Transforming the IO3 Presentations into a PDF format for the Final e-book

Deliverable Form	
Project Reference No.	**2020-1-IT02-KA204-080082**
Document Title	Transforming the IO3 Curriculum into a PDF format for the e-Book
Relevant Intellectual Output:	Intellectual Output 3
Nature:	eBook
Dissemination Level:	Restricted to a group specified by the consortium (including the Commission Services)
Document version:	Volume 1
Date:	1 March 2023
Authors:	Mahmed Ibrahim (OLUS)
Document description:	This document provides the already designed curriculum for IO3: Digital Transformation Course into a pdf format to be included in the final e-Book of the project. From proposal: the theory, design approach, tests, case studies and tools will be all collected into a book and ebook that will constitute the final outcome of this Intellectual Output

Add Headings (Format > Paragraph styles) and they will appear in your table of contents.

IO3: Digital Transformation Course

Module 1: State of the Art on Digital Transformation - setting the context

Content Table

Learning Outcomes

- To gain knowledge regarding the state of art on Digital Transformation processes
- To gain an institutional framework regarding Digital Transformation
- To learn about the main aspects of Digital Transformation processes

Course Requirements

- Pen and paper/ computer
- Internet access

Overview

This module will provide you with a first definition of Digital Transformation, by also drawing an institutional reference framework about guidelines and indicators useful for measuring and evaluating the effectiveness of digital transformation processes.

Finally, starting from the skill gap analysis showed in the IO1, the module will give an overview of the main skills needed to develop and to manage effective digital transformation processes.

Keywords

Digital Transformation, DESI Index, European Digital Compass, Skill Gap, Business Model

Introduction

A company may take on digital transformation for several reasons. However, the most crucial reason is basic economic survival.

COVID-19 illustrated the importance of adapting quickly to dramatic changes, including disruptions to supply chains, time-to-market pressures, and rapidly changing customer expectations.

Spending on the digital transformation of business practices, products, and organizations has never been more critical for its survival.

Brief History of Digital Transformation

The term 'digital transformation' itself was coined relatively recently to describe the changes companies across the globe are undertaking.

However, the phenomenon originates much earlier, at a time when technology was taking its first steps towards digitisation.

While intrinsically related, digitisation and digitalisation are not the exact same thing. The earlier concept, digitisation, describes the shift from analogue to digital technology which was kickstarted in the late 40s by American scientist Claude Shannon and his famous paper, A Mathematical Theory of Communication.

Shortly afterwards, the invention of the microchip and the semiconductor transistor changed the technological landscape forever by making digital computing possible for the first time.

Riding the digitisation wave, the 70s brought us arcade video games, home computers and increased demand for data entry, as organisations doubled their efforts to transfer their records onto a digital platform. Workforce automation then cropped up in the 80s, along with another key invention – the World Wide Web.

Following the invention of the Web, the turn of the century saw a global surge in technological innovation, with internet users reaching 1 billion and mobile phones becoming commercially available. Before the 2000s were out, the first stage of the digital revolution had swept across the world.

Technological developments didn't end there; innovations evolved into digital transformation as we know it today. Companies started rethinking the way they connect to customers, using digital channels and devices to modernize interactions and establishing relationships directly with their customers. These changes were shortly followed by a wider shift in the way organisations do business.

From 2000 to 2015, the rise of smart devices and social media platforms led to a drastic change in the methods customers used to communicate with businesses, and also the expectations customers had with regards to response times and multi-channel availability. Businesses started to see that they were now able to communicate digitally with their customers on an individual basis, and often in real time. An ever-growing selection of digital payment options such as PayPal also contributed to more and more online commerce and opportunities for web-based points of sale.

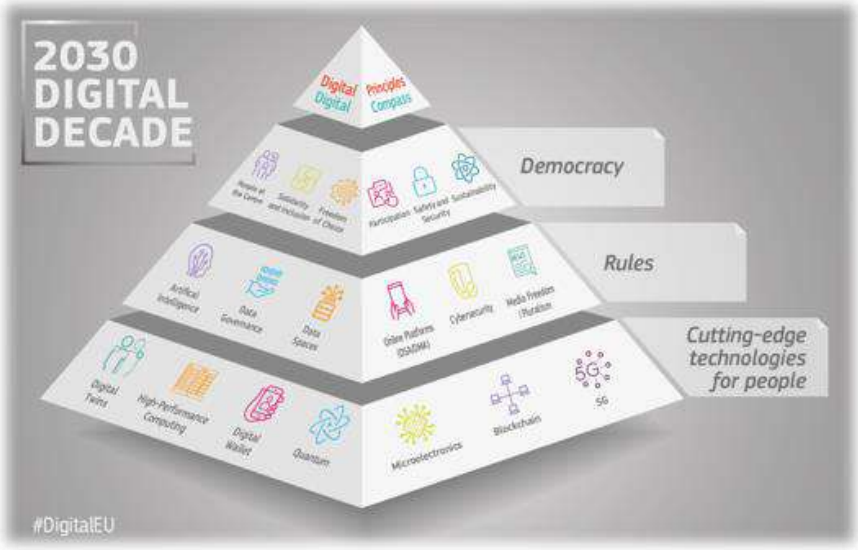
Nowadays, there is a focus on mobile devices and on creating value for customers by leveraging the kinds of personalised customer data that mobile technologies can generate on a massive scale. Businesses are taking advantage of this personalised information and are able to better tailor their products, communications, and interactions to fit customers' specific needs.

Digital transformation redefined how companies used consumer data insights to generate new business. By analysing digital interactions with their customer base, businesses were able to adjust their customer experience in line with the evolving needs of their audience.

Digital transformation as we know it today is a strategic approach rather than technological upgrade. In the last few years, organisations have been backing up their digital ambitions by upskilling their teams and reshaping company culture to view digital transformation as an ongoing effort instead of a one-off project.

European Digital Compass

In March 2022, The European Commission presented a new policy programme to support the principles stated in the 2030 Digital Decade in order to increase its strategic autonomy in tech and develop new rules and technologies to protect citizens from counterfeit products, cybertheft, and disinformation. Most importantly, the EU's goal includes bringing new freedoms and rights, and give EU citizens the opportunity to reach out beyond physical communities, geographical locations, and social positions.



The new policy program to support the stated principles of the Digital Decade is enclosed within the 2030 Digital Compass. It covers four main topics: making citizens fit for the digital age, building up the necessary infrastructure for digitalisation, enhancing digitalisation at business level, and deploying digital public services.

The Digital Compass sets out a 10-year-long roadmap for Europe’s digital transition. It narrows down the objectives by setting out 11 goals, a monitoring system, and key milestones to achieve these ambitions by the end of the decade.

Source: European Commission, ec.europa.eu, EUROPE'S DIGITAL DECADE

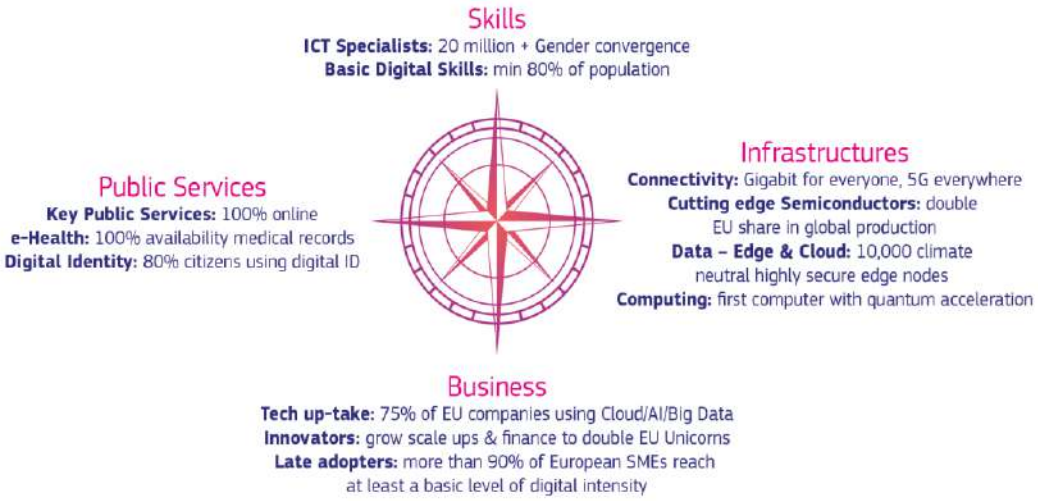
The digital compass uses the 4 points of the compass to identify the main goals to reach over the next decade:

- a digitally skilled population and highly skilled digital professionals;
- secure, performant and sustainable digital infrastructures;
- digital transformation of businesses;
- digitisation of public services.

The Compass aims to pave the way to creating a secure human-centered digital ecosystem, where citizens are empowered, and businesses prosper from the digital potential. More and more digital infrastructure, in terms of hardware and software, should be developed in Europe.

Stating its vision, the Commission acknowledges the shortcomings of the European digital space, **the uneven distribution of digital skills and resources for digitalisation, and the dependency on foreign supply chains.**

Almost 30 years into the widespread use of the internet, a digital divide has emerged between citizens and businesses, urban/non-urban areas, and between high and low-income countries. The uneven distribution of knowledge and skills can hamper the ambitions of a continent-wide digital decade. The second issue, the dependency on foreign products and services, could lead to economic loss and incompatibility between foreign and European values that underpin digital solutions that are developed.



European Digital Compass – Goals

The goals cover four main areas:

- digital skills (goal 1),
- digital infrastructure (goals 2, 3, 4, 5),
- digital transformation of businesses (goals 6, 7, 8)
- digitalisation of public services (goals 9, 10, 11)

1. The EU needs to have **a digitally skilled population** and **20 millions ICT specialists** in the EU.
2. All European **households should be covered by a Gigabit network**, with all populated areas covered by 5G.
3. The European **production of cutting-edge and sustainable semiconductors** should represent **at least 20% of world production in value**.
4. **10.000 edge nodes should be deployed in the EU**, to guarantee access to data services with a low latency wherever businesses are located.
5. The first computer with quantum acceleration should be deployed in the EU and **the EU should be at the forefront of quantum capabilities by 2030.**
6. 75% of European enterprises should use **cloud computing services, big data and Artificial Intelligence (AI).**
7. 90% of European SMEs should reach at least a **basic level of digital intensity.**

8. Europe **should double the number of unicorns** (privately held startup company valued at over US$1 billion)
9. **100% of key public services will be available online** for citizens and businesses.
10. 100% of European citizens should have **access to electronic medical records.**
11. 80% of European citizens should **use digital IDs**.

Learning activity

1 - Choose one area of European Digital Compass and try to imagine some activities could be led to set a Digital Transformation Process one that area.

2 - What do you think would be the biggest difficulties in carrying out the activities you have imagined?

DESI Index

The **Digital Economy and Society Index (DESI)** monitors Europe's overall digital performance and tracks the progress of EU countries regarding their digital competitiveness. On annual basis, it monitors the performance of member states in digital connectivity, digital skills, online activity and digital public services in order to assess the state of digitalization of each member state as well as to identify areas requiring priority investment and action.

DESI consists of 5 main indicators:

- Connectivity (fixed and mobile broadband, prices)
- Human capital (Internet use, basic and advanced digital skills)
- Use of Internet services (citizens' use of content, communication, online transactions)
- Integration of digital technology (business digitalization, e-commerce)
- Digital public services (e-government, e-health).

Learning activity

1 - List the 5 main indicators of DESI Index

2 - Try to explain the scope of application of each one

United Nations Development Program

UNDP launched its first Digital Strategy in mid-2019 to harness digital transformation within the organization. The strategy represented a systematic and corporate driven transformation process to reimagine the way UNDP serves its partners and operates its systems and processes. Digital Strategy 2022-2025 is intended to maintain and accelerate the momentum that has already been generated across UNDP and among its partners.

The new UNDP Strategic Plan 2022-2025 highlighted the importance of digital as one of the key enablers. This renewed Digital Strategy builds upon the Strategic Plan, and puts forth a vision whereby digital is an empowering force for people and planet.To achieve this vision, three objectives are outlined: two programmatic and one operational.

This Digital Strategy is structured in three main parts:

Part 1 – Guiding principles and value proposition: Overview of UNDP's approach to digital transformation.

Part 2 – Setting the course: Vision, objectives, and outcomes towards which UNDP will continue evolving over the next four years.

Part 3 – Strategy implementation approach and measuring results: High-level approach to implementing the strategy

The first objective is to use digital to amplify UNDP's programming work. Secondly, UNDP will look to strengthen inclusive digital ecosystems. Finally, the third objective is focused on transforming UNDP into a digitally native organization, fully equipped with the digital skills, processes, and data necessary for UNDP to continue as the development partner of choice for the digital age.

UNDP Digital Strategy – Guiding Principles & Value Prop

UNDP commits to the following principles in its approach to digital technologies:

- UNDP puts human rights at the center
- UNDP promotes inclusive- and gender-sensitive approaches that leave no one behind
- UNDP contributes to shared global standards and frameworks that protect people's rights
- UNDP advocates for open digital standards and open data
- UNDP works to strengthen local digital ecosystems
- UNDP leverages strategic partnerships to catalyze inclusive approaches to digital development

UNDP's role and positioning in the digital development space, and therefore its ability to deliver on this strategy, stem from several defining features of the organization:

Broad mandate and integrator role in the UN System

- Longstanding expertise in supporting governments on digital transformation
- Rights-based, intentionally inclusive, approach
- Proactive consideration of potential risks of digital technology
- Unparalleled country presence

UNDP Digital Strategy – Setting the Course

UNDP's long-term vision:

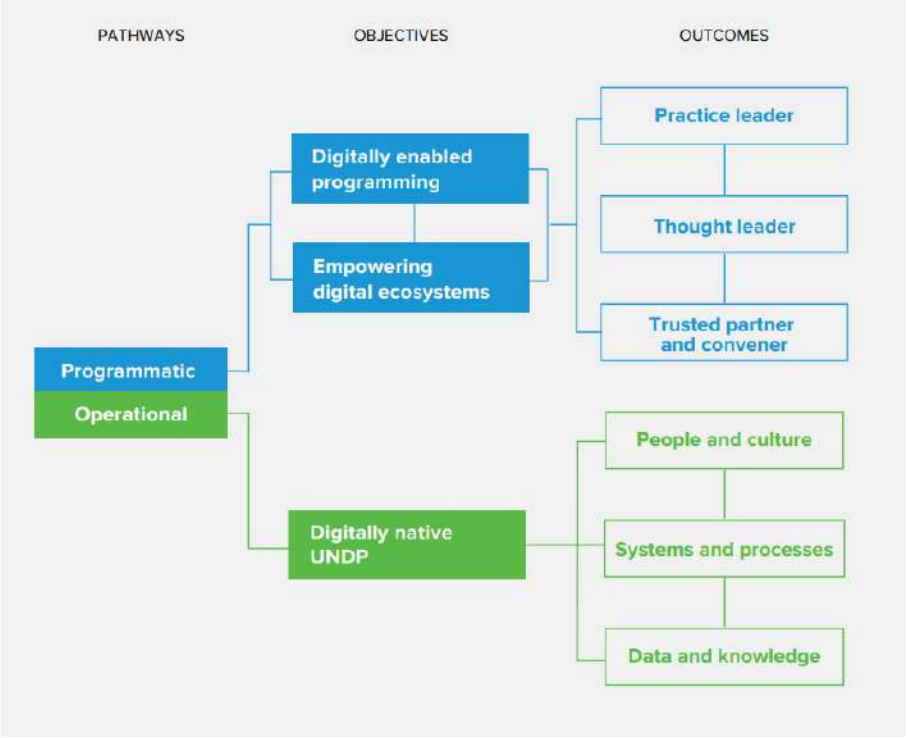
- To help create a world in which digital is an empowering force for people and planet.
- This renewed Digital Strategy is grounded in UNDP's longstanding commitment to eradicating poverty and supporting countries in their progress

Programmatic

- Amplify development outcomes by embedding digital across all UNDP programming.
- Support societies in their efforts to create more inclusive and resilient digital ecosystem

Operational

- Transform UNDP so that it has fit-for-purpose digital systems, processes, tools, and data, as well as a digitally competent workforce to effectively support the first two objectives.



UNDP Digital Strategy – Strategy Implementation Approach and Measuring Results

- Country offices will be the primary drivers of digital programme design and implementation in the field.
- Accelerator Labs will support innovation of digital solutions based on the local context and through country-led experimentation.
- Regional bureaux will continue to be the first backstop for country office support, while identifying regional programmatic opportunities and leading regional digital partnerships.
- Global headquarters will provide corporate guidance and support for the application of digital to programming as well as digital systems and process support.
- Global policy centres/centres of excellence provide an opportunity to extend UNDP's capacity in specific policy/thought leadership areas.

Learning activity

1 - What are the main parts of the digital strategy according to the UND programme?

2 - Try to explain relevant aspects of each part.

Main aspects to focus on to manage DT process

Digital transformation is about evolving a business by experimenting with new tech and rethinking your current approach to common issues. Because it's an evolution, a transformation doesn't necessarily have a clear end point. *"Digital transformation is better thought of as continual adaptation to a constantly changing environment." (Kane, 2017)*

For enterprises, that means continually seeking out ways to improve the end-user experience. Digital transformation is important because it allows organizations to adapt and remain competitive in ever-changing industries and continually improve how they operate. This could be through offering improved on-demand training, migrating data to cloud services, leveraging artificial intelligence, and more.

Some key aspects to focus on during DT processes of an enterprise include:

- **Customer Experience** — working to understand customers in more detail, using technology to fuel customer growth, and creating more customer touchpoints
- **Operational Processes —** improving internal processes by leveraging digitization and automation, enabling employees with digital tools, and collecting data to monitor performance and make more strategic business decisions
- **Business Models —** transforming the business by augmenting physical offerings with digital tools and services, introducing digital products, and using technology to provide global shared services
- **Privacy & Cybersecurity** — As organizations increase their digital presence and transition to cloud and remote work, the risk of security breaches on their systems and enterprise networks become increasingly real. Focus on cybersecurity is a must in a digital transformation process. As more digital solutions become available, organizations tend to jump on trends that offer more convenience. However, a large portion of consumers and employees are not willing to give up safety and security just for convenience. CIOs need to take privacy seriously. Employees and consumers won't support a transformation if they feel it violates their privacy or personal data security.

One of the last McKinsey Global Survey (December 2021) confirm that, in digital transformation projects, success remains the exception, not the rule: less than one-third of respondents say their companies' transformations have been successful at both improving organizational performance and sustaining those improvements over time. What those successful companies have in common is that they all involve people in the transformation goal and processes. In this, culture plays a key role.

- **Culture** — A redefining of organization mindsets, processes, talent, and capabilities for the digital world is always needed to achieve long-term digital transformation for any industry. The most successful corporations recognize that digital transformation requires a flexible workflow, a decentralized decision-making process, a bias toward testing and learning, and a greater reliance on different business ecosystems.

- **Augmented Intelligence** — Augmented intelligence goes beyond artificial intelligence (AI), allowing humans and machines to work in tandem. AI's data collection and analysis capabilities far surpass that of a human worker. But augmented intelligence isn't about replacing employees with machines — AI collects and presents data in a way that allows people to augment their knowledge. Why focus on the stated aspects on DT processes?

- **Increases productivity while reducing labor cost**s — Using technology to work more efficiently is one of the most impactful ways to transform businesses . With the proper tools, you can keep costs down and productivity up.
- **Improves the customer experience** — Tech-savvy customers want a great experience through multiple touchpoints — mobile apps, social media, email, live chat, etc. Digital transformations are the driving force behind improved customer experiences.
- **Drives innovation, keeping you ahead of your competition** – Your competitors are looking into digital transformation regardless of whether or not you are. Choosing not to embrace digital transformation is essentially deciding that you don't mind being left behind.

Learning activity

1 - Choose one of the main aspects to focus on in a digital transformation process

2 - Try to explain why it is important in your opinion.

Skill gaps and skills needed to manage DT process

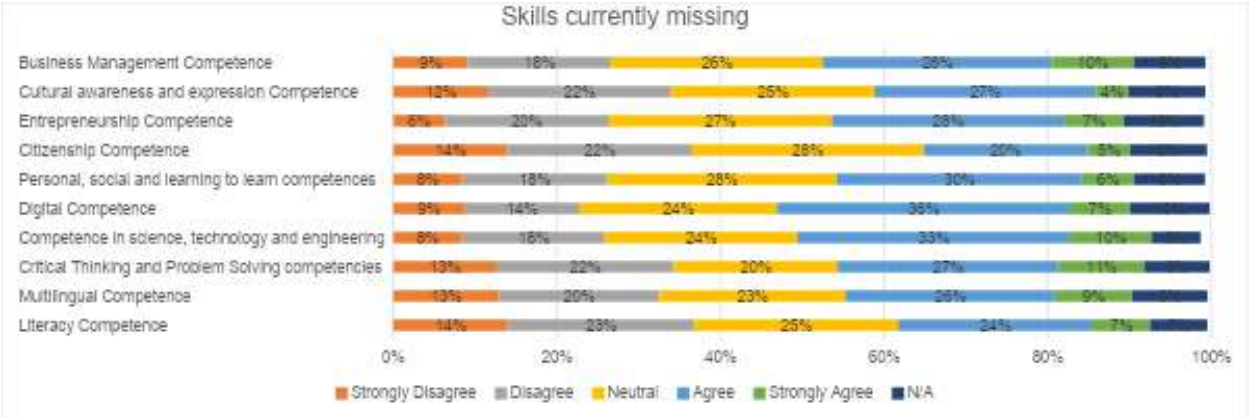
According to the research and survey conducted to investigate the issues of Digital Transformation and Sustainable Development, an important question from the survey focused on what the respondents believe were the most important factors that hinder the successful Digital Transformation of their organisations. The respondents were given a list of factors and they could vote the ones they believed were the most important.

Missing skills by the employers, managers etc. (21%) is considered by far the most important factor that could limit the extent of an organisation's Digital Transformation and it is followed by the Underestimation to push innovation (14%), missing skills by the employees (13%) and finally Technological barriers (13%).

To assess the current skills gap, a question about which competencies are missing was asked and the respondents were given different options.

Digital Competencies, Competences in Science, Technology and Engineering and Learning-to-learn competencies are the ones that are considered to be missing to the largest extent from organisations in order to achieve a successful Digital Transformation.

Results of the question "Which of the following competencies are currently missing from your organisation that prevent a successful Digital Transformation"



As The Economist recently noted, one of the most obvious consequences of the current Covid-19 pandemic will be “the infusion of data-enabled services into ever more aspects of life.” Digital transformation is an even bigger imperative for organizations in the short-term future.

Contrary to popular belief, digital transformation is increasingly less about technology and more about people. Technological skills such as cloud computing, AI/ML, Mobile app development, UX/UI, cybersecurity, DevOps are certainly crucial skills in modern digital transformation processes.

However, the ability to adapt to an ever more digital future depends on developing the next generation of skills, closing the gap between talent supply and demand, and future-proofing your own and others’ potential. The ability to upskill and reskill a company’s employees and enhance internal talent is a crucial tool for being actively part of the future of digital transformation.

While the future is more ambivalent and uncertain than ever, it is certain that a pretty strong bet on the future is to focus on reskilling and upskilling people, leveraging soft skills and human adaptability to adjust to change.

In the following slides you can find a list of key soft skills needed within an individual and an organization through DT processes.

When it comes to new undertakings, critical thinking is a skill that helps people define and solve new problems that come their way.

CRITICAL THINKING

It involves conceptualizing, synthesizing, and analyzing data, as well as the ability to reason and draw conclusions from those analyses. It’s essential for business survival.

Digital transformation can require complex changes that require buy in across an organization. Your team must be able to take technical terms and explain them — in writing and through speech — in a way that the rest of the business can understand. Your ability to persuade and influence others Will also be a factor.

COMPLEX COMMUNICATION

Creative people can look at a problema and think of new ways to solve it in ways that often seem off the wall at first glance.

Sharing a current challenge that the company is looking to solve and asking candidates how they would approach the problem is a great way to gauge creativity skills, thought process and originality.

CREATIVITY

Team members who are willing to work with others is a crucial skill in today's digital world— listen to their ideas, brainstorm, communicate, take feedback, and be willing to share the spotlight.

With many workers working from home right now, teams can adopt cloud-based technologies to maintain effective collaboration, whether that's through video conferencing, digital whiteboards, or a collaborative work management platform.

COLLABORATION

People on a team who can easily change course and adapt quickly are crucial in digital transformation processes. Some processes Will not always go according to plan, some tasks will take longer than expected and new challenges will arise. A flexible team who can pivot easily will face digital transformation challenges with the right spirit.

FLEXIBILITY AND ADAPTABILITY

Learning activity

1 - List the main skills needed to manage Digital Transformation processes

2 - Try to explain the reasons why these skills could be important

Conclusion

Digital transformation redefined how companies use consumer data insights to generate new business. By analysing digital interactions with their customer base, businesses were able to adjust their customer experience in line with the evolving needs of their audience.

For enterprises, DT means continually seeking out ways to improve the end-user experience. Digital transformation is important because it allows organizations to adapt and remain competitive in ever-changing industries and continually improve how they operate

Digital transformation is increasingly less about technology and more about people. The ability to develop the next generation of skills, to upskill and reskill a company's employees and enhance internal talent is crucial for being actively part of the future of digital transformation and close the gap between talent supply and demand.

Self Evaluating Test

1. According to Digital Compass, which of these is NOT a main goal to be reached in the next decade?

- digital transformation of businesses;
- digitisation of public services;
- sustainable digital infrastructures
- open innovation programs

2. Which of these is NOT an indicator of DESI Index?

- Connectivity
- Human capital
- web interfaces
- Integration of digital technology

3. Which of these is one of the most important aspects to focus on in DT processes?

- Customer Experience
- Software development
- Digital Recruiting
- Social communication

4. Which of these is one of the skills needed to manage a DT process?

- Public speaking
- Empathy
- Creativity

- Linguistic skills

Self Evaluating Test - Answers

1. According to Digital Compass, which of these is NOT a main goal to be reached in the next decade?

- digital transformation of businesses;
- digitisation of public services;
- sustainable digital infrastructures
- open innovation programs

2. Which of these is NOT an indicator of DESI Index?

- Connectivity
- Human capital
- web interfaces
- Integration of digital technology

3. Which of these is one of the most important aspects to focus on in DT processes?

- Customer Experience
- Software development
- Digital Recruiting
- Social communication

4. Which of these is one of the skills needed to manage a DT process?

- Public speaking
- Empathy
- Creativity
- Linguistic skills

Recap of main competences/things to remember

The Digital Compass **sets out a 10-year-long roadmap for Europe's digital transition.**

The main goals to reach over the next decade:

- a digitally skilled population and highly skilled digital professionals;
- Secure, performant and sustainable digital infrastructures;
- digital transformation of businesses;
- digitisation of public services.

The **Digital Economy and Society Index (DESI)** monitors Europe's overall digital performance and tracks the progress of EU countries regarding their digital competitiveness.

Some key aspects to focus on during DT processes of an enterprise include: Customer Experience, Operational Processes, Business Models, Privacy & Cybersecurity, Culture Augmented Intelligence

Skills needed to manage DT processes include: Critical Thinking, Complex communication, Cre ativity, Collaboration, Flexibility and adaptability

References

- European Commission, 2021, *2030 Digital Compass: the European way for the Digital Decade*, https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX%3A52021DC0118
- Furlan, 2022, *Our Guide to the 2030 Digital Compass: the European way to the digital decade*, https://89initiative.com/our-guide-to-the-2030-digital-compass-the-european-way-to-the-digital-decade/
- European Commission, 2021, *Europe's Digital Decade*, https://digital-strategy.ec.europa.eu/en/policies/europes-digital-decade#:~:text=The%20Digital%20Compass-The%20Communication%20'Digital&text=a%20digitally%20skilled%20population%20and,digitisation%20of%20public%20services.
- European Commission, 2021, *Europe's Digital Decade: Digital Targets for 2030*, https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age/europes-digital-decade-digital-targets-2030_en
- European Commission, 2021, *The Digital Economy and Society Index*, https://digital-strategy.ec.europa.eu/en/policies/desi

- European Commission, 2021, *2030 Digital Compass: the European way for the Digital Decade*, https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX%3A52021DC0118
- Furlan, 2022, *Our Guide to the 2030 Digital Compass: the European way to the digital decade*, https://89initiative.com/our-guide-to-the-2030-digital-compass-the-european-way-to-the-digital-decade/
- European Commission, 2021, *Europe's Digital Decade*, https://digital-strategy.ec.europa.eu/en/policies/europes-digital-decade#:~:text=The%20Digital%20Compass-The%20Communication%20'Digital&text=a%20digitally%20skilled%20population%20and,digitisation%20of%20public%20services.
- European Commission, 2021, *Europe's Digital Decade: Digital Targets for 2030*, https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age/europes-digital-decade-digital-targets-2030_en
- European Commission, 2021, *The Digital Economy and Society Index*, https://digital-strategy.ec.europa.eu/en/policies/desi

Module 2: Why Systems Thinking can support Digital Transformation

Content Table

Learning Outcome

- To learn how Systems Thinking can support/enhance Digital Transformation processes
- To learn how Systems Thinking that can be applied on Digital Transformation
- To gain a framework on Design Thinking and Systems Thinking

Course Requirements

- Pen and paper / computer
- Internet access

Overview

In this module we will see how to apply the principles of Systems Thinking seen in the course developed in IO2, to Digital Transformation processes.
We will explore the differences between Design Thinking and Systems Thinking and explain why the systemic approach is more effective in managing digital transformation processes.

Keywords

Digital Transformation, Systems Thinking, Design Thinking

Previous Module recap

Digital transformation redefined how companies use consumer data insights to generate new business. By analysing digital interactions with their customer base, businesses were able to adjust their customer experience in line with the evolving needs of their audience.

The Digital Compass sets out a 10-years-long roadmap for Europe's digital transition.

The main goals to reach over the next decade:

- a digitally skilled population and highly skilled digital professionals;
- Secure, performant and sustainable digital infrastructures;
- digital transformation of businesses;
- digitisation of public services.

The Digital Economy and Society Index (DESI) monitors Europe's overall digital performance and tracks the progress of EU countries regarding their digital competitiveness.

For enterprises, DT means continually seeking out ways to improve the end-user experience. Digital transformation is important because it allows organizations to adapt and remain competitive in ever-changing industries and continually improve how they operate.

Some key aspects to focus on during DT processes of an enterprise include: Customer Experience, Operational Processes, Business Models, Privacy & Cybersecurity, Culture, Augmented Intelligence

Digital transformation is increasingly less about technology and more about people. The ability t o develop the next generation of skills, to upskill and reskill a company's employees and enhanc e internal talent is crucial for being actively part of the future of digital transformation and close t he gap between talent supply and demand.

Skills needed to manage DT processes include:

- Critical Thinking,
- Complex communication,
- Creativity,
- Collaboration,
- Flexibility and adaptability

Introduction

The current era of digital transformation is not about individual pieces but about connecting various gadgets and systems to provide value – Digital transformation is about creating a network of intelligence by leveraging technology. It is not aimed at meeting customer demand alone, but geared towards restructuring organisation and how they are managed to increase wealth and value creation through process efficiency and effectiveness in general.

The current era of transformation is a revolution of technologies and practises to move away from perceived norms and legacy systems. It views digital transformation also from an organisational point of view and not from a customer or technological perspective alone. In other words, the current era of digital transformation has taken a radical approach to change and include the entire system and not a particular aspect, as truly digital companies have no specific digital department but imbibes digital in its organisational culture and as a fundamental part of strategy.

Why Systems Thinking can support/enhance other Digital Transformation skills

One of the last McKinsey Global Survey* confirm that, in digital transformation projects, success remains the exception, not the rule: less than one-third of respondents say their companies' transformations have been successful at both improving organizational performance and sustaining those improvements over time. Apart from involving people in the transformation goal and processes, in which culture plays a key role, as seen in the previous module, what those successful companies all have in common is that they take a large number of actions with a systemic approach.

It is arguable that when it comes to organizations, systems thinking is an effective way to approach digital transformation, as it sees how different complex entities interact and influence each other and make up the whole system.

Different divisions or teams within an organization connect and affect each other. Ideally, they work together toward some common goals. Working as a team (as a system), having a "top-to-bottom" mindset, and being able to change course and adapt quickly based on the system's results will boost the flexibility and adaptability of the organization and, consequently, of the individuals that are part of the units that form the system's organization.

Business leaders who are systems thinkers see "the big picture", and that is why focusing on systems thinking can maximize performance within the organization and enhance the development of crucial soft skills for the transformation of an organization. By working together towards a goal, different units within the organization can enhance their critical thinking and creativity skills. Having the ability to brainstorm potential solutions as a system in a free and creative way is vital.

The ability to organize information about a central topic or idea in a nonlinear way to show unique connections and brainstorm in a collaborative way between a large number of people of different processes within a system can not only strengthen crucial soft skills but also help in capitalizing

the topmost performance as individual and as a whole.
An essential component of systems thinking is collaboration and focusing on feedback "outside of the box". Giving attention to relevant feedback enables businesses to produce solutions to problems and to avoid wasting resources. Maximizing operational efficiency is a primary goal of using systems thinking analysis.

Focus on solutions and Design Thinking

The rapid and unpredictable shifts of our current digital world make the transition from business as usual to digital-first not so easy. Keeping up can present a challenge and leave many unsure of how to proceed. This is where design thinking comes in.

Design thinking is a five-step, user-centric design methodology that does not present a solution upfront but examines both present and future details of a problem and explores alternate solutions.

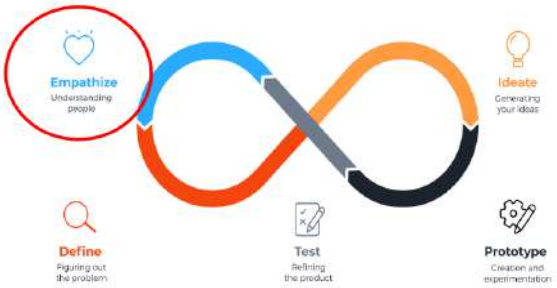
Digital transformation presents problems that are complex and undefined. So, using design thinking to embrace your organization's digital transformation helps tackle these problems by using a fluid, flexible, hands-on approach to interact with consumers and come up with solutions.

Adopting digital transformation for all business practices is a must, and design thinking methodology is an effective way to tackle the problems this transition presents.
Adopting this user centric method will help incorporate digital technologies into an organization.

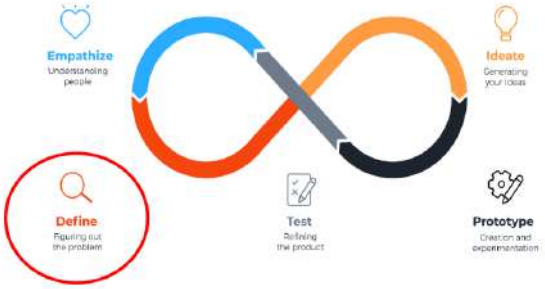
Design thinking is made up of five steps:

1. Empathize
2. Define
3. Ideate
4. Prototype
5. Test.

A critical element to digital transformation is creating an excellent experience for the customer. To do this effectively, it is important to empathize with them to deeply understand their motivations, needs and pain points. Instead, observe as they interact with your product or service. Truly gaining a deep understanding of where the customer's friction points are along the digital journey will get you the information you need to successfully solve their issues.

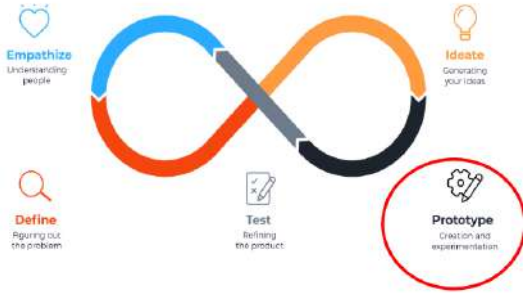


The define stage brings clarity to the problems you are trying to solve. The insight gained from the empathize stage will help in order to pinpoint where to allocate resources, where to focus time and energy, and above all formulate a problem statement.
It is fundamental that the problem statement should be focused on a specific issue and geared toward the user.

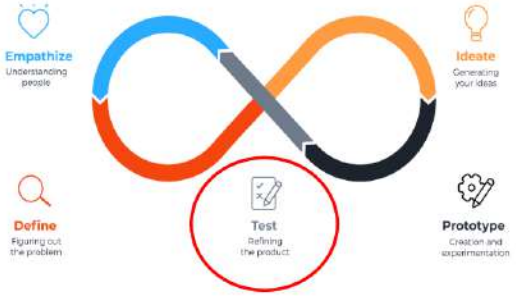


Once the problem has be defined and generated a problem statement, it's time to generate some ideas on how to fix it. In this phase, it is important to brainstorm by using the collective minds of a group in order to develop a variety of creative ideas/solutions. The key is to work cross-functionally in a highly collaborative setting. The ideate phase is quick, creative and, most importantly, collaborative.

In this phase the team will experiment with a variety of simple and inexpensive models aimed to quickly test and validate the solution ideas. Prototypes should be tested on a small set of users — either with usability testing or on a narrow selection users. This phase should be very fast-paced, with quick and efficient improvements. Observe the way people interact with the prototype, collect feedback and use this information to adjust and optimize the next model.



Continuously testing the various prototypes is an opportunity to constantly improve. Every interaction with a customer is a learning opportunity to enhance the customer experience. In the testing phase, you capture the information needed to revisit previous stages in the design thinking process. A continuous testing and optimization is key to generate new ideas for improvement.



Learning activity

1 - List the steps of Design Thinking process

2 - Try to explain the goals of each step

Systems Thinking and Digital Transformation

A successful digital transformation program is not done in isolation. It is done in the context of its fit to entire business goals. Digital transformation should not be approached from a single or individual perspective that could create more problems in the process of solving a problem.

In current day business operations, Systems Thinking is a holistic approach to analyzing and understanding how the system's constituent behaviors and elements interrelate, how they change over time, and how they fit in the context of a larger system.

The ever-increasing complexities of todays and tomorrow's intelligent and connected products lead to increased costs, missed market opportunities, and resources that are unable to scale. Systems Thinking is an essential methodology to managing this ever-increasing complexity and this approach is critical to the success of Digital Transformation.

The systems thinking method comprises four steps:

- Identification of a challenge
- Construction of a hypothesis/model
- Testing
- Implementation

Systems thinking process systemically involves a rather large number of different skills and tools that come into play during all phases of the DT process.

ST is not a tool, but it is enabled through the right set of data models, tools, processes and underlying platforms. Systems Thinking is very relevant to Digital Transformation since it also focuses on transformation of the same data models, tools, processes. Systems Thinking is meant to be a permanent characteristic of the enterprise's approach to product conception, design, manufacturing, asset operation, maintenance, and disposal and the continuous feedback between all of these. It allows Digital Transformation to continuously evolve.

Design Thinking vs Systems Thinking

Design thinking has the capability to reshape creative problem solving approaches into a structured innovation approach by coming up with methods and tools to empathize with people, create human centered solutions, and de-risk failure through prototyping. However, one of the main concerns with the design thinking approach is what follows the prototyping process?

This is one of the main matters in question that encircles design thinking: the absence of continuity and integration inside the organization's system, and not placing the solution with the right system to manage change. Therefore, there is a necessity to close the gap between ideas and execution operated within the right system that is healthy for innovation.

Systems thinking is an approach to understand, design, systemize the flow of value from various aspects of the organization across the value chain to ensure synchronicity, consistency, integratio n, and maximization between people, activities, processes, policies, places and resources. System s thinking is a way to **describe and understand** the causality and interrelations between variable s within a system.

Design thinking is extremely useful to innovate new solutions through a "bottom-up" human centered approach. Systems thinking is extremely useful and successful to manage change and integration based on a “top-down” big picture view. Systems thinking approach complements with design thinking, instead of replacing it altogether.

Some of the missing components inside an organization system that are not overlooked in design thinking approach include: Partnerships, business activities, resources, cost structure, revenue model, pricing, finance, marketing, branding, sales, operations, metrics, innovation strategy. The application of systems thinking applies for both internally within the organization and externally across the value chain.

These must be considered when implementing new solutions generated from the outcome of design thinking. Designing systems is necessary to enable the conditions for a culture of innovation. In fact, systems thinking goes beyond the organization itself, impacting the external stakeholders, environment, regulations and how these all work together to achieve a vision of a better system than the existing.

DT and ST are not mutually exclusive. A successful approach isn’t to pick and choose which model to follow, but to recognize the limitations of each and develop the ability to shift between ST and DT dynamically throughout the process.

Learning activity

1 - Try to explain the main differences between Design Thinking and Systems Thinking

2 - Try to devise a situation in which to apply one of these approaches

Conclusion

Adopting digital transformation for all business practices is a must, and design thinking methodology is an effective way to tackle the problems this transition presents. Adopting this user centric method will help incorporate digital technologies into an organization.

On the other hand, in current day business operations, Systems Thinking is a holistic approach to analyzing and understanding how the system's constituent behaviors and elements interrelate, how they change over time, and how they fit in the context of a larger system.

The two models are both key for the transformation approaches for an organization. DT and ST are not mutually exclusive. A successful approach isn't to pick and choose which model to follow, but to recognize the limitations of each and develop the ability to shift between ST and DT dynamically throughout the process.

Self Evaluation Test

1. Which of these capabilities could be improved by working with a systemic mindset?

- Adaptability
- Empathy
- Project Management
- Patience

2. Why using Design Thinking for Digital transformation processes could be effective?

- Design Thinking uses technology
- Design Thinking is funny
- Design Thinking uses a fluid, flexible, hands-on approach
- Design Thinking is easy to be used

3. Which of these is NOT a step of Design Thinking?

- Prototyping
- Testing
- Ideation
- Selling

4. What kind of relationship is there between Systems Thinking and Design Thinking?

- Systems Thinking and Design Thinking are opposed
- Systems Thinking and Design Thinking are complementary
- Systems Thinking is better than Design Thinking

- Design Thinking is better than Systems Thinking

Self Evaluation Test - Answers

1. Which of these capabilities could be improved by working with a systemic mindset?

- Adaptability
- Empathy
- Project Management
- Patience

2. Why using Design Thinking for Digital transformation processes could be effective?

- Design Thinking uses technology
- Design Thinking is funny
- Design Thinking uses a fluid, flexible, hands-on approach
- Design Thinking is easy to be used

3. Which of these is NOT a step of Design Thinking?

- Prototyping
- Testing
- Ideation
- Selling

4. What kind of relationship is there between Systems Thinking and Design Thinking?

- Systems Thinking and Design Thinking are opposed
- Systems Thinking and Design Thinking are complementary
- Systems Thinking is better than Design Thinking
- Design Thinking is better than Systems Thinking

Recap of main competences/things to remember

Working in teams with a systemic mindset, will not only maximize operational efficiency but also boost the critical thinking, creativity, flexibility and adaptability of the organization and, consequently, of the individuals that are part of the units that form the system's organization.

Digital transformation presents problems that are complex and undefined. Using design thinking for digital transformation helps tackle these problems by using a fluid, flexible, hands-on approach to interact with consumers and come up with solutions.

Design thinking is made up of five steps:

1. Empathize,
2. Define,
3. Ideate,
4. Prototype,
5. Test.

Systems Thinking is a holistic approach to analyzing and understanding how the system’s constituent behaviors and elements interrelate.

Systems thinking approach complements with design thinking, instead of replacing it altogether.

References

Himsworth, 2018, FORBES, *Five Steps To Accelerate Digital Transformation With Design Thinking*, https://www.forbes.com/sites/forbesagencycouncil/2018/02/28/five-steps-to-accelerate-digital-transformation-with-design-thinking/?sh=5d79dcc478aa

Karl, 2021, *The Design Thinking Process*, https://www.maqe.com/insight/the-design-thinking-process-how-does-it-work/

Stobierski, 2022, HARVARD BUSINESS REVIEW, *Design Thinking Sills for Business Professionals*, https://online.hbs.edu/blog/post/design-thinking-skills

Corporate Finance Institute, 2022, *Systems Thinking*, https://corporatefinanceinstitute.com/resources/knowledge/strategy/systems-thinking/

Professional Development Enterprise Learning, 2021, *Reasons Why Systems Thinking is Important for Innovation*, https://pdel.sim.edu.sg/featured-insights/hear-from-the-experts/3-reasons-why-systems-thinking-is-important-for-innovation/

La, 2019, *Why designers should find the balance between systems thinking and design thinking?*, https://uxdesign.cc/why-designers-should-find-the-balance-between-systems-thinking-and-design-thinking-efdb57b9949f

Nwonu, 2019, *DIGITAL TRANSFORMATION – A SYSTEMS THINKING APPROACH TO TECHNOLOGICAL (R)EVOLUTION*, https://www.academia.edu/31706674/DIGITAL_TRANSFORMATION_A_SYSTEMS_THINKING_APPROACH_TO_TECHNOLOGICAL_R_EVOLUTION

Module 3: How Systems Thinking can enhance skills for Digital Transformation?

Learning Outcomes

- To learn how apply the main skills of System Thinking to Digital Transformation Processes
- To gain the main Tools of System Thinking
- To develop skills useful to manage complexity

Course Requirements

- Pen and paper / computer
- Internet access

Overview

In this module will be presented the main features and the main tools of system thinking to understand how these could be applied effectively to digital transformation processes. Finally we will see some soft skills useful to managing the complexity that characterizes digital transformation scenarios.

Keywords

System Thinking, System Dynamic, Design Thinking, Skills, Complexity

Previous Module recap

Working in teams with a systemic mindset, will not only maximize operational efficiency but also boost the critical thinking, creativity, flexibility and adaptability of the organization and, consequently, of the individuals that are part of the units that form the system's organization.

Digital transformation presents problems that are complex and undefined. Using design thinking for digital transformation helps tackle these problems by using a fluid, flexible, hands-on approach to interact with consumers and come up with solutions.

Design Thinking and System Thinking are not mutually exclusive. The two models are both key for the transformation approaches for an organization. A successful approach isn't to pick and choose which model to follow, but to recognize the limitations of each and develop the ability to shift between System Thinking and Digital Transformation dynamically throughout the process.

Introduction

A successful digital transformation program is not done in isolation. It is done in the context of its fit to entire business goals. Digital transformation should not be approached from a single or individual perspective that could create more problems in the process of solving a problem.

The holistic idea of 'the whole being more than the sum total of its parts' goes back to Ancient Greece. In current day business operations, Systems Thinking is a holistic approach to analyzing and understanding how the system's constituent behaviors and elements interrelate, how they change over time, and how they fit in the context of a larger system.

The ever-increasing complexities of todays and tomorrow's intelligent and connected products lead to increased costs, missed market opportunities, and resources that are unable to scale. Systems Thinking is an essential methodology to managing this ever-increasing complexity and this approach is critical to the success of Digital Transformation.

ST is not a tool, but it is enabled through the right set of data models, tools, processes and underlying platforms. Systems Thinking is very relevant to Digital Transformation since it also focuses on transformation of the same data models, tools, processes. Systems Thinking is meant to be a permanent characteristic of the enterprise's approach to product conception, design, manufacturing, asset operation, maintenance, and disposal and the continuous feedback between all of these. It allows Digital Transformation to continuously evolve.

A brief recap of Design Thinking/ System Thinking

As we have seen in the previous module, design thinking has the capability to transform designers' creative problem-solving approach into a structured innovation approach by providing method and tools to empathize with people, create human-centered solutions, and de-risk failure through prototyping. **But what comes next after prototyping?**

The lack of continuity and integration inside the organization's system, and not placing the solution with the right system to manage change are two of the main challenges that surround design thinking. Hence, there is a necessity to close the gap between ideas and execution operated within the right system that is healthy for innovation.

Systems thinking is an approach to understand, design, systemize the flow of value from various aspects of the organization across the value chain to ensure synchronicity, consistency, integration, and maximization between people, activities, processes, policies, places and resources. (Stobierski, 2022)

Design thinking is meant to innovate new solutions based on "bottom-up" human-centered approach. Systems thinking is meant to manage change and integration based on "top-down" big picture view. (Tjendra, 2018)

Systems thinking approach complements design thinking, instead of replacing it altogether.

Partnerships, business activities, resources, cost structure, revenue model, pricing, finance, marketing, branding, sales, operations, metrics, innovation strategy. These are some of the missing components inside an organization system that are not overlooked in design thinking approach.

The application of systems thinking applies for both internally within the organization and externally across the value chain. These must be considered when implementing new solutions generated from the outcome of design thinking. Designing systems is necessary to enable the conditions for a culture of innovation. In fact, systems thinking goes beyond the organization itself, impacting the external stakeholders, environment, regulations and how these all work together to achieve a vision of a better system than the existing.

System Thinking & System Dynamics

Systems thinking is a way to **describe and understand** the causality and interrelations between variables within a system. A way to complement systems thinking is by **quantifying** the impact of those interactions. This process is called **System Dynamics**.

System Dynamics complements systems thinking by quantifying interactions and develops a time-dependent view of how the system behaves. The approach focuses on building computer models that represent and simulate complex problems in which behavior changes. These models bring to light less visible relationships, dynamic complexity, delays, and unintended consequences of interaction.

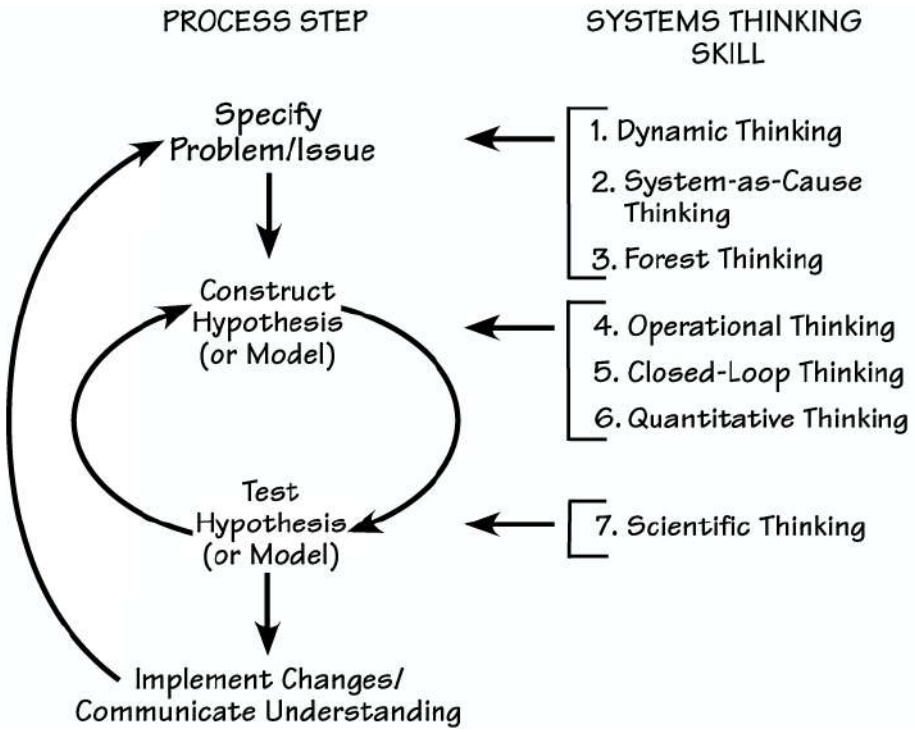
The 7 Skills of System Thinking

The systems thinking method comprises four steps:

- identification of a challenge
- construction of a hypothesis/model
- testing
- implementation

System thinking process systemically involves a rather large number of different skills—seven, at least—that all require practice.

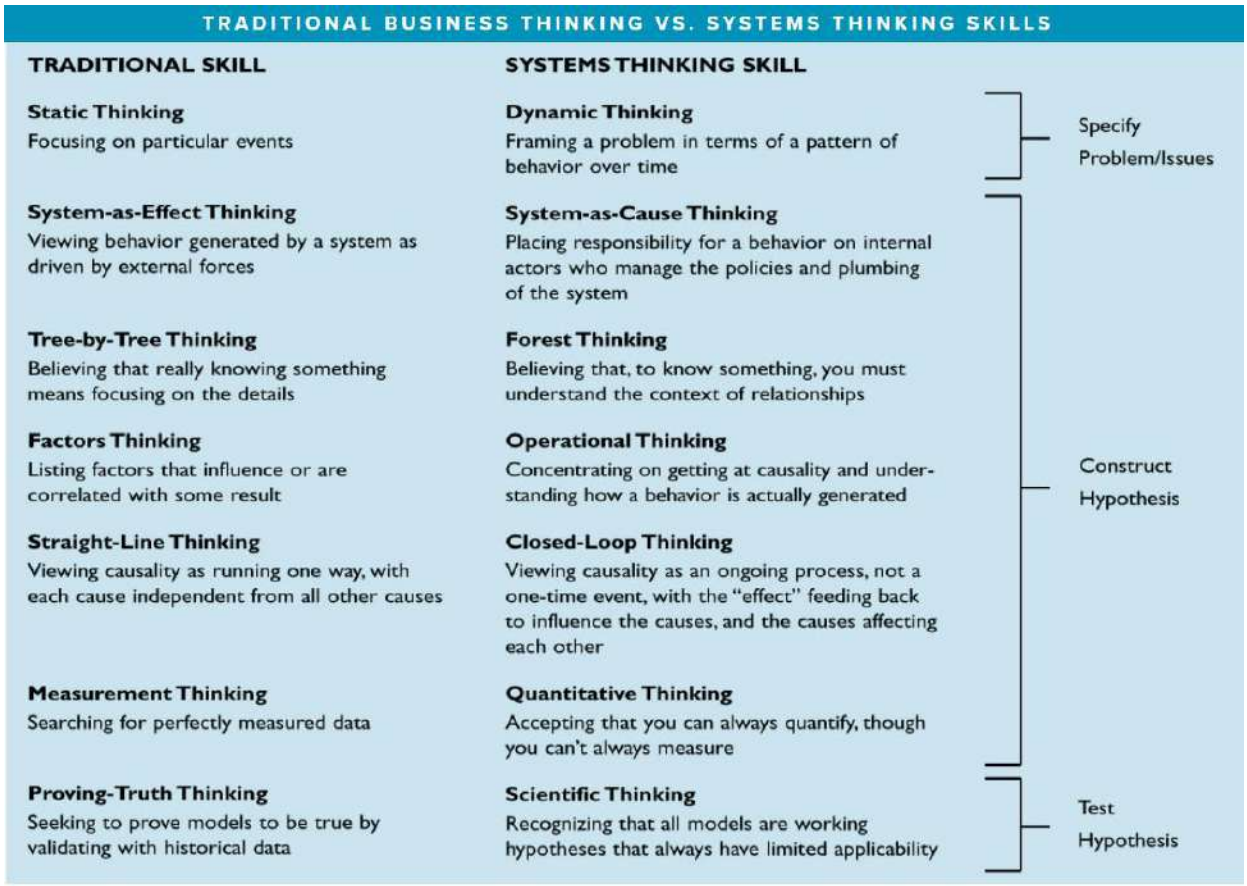
The **seven systems thinking skills** come into play during all the phases of the ST process.



As seen in the previous slide and in the chart on the right, the 7 ST tools that come into play during the whole ST process are the following:

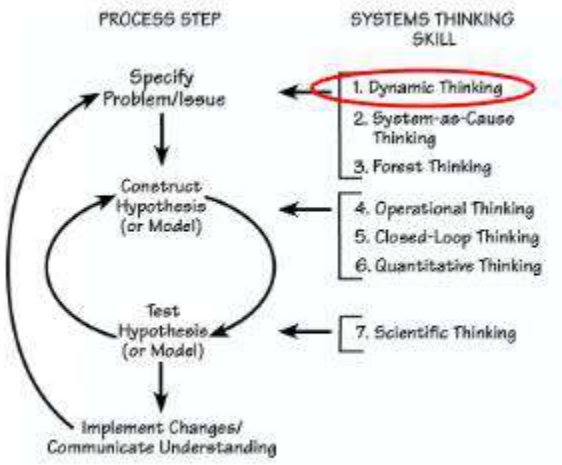
- Dynamic Thinking
- System-as-Cause Thinking
- Forest Thinking
- Operational Thinking
- Closed-Loop Thinking
- Quantitative Thinking
- Scientific Thinking

In the next slides we will go into detail with each ST skill, see the differences with the traditional business thinking and see how to enforce each skill in order to master ST.



The 7 Skills of System Thinking - Dynamic Thinking

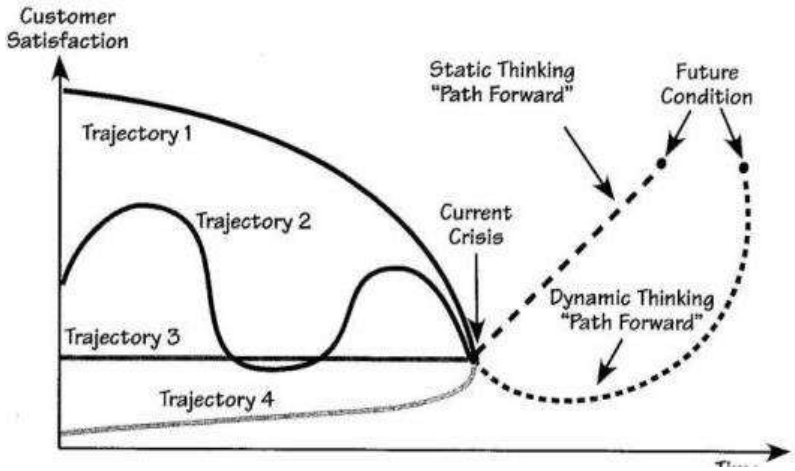
The first thinking skill in the systems thinking paradigm is **Dynamic Thinking.** It comes first because you must be able to think dynamically in order to use the other six skills. Dynamic Thinking skills enable you to trace your issue or challenge as a **trajectory of performance over time**. The trajectory should have a historical segment, a current state, and one or more future paths. Dynamic Thinking thus puts a current situation in the context of where you came from and where you are going.



In contrast, for Static Thinkers, the starting point for understanding change is where they are right now; that is, the current state. This type of Thinker tends to see change as "jumping" from the current state to a future goal in a rather straightforward way.

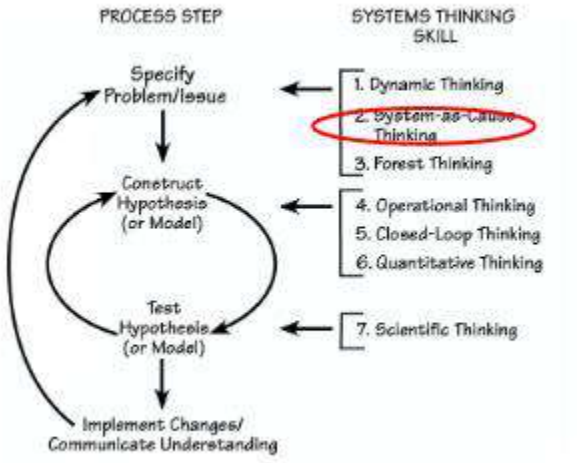
Dynamic Thinking, by focusing attention on historical trajectories, encourages you to look at underlying systemic relationships, and provides a first clue as to the nature of these relationships. This skill also guides attention to the shape and timing of the "path forward," stimulating you to think about the many possible problems that may befall any change effort. By using Reference Behavior Pattern graphs, you can hone your Dynamic Thinking skills to a fine point. The new perspective that results from this kind of thinking can then help you develop high-leverage improvement initiatives.

As you can see in the graph on the right, the trajectories indicate that there are several different ways to reach a current crisis point. Static Thinkers commonly project the path from "current crisis" to "future condition" as a straight line. Dynamic Thinkers chart paths that are longer and less linear, incorporating a "worse-before-better segment.



The 7 Skills of System Thinking - System-as-Cause Thinking

Dynamic Thinking positions your issue as a pattern of behavior over time. The next step is to construct a model to explain how the behavior arises, and then suggest ways to improve that behavior. System-as-Cause Thinking can help you determine the extensive boundary of your model, that is, what to include in your model and what to leave out. From a System-as-Cause Thinking approach, you should include only the elements and inter-relationships that are within the control of managers in the system and can generate the behavior you seek to explain.



By contrast, the more common System-as-Effect Thinking views behavior generated by a system as "driven" by external forces. This perspective can lead you to include more variables in your model than are necessary. System-as-Cause Thinking thus focuses your model more sharply, because it places the responsibility for the behavior on those who manage the policies and plumbing of the system itself.

To develop System-as-Cause Thinking, a key question to set ourselves is "How could we have been responsible?" It is always possible to see a situation as caused by "outside forces." But it is also always possible to ask, "What did we do to make ourselves vulnerable to those forces that we could not control?"

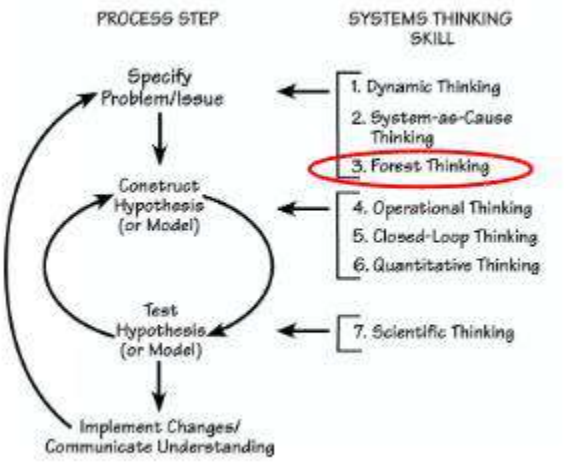
In many organizations, people assume that to really know something, they must focus on the details. This assumption is reinforced by day-to-day existence—we experience life as a sequence of detailed events. We can also think of this as Tree-by-Tree Thinking. Models that we create by applying Tree-by-Tree Thinking tend to be large and overly detailed; their intensive boundaries run deep.

The 7 Skills of System Thinking - Forest Thinking

In using such models, we would want to know whether that particular red truck broke down on Tuesday before noon, as opposed to being interested in how frequently, on average, trucks break down.

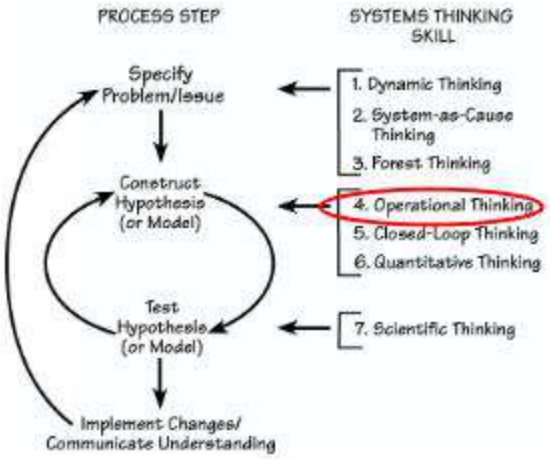
Forest Thinking–inspired models, by contrast, group the details to give us an "on average" picture of the system. Forest Thinking focuses on emerging properties when looking at the group.

To hone your Forest Thinking skills, practice focusing on similarities rather than differences. For example, although everyone in your organization is unique, each also shares some characteristics with others. While some are highly motivated to perform and others are not, all have the potential to make a contribution. Regardless of the individual, realizing potential within an organization comes from the same generic structure.



The 7 Skills of System Thinking - Operational Thinking

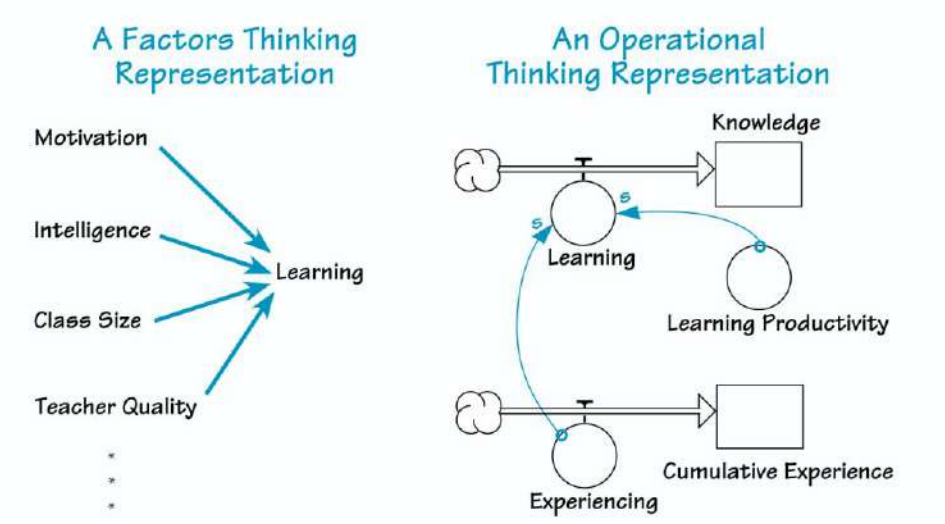
Operational Thinking tries to get at causality—how is behavior actually generated? This thinking skill contrasts with Correlational or Factors Thinking which can be simplified as a lists of factors that influence or drive some result.



There are several problems with mental models bearing such list structures, however. For one thing, lists do not explain how each causal factor actually works its magic. They merely imply that each factor "influences," or is "correlated with," the corresponding result. But influence or correlation is not the same as causality.

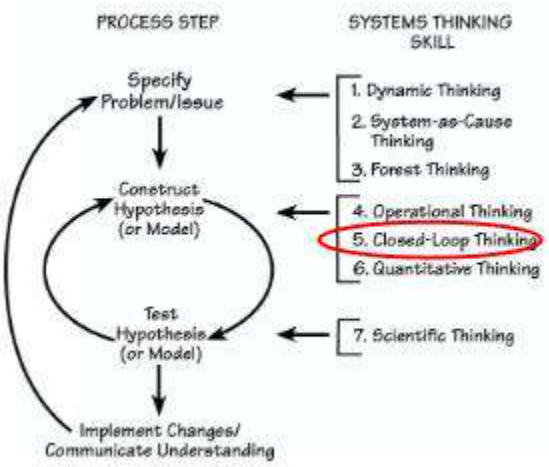
For example, if you use Factors Thinking to analyze what influences learning, you can easily come up with a whole "laundry list" of factors. But if you use Operational Thinking, you might depict learning as a process that coincides with the building of experience. Operational Thinking captures the nature of the learning process by describing its structure, while Factors Thinking merely enumerates a set of factors that in some way "influence" the process.

To develop Operational Thinking skills, it is necessary to to work your way through various activities that define how a business works examine processes such as hiring, producing, learning, motivating, quitting, and setting price. In each case, ask, "What is the nature of the process at work?" as opposed to "What are all of the factors that influence. the process?"


A Factors Thinking Representation
Motivation
Intelligence
Class Size
Teacher Quality
Learning
An Operational Thinking Representation
Knowledge
Learning
Learning Productivity
Cumulative Experience
Experiencing

The 7 Skills of System Thinking - Closed-Loop Thinking

Imagine discussing your company's profitability situation with some of your coworkers. In most companies, the group would likely list things such as product quality, leadership, or competition as influences on profitability. This tendency to list factors stems from Straight-Line Thinking.

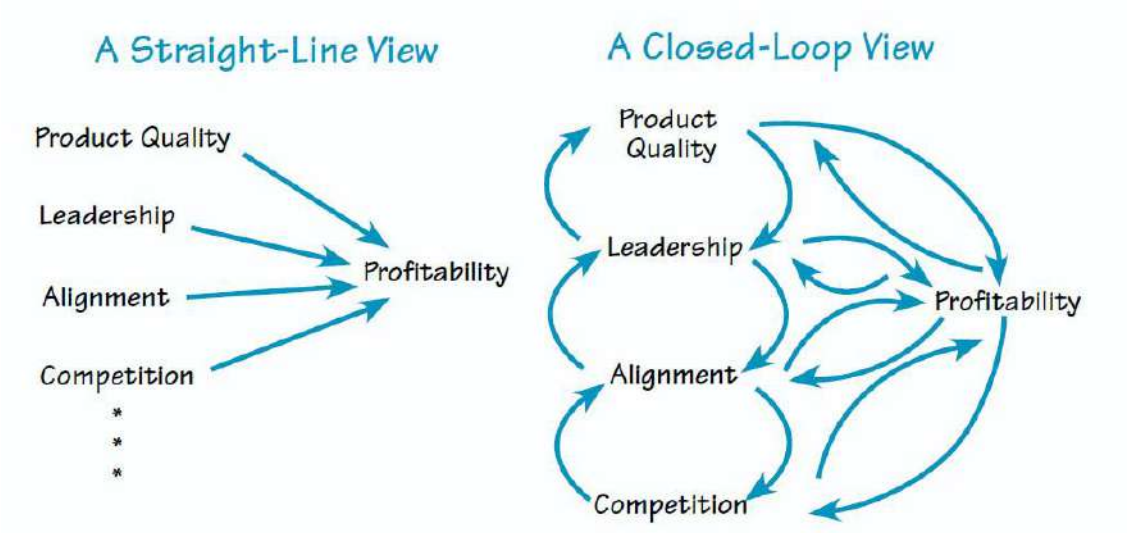


The assumptions behind this way of thinking are

- that causality runs only one way—from "this set of causes" to "that effect,"
- that each cause is independent of all other causes.

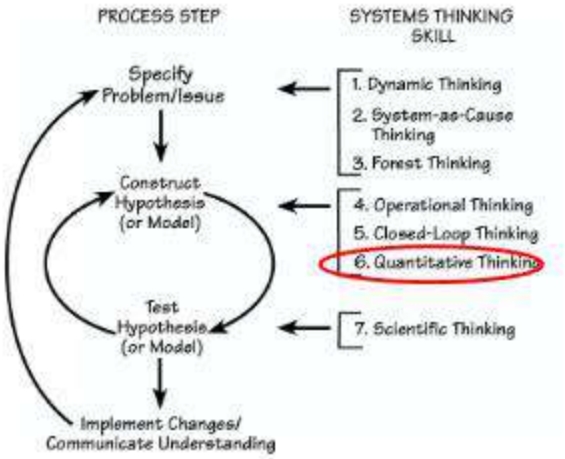
In reality, however, as the closed-loop part of the illustration shows, the "effect" usually feeds back to influence one or more of the "causes," and the causes themselves affect each other. Closed-Loop Thinking skills therefore lead you to see causality as an ongoing process, rather than a one-time event.

To sharpen Closed-Loop Thinking skills, take any list that you encounter and think through the ways in which the driven drives and in which the drivers drive each other. Instead of viewing one variable as the most important driver and another one as the second most important, seek to understand how the dominance among the variables might shift over time.



The 7 Skills of System Thinking - Quantitative Thinking

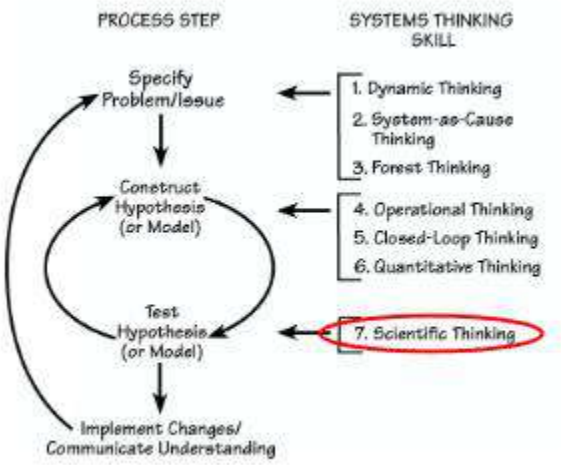
Quantitative is often confused as synonym of *measurable.* because of the presumption that "to know, one must measure precisely." However, there are many factors that cannot be measured very precisely. These include "soft," variables, such as motivation, self-esteem, commitment, and resistance to change.



Would anyone want to argue that an employee's self-esteem is irrelevant to his/her performance? Who would propose that commitment is unimportant to a company's success? Factors like self-esteem and commitment rarely make it into the spreadsheets and other analytical tools that we use to drive analysis because such variables can't be measured. However, they can be quantified. If zero means a total absence of commitment, 100 means being as committed as possible.

The 7 Skills of System Thinking - Scientific Thinking

To understand Scientific Thinking, it is important to acknowledge that progress in science is measured by the discarding of falsehoods. The current prevailing wisdom is always regarded as merely an "entertainable hypothesis," . On the other hand, too many business models are unscientific; yet business leaders revere them as truth and defend them to the death. Analysts make unrelenting efforts to show that their models track history and therefore must be "true."



In using Scientific Thinking, systems thinkers worry less about outfitting their models with exact numbers and instead focus on choosing numbers that are simple, easy to understand, and make sense relative to one another. Systems thinkers also pay lots of attention to robustness they torture-test their models to death! They want to know under what circumstances their model "breaks down." They also want to know, does it break down in a realistic fashion? What are the limits to my confidence that this model will be useful?

The easiest way to sharpen your Scientific Thinking skills is to start with a computer model that is "in balance" and then shock it. For example, transfer 90% of the sales force into manufacturing. Set price at 10 times competitor price. Triple the customer base in an instant. Then see how the model performs. Not only will you learn a lot about the range of utility of the model, but you also will likely gain insight into the location of that most holy of grails: high-leverage intervention points.

How practice System Thinking Skills

SYSTEMS THINKING SKILL	PRACTICING THE SKILL
Dynamic Thinking: Framing a problem in terms of a pattern of behavior over time.	Construct behavior over time graphs; think of events as interesting points in a variable's overall trajectory over time.
System-as-Cause Thinking: Seeing internal actors who manage the policies and "plumbing" of the system as responsible for a behavior.	Instead of blaming, ask "How could those within the system have been responsible?" or "What could those within the system have done to make it more resilient to external shocks?"
Forest Thinking: Seeing beyond the details to the context of relationships in which they're embedded.	Focus on similarities rather than differences.
Operational Thinking: Understanding how a behavior is actually generated.	Ask "What is the true nature of a process?" rather than "What are all the factors that influence the process?"
Closed-Loop Thinking: Viewing causality as an ongoing process, not a one-time event, with effects feeding back to influence causes, and causes affecting each other.	Take a "laundry list" and try to understand how the items on it might influence each other.
Quantitative Thinking: Knowing how to quantify, though you can't always measure.	Ask what key "soft" variables have been left out of analyses, and ruminate about the implications of including them in your model.
Scientific Thinking: Knowing how to define testable hypotheses.	"Shock" a computer model by drastically changing the values of certain variables, to see how the model holds up.

Learning activity

1 - Choose three skills of System Thinking and try to explain them

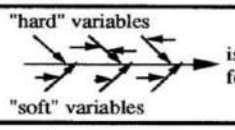
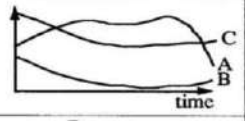
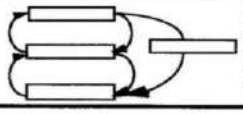
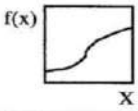
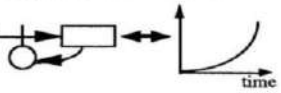
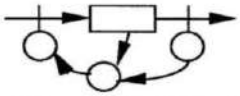
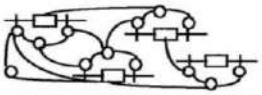
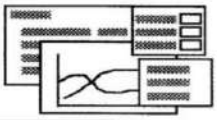
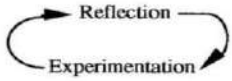
2 - How can each of these skills help the development of the Systems Thinking method?

System Thinking Tools

There are at least ten distinct types of systems thinking tools which fall under four broad categories:

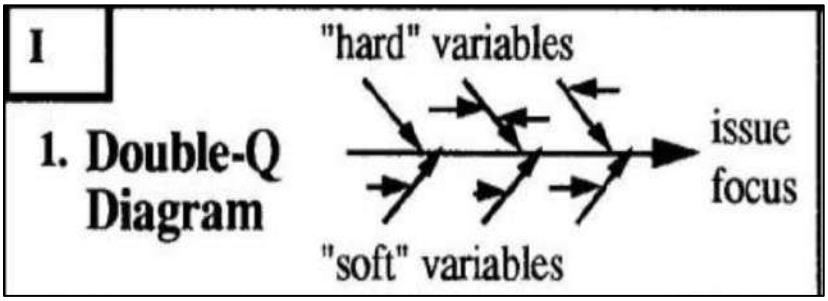
- Brainstorming Tools,
- Dynamic Thinking Tools,
- Structural Thinking Tools,
- Computer-Based Tools.

Although each of the tools are designed to stand alone, they also build upon one another and can be used in combination to achieve deeper insights into dynamic behavior.

Tool	Description
I 1. **Double-Q Diagram** 	A brainstorming tool for capturing free-flowing thoughts in a structured manner and distinguishing between hard and soft variables that affect the issue of interest.
II 2. **Behavior Over Time Diagram** 	Using some of the main branch variables from the fishbone diagram, the behavior of each one can be graphed over time, taking into account any inter-relatedness in their behavior. (Also called reference modes).
3. **Causal Loop Diagram** 	Drawing out causal relationships using the fishbone and behavior over time diagrams helps identify reinforcing and balancing processes.
4. **System Archetypes** 	Helps in recognizing common system structures that fit one of the recurring system archetypes such as eroding goals, shifting the burden, limits to growth (compensating feedback), fixes that fail (policy resistance), etc.
III 5. **Graphical Function Diagram** 	Represents the effect of one variable on another graphically by plotting the relationship over the entire range of values that the X variable may theoretically operate.
6. **Structure-Behavior Pairs** 	A library of simple structure-behavior pairs consist of the basic dynamic structures that can serve as building blocks for developing computer models, e.g. exponential growth, delays, smooths, S-shaped growth, oscillations, etc.
7. **Policy Structure Diagram** 	A conceptual map of the decision making process that is embedded in the organization. Focuses on the factors which are weighed for each decision point. Build library of generic structures.
IV 8. **Computer Model** 	Allows you to map all the relationships that have been identified as relevant and important to an issue in terms of mathematical equations and run policy analyses through multiple simulations.
9. **Management Flight Simulator** 	Provides "flight" training for managers through the use of interactive computer games based on a computer model. Through formulating strategies and making decisions to achieve them, help connect consequences to decisions made.
10. **Learning Laboratory** 	A managers' practice-field. It is equivalent to a sports team's experience, where active experimentation is blended with reflection and discussion . Uses all the systems thinking tools, from fishbone diagrams to MFS's.

Brainstorming Tools:

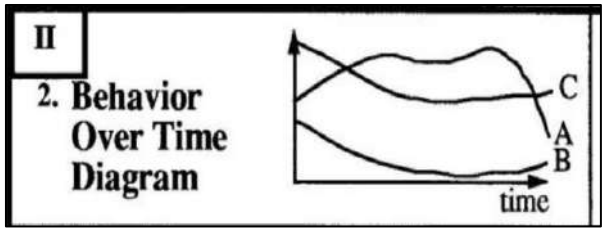
The Double-Q (QQ) Diagram is based on what is commonly known as a fishbone or cause-and-effect diagram. The Q's stand for qualitative and quantitative, and the technique is designed to help participants begin to see the whole system. During a structured brainstorming session with the QQ diagram, both sides of an issue remain equally visible and properly balanced, avoiding a "top heavy" perspective. The diagram also provides a visual map of the key factors involved. Once those factors are pinpointed, Behavior Over Time Diagrams and/or Causal Loop Diagrams can be used to explore how they interact and encourages creativity while still adhering to artistic "rules."



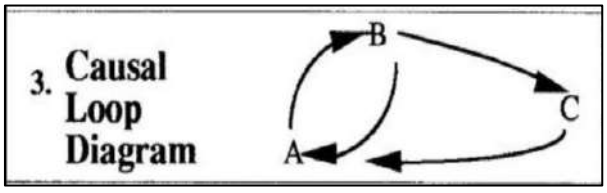
A QQ diagram begins with a heavy horizontal arrow that points to the issue being addressed. Major "hard" (quantitative) factors branch off along the top and "soft" (qualitative) factors run along the bottom. Arrows leading off of the major factors represent sub-factors. These sub-factors can in turn have sub sub-factors leading off of them. However, many layers of nesting may be a sign that one of the sub-factors should be turned into a major factor.

Although QQ diagramming may sound like a very rigid process, it can help give form and structure to unclear problems. It can be likened to the free flowing visualization process that an artist uses which encourages creativity while still adhering to artistic "rules."

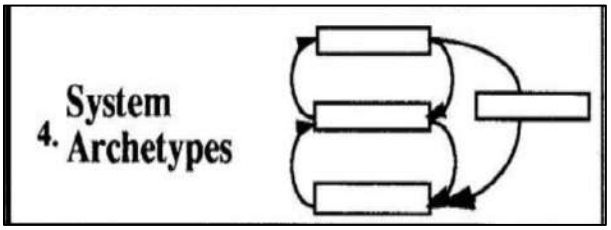
Dynamic Thinking Tools:



Behavior Over Time (BOT) diagrams are more than simple line projections—they require an understanding of the dynamic relationships among the variables being drawn. For example, say we were trying to project the relationship between sales, inventory, and production. If sales jump 20%, production cannot jump instantaneously to the new sales number. In addition, inventory must drop below its previous level while production catches up with sales. By sketching out the behavior of different variables on the same graph, we can gain a more explicit understanding of how these variables interrelate.



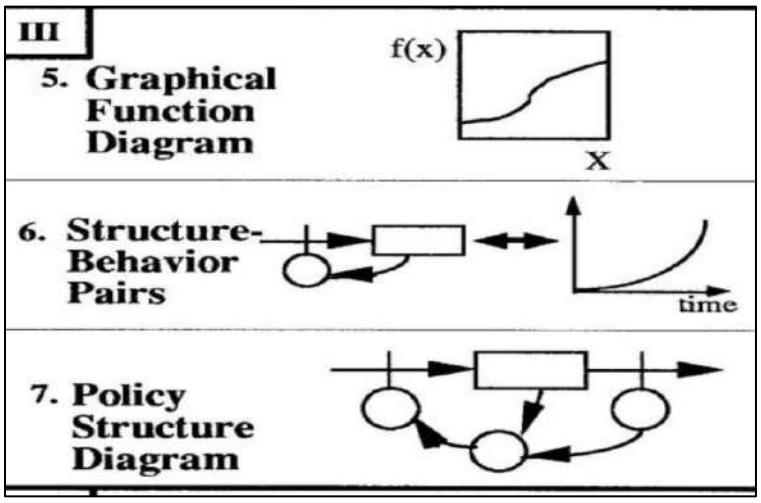
The Causal Loop Diagram (CLD) provides a useful way to represent dynamic interrelationships. CLD's make explicit one's understanding of a system structure, provide a visual representation with which to communicate that understanding, and capture complex dynamics in a succinct form. CLD's can be combined with BOT's to form structure-behavior pairs which provide a rich framework for describing complex dynamic phenomena.



System Archetypes is the name given to certain common dynamics that seem to recur in many different situations. These archetypes, consisting of various combinations of balancing and reinforcing loops, are the systems thinker's "paint-by-numbers" set — users can take real-world examples and fit them into the appropriate archetype. Specific archetypes include: Drifting Goals, Shifting the Burden, Limits to Success, Success to the Successful, Fixes that Backfire, Tragedy of the Commons, Escalation.

Structural Thinking Tools

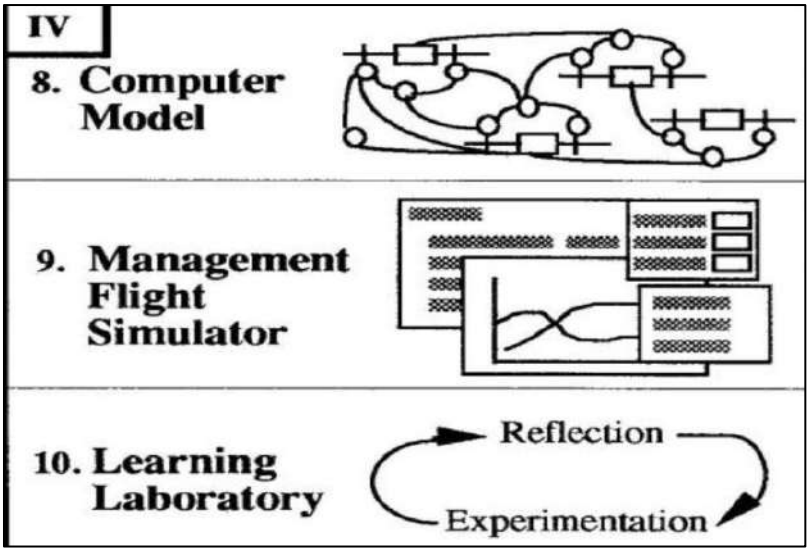
Graphical Function Diagrams, Structure-Behavior Pairs and Policy Structure Diagram can be viewed as the building blocks for computer models. Graphical Functions are useful for clarifying nonlinear relationships between variables. Structure-Behavior Pairs link a specific structure with its corresponding behavior. Policy Structure Diagrams represent the decision-making processes that drive policies. In a sense, when we use these structural thinking tools we are moving from painting on canvas to sculpting with hammer and chisel.



Computer Based Tools

Computer based tools, including **computer models, management flight simulators, and learning laboratories**, demands the highest level of technical proficiency to create. On the other hand, very little advance training is required to use them once they are developed. We will discuss

these tools in future issues from the perspective of predesigned packages — art appreciation versus a creation



Soft Skills to manage complexity

Contrary to popular belief, digital transformation is increasingly less about technology and more about people. Technological skills such as cloud computing, AI/ML, Mobile app development, UX/UI, cybersecurity, DevOps are certainly crucial skils in modern digital transformation processes. However, the ability to adapt to an even more digital future depends on developing the next generation of skills, closing the gap between talent supply and demand, and future proofing your own and others' potential.

The ability to upskill and reskill a company's employees and enhance internal talent is a crucial skill for being actively part of the future of digital transformation. While the future is more ambivalent and uncertain than ever, it is certain that a pretty strong bet on the future is to focus on reskilling and upskilling people, leveraging human adaptability to adjust to change.

Collaboration

There is no monopoly of knowledge, no one firm or person knows it all. Firms should focus on their core competence and leverage third party platforms to create value, instead of trying to do everything in-house. Moreover, the fast pace of change of technology is not easy to keep up with, but platforms can be easily changed without huge cost implications.

Flexibility

Digital is an experience and the transformation is a journey through technological advancement and changes. Therefore, to be successful in digital transformation, businesses must be lean and agile, Swift to change and adopt new technologies and methodologies at the shortest possible time. For firms to be successful in the digital warfare, they must be proactive and not reactive, an attribute that comes with being flexible and futuristic.

Commitment

The idea of going digital should be bought by everyone in the organisation, from senior management to the lowest ranked staff. System thinking should be at the DNA of the organisation with focus and emphasis on producing results at every single point in the value chain, to deliver overall benefits.

Learning activity

The number of businesses that transform digitally increases proportionally the number of digital services and products. An increased number of such services and products has a double effect:

1 - It reduces the effect on the environment, which increases the country's welfare

2 - It increases the economic activity which in turn increases the country's welfare

Furthermore, an increased welfare has also a double effect:

1 - It decreases corruption, which decreases the overall resistance to change that might be observed by businessmen. A decreased resistance to change results in a higher number of businesses that transformed digitally

2 - Also, an increased welfare results in more incentives to businesses to proceed to digital transformation, which further decreases the resistance to change and at the same time reduces the cost of businesses to transform digitally. This reduced cost results in a further increase of the number of businesses that transformed digitally.

a) Identify the number and type of feedback loops

b)What is the characteristic of the identified loops

Conclusion

Systems thinking allows people to use their understanding of social systems to improve a situation in the same way engineering can be used. Unlike the traditional system that focuses on separating the individual pieces of what is being studied (Design Thinking), System Thinking in contrast, focuses on how the subject of study interacts and where it intersects other constituents of the entire system.

Self Evaluation Test

What are the 4 phases of System thinking?

- Identification of a challenge -Construction of a hypothesis/model -Testing -Implementation
- Identification of a theory -Construction of a hypothesis/model -Testing -Implementation
- Identification of a challenge -Construction of a theory -Testing -Implementation
- Identification of a challenge -Construction of a focus group-Testing -Implementation

Which of these are NOT phases of System Thinking?

- Dynamic Thinking, System-as-Cause Thinking, Forest Thinking
- Operational Thinking, Closed Loop Thinking,
- Quantitative Thinking, and Scientific Thinking
- Idea generation, Critical Thinking

Which of these are NOT tools of System Thinking?

- Causal Loop Diagram
- Management Flight Simulator
- Gap Analysis
- Computer Model

Which of these is one of the main soft skills for managing complexity?

- Emotional Intelligence
- Public speaking
- Collaboration
- Accuracy and punctuality

Self Evaluation Test - Answers

What are the 4 phases of System thinking?

- Identification of a challenge -Construction of a hypothesis/model -Testing -Implementation
- Identification of a theory -Construction of a hypothesis/model -Testing -Implementation
- Identification of a challenge -Construction of a theory -Testing -Implementation
- Identification of a challenge -Construction of a focus group-Testing -Implementation

Which of these are NOT phases of System Thinking?

- Dynamic Thinking, System-as-Cause Thinking, Forest Thinking
- Operational Thinking, Closed Loop Thinking,
- Quantitative Thinking, and Scientific Thinking
- Idea generation, Critical Thinking

Which of these are NOT tools of System Thinking?

- Causal Loop Diagram
- Management Flight Simulator
- Gap Analysis
- Computer Model

Which of these is one of the main soft skills for managing complexity?

- Emotional Intelligence
- Public speaking
- Collaboration
- Accuracy and punctuality

Recap of main competences

1. Systems Thinking is a holistic approach to analysing and understanding how the system's constituent behaviors and elements interrelate, how they change over time, and how they fit in the context of a larger system.

2. System Dynamics complements system thinking by quantifying the impact of the analysed interactions within the system

3.The systems thinking method comprises four steps: -Identification of a challenge -Construction of a hypothesis/model -Testing -Implementation

4.System thinking process systemically involves a rather large number of different skills—seven, at least—that come into action in all phases of ST process: Dynamic Thinking, System-as-Cause Thinking, Forest Thinking, Operational Thinking, Closed Loop Thinking, Quantitative Thinking, and Scientific Thinking

5.There are at least ten distinct types of systems thinking tools which fall under four broad categories: Brainstorming Tools, Dynamic Thinking Tools, Structural Thinking Tools, Computer-Based Tools.

6. The ability to adapt to an even more digital world depends on closing the gap between talent supply and demand. Upskilling and reskilling a company's employees and enhance internal talent is a crucial skill for being part of the future of digital transformation. Soft skills such as collaboration, flexibility, and commitment are at the basis for an agile and lean transformation in order to manage complexity.

References

- Harverd Business Review, 2020, *Digital Transformation Is About Talent, Not Technology, by* Becky Frankiewicz and Tomas Chamorro-Premuzic, https://hbr.org/2020/05/digital-transformation-is-about-talent-not-technology

- The Enterprisers Project, 2021, *Digital transformation: 7 in demand technology s kills by* Vivek Mani Tripathi, https://enterprisersproject.com/article/2021/10/digital-transformation-7-skills-prioritize

- Harvard Business School, 2022, *Five Design Thinking Skills for Business Professi onals* by Tim Stobierski https://online.hbs.edu/blog/post/design-thinking-skills#:~:text=Design%20thinking%20is%20an%20approach,is%20meant%20to%20be%20iterative.

- The Systems Thinker, The "Thinking" in Systems Thinking: Honing Your Skills, by Barry Richmond https://thesystemsthinker.com/the-thinking-in-systems-thinking-honing-your-skills/

- Learning for Sustainability, *2019, An introduction to systems thinking and systemic design – concepts and tools, by* Will Allen & Margaret Kilvington https://learningforsustainability.net/wp-content/uploads/2019/01/Intro-systems-thinking-and-systemic-design-concepts-and-tools.pdf

- The Systems Thinker, PALETTE OF SYSTEMS THINKING TOOLS, by Daniel Kim, https://thesystemsthinker.com/palette-of-systems-thinking-tools/

- Business Innovation Design, 2018, *Systems Thinking is the New Design Thinking*, by Jeffrey Tjendra, https://businessinnovation.design/blog/2018/4/25/systems-thinking-is-the-new-design-thinking#:~:text=What%20is%20the%20difference%20between,%2Ddown%E2%80%9D%20big%20picture%20view.

- *DIGITAL TRANSFORMATION – A SYSTEMS THINKING APPROACH TO TECHNOLOGICAL (R)EVOLUTION* by Emeka Nwonu, https://www.academia.edu/31706674/DIGITAL_TRANSFORMATION_A_SYSTEMS_THINKING_APPROACH_TO_TECHNOLOGICAL_R_EVOLUTION

- The Systems Thinker, DYNAMIC THINKING: A BEHAVIORAL CONTEXT by Barry Richmond, https://thesystemsthinker.com/dynamic-thinking-a-behavioral-context/

- The Systems Thinker, THE “THINKING” IN SYSTEMS THINKING: HOW CAN WE MA KE IT EASIER TO MASTER? by Barry Richmond, https://thesystemsthinker.com/the-thinking-in-systems-thinking-how-can-we-make-it-easier-to-master/#:~:text=System%2Das%2DCause%20Thinking%3A,ways%20to%20improve%20that%20behavior.

- Institute for Strategy and Complexity Management, Systems Thinking and Systems Dynamics,https://www.corporatestrategies.org/systems-thinking-and-system-dynamics/

Module 3: How Systems Thinking can enhance skills for Digital Transformation?

Learning Outcomes

- To gain a framework of some business cases of Digital Transformation processes and System Thinking
- To deepen why some cases failed
- To learn some lessons and best practice from famous cases

Course Requirements

- Pen and paper / computer
- Internet access

Overview

In this module will provide you some examples of brands that have implemented or not digital transformation processes supported by system thinking perspective. And it will show why System Thinking could be effective to support digital transformation processes.

Keywords

Digital Transformation processes, Business Cases, Design Thinking, System thinking, customer.

Previous Module recap

1. Systems Thinking is a holistic approach to analysing and understanding how the system's constituent behaviors and elements interrelate, how they change over time, and how they fit in the context of a larger system.

2. System Dynamics complements systems thinking by quantifying the impact of the analysed interactions within the system

3. The systems thinking method comprises four steps: -Identification of a challenge -Construction of a hypothesis/model -Testing -Implementation

4. System thinking process systemically involves a rather large number of different skills—seven, at least—that come into action in all phases of ST process: Dynamic Thinking, System-as-Cause Thinking, Forest Thinking, Operational Thinking, Closed Loop Thinking, Quantitative Thinking, and Scientific Thinking

5. There are at least ten distinct types of systems thinking tools which fall under four broad categories: Brainstorming Tools, Dynamic Thinking Tools, Structural Thinking Tools, Computer-Based Tools.

6. The ability to adapt to an even more digital world depends on closing the gap between talent supply and demand. Upskilling and reskilling a company's employees and enhancing internal talent is a crucial skill for being part of the future of digital transformation. Soft skills such as collaboration, flexibility, and commitment are at the basis for an agile and lean transformation in order to manage complexity.

Introduction

Adopting a Systems Thinking habit clearly helps to understand important connections and encourages a wide perspective, rather than just a focus on specific events. Systems thinking is an entirely different way of managing an organization. A typical organization uses many different methods to market a product, buy merchandise, manage customer relationships, and so much more.

By learning how to manage these procedures through a systemic approach, management effectiveness can increase exponentially. As the next few decades unfold, and as digitalization runs at an increasingly faster way, systems thinking approaches will become fundamental in developing a digital transformation process. Within a global environment, managers will need to be competent in understanding and using the principles behind this innovative thinking style.

Case study presentation

The following chapter will present four different business cases in which a systems thinking approach was applied or, in contrast, how systems thinking methodologies could have helped the selected companies in the digital transformation process.

We will also explore how two similar products with similar features can have a completely different success story based on whether applying systems thinking approaches or not. In addition, we will also explore how the complete lack of a system thinking approach can lead to total failure of a product or company, overcome by the fast pace of the current digital world.

Learning Activities

1-What do you know about iPod and Zune?

2- What do you imagine could be their approaches on Digital Transformation through System Thinking?

Now, read the following slides to deepen their history

iPod vs Zune

The **iPod** is a series of portable media players and multi-purpose mobile devices designed and marketed by Apple Inc. Apple released its spectacular and successful first version of iPod in 2001, about 8+1/2 months after the Macintosh version of iTunes was released. By 2005, iPod sales exceeded 20 million units per year.

To compete with Apple, Microsoft released "Zune", Microsoft's personal music player in 2006. However, the Zune did not share the iPod's ergonomics or aesthetics. Moreover, Microsoft had not developed all the ancillary systemic structures that made the iPod successful.

For the iPod to really catch on, a system had to be developed that facilitated the downloading of music from the Internet. This required not only the technology, but also consideration of ancillary factors, such as licensing, royalties, payment and transaction management, and storage. By addressing each of these with the development of iTunes, Apple not only enabled the iPod, but completely disrupted existing music listening technology (CDs).

In Designing for People, according to the American researcher Don Norman:
"It is not about the iPod; it is about the system. Apple was the first company to license music for downloading. It provides a simple, easy to understand pricing scheme. It has a first-class website that is not only easy to use but fun as well. The purchase, downloading the song to the computer and thence to the iPod are all handled well and effortlessly. And the iPod is indeed well designed, well thought out, a pleasure to look at, to touch and hold, and to use. There are other excellent music players. No one seems to understand the systems thinking that has made Apple so successful.".

Why is this System Thinking?

The iPod is not a stand-alone product; instead, it is part of a personal entertainment system, the elements of which include the iPod itself, the individual who is listening, the environment (indoors, outdoors, office, gym, etc.), the songs, the song acquisition and storage, and the activities while listening (whether jogging, studying, relaxing, spinning, driving, etc.).

The iPod Personal Entertainment System is not a product at all; it is a service. It is experienced, not consumed. Apple's recognition of this and that the device itself is simply an element of this service was not only innovative, but revolutionary. While other manufacturers (Sony, Tascam, Microsoft, Diamond, etc.) structured their companies to support the device that they manufactured, Apple structured their company to support the user.

Failure to understand that many products are not really stand-alone devices, but instead are merely one component of a user experience system. Understanding the interconnectedness that gives systems their unique character is key and it is exactly what Apple's ipod leveraged and what Microsoft's Zune failed to consider. Systems Thinkers have taught us that a system is a product of the interaction of its parts, not just the sum of its parts. the relationships between components and how they function as a whole must be taken in consideration

Learning Activities

1-What do you know about Polaroid?

2- What do you imagine could be its approach on Digital Transformation through System Thinking?

Now, read the following slides to deepen its history

Polaroid

Polaroid Corporation pioneered (and patented) consumer-friendly instant cameras and film. An **instant camera** is a camera which uses self-developing film to create a chemically developed print shortly after taking the picture. The invention of commercially viable instant cameras which were easy to use is generally credited to American scientist Edwin Land, founder of Polaroid Corporation, who unveiled the first commercial instant camera, the model 95 Land Camera, in 1948, a year after he unveiled instant film in New York City.

Polaroid rose to market dominance in instant photography as a result of the innovative products developed by its founder, Edwin Land, and was once considered a stellar example of a high-tech success. In the 1980s, Polaroid was well aware of the emerging trend in electronic imaging technology, and by 1989 was spending 42% of its research and development budget on digital imaging. Polaroid was the number one provider of digital cameras by 1990.

Despite its early lead in the digital camera market, Polaroid failed to take full advantage of the emerging trends in digital photography, such as purely digital workflow. Senior management continued to rely on an outdated mental model that customers wanted hard-copy print, rather than electronic images that could be viewed on digital displays and in slide shows.

Even though Polaroid made significant investments in its Micro-Electronics Laboratory in the mid-1980s, the company had a bias against electronics. That bias was fueled by the significant profitability of their film business with gross margins of over 65%, which made the consideration of new business models and markets out of the question (a frozen paradigm).

Over time, customers began to realize the speed and cost-savings associated with digital workflow, as digital cameras became commodities and resolution increased. As a result, Polaroid began losing its largest customers in the real estate and photo-identification markets, and its sales of film dropped precipitously. By October 2001, Polaroid filed for bankruptcy and never recovered.This is an example of a flawed mental model. Although Polaroid instructed its researchers to develop digital cameras in response to emerging trends in digital photography, the focus was on developing digital cameras that could produce hard-copy print, without recognizing emerging new market opportunities. Polaroid's innovation was limited by its out-of-date mental models/frozen paradigm, while competitors such as Canon, Nikon, and even Kodak (to a degree) were better Systems Thinkers.

Learning Activities

1-What do you know about Blackberry?

2- What do you imagine could be its approach on Digital Transformation through System Thinking?

Now, read the following slides to deepen its history

Blackberry

The Blackberry smart phone was launched by Canadian company Research in Motion (RIM) in 1999.

RIM had the lion's share of the smartphone market by 2007, with over 10 million subscribers, and was worth over $67 Billion. The success of the Blackberry smart phone was due to several innovative features, such as the Blackberry Messenger (BBM) service and Blackberry Curve, strong security, and an embedded QWERTY physical keyboard. Blackberry was the device of choice by the government, many universities, and most businesses that required high security and inexpensive messaging.

However, in the late 2000s, Apple and Samsung began to out-innovate RIM's Blackberry. Apple created new ways for customers to use smartphones, such as an intuitive user interface and touchscreen navigation. Apple also developed means by which smartphones could make people's lives more convenient and more fun, and Samsung quickly followed suit. Apple saw the smartphone as more than just a communications device; they saw it as a component of a user experience system. Meanwhile, RIM did little to bring new features to its customers and failed to recognize the dynamic changes occurring in the business market.

Despite widespread consumer demand for hardware improvements (such as a touchscreen keypad, higher resolution, bigger screen, and faster Central Processing Units) and more applications (games, music, social media, interactive video, camera, and other entertainment), RIM focused instead on secure corporate communications. Well behind the competition, RIM finally launched a touchscreen device that was viewed as an inadequate imitation of the iPhone.

By September 2013, the company announced a loss of almost $1 billion due to unsold inventory. Today RIM is a shadow of its former self, with capitalization of less than $4 billion (versus $82 billion in 2008) and a stock price down more than 90% from its high of $137.41 in mid-2008.

This is an unfortunate example of viewing products and services as stand-alone items and failing to recognize that most products are components of user experience systems. Blackberry continued to view its products as mobile e-mail devices, while Apple and Samsung created new ways to use smartphones as mobile entertainment devices, while continuing to provide e-mail services with an intuitive user interface.

Understanding the interconnectedness that gives systems their unique character is key and it is exactly what Apple and Samsung leveraged and what RIM's Blackberry failed to consider.

Learning Activities

1-What do you know about IKEA?

2- What do you think could be its approach on Digital Transformation through System Thinking?

Now, read the following slides to deepen its history

IKEA

IKEA is a Swedish-founded multinational conglomerate that designs and sells ready-to-assemble furniture, kitchen appliances and home accessories, among other goods and home services.

The group is known for its modernist designs for various types of appliances and furniture, and its interior design work is often associated with an eco-friendly simplicity. In addition, the firm is known for its attention to cost control, operational details, and continuous product development that has allowed IKEA to lower its prices by an average of two to three percent.

IKEA's design thinking process is based to focus on 5 major principles that is followed for all its designs – form, function, sustainability, quality and low price.

IKEA, by paying keen interest in the design thinking processes came up with furniture created in a way that it was easy for the user to transport and gather. It emerged as a successful user-friendly product worth the price it was offered for. Practically, it became very convenient for the customers to pack and ship it.

IKEA stores are often designed in a one-way layout, leading customers counter-clockwise along what IKEA calls "the long natural way" designed to encourage the customer to see the store in its entirety (as opposed to a traditional retail store, which allows a customer to go directly to the section where the desired goods and services are displayed).

The sequence first involves going through the furniture showrooms making note of selected items. The customer collects a shopping cart and proceeds to an open-shelf "Market Hall" warehouse for smaller items, visits the self-service furniture warehouse to collect previously noted showroom products in flat pack form.

IKEA is a great example of how linking design thinking with system thinking methodologies can generate value.

In specific, enterprises like IKEA use design thinking in its customer centric product development process and showroom experience. How IKEA's organization system is designed and operated is thoughtfully created centered around people.

After visiting the showroom, customers are guided to purchase in a warehouse setting where items are sourced and procured not by IKEA employees, but by themselves. Customers have the option to have their purchased goods delivered. Now they are embarking on digital transformation initiatives to digitize their value proposition.

IKEA's case is paradigmatic. They have been applying design thinking to product development and the design of the customer's showroom experience for years. IKEA has redesigned these processes with a systemic approach to connect the front-end experience with back-end operations, thus obtaining organizational and user experience advantages

Design thinking is at heart of this experience, however, it is systems thinking that allows the implementation of value proposition, connect front-end experience with back-end operations, and orchestrate the value between stakeholders and metrics to run a much better organization.

Conclusions

Businesses are systems, the components of which include products and/or services, the physical building and its contents, employees, customers, stakeholders, management, the environment, regulatory agencies, banks, suppliers, communications vehicles, transportation services, performance metrics, and other factions. These components interact in complex and sometimes surprising ways. Systems Thinking is a perspective, a set of tools, and a language that may be used to understand and optimize system behavior. Yet, Systems Thinking is not used extensively in business management.

As the next few decades unfold, and as digitalization runs at an increasingly faster pace, systems thinking approaches will become fundamental in developing a digital transformation process. Within a global environment, managers will need to be competent in understanding and using the principles behind this innovative thinking style.

Understanding the interconnectedness that gives systems their unique character is key and companies must leverage it in innovation, or failure to consider this aspect could lead to being out-competed and consequently left behind in a fast moving innovative world.

Self Evaluation Test

Which of these aspects was considered from Apple and wasn't considered from Microsoft?

- The importance of aesthetic aspects
- Technical specifics of iPod and Zune
- The interconnectedness that gives systems their unique character
- Pricing of their products

Which of these aspects was missing in the Polaroid model?

- Consideration of emerging new market opportunities
- Study of right pricing
- Aesthetic design of their products
- Employee's needs of learning

Which of these aspects wasn't considered in developing and updating Blackberry?

- Most products are components of user experience systems
- Customers want beautiful products
- Customers don't like read email by phone
- Users prefer using devices from different brands

Why is it important to focus on the interconnectedness between all elements of a System?

- To increase profits
- To become famous
- To be able to innovate
- To create design products

Self Evaluation Test - Answers

Which of these aspects was considered from Apple and wasn't considered from Microsoft?

- The importance of aesthetic aspects
- Technical specifics of iPod and Zune
- The interconnectedness that gives systems their unique character
- Pricing of their products

Which of these aspects was missing in the Polaroid model?

- Consideration of emerging new market opportunities
- Study of right pricing
- Aesthetic design of their products
- Employee's needs of learning

Which of these aspects wasn't considered in developing and updating Blackberry?

- Most products are components of user experience systems
- Customers want beautiful products
- Customers don't like read email by phone
- Users prefer using devices from different brands

Why is it important to focus on the interconnectedness between all elements of a System?

- To increase profits
- To become famous
- To be able to innovate
- To create design products

Recap of the main competences

Failure to understand that many products are not really stand-alone devices, but instead are merely one component of a user experience system. Systems Thinkers have taught us that a system is a product of the interaction of its parts, not just the sum of its parts. The relationships between components and how they function as a whole must be taken in consideration

Understanding the interconnectedness that gives systems their unique character is key and companies must leverage it in innovation, or failure to consider this aspect could lead to being left behind in a fast moving innovative world.

Linking design thinking with system thinking methodologies can generate value. Design thinking is at heart of an experience, however, it's Systems Thinking that allows the implementation of value proposition, connect front-end experience with back-end operations, and orchestrate the value between stakeholders and metrics to run a much better organization.

References

- Tjendra, 2018, Business Innovation Design, 2018, *Systems Thinking is the New Design Thin king*, https://businessinnovation.design/blog/2018/4/25/systems-thinking-is-the-new-design-thinking#:~:text=What%20is%20the%20difference%20between,%2Ddown%E2%80%9D%20big%20picture%20view.
- Monat, Amissah, Gannon, 2020, *Practical Applications of Systems Thinking to Business*, https://www.mdpi.com/2079-8954/8/2/14/htm
- Powell, 2021, *Systems Thinking: How to Lead in Complex Environments*, https://scontrino-powell.com/case-studies/systems-thinking-how-to-lead-in-complex-environments
- Dowdall, 2019, Catalyst Consulting, *Systems Thinking Examples* https://www.catalystconsulting.co.uk/systems-thinking-examples/
- Nwonu, 2019, *DIGITAL TRANSFORMATION – A SYSTEMS THINKING APPROACH TO TECHNOLOGICAL (R)EVOLUTION*, https://www.academia.edu/31706674/DIGITAL_TRANSFORMATION_A_SYSTEMS_THINKING_APPROACH_TO_TECHNOLOGICAL_R_EVOLUTION