Facing Complex Problems through Visuals

Visual Thinking and Visual Communication Practices to Enhance Understanding of Complex Problems

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Master of Design in Strategic Foresight and Innovation

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Abstract

New technologies, lifestyles and other irreversible changes are generating unprecedented interconnectedness challenges and problems that we face as society and organizations. These changes are also bringing new possibilities to visual communication practices. In this major research project I will argue that rhetoric and logical reasoning alone are insufficient and must be enriched by visual thinking and visual communication to enhance better understanding, in the face of these interconnected and complex scenarios. Through a process of literature review and research of the main trends in professional practice on visual thinking and visual communication practices, this paper describes the particularities that make these tools so effective for facing complex problems. As I will argue, visual thinking and visual practices expand our ability to share common mental models, enhance participation and co-creative design, boost our understanding of complex information, facilitate data analysis and systems thinking, and enable us to connect emotionally with audiences.

Acknowledgements

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Finally, I would like to thank my family with all my heart: Thank you to Mariana, Carmen and Dolores who came along, enjoyed, endured, braved and thrived with me in this adventure.

To:

Mariana, Carmen, Dolores. Las amo

Mis padres, Jorge y Flor. Gracias por apoyarme siempre.

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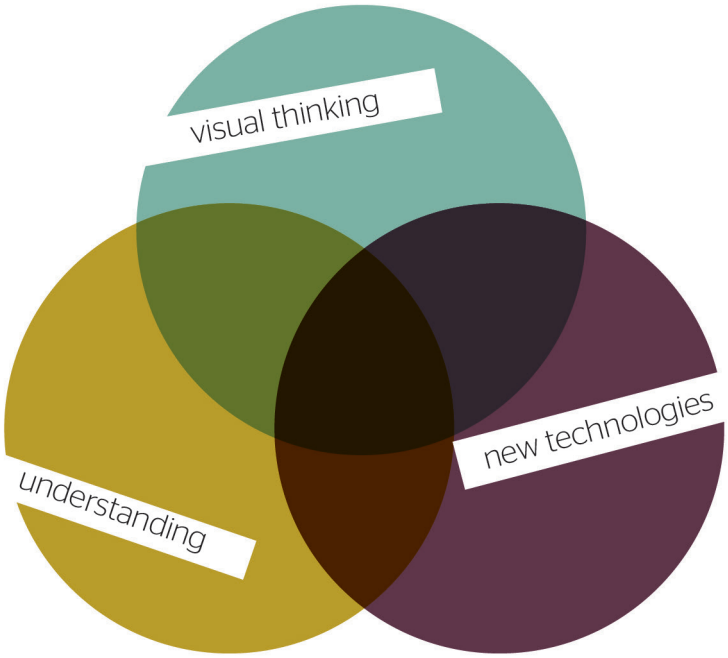
1. Introduction

Figure 1. Scope of MRP



In my professional career, I have been a graphic designer, art director and member of multiple environments and team settings. I frequently face complex problems that demand alternative approaches such as design thinking to frame and find solutions. However, methodical approaches are often not enough to solve these problems, as they contain multiple variables that are constantly changing, and are consequently hard to predict. This constant exposure to complex problems and the inability that traditional linear design methods have to solve them, has led me to become interested in visual and design thinking approaches and visual communication practices as alternatives to find, face and solve complex problems. I am interested in designing visual thinking approaches that help us to think better, in educational or organizational environments. I am also astonished and concerned about the new future that

technology may bring. I see dialogue as an ideal practice to find more human-centered perspectives and to enhance better understanding; a place to put into practice all of our imagination and logical capabilities to solve complex problems in ways that science and technology are unable to solve. It is in the intersection of all of these topics that this research inquiry takes place.

"The medium is the message," declared philosopher and communication theorist Marshall McLuhan, half a century ago (McLuhan, 1964). Since then, we have witnessed studies about the effect that TV, radio, telephone and computers may be having in the way we think, or even more deeply, in the way we shape our thoughts, see things and frame reality. This transformative characteristic is not independent from our new electronic or digital media. Communication media – like the spoken word or written language –has shaped our thoughts, arguments and decisions in the past. Like McLuhan said (1964), "when technology extends one of our senses, a new translation of culture occurs as swiftly as the new technology is interiorized."

The literature reviewed for this project explores different perspectives and disciplines, new ways to solve complex problems (Bohm, 2013; De Bono, 1995; Buchanan, 1992; Rittel, Webber, 1974), and questions the adequacy of using only verbal logical reasoning inherited from ancient Greece to solve them. This literature suggests alternatives such as system thinking, design thinking, or multi-disciplinary and participatory dialog techniques, to help us understand more complex realities that led us to propose non-linear solutions. All of them require the aid of visual thinking, visual communication practices and their ability to share common mental models, enhance participation, emotional engagement and co-creation enabling their capacity to show complex systems and inspire new solutions and ideas.

I also explore the role that visual thinking and visual communication practices may play with regards to digital communication technologies, such as the Internet on mobile devices, and how they reveal and create a more complex interconnectedness between our actions, opinions and interactions. In this context, visual communication

practices play a very important role as a globally understood language that is persuasive and powerful, and allow us to display and simplify information and connect with our emotions. The power of an image is nearly universal in its reach across languages and cultures. At the same time, visual practices may provide us with the mindset, skillset and toolset required to help us reveal and understand this complexity.

Visual practice effectiveness will depend on the practitioner's ability to adapt and transform the available tools by taking a design thinking approach appropriate to the particularities of the situation and by bringing innovation, new perspectives and more resources to solve our problems.

We may be facing new ways to think about the future, new channels to learn, teach, synthesize, convince or explain things. In this brief paper, I offer evidence that visual thinking and visual communication practices are useful toolsets, skill sets and mindsets to face complex problems, and that they will become more relevant as a communication and thinking toolset, mindset and skillset, both in the digital and non-digital world. To further explain the power of visual communicative techniques in the crafting of a global understanding, I will attempt to describe the power of visuals through visuals. This cyclic narrative informs as well as preaches. It is hoped that this will act as a guide to understanding the processes of complex problem solving through a visual narrative that is both engaging and easily understood by all.

2. Research Questions

Two main questions were set while framing the scope of this MRP:

How can we make better use of visual thinking and visual communication practices to enhance understanding with regard to complex problems in society?

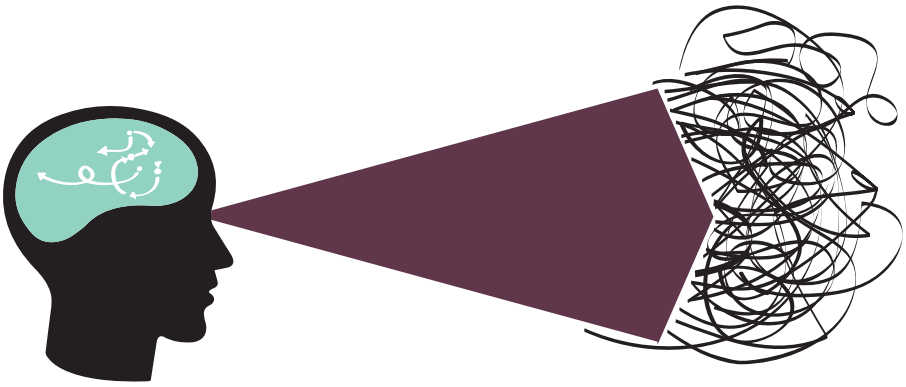


Figure 2. Main Research Question.

Is there evidence to suggest that understanding will come to rely more strongly on visual thinking and communication approaches?

Figure 3. Second Question.
The person profile with brain icon was created by Yuki Nakanishi from the Noun Project

The first question, How can we make better use of visual communication to enhance understanding and decision-making with regard to complex problems in society? is the principal question on which this research project and proposal is framed. It is a challenging question, where answers cannot be definite,but rather a set of proposals that may lead to the development of strategies and ongoing actions to make a better use of them. The second question provides the relevance needed to prove the validity of these studie. This paper shows evidence that visuals are, in fact, increasing in relevance, and that complex problems need alternatives to the traditional linear-way of thinking to face them. . By exploring visual thinking practices, professional visual communication practices, new communication technologies and the increasing demand for these services, I demonstrate the relevance of these studies as strategic approaches to face complex problems within organizations. I also validate the significance of the issue explored as it is an evolving field in which theory, discussion, practice and documentation is necessary to keep improving and contributing to better practice.

3. Project Methodology

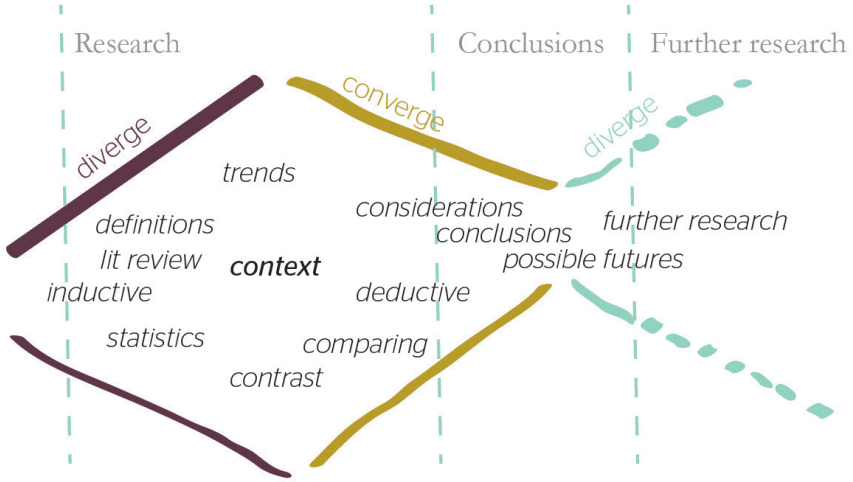


Figure 4. Project Methodology

This research defines gaps and opportunities in emergent visual thinking and visual communication tools. A need to search for alternatives to logical reasoning exists

today so that we may better solve the complex problems we will face in the future. During the implementation of my research, a literature review was carried out that explored different perspectives and disciplines as well as ways to solve complex problems. This research raised the question of the adequacy of using merely verbal and logical reasoning methodologies. The literature consulted suggests alternatives such as system thinking, design thinking and multi- disciplinary and participatory dialogue techniques to help us understand more complex realities and lead us to propose non-linear solutions that fit our futures. Through conversations with my advisors Greg Van Alstyne, Patricia Kambitsch and Dave Gray, I obtained enriching and meaningful insights from their knowledge and experience. This helped to guide the research process. My experience as a graphic designer and art director, allowed me to channel the conversations to arrive at novel conclusions.

My research focus is on context, showing evidence and providing historically meaningful data that establishes and frames the particularities that visual toolsets, skillsets and mindsets bring for understanding complex problems. Using a multi-perspective approach that includes sensemaking and problem framing, this paper will attempt to bring innovative conclusions complemented with proposals (See Appendix) that will contribute to the study of visual communication practices and visual thinking studies.[1]

This work contains visualizations that will help the reader to understand the ideas, arguments and insights of this project in a simple and effective way.

[1] As a way to practice what I preach, in the sense of using non-linear design methods to solve complex problems, I propose in the appendix a set of visual tools that are not fully developed, but that like sketches in a visual thinking process, will get the user involved in the process and encourage a co-creation process for a better design

4. Context

4.1 Complex problems

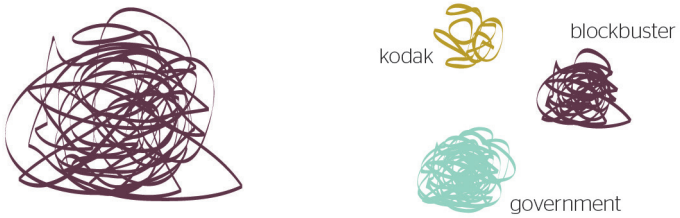


Figure 5. Complex problems are confusing, undefined, unpredictable, multiple.
Figure 6: Organizations and society need to face them frequently

A wicked problem is a class of social system problems which are ill-formulated, where the information is confusing, where there are many clients and decision makers with conflicting values, and where the ramifications in the whole system are thoroughly confusing. (Rittel & Webber, 1974).

Welive in a complex world where climate, new technologies, economy, politics, societies and values are changing constantly. As clear examples of this class of problems, wicked problems as defined by Rittel and Webber, are hard to predict as they are part of interconnected systems where variables and boundaries are hard to define, measure or control. These kind of complex problems that organizations and communities are facing today are a common concern for practitioners and specialists in different fields, and they refer to these complex problems in many ways: Wicked problems, Fuzzy goals, Messiness (Buchanan, 1992; Gray, 2008a; Meadows, 2008; Rittel, 1974; Sevaldson, 2011.). In this work, I will indistinctly call them complex problems, a term that Richard Buchanan, Jamshid Gharajedaghi, Birger Sevaldson, and many other theorist from visual and design thinking practices use to describe this concept.

4.2 Traditional linear thinking methods

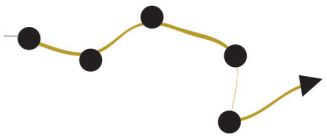


Figure 7. Logic reasoning solve problems linearly.
Figure 8. Linear thinking avoids facing complex problems.

The main issue when facing complex problems, as shown by most authors, is that the traditional linear solution methods that we are trying to use are insufficient (Bohm, 2013; Buchanan, 1992; Meadows, 2008; Rittel, 1974, De Bono, 1995). The industrial revolution and the development of a scientific method in the 19th century has advocated a logic for linear thinking that looks for causes, effects and absolute ends. Edward de Bono, (1995) explains this tendency by reviewing the foundations of the traditional Western thinking system, where the classical Greek philosophers had the idea to search for the absolute truth. This search, de Bono explains, has led us to develop absolute solutions that are only reached by simplifying and isolating problems by avoiding complexity. Here, boundaries, definitions and therefore solutions are complex and constantly changing. De Bono specifically criticizes the Socratic dialectic method, which is based on finding problems and removing their causes to uncover the *truth*. This search, de Bono explains, has led us to develop absolute solutions that are only reached by simplifying and isolating problems by avoiding complexity. Here, boundaries, definitions and therefore solutions are complex and constantly changing. De Bono specifically criticizes the *Socratic dialectic method,* which is based on finding problems and removing their causes to uncover the *truth*[2] because it induces critique, but cannot deal with change. He also adds that the heritage of Greek philosophers is "such a good tool for solving problems that we try to use it for everything."

[2] De Bono works to create alternative approaches to the Socratic method: Parallel thinking that can deal with uncertainty, change and look for solutions instead of looking for problems to avoid them.

(p.26) De Bono explains that, when the causes of the problem are not easy to find, or there are too many causes, they cannot all be removed.[3]

In this same direction, Richard Buchanan (1992) says that traditional design problem-solving techniques derived from a logical reasoning approach are insufficient to solve complex problems. These linear solution techniques, says Buchanan, need – as a first step – to define the problem in order to look for the solution: something impossible to face in complex problems because it is often indefinite. The same idea is expressed by Peter M. Senge from a different discipline and approach not related to visual thinking. He mentions in his preface for On Dialogue, that the efficacy of reductionist sciences "hinges on its being able to fragment or isolate its subject matter and it fails and may become actively dysfunctional when confronted by wholes, and by the need to understand and effectively action in a highly interdependent context." (Bohn, 2013).

The literature review explored shows two novelties that may be setting complex problems in the main agenda[4]: An increasing concern about the impact that our activities may have on a global environmental scale, and a concern by leading organizations and companies that have struggled because of their inability to deal with complexity and change. Kodak, Blockbuster and Nokia are some examples of successful leading companies that did not anticipate or react to those changes and lost their market leadership. It was hard for many industries to anticipate how the iPhone would change the rules of entire industries like telephone, Internet, photography, music and and others.[5] In the beginning of the 21st century, music record companies

[3] De Bono is criticizing the consequences of conceiving *absolute truth*. This argument is valid and very useful because it finds the consequences of the misuse of logic reasoning. However, I would argue that although Aristotle, believed in logic as the key instrument to reach the absolute truth or the Form of God, he thought that our physical world was in constant change.

[4] Complex problems are not something new. As Donella Meadows reminds us, "every person we encounter, every organization, every animal, garden, tree and forest is a complex system" (2008, p.3) This affirmation opens a new possibility of exploration. If complex problems are not something new, then societies may have been trying to find legitimate approaches to tackle these situations in ancient times. An opportunity to revisit them may be valuable to learn from those attempts.

[5] According to the Flickr stats report, The most popular camera used on Flickr is the iPhone (Jeffries, 2012)

could not anticipate the disruptive revolution that Napster, MySpace, iTunes, and recently, streaming music would make on the music market. The Amazon business model, and new reading platforms such as Kindle and the iPad have changed the rules of the book industry and service delivery so fast that competitors are still trying to find a strategy to remain in the market.[6] New forms of currency exchange like Bitcoin may confront the actual economic models in which governments are based, as it is decentralized from any institution, and created and held electronically.[7] This, and many other disruptive changes driven by new products, services and technologies have made organizations and communities pay careful attention to alternative ways of understanding and predicting complex problems and changes they may be facing.

The solutions suggested to solve complex problems are diverse. They all look for alternatives that do not rely entirely on traditional linear design solutions and on finding new ways to frame and understand problems. Many of the solutions suggested in the literature review can take advantage by using visual thinking tools and design practices to help us think and frame the problems from different perspectives. Therefore, before exploring the suggested solutions, I will briefly define and explain the main characteristics and uses of visual and design thinking practices. This will clarify the relevance that visual tools and skills may bring as an alternative and complementary mindset to traditional linear way of thinking, when facing complex problems.

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6 Clayton Christensen, an influential business thinker and Professor of Business Administration at the Harvard Business School, helps us to understand why traditional organizations are failing to adapt to disruptive changes. He explains that traditional performance metrics may not see disruptive innovations attractive because they may have lower gross margins or their target markets seem smaller. By discarding those innovations, a new space is created for disruptive competitors to emerge (Christensen, Overdorf, 2000) (Disruptive innovation is a term coined by Christensen and it is defined as a process by which a product or service takes root initially in simple applications at the bottom of a market and then relentlessly moves up market, eventually displacing established competitors).

7 "Bitcoin has made significant progress in its adoption and usage since it was unveiled in 2009. Its evolution over the next few years will determine whether this leading cryptocurrency will become an integral part of the global financial system, or whether it is destined to remain a niche player." (Investopediastaff, 2012). Forbes.

4.3 A broader definition of Communication

This project searches for the role that visual communication may have on better practices to understand complex problems. This chapter explains why the different communication media and perception channels we use are so important when framing and understanding our reality (and problems).

The term *communication* is key to find possible answers to the main research question. According to the Oxford English Dictionary[8]:

Communication

The imparting or exchanging of information by speaking, writing, or using some other medium.

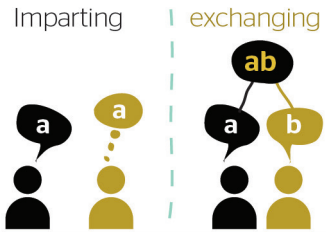


Figure 9. Definition of communication according to the dictionary.
The person icon was created by Francesco Terzini from the Noun Project

This definition may be useful when analyzing the different parts that constitute the communication process – something that we will need to do in this work – but it is too vague when trying to understand or explain how these complex processes affect the thoughts, comprehension and construction of the message by the entities implied in the process. Humberto Maturana, a biologist and systems theorist, defines communication as a "mutual coupling of coordinated actions between members of the same social unit" (Maturana, 1987). By explaining interrelations of biological entities, Maturana is able to develop a universal law for cognition. He explains why and how *communication* and what he calls *languaging*, has a crucial role as the only source of knowledge and learning from our external environment. From this theory, we can infer that as communication channels change from one person to another, reality will be particular to every entity and will be based on their channels and capacity to

8 http://www.oxforddictionaries.com/definition/English/communication

perceive and understand messages. This will in turn, exchange or act in consequence to that subjective perceived reality. From a different perspective, Marshall McLuhan exposed the power of the media to shape the message, and the influence that digital communication media may have in our lives. (McLuhan, 1964; McLuhan, E., & Zingrone, 1995). The main interest of this research when referencing communication is to understand that visual communication enhances different ways to think. Oral, written and visual language –including channel variations like speech, dialogue, conference, printed book, digital book, instant messages, telephone and Skype calls, advertising, television, drawings, gestures and live or recorded music – all provide different meanings to the messages they contain. Nicholas Carr, an American writer who has explored the effect of digital technologies on cognition for several years argues how the internet is already changing the way we think[9].

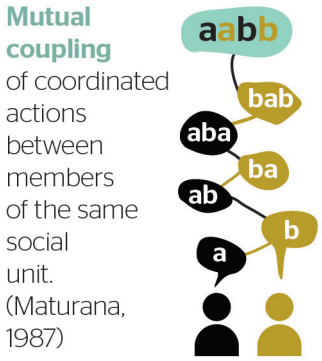
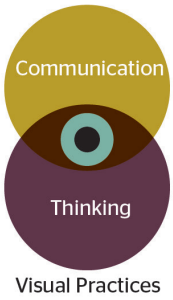


Figure 10. Definition of communication according to Humberto Maturana.

Figure 11. The medium is the message

[9] Carr provides a literature review about scientific evidence, as well as historical examples proving his hypothesis, like Friedrich Nietzsche and how the typewriter made him write in a different way, or Socrates arguing that "our dependence on the technology of the alphabet will alter a person's mind, and not for the better." (Carr, 2011).

4.4 Visual thinking + Visual Communication Practices: A rhetoric toolset, skillset and mindset



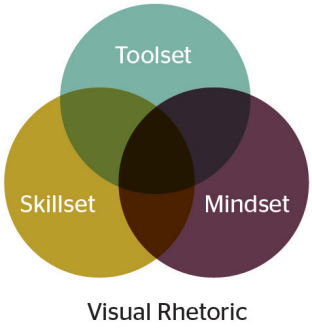


Figure 12. Visual practices: Visual Communication + Visual Thinking
Figure 13. Visual Rhetoric: Toolset, skillset and mindset

Based on the previous definition explored on communication and by showing some recent approaches on rhetorical studies and on visual practices recent development, this chapter explores and explains why visual communication and visual thinking practices must be seen as a whole toolset, skillset and mindset for a better comprehention of their communicative and transformative scope .

Throughout history, the studies of how we use language and communication systems and how they affect the way we think can take us back to the Classical Rhetoric studies. Those are based first on oral and then on textual communication. Meanwhile visual communication has been studied from a different perspective, related to art and normally scoped to their capacity to persuade the pathos of the audiences, nowadays, most of what graphic designers know about visual rhetoric concerns understanding and controlling the symbols and meanings of different visual and text elements of a graphic.

Malcolm Barnard (Jenks, 1995), wrote about how advertising practices evolved in the second half of the 19th century, from the supposedly innocent beginnings of informing, through to the modern meaning of persuasion. The most used rhetorical resources have been successfully adapted from the oral tradition into the abstract language of the visual. As visual communication is a process which requires more time

than verbal language to be created, exchanging information becomes a slow process, and thus, more thought and care can be placed into meaning. Therefore, we can find that visual rhetoric studies focus mainly on this aspect of the communication process, which is: imparting. As new technologies allow us to impart more visual symbols and other communication signals at a faster pace, and visual thinking emerges as a recognized practice, we must consider the possibility of expanding visual practices studies into a rhetoric that considers them as toolset, skillset and mindset able to frame and face our reality.

Sonja Foss, from the University of Colorado, *Framing the study of visual rhetoric: Toward a transformation of rhetorical theory. Defining visual rhetorics* (Foss, 2014), calls for a more extensive definition of rhetoric. Foss claims that rhetoric "is the human use of symbols to communicate." By saying this, Sonja suggests that rhetoric is not scoped only to oral or written language, but it contains all the possible symbols that we could interpret through our senses.(Foss, 2014).The importance of including visuals in rhetoric studies is clearly stated when she says that "Visual artifacts constitute a major part of the rhetorical environment, and to ignore them to focus only on verbal discourse means we understand only a minuscule portion of the symbols that affect us daily."

With this consideration in mind, I included in this MRP two categories of visual practices for their research: visual communication and visual thinking. The former refers to the practices, tools and skills that helps us to impart and exchange information, such as advertising, graphic design, photography, etc., and the latter, the communication practices that are deliberately using and taking advantage of the mindset enhanced by the use of such and other specialized visual tools and skills such as diagrams, icons, and other strategic visual display. Together, visual communication practices and visual thinking conforms the toolset, skillset and mindset studied in this work as vehicles to bring a better understanding and an alternative to the traditional linear thinking.

4.5 Visual Communication Characteristics

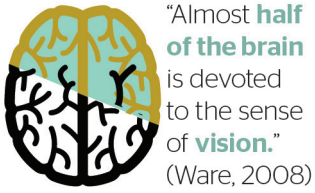


Figure 14. Visual Brain. *The brain icon was created by hunotika from the Noun Project*

In this chapter, I will show some of the key characteristics of visual communication that make them a relevant tool for perceiving, imagine and understanding our reality.

Even before humans were able to talk, we perceived the world through our senses. By touching, smelling, tasting, hearing and seeing, we receive information and interpret it in our minds. Among all of these senses, it is perhaps the visual sense that we most use to communicate. Almost half of the human brain is devoted to the sense of vision (Ware, 2008). Our incredible capacity to think and perceive has helped us to create and develop complex systems of symbols and signals that allow us to communicate at higher levels. It was a long history of visual communication tools development that led to the concept of graphic design as a discipline at the beginning of the 20th century. The use of visuals as a communication tool has been theorized since then and companies, organizations, governments and people now use it in very effective ways. Graphic design and visual communication are fully recognized for their impact and their strong capability to persuade us.

Robert McKim, a pioneering visual thinking theorist from the 1970s describes three kinds of visual imagery as vehicles to visual thinking: "*seeing, imagining and drawing*" (McKim, 1972). Visuals, as a language, can help us to represent, interpret and abstract our world and our thoughts in different ways that other languages may not be able to. By making drawings, glyphs, symbols, and using colours and textures we have been able to communicate our ideas, dreams and desires. The alphabet for example, is a set of symbols that we use to represent phonemes so we can translate oral language into a written one and develop new media to communicate and think. Arts

like painting, sculpture, textile and disciplines like engineering and architecture, often use drawings as a tool to express feelings, explain ideas and describe products and processes. But what is the kind of thinking that using visual communication practices enhances? In which way does it differ from a more logical linear thinking? Why is it relevant when facing complex problems?

4.6 Visual Thinking Characteristics

This chapter describes the contribution of visual thinking according to different experts in the field providing different categorizations according to their main uses, domains, tools, skills or solutions they provide. All of them point –from their own perspectives– to the importance that visual practices may have when facing complex problems.

David Sibbet, a renowned pioneer in visual thinking practices, explains in a clear and practical way (Sibbet, 2010) how visuals may help to resolve "confusions in groups that arise from inadequate or conflicting mental models". Sibbet provides many examples to enhance enacting, imagination, engagement and thinking in group meetings by using visuals. Dan Roam (2009) teaches us how to use simple graphics to discover, develop and sell ideas using four steps of visual thinking. Dave Gray (2014) suggests how visualization can help, in a management context, to make information more tangible, actionable, and clearer, so teams can have a better understanding, and therefore, make better decisions and have better results. He also suggests three dimensions of experience in which the use of visuals may help managers to develop better ideas, create more engagement and improve their actions: rational, with systematic and logical visuals, like chart diagrams; emotional, by using metaphors to help create engagement and excitement; and practical, to explain processes, structures and possible changes and actions (Gray, 2010).

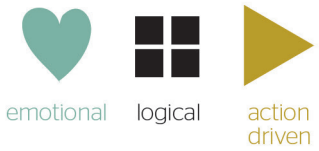


Figure 15. Three dimensions of visual experience, according to Dave Gray

Evert Lindquist, Director of the Institute of Public Administration at the University of Victoria, has been interested in how governments address complex policy challenges, and the way that visual practices may help in analyzing, advising and engaging in different complex policy issues, Lindquist (2011) makes a clear overview of the professional practice of visual communication by identifying three main domains in which they originate: Information visualization and data analytics; graphics and information display; and visual facilitation for thinking and strategy.

A different categorization made collaboratively by Lindquist and Sibbet was recently developed and exposed on the September 27th meeting of Northern California Chapter of the National Speakers Association. (Exec-com, 2014). The map shows visual facilitation (without strategy) as one domain, and it adds cognitive visualization as a new category.

4.7 Examples of Visual Thinking Practices

Figure 16. Visual facilitation by Scriberia at the World Economic Forum in January 2013.

In the following section, I will show some recent examples of how visual practices are contributing in the different domains described by Lindquist (2011) and outlined in the previous section. Some of these visual practices are bolstered by different trends and drivers like the need to analyze big data and the need to engage audiences to facilitate and improve collaboration between teams. These examples show how visual practices can contribute to expand linear thinking methods –like data analytics– as well as enhance non-linear thinking methods –like systems and participatory thinking.–

Figure 17. Visual for Strategy . Student working on a System Strategy Process at the SFI Lab, OCAD U (2014).

4.7.1. Information Visualization and Data Analytics

Big Data Analysis

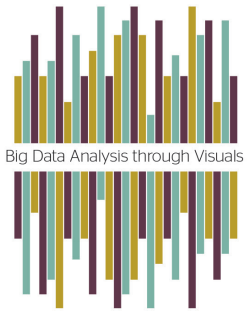


Figure 18. Big Data Analysis using graphic visualization in an intuitive way.

According to Forbes magazine, demand for big data expertise across a range of occupations saw significant growth in 2014. There was a 123.60% jump in demand for Information Technology Project Managers with big data expertise, and an 89.8% increase for Computer Systems Analysts. (Columbus 2014). IBM has just launched IBM Watson analytics, a powerful system to add, analyze and visualize large quantities of data and find patterns to transform information in knowledge at much greater than human speed. According to Steve Denning, Watson analytics is a potential game changer that may help to save IBM from its fall (Denning, 2014). The data analytic tool is making use of graphic visualizations in an intuitive way. According to Daniel Burrows, a technology forecaster and business strategist, "Watson can unlock the vast world of unstructured data that makes up as much as 80 percent of existing information today." (Denning, 2014). It is expected that IBM will be investing over $1 Billion in Watson Discovery Advisor, IBM Watson Explorer and IBM Watson Analytics (Columbus, 2014).

Patrick Maes, Chief Technology Officer of ANZ Bank), talks about making data analytics work smarter at the recent Gartner Symposium on the Gold Coast (Merret, 2014). He relayed an experiment done together with RMIT that took all FY2013 expenditure data and all accounts bills into a 3D visualization that allowed people to walk into the data and compare, for example, Taiwan versus Japan. He explained that the board members were able to "find things that they were not aware of just by looking at the data, (and) by interacting in an active way with the data instead of looking at long, two dimensional spreadsheets." As he says, "when we look at data we make it visual, we can find patterns that the machine would not be able to find (itself)." As the amount of information available increases, we need better research processes and we need to save time by looking faster. Visual communication practices will play a key role in unlocking the true potential of this field.

4.7.2. Graphics and Information Display

The way that information is presented is relevant to persuade audiences and communicate efficiently, assertive and quickly. Our attraction to beauty, our need for speed and new technological devices to communicate and generate visuals are some of the drivers that are enhancing visual practices.

Sharing and explaining information

The use of infographics[10] to share information is increasing in all fields. The term itself is becoming known in the business arena and society in general. Most newspapers and their online versions are using graphic information displays to show their research, news and information. Reforma, a leading newspaper in Mexico, disrupted the market 20 years ago with a full colour format, innovative typographies and ways to add titles and subtitles to facilitate quick readings. It also included data visualization graphics. All of these design innovations contributed to position Reforma as one of the best newspapers on the Mexican market. Antonio López Hidalgo (López, 2002), describes a similar story in Spanish newspapers and shows the most important characteristic of this new kind of graphic journalism as a two-speed-newspaper, that allows to have a quick view of the content by using graphic resources that displays more fragmented information to expedite reading.[11] The reader can then only go deep into reading the most interesting information.[12]

Figure 19. Double-reading design

[10] The term origins in the 1960 's as adjective: blend of information and graphic.
[11] He describes three kinds of visual journalistic formats: the two-speed reading, the quick reading and the new graphic.
[12] This contrast may be obtained with different graphic resources like using different typefonts, size, color, etc. El Mundo from spain uses Helvetica and Times for Main and secondary titles of a same page.

Vox <www.vox.com>, an online news site, whose main mission is to explain the news (Vox, 2014), makes a remarkable use of visual information by showing a compilation of infographics that help to understand the most diverse topics in the news, such as the recent ebola outbreak, the marijuana market and the history of the Roman Empire.

I can share an example of the usefulness of infographics beyond ornamental needs in my own experience. While working for HDOo in 2013, a change management consultancy in Mexico, which I worked at during 2013, infographic design played a key role in a big change management event for a client. Eight different areas were about to present a strategic rearrangement on the way they conformed and operated. Each Area Director, made a presentation to show the initiative to the whole company. Presentations had so many different visual and narrative styles that the reorganization was failing to present a unified visual strategy. By giving them an integrated graphic design approach, we created eight different infographics to each initiative. In that way we were able to unite them as part of a single strategy. Each infographic used the branding colours and one extra colour to distinguish it from the others. The infographic was also helpful to allow directors to structure the time and narrative of the event. The event was a success and the new initiatives were well received by the assistants.

Some remarkable compilations of infographics through the web can be seen on: www.informationisbeautiful.net. This site is curated by David McCandles, a writer and designer who recently spoke about the beauty of data visualization at a TED Talk that now has more than 2 million views.

Animated versions of infographics are also becoming popular. Kurzgesagt, a Munich-based design and animation studio publishes animated infographics on topics related to sciences, education and commerce. Their combined 30 videos now have more than 30 million views on Youtube (Youtube, 2014). Some of their private clients are Dell, Siemens, Microsoft and Adidas. (Kurgesagt, 2014).

Graphic Design and Transparency

Graphic design is a discipline for which the boundaries with other visual practices are often hard to define. Editorial design for books, newspapers and magazines are considered a specialization of graphic design. Therefore this kind of design is often considered a means to create a more engaging and beautiful design to enhance viewership and readership. I see in editorial design a much stronger utility as a crucial way to provide transparent information. The need for transparency and access to public information is a global trend and though the years, transparency levels in government and corporation world has increased. The Mexican government, for example, created in 2003, an autonomous, specialized and impartial body with decision-making autonomy in charge of guaranteeing the right to access public information[13] and it is responsible for implementing and enforcing the Federal Law of Transparency. On the corporate social responsibility field, Global Reporting Inititative (GRI), has pioneered and developed a comprehensive Sustainability Reporting Framework that is widely used around the world. The Framework – which includes the Reporting Guidelines, Sector Guidance and other resources – enables greater organizational transparency and accountability. However, many institutions and departments are getting behind and the reason is that their adherence to provide structured, hierarchical and clear data is missing. In this era where information is so abundant, editorial design is key in providing the appropriate information to make their information more easily readable.

Illustrated books for adults

We have seen in recent years, how different kinds of books that used to be mainly textual, have successfully incorporated illustrations and a more graphic based narrative into different disciplines. The *Business Model Generation* (Osterwalder and Pigneur, 2010), an acclaimed global bestseller is one notable example. *The Philosophy Book (Big Ideas simply explained)* (Buckingham, 2011), is part of a collection that explains psy-

[13] Federal Institute for Access to Public Information and Data Protection (IFAI)

chology, economics, politics, religion, etc. strongly supported by illustrations, infographics and other visual resources.

I had the opportunity to design an activity book for DEMAC A.C., a non-for-profit organization dedicated to support, document and publish texts written for women to enhance positive changes in their lives and in society. *Para perderle el miedo a la escritura (Losing the fear to write)* (Medina A, Zuñiga, M. 2013) is a fully illustrated book that encourages women to write about their lives. The book is based on the autobiographical writing workshops made by the organization for more than 10 years in different communities around Mexico. This book may be part of a global trend of the so called Activity Books, that are intended to encourage the reader to interact, write, and think creatively and are not exclusive for children anymore. Some examples are The *Listography* books by Lisa Nola, The *Open Day Book* (Earle, 2010).

Figure 20. *Para perderle el miedo a la escritura.* Illustrated Activity Book for adults

4.7.3. Visual Facilitation for Thinking and Strategy

Visual facilitation is being adopted by more companies and organization around the world. *Innovation Arts,* a successful strategy consultancy and design agency, has worked using visual thinking tools for the World Economic Forum in Davos, TED talks, BBC and The Guardian. (Bishop, 2013).

During 2014 at the World Economic Forum in Davos, Housatonic Design Network (HDN) had the opportunity to participate as a graphic facilitator for sessions concerning various topics, such as mobility, technology and projects about mineral processing and supporting the New Vision for Agriculture project (NVA). (HDN, 2014). A testimonial cited on the web page notes that "during the conference a lot of participants were very interested in the work Housatonic was doing and also wondering how to use it... We found the result very useful at the beginning of day 2 because it allowed us to start with an informal walk in front of the drawing and to summarize the outcomes of the first day." (CIDSE).

Business Model Generation book (Osterwalder, and Pigneur, 2010) provides the reader with multiple tools to help them to build, analyze and discuss business models. the *Business Model Canvas* or the V*alue Proposition Canvas* are very good examples of successful visual tools to facilitate strategy.

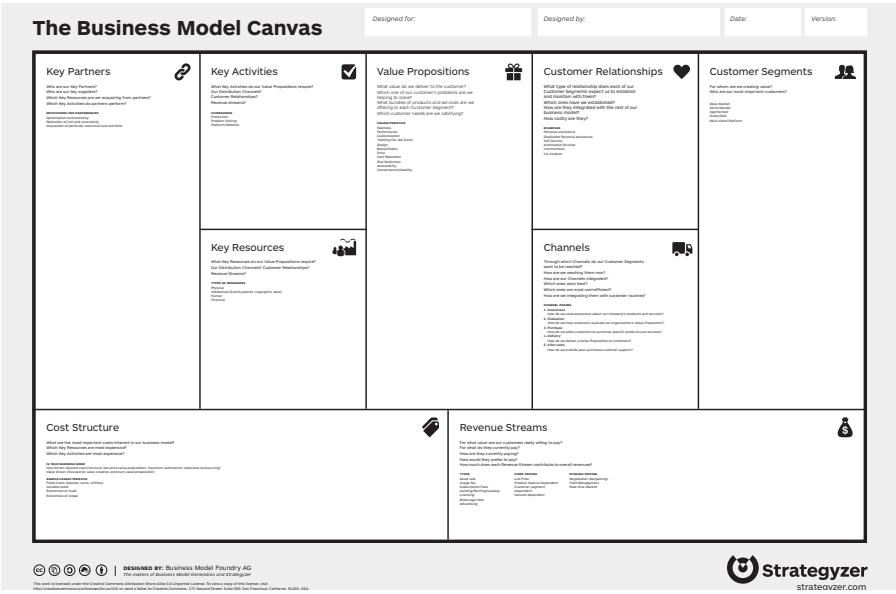


Figure 21. Business Model Canvas. *The Business Model Canvas is licensed under the Creative Commons Attribution-Share Alike 3.0 Unported License. http://creativecommons.org/licenses/by-sa/3.0 Retrieved from: http://www.businessmodelgeneration.com/canvas/bmc*

Systems Thinking

Jamshid Gharajedaghi notes in his book, *Systems thinking: Managing chaos and complexity* (Gharajedaghi, 2011), that businesses are eroding their competitive advantage as they follow an inertial, imitative and sub-optimized approach to solving problems, making it difficult for them to adapt and confront technological breakthroughs. He suggests

a systems-thinking approach to tackle complex problems; a multidimensional view that considers a holistic, cultural, operational and systems dimension.

Talking about systems can become very complex. By using visuals to draw systemic thinking we are able to share mental models and retain more data to understand the system as a whole or in part. As described by Birger Sevaldson, Systems Oriented Design is a new version of systems thinking and systems practice that is developed from within design thinking and design practice. (Sevaldson, 2011). It is systems thinking and systems practice tailored by and for designers. A great example of the use of how visuals –and storytelling –may help to explain systems is the animation: Feedback loops: *How nature gets its rhythms – Anje-Margriet Neutel* (TedEd, 2014), presented in the TedEd lessons online site explaining how feedback loops works.[14]

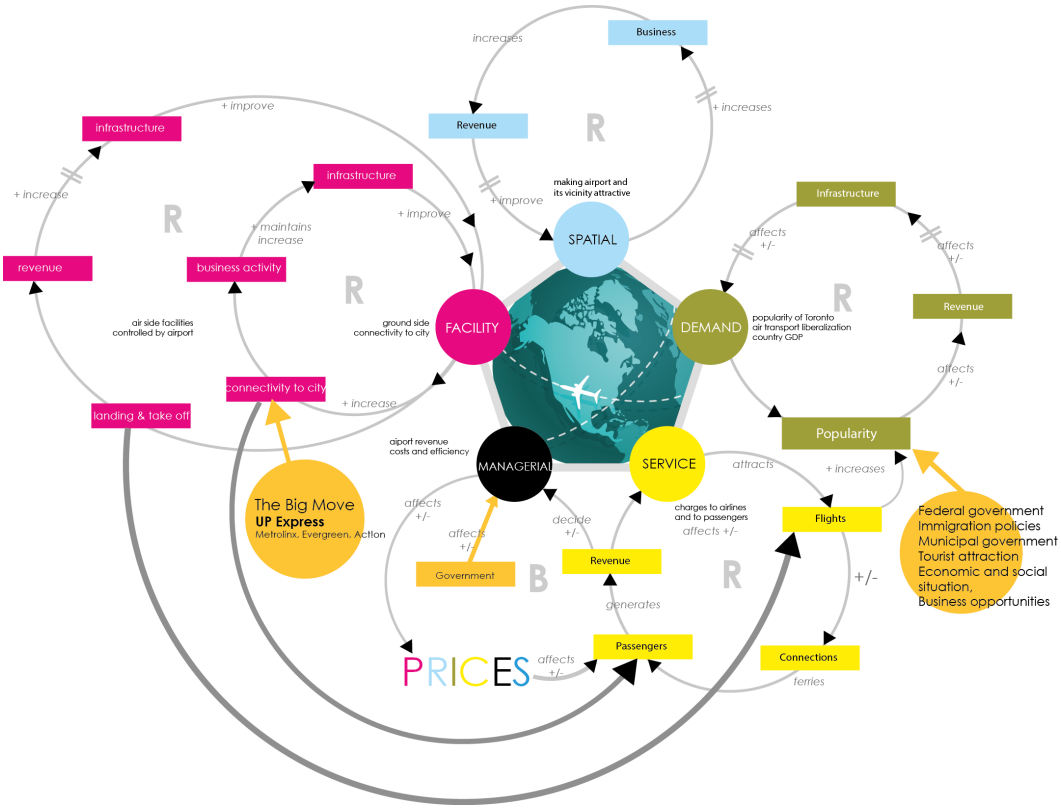


Figure 22. Example of visual system thinking. *Toronto Pearson International Airport Competitiveness* diagram produced for the OCAD university graduate course, Understanding Systems. Olabiyi Dipelou, Raja Mujerka and Rodolfo Taboada. (2014)

[14] http://ed.ted.com/lessons/feedback-loops-how-nature-gets-its-rhythms-anje-margriet-neutel

Visual and Design Thinking to Solve Complex Problems

Figure 23. Image of design thinking process. Ksenia Benifand, Krittika Sharma and Rodolfo Taboada working on a design thinking process at the SFI Lab, OCAD U (2014).

Richard Buchanan, a Professor of Design, Management and Information Systems at Weatherhead School, gives us a clue to using design-thinking to solve complex problems. He synthesizes traditional design methods to solve problems as a two-step process: problem definition and problem solution. He suggests that, in real practice, designers face problems that do not have definitive conditions or limits to design, making it very difficult to solve them in a linear design method.[15] Buchanan suggests that the designer has the capacity to confront problems that have unclear goals, as "the subject matter of design is potentially universal in scope, because design thinking may be applied to any area of human experience. But in the process of application, the designer must discover or invent a particular subject out of the problems and issues of specific circumstances." (Buchanan, 1992).[16]

Visualizing is a key part of every design process. When designing, some ideas are hard to describe with words, and often, words and ideas are hard to convert into images, products or services. If we remember the visual thinking process described by

[15] Buchanan need to add explanation about design thinking process.
[16] Buchanan make a very useful review on other thinkers supporting design thinking, like John Dewey,

McKim (Seeing, imagine drawing), we may find that these three action process brings understanding of a given object. When designing, we are creating something new and we can only see the result in our minds. If that idea cannot be visualized (or as Lester suggest: mentally verbalized/symbolized), it can not exist. Visualizing through sketching is a very effective process as a next step to take ideas through to tangible outcomes. As an example I will take one of my experiences as a teacher of graphic design at Universidad Iberoamericana. As part of the Digital creativity lab, I used to assign to my students, a poster for an hypothetical cinema festival. A poster is a basic outcome that covers the main aspects of graphic design (composition, impact, images, text, data, creativity and persuasion). Before jumping into Adobe Illustrator or Photoshop, I asked the students to bring 5 sketches of completely different ideas. It was very common for students to not bring a sketch, or to bring a sketch that was so unclear that lots of verbal explanation was needed. Those students were certain that their idea was excellent and that the poster will look great so many of them refused to make a better sketch and considered that action a waste of time. When those students tried to make their final poster, the results were not what they had in mind and they failed to finish the task. I see this kind of mistake very often, and my opinion, based on my student's and my own experience, is that things do not necessarily exist in our minds. They just start to reveal as soon as we start to work and sketch on the idea. In short: sketching is a crucial part of the design process.[17]

Another aspect to visualize when designing is that the designer can share the ideas clearly and co-creatively in teams. In this way, the design thinking process can become a collaborative process too. The efficiency of using dialogue as an integral part of the design process has been taken seriously by many as a way to find and frame complex problems from different perspectives.

[17] Tim Brown, director and CEO of IDEO recommends to make ideas visual (Brown, 2012). He suggests as a strategy for designing your life, for example, to think of your life as a prototype, and ask yourself what things you would change.

Conversations to Solve Complex Problems

Figure 24. Visual Facilitation enhancing conversations. Attendees at the *Canadian Governance in the Digital Era: Systems Mapping & Futures Workshop* (2014) having a conversation enriched by a 3 horizons mural. Mediated reference to visualize the future.

I previously mentioned the power that participatory dialogue has when facing and understanding complex realities. Societies have developed different models and techniques to enhance better conversations. Some recent examples are Dialogic learning (Flecha, 2000) and OpenSpace Technology (Owen, 2008). Other traditional approaches are roundtables, or, in Spanish speaking countries, the *tertulias.*[18] The main characteristics of good conversations may differ according to each method, but they generally agree with developing egalitarian environments, practice active listening, removal of the ego, thinking and freedom balanced with respect.

Verbal communication is commonplace. This is because oral communication as a conversational tool to exchange ideas (or develop a languaging process as described by Maturana) is quicker than other languages. Arthur Schopenhauer has this to say when comparing visual and auditory language:

[18] A type of Spanish literary salon that was popular in Spain from at least the 17th century and that eventually replaced the more formal academies. The term derives in habitual public gatherings to converse or discuss about a specific topic.

> *It is true that the eye can perceive much more stimulus that the ear, but we are not able to reproduce them for the eye but with the help of certain instruments. We are not able to reproduce and change the visible signs with the speed that we can do with the hearing signals, thanks to the agile tongue organ. This is why the ear is the essential sense of language and therefore of reasoning.* (Schopenhauer, 1998)

When making a conversation, visuals cannot compete with the speed of oral language. On the other hand, we can see how in digital devices "reading is losing to watching because viewing requires little mental processing to be perceived" (Lester, 2006). And as visual practices gain speed thanks to new technologies, they grow in their communicative value. Graphic recording, for example, can create graphics and images to complement the exchange of information and expand our understanding when having verbal or written conversations.

Krznaric explores in in his paper "how change happens" how multidisciplinary view and a broad range of approaches can make us more flexible when tackling the challenges facing our communities and conclude that one of the most important issues in which that most development strategies fail is that they "overlook the importance of personal relationships and promoting mutual understanding as a strategy of change" (Krznaric, 2007).

Visual Facilitation to Enhance Better Conversations.

Visual and Design Thinking provides important toolsets, skillsets and mindsets that can help us to find, frame and solve complex problems. I had the opportunity to observe and document an event organized by SSHRC partnership development grant led by OCAD University's Strategic Innovation Lab (sLab).[19] The event *Canadian Governance in the Digital Era: Systems Mapping & Futures Workshop* used many innovative visual practices to enhance conversation and interaction between a diverse group conformed by practitioners, experts and change-makers from inside and outside government.

[19] sLab (Strategic Innovation Lab) is a centre for design, innovation and strategic foresight research and development at OCAD University in Toronto, Ontario, Canada (retrieved: http://slab.ocadu.ca)

Figure 25. Graphic Recording. Graphic recording by PlayThink (Patricia Kambitsch and Kelly Kornet) at the *Canadian Governance in the Digital Era: Systems Mapping & Futures Workshop* (2014).

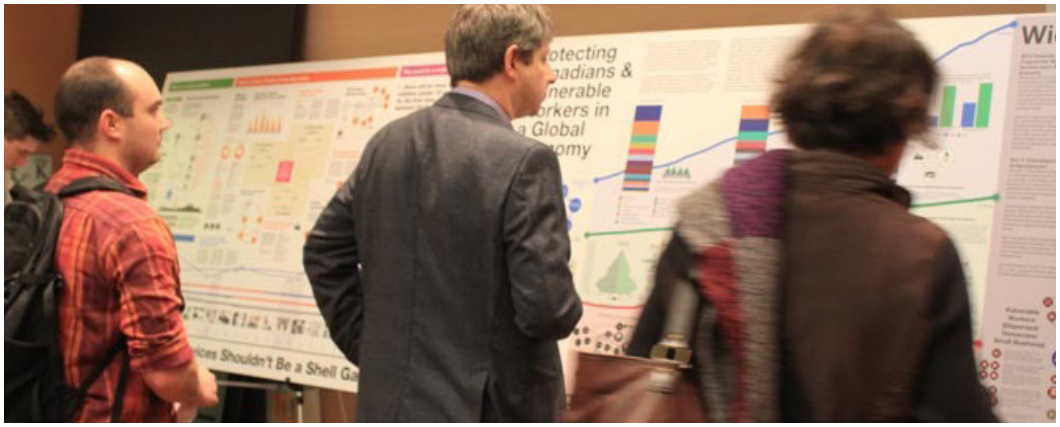


Figure 26. Gigamaps. Attendees at the *Canadian Governance in the Digital Era: Systems Mapping & Futures Workshop* (2014) looking at different Gigamaps made by Strategic Foresight and Innovation students from OCAD University.

Figure 27. Visual facilitation. At the *Canadian Governance in the Digital Era: Systems Mapping & Futures Workshop* (2014)

The opportunity to take part in that documentation was helpful for my MRP as it allowed me to have a closer qualitative observation and real practical experience in live sketching and visual facilitation to enhance conversations. The main goal of the project was to explore the unprecedented challenges and opportunities facing governing institutions and associated groups in the digital era, through research and engagement activities that developed a network equipped to understand these dynamics and to guide innovation. The diversity of the target attendees required the development of a welcoming and inclusive format where all participants felt encouraged to contribute, talk and express their ideas. The event made use of visual facilitation across multiple segments, including lighting talks, rounds of comments, semi-structured teams and an Open Space format. The visuals played an important role in engaging, summarizing and documenting the ideas expressed during the event. Although the main protagonist of the event was the oral dialogue and visuals were a complementary activity, it was remarkable how central the visual facilitation became during the proceedings. After the event, the sLab team prepared a gigamap for an upcoming event: Digital Governance Forum, where participants would take it as a departure point for participant contributions. Graphic recording played a role in engaging, documenting and lastly transforming a new kind of visual practice to continue to enhance better conversations.

An explanation on how the use of visuals –like graphic recording or visual facilitation showed in the example above–, positively improves understanding in conversations may be explained by an empirical investigation presented at the 22nd Annual Conference of the Cognitive Science Society (Umata, Ichiro, Atsushi Shimojima, and Yasuhiro Katagiri, 2000). They found that when using two independent systems of representation: spoken language and graphics in a dialogue, it significantly extends the expressive capacity of the spoken language used in most cases. The graphic representations worked and contributed as mediated reference and dual description.[20]

[20] Mediated reference is a case where a linguistic expression reaches its "final" referent due to the fact that its "immediate" referent has a referential connection to this final one in the system of graphics. Dual description is a case where a declarative sentence is used to describe a fact that holds in the gra-

This makes the graphic-linguistic relation, not only a parallel composition of individual expressions but it also provides a relation in which graphics extend the expressive (and thinking) capacity of the spoken language.

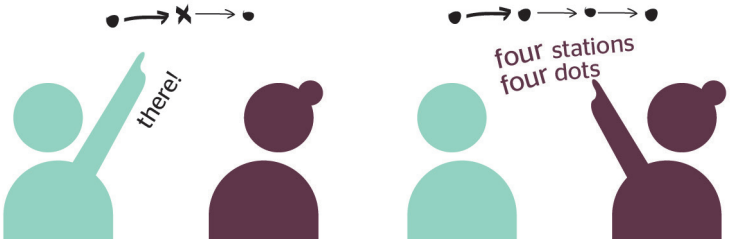


Figure 28. Mediated reference.
Figure 29. Dual Description:"We need to complete four", (stations, dots).
Based on *Talking though Graphics* (Umata, 2000)

4.8 How new technologies are enhancing new forms of visuals for exchanging/communicating/thinking

The spread of new technologies in design software and printing techniques allow graphic designers to work faster. The use of technologies facilitates the manipulation of graphics like photography or drawings[21] and other visuals such as Microsoft PowerPoint –a well-known application that allows non-graphic designers and visual communication experts to make use of visuals for creating presentations in the professional business field–. Our fascination with using visuals combined with an accessible computer tool has led us to experiment with visuals, making PowerPoint a very successful tool, and, as Dave Gray explains in his article *Why PowerPoint rules the business world* (Gray, 2008), "it shows no signs of going away anytime soon."

This article, however, also mentions the discredit that this presentation format has had for confusing and boring the audience. Edward Tufte, Professor Emeritus of political science, computer science, statistics and graphic design at Yale, affirms that "PowerPoint is *evil"(Tufte,* 2003) and compares it with a drug that promised to make us beautiful but instead, "induced stupidity, turned everyone into bores, wasted time,

phic as well as the corresponding fact in the situation represented by the graphic.
[21] For example, the fascination of editing and sharing photographs through Instagram.

and degraded the quality and credibility of communication". Tufte blames the use of bullet points organized onto slides because this often reduces the analytical quality of presentations, weakens verbal and spatial reasoning and almost always corrupts statistical analysis. (Tufte, 2003) Gray took the chance to talk about something that seems a key point in visual communications in today's world. He affirms that the problem is not the tool, but the lack of visual literacy[22] among PowerPoint users. Gray suggests we should "teach visual literacy in our schools, and to our business people." (Gray, 2008b) This, I believe, would definitely to improve the quality of our presentations, no matter which media or software we use in the future.

The rise of the Internet as a platform to share information has allowed us to create new channels to capture, create and share images more easily. Memes[23] of images that can easily be created by anyone conveying impactful, funny and clever messages combining available images on the web with text are a very popular and successful way to communicate through Facebook and other digital social networks. The use of emoticons on online chats applications and web forums is now normal in almost every textual conversation. For example, Line.me <http://line.me>, a chat application, is trying to differentiate and grow by providing a vast library of emoticons for their users.

Another variation of emoticons are the kaomojis: emoticons created using Japanese and other 2-byte characters that English keyboards don't easily have access to (Japaneseemoticons.net, 2014). This variation of emoticons is particularly interesting because it reveals an important characteristic that visual symbols[24] have: they may

[22] The term is credited to John Debes, co-founder of the International Visual Literacy Association. (Avgerinou, 2012). According to Gray Gray Visual Rhetoric is "the ability to both read and write visual information; the ability to learn visually; to think and solve problems in the visual domain" (2008b).
[23] Clinton Richard Dawkins, an evolutionary biologist and ethologist used the term "meme" as the cultural analog to "gene" (Dawkins, 1976). Meme "is ascribed to an idea, behaviour or style that spreads from person to person within a culture... An internet meme is a hijacking of the original idea and that instead of mutating by random change and spreading by a form of Darwinian selection, they are altered deliberately by human creativity. Unlike with genes (and Dawkins' original meaning of "meme"), there is no attempt at accuracy of copying; internet memes are deliberately altered." (Solon, 2013).
[24] Icons, Indexes, and Symbols (See figure 33): C.S. Peirce, defines a sign as"anything which is so determined by something else, called its object, and so determines an effect upon a person, which

Figure 30. ASCII Art. Our eagerness to make graphics. Retrieved from: http://commons.wikimedia.org/wiki/File:ASCII_ART_Zebra.jpg

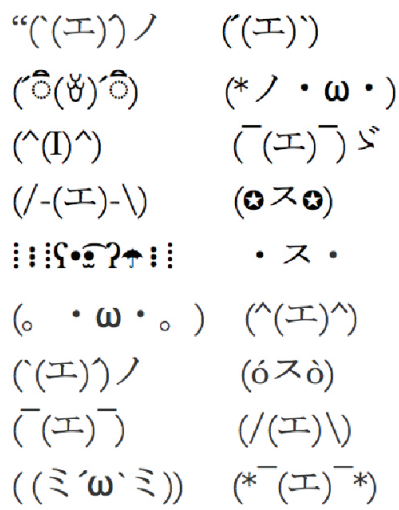


Figure 31. Eighteen kaomojis of bears: Retrieved: www.japaneseemoticons.net

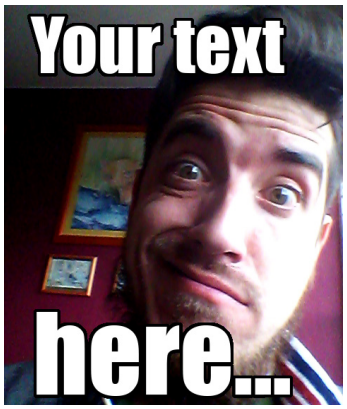


Figure 32. Memes: strengthe-ninig messages through visuals.

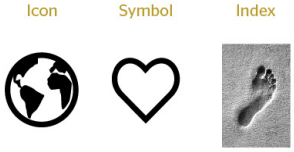


Figure 33. Three kinds of signs

change and still be understood. For example, there are more than 200 kaomojis to represent a bear, and we can understand most of them even if it is the first time we see them. This is because visual icons are not, unlike words or letters, based on social conventions. Colin Ware, a specialist in advanced data visualization, computer science (MMath, Waterloo) and in the psychology of perception (PhD, Toronto), distinguishes important differences that visual thinking and language–based thinking have. He explains how language is a socially-developed system of shared symbols that can be expressed through speech or text and that those symbols are invented. Visual-thinking basis, on the contrary, "is not learned symbols but pattern perception." This means that our understanding of visuals does not come (only) from cultural convention, but as well from our visual experiences as we interact with the world. According to Ware, "our pattern perception is partly innate and partly learned." (Ware, p.131).

It is hard to argue against the proposition that the facility and desire to share and generate graphics, symbols and images on digital devices may be enhancing new possibilities of visual communication that not only impart, but exchange information in faster ways, making visuals a more dynamic language.

An example of our desire to create and communicate with graphics can be seen, if we remember the beginning of personal computers. The operative systems only allows for adding text characters into the screen but it did not take too much time for popularizing a new kind of graphic representation made exclusively with the characters available at those operative systems. The ASCII art may be boosted bya a genuine enthusiasm and inclination to communicate and create graphics. A recent example to show where imagination and desire to use graphics can be demonstrated by looking at the first drone-grafitti reported in New York City (Michel, 2015).

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effect I call its interpretant, that the later is thereby mediately determined by the former." He categorize signs into three main classes: icons, indexes ans symbols, depending on what object requires for successful signification: *Icon*, when the sign reflect qualitative features of the object *; index* when the sign utilize some existential or physical connection between it and its object; *symbol*, when the sign utilize some convention, habit, or social rule or law that connects it with its object (Atkin, 2006). .

4.9 A More Visual and Connected World: Trends and Statistics in Visual Communication Practices

Based on my previous research as part of an independent study about the future of illustrated books with regards new digital technologies and platforms for my SFI Program at OCADU, I cite the most important signals, trends and drivers that show evidence that visuals as communication tools will become more relevant in the future.

- Successful social networks like Facebook and Twitter, have included more actively the use of images and/or videos. Facebook posts that include images are more likely to receive a response.[25] According to Twitter blog (World Economic Forum, Vis, 2014): *"Twitter* has reported[26] that including an image in a tweet gives verified users a bump of 35% in retweets compared to what they would normally get, further boosting the use of pictures."

- There is an increasing facility for all audiences to generate images in an easy and effective way. (Meme generators, photo-editor apps, dynamic website templates).

-According to a web usability study by Jakob Nielsen, people only read an average of 28% of the text on a standard web page. (Nielsen, 1997)

-There is an increasing number of successful social networks that are visually based, including: Flickr, Pinterest, Instagram, Line.me, Tumblr, Tinder, Vine, Snapchat

-We are changing the amount and purpose we make use of different communication media to learn, and spend our free time. Common Sense Media found that "reading rates don't just fall as kids grow up, but they've also dropped dramatically over the last three decades, with 45 percent of 17-year-olds admitting they read by choice only once or twice a year" (Time magazine online, Alter, 2014). According to PwC,

[25]According to Kissmetrics, photos get 53% more likes, 104% more comments and 84% more click-throughs on links than text-based posts. And as we've mentioned before, self-explanatory photos seem to perform best. (Cooper, 2013).

[26] https://blog.twitter.com/2014/what-fuels-a-tweets-engagement

the U.S. print and audiobook market value will fall from 13.1 billion in 2011 to 7.94 billion U.S. dollars in 2018. In contrast, the cinema industry revenue is projected to grow from 87.44 billion US dollars in 2011 to 106.01 billion US dollars in 2017.

Almost a quarter of Internet users (23%) had met someone online who they did not know before (Dutton, 2009).

-Today, 20%of the U.S. population can use a computer. But 80% of school-age children have learned to become computer literate (Lester, 2006).

-98% of all the words and pictures created in the world will be computer mediated(Sculley, as cited on Lester 2006).

5. Considerations on Visual Communication Practices

Figure 37. Collaboration and participation. Sharing common mental models.
Figure 38. Connectedness demands new understanding
Figure 39. Visual Literacy

As highlighted above, visual communication practices taken together offer a broad and powerful toolset, skillset and mindset enabling diverse groups from two to two million to frame, share and understand ideas and build toward shared mental models of complex problems and innovative solutions. Visual icons transcend language barriers and in many instances have been globally adopted. They have always been a very important way to perceive our world. We send and receive a lot of information visually. Therefore, it is natural to easily adopt new forms of visual communication.

New communication technologies, information availability and our need for speed are facilitating and enhancing visual communication practices that are engaging, simplified, impactful and memorable: they may become a more relevant tool for shaping and sharing our thoughts.

Visual thinking practices are becoming a useful toolset, skillset and mindset for organizations and societies to face complex problems. These practices help us to imagine solutions, design, prototype and enhance collaboration and participation from multi-perspective views. It also helps to explain and clarify strategies and share them with the different stakeholders. For our self-betterment, it is a proactive way to keep improving our thinking and actions. Design thinking is the key ingredient to take previous knowledge, research and logical reasoning into an evolving and transformative practice that keeps improving solutions.

Based on the research conducted for this project and on my own experience, I enlist some considerations that may be useful for the practice and study of visual communication:

5.1. Collaboration and Participation

The intersubjective nature of practices like graphic facilitation enhances participation across multidisciplinary teams and opens the possibility to share mental models and build insights and knowledge on complex levels. This multi-perspective and collaborative work is the key for solving complex problems, as it helps us to understand and transpose different views of a problem. The book Business Model Generation (Osterwalder, 2011) is the result of an effort that includes collaboration from more than 470 strategy practitioners in 45 countries. Governance, democracy and organization structures needs to find better ways to communicate and create participatory environments.[27]

[27] The research on Digital Governance by s-Lab is an example of this concern.

5.2. Connectedness demands new understanding and more inclusiveness

The connectedness and unexpected effects that our actions are having on the environment and social order are demanding a systemic view that makes us understand that our problems are more complex than we can imagine, and consequently cannot be solved using established linear and isolated solutions. Alternative methods are required. Visual thinking and visual communication practices are providing us with unique ways of framing and solving problems, such as sharing ideas or making participatory mental models tangible and understandable. This enhances participatory action and meaningful conversations with broader audiences that may fulfill the demands that a more interconnected world requires.

5.3. Visual Literacy: The Exchange of Information

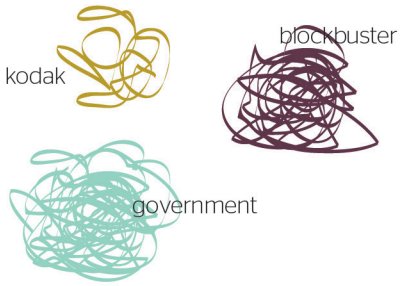
Technologies are allowing us to communicate faster. Our visual capacity demands a better visual literacy that will open opportunities for new forms of communication and thinking. Like Kaomojis, that emerge from disparate attempts to communicate through visuals, there are formal efforts like *The Noun Project*[28], which is building a huge library of icons anyone can understand. Community can contribute by uploading their own icons and enrich the library.

According to Dave Gray "What we are seeing today on the internet is the emergence of a truly global culture, a culture that communicates visually..." Gray suggests that thanks to the thinking tools that are available today, people's visual literacy is slowly rising." He also suggests that visual literacy is not only about *reading* but also about learning to *write* visually. Gray goes further with this idea and it seems that he has taken seriously the task of improving visualization skills and providing us with lots of exercises and insights on how to develop our visual literacy on his web page[29] (Gray, 2014). In the Appendix section B, you will find a an proposal to excercise our visual literacy in a Visual Conversation Hackathon.

[28] http://thenounproject.com
[29] http://www.davegrayinfo.com/visual-thinking-school/

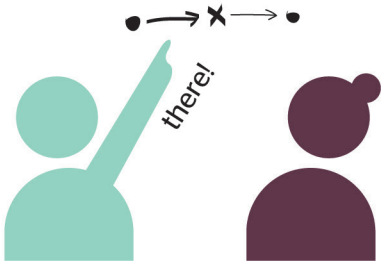
6. Conclusions

Organizations are concerned about the rise of complexity



Rhetoric and logical reasoning alone (verbally-centered practices) are poor at addressing new challenges.

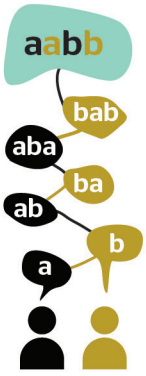
Enrichment of dialogue by visual thinking and visual communication practices addresses linear-thinking limits



Such contributions are possible due to the **particularities that the toolsets, skillsets and mindsets that visual practices** provide.

Technologies brings complexity a new dimension by **speeding up the pace of changes** and **creating more connectivity.** Technologies are enhancing **visually based platforms of communication.**

A broader definition of communication like the languaging theory of Humberto Maturana, brings **communication a crucial role as the only bridge to change on our actions.**



Visual practices provide the **add-on for logical thinking** to break linearity and **face complexity.**

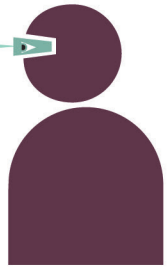


Figure 40. Conclusions

Organizations are concerned about the rise of complexity and rapid pace of change driven by new technologies and interconnectedness. The disruption that services and products like the iPhone, iTunes, digital photography, etc., have brought to different industries, were not anticipated by many successful companies, resulting in an inability to react and adapt to those changes.

Rhetoric and logical reasoning alone (verbally-centered practices) are poor at addressing new challenges. As reviewed in the first two chapters, the linear thinking used in traditional logic prevents us from properly appreciating complex problems. Using logic alone, complex problems seem hard to describe, their boundaries seem ill-defined and their variables and causes are obscure. .

Enrichment of dialogue by visual thinking and visual communication practices (visually-centered practices) addresses linear-thinking limits by enhancing clearer, actionable and more participatory conversations. Visualizations work as a tangible support to provide mediated references and "dual descriptions" that contribute to extend verbal expressive capacity in most cases. Graphic recording and visual facilitation have demonstrated their capacity to engage and enhance verbal conversations around complex problems. The Canadian Governance in the Digital Era event mentioned earlier is one example.

Such contributions are possible due to the particularities that the toolsets, skillsets and mindsets that visual practices provide. By citing some psychological implications demonstrated mainly by Colin Ware, we found how visual is not only based on learned symbols but on pattern perception as well. It has been present since the beginning of history, to make communication of ideas more attractive and engaging. The ability to make tangible visualizations enhances participation, co-creation and collaboration, and allows groups to share common mental models. Pattern perception helps us to display complex information. Drawings based on symbols can help to discover non-linear models, like those used for systems thinking. Visual

symbols, icons or signs can transcend language barriers as it may become a globally understood language.

A broader definition of communication like the languaging theory of Humberto Maturana, brings communication a crucial role as the only bridge to change on our actions. Communication theories from Marshall McLuhan, and recent evidence provided, show us that the media we use to communicate builds our thinking and understanding. Therefore, we should be aware that oral, written, visual and any other form of communication, provide us with different resources to build and shape our thoughts and face the complexity of our surroundings. Different practices to deal with complexity shown in this paper brings human dialogue as a core practice to find solutions. As visual practices demonstrates its ability to facilitate and improve them, it will gain the position it deserves as a complex problem solving tool.

Technologies plays a double role in this entanglement. First, it brings complexity a new dimension by speeding up the pace of changes and creating more connectivity. Second, technologies are enhancing visually based platforms of communication. Based on the trends and statistics shown previously, I argued that social networks, news media, and web interfaces design, are increasing the amount of visual resources they display. New practices like double reading, quick reading and infographics, together with traditional visual practices such as photographs, video or drawings, are helping users to find, select and engage into the information available on the web. According to different statistics and trend reviews, users are reading less and seeing more. At the same time, the speed and capacity to share information through computers and mobile devices is unprecedented. This factor is facilitating and speeding up the capability of users to handle visual practices such as icons, symbols, memes, photographs, maps in order to impart and exchange information in a more efficient way. Technologies will enhance even more visual practices and that will impose and increase our ability to communicate and think visually.

Visual practices are not the solution to complex problems. But the toolset, skillset and mindset that visual thinking practices brings, provide the add-on for logical thinking to break linearity and face complexity. The hybrid formula is powerful, but its effectiveness will rely in our capacity to expand our literacy in visual, written and oral language. The recognizement and adoption of this new hybrid (verbal + visual + textual) practices, will give us a fighting chance to address these complex problems.

Two main questions were set for this Major Research Project. The answers, as I mentioned before are not definite (as they are exploratory questions dealing with complexity), but the answer reached on this paper may help to bring to light the validity to continue developing visual practices as a way to deal with complex problems.

1. How can we make better use of visual thinking and visual communication practices to enhance understanding with regard to complex problems in society?

Visual thinking is revealed as a complementary and transformative practice when having strategic conversations as it may provide with models and references that facilitate non linear thinking, and will work together with logic to bring explanation and broader understanding of complex problems.

2. Is there evidence to suggest that understanding will come to rely more strongly on visual thinking and communication approaches?

Global connectedness is a factor that influences our dependence on visual representations instead of verbal communication. It transcends the limits that languages establish. Our society moves fast, and we do not have much time to read long sets of instructions. Visual communication saves us time in certain situations and provides us with the non-linear thinking that will accompany our logical thinking to face and solve complex problems.

7. Possible Futures of visual practice and studies

Trends are engaging, and visual facilitation infographics and animations are trending at present. This is very encouraging as a sign that organizations will be pushed into novel practice. But we, as practitioners, must be aware that novelty goes away with time, and therefore it is required that visual thinking tools must be perceived as real tools to facilitate and help organizations, industries and societies to reach their specific goals and communicate better. In this way, we can be certain that visual practices will take the position they deserve as a powerful toolsets, skillset and mindsets, capable of changing perspectives and decisions on how we will tackle complex problems.

Human Centered approach

The validity to promote and bring a new form of visual communication will have many advantages for those who work in the different visual communication fields. But how useful they will be will depend on how much visual practice is championed to bring better understanding and better decisions to bare on complex problems of our present and future. If visual thinking professionals are able to enhance conversations, consider more perspectives, and better explain our problems, then consider the betterment that will have on our fundamental human needs.

Hybridized Methods: Adaptation, Alternatives and Creation

Theory tends to classify and divide disciplines and phenomenons for their study. But we know that real life is different. As designers and facilitators, we should make use of our design-thinking approaches to use the different visual thinking tools available. The challenges of every situation will demand to make adaptations and changes to the tools described in the vast literature of visual thinking. As in design and advertising, the result may be unique, but it may be conceived as a hybrid of different tools

and techniques. The Digital Governance event, for example, made use of visual facilitation, Lighting talks, Open Space Technology, and other engaging and participatory methods all combined in a single event to face the challenges of the project. The multidisciplinary team organizing the event provided the right tools for the challenges and opportunities by considering the number and diversity of attendees, the available space, the outcomes expected and other considerations. Visual and design-thinking tools were selected and adapted in order to contribute to the main goal of the event.

Hybridization can be enabled to go even further if we not only consider available visual thinking practices and theories, but if we are able to co-create tools considering other disciplines like education, psychology, philosophy, etc. During the realization of this work, many ideas on how to improve or implement new visual tools came to my mind. Some of them are shown in the Appendix. The intention of showing these proposals at such an early stage of its design thinking process, is to encourage a brainstorm, a conversation, or a chance to participate and collaborate in the development of these or other new ideas derived from a visual and design thinking approach, by playing with hybridization. Visual practice effectiveness will depend on the practitioner's ability to adapt and transform the available tools by taking a design thinking approach appropriate to the particularities of the situation and bring innovation, new perspectives and more resources to solve our problems.

8. Further research

There are many paths in which further research may contribute to the topics and arguments stated and explored in this paper. The following paragraphs suggests the ones that most intrigue me:

Multi-disciplinary approach:

As this work was a unique overview of visual communication practices and visual thinking, it may open new paths of exploration depending on the interest of the researcher. How might tools be merged and mixed with other tools that may come from different disciplines to create and adapt to the new challenges we face? What else can we take from the vast literature on rhetoric, communication, biology, psychology, sociology studies, etc. to keep renovating, adapting and improving visual communication practices? What are the risks that creating more participatory environments may bring to organizations?

Documenting professional practices to feed theories.

Looking closer at the differences in practice between professional and non-professional fields in visual thinking and visual communication reveals one such area. The gap here between practices is large, and rarely informs the other. If practitioners and theorist worked closer together, and documented and shared their experiences we would be able to improve the field as a whole and build trust among organizations and other possible actors interested in using such tools.

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10. Appendix

Sketching Possible New Visual Thinking Tools

As a designer, I was inclined to look for practical responses to the research questions set out in this paper. During my research, synthesis and analysis work for this project, I often stopped to think and sketch different tools that may help to solve the problems exposed. With the considerations and the conclusions listed above, I hereby describe a set of ideas, sketches and proposals for new visual thinking tools.

These are initial thoughts that may serve as the beginning (or continuation) of a useful visual thinking tool for the future. You will find an intentional hybridization for the purpose of bringing innovation.

My intention is to inspire the reader to look for solutions, not only by using linear design methods, but also by practicing informal or alternative approaches (like starting with someone else's sketches or mixing approaches or solutions from different disciplines).

The reader can feel free to comment, contribute and reshape these ideas for innovative purposes.

A. Graphics into academic papers!

The Strategic Foresight and Innovation Master of Design program, allows to do a Major Research Project in order to obtain a degree. This is an academic requirement and because of this, it needs to fulfill the standard academic requirements on how to display the information published.

The SFI program, as a leading innovative program, allows students to create a bespoke design. As a consequence of this, an opportunity to make a more graphic

paper may be arising. Double reading, quick reading, information visualization and better narrative are some of the expressive possibilities that may make an academic paper something more attainable, readable and usable for a broader audience.[1]

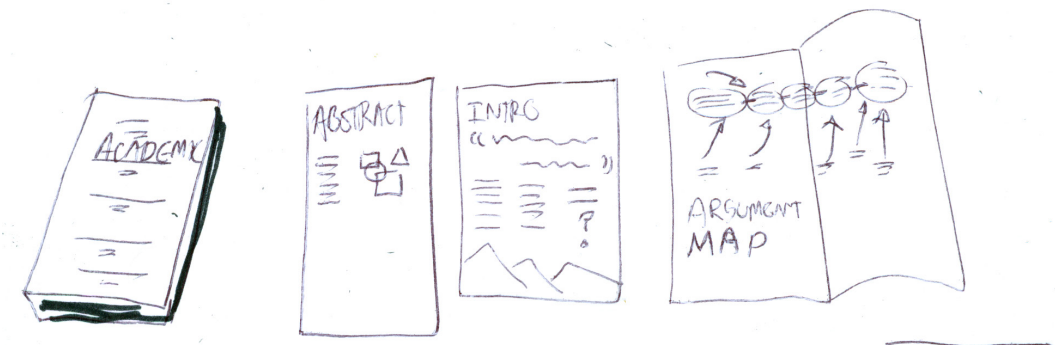

Figure 38: Graphics into academic papers. Papers are made more accessible with the help of visual design, such as abstract that include images, introduction with double reading, argument map referencing bibliography.

B. Experimental translation. Forcing new perspectives to discover new possibilities

By the end of the nineteenth century, Wassily Kandinsky found that creativity in painting had been restricted to the imitation of forms found in nature. He intentionally compared visual arts with music –a different media language – that didn't imitate the external environment but instead created a different, unique human expression – as a way to look for a new path to free visual arts from that limitation. Kandinsky's experiments were the beginning of a new kind of abstract painting and helped in the foundations of a theory of visuals as a language.

In the opposite direction, Claude Debussy gave to music, new composition possibilities by freeing it from its rigorous math of patterns and rhythms. The idea was to imitate the more unrestricted timing, melody and sounds of nature.

[1] Due to time constrains, two design versions of this paper were made. One in a traditional academic way. and the other version that while keeping the main guidelines taht makes an academic paper useful for researcher, it took a bigger risks by bringing graphics all along the document to support the ideas and to facilitate a quick reading technique.

In the same way, I would like to propose experimental exercises that may drive us to find new insights on how to better communicate through visuals. A proposition to bring this idea to life is to organize visual jam session (Visual Conversation Hack-athon) in which participants can only communicate through visuals. By restrict them to use visuals in a communicative context in which we normally use verbal or written language, we may be pushing the capabilities of visual communication practices and perhaps, breaking the limits and bringing some new visual practices. For example, by taking the globally understood capacity of visual practices, we could take the chance to bring together participants who don't share a common verbal language and work together for a specific purpose.

The following image sketches the poster information of a fictitious event. A *Visual Conversation Hackaton* in which participants from all over the world will communicate through visuals, to discuss about sustainable urbanism.

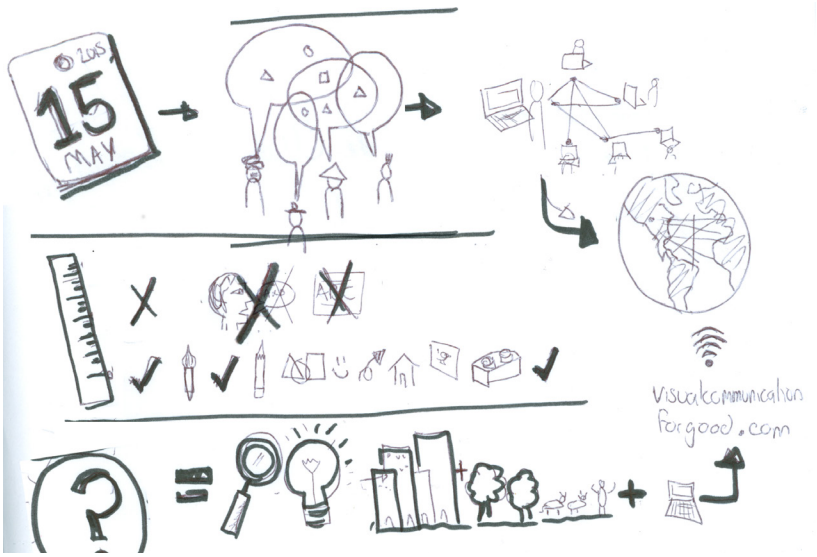

Figure 39. Fictitious Visual Conversation Hackaton. Even the poster will only communicate through visuals.

C. Exploring more ancient techniques for solving complex problems.

Taking advantage of Donella Meadows' affirmation that complex problems are not something new, but that they are in fact, present almost everywhere, it is logical to

think that ancient cultures were also looking for and proposing solutions to complexity. Distinguishing cycles of life, finding the right time to sow, or understanding unpredictable changes in society and environment may have led them to develop strategies like democracy, religion, magic, rhetoric and science.

For example, during my MRP, I found a similarity between classic rhetoric art and visual thinking emerging theories, that if carefully compared, may bring some new insights to the visual thinking studies. Unifying theories has been a common practice in science to bring new discoveries that have resulted in practical and technological innovation for humanity. Therefore, there is no futility in trying to bring academic comparison between Aristotle's or Socrates's thinking and Dave Gray's or David Sibbet's ideas on visual thinking. The following figure is a first attempt to combine and recognize similarities between both, the classic rhetoric and the visual thinking main attributes. A collaborative environment among philosophers, designers, visual thinkers and other specialists, in this or in any other approach, may help to bring more ideas to build better models that help us to face complex problems.

The following tables and sketches reveal some key coincidences between classic rhetoric art and visual thinking practices.

Figure 40: Unifiying theories. Trying to compare and unify Robert McKim, Dave Gray, Aristotle and Evert Lindquist categorization of means to persuade audiences. A universal rhetoric for every form of communication.

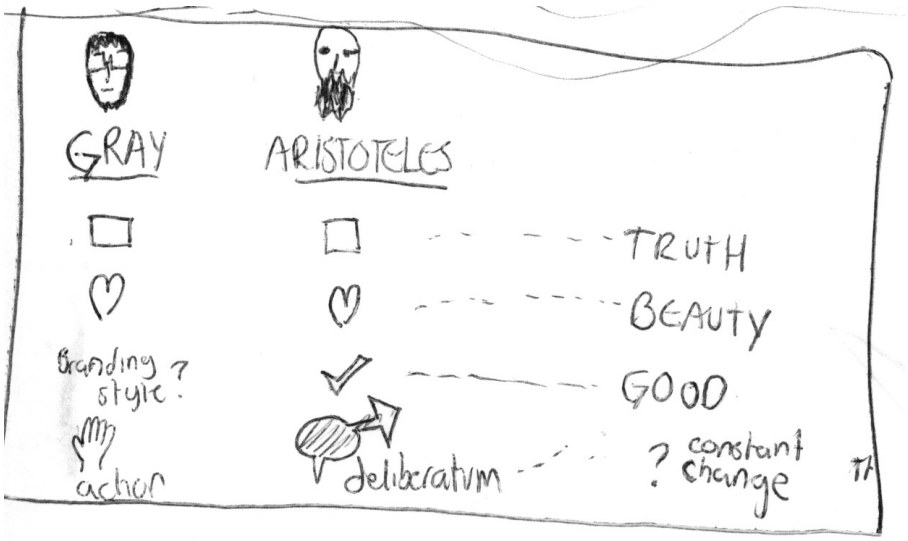

Figure 41: In search for Good, Truth and Beauty. Gray, Aristotle and the great searches of humanity according to Plato. In this instance, ethos, pathos and logos are correlated to good, beauty and truth. What about the actionable and *deliberatvm*. Is perhaps "change " the missing piece? Something that, if we are not searching for, is a constant that affects the other three. It is a factor that keeps us in constant movement, to learn, to compete, to fail, to find.

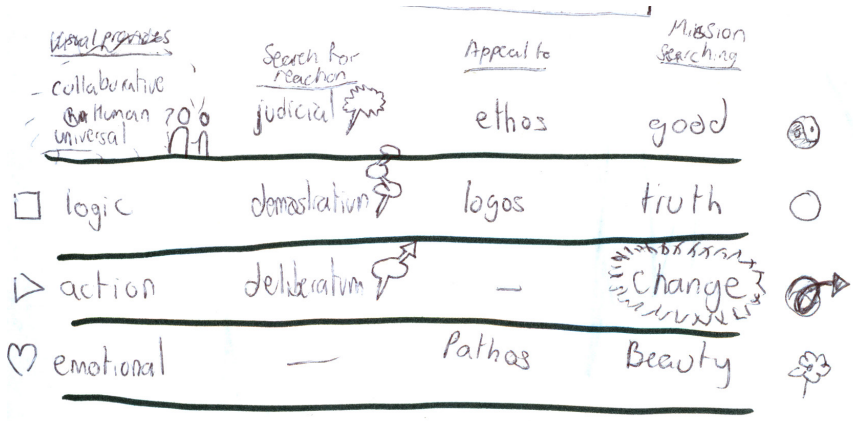

Figure 42: Bringing change and co-creation into the equation.
Figure 43 (*below*). My Kaomoji