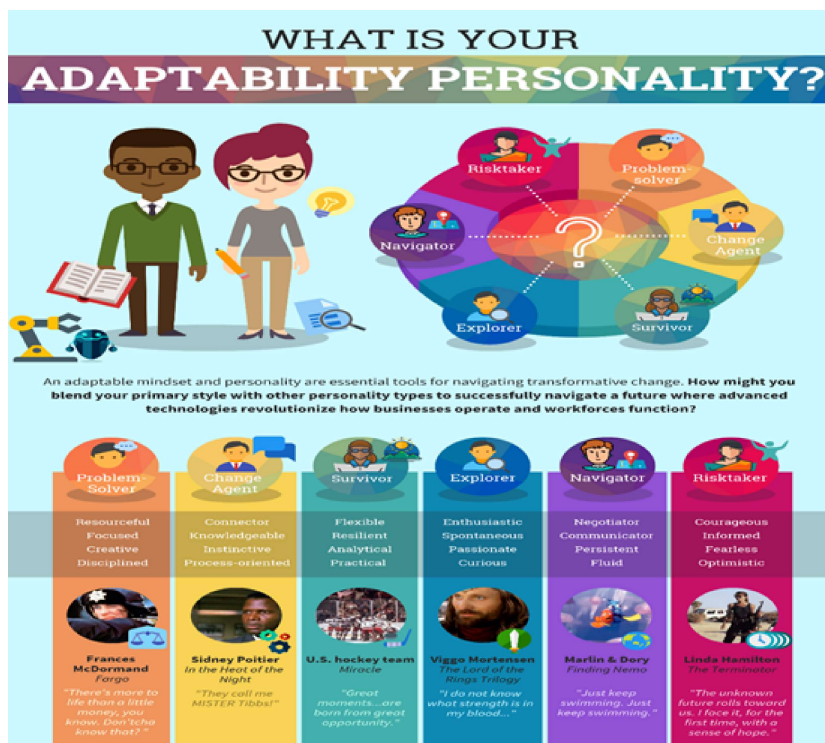

Figure 2.3 Adaptability infographic

Source: https://www.thepracticalprofessional.com/2019/02/what-is-your-adaptability-personality.html

4. Ways to make successful changes

We have all established that change is the most unchangeable characteristic of life. To be able to make successful changes there are some useful ways we can follow aiming to optimum results.

1. **Acknowledge and comprehend the need for change.** The very first step in any changing process is to genuinely realize and identify the need for it. Sometimes we turn a blind eye to the necessity of change because it can be scary, and the idea of the unknown is not easy to handle. Acknowledging the vitality of change is the first thing to do, when you find yourself facing new conditions and unfamiliar circumstances.

2. **Manage your time effectively.** Losing too much time will only make things worse. On the other hand, rushing into decisions can lead to uncalculated risks, and damages. Find the balance between procrastination and avoidance.

3. **Share your ideas with people who can help you.** In the professional field, especially in Advanced Manufacturing, change cannot happen just by the effort of one or two people. The need for change must be understood by all involved members.

4. **Put short term goals.** Take baby steps, if needed, but move forward, set daily goals, instead of huge, long-term goals. Accept the fact that changes take time, and it is better to celebrate every small step than being disappointed, if you aim too high from the start.

5. **Evaluate your progress, by being open to self-improvement.** Self-evaluation will be your ally in the process of changing. Be honest with yourself and do not be afraid to accept possible setbacks. We learn through our mistakes. Do your personal or team SWOT analysis.

Figure 2.4 Successful changes

Source: www.elements.envato.com

5. Tips for increasing the effectiveness of changes

1. **Collaborate with people who prosper on change.** It is of great importance to be aligned with your co-workers, or partners and actively try to engage with stakeholders that are eager to learn and advance. Flexibility and adaptability needs to be everyone's skill.

2. **Don't be afraid to take necessary risks.** Being open-minded is a necessary mindset in the process of change. You might find yourself in awe in front of new technological needs, or professional rules. Consult people you trust and take calculated risks.

3. **Set a timeline and be consistent.** It will prove crucial for your success to set a timeline before you get in the process. Setting a time frame is not just about the necessary time you will spend. It is also a technique that helps you clarify all the steps of your path, and a self-evaluating tool too.

4. **Define how you will calculate success**. Make a choice on what results you will take under consideration, so you can be precise when measuring the success and consistency of your changes.

5. **Understand and identify possible limitations**. Be realistic and honest about what might become, or already is, an obstacle in your way to effective changes. By knowing the barriers, you gain more freedom in your overall choices and efforts.

Figure 2.5 What is Change management and How Does it Work?

Source: https://www.prosci.com/resources/articles/what-is-change-management-and-how-does-it-work

Critical and Innovative Thinking

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1. Definition of critical thinking

Critical thinking is a complicated mental process, which requires logic and emotional intelligence. We can say that it is: "**the objective analysis and evaluation of an issue in order to form a judgment .**" (Oxford Dictionary on lexico. com, https://www.lexico.com/definition/critical_thinking).

Figure 2.6 Critical thinking; Source: https://www.theeducatedbrain.com/critical-thinking.html

2. Process of critical thinking

Critical thinking is a perplexed mental act that has undergone many philosophical and theoretical analysis through the centuries. Today's critical thinking cannot be the same as it was a hundred years ago, or even ten. There are some basic components of critical thinking though, that unanimously we can agree on.
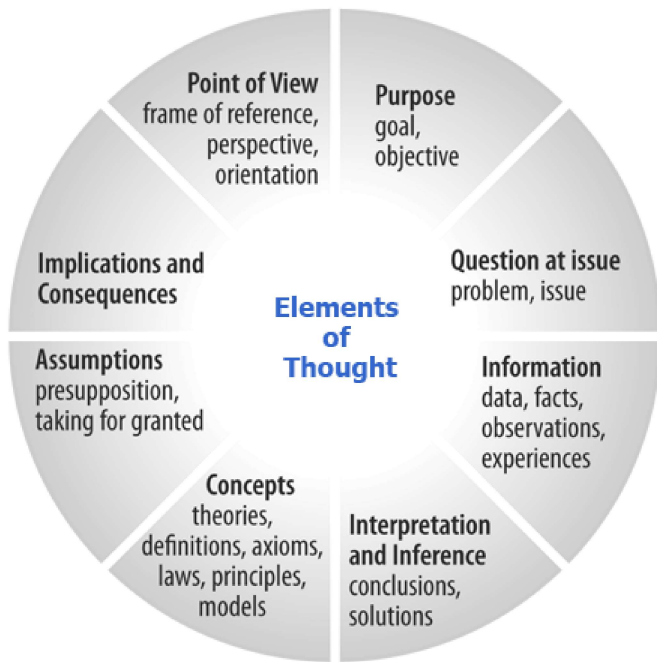

Figure 2.7 Analyze a Problem Using the Elements and Standards

Source: https://www.criticalthinking.org/ctmodel/logic-model.php

3. The components of critical thinking

1. **Identify the problem or issue.** First, you should find the core of the issue and actually see it as a challenge. Acknowledge the existence of it.

2. **Pay attention to all different opinions and arguments.** Any time you stumble on differences of opinions or contradicting suggestions, it is vital that you thoroughly research independently, so as not to be influenced by specific biases.

3. **Evaluate information.** Try to leave your own bias aside, trust your instinct and critical process, and evaluate the strengths and weaknesses of information or data collected.

4. **Define what is important and what not**. Figure out which evidence, data or statistics are most important for you to consider in the current situation.

5. **Be open-minded and brainstorm with your team.** Brainstorming is a lifesaving technique, especially if you already have created a strong team of creative people, eager to participate and share ideas.

6**. Reflect**. You need time to process all data and information, to make decisions that will take you forward and create an innovative and adaptable path.

7. **Communicate**. Everything starts and ends with communication. Communicate the results of your research, the ideas you came up with, the innovation you aspire to achieve with the right stakeholders and collaborators.

Figure 2.8 Critical thinking; Source: https://talentlens.in/critical-thinking-essence-decisive-mind-works/

4. Critical thinking abilities

The abilities of critical thinkers are a lot and include **observation, analysis, interpretation, reflection, evaluation, inference, explanation, problem solving, and decision making** (Critical Thinking, https://www.skillsyouneed.com/learn/critical-thinking.html)

Figure 2.9 Critical Thinking Skills

Source: https://www.indeed.com/career-advice/career-development/critical-thinking-skills

5. The meaning of innovative thinking

- **Innovation is a new idea, method, or device, a novelty, or the introduction of something new (Merriam-Webster Dictionary online) .**

- **Innovative thinking is** *"the ability to come up with new ideas and novel approaches to problems. It is about being creative and flexible."* (Innovative Thinking: Why is it the skill of the future, Michael Dunlop, December 2020)

Living in this century, with our numerous gadgets and commodities in everyday life, we struggle to imagine or remember a world without them. Our whole lives and civilization exist thanks to the innovative thinking and flexibility of our ancestors. Outside the box thinking, innovative ideas and groundbreaking attempts, resulted in what we experience today, as our modern society. Breaking the rules, and not following the same path as everyone else, forgetting about stereotypes, proposing new methods and ideas of dealing with problems, constantly exploring new territories, are all aspects of innovative thinking. In a world that rapidly changes, being ahead of time is the best asset a person can have, and the best investment a company can make.

To learn more, check this out: (CEOpedia Management online,
https://ceopedia.org/index.php/Innovative_thinking)

6. Ten ways to develop innovative ideas

1. **Be curious.** Curiosity is the foundation of innovation, creativity, and groundbreaking ideas.

2. **Practice Mindfulness.** The simplest way to describe it is as being consciously present every single moment. Being mindful means recognizing all your thoughts, your ideas, the way your body feels, your feelings and what caused them. Getting all this information, you will soon find the way to lead your brain to innovative paths, avoiding making the same mistakes, or letting negativity overwhelm you.

3. **Brainstorm.** Find the time to discuss ideas, no matter how crazy they may seem. Listen carefully to other peoples' concepts, try to build on them, and develop them even more. Be positive and open to suggestions and don't get stuck to preconceived notions and old habits.

4. **Be consistent.** Being creative and innovative, does not mean that you don't follow any rules, deadlines, or company's guidelines. The more consistent you are, the more people will appreciate you, and leave you the space to promote your ideas.

5. **Try to do something new every day.** Variety is fundamental in innovative thinking, and by empowering it every day, you will be full of ideas, creativity and will sharpen your imagination.

8. **Meditate and exercise.** Meditation is a way to awaken our most inner spiritual parts of our brain, and nowadays it is an extremely popular practice even in working environments. It can lead to more creative ideas.

9. **Stop fearing failure.** Fear only keeps us back. Embrace your strengths and arm yourself against negativity.

10. **Live life looking for inspiration.** Live your life to the fullest, travel, go to different places, find time for creative experiences, read books, and be curious about everything surrounding us.

Figure 2.10 How to Develop Innovative Ideas; Source: https://blog.bridgepointeffect.com/how-to-develop-innovative-ideas

Figure 2.11 Tips to create a culture of innovation

Source: https://www.projectmanager.com/blog/innovation-culture

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Innovative thinking: Why it's the skill to the future

Michael Dunlop, December 2020
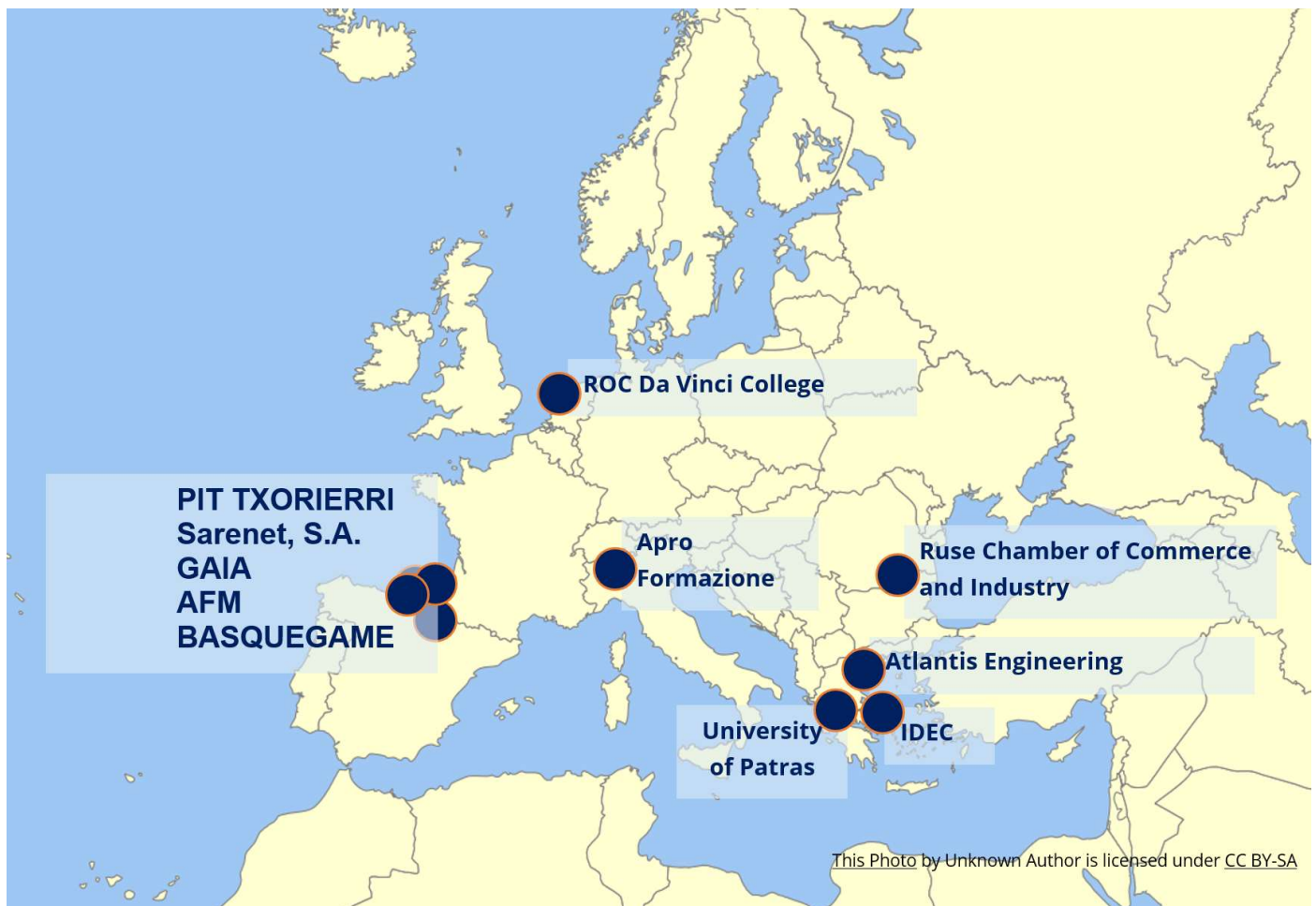
https://www.viima.com/blog/innovative-thinking

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Problem Solving definition

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1. Problem Solving definition

Problem solving is the act of defining a problem; determining the cause of the problem; identifying and selecting alternatives for a solution; and implementing a solution. (Asq Organisation)

Problem solving is considered one of the most vital soft skills nowadays. The technologies involved in Advanced Manufacturing such as, efficient production, intelligent production, innovation, and of course effective organisation, will thrive even more with the integration and implementation of problem-solving skills to the core of these industries, that is the employees.

Figure 3.1 Problem solving

Source: www.elements.envato.com

Why are problem solving skills essential today

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1. Why are problem solving skills essential today

COVID-19 not only has traumatised every aspect of life, or business factor but caused unprecedented problems and disruptions that still cannot be fully measured, realised and evaluated as to the future of business and the world overall. The pandemic should be seen and dealt with as an opportunity for even more innovative practices, for upgrading the existing advanced technology, for the manufacturing sector to catch up with the needs of the global new reality. And here is where problem-solving skills prove to be of such great importance for the people in the industry. Behind each technological achievement and new practices, lies the work of people, who found themselves facing unimaginable issues, both professional and personal. Soft skills will become the vehicle to support them, in this altered business reality, and become the base for financial survival and improvement. Supporting the employees in the Advanced Manufacturing sector through the implementation of problem-solving skills, is today a vital necessity.

Problem solving as a complex mental process

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1. Problem solving as a complex mental process

Problem-solving is a complex mental process, which can be broken down to the following core elements:

- representing

- planning

- executing

- monitoring

All the above are steps that each person should follow to succeed in any problem-solving process. In the case of professional challenges and, in particular, Advanced **Manufacturing**, problem-solving requires vast knowledge on the subject of matter.

To sum up, **the traits of a person who can successfully solve problems** are:
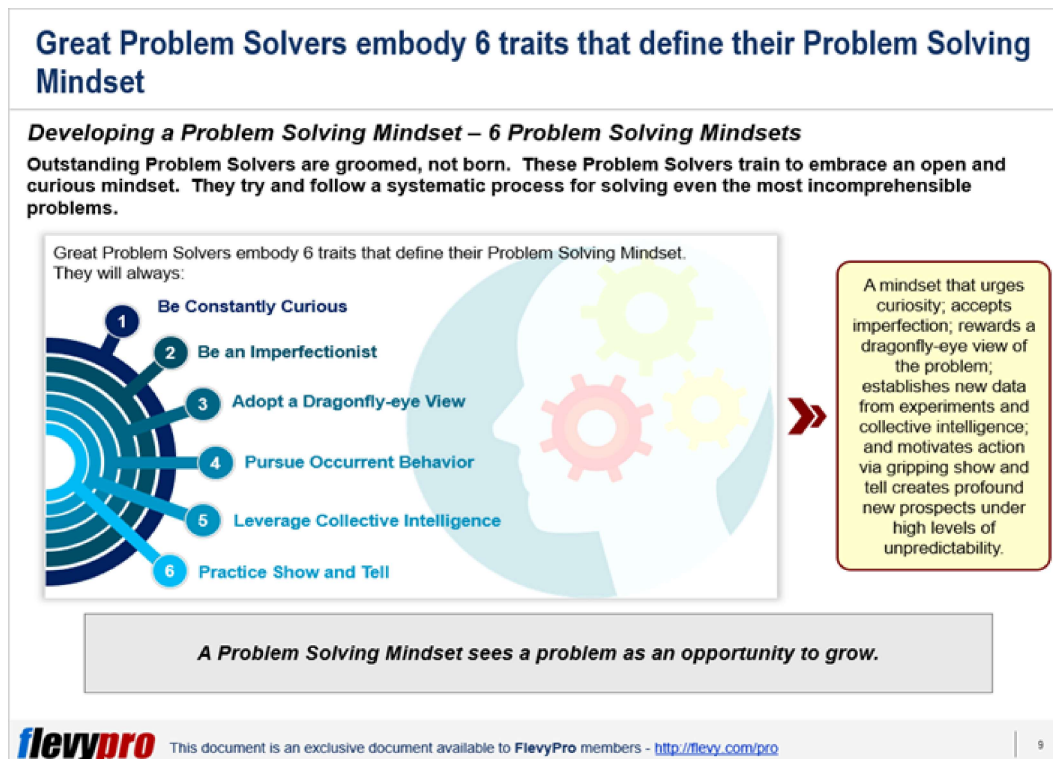

Figure 3.5 6 Mindset Traits of Great Problem Solvers

Source: *flevy.com/blog*

Figure 3.6 Problem solving as a complex mental process

Source: www.elements.envato.com

Problem solving as a complex mental process

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1. Problem solving as a complex mental process

Problem-solving is a complex mental process, which can be broken down to the following core elements:

- representing

- planning

- executing

- monitoring

All the above are steps that each person should follow to succeed in any problem-solving process. In the case of professional challenges and, in particular, Advanced **Manufacturing**, problem-solving requires vast knowledge on the subject of matter.

To sum up, **the traits of a person who can successfully solve problems** are:

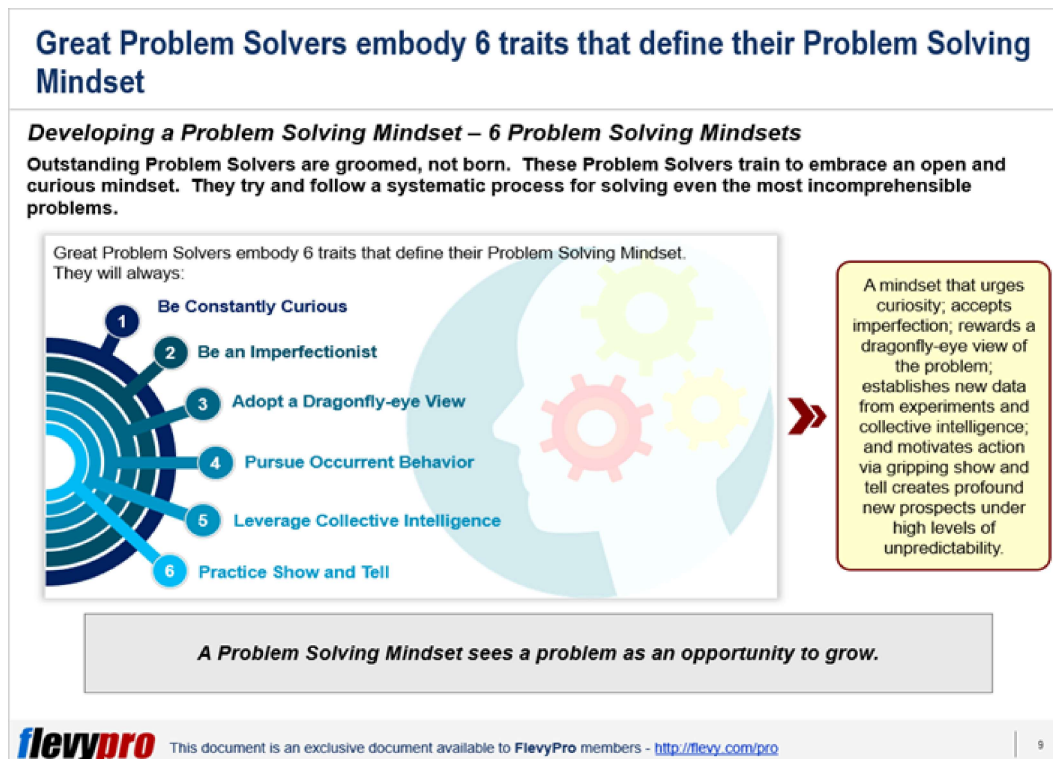*Figure 3.5 6 Mindset Traits of Great Problem Solvers*

Source: flevy.com/blog

Figure 3.6 Problem solving as a complex mental process

Source: www.elements.envato.com

Nine steps of an effective problem-solving process

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1. Nine steps of an effective problem-solving process

1. **Pinpoint the problem.** Before rushing on finding a solution in general or getting distraught because things didn't go as planned, think, and detect the core of the problem. Identify the significance of it, the gravity of the problem compared to other issues

2. **Analyse the issue.** Try to see the problem from many different perspectives and communicate your thoughts with stakeholders or peers you trust.

3. **Evaluate your data.** Do not take any piece of information as correct, important, or useful. Thoroughly examine the sources, their biases, their knowledge on the matter.

4. **Be flexible to possible solutions.** Think and imagine different possible outcomes and ways to reach your goal each time, not fixating on one single idea that at first seemed like a one-way.

5. **Use your experience**, **combined with creativity.** Especially in a line of work such as Advanced Manufacturing, one is called to come up with ideas, or dealing with severe issues daily. Use all this experience you already have, allowing yourself to take things a step further and be creative.

6. **Make a SWOT analysis of each possible solution.** Find the strengths and weaknesses of all the solutions you came up with, and carefully analyse the data you have collected.

7. **Choose the optimum solutions.** Select the solutions that fit best to your end goal.

8. **Evaluate your competences**. Solutions cannot just magically occur. You need to carefully evaluate the resources you will need. Take in consideration: people, time, deadlines, timetables, expenses, additional costs, technological support.

9. **Organise your action plan.** Go back and check your action plan, be realistic about your choices, and then allocate specific tasks to your team members, set timelines, and expected outcomes.

Figure 3.7 Elements of the complete problem solving process

Source: *https://planet-lean.com/problem-solving-system/*

Creativity techniques

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1. Creative Problem Solving

Curiosity: In the 1940s **Alex Osborn**, an American advertising executive, started elaborating on his theory on **problem solving.** His work was continued by **Sid Parnes** in the 1950s and the Creative Education Foundation. (The CPS Process, Creative Education Foundation website) Their work is considered one of the first to highlight the importance of **creativity** in problem solving, what is known as Creative Problem Solving (CPS) Process.

The core principles of CPS theory, which are still valid today are:

- **Ask Problems as open-ended questions**

Solutions are developed when problems are rephrased as open-ended questions with multiple possible answers. Using this technique you produce lots of valuable information, whilst closed-ended questions tend to elicit only confirmation or denial. Questions bring more solutions whereas statements tend to generate limited or no response at all.

- **Eliminate judgement**

The instantaneous judgement in response to an idea shuts down creativity, and the production of more possible solutions. There can be a selected time for criticism and evaluation, after the brainstorming process.

- **Focus on "Yes, and" rather than "No, but"**

When generating ideas, language matters. "Yes, and" allows continuation and expansion. The use of the word "but" – preceded by "yes" or "no" – closes down conversation, negating everything that has come before it. (The CPS Process, Creative Education Foundation)

2. What is scamper?

SCAMPER is an acronym formed by seven different words: **Substitute, Combine, Adapt, Modify, Put to another use, Eliminate and Reverse.**

It's a thinking technique that challenges the status quo and helps you explore new possibilities.

Figure 3.8 SCAMPER model

Source: https://www.pinterest.com/pin/769974867515949847/

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Creative Problem Solving

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Oxford Handbooks, Problem Solving

https://www.oxfordhandbooks.com/view/10.1093/oxfordhb/9780195376746.001.0001/oxfordhb-9780195376746-e-48

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Communication

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1. Definition of the term

Communication is a process by which information is exchanged between individuals through a common system of symbols, signs, or behaviour (Merriam-Webster Dictionary Online). In plural, **"communications" are a system (as of telephones or computers) for transmitting and exchanging information.**

Figure 4.1 What Is Communication?

Source: https://www.geektonight.com/what-is-communication/

Communication is one of the most imperative and transversal soft skills.

2. Methods of communication

Communication can be broken down in the following basic forms:

● **Oral communication**: From an informal talk with our peers, our family, to public speaking, to socialising, speaking in a work meeting, ordering food, or asking someone out. Oral communication is our way to communicate with the world.

● **Verbal/ Written communication**: Containing every type of written communication method, letters, emails, text messages, presentation slides, and recently of course emojis, GIFS, emoji reactions to texts …

● **Nonverbal communication**: Containing every non-spoken element that we voluntarily or not, indicate to others, and what we receive from them. From the clothes we wear, to our body language, our posture, the way we move or stand, all these elements create a very strong signal to others.

● **Visual communication:** Especially today visual communication is stronger than ever. We watch TV, films, Facebook and Instagram have become means of advertising and opinion. Images are not only a strong communication signal, but also get directly to our soul more even than our brains.

Communication would not exist though unless we had its final and vital element:

Active Listening: Active listening means that the member who receives the information pays attention, makes eye contact, uses their body language to show their interest and overall, actively listens and understands, so their answer will make the conversation move forward.
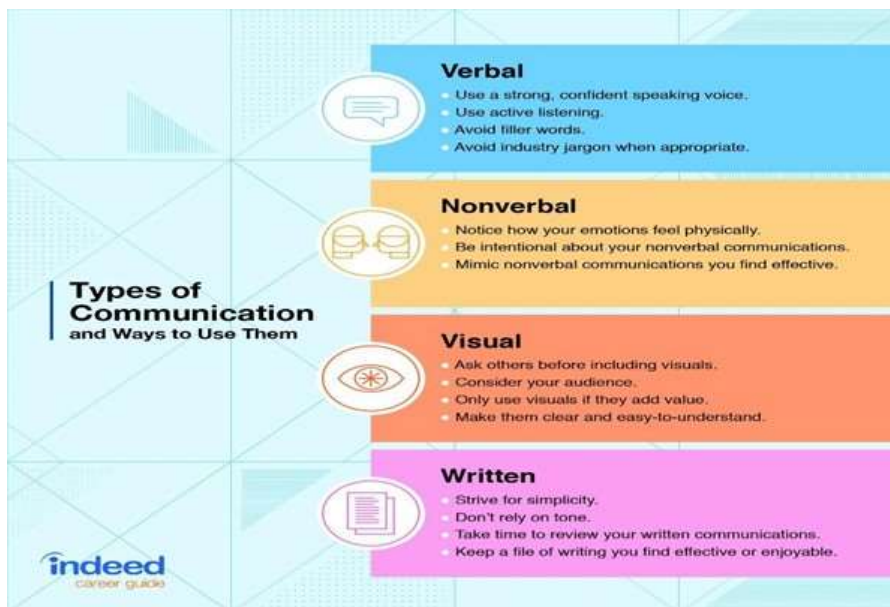

Figure 4.2 Types of communication and ways to use them

Source: https://www.indeed.com/career-advice/resumes-cover-letters/communication-skills

3. Why are communication skills so important today?

The way we express ourselves, the choice of the words we use and our intonation are the tools we possess to achieve the best result in passing our ideas to others. We need communication in every stage of our lives.

We are now living in an unimaginable society of technological progress and velocity, in which communication has become one of the key elements of life.

Starting with the internet, followed by the social media thunder, such a huge change was brought in the way we communicate. Communication has been and still is a global tool used by mankind, but at the same time it is totally personalised, since we are all different, affected a lot by one's culture, interests, age, experiences, needs, work environment, and personal curiosity to enrich and expand one's vocabulary.

4. Effective communication

It is important that interpersonal communications are effective. Effective communication is an important problem-solving mechanism, and a tool leading to success and improvement. Regardless of the medium we use today to communicate, it all depends on our personal ability to exchange effective ideas.
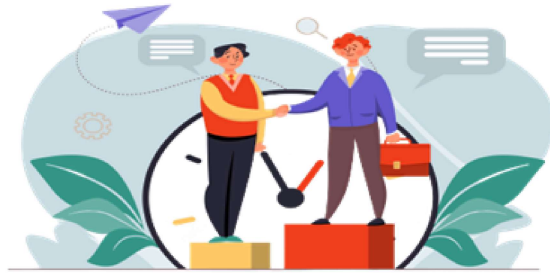

Figure 4.3 Effective communication

Source: www.elements.envato.com

5. Main set of principles to achieve effectiveness in communication

Principle	What to do	
Focus on listening	Allow other people to express their thoughts and ideas	Allow yourself the time to comprehend and process the information
Language is powerful	Be respectful, polite and avoid any triggering terms, or words that could cause friction	Avoid hate speech, discriminative language, sexist comments, or references have no place in any work environment today.
Be specific	Know the correct terminology	Share the necessary information, without overflowing the conversation with minor details that can cause confusion.
Leave behind preconceived notions and biases	Try to not have established opinions about people without really knowing them	
Non-verbal communication is vital	Being positive, affirmative, open-minded, and having a strong pleasant personality	Be flexible in communicating with others, giving them space, and producing efficient results

Furthermore, for the communication to be effective, all involved members should be willing to actually listen actively, be respectful, give time and show their appreciation, even if they disagree at some points of the conversation.

01 Listening
Strong observational skills to fully understand the message being conveyed

02 Non-verbal Communication
Body language like posture, gestures and eye movement

03 Being Clear
Choosing the right words to deliver a message that's easy to understand

04 Being Concise
Using fewer, well-chosen words to convey your message

05 Being Confident
The right message with the appropriate non-verbal communication

06 Being Personable
A friendly tone and a simple smile can go a long way

07 Being Patient
Being composed and not rushing when conveying your message

Figure 4.4 Communication skills

Cooperation-Team Working

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1. Definition of Cooperation

Cooperation is the "**voluntary arrangement in which two or more entities engage in a mutually beneficial exchange instead of competing. Cooperation can happen where resources adequate for both parties exist or are created by their interaction." (**Web Finance, Business Dictionary). Cooperation goes hand in hand with teamwork. Teamwork is defined as "**the summary of skills required to work well as part of the team" (**Skills Panorama, Cedefop).


Figure 4.5 Cooperation

Source: www.elements.envato.com

"Mens sana in corpore sano, the saying goes – a healthy mind in a healthy body. The World Health Organization (WHO) **defines 'mental health'** *as a state of mental wellbeing in which people cope well with the many stresses of life, can realise their potential, can function productively and fruitfully, and are able to contribute to their communities. While the coronavirus pandemic is primarily a physical health crisis, it has had widespread impact on people's mental health as well, inducing considerable levels of fear, worry, and concern in the general population, and leading to – or worsening – loneliness. The 'Health at a Glance: Europe 2020' report found evidence of higher rates of stress, anxiety and depression, in particular among specific groups. The growing burden on mental health caused by the crisis has been referred to by some observers as a* **'second' or 'silent'** *pandemic"* (Mental Health and the pandemic, European Parliament).

The Benefits of Collaboration

The most collaborative partners of a global law firm outperformed their colleagues during and after the 2007–2008 financial crisis.

The revenues of the top 10% most collaborative partners

The next 11% to 30%

The bottom 31% to 100%
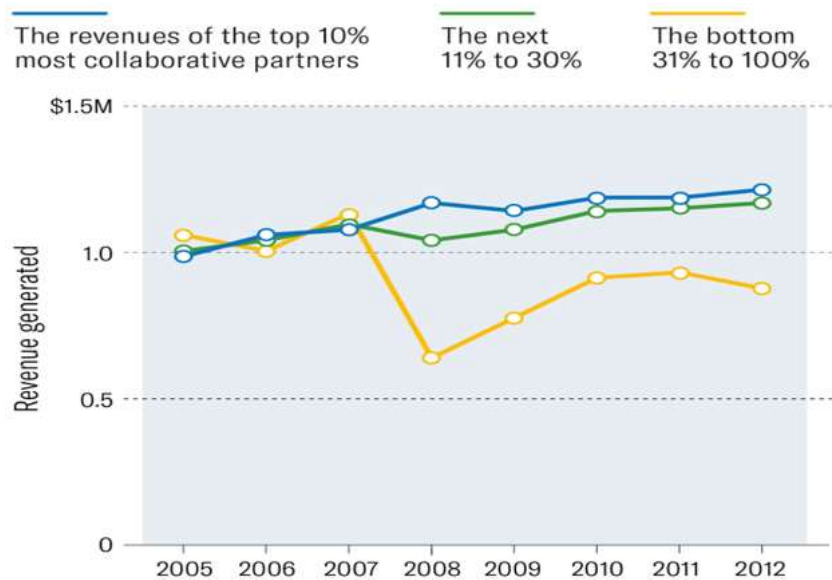
Note: Chart plots average revenues generated by three groups composing 400+ of the firm's partners, grouped by the proportion of their work conducted with fellow partners. Excludes partners whose precrisis performance was in the top or bottom 10% for the firm; also excludes groups that typically flourish in a downturn, such as bankruptcy/restructuring.
Source: Heidi K. Gardner and Ivan Matviak's analysis of the timesheet, billing, and financial records of a global law firm.

⊽ HBR

Figure 4.6 7 Strategies for Promoting Collaboration in a Crisis; Source: https://hbr.org/2020/07/7-strategies-for-promoting-collaboration-in-a-crisis

Collaboration is *"the practice of individuals functioning together to create integrated decisions"* *(Cloud Tutorial).*

The conditions to have an effective collaboration are:

1. *Everything is done on time and problems are solved in efficient ways.*

2. *Employees get the chance to exchange pieces of expertise and learn from one another, which makes their competences stronger and creates a culture of sharing information, instead of withholding.*

3. *Any occurring difficulties or problems are quickly recognised and dealt with.*

3. Strategies to create a well-balanced and efficient team

Creating a strong team, balancing different individuals with different personalities, talents, aspirations, and inevitable weaknesses, is quite a task. Like a maestro conducting an orchestra, where everyone has a specific role, place, task, and knows exactly where their part starts and finishes, so the final result will be exceptional. There are some strategies though, that if followed can lead to efficiency and the ever-sought-after team balance and strength.

1. **Every employee and every idea are valuable.** Respect your employees and listen to their ideas, as firstly they deserve it, and secondly, you never know where these ideas might take you.
2. **Be empathetic**. Try to be close to your team members, and sense their mindset, as everyone deals with many issues both in their professional and personal lives.
3. **Promote communication, trust and sharing.** If you set the tone for the whole group, prove with your own attitude the benefits of trusting, sharing knowledge, sharing information, and talking things through.
4. **Enhance and promote diversity.** People with different talents can perfectly work complementary to one another, each one offering their expertise.

5. **Set a specific goal.** The clearer you are with the goal you set, the more precise the tasks for each team member will become.

6. **Use each members' strengths.** If you understand in which areas each person excels, you have already won the battle of creating a strong team.

7. **Create an action plan**. By setting an end goal, a timetable and also dividing the appropriate tasks to the right people, you are more likely to succeed, as team members will know exactly what and when to proceed with their allocated tasks.

8. **Establish rules.** For any team to properly function, there have to be specific rules which everyone follows.

9. **Give credit.** Give credit to your team members for their performance, and they will continue to thrive.

Control egos and tensions. Set the example, by leaving your ego aside, and of course try to control their behaviour if it is disruptive for the whole team.

Figure 4.7 9 strategies for stronger business teams

Source: https://www.gavelintl.com/9-strategies-effective-teambuilding/

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Definition of leadership

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1. Definition of leadership

«Αρχή άνδρα δείκνυσι» , said Bias of Priene, one of the Seven Sages of Greece, which means that only when a person has power shows his true colors and character. Power and leadership reveal all our characteristics, positive or not.

Leadership is **"the set of characteristics that make a good leader, but also the position or fact of being a leader**" (Cambridge Dictionary Online).

Leadership comes down to each person's psychological traits and mindset. Some people seem born to be leaders, while others work best when they are part of a team and avoid being in the spotlight. It is often mistaken as a trait only strong, in high places and successful people possess, but the truth is, that leadership skills are useful, no matter your professional title or place in the workplace grading.

Figure 5.1 Leadership

Source: www.elements.envato.com

2. The complexity of leadership

If we go back in history and think of great leaders, the first thing that comes to mind is someone who can influence and persuade people to follow his/her vision. Often the misuse of leadership and the power of influence led to catastrophic results. Having such great power can alter one's personality, as with power comes privilege, and humans are prone to mistakes and arrogance. Being a leader comes with the weight of many responsibilities, but it can also be a life changing quality not for yourself only, but for everyone.

3. Taking charge of initiatives

Initiative is the ability to be resourceful and make work choices, without always being told what to do. (Youth employment organization, UK).

Companies expect their employees to take initiative: communicate effectively, to influence and inspire their team and the whole world, especially in the innovation sector. Being flexible, knowledgeable, empathetic, having big dreams, thinking out of the box, and daring to take risks are some traits that leaders possess.

Figure 5.2 Leadership Development

Source: https://register.tlcenter.wustl.edu/public/category/programStream.do?method=load&selectedProgramAreaId=1073638&selectedProgramStreamId=1239411&hsCtaTracking=c328b208-90f8-438b-b441-8f1d7b4e52ac%7C07ac6462-2368-47bf-84a7-04571020c6af

The characteristics of a successful leader

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1. The characteristics of a successful leader

Lead by example: People that look up to you, see you as a role

Communicate: Ask your team members what they need in

Lead your team to a common goal and vision: Having a

Be confident and

Detect everyone's talent: Let the people

Take accountability:
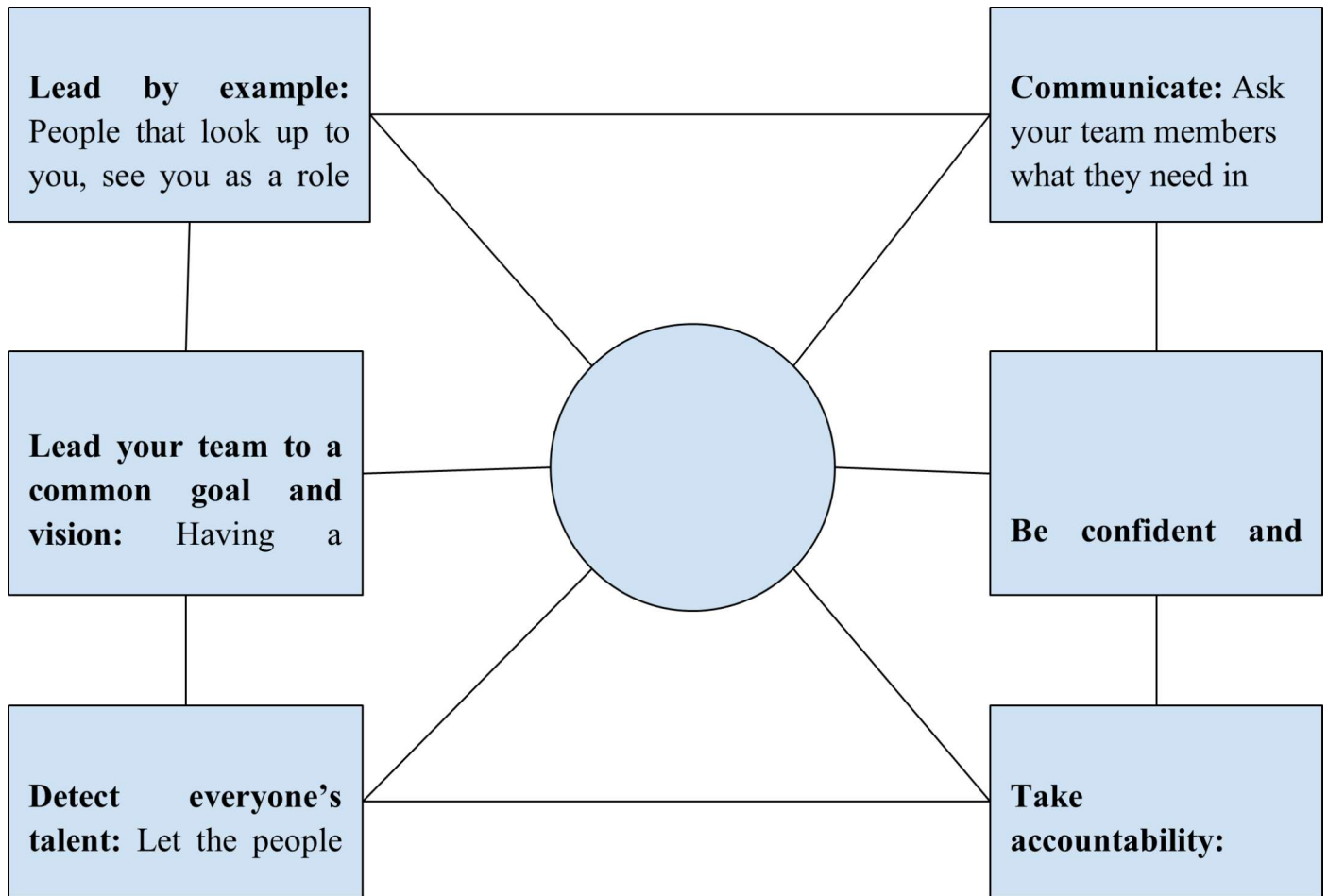
Figure 5.3 Characteristics of a successful leader; Source: the Author

*Furthermore, **work on your empathy skills:** empathy is considered one of the most important soft skills, and emotional intelligence is vital to form a well-functioning team that will support you.*

*Finally, **be calm and give feedback:** leaders should stand by their team, never tired to explain and teach new things, stressing the importance of constant learning and sharing knowledge.*

Figure 5.4 10 leadership skills for effective leaders

Source: https://blog.acesence.com/10-important-leadership-skills-for-effective-leaders/

Effective ways to lead your team

Site:	DTAM Online Training Platform		Printed by:	Ioanna Matouli
Course:	Transversal Skills		Date:	Friday, 8 December 2023, 4:24 PM
Book:	Effective ways to lead your team			

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1. Effective ways to lead your team

If you are responsible for hiring people, you will know that choosing the right candidates is of course essential for any organization or company to thrive. It might be easier to select the appropriate candidate that will become a member of your team, than keeping them engaged, inspired and ready for innovative ideas and new projects. There is always the need for the leader to be the connecting link between the team members and find the ways to get the best results, especially in an intense environment such as advanced manufacturing.

"With "Industry 4.0" set to transform the manufacturing sector, advanced manufacturing leaders are doing everything they can to hone their technical skills and keep pace with emerging technologies. But in the scramble to adopt new IoT technologies and teach workers advanced manufacturing techniques, soft skills are commonly being dismissed. Soft skills are critical for ushering in the next phase of advanced manufacturing. From grappling with big data in a collaborative environment to enhancing cybersecurity using creative problem-solving skills, interpersonal skills can and will be used to navigate the future challenges faced by manufacturers." (Kate Began, Crucial Skills for Advanced Manufacturing Leaders, 2019)

Leadership skills and soft skills in general are becoming more and more crucial in the professional field, whilst big companies seek for people who can manage teams, become leaders, and at the same time inspire, evolve, and have a clear vision for the future.

Figure 5.5 Leading the Team; Source: https://www.totaltrainingsolutions.com/solutions/training-courses/leadership-development-solutions/leading-the-team/

The ways to lead your team efficiently and successfully should contain:

1. **Communication.** Especially in the environment of advanced manufacturing, efficient and clear communication is extremely crucial to maintain safety and expand your operations.

2. **Critical thinking**. Especially in the industry of advanced manufacturing, the ability to apply critical thinking during any decision-making process is crucial.

3. **Time management and organization.** Being organized and knowing what your daily tasks should be, is the first step to manage your time more effectively.

4. **Adaptability to changes.** All the challenges of the world and the industry itself, that keeps changing and producing innovative technologies and products, leaders should be ready to embrace the change and follow the flow of development.

5. **Stress Management**. As a leader you should prioritize mental health issues, for your whole team and yourself.

6. **Rewarding.** When a member of your team performs their best, reward them, making clear that their work is validated.

7. **Constant motivation.** The leader must create motives for the team, which as feedback would make him/her motivated back.

8. **Creativity**. Only by looking forward, having a vision for the future, will you achieve the best for you and your team.
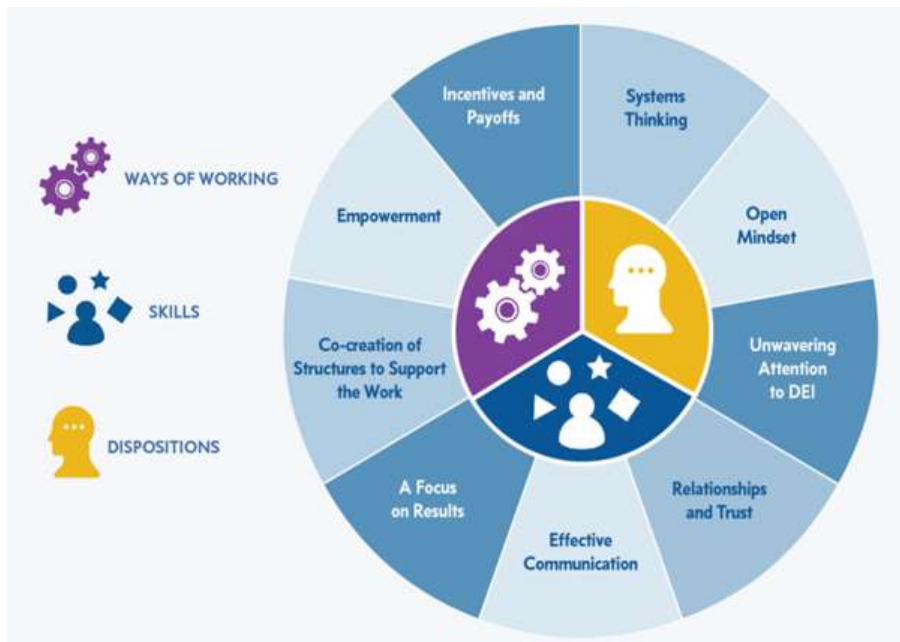

Figure 5.6 Characteristics of Effective Systems Leaders

Source: https://medium.com/equal-measure-ideas/what-are-the-characteristics-of-effective-systems-leaders-981b3fb35bd9

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Crucial Skills for Advanced Manufacturing Leaders

https://industrytoday.com/crucial-skills-for-advanced-manufacturing-leaders/

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Intercultural understanding

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1. Intercultural understanding
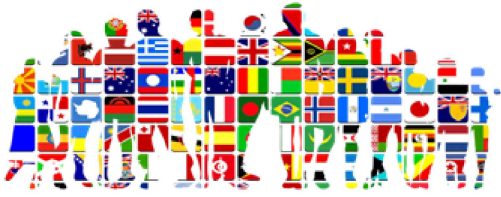
Figure 6.1 Intercultural communication essentials; Source: Diplo, 2019

"In our increasingly diverse societies, there is an urgent need for inclusive and coordinated responses from both educational and non-educational stakeholders which are aimed at promoting common values such as tolerance, mutual respect, equal opportunities, and non-discrimination, as well as fostering social integration, intercultural understanding and a sense of belonging. (CofEU 2015c, 37)"

Intercultural communication is the study and practice of communication across cultural contexts. It applies equally to domestic cultural differences such as ethnicity and gender and to international differences such as those associated with nationality or world region. (Milton J. Bennet, IDR Institute, Intercultural Communication)

The deeper essence of intercultural communication, which is necessary across the professional world today, is that it goes further than non-verbal communication, further than knowing the stereotypical approaches of communication, into studying and caring about other people's culture as art, local habits, languages.

Across Europe, and the whole world, diversity in the workplace is an established reality. Companies are the people who work in them, and each person is formed from his or her cultural background and heritage. Our cultural background shapes the way we behave, think, and work. Even subconsciously we are affected by our past, our ethnicity, and cultural history.

After the pandemic numerous businesses have now implemented a remote work model, which means that they can cooperate with people from all around the world. Consequently, it is crucial to work towards intercultural communication and appreciation.

Figure 6.2 Constituent elements of intercultural competence

Basic elements of intercultural communication

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1. Basic elements of intercultural communication

We can define the elements of intercultural communication as:

- **the verbal** ones: which is the language we use and both parties understand, and

- **the non-verbal** ones: which are the gestures, the use of body language, our expressions and sign language we use to make the other person understand what we are trying to say.

We need to take in consideration the context in which the conversation is taking place, the levels of hierarchy between the two members, which of course applies to any kind of communication, but here even more.

We do not have just a **source** and a **receiver,** but also **the message** we want to get through, the way the person especially coming from a different culture receives and understands it, the way they **conceptualise** the meaning and the **response or feedback** they give back.

During an intercultural conversation, the effort both parties must make is more intense and the way in which we ask for something or describe something should be of great clarity, so we avoid misunderstandings that especially in a workplace can be hazardous. During an intercultural communication process we must make sure that both parties have the same thing in mind, and they understand each one's point of view.
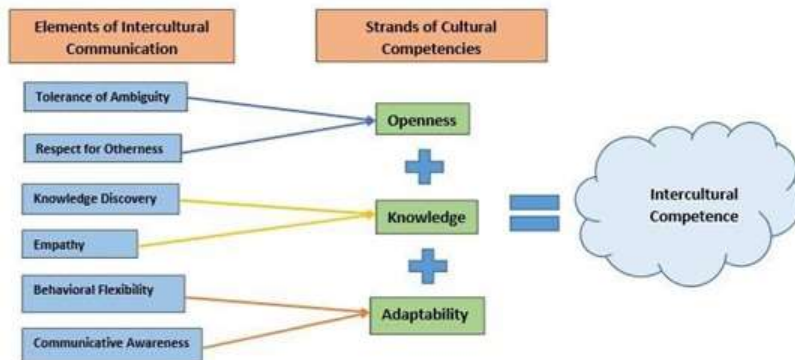

Figure 6.3 Intercultural Competence Assessment

Source: https://sites.google.com/site/russellhrmn302eportfolio/home/outcome-3

Theories of intercultural communication

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1. Theories of intercultural communication

Intercultural communication is defined as "*the sharing of information on different levels of awareness between people with different cultural backgrounds, or in a simpler way : individuals influenced by different cultural groups negotiate shared meaning in interactions.*" (What is intercultural communication, Ehlion Magazine online)

From a sociological point of view, we observe the attitude and behaviour of a person coming from a different cultural background, aiming to understand it, analyse it and compare it to other cultures. It is certain that we do not talk in the same way or use the same words when talking to our family and when talking in a professional setting. Even more for people coming from totally different backgrounds it is very interesting to study and analyse how each culture perceives respect, or friendship, professionalism, or work ethic.

We have all come across people sharing their stories, trying to explain how they grew up, or what is considered funny, or successful in their culture and country of origin. These shared stories are a type of intercultural communication, which of course cannot conclude to general findings, as it is very personalised, but gives some hints about the person's culture, and the overall atmosphere of their country.

Different cultures and ways of thinking

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1. Different cultures and ways of thinking

In some cultures, winning and succeeding is established as the only way to live your life, whereas other cultures value effort and cooperation more, regardless of the outcome.

In some countries a friendly workplace environment where people share their thoughts and interact on a more personal level, is considered normal, acceptable and is a prerequisite, whereas in other cultures people in the workplace interact strictly professionally, and do not connect more on a personal level.

We all need to work on our **intercultural competence**, which means to be able to effectively interact, communicate and cooperate with people from different backgrounds.
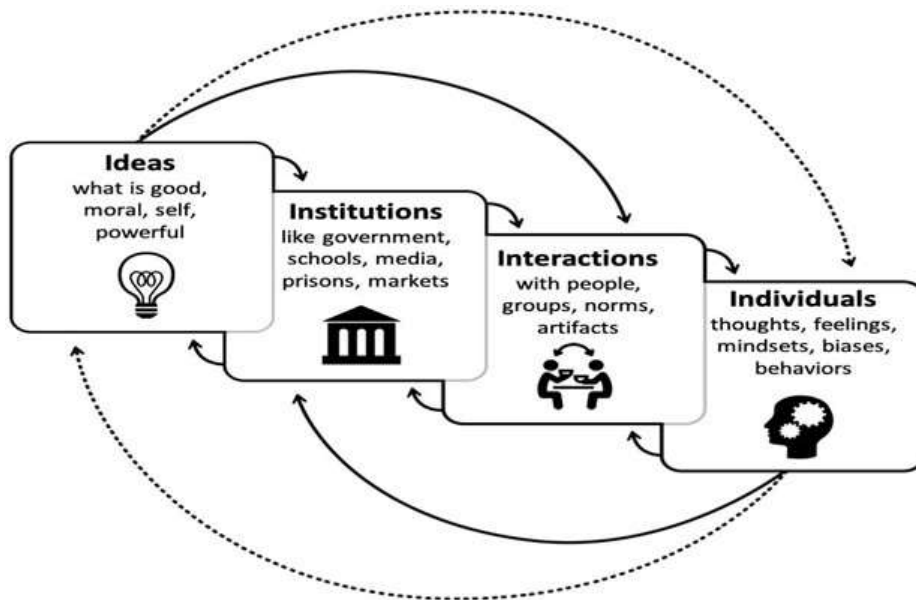

Figure 6.4 A Culture Cycle Approach;
Source: https://www.frontiersin.org/articles/10.3389/fpsyg.2019.00700/full

Figure 6.5 Different cultures and ways of thinking

Source: www.gettyimages.com

2. Obstacles to an effective intercultural communication

Intercultural communication is necessary in our globalised reality and workplace, but we need to acknowledge that there are limitations and obstacles that might occur.

- **Language**. Language can be a link, but also an obstacle if people cannot share a common language in the workplace. Especially in an environment such as advanced manufacturing, a level of understanding should be a prerequisite.

- **Preconceived ideas**. We sometimes have, involuntarily, preconceived notions about other countries, their people and their habits, or their work ethic. We should all give time to people, and deal with their actual performance and attitude, and not an idea we had before even working with them.

- **Stereotypes**. Even the more open-minded people sometimes fall in the trap of stereotypes because this is what society has been imposing on us for centuries. At least we should be aware of our own biases and try to avoid them, always reflecting on our preconceived ideas and actively trying to diminish them.

- **Ethnocentrism**. It is the idea that one's country is superior to others, with no actual proof that can support this notion. Especially in some countries ethnocentrism is quite strong and it affects the relationship between co-workers coming from different origins, disabling their honest communication and collaboration.

Historical rivalry between countries. We cannot pretend that historic rivalries do not exist. Being aware of that fact, we should try to leave it behind and focus on the working relationship we form with a specific person and not the nation he or she comes from.
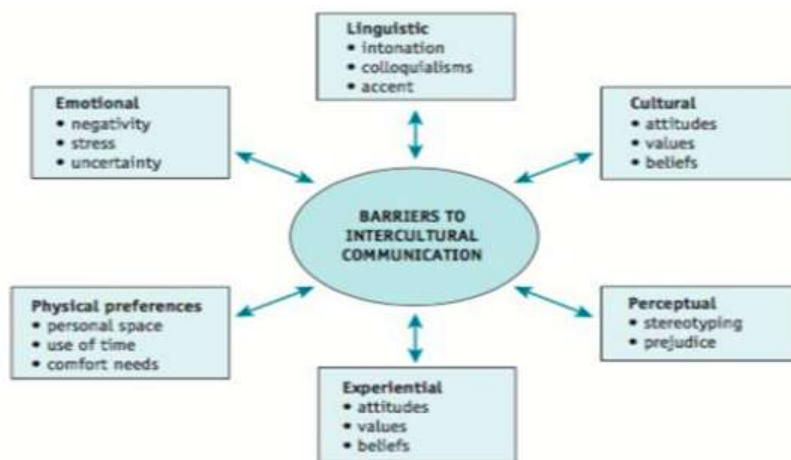

Figure 6.6 Barriers to intercultural communication

How to improve your intercultural skills

Site:	DTAM Online Training Platform		Printed by:	Ioanna Matouli
Course:	Transversal Skills		Date:	Friday, 8 December 2023, 4:25 PM
Book:	How to improve your intercultural skills			

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1. How to improve your intercultural skills

Respect	Respect different heritage and cultures	Learn what is considered appropriate and not for others	
Study the culture	Study the history and the cultures of your colleagues or peers	This will open a new world for you and make you understand them on a deeper level	
Be inclusive	Include people from a different culture in your conversations	Use English if that is the working language everybody adopts	Avoid speaking in your native language, so as not to leave someone out
Use your empathy	Put yourself in their position and think how you would want people to treat you, if you were in a different country, among people whose language was not familiar to you	Show them that you are interested in them, ask them questions, include them even in your social life	
Use your experience and common sense	Use your experience from previous interaction with people from a different background	Use your logic to avoid misunderstandings and friction	
Be self-aware	If you know that you are a loud and extrovert person, but you work with people that culturally tend to be reserved and timid, try to moderate your behaviour		
Do not just assume	Do not assume that what is normal and acceptable for you, is the same cross culturally	Think before you express your opinion, keep in mind that people from a different background, might have a different mindset, and beliefs	Do not take for granted that a certain behaviour is the best for everyone.

Be attentive and an active listener	Pay attention to your peers, ask them questions about their country of origin, their culture, their tradition, and get to understand them	Notice the way they behave, the way they want to be addressed to effectively interact with them	
Use your soft skills	Use you interpersonal skills, show interest in the person you are talking to	Do the extra mile and use body language	Use words that you know can get easier understood, and avoid using either slang language

Figure 6.7 Intercultural skills

Source: www.elements.envato.com

2. Value of acceptance

The UNESCO definition of tolerance speaks of respect, acceptance, openness, harmony, and recognizing others' freedoms:

Tolerance is respect, acceptance and appreciation of the rich diversity of our world's cultures, our forms of expression and ways of being human. It is fostered by knowledge, openness, communication, and freedom of thought, conscience and belief. Tolerance is harmony in difference [—]. Tolerance is, above all, an active attitude prompted by recognition of the universal human rights and fundamental freedoms of others. (UNESCO 1995, 5)

Today more than ever, we all understood the fragility of our world, the changes that followed the pandemic, the challenges we were all called to face. Therefore, the need for acceptance in the workplace is very prominent.

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A conceptual approach

Tuuli Lähdesmäki, Aino-Kaisa Koistinen, Susanne C. Ylönen

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Information analysis

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1. Information analysis

The amount of information we are receiving today is immense and can easily become overwhelming. We are bombarded by uncountable information through the internet and all the social platforms, like never in human history. Even though this plethora can be of great value, it can also lead to disinformation, fake data, and cause disorientation and confusion.

Definition of **Information: processed, organized and structured data that has undergone the interpretation of a purposeful intelligence.**

It provides context for data and enables the decision making process. Information organizes and systemizes relevant and timely data to inform or to develop new ideas and notions. It emerges after critical thought and analysis, and aims to provide new material for thought and new ideas turning to plans, turning to reality, optimizing the ratio of knowledge to information.

Information is based on the human intellect and is based on our mental and psychological traits. **The way we interpret data, is connected to the way we interpret the world.**

Figure 7.1 Information analysis

Source: www.elements.envato.com

2. Types of Information analysis

This systematic process of collecting and interpreting data has several ways to be performed. These following types are broadly used today:

1. **Search/ Research**. What else could be the most common and logical way to find information? Researching a variety of sources is the first step of information collection and analysis. Experiments and innovative ways that were not existing until now, are used to derive new knowledge.

2. **Requirements gathering**. Asking your stakeholders about their requirements to understand the way you have to follow, and the way to interpret the most relevant data.

3. **Mapping**. The process of matching fields from various sources, which is used to standardize them, creating a standard format for analysis.

4. **Aggregation**. Combining and bringing together information from various sources.

5. **Interpretation**. Using critical thinking, deduction, divergent thinking, design thinking, and all the types of thinking a human possesses, to come up with a critical and elaborated conclusion, based on collected data and human intellect. (https://simplicable.com/new/information-analysis)

Data analysis

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1. Data analysis

Data collection is the systematic process of gathering observations or measurements. Either for academic research, or business, or when aiming to find innovative products or solutions to existing problems, data collection and information analysis are the first steps you need to take, to get insight to the subject of research. The subject of research might vary, but overall, there are methods and tools that apply to almost every research process.

Data Analysis

- Turning **raw data** into **useful information**
- Purpose is to provide answers to questions being asked at a program site or research questions
- Even the greatest amount and best quality data mean nothing if not properly analyzed—or if not analyzed at all

Figure 7.2 Data analysis key concepts; Source: https://slideplayer.com/slide/11665954/

Your goal is to collect the more appropriate data for your research, to have the most accurate results. Therefore, you should follow specific steps that will ensure the validity of your analysis:

1. **Define the purpose of your research**. By defining the purpose and goal of your research, you can understand the type of data you need to analyze.

- Ask specific and direct questions, the answers to which will show you what you need in terms of data analysis.

- Define your parameters

- Decide and define your flexibility and limitations regarding your parameters and your possibility to negotiate or not.

2. **Collect your data**

- Select your data based on your set parametres

3. **Process the data**

- Organize your data

- Check the reliability of your sources

- Leave aside useless irrelevant data

4. **Analyze your data.**

- Go through all your selected data and find the connections and causal relationships.

- You might realize that you must redefine your initial ideas.

5. **Interpret your results.**

- Check if your results answer your initial question

- Ponder on whether you have taken under consideration all the parametres

Turn your data into graphs or charts. By using these visualization techniques, you create a stronger and clearer signal of your analysis.
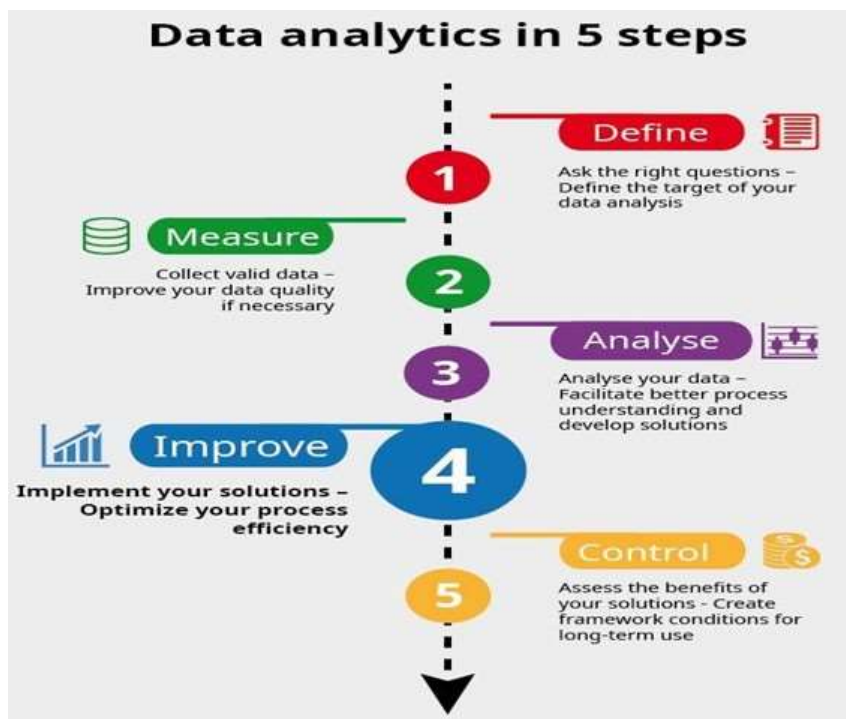

Figure 7.3 Data analytics in 5 steps

Source: https://www.yokogawa.com/eu/blog/chemical-pharma/en/analyze-your-data-step-4-improve/

2. Why is data analysis so important?

Data on its own, it is just numbers, or lifeless clues in a way, that need analysis to turn them into something useful. If the analysis is done by computers, of course we get valid results, but again, it takes a person to interpret them and analyze them, so to reach a concrete conclusion. Data analysis is crucial in today's business world, and of course in advanced manufacturing. The combination of specific data and the interpretation of their analysis is a method that many successful companies follow.

Data analysis offers you awareness about the consumers, providing information that allows you to facilitate their specified needs. The more information you collect and analyze the more personalized and effective your services can become.

Data analysis gives you the right perspective and can work as a guideline for your future steps and decisions. If you reach the point of having collected the appropriate data, you can easily detect the market's needs, and provide the awaited services.

3. Information vs Data

There is a difference between data and information.

Figure 7.4 Data, information and systems

Source: http://www.myshared.ru/slide/1050548/

Figure 7.5 Data vs. Information vs. Knowledge

Source: https://ppcexpo.com/blog/data-vs-information-vs-knowledge

Types of data analysis

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1. Types of data analysis

1. **Descriptive Analysis:** Or learning from the past. This type of analysis focuses on past data and tries to analyze them regarding the present time gathering information that could turn useful today.

2. **Exploratory analysis.** Its name says it all. The goal of this type of analysis is to explore and find the connection between data and variables. The exploratory analysis allows you to find the correct connections and therefore come up with solutions for certain challenges.
3. **Diagnostic Analysis:** As its name suggests, this type of analysis focuses on understanding and detecting the reasons that lead to certain results. It diagnoses why something worked or not, the reasons behind a success or a failure. To conduct a diagnostic analysis, you need to have all the data, and be very detailed, checking everything that can help you find why things happened as they did.
4. **Predictive Analysis:** This type of analysis aims to predict what is most likely to happen in the future, using data and knowledge of the past. Finding similarities or differences between now and the past, you can see upcoming trends or new needs.

5. **Prescriptive Analysis:** This type of analysis, uses all the information you have collected from the previous types, and after consideration, critical thought and close look to all elements, you decide how to act and which plan is the most suitable for you, trying to ensure success.
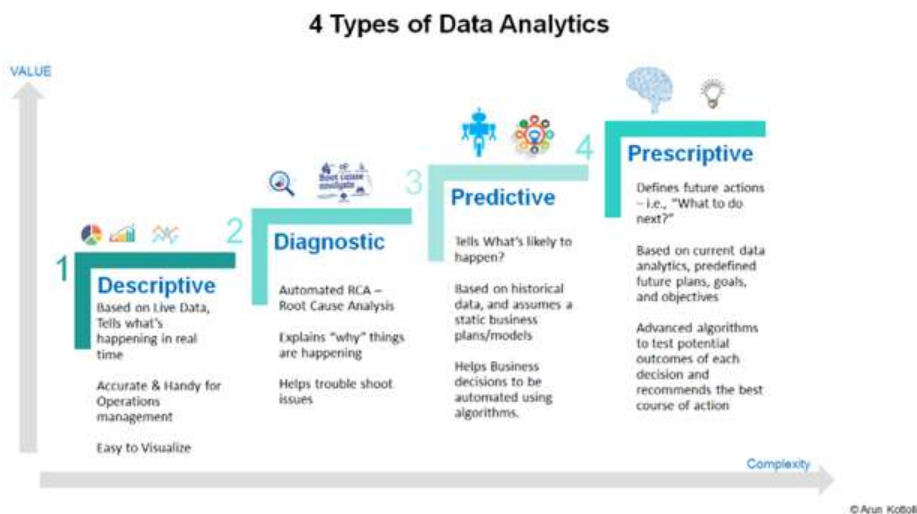

Figure 7.6 4 Types of Data Analytics

Source: http://arunkottolli.blogspot.com/2018/08/4-types-of-data-analytics.html

Control reliability of information

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1. Control reliability of information

The amount of information we receive daily is overwhelming. Through all the social platforms, on TV, on the internet, we are surrounded and bombarded by uncontrollable pieces of information, a fact that makes reliability control essential. It is not uncommon for people to believe something because they saw it online and to accept some unreliable or false statement for truth. There are ways though to control the reliability of the data you collect.

1. **Knowing and recognizing the source**. If you find the information online, on a website that it is familiar to you and you have used in the past for similar research, the chances are of course better, than finding information on websites or platforms you have never used before, or they don't really ring a bell.
2. **Use your instinct combined with logic**. When reading an article, or collecting information online, what is your first response to them? Would you share them with others? Do they feel valid and based on research? Or you feel that there might be something suspicious about them? The more you use your critical thought, the more you can trust them.
3. **Check if the source is used elsewhere.** Is the information you found used by other people or other valid sources? Is it the result of an academic research or is it used in academic lectures? Is it cited by analysts and respectable figures in your field? If so, the chances of course for the information to be valid are very significant.
4. **The closer you are to the source, the more reliable.** It is only logical, but sometimes we forget about it amongst the plethora of data around us. If you go directly to the source of information, it is easier to receive pure and valid data.
5. **Recognise your own bias.** We all tend to search information on sources and media we feel closer to form a psychological or ideological point of view. Are we more prone to accept something as valid, because of our own bias? The first step is to understand that all of us have some preconceived ideas that might blur our judgment. At least acknowledging them, will help ensure the reliability of our sources and choices.
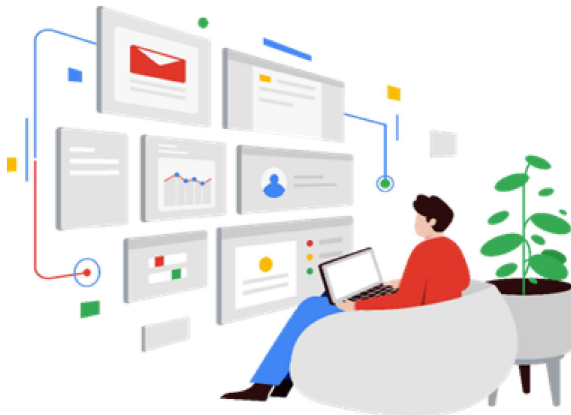

Figure 7.7 Control reliability of information

Source: www.elements.envato.com

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Project and Project Management definitions

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1. Project and Project Management definitions

What exactly is a project, and what constitutes a project management process?

A project is *"an activity to meet the creation of a unique product or service and thus activities that are undertaken to accomplish routine activities cannot be considered projects"* (https://www.managementstudyguide.com/what-is-project-management.htm)

Our daily activities which are performed on a regular almost automatic basis, are not considered projects.

A typical project has following characteristics:

▪ **Team:** Project management involves a team working for the manifestation of the concept, using all expertise across the various departments.

▪ **Timeline:** Every project has a specific and definite timeline with a set starting and end point.

▪ **Resources:** Each project has certain resources regarding the capital and of course the people working for.

▪ **Tools:** Specific tools are used during the project management process, to enable a smooth and undisturbed workflow.

Project management is "*the application of processes, methods, skills, knowledge and experience to achieve specific project objectives according to the project acceptance criteria within agreed parameters. Project management has final deliverables that are constrained to a finite timescale and budget."* (https://www.apm.org.uk/resources/what-is-project-management/).

Project management has two specific characteristics:

1. specific final deliverables
2. specific **finite timespan**

Figure 8.1 What is project management? Source: https://www.4pmti.com/what-is-project-management/

Project management is a systematic process of planning, analyzing and finally implementing, using specific skills and knowledge, aiming to deliver something of value.

Figure 8.2 Project management

Source: www.elements.envato.com

Project Lifecycle

Description

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1. Project Lifecycle

The phases of a project make up the project life cycle. The basic phases or stages of a project are dependent on the kind of project that is executed. Each phase of the project is associated with specific milestones and the set of deliverables that have to be finished according to the planning. (https://www.managementstudyguide.com/what-is-project-management.htm)

- **Initiation phase**

During this phase, we are called to outline the project, structure its business case, and get it approved, in order to proceed.

- **Planning phase**

The planning phase is crucial in structuring a **project roadmap** which the entire team will be able to follow. All the details and goals are defined, to meet the requirements that were set in the beginning.

- **Execution phase**

The execution phase begins with a project meeting, known as the **kickoff meeting**, where all the objectives are defined and shared to the involved members and stakeholders.

- **Controlling and monitoring phase**

In parallel with the execution phase, the controlling and monitoring phase takes place. All adjustments, and necessary changes will take place, to meet the project's needs and ensure the maximum quality.

- **Project closure**

The closing phase is a crucial step in the project management's life cycle. It indicates the official end of the project and offers the chance for feedback and reflection. All the appropriate products and deliverables are handed **over to the customer**, and the involved stakeholders are informed about the project's end.

Figure 8.3 Project lifecycle

Source: https://www.workamajig.com/blog/project-life-cycle

Project Planning and Implementation

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1. Project Planning and Implementation

Project planning is *"a procedural step in project management, where required documentation is created to ensure successful project completion. Documentation includes all actions required to define, prepare, integrate and coordinate additional plans. The project plan clearly defines how the project is executed, monitored, controlled and closed".* (What does project planning mean? https://www.techopedia.com/definition/14005/project-planning)

Project planning can be broken down into the following steps/phases

1. Identifying your project's goals and objectives
2. Identifying the key stakeholders
3. Identifying the project's deliverables
4. Structuring the project's schedule and timetable

Project implementation is *"the process of putting a project plan into action to produce the deliverables, otherwise known as the products or services, for clients or stakeholders."*

It takes place after the planning period, during which the key objectives for the project, the timeline and the project's budget are defined.

The implementation phase can be broken down into the following steps

1. Assessment of the project plan
2. Execution of the plan
3. Adjustments and necessary changes
4. Project data analysis
5. Feedback

Final reports

Figure 8.4 Project management and implementation methodology overview

Source: https://www.slideteam.net/project-management-and-implementation-methodology-overview.html

Risk analysis

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1. Risk analysis

"Risk Analysis and Management is a key project management practice to ensure that the least number of surprises occur while your project is underway." (https://www.pmi.org/learning/library/risk-analysis-project-management-7070)

Whilst we cannot predict exactly how a project will turn out, by applying a risk assessment process, we can minimize possible risk factors. The goal of the risk assessment process is to guarantee as much as possible the smooth delivery of each project. It is a way to ensure the successful delivery of any project and prevent unwanted consequences that could harm the project's completion. It is crucial for any organization, company, or team, to create and implement an efficient risk assessment plan, as it ensures:

- Mindful and conscious risk identification

- Minimum surprises and setbacks with maximum chances of success

- Timely identification and communication of possible problematic factors issues

- Team building and effective team cooperation

There are guidelines that can ensure the effectiveness of the risk assessment procedure. (https://www.pmi.org/learning/library/risk-analysis-project-management-7070)

- **List of possible risk sources and categories**

- **Impact and probability matrix**

- **Risk cutback and action plan**

- **Contingency/ Emergency plan**

- **Risk threshold and metrics**

Figure 8.5 Risk management

Source: http://blog.zilicus.com/project-management-guide-project-risk-management/

Planning tools

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1. Planning tools

1. **Affinity Diagram** The affinity diagram is a brainstorming tool that is used to organize a vast amount of

    disorganized and raw data into groupings based on natural relationships. An affinity diagram is best used in the following cases:

a) You are confronted with numerous facts, information and ideas that seem chaotic and endless.

b) The issues that emerge, seem too complicated, confusing and need sorting out.

2. **Interrelationship Diagram**

Interrelationship diagrams graphically display all the interrelated cause and effect relationships involved in a complex problem. The process of creating an interrelationship diagram helps us detect the natural links between various aspects of a given situation.

3. **Tree Diagram**
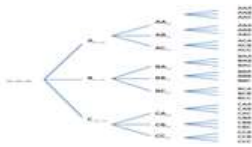
This tool is used to break down vast and broad categories into subtler, more detailed ones. The tree diagram overall assists in zooming in from the general picture to the more specific detailed one.

4. **Prioritization Matrix**

This tool is used to firstly prioritize given items and then describe them in terms of weighted criteria.

5. **Matrix Diagram**

The matrix diagram shows the relationship between two or more sets of elements, the relationship is described either as present or absent. On the next level, the diagram helps define if the relationship is strong or not and the roles held by various individuals or measurements.

6. **Process decision program chart** The process decision program chart extends the tree diagram in order to identify risks and countermeasures for the lowest level tasks.

7. **Activity network diagram**

This tool is used to structure the most effective sequence or schedule for a set of tasks and subtasks. Its purpose is to assist teams in defining, organizing, and managing complex activities. It is valuable when most of the tasks and subtasks run at the same time.

Figure 8.6 Planning tools

Source: www.elements.envato.com

The importance of communication

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1. The importance of communication

Communication is one of the most important and transversal soft skills.

Communication skills "**help to express ideas and views clearly, confidently and concisely in speech, writing and body language"** (Skills Panorama, Cedefop).

Communication is the key element of an effective team, of an efficient leader, and of course it is vital for the successful delivery of any project, and any project management procedure. Without effective communication, active listening and participation, the chances of failure are prominent. Poor communication leads to misunderstandings, setbacks, delays and in the end endangers the whole project.

In project management, that translates to sharing our ideas, being clear and precise about our objectives, and making sure that everyone has all the necessary information. The tricky element of communication is that we can never be sure that the information we share will be acknowledged the way we meant it by everyone. The way people understand things, the way they decode the information, comes down to their personality, their background, and the mental and psychological state they are in, when they receive the information. In project management it is vital that we communicate effectively, otherwise there is a great chance that mistakes will happen, delays will occur, and the end result will not be adequate.

Figure 8.7 Communication Management Overview; Source: https://www.howthebusiness.com/project-management/communication-management/

Change of management

Description

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1. Organizational change refers broadly to "the actions a business takes to change or adjust a significant component of its organization. This may include company culture, internal processes, underlying technology or infrastructure, corporate hierarchy, or a

Organizational change refers broadly to *"the actions a business takes to change or adjust a significant component of its organization. This may include company culture, internal processes, underlying technology or infrastructure, corporate hierarchy, or another critical aspect."* (Harvard Business School Online, https://online.hbs.edu/blog/post/change-management-process)

Organizational changes can be:

1. **Adaptive changes.** Adaptive changes are gradual and smaller in scale. The scope of these changes is the upgrading of products, the evolution of work procedures and ethics, the development of strategies.
2. **Transformational changes.** Transformational changes are much larger in scale and occur when something very important changes in an organization or a company. Anything that directs the company into new territories and paths, like expanding in another country, constitutes transformational change.

2. Necessary steps for a successful change management process

To lead your organization or company to a successful future, you will most probably go through a change management process.

1. **Prepare your company for the upcoming changes.**

Change does not come easy, at least not very often. Prepare your team members and all involved members for the upcoming changes in management and give them a period to adjust.

2. **Structure your plan and your vision for the future.**

Organize and plan the changes and manifest your vision, as to where you want to lead your company.

3. **Implement the changes.**

Plan the changes, organizing the tasks needed for them to become reality, and   informing everyone on the upcoming upgrading.

4. **Embed changes.**

Gradually embed the necessary changes, monitoring their efficiency.

5. **Analyze, review and reflect.**

Reflect on the effectiveness of the changes, review their dynamic and reflect on their strengths and weaknesses. Be realistic about them, measuring their impact and the time needed to see actual results.
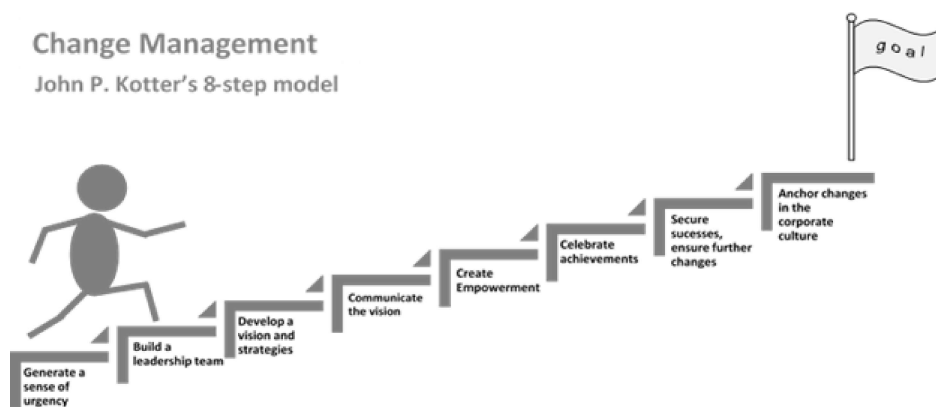

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Figure 8.9 Change management checklist

Source: https://www.techtarget.com/searchcio/definition/change-management

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