Shaping messages for change

Systemic design approach for the development of a visual communication channel

DYCLE case of study

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Thesis project
Academic year 2018-2019

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DYCLE

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Acknowledgements

We would like to specially thank our families because without their support, courage, and love given along this path, the completion of this project would not have been possible. Thanks to our friends for having shared this great experience with us and for helping to create unforgettable stories. In addition, thanks to DYCLE Berlin for opening the doors of their organization and letting us work with them. And last but not least, thanks to our tutor and co-tutor Pier Paolo Peruccio and Luigi Bistagnino for their advice and time.

Abstract

Communication plays an important role in the generation of meanings, knowledge and relationships in societies; the characteristics of these dynamics are related with the systemic design discipline through some guidelines that were suggested by Lidia Signori as requirements in order to develop a systemic communication. Among all the communication elements, this thesis is focused on information visualization, a channel of visual communication, in which the transmission of information is achieved through graphic elements in a proper way.

DYCLE (Diaper Cycle project) is a systemic project that has revolutionize the diaper industry by creating 100% biodegradable diapers. It is an entrepreneurial initiative full of values and relations that should be spread; that is why this project was taken as a case study in which besides the guidelines, the methodology of visual thinking was considered as an adequate way to organize complex ideas, that helped represent and transmit key information adapted to the specific users of the project.

The result of the investigation shows different graphic representations that vary depending on the type of information and the intention of the message. These graphic representations are presented as diagrams, schemes, infographics or illustrations.

In addition, in order to achieve a complete systemic project, a diagnosis of the problems that still have the system was made. These critic factors should be considered during the implementation, regardless of the context. After describing these problems, several solutions for each one, were pointed out; in this case, specifically for DYCLE Berlin.

Key words: Systemic design, communication, visual thinking, information visualization, systemic communication.

Summary

The thesis presents a theoretical framework based on the systemic design methodology, its theoretical foundations in the theory of systems, and the theories of communication throughout history. First, it was possible to explore the relationships between them thanks to the five guidelines (men at the center, autopoiesis, act locally, relationships and input-output) that characterize the dynamics of these disciplines and that were taken as requirements later in order to develop a systemic communication.

After establishing these guidelines, it was possible to identify a common critic factor: the linearity not only in its conceptual form, also in the visual interpretation of the theories. Knowing the important role that communication plays in the generation of meanings, knowledge and relationships in societies, the problem demanded a new orientation or a reconsideration through systemic design. Thus, it was seen that choosing the right channel without isolating it from the other components, was required for successful communication. In this case, the channel of visual communication was chosen due to the facility of the receiver to capture a message visually, increasing his interest.

The large amount of waste that the diaper industry has every year, lead to the development of a project full of values and relations. DYCLE is a systemic project that wants to revolutionize the production, use, and disposal of baby diapers by creating 100% biodegradable diapers. In this way, the diapers will be no longer considered a waste but a nutrient for plants, transformed by a simple and ancestral process that makes fertile soil: Terra Preta. It is a powerful idea that requires a proper analysis in order to share it with the world.

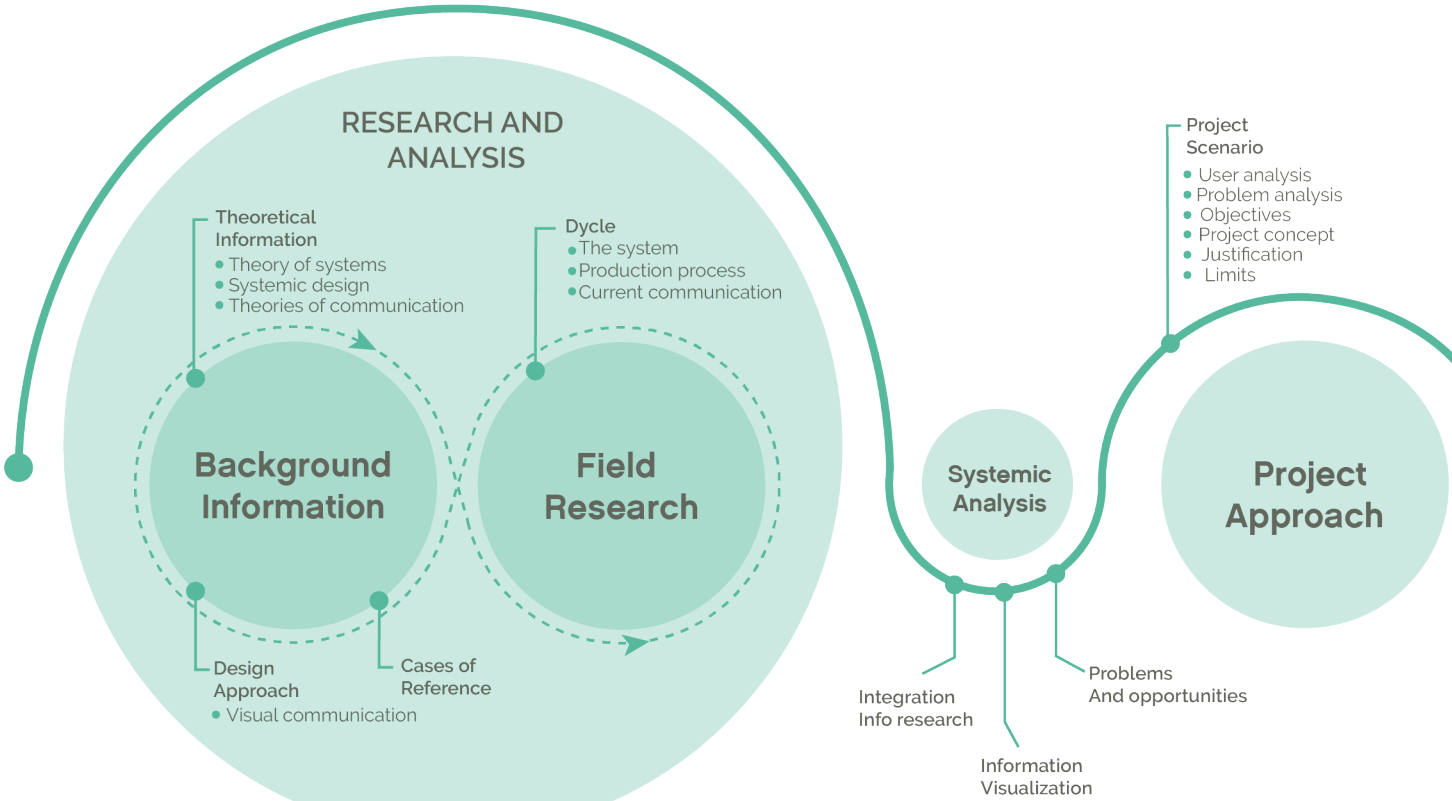
This was the motivation for taking this project as a case of study in which besides the guidelines of systemic design and a proper user analysis, the methodology of visual thinking by Dave Gray, was considered as a great way to help the developers of information visualization to classify the information, knowledge and ideas, depending on the type and intention of the message.

Besides intervening in the current communication of the message, a systemic analysis was made; pointing out the current problems of the system. These were studied in such a way that several solutions could be provided to each one of them. Having solved the problems of the system, a scheme of the systemic project was able to emerge.

The result of the investigation will show different graphic representations that may vary depending on the type of information and the intention of the message. which can be data, processes, relationships, connections, and values of the project; being the latter of great importance in order to generate meanings and knowledge in each of the users, thus attracting more participants to achieve an impact at a local, regional and global level.

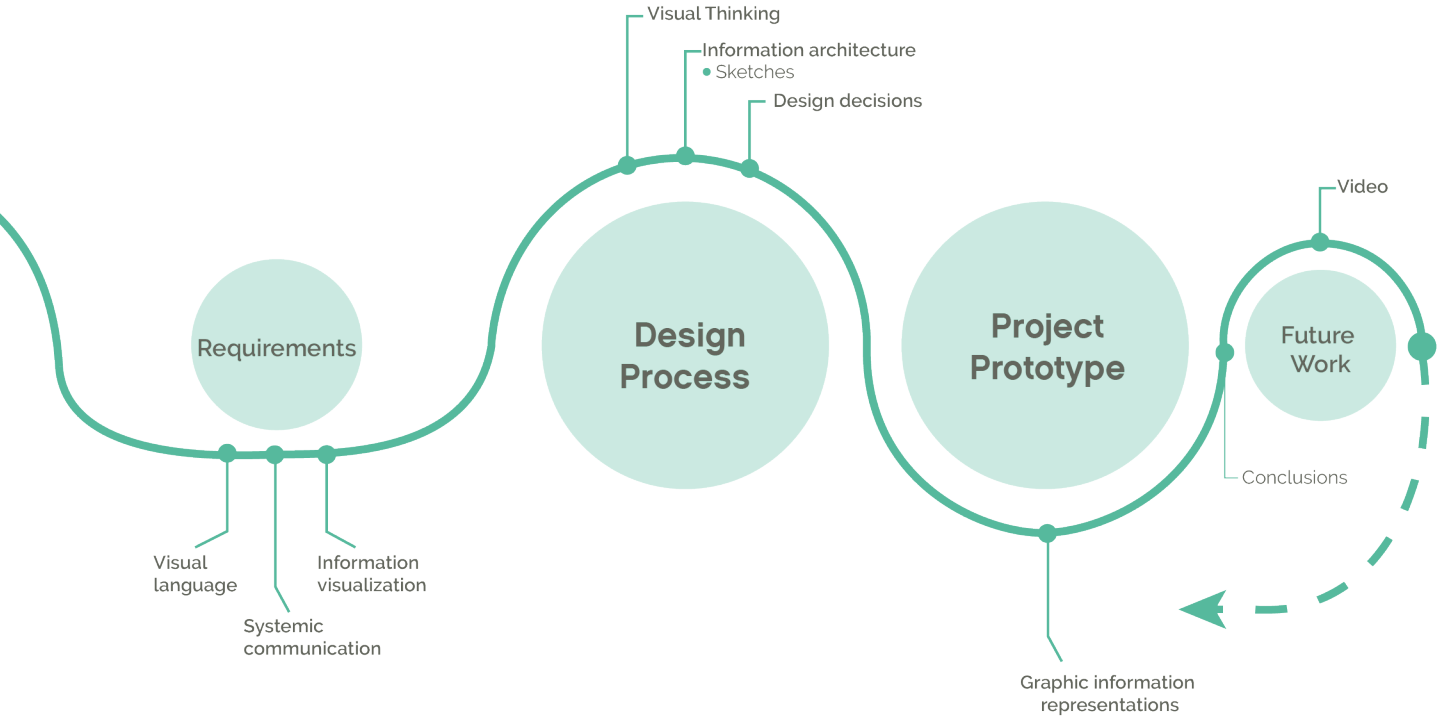
These graphic representations are diagrams, schemes, infographics and illustrations.

Thesis methodology



The thesis was developed following a systems thinking-based methodology where a holistic analysis of the context, users, problems, and needs, are always present throughout the project in each phase. The methodology consists of 6 sections: Background information, field research, project approach, design process, and the prototype where the final solution is presented and pointing out its future developments.

Even though is represented in a linear way, some phases where develop alongside one another, and there was always the need to take a step back to reconsider the analysis done in the previous phases. It begins with a brief research of theoretical information on the topics and concepts related in the project, followed by an analysis of the design approach and different case studies; the process then passes to the



field research, where it was possible to understand the system and process in the project and identified through a systemic analysis the current situation on communication, visual information, and their problems. This gave way to the project approach, where the users and problems were analyzed, and the establishment of the objectives, concepts, and boundaries was done. This helped determine the requirements that were used in next phase of the design process to finally arrive at project's prototype, where an option was presented as to how to transmit the information to the users; posing in a future development the possibility to improve the interaction of the users.

Systemic Design and Communication Theories

1

Systemic design and theory of systems

Systemic Design

Systemic Design (SD) is a discipline that has been developed by different academic groups through teaching and research activities. Among these, it is possible to find the Systems oriented design at the Oslo School of Architecture and Design and the National Institute of Design in India. The **Politecnico di Torino** with the program ***Master of Science in Systemic Design*** intends to be a leader in this branch of knowledge. Until today it has investigated the aspects linked to the productive world, identifying a methodology of inquiry and intervention in the productive and serving structure, and requalification of the system.

The vision of SD lies in systemic thinking at the beginning of the 20th century, particularly in biology, physics, psychology, and ecology, but it was only until the 1950's that it began to influence engineering and economics, thus generating systemic management. The practical experiences in the field of industrial processes came in the 70's. In the early 90's, with the cooperation of the institute ZERI (Zero Emission Research and Initiatives) and its founder **Gunter Pauli** ("The blue economy")[1], who came up with the the idea that every process should include respect for the environment and apply natural techniques that will allow every production process to be part of the ecosystem.

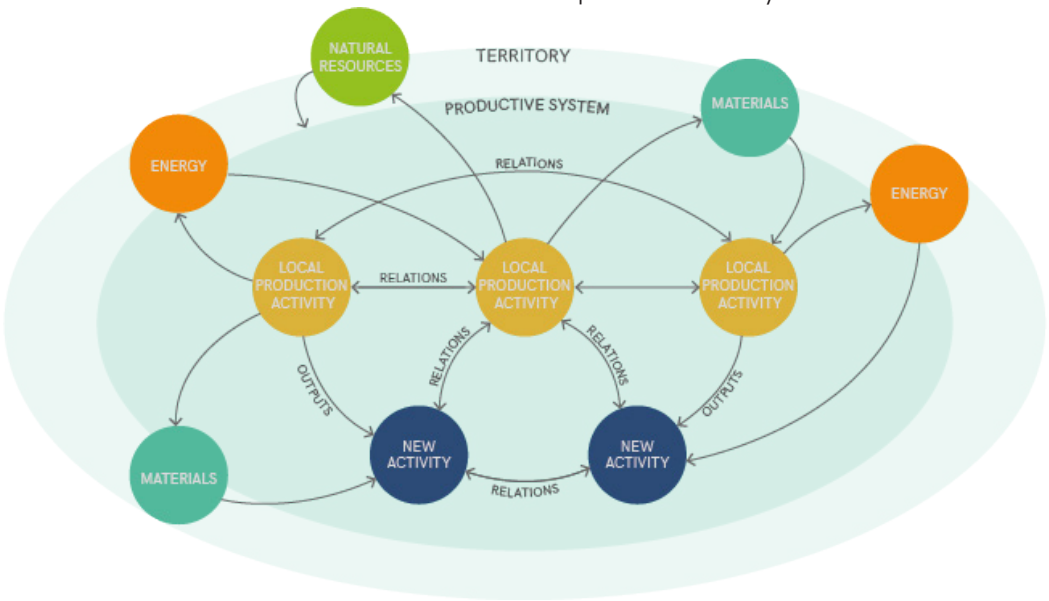


Diagram 1: Systemic Design methodology; Take from: https://www.slideshare.net/NatalyGuataquiraSarm/systemic-design-explanation-and-personal-work

1. Pauli, G. (2010). The Blue Economy: 10 years - 100 innovations - 100 million jobs. United States: Paradigm Publications.

SD methodology (*diagram 1*) focuses in making a better use of material and energy flow within systems (Local production activities) by creating new connections in between them or other systems, as well as designing new ways of working to propose a model in which industrial processes can mimic the functioning of the environment, always considering other crucial elements to ensure greater effectiveness, looking for sustainable alternatives where each individual's needs are not compromised. Resulting in a method with clear and specific principles that can be applied in concrete fields (Barbero, 2012)[2]. The theory can be summed up by five basic principles or guidelines (*diagram 2*): Output-Input; Relationships; Towards autopoiesis; Act locally; Men at the center of the project (Bistagnino, 2009)[3].

To understand these guidelines, we will briefly see the history of systems theory that forms the basis of systemic design, explaining the concepts of different theorists such as Bertalanffy, Wiener, Parsons, and Luhmann, among others. This will help understand the dynamics of complex systems in different areas and the role of communication in social systems explained in a systemic approach.

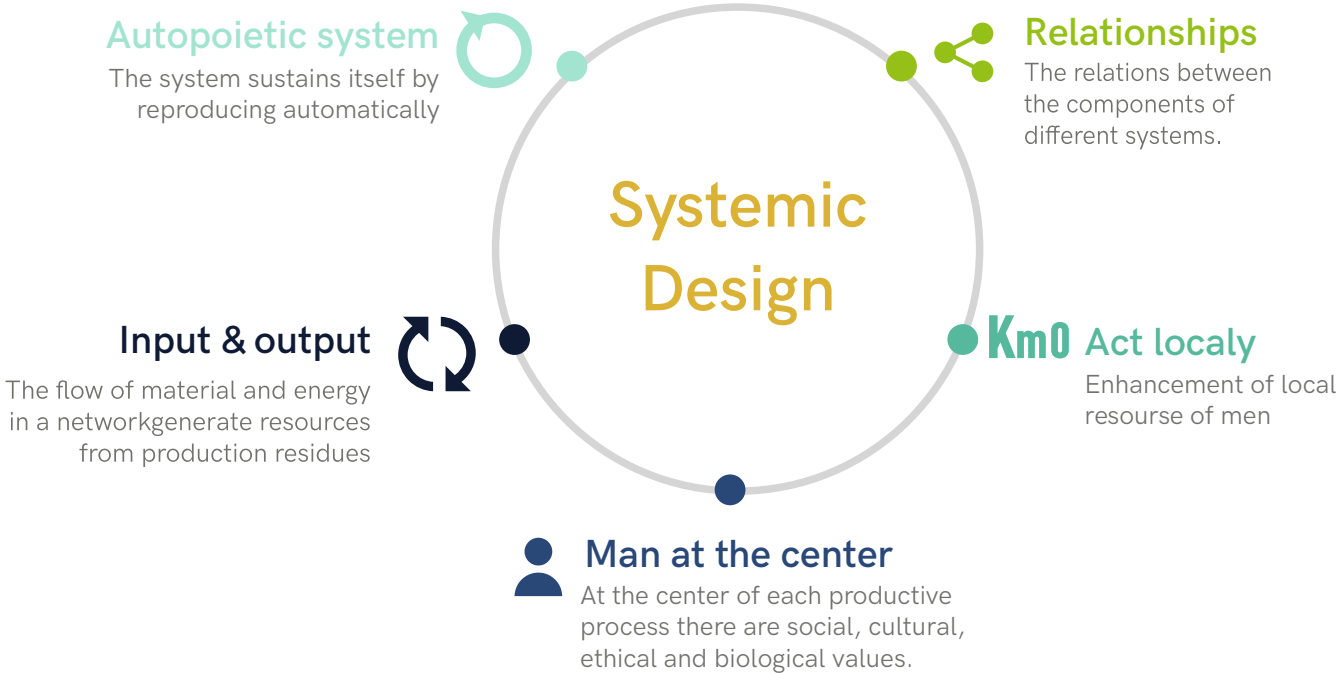


Diagram 2: Basic principals in systemic design by Luigi Bistagnino

2. Barbero, S. (2012). Systemic Energy Networks, Vol. 1. The theory of Systemic Design applied to Energy sector. lulu.com.

3. Bistagnino, L. (2009). Design Sistemic.

Introduction to Systems Theory

At the beginning of the 20th century, the biochemist Lawrence Henderson, together with other organicist biologists, used the term ***system*** for the first time to name living organisms and social systems; from then on, by system, its understood as a set of elements that interact with each other, do not necessarily have to be human, or animals, they can also be computers, neurons or cells, among many other possibilities (Capra, 1998, pág. 47)[4]. This, among other concepts, contributed, to the paradigm shift from a ***mechanistic*** (reductionist) vision to a ***systemic*** or ***ecological*** vision, which sees the world as an integrated whole rather than as a discontinuous collection of parts.

From this new vision emerges ***systemic thinking***, born by the ideas proposed by organicists biologists, later enriched by physicists, Gestalt psychologists and ecologists, gave rise to a new way of thinking in terms of connectivity, relationships and context, that was able to describe complex systems that the traditional linear way of thinking couldn't solve. However, it was not until the concepts presented by Ludwig von Bertalanffy's of ***open systems*** and ***General Systems Theory*** that established ***systemic thinking*** as a major scientific movement (Capra, 1998, pág. 66)[5].

His ***Systems theories*** were intended to collect different theories and develop a unique methodology. It questions the traditional scientific concepts of causality, determinism, and reductionism, replacing them with the notions of circular causality, and self-organization, before gradually moving towards the demonstration of order from disorder. This idea was fostered over the years, contributing to the emergence of a new paradigm in the international scientific world.

To continue the discussion of the history and evolution of the ***Systems theories***, there will be presented a brief investigation regarding the thinking of some exponents and authors that have applied these studies in different fields, especially in the area of sociology, to focus at the end on the human part of social systems and understand the dynamics in which society evolves systemically through communication.

4-5. Capra, F. (1998). La trama de la vida, una nueva perspectiva de los sistemas. Barcelona: Editorial Anagrama.

Concepts and Theorist

Ludwig von Bertalanffy: General Theory Systems

Image 1: Ludwig von Bertalanffy; Taken from: http://lortiamac.blogspot.com/2016/08/karl-ludwig-von-bertalanffy.html

Ludwig von Bertalanffy (1901-1972) an Austrian biologist and philosopher; is one of the most important biologists of the '900. Bertalanffy began his career as a biologist in Vienna in the 1920s, later joining a group of scientists and philosophers known internationally as the Vienna Circle.

His book on ***General System Theory***, published in 1969, was one of the first contributions to the field of ***Systems theories***, this model has had a great influence on the scientific perspective and remains a fundamental reference in the analysis of systems. In it, he understood that the whole was greater than the sum of its parts, and that using this theory we could observe patterns and the way relationships were organized in any living system.

The first important aspect of Bertalanffy's General theory, is his claim that living organisms are open organisms that cannot be described by classical thermodynamics; these living systems can be *opened* or *closed*; according to Bertalanffy's definition, those called "open" in order to stay alive, need to feed from a continuous flow of matter and energy from their environment (*diagram 3*) (Capra, 1998, pág. 67)[6]. The ones called "closed" are theoretically isolated from any environmental influences, in a state of thermal equilibrium, which can also be consider death, in other words: "when a living being no longer needs to feed" (Signori, 2010, pág. 12)[7].

6. Capra, F. (1998). La trama de la vida, una nueva perspectiva de los sistemas. Barcelona: Editorial Anagrama.

7. Signori, L. (2010). Tesi di laurea, Final thesis: Da utente a soggetto [Risorsa elettronica] : come cambiano le comunità attraverso l'approccio sistemico alla comunicazione. Torino: Politecnico di Torino.

He identified in living systems the need for a continuous regulation based on the environment in which the living system is inserted to maintain its stable state and its metabolism process; which led him to postulate ***self-regulation*** as another key property of living systems. This idea was later redefined by the chemical physicist **Ilya Prigogine** thirty years later in terms of ***self-regulation*** of ***dissipative structures***. This living systems cover such a wide spectrum of phenomena, involving individual organisms and their parts, social systems and ecosystems, Bertalanffy believed that the General Systems Theory could offer an ideal conceptual framework for the unification of various scientific disciplines that had been isolated and fragmented (Capra, 1998, pág. 68)[8].

This search for integration among the various scientific disciplines was a change to the usual way of teaching in which physics, biology, psychology or social science were treated as separated domains, with repeated processes to the point that each specialty takes a specific area, without any connection to the others. In contrast to the interdisciplinary ideas of the *General Systems Theory* for an integrated education, "it would prove to be an essential part in the search for the understanding of reality" (Bertelanffy, 1986, pág. 50)[9].

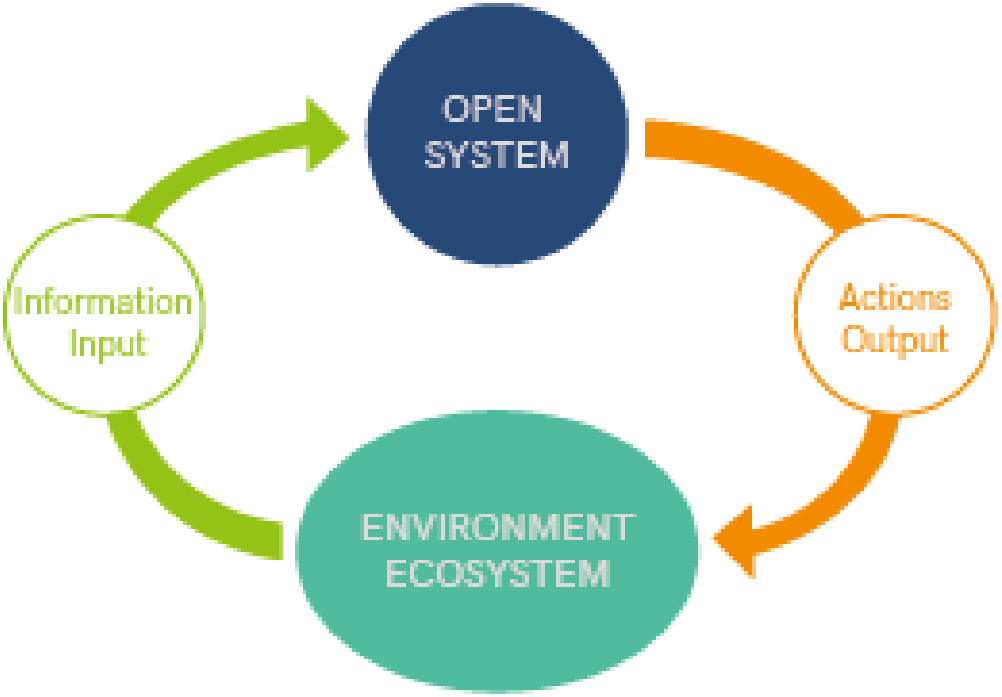


Diagram 3: Scheme of how living systems work

8. Capra, F. (1998). La trama de la vida, una nueva perspectiva de los sistemas. Barcelona: Editorial Anagrama.

9. Bertelanffy, L. V. (1986). General System Theory; Foundations, Development, Application . Mexico: Fondo de Cultura Economica.

Norbert Wiener: Cybernetics

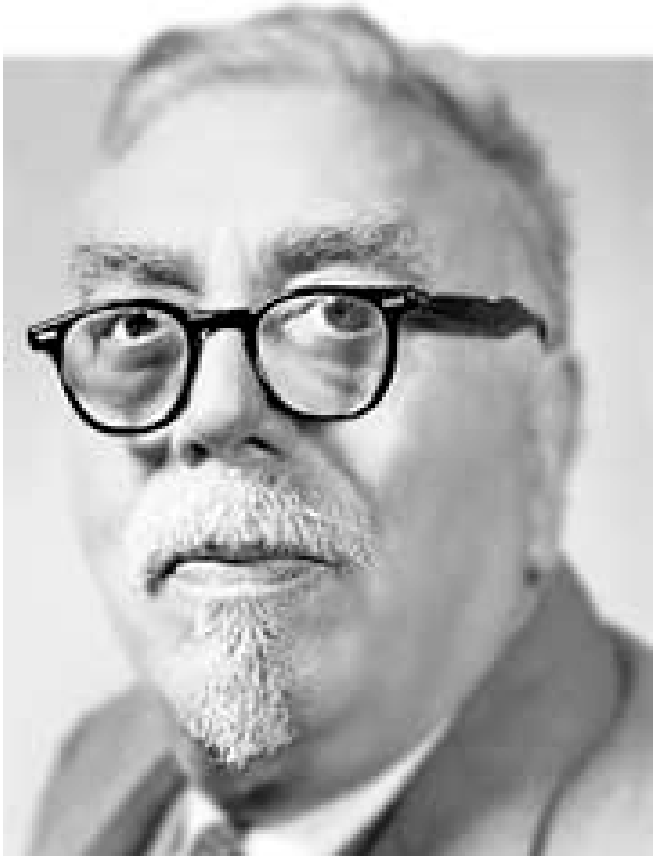


Image 2: Nobert Wiener; Taken from: https://cibernetico.org/2017/03/27/pioneros-del-enfoque-sistemico-cibernetico-y-el-pensamiento-complejo-la-cibernetica-2/

Norbert Wiener (1894-1964), was an American mathematician and philosopher, famous in the field of mathematics and logic. While Ludwig Von Bertalanffy worked on his General Systems Theory, Wiener promoted a completely new field of research in an attempt to develop self-driven and self-regulating machines. This new science was called ***Cybernetics***, it became a powerful intellectual movement that developed independently from the organicists biologists and the theory of systems. It concentrated on communication patterns (transfer of information) and control, between networks and closed loops (mechanical and living systems) that rely on the feedback of operational properties and transmission of this information (*diagram 4*), his investigations led to the concepts of ***feedback*** and ***self-regulation***, and later, ***self-organization***. These new ideas were of great importance in the expansion of the systemic vision.

Cybernetics enjoyed great scientific prestige since its beginning, due to its link with mechanistic science and its strong connections with the military. This increased even more with the passing of time, as computers multiplied not only in the scientific field but also in the common industrial community, leading to great changes in each area of our lives.

Even so, Wiener perceived a dark side in the diffusion of this new technology, in terms of the social impact it would generate within the communities and their ways of living. Capra explains it perfectly in his book, *the web of life*; the importance that the computers have acquired along with other "Information technology" in such a short time, has greatly affected cultural diversity, due to its excessive use and especially in the field of education. Schools employ a methodology that consists of simply making students processes large amounts of information, without giving the space to use it and generate new ideas. The management of language is another concern in the learning aspect, from the

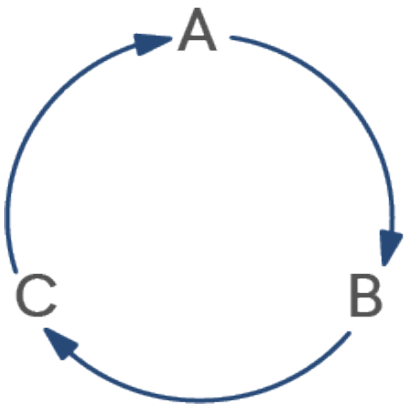


Diagram 4: Circular causality in a feedback loop

*A **feedback loop** is a circular arrangement of causally* connected elements, in which an initial cause propagates around the successive links in the loop, each element influencing the next. The first link (**input**) is affected by the last one (**output**), which translates into **self-regulation** of the whole system, as the initial stimulus is modified along each route through the circuit. (Capra, 1998, p. 75)*[10]

beginnings of the creation of the new sciences and new technologies, scientists and computer engineers have employed several metaphors derived from the military, which has introduced cultural deviations and, as consequences, excludes other groups from participation in the educational experience, making us forget the idea of an educational integration that has been spoken since Bertalanffy (Capra, 1998, págs. 70-88)[11].

Talcott Parsons: Structural-functional and Social Systems

Image 3: Talcott Parsons; Taken from: https://www.biografiasyvidas.com/biografia/p/parsons_talcott.htm

Talcott Parsons (1902-1979) was an American sociologist, is considered one of the most influential figures in the development of sociology in the 20th century. Parsons extended himself beyond traditional

*It is the beginning or the origin of something. The concept is used to name the relationship between a cause and its effect

10-11. Capra, F. (1998). La trama de la vida, una nueva perspectiva de los sistemas. Barcelona: Editorial Anagrama.

sociological topics and participated in the Macy Conferences on Cybernetics and Systems Theory, with other systems theorists such as Norbert Wiener, Ludwig von Bertalanffy, Ross Ashby, Warren McCulloch, and Hains von Foerster (Adams, Hester, & Bradly, 2013)[12].

His famous ***theory of Structural-functional***, whose most notable contribution was the diffusion of the concept of organizational principles that underlie ***social systems*** and ***social action***. The fundamental premise of this theory is the tendency of social systems to change or evolve over time, due to its changing needs and challenges, it needs behavior patterns (values, goals, functions, etc.) that keep the system in balance, and feedback mechanisms that help face the problems (Parsons, 1991)[13]. Parsons defines the system as an interrelated set of parts capable of self-regulation and in which each part performs a necessary function of reproducing the entire system; social action, according to Parsons, is a motivated behavior which is promoted by certain causes and directed to a certain goal, it essentially represents the character of a system (Signori, 2010, pág. 17)[14].

Taking Durkheim's idea that all social systems must meet integrated challenges, Parsons identified four main categories of problems or challenges that he believed were common in all social systems. His typology of needs of the social system came to be known as the four-function scheme, **AGIL** (*diagram 5*): Adaptation; Goal attainment; Integration; Latent pattern maintenance (Powers & Fernandez, 2011)[15].

In his studies, the individual is at the center of the problems of sociology, his analysis of social structure was based on action as the unit of all operations within a system. Prioritizes the perspective of men and the cultural dimension of social reality above the structure of it. For him, the social order will only be achieved if social actors share a culture of common values, which unites them together to share and perform co-operative activities.

12. Adams, K. M., Hester, P. T., & Bradly, J. M. (2018, October 10). A historical perspective of systems theory. Retrieved from Research gate: https://www.researchgate.net/publication/288782223_A_historical_perspective_of_systems_theory

13. Parsons, T. (1991). The Social System. England: Routledge.

14. Signori, L. (2010). Tesi di laurea, Final thesis: Da utente a soggetto [Risorsa elettronica] : come cambiano le comunità attraverso l'approccio sistemico alla comunicazione. Torino: Politecnico di Torino.

15. Powers, C. H., & Fernandez, M. (2018, October 10). Testing Parsons: Evidence from an Organizational Subunit and Implications for Structural Functional Theorizing. Retrieved from Wiley Online library: https://onlinelibrary.wiley.com/doi/full/10.1111/j.1475-682X.2011.00397.x

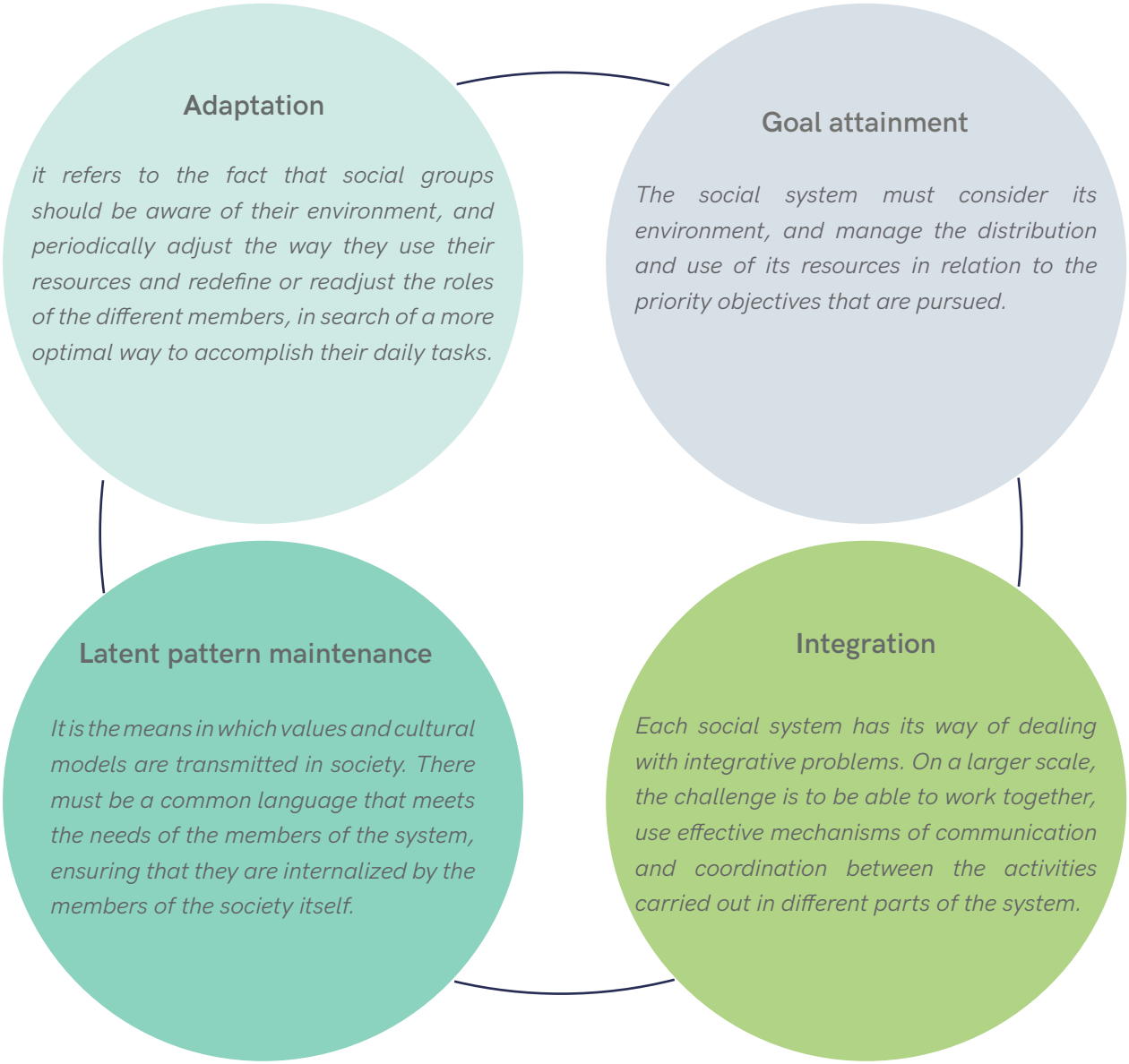


Diagram 5: The four functional system problems represented by AGIL model, Parsons

Niklas Luhmann: Social Systems

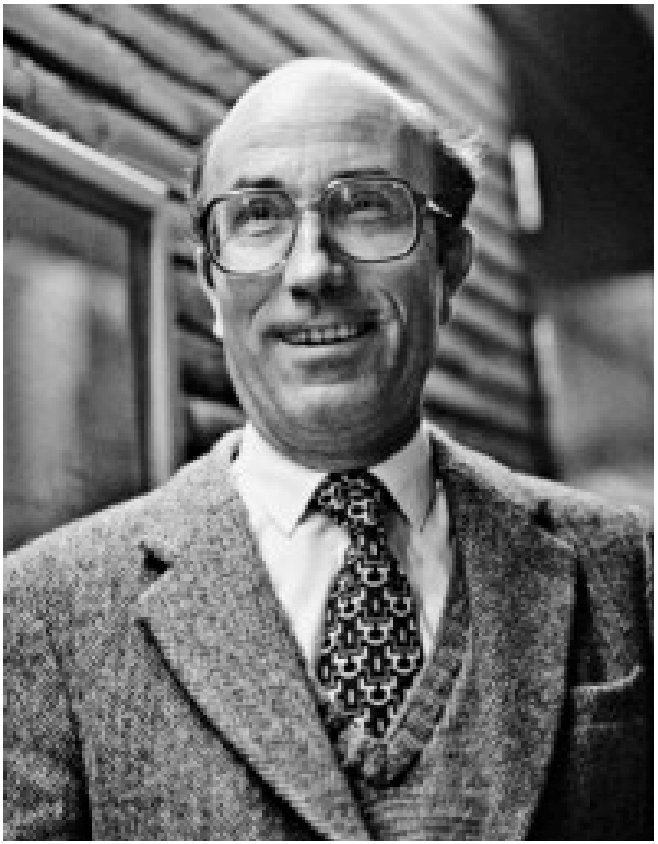


Image 4: Niklas Luhmann; Taken from: https://gedankenstrich.org/2010/08/luhmann-vor-dem-world-wide-web/

Niklas Luhmann (1927-1998) was a German sociologist, is remembered as one of the most important social theorists of the 20th century. His vision of modern society as a system is constituted, not so much of individuals but of communication, broke with the more traditional views of his colleagues in sociology.

His vision matches that of those who see systems as a functional construction of components with defined boundaries and environments. This statement that has been mentioned by some of the systems theorists so far, represented a radical shift from the idea that in society there is an actor or an action behind social communication, towards a systemic perspective where society is a system that does not exist only in itself but is also maintained thanks to its relationship with the environment.

He uses and distinguishes three major types of systems: the living system, psychic system, and social system. The first is reproduced thanks to life, the second is done via the conscience and the third is perpetuated essentially through communication. Luhmann focuses on the latter, in the sense that modern societies are characterized by different subsystems within them, among which are the political, economic, artistic, family, religious or educational subsystems (Urteaga, 2009, pág. 304)[16], each of these has a particular communication instrument that characterizes them.

Luhmann describes these subsystems as self-sufficient, taking the concept of *autopoiesis* from the works of Humberto Maturana and Fernando Varela; this explains the way in which a living system is self-reproducing. This concept of *autopoiesis* is associated with the notion of "operational lock". It is not a property or a set of elements that closes the system and draws its

16. Urteaga, E. (2009). Niklas Luhmann's systems theory. Universidad del Pais Vasco

limits, instead is closed by its own chain of operations, and the effect from its environment has been already determined by the system.

The central argument is to identify the social processes in the *autopoiesis* network as a communication process: "*Social systems use communication as a particular mode of autopoiesis reproduction. Its elements are communications that are (…) produced and reproduced by a communication network and that cannot exist outside said network* "(Capra, 1998, pág. 224)[17].

The work of the second wave of social systems theorists has provided tremendous insight into the utility of systems concepts. However, the criticism to Luhmann's studies is the lack of a defined methodology when defining his vision in how social systems are constituted (Signori, 2010)[18]; he was more interested in how things function as oppose of what they are.

Communities evolve in a systemic way

The interaction of the human being with other ecosystems and natural phenomena are not easy to predict or solve, much less with mathematical equations based on linear models. It is for this reason that traditional thinking is insufficient to understand certain types of systems, are unable to perceive the relationships and interactions that greatly influence the behavior of these systems.

Understanding that *systemic thinking* is a way of thinking in terms of connectivity within the context of any system, scientists from different disciplines agree that between living systems exist dynamics of evolution that are common among them, including the human social system. Social systems are based on interactions between actions. Communication is the medium in which systems connect between themselves and their context; it is the unit of information, message, and understanding. These dynamic spreads knowledge and generates within the system the tendency to evolve, constantly changing their needs and challenges. These are communicated through a medium, the most common means is the language: "*Language is the main means of human communication, If a nation's literature declines, the nation atrophies*" (McLuhan E., 2008)[19].

17. Capra, F. (1998). La trama de la vida, una nueva perspectiva de los sistemas. Barcelona: Editorial Anagrama.

18. Signori, L. (2010). Tesi di laurea, Final thesis: Da utente a soggetto [Risorsa elettronica] : come cambiano le comunità attraverso l'approccio sistemico alla comunicazione. Torino: Politecnico di Torino.

19. McLuhan, E. (2008). Marshall McLuhan's Theory of Communication. Global Media Journal, 27-31. Retrieved from Global Media Journal-Canadian Edition: http://www.gmj.uottawa.ca/0801/inaugural_mcluhan.pdf

In the vision of systems, a common language is considered as the integrating operator of social systems. Marshall defines this medium as the container of the message, *"the medium is the message"*, referring to the effects of technology, not technology itself - a telephone or radio or computer - but how its message affects people and societies. For example, *"the railway didn't introduce movement or transportation or Wheel or road into human society, but it accelerated and enlarged the scale or previous human functions"* (McLuhan M., 1964)[20]. In this sense, it must be differentiated the systemic approach of the system, the latter is the consequence of the first, before anything its necessary to first understand the systems in order to recognize their components and interactions.

Today's society is made up by groups of people who have physical, cultural and social needs that must be met. To explain these dynamics of evolution within social systems from the guidelines of systemic design, we will take as reference the study previously conducted by Lidia Signori (Signori, 2010)[21], to see if it is possible to apply them in other areas or disciplines, especially in the area of communication. Below are the guidelines that will be used as a reference to develop the systemic communication in the DYCLE project according to the analysis done by Signori.

The analysis of the guidelines conducted by Signori allows to see the common characteristics of our society with that of other living systems and also to study what is happening in current communities. Understanding how societies work from the systemic aspects will help to find the most effective way to communicate the reconfiguration of systems, to model their thinking, to transform the way of storing and processing thought, by processing them in a circular thought allowing the observation of the whole, in complex systems such as the case of DYCLE, where the communication will be directed towards the visual aspect, reducing excess information to simpler ways of understanding.

20. McLuhan, M. (1964). Understanding Media: The Extensions of Man. Canada: McGraw-Hill.

21. Signori, L. (2010). Tesi di laurea, Final thesis: Da utente a soggetto [Risorsa elettronica] : come cambiano le comunità attraverso l'approccio sistemico alla comunicazione. Torino: Politecnico di Torino.

Man at the center

It highlights the importance of the subject in social networks, given its capacity to generate meanings, that is, to give an intellectual and cognitive content to the network. Man is creative and reflective, has the ability to self-determine[22].

Antopoiesis

Also called self-generation; in a society, this is referred to in terms of communication networks, intangible goods are generated, each communication creates thoughts and meanings that are translated into ideas that feed and regenerate the same network (they can be consumer goods and products)[23].

Act locally

It refers to the context; this aspect differentiates one system from another. In living systems this characterizes the system, in social systems the environment to which it belongs defines the identity of the community, it can be understood as a physical or cultural environment[24].

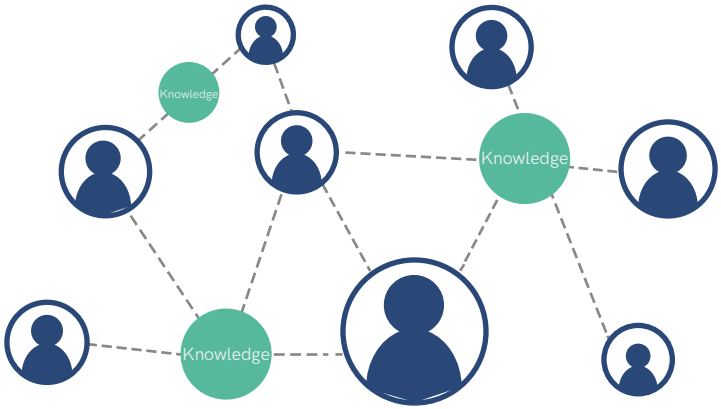


Diagram 6: Dynamic in social systems.

Relationships

It refers to the exchange of relations that society has within and with the external environment, it can refer to the exchange of immaterial relationships between people, or physical exchange such as energy flows and matter, for example, the circulation of products and resources. This exchange enriches the network of relationships and creates collective culture[25].

Input-output

Is an aspect of relationships, it is the flows of matter and energy in networks to generate resources from the waste produced. In the case of social systems, it refers to the flow of information through social media that generates knowledge[26].

22- 26. Systemic design guidelines; Source: Signori, L. (2010). Da utente a soggetto [Risorsa elettronica] : come cambiano le comunità attraverso l'approccio sistemico alla comunicazione . Torino: Politecnico.

Communication

Introduction to communication theories and its current linearity

Through the history of communication theory models, there has been a constant, which is the linear way of transmitting informartion. The challenge will be to apply the guidelines of systemic design in an adequate way to express, through visual communication, a project that shares the same characteristics, dynamics and relationships. For this to happen, first, it is necessary to make an overview of the communication theory concepts. This chapter will roughly explore some of these communication theories and the few differences between them despite the difference of publication period.

According to the etymological definition, the word communication comes from the Latin "*communicare*" and means "*to put in common*", "*to share*". Likewise, the Merriam Webster dictionary defines communication as "*a process by which information is exchanged between individuals through a common system of symbols, signs, or behavior*" (Merriam Webster, 2018)[27]. However, this definition focuses on human communication that despite being easy to understand, the truth is, human communication is a lot more complex.

Communication in societies has always been present. In fact, "*the first forms of human communication were pointing and pantomiming*." (Tomasello, 2008)[28]. This led to the development of different forms of cognition such as the ability to speak and write, among so many others, that we have nowadays. Looking carefully, since the beginning the discourse about communication has always been humanistic, focusing on cooperation and a prosocial motivation. This is how societies, communities and cultures have evolved and adapted all along history.

As it was seen on the dynamics of communication in societies presented on the previous chapter. These, managed to create complex communication networks and all necessesary relationships and behaviors, thus creating and producing knowledge. The interesting thing is that there was never anything that forced them to develop all these relationships and behaviors necessary to create a society. This evolution was due to the capacity of self-organization that societies managed to create complex communication networks and thus produce knowledge.

Even though the communication evolved in an organic, natural and self-organized way; the interpretations and visual representations have always been through rigid models and structures based on the same old schemes and components as from the first technic communication models. There have been many attempts to develop a model, the following examples are not going to be explained further, they are named only to demonstrate how communication throughout history has been transmitted in a linear way.
The first example and from which practically all

27. Merriam Webster. (2018, oct 11). Merriam Webster. Retrieved from https://www.merriam-webster.com/dictionary/communication

28. Tomasello, M. (2008). Origins of Human Communication. Massachusetts: MIT Press.

the theories were developed is the one exposed by Aristoteles in "*Rhetoric*". He said that communication has three components and the analysis must be made regarding these (Kenneth, 1984)[29].

Diagram 7: Self interpretation of Aristoteles model

This is a complete linear diagram where nothing interrupts the speech and everything that surrounds and influence the communication is not considered. But it was still the first approximation that led a path to the next authors.

The following model from Claude Shannon and Warren Weaver published in 1948, was a mathematical theory of communication for electronics, however, it was also used to describe human communication. The model consisted basically on the same components of the one from Aristoteles, there was an addition of three more components: transmitter, receiver, and noise.

The transmitter is the one that sends the original message and the receiver captures the message for transmitting it to the destination. The noise is all kinds of distortions that could change the message (Shannon & Weaver, 1964)[30].

The communication can happen through events. According to Peter Pagin in his article "What is a communicative success?". In every communicative event, there is a sender, a signal and a receiver. Communication is simply the process of transferring information from the sender to the receiver and if there is an adequate (exact

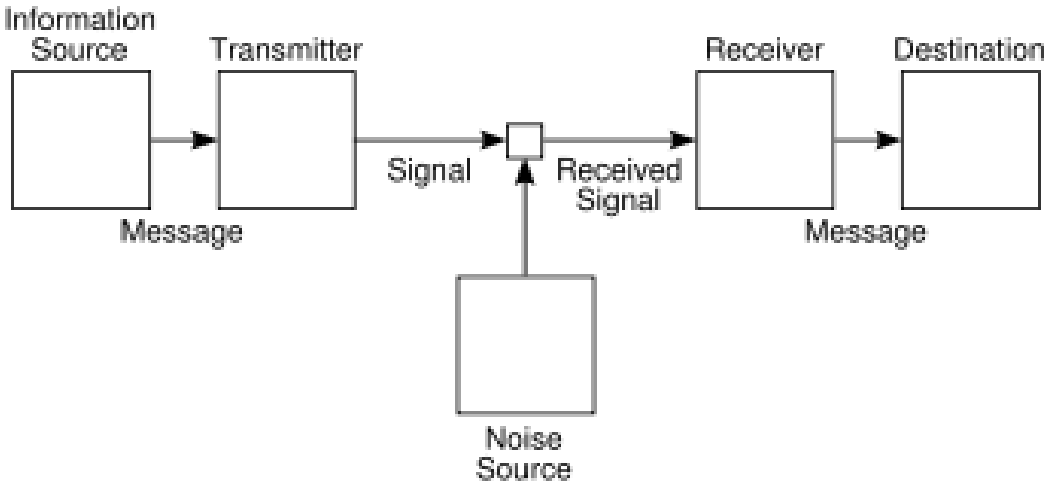


Diagram 8: The Mathematical Theory of Communication by Shannon and Weaver; Taken from: Shannon & Weaver, 1964.

29. Kenneth, D. (1984). El proceso de la comunicación. Buenos Aires: El Ateneo.

30. Shannon, C., & Weaver, W. (1964). The Mathematical Theory of Communication. Illinois: The University of Illinois Press.

or approximate) recognition of the signal, the receiver will act accordingly.

> **"The event is a process that starts with some inner state of the sender and ends with some inner state of the receiver. In between a signal is transmitted. The relevant inner state of the sender takes part in causing the signal, and the signal, in turn, takes part in causing the relevant inner state of the receiver."**
>
> -(Pagin, 2008)[31]

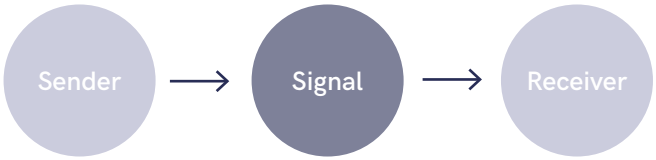


Diagram 9: Self interpretation of Pagin's model

The last model is an example of how a contemporary model of communication is still based on the previously exposed linear structures. Despite this, he tries to introduce some dynamism in the concept, between the components and in the graphic and visual communication of model. The theory of David Kenneth Berlo understands the communication as a process and uses the dictionary to define it as a phenomenon that represents continuity, modification through time and dynamism, in which every component interacts with each other and influence each other (Kenneth, 1984)[32].

Kenneth presents six important components of communication: Source-Encoder-Message-Channel-Decoder-Receiver. One of the important things about this model are the relationships between the characteristics of the source and the receiver, which determines the faithfulness of the message. Like Pagin states in the previous model, the two of them must have a similitude. But here, Kenneth adds that they can even be the same person, that the source must have been a receiver and vice versa, and that the messages sent are determined by the received ones. Based on this, it is possible to elaborate a sort of mental scheme of how communication is understood:

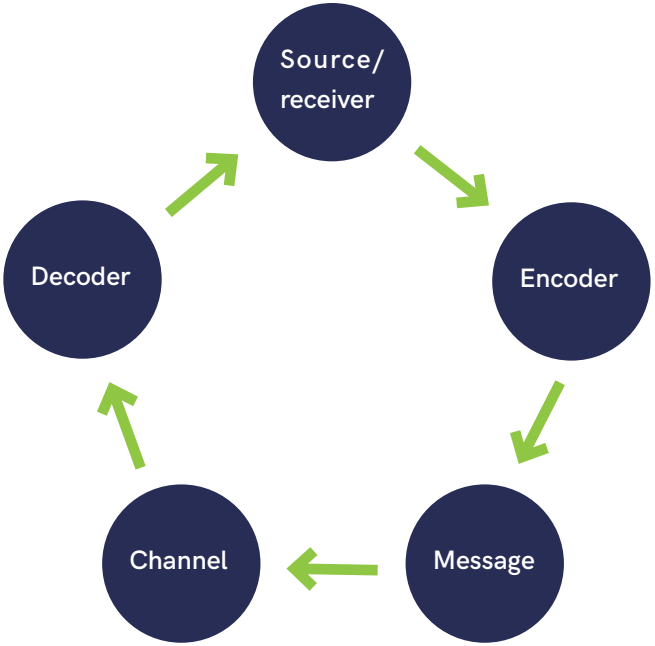


Diagram 10: Self interpretation of Kenneth's model

31. Pagin, P. (2008). What is a communicative succes? Canadian Journal, 5.

32. Kenneth, D. (1984). El proceso de la comunicación. Buenos Aires: El Ateneo.

Instead, he continues presenting the communication as a linear path. As it is seen in the *image 5*.

The graphic Kenneth propose, for a clearer understanding of the content, is basically the same linear structure, with an explanation of every content's characteristic. Naturally, this approach makes things clearer than the previous ones but still does not capture the main guidelines we proposed good communication in society should have.

The way in which the concept of process is presented by Kenneth is not reflected either in the model or in the graphic expression or visual interpretation. There is no interaction, no relationships, and no dynamism. It does not seem to advance enough since the first models of communication. Even so, it is worth noticing the characteristic of interdependence described by him on the book and that are also found in the guidelines of systemic design and communication proposed at the beginning. The same author highlights the importance of **choosing the right channel without isolating the other components because every single one depends on the others.**

The theories of communication in societies before analyzed demand a new orientation or a reconsideration through systemic design. Although they share the same characteristics as systemic design and the systems theory (same guidelines), the problem is that, until now, these guidelines have not been applied in an appropriate manner to any kind of communication in societies. What

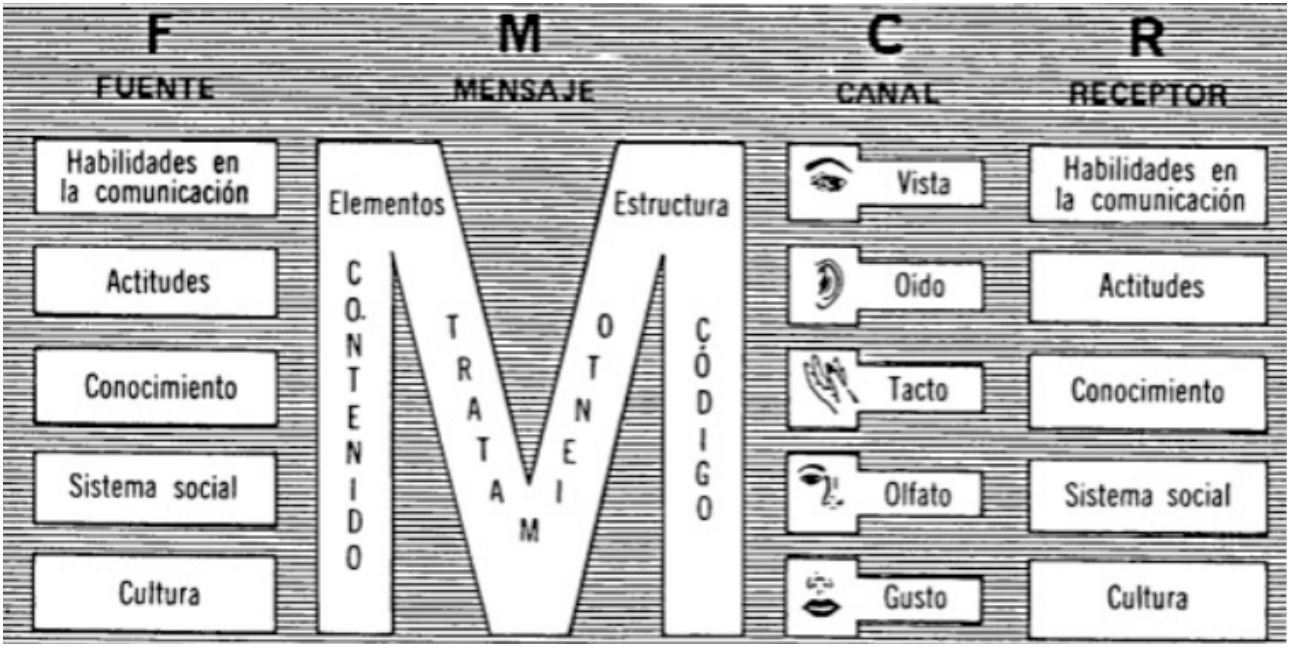


Image 5: Model of the communication components by Kenneth, D.l

the theories and systems preach are not applied. This is reflected in the linear interpretation of every model and in the incongruence in the visual communication.

The problem previously exposed, argues why a change is needed and why these guidelines should be present in the development of the thesis, which is to achieve better communication of the DYCLE project. The interesting thing is that DYCLE is a systemic project with a high social responsibility, which when expressed through the same values of systemic design and its theories, will be reflected in a consistent way of visual communication in terms of message and channel. In other words, t**he content or message is the systemic project and the container or channel is the visual communication through systemic design**. In this way, again, all the analyzed factors converge in the guidelines.

Systemic design communication over time

There is no exact methodology for systemic design communication, but some approaches have been made. The history of the theory of systems and the systemic design is short but despite it, has been gaining recognition and support from many actors, forming groups of people who work so that this discipline can be valued and applied in all parts of the world. Thus, several instruments have been developed to make it known and transmit all kinds of relevant messages to all types of public.

Image 6: 50 anni Club di Roma. By: Alejandra Cuervo

Events and conferences: Club of Rome

This is the case of the non-profit organization Club of Rome, that describes itself as "*an organization of individuals who share a common concern for the future of humanity and strive to make a difference. The members of this organization are notable scientist, economists, businessmen and businesswomen, high-level civil servants and former heads of state from around the world.*" "*The Club of Rome's mission is to promote understanding of the global challenges facing humanity and to propose solutions through scientific analysis, communication and advocacy. Recognizing the interconnectedness of today's global challenges, our distinct perspective is holistic, systemic and long-term.*" (Club of Rome , 2018)[33].

Image 7: 50 anni Club di Roma; Taken from: https://www.wwf.it/il_pianeta/sostenibilita/one_planet_economy/?42400/Il-Club-di-Roma-ha-50-anni#

On October 17th and 18th 2018, an event was held in the Institutum Patristicum Augustinianum, in the city of Rome to commemorate the 50th anniversary of the club's founding. A series of lectures were made not only of club members but also of well-known guests to point out the critical problems that humanity is facing and also new ideas of solutions and initiatives to help the world become a sustainable one.

Among the **topics and concepts presented during the conference** by the different rapporteurs, such as tipping points in climate disruption, ecosystems decline, the search for renewable energy and a true Green economy, the pursuit of GDP growth and the increasingly unequal wealth distribution, including social, political, environmental and economic aspects that are in need of a more balanced value system and a future vision that searches an equitable distribution of wealth within and between countries.

Image 8: 50 anni Club di Roma. By: Alejandra Cuervo

33. Club of Rome . (20 de 10 de 2018). Club of Rome . Obtenido de https://www.clubofrome.org/about-us/

Although the communication wasn't specifically the focus of the discussion, it was possible to observe, relate and highlight some aspects of it, due to the intrinsic relationship that exists when sharing these ideas and solutions through communication. Just as one of the ideals of the Club of Rome poses: "*promote understanding of the global challenges facing humanity and to propose solutions through scientific analysis, communication, and advocacy.*" (Club of Rome , 2018)[34].

There were chosen among the speakers some that have mentioned during their speech, strategies and approaches in the part of communication. For example, its role in the action plans for climate change and methodologies to involve people in the process of innovations or new policies. Likewise, **interviews have been made** to some of the speakers regarding the communication strategies of the entities to which they belong to and of the same Club of Rome.

From these arguments of the conference related to the communication and interviews made, it is worth underline **Prof. Enrico Giovannini.** He is an Italian economist and statistician. Since 2002 he has been a full professor at Rome University "*Tor Vergata*". He was Minister of Labor and Social Policies in the Letta Government, President of the Italian Statistical Institute, Director of Statistics and Chief Statistician of the OECD (Organization for Economic Co-operation and Development). (Club of Rome , 2018)[35] He is also the spokesman of ASVIS (Alleanza Italiana per lo Sviluppo Sostenibile).

Image 9: Enrico Giovannini; Taken from: http://www.padovalegge.it/enrico-giovannini/

He presented ASVIS, its role, its achievements and which methodologies, tools and forms of communication they use.

They communicate through annual reports, events, the website and a model of Indicators for each SDG at a regional and city level for showing how the simultaneous implementation of policies can change and reduce the overall costs of moving towards 2030 in a sustainable way. Policies at an European level are quoted in treaties, but the problem Is how to put it into practice, how to make these new ideas attractive for policymakers.

If ideas are transmitted with negativity such as "*the world is going to collapse*", there's no chance to get elected to participate. That is why he suggested that people must provide solutions and a vision of how to get things done.

34-35. Club of Rome . (20 de 10 de 2018). Club of Rome . Obtenido de https://www.clubofrome.org/about-us/

The solution ASVIS is raising is a complex plan to change the pieces of the system. From a conceptual system to a policy framework: with measures of prevention, preparation, protection, promotion and transformation. In the **interview** with him, he developed more the concept and specified the communication they implement depending on the different targets. These are some remarks:

"*We focus in visualization as an element that captures people's attention, we have a network with 200 organizations from the civil society, which is useful for spreading the information whenever we launch a product or tweet information.*

Internally, we have a newsletter which is out weekly and monthly; an annual report and recently a new instrument of web TV, where we transmit the main news with the agenda of the events, all of these are seen just on our website.

Another means of communication are events we organize, among these important events we have the Festival of Sustainable Development that takes place for 17 days, normally from May to June.

We communicate in different ways depending on the target, our events can be divided into three targets: the politician, stakeholders and schools, including in the last one the universities. For the politician and stakeholder, there are events in which we call them to reflect on certain topics and arguments, in particular about the SDGs, along with an annual report where we examine the situation in Italy and make a series of proposals. For the schools and universities, we provide a learning course for students and professors to educate them about these new initiatives in climate change, SDGs, and other topics. We have made a network with Italian universities, from various disciplines and in this way create an integrated education, and reward and promote young innovators.

One of the difficulties we find when trying to communicate these topics of climate change and sustainability lies in identifying the proper key or words to let the message through. When the key is not right, the message can change because they don't know how to read them. That's why ASviS is also looking to organize training courses for the journalist, the purpose for mind-change by the agenda for 2030 requires a change in redaction and the way we read the news. If we must read reality through the eyes of SDGs, the structure of the writing should be changed."

Another interesting argument founded on the interviews was the one from **Camilla Born**, a senior policy advisor in E3G´s Climate Diplomacy team based in London. E3G is "*an independent climate change think tank operating to accelerate the global transition to a low carbon economy.*" (E3G, 2018)[36].

Image 10: Camilla Born; Taken from: https://www.gcsp.ch/News-Knowledge/Experts/Guest-Experts/Born-Ms-Camilla-Born

"There are layers in the way we engage in climate change. There's an elite layer which, in a way, I think is ok to have it because not everyone has to know every policy, but this elite layer has to be responsible and not arrogant. people don't have to be an expert and know every tiny aspect of climate change but they have to know that life is changing and that someone is trying to help them stay safe and that is not going to happen without politicians that talk about climate change, what that means for our futures and how are we going to respond to it.

Public engagement is important to achieve the impact desired and empowering people through cultural resilience in order to deal with climate changes.

When you talk about climate change, is important to make people understand the consequences for their own lives, otherwise, they would not really understand.

People think that sometimes is better to communicate just the benefits of waste management or how to save money, but people respond much more about community or culture. It depends on where you are from. It´s about understanding the culture to communicate it. That's why it's important to have more different people part of the conversation.

Communication must change, and it will. I'm very aware even if I'm very young. I have quite a lot of platforms so I'm always trying to bring on other people with me because not everyone gets to speak. And I'm aware how much a conversation can change, but older people still get funny of that maybe they think that I'm the wrong kind of young leader, but I try."

36. E3G. (2018, 12 7). E3G. Retrieved from https://www.e3g.org/about

In conclusion, after being part of the 50th anniversary of the Club of Rome, It was possible to observe important points from the exhibitors during the two days of the event related to the use of communication, even though it's not specifically mentioned in each of their presentations and projects, it is an important aspect in order to implement their ideas.

During the conference they **remarked** the need of translating all types of research on climate change and sustainable development into **policies**, so the governments can implement them; the importance of a **shift in mindset** is something they are trying to achieve with these policies, among others. In this sense, **communication is a key factor in order to make people involved and engaged in these initiatives.**

As Dr. Hans Herren said, the Government and companies should make mandatory for the public to **participate in the creation of these policies and the process of the projects.** This integration of **different people with a variety of backgrounds will lead us to sustainability** (financial, social, environmental, ethical, cultural, territorial) if every company and project implementation consider this, everything will change.

Another factor that should be considered in the communication strategies mentioned in the conference is the **different types of targets.** For example, when looking for investors and trying to involve the community, it needs **different strategies** and to consider the territory, community, and culture where the project will be implemented. Nonetheless, we observed

Image 11: Hans Herren; Taken from: https://www.youtube.com/watch?v=ICHOqrR8Dng

different problems in the divulgence of the event and its speakers.

This was reaffirmed later by asking some questions to some of them; many of them agreed that there is a clear lack of information exchange in the event itself and the projects presented; it may not be intended but it seems to be exclusive, the ideas presented stays within the same circle of persons (scientist, researches, etc.) and is not shared with the general public. Even the same members of the Club of Rome as Gunter Pauli, state that "*The Club of Rome doesn't have any communication, is*

Image 12: Gunter Paulli; Taken from: https://www.infopymes.info/2018/08/gunter-pauli-el-creador-de-la-economia-azul/

terrible and exclusive!"; also, Mamphela Ramphele, the Co-President of the Club of Rome since 2018 said that "traditionally we´ve not communi*cated well in the club of Rome. it is technical and academic."*

It was seen that this is due to the l**ack of investment in communication, and the strict and methodological way in which the information is presented.** Despite highlighting all these problems, they agree that the communication must change soon and that the message has not been received by everyone they are trying to involve.

There is willing of change, and this is the main point. They know that something is missing and that they have to work on solutions. The following are some ideas that were common to everybody:

- Need for involving community and have public engagement in the communication for reaching awareness of people is the core topic. Unless people understand what it means to change the ways of living and the impact it will have in their own lives, they will not change the mindset.

- For this to happen is important to reduce the complexity, so that information can reach every single person, this means, having an inclusive way of spreading knowledge and experiences. Quoting Camilla Born in the interview made, "*Inclusive means: a responsible and not arrogant communication*".

- The graphic communication for involving people easily is important, this, helped by nontraditional ideas would help when implementing an open and public way to present ideas.

- It is already known how bad the situation is, what needs be done now is **communicate through useful, innovative strategies and tools to approach different generations.** Is a powerful message that deserves to be spread.

Theories and books:

Jay Forrester

Jay Wright Forrester (1918-2016) was an American engineer. He applied his engineering knowledge to human systems and focused on the use of computer simulations to analyze social systems and predict the implications of different models. This method was called "*system dynamics*" (González, 2016)[37].

This method, originally designed to help business management to improve its understanding of industrial processes, allowed to perform simulations to study the behavior of systems and the impact that the application of different alternative policies could generate in the short and medium term, thus helping to understand how changes in a system can affect them over time. It is currently used in the public and private sector for

37. González, G. G. (2018, October 14). Jay W. Forrester: pionero de la computación digital y dinámica de sistemas. Retrieved from REVISTAS ACADEMICAS UTP: http://revistas.utp.ac.pa/index.php/prisma/article/view/1263/html

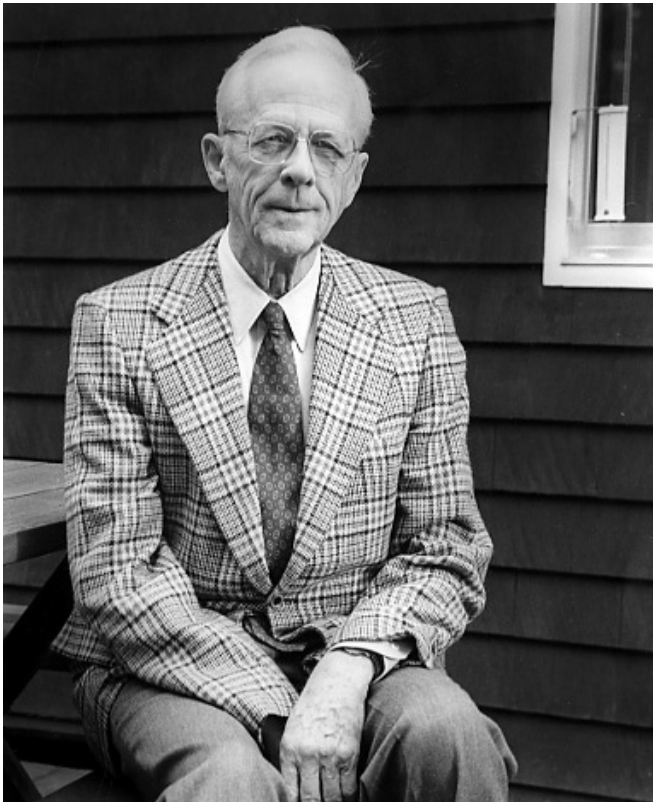


Image 13: Jay W. Forrester; Taken from: https://concordlibrary.org/special-collections/oral-history/Forrester

the analysis and policies design. It is used in particular to improve the development of new products by investigating the dependence on natural resources and the problems arising from the increase in the global consumption of industrial processes. In this aspect, its method is very similar to that of systemic thinking, since it is based on the same causal diagrams with cycles or feedback loops to understand the production processes (Saeed, n.d.)[38].

With this new model, Forrester redefined how economic behavior should be represented; he considered that mathematics and differential equations, which often deceived the reader about the nature of the system, were an abstract and unnatural way to represent a dynamic system. Therefore, he employed the use of several diagramming methods to conceptualize, represent and communicate the models. His representation operated in terms of ***stocks*** and ***flows*** in both diagrams and equations that correspond intuitively with what happens in the real operational structure (*diagram 11*), using symbols that correspond to a hydrodynamic interpretation (*diagram 12*). This was called "*flow diagrams*".

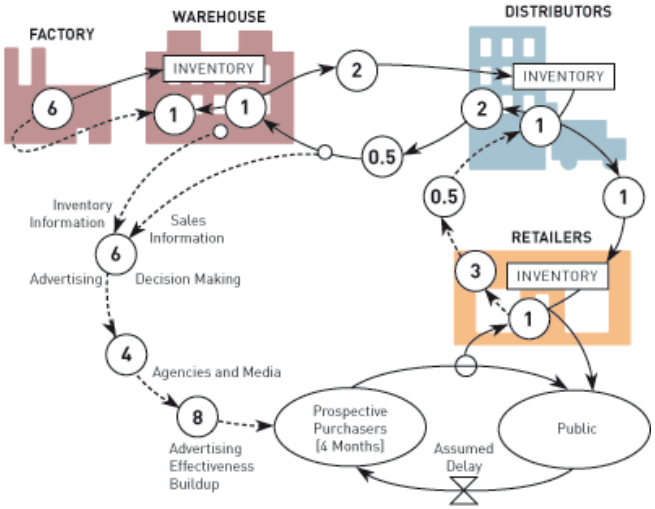


Diagram 11: Modeling System Dynamics, Taken from: Adapted from "Industrial Dynamics: A Major Breakthough for Decision Makers." Harvard Business Review. July August 1958. Shows the interrelationships in Forrester's early model of General Electric's supply chain problems. The buildings represent stocks, in this case, inventory levels (Factory, warehouse distribution, retailers). Dotted lines are the flow of information (orders or sales figures); solid lines, flows of products or casual influence. Numbers in circles show the number of weeks requires for each step.

38. Saeed, K. (n.d.). Jay Forrester's disruptive models of economic behavior. Worcester Polytechnic Institute.

From this model, Forrester established a group of symbols (*diagram 13*) to describe the "*flow diagrams*" which were later adopted by different disciplines to explain their systems. In them, he distinguished levels in a schematic way (using rectangles), as well as distinguishing symbols for the rates, variables and parameters that are part of the process of a system. The information links were specified with broken arrows; Conservative flows were marked with solid arrows that indicated different entities, for example, materials, money, personnel, among other symbols. These diagrams became the language of the dynamics of the system, and likewise, in the root of what is now known as **Stock / Flow diagrams** (Lane, 2000)[39].

From this approach, it is possible to rescue the implementation of a visual representation of a respective situation, showing graphically the relationships of stocks and flows between other component within the system, as well as distinguishing the different variables that are

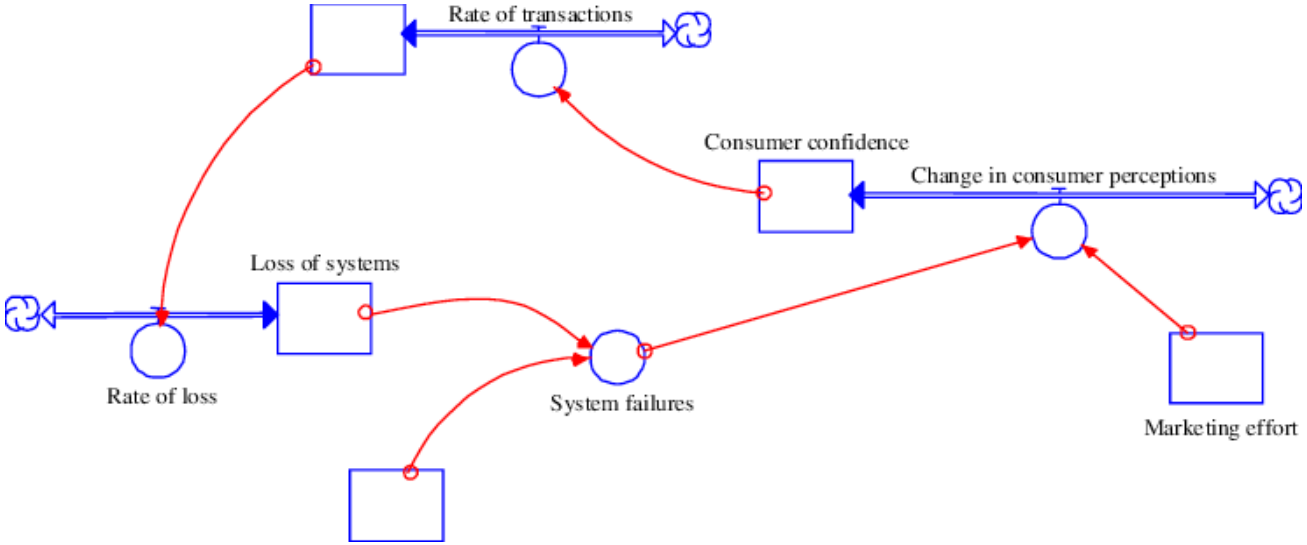


Diagram 12: System Dynamics model; Taken from: https://www.researchgate.net/figure/System-dynamics-model_fig3_240900952

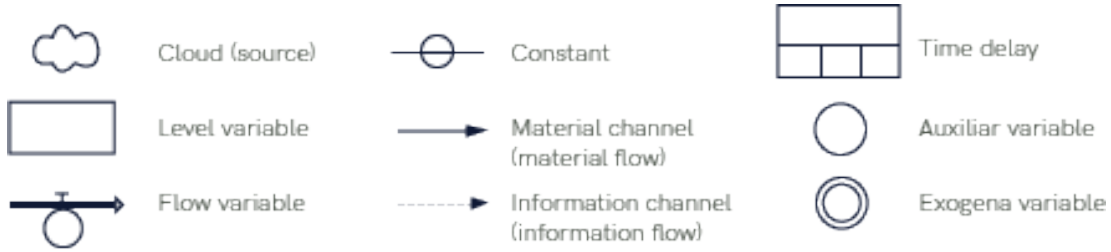


Diagram 13: Elements from Forrester's diagrams

39. Lane. (2000). Diagramming conventional system dynamics. Journal of the Operational Research Society, 241-245.

part of it in order to facilitate the understanding of the dynamic behavior of any system complex. Likewise, establish signs and symbols to maintain a common language that can be applied to any system. They have a negative side in terms of how to read the system, the result of a detailed diagram full of distractions that makes it very difficult to understand the structure of the model as a whole.

Edizione Ambiente

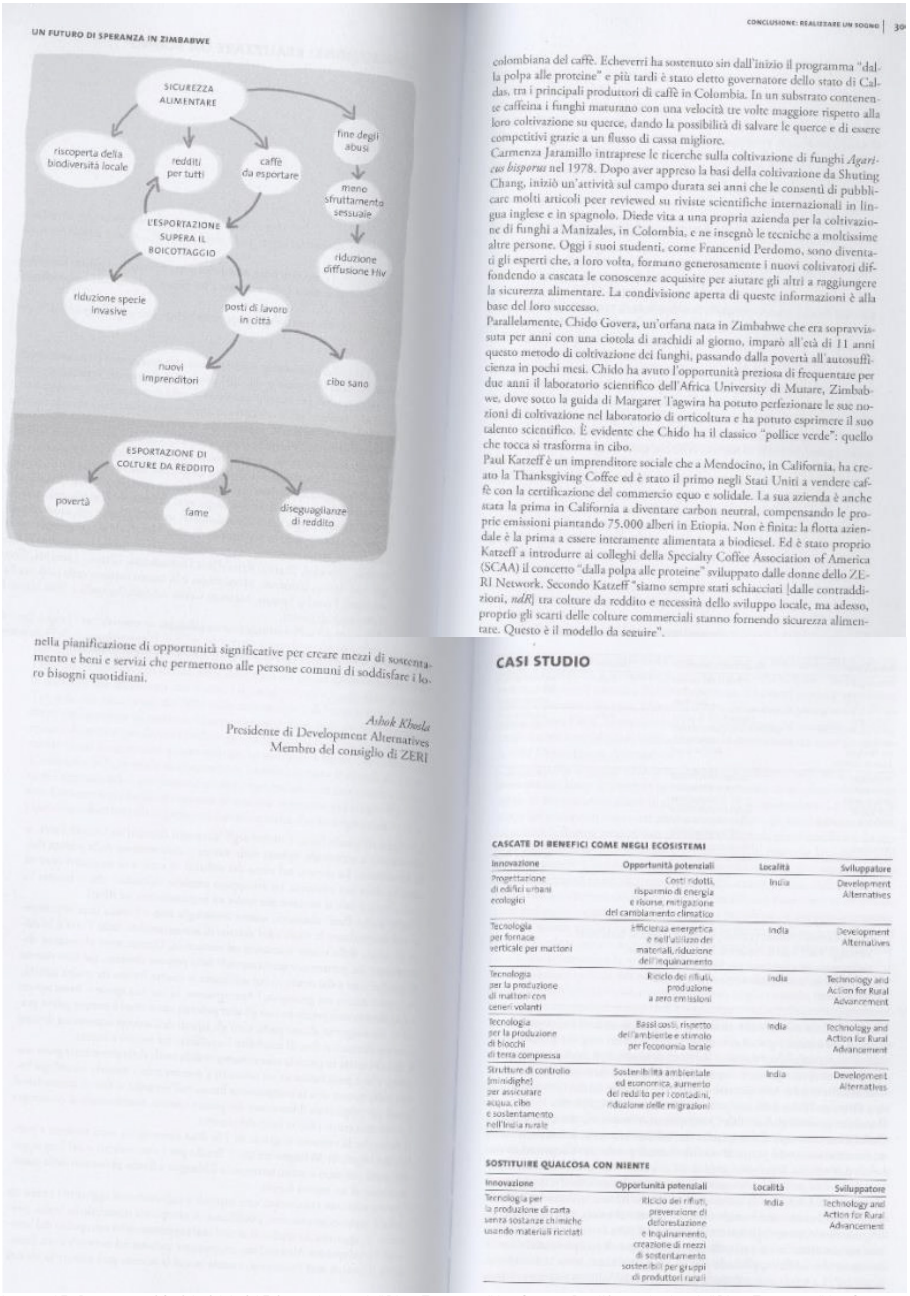
As the systemic design was growing as a discipline, several scientists, theoreticians, and organizations like the Club of Rome, started to document and theorize a lot about the subject. That was how the need to continue communicating the issue through different tools that could reach more people was seen.

This is the case of the Italian publishing house "*Edizione Ambiente*". An editorial dedicated to the publication of books, essays, reports, newspapers, and bulletins focused on the subject of sustainable development. "*Edizioni Ambiente has grown to represent the largest Italian structure specialized on the topic. His research focuses on the meaning of "environment" that contains, besides natural capital, the social, cultural, economic, architectural, technical and scientific approach.*" (Edizioni Ambiente, 2018)[40]

Image 14: Cover from the book "Blue Economy" by Gunter Pauli

Likewise, the publishing house implements new means

40. Edizioni Ambiente. (2018, 12 10). Edizioni Ambiente. Retrieved from http://www.edizioniambiente.it/chisiamo/



UN FUTURO DI SPERANZA IN ZIMBABWE

CONCLUSIONE: REALIZZARE UN SOGNO | 39

colombiana del caffè. Echeverri ha sostenuto sin dall'inizio il programma "dalla polpa alle proteine" e più tardi è stato eletto governatore dello stato di Caldas, tra i principali produttori di caffè in Colombia. In un substrato contenente caffeina i funghi maturano con una velocità tre volte maggiore rispetto alla loro coltivazione su querce, dando la possibilità di salvare le querce e di essere competitivi grazie a un flusso di cassa migliore.

Carmenza Jaramillo intraprese le ricerche sulla coltivazione di funghi *Agaricus bisporus* nel 1978. Dopo aver appreso la basi della coltivazione da Shuting Chang, iniziò un'attività sul campo durata sei anni che le consentì di pubblicare molti articoli peer reviewed su riviste scientifiche internazionali in lingua inglese e in spagnolo. Diede vita a una propria azienda per la coltivazione di funghi a Manizales, in Colombia, e ne insegnò le tecniche a moltissime altre persone. Oggi i suoi studenti, come Francenid Perdomo, sono diventati gli esperti che, a loro volta, formano generosamente i nuovi coltivatori diffondendo a cascata le conoscenze acquisite per aiutare gli altri a raggiungere la sicurezza alimentare. La condivisione aperta di queste informazioni è alla base del loro successo.

Parallelamente, Chido Govera, un'orfana nata in Zimbabwe che era sopravvissuta per anni con una ciotola di arachidi al giorno, imparò all'età di 11 anni questo metodo di coltivazione dei funghi, passando dalla povertà all'autosufficienza in pochi mesi. Chido ha avuto l'opportunità preziosa di frequentare per due anni il laboratorio scientifico dell'Africa University di Mutare, Zimbabwe, dove sotto la guida di Margarer Tagwira ha potuto perfezionare le sue nozioni di coltivazione nel laboratorio di orticoltura e ha potuto esprimere il suo talento scientifico. È evidente che Chido ha il classico "pollice verde": quello che tocca si trasforma in cibo.

Paul Katzeff è un imprenditore sociale che a Mendocino, in California, ha creato la Thanksgiving Coffee ed è stato il primo negli Stati Uniti a vendere caffè con la certificazione del commercio equo e solidale. La sua azienda è anche stata la prima in California a diventare carbon neutral, compensando le proprie emissioni piantando 75.000 alberi in Etiopia. Non è finita: la flotta aziendale è la prima a essere interamente alimentata a biodiesel. Ed è stato proprio Katzeff a introdurre ai colleghi della Specialty Coffee Association of America (SCAA) il concetto "dalla polpa alle proteine" sviluppato dalle donne dello ZERI Network. Secondo Katzeff "siamo sempre stati schiacciati [dalle contraddizioni, *ndR*] tra colture da reddito e necessità dello sviluppo locale, ma adesso, proprio gli scarti delle colture commerciali stanno fornendo sicurezza alimentare. Questo è il modello da seguire".

nella pianificazione di opportunità significative per creare mezzi di sostentamento e beni e servizi che permettono alle persone comuni di soddisfare i loro bisogni quotidiani.

Ashok Khosla
Presidente di Development Alternatives
Membro del consiglio di ZERI

CASI STUDIO

CASCATE DI BENEFICI COME NEGLI ECOSISTEMI

Innovazione	Opportunità potenziali	Località	Sviluppatore
Progettazione di edifici urbani ecologici	Costi ridotti, risparmio di energia e risorse, mitigazione del cambiamento climatico	India	Development Alternatives
Tecnologia per fornace verticale per mattoni	Efficienza energetica e nell'utilizzo dei materiali, riduzione dell'inquinamento	India	Development Alternatives
Tecnologia per la produzione di mattoni con ceneri volanti	Riciclo dei rifiuti, produzione a zero emissioni	India	Technology and Action for Rural Advancement
Tecnologia per la produzione di blocchi di terra compressa	Bassi costi, rispetto dell'ambiente e stimolo per l'economia locale	India	Technology and Action for Rural Advancement
Strutture di controllo [minidighe] per assicurare acqua, cibo e sostentamento nell'India rurale	Sostenibilità ambientale ed economica, aumento del reddito per i contadini, riduzione delle migrazioni	India	Development Alternatives

SOSTITUIRE QUALCOSA CON NIENTE

Innovazione	Opportunità potenziali	Località	Sviluppatore
Tecnologia per la produzione di carta senza sostanze chimiche usando materiali riciclati	Riciclo dei rifiuti, prevenzione di deforestazione e inquinamento, creazione di mezzi di sostentamento sostenibili per gruppi di produttori rurali	India	Technology and Action for Rural Advancement

Image 15: Pages no. 20, 21, 314, 315 from the book "Blue Economy" by Gunter Paulifrom the book "Blue Economy" by Gunter Pauli

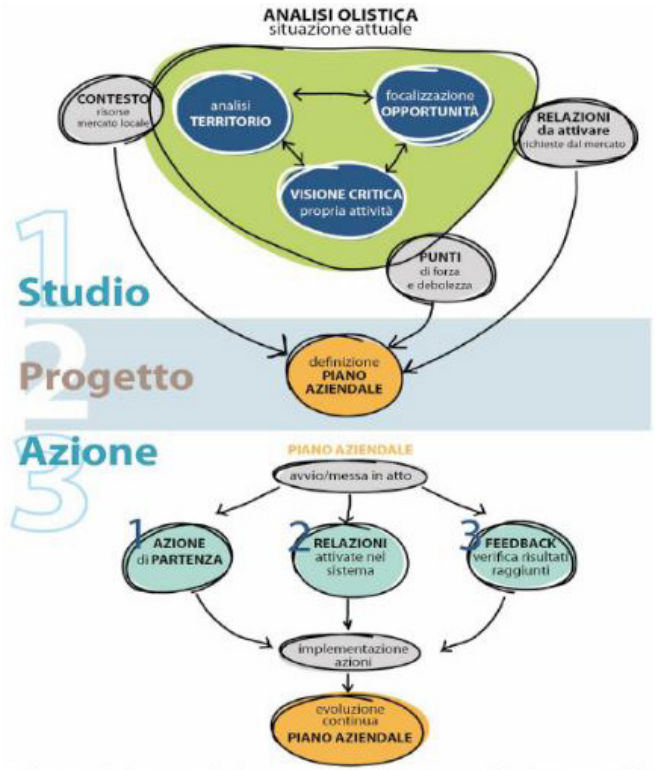
of digital communication like e-books and publications on its website *www.edizioniambiente.it*. This, together with the possibility of downloading free-books, gives more chances to reach more readers and thus, more knowledge of the topic, which is an important factor for the emerging discipline.

It is worth mentioning that normally the publications have this kind of rigid and scientific way of communication with a small amount of visual content, as we can see in the book "*Blue Economy*" written by Gunter Pauli. It is a traditional, book.

Edizione Ambiente try to make the message reach a lot of people by sharing it online and having free downloads of the content but it can be difficult to read for some people that are not experts on the subject.

Image 16: Cover and page no. 59 from the book "micro macro" by Luigi Bistagnino

If it is considered, as it has been seen previously, that for achieving a clear understanding and knowledge of the content, the visual communication takes an important part when communicating any kind of information. In this channel, the schemes and graphics are limited to a few ones. This was attempted to change with the books of professor Luigi Bistagnino, who will be discussed further in the next chapter. For instance, in the book "*micro macro*", he developed several schemes and graphics trying to concrete many concepts and relationships between them. Including in that way, many other readers in the field of systemic design.



Le diverse fasi temporali che portano alla definizione del piano aziendale e la loro interazione continua.

Relazioni tra gli attori per un nuovo sviluppo locale sistemico.

L'esperienza sul campo del gruppo di ricerca di Design Sistemico del Politecnico di Torino, che da una quindicina d'anni sta incrementando teoria e pratica dei sistemi in diversi settori industriali, conferma le considerazioni fatte in precedenza.
I progetti con le grandi imprese del territorio sono state condotte soprattutto con rapporti uno a uno (grande impresa-Politecnico) con ridotto coinvolgimento di altri soggetti del territorio, dovuto alla volontà di tutelare la proprietà intellettuale del progetto e alla posizione di predominio con cui è sentito il connubio grande impresa e accademia. Inoltre, si è potuto constatare come i progetti con le grandi imprese durino mediamente di più, anche se non sempre portano alla realizzazione del progetto *in toto*. Per esempio, il progetto condotto con la NN Europe ha visto una revisione profonda dei processi produttivi delle sfere di acciaio e l'azienda ha dimostrato una predisposizione al cambiamento radicale, nonostante le grandi dimensioni (Campagnaro, 2009). Un altro caso

Image17: Pages no. 84, 120 from the book "micro macro" by Luigi Bistagnino

Conclusions

The vision of systems thinking gave way to the development of theories that tried to explain the organization of living systems, how they work and interact with each other and with the environment. The studies and concepts that resulted from these, forms the basis of the guidelines that define Systemic design.

The application of systemic theories in the area of sociology by theorists such as Parsons and Luhmann, among others, showed how communication is a key characteristic of the evolution of humanity. They gave a vision of how societies are in a continuous exchange of information between their components and their environment where man is at the center of all activity; This exchange, depending on the user, creates different meanings and thoughts that as it continues to circulate in the system generates new relationships, knowledge, and feedback, this is how society evolves.

After analyzing various communication methodologies by different authors, it was shown that, although they share similar characteristics as systemic design and system theories, their models work in a linear way, and although there are attempts to improve the understanding of both the theoretical aspect and the graphics part, these theorists and cases studied (Club di Roma, Jay Forrester, Edizioni Ambiente) do not apply adequately these guidelines to any type of communication in societies. This is reflected in the interpretation of each model and in the inconsistency in visual communication.

Since neither the linear model nor the examples of graphics and schemes are a proper way to communicate a systemic project, it is necessary to make a change and apply these guidelines in order to achieve better communication for the DYCLE project. Being this already a systemic project, when expressed with the same values of systemic design and its theories already seen, it should be reflected in a visual way.

In other words, the information is considered the message, and the channel is the visual communication, in this way all the analyzed factors converge in the principles of communication and its relationships with systemic design.

Visual Communication

2

Visual communication and its benefits

As seen in the previous chapter and having analyzed these models it is worth highlighting the **importance of the channel in the process of communication.** It is the vehicle that transports the message, and its right election will determine a successful communication. Therefore, designing the channel in which the information will be visualized become a significant matter, which must be considered during the whole process. It is always important selecting the right one without isolating the other components. (Kenneth, 1984)[1]

Due to this systemic characteristic of the channel in the communication process, the role of systemic design in it become of great value. That is why this thesis is going to focus on the development of a channel of non-verbal communication for the project (message) of DYCLE, specifically a **channel of visual representation of information, values, patterns, connections and relationships.**

There are some statements known thanks to Kenneth that argues why choosing this particular channel is more appropriate. First, in general, when transmitting a difficult content, the receiver is not able to capture as much oral information, as visual (Kenneth, 1984)[2]. In this way, **the interest increases by 89%** (BAQUIA, 2007)[3], this means that it is more effective to decode a message visually captured.

In addition, he explains that the use of two channels is better than one. For instance, if the receiver can see and hear at the same time, the message will have more chances to be communicated in a successful way. Then if the receiver can see, touch and read the channel, there will be a better understanding and the person will acquire a greater consciousness of the message, achieving knowledge. In other words:

"The visualization becomes a medium for increasing cognitive perception of the beholder, easing reasoning and storing of the information represented."

-((Stabellini, Remondino, & Tamborrini, 2017)[4]

Although the visual language increases the interest, and it is a language easier to understand, this kind of expression is clearly a challenge. It aims to transmit all kinds of information without words and the representations to be recognized by every type of public, indeed it can transmit more information than a written text. (BAQUIA, 2007)[5].

This kind of language is universal, but of course, the representations will be understood differently depending on the culture and context where it is presented. Therefore, **it is important to know and understand the audience interested (receiver) in order to offer a suitable representation to them, so that people will be able to link the information and data given, thus producing knowledge.**

1-2. Kenneth, D. (1984). El proceso de la comunicación. Buenos Aires: El Ateneo.

3; 5.BAQUIA. (2007, June 13). La importancia de la comunicación visual. Retrieved from BAQUIA: https://www.baquia.com/emprendedores/la-importancia-de-la-comunicacion-visual

4. Stabellini, B., Remondino, C. L., & Tamborrini, P. (2017). Data Visualization Collection. How graphical representation can inspect and communicate sustainability through Systemic Design. The Design Journal, 2.

"Basically, there are two factors that influence the process of communication between the designer and the reference users: **how the visualization used is well adapted to encode information on the nature of the story that you want to tell, and the background and knowledge of the reader about the argument represented."** (Stabellini, Remondino, & Tamborrini, 2017)[6]

Besides this fact of clearly importance for reaching an adequate visual communication in each context, which is going to be analyzed later on the chapter 3; it is important knowing **how to create the visual content that can convey all the information, knowledge and ideas.** For this to happen, there is a methodology named **"Visual Thinking"** used in business field and which can be considered for the development of this thesis.

"Visual thinking is a way to organize your thoughts and improve your ability to think and communicate. It's a great way to convey complex or potentially confusing information." (XPLANE, 2018)[7]. This approach was created in 1993 when **Dave Gray**, author of books on design, well-intentioned innovation and change initiatives in industry, government and small businesses, founded XPLANE, a "visual thinking company, to help people develop shared understanding, so they can make better, faster decisions, and work better together to create more lasting, sustainable impact." (XPLANE, 2018)[8]

Gray shares this practice with business people, executives and designers by doing workshops and videos online. He starts with the basics: **knowing how to draw.**

Image 1. Dave Gray. Taken from: http://www.xplaner.com/bio/

6. Stabellini, B., Remondino, C. L., & Tamborrini, P. (2017). Data Visualization Collection. How graphical representation can inspect and communicate sustainability through Systemic Design. The Design Journal, 2.

7-8. XPLANE. (2018, 12 25). XPLANE. Retrieved from http://www.xplaner.com/visual-thinking-school/

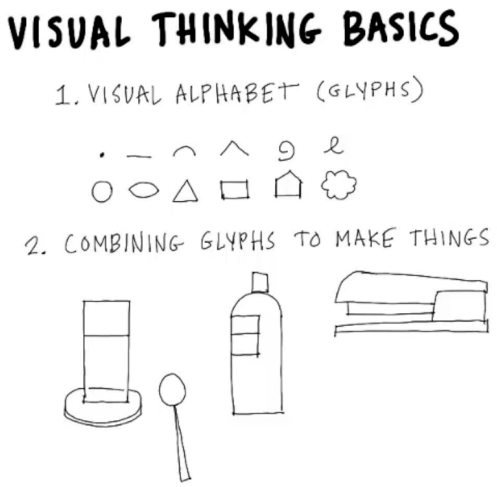


Image 2. Visual basics by Dave Gray taken from www.xplaner.com

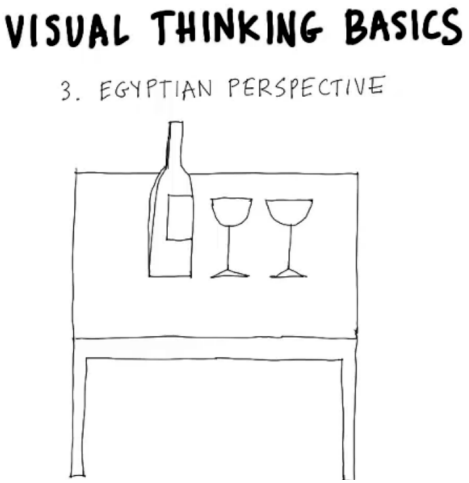


Image 3. Visual basics by Dave Gray taken from www.xplaner.com

That is why he proposes a visual alphabet: Shapes that can be combined in order to make things. (Image 2)

After combining these shapes, he also presents the Egyptian perspective (*image 3*) which combines different perspectives and can be used for representing complex ideas. This perspective rather makes things look like they are in real life, tries to represent things in a more logical way by drawing the things how people think they are.

Finally, there is a way of narration made up with the shapes of the alphabet and perspectives before mentioned. The way of putting all together is by creating scenes and panels that can be used for storytelling. Labeling scenes or things is recommended. (*image 4*)

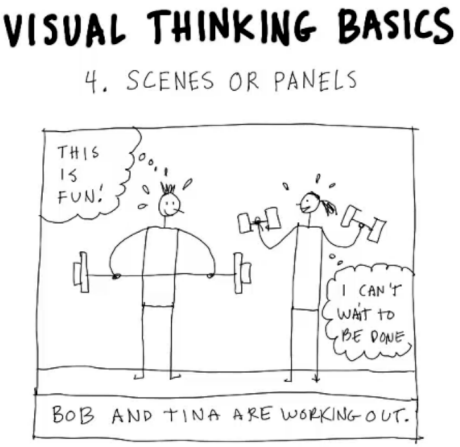


Image 4. Visual basics by Dave Gray taken from www.xplaner.com

After knowing how to draw, then comes up the question **"what to draw?"**. Dave Gray made up a simple three by three matrix that will help people determine the best way to approach drawing an idea. There are **three main ways to visualize ideas.** The first one works when the time is implicit and there is a sequence, process or flow in anything that is going to be explained. For instance, a flowchart. In the second one, the primary concepts are comparison, contrast and differences. In this case, the example can be the bar charts. The last main form is based on making visible the relationships and connections, show structures or systems. In the business context, the example can be an organizational chart.

Gray argues that these are schematic and logical ways of visualizing ideas. **These are the "head-centered images" related to thinking and used when the purpose is to make people think about a topic rationally and logically.**

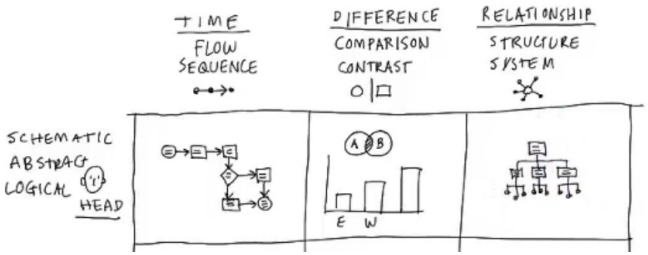


Image 5. Three by three matrix by Dave Gray taken from www.xplaner.com

Thus, what he does in order to create the matrix, is contrast them with other six ways of drawing ideas (*Image 7*). So, based on these three head centered images characteristics (time, differences and relationships); he explains two more: "Heart-centered images" and "hand-oriented images".

The h**eart-centered images aim to engage people and appeal to the emotion and passion using metaphors to work with the imagination.** First, when the time is implicit in the idea we want to explain, using stories is important. When a comparison is needed, showing opportunities is useful, and this can be done by contrasting a linear metaphor (like a machine) that can be thought in just one way, with an organic one (like a tree) in which the roots are important for growing a big tree. The opportunities are shown with the branches and If the tree is nurtured over time the fruits will finally grow. With this organic way, new ideas and ways of thinking can emerge.

And last, when thinking about anything as a system. For instance, an innovation in a company can be shown not by a hierarchical organizational chart, but as a solar system in which the sun is the goals wanted to achieve with the innovation. The planets are the initiatives the company must work on and the sub initiatives are moons around the planets. This is also a more organic way of thinking about things and visually organize the ideas.

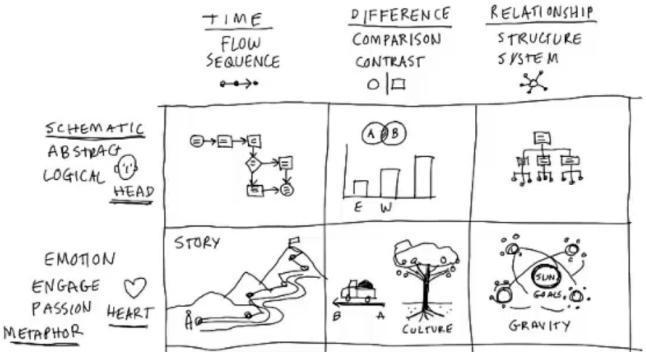


Image 6. Three by three matrix by Dave Gray taken from www.xplaner.com

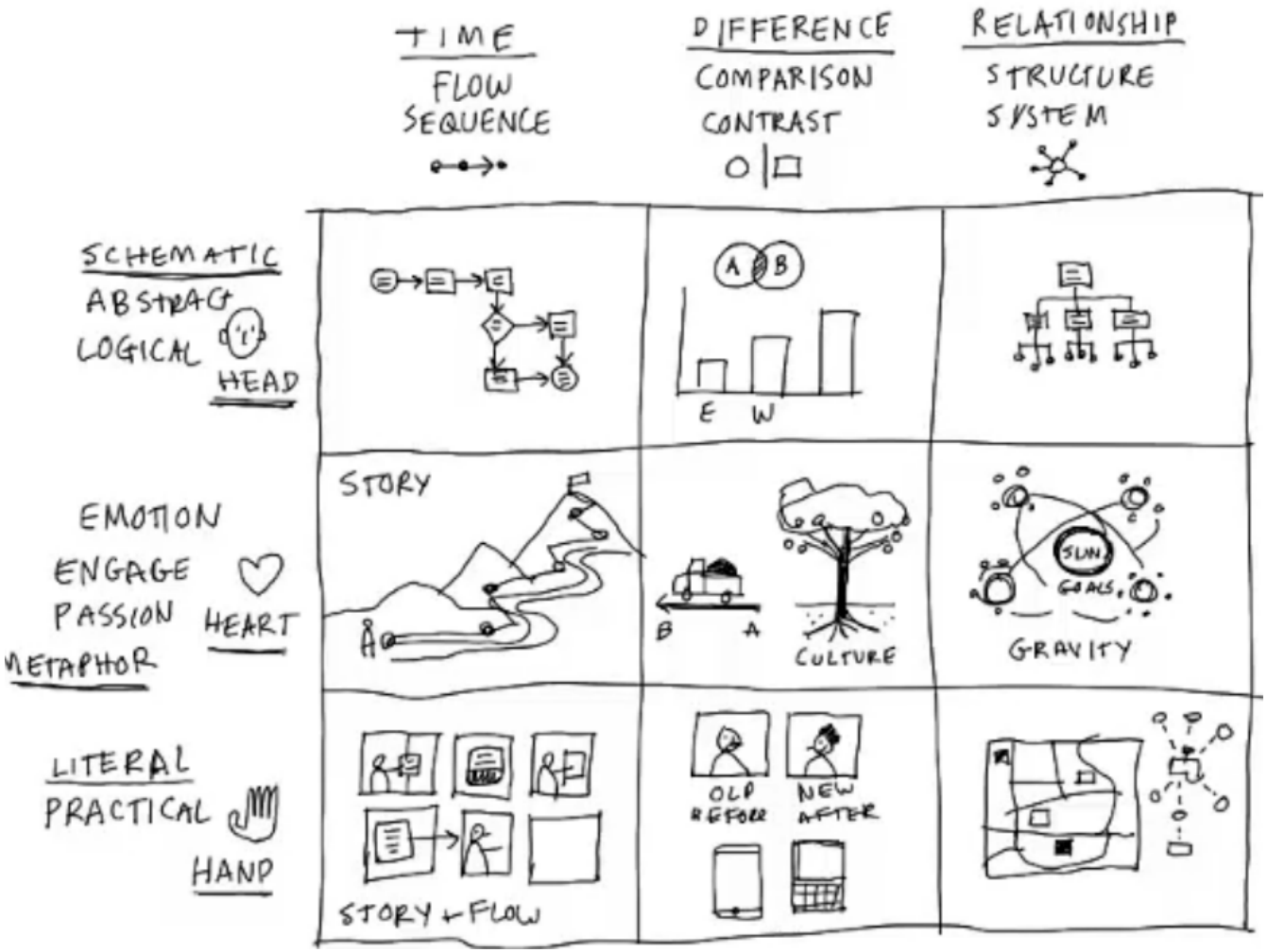


Image 7. Three by three matrix by Dave Gray taken from www.xplaner.com

The hand-oriented images, also called "literal images" are needed for sharing practical information because sometimes people just need to understand what to do. First, for communicating a time sequence, thinking like a comic book that shows steps can be useful. It can be understood as a flowchart of a story. Then, when wanting to show contrast, it can be made by images or photographs of before and after, make the difference visible. And when the relationships are the main factor, for instance, a map can be used to see relations between places and positions. Also, the exploded diagrams show how every piece is related to the whole thing.

To conclude, these nine ways to visualizing ideas will help to understand in which way any type of idea can be shown and make the **first approach by classifying it, in what to communicate (time, differences, relationships) and second, if the idea is appealing to the logic, the emotions or the practical things.**

In that way, communication can be reached in a clearer way. This matrix is going to be used for making an accurate approach to the different forms of visual thinking that are going to be needed for every audience of DYCLE in its specific context.

According to Andrew Vande Moere and Helen Purchase on the research paper "The role of design in information visualization", a visualization developer has to evaluate and balance three requirements in the design process. As in most other design-related fields, information visualization seeks to achieve **equilibrium between the requirements of utility, soundness and attractiveness.** (Moere, 2011)[9]

"Utility corresponds to the classic notions of functionality, usability, usefulness and other quantitative performance measures; these aspects generally define the effectiveness and the efficiency of the visualization. Soundness is concerned with reliability and robustness. Attractiveness refers to the aesthetics aspect: the appeal or beauty of a given solution; aesthetics does not limit itself to the visual form, but also includes aspects such as originality, innovation and user experience." (Stabellini, Remondino, & Tamborrini, 2017)[10]. Again, these factors should be considered from the beginning and not as an add on.

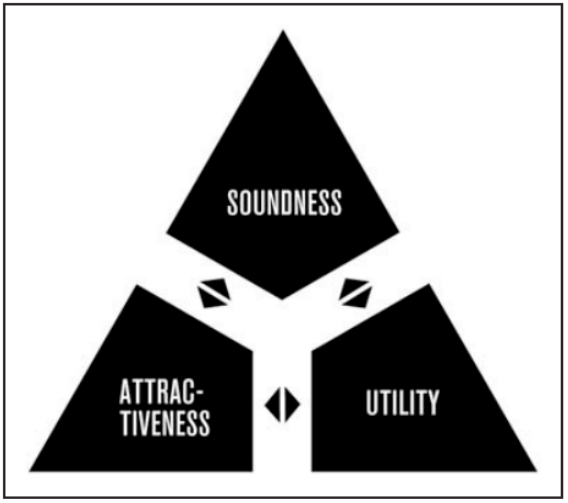


Image 8. The Vitruvius triangle, based on typical design requeriments by Andrew Vande Moere and Helen Purchase. Taken from: On the role of design in information visualization

"Media producers and designers form their messages according to how a hypothetical recipient (receiver) would perceive the material. The aspect of the information is closely connected to the receiver ability to select, attend to, and process it. It is ultimately him who chooses among the available data what they want to explore, how will it be processed and interpreted, in what order and how deeply will it reach them". (Holsanova, 2012)[11]

9. Moere, A. V. (2011). On the role of design in information visualization. SAGE.

10. Stabellini, B., Remondino, C. L., & Tamborrini, P. (2017). Data Visualization Collection. How graphical representation can inspect and communicate sustainability through Systemic Design. The Design Journal, 2.

11. Holsanova, J. (2012). New methods for studying visual communication and multimodal integration. SAGE.

Even though the studies regarding this are very few, it is at the hand of the receptor to decide the best way to communicate the content while **knowing who their targets are (receiver) and consider the user experience when looking at the visual representation.**

As mention before, a visual representation is more effective to be perceived by the human eye than blocks of data. Take for example, the reading materials for children's always feature pictures of larger print whether these are comics, coloring books, or storybooks; they all have in common the ability to allow the reader to know what is going on because they perceived the illustrations and interpreted the sequence of events alongside an easy-to-read text (Soegaard, 2008)[12].

Perception and interpretation play a crucial role in how non-verbal representations are perceived by the audience, even though the message can be interpreted differently by each individual, there are different factors that affect the way information is sensed. **Perception of visuals** is determined by both bottom-up factors such as form, size, color, luminance, contrast, among others; and top-down factors that refer to the **recipient's personal characteristics** such as interest, attitudes, goals, prior knowledge, emotions and cultural experiences (Soegaard, 2008)[13]

While the latter requires a deep analysis of the target, the bottom-up factors are defined as **Visual hierarchy**, this allows an understanding of how the receiver process graphic content and **affects the way the information is perceived.** These characteristics that can be used to influence the audience perception of the content are explained as:

Size: The larger the element, the more attention it will attract compared to smaller elements, if there is information that is more important or as a way to indicate where to start.
Color: bright colors draw attention over muted ones. After bright colors, richer and darker ones will be more attractive,
Contrast: Dramatically contrast colors will catch the eye more than slightly contrasting colors. This helps to show what is more important in a graphic or design.
Alignment: this creates order between design elements if an element brakes away from the others it will attract more attention or meaning other action.
Repetition: repeating styles, color, shapes can give the impression that the content and information are related. If one of the elements brakes the style, it could quickly draw attention given it more importance or meaning the start of another process.
Proximity: this is another way to show the relation between the elements of the content.
Whitespace: space surrounding elements (it can be any color) can be used to draw attention to certain pieces of content. It makes the information easier for the eye to digest, and it lets them zoom-in on each area of it.
Texture and style: the use of richer textures and styles can help prioritize and distinguish content. For exam-

12-13. Soegaard, M. (2018, November 20). Visual Hierarchy: Organizing content to follow natural eye movement patterns. Retrieved from Interaction Design Foundation: https://www.interaction-design.org/literature/article/visual-hierarchy-organizing-content-to-follow-natural-eye-movement-patterns

ple, fonts can set the tone of a design, showing textures representing an element of the composition can help the reader identify more easily what he/she are seeing. However, it should be considered not to overwhelm with information, this might end up distracting from the initial purpose.

There are common patterns for the hierarchy of visual content. These are based on the movements that the human eye tends to make when presenting content (page). For example, English, Spanish and Italian are read from left to right; they already have a scan pattern set when they are faced with a text page. On the contrary, Arabic has a different method where you read from right to left. It is important to **understand how the receiver processes the information before adopting a hierarchy pattern.**

In the case for a systemic communication, it requires a different way to read the information, but it is still useful to consider how usually readers start looking at it. When talking about hierarchy it doesn't mean there is more important than another, all knowledge is important, this method is simply to organize and transmit in a better way that it will not overwhelm the reader with too much information.

Graphic and visual design references

Bruno Munari

"Bruno Munari (October 24, 1907, Milan- September 30, 1998, Milan) was an Italian artist and graphic designer, a proponent of the Italian futurist movement, and one of the founders of the Italian movement for concrete art. He had a strong intellect, culture, and inclination toward the arts, which allowed him to contribute to all fields of the visual arts (painting, drawing, sculpture, industrial and graphic design, and film) as well as literature and poetry." (casati gallery design, 2018)[14]

Image 9. Bruno munari. Taken from: https://www.collezionedatiffany.com/metodo-bruno-munari-2016/

His approach to the visual arts and communication is from a ludic and interactive perspective. He focused on the personal development of the children's intellect, creativity, learning skills, and personality. It was a very important contribution to the educational field due to the fusion of creativity and knowledge. He argued that through the games, the creativity helps to memorize information creating relations and connections between what is known until the moment.

That is why it is so important playing with forms, materials, and having multisensorial contact that stimulates the creativity and fantasy. Thinking about this, he developed different types of toys and books that were "undefined" or "unfinished". These were created for suggesting the kids the concept of completing, creating and making on their own; alluding to the invention. Instead, the fact of giving the children the common toys that were almost real; did not give them the opportunity to conclude and make connections with their imagination. That is the case of "Libri illeggibili" (unreadable books). These were books with the purpose of communicating something as an object, without thinking of its content. A book without words. Just by turning the pages, the content will compose or decompose. The reader can create his own story because they are the main characters of it. It is clear the ludic concept of movement and interaction that he was influenced by, due to the futurist movement.

The movement wanted to communicate concepts like movement, action, and speed. But for this to happen, they made painting and sculptures; static techniques that did not achieve the goal.

14. casati gallery design. (2018, 12 11). casati. Retrieved from http://www.casatigallery.com/designers/bruno-munari/

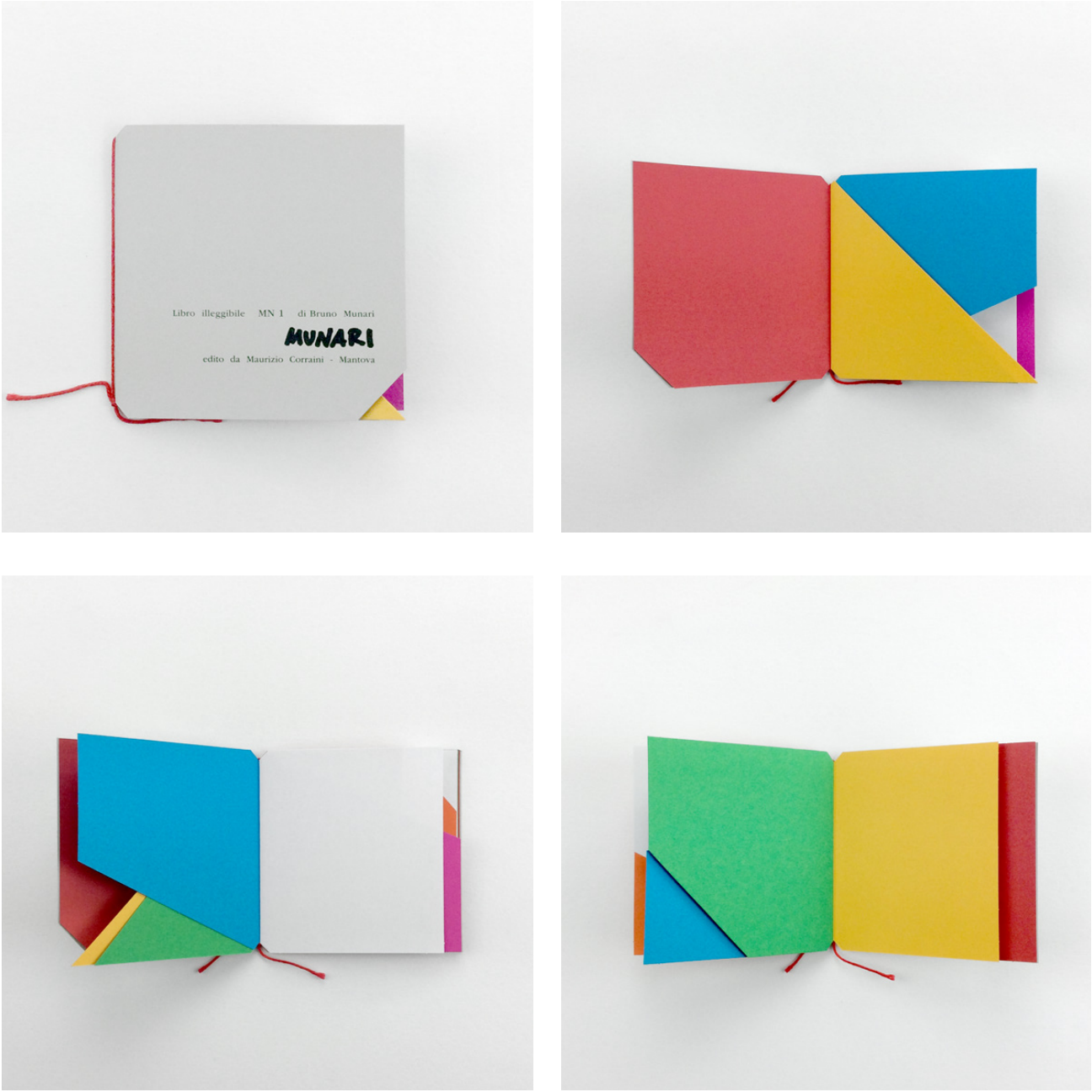


Image 10. "Libri illeggibili" by Bruno munari. Taken from: https://www.counter-print.co.uk/products/libro-illeggibile-mn-1

Thus, he, as one of the proponents of the Italian futurist movement, tried to change it. For instance, by creating the moving sculptures named "Macchine inutile".

Image 11. "Macchine inutile" by Bruno Munari. Taken from: http://www.turinisturin.com/2017/02/12/dal-16-le-opere-di-munari-al-mef/

Although his interest was in the children, Munari argued that the adults should have more curiosity and free their mind like the kids do, in this way the pre-concepts will not be an obstacle for solving any kind of problem. In fact, he developed a project methodology for design problems in one of his famous books "Da cosa nasce cosa" ("One thing leads to another"). He explained the methodology with the example of how to make "green rice".

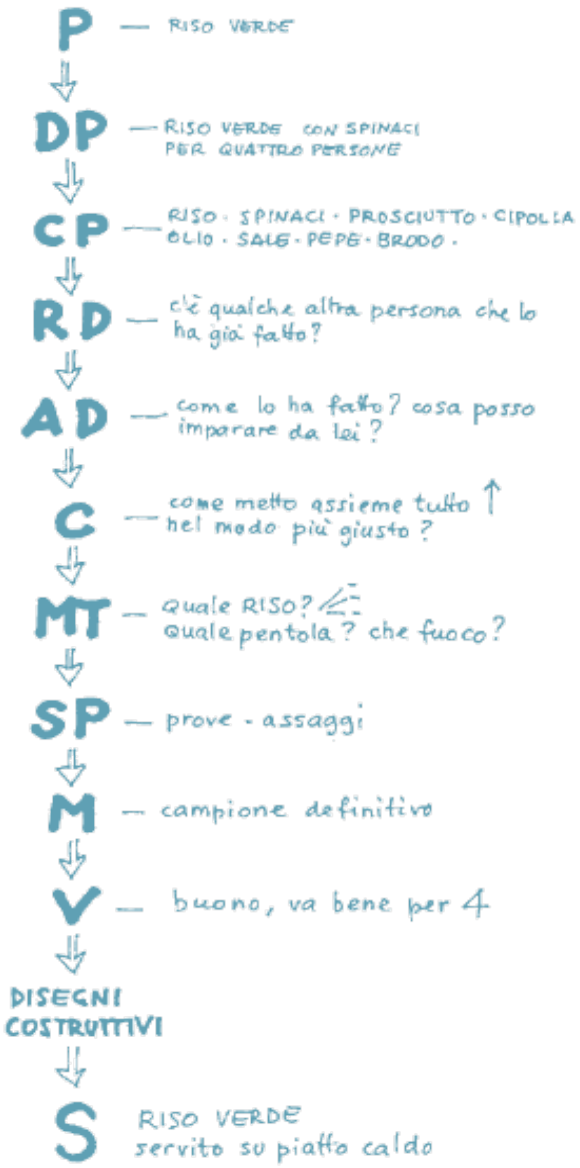


Image 12. Project methodology by Bruno Munari. Taken from: https://areeweb.polito.it/didattica/corsipn/MMI%20D&R/materiale%20didattico%20set.htm

To conclude, it is important to highlight the value related to the development of the present thesis. First of all, books are key elements of visual communication. they are "*vehicles through which it is possible to promote a new concept of dynamic and total art, which engages all the senses. He (Munari) himself stated that it is necessary to think in at least three dimensions*". Secondly, the readers must be active receivers of information, be the protagonist of every story, that is why in his books there are no characters with names. Likewise, the books are intended to share and democratize knowledge. That is why they have to be also accessible and easy to read by everyone. It is important to create interaction and make the "*creative processes transparent and define a new educational role for visual arts.*" (Marnie, 2016)[15]

Luigi Bistagnino

An outstanding exponent of the communication in Systemic Design, teacher of the Department of Architecture and Design of the Politecnico di Torino. He is one of the academic leaders of circular economy thinking in Europe, his methodological theories and principles of the discipline of systemic design are part of the RETRACE project, which consists of a systemic approach for regions in a transition towards a circular economy. He sees the economy as a system within another system, "a network of actors connected by relations and flows of matter and energy", where everything is transformed, and nothing is destroyed.

It can be said that it uses two types of models to explain the complexity of the systems. The first uses a systemic approach set to model a territory based on quantitative data presented in a non-linear way, defining in a deterministic way the interrelations between the elements of a territory (Flow of materials, economic indicators, social effects ...). The second model, seek to be accessible and adaptable to any vocabulary of each actor involved (stakeholder, entrepreneurs, etc.), they are designs that seek the translation of ideas, using infographic tools, maps, images, videos, etc. (Barbero, 2017)[16]. The model of these diagrams operates in a similar way to the ones described by Forrester before, since it is based in

Image 13. Luigi Bistagnino. Taken from: http://www.edizioniambiente.it/autori/426/luigi-bistagnino/

15. Marnie, C. (2016, 12 1). The Function of Play in Bruno Munari's Children's Books. A Historical Overview. Journal of Theories and Research in Education.

16. Barbero, S. (2017). Systemic Design Method Guide for Policymaking: A Circular Europe on the Way. Torino: Umberto Allemandi Srl.

the systemic thinking using the same causal diagrams or causal feedback circuits that show the flow of matter and energy in each phase of the system and establishes the different connections and relationships that occur between each component to understand production processes.

Systemic thinking provides cognitive tools that allow us to consider things in their interrelationships, how they impact each other and how they generate the appropriate effects that arise from these interactions. In addition, it produces mental representations using systems as epistemological tools.

Diagrams as a methodological means to explain systemic design according to Luigi Bistagnino should be simple and concrete, each born from observing the operation of the systems in their natural environment, the flow of correlated and sequential messages between them that show the direction of message flow. Everything is connected, everything is found, whether it is transformed; this is the connectivity for the circular economy.

To represent this type of systems in a systemic way, it is importance of considering certain aspects such as: the relationships that take place in the context of a territory where the activities of the system are located, in addition to the relationships that are generated within it and outside the local context, including different levels of action that are divided into regional, national, continental, and global.

These considerations are intended to understand the operation of the system, identify the opportunities and disadvantages that may exist. Therefore, to understand these diagrams it is necessary to explain in small steps the most important aspects with the help of schemes presented by teachers and students of systemic design, visualizing the activities that occur within a systemic project (Barbero, 2017, págs. 76-79)[17]

Generated relations

The following diagram (*diagram 1*) explains the relationships generated by an activity within a territory (suppliers of the necessary materials and services), where the resources come from (inputs) which can come from the local, regional, national or international level, in order to understand the products generated during a specific activity. It also marks the connections between the different actors that are involved in the process, from the origin of the inputs to the final consumer and the result of the activity, for example, the distribution of the product to large-scale wholesale (Large Scale Retail) such as supermarkets or local stores and markets.

17. Barbero, S. (2017). Systemic Design Method Guide for Policymaking: A Circular Europe on the Way. Torino: Umberto Allemandi Srl.

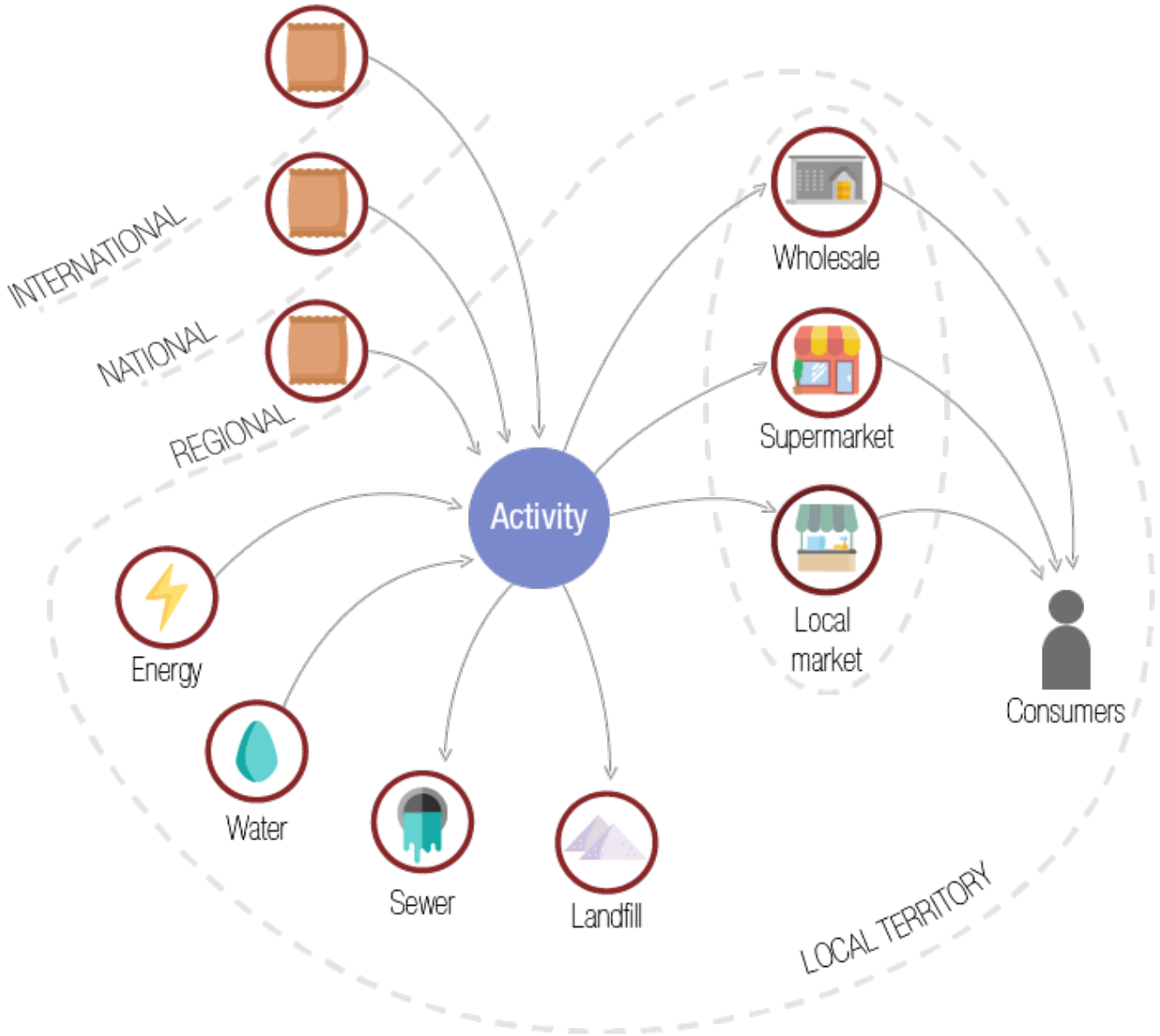


Diagram1. Schema of the relationships; Taken from: RETRACE

Input and Output Resources

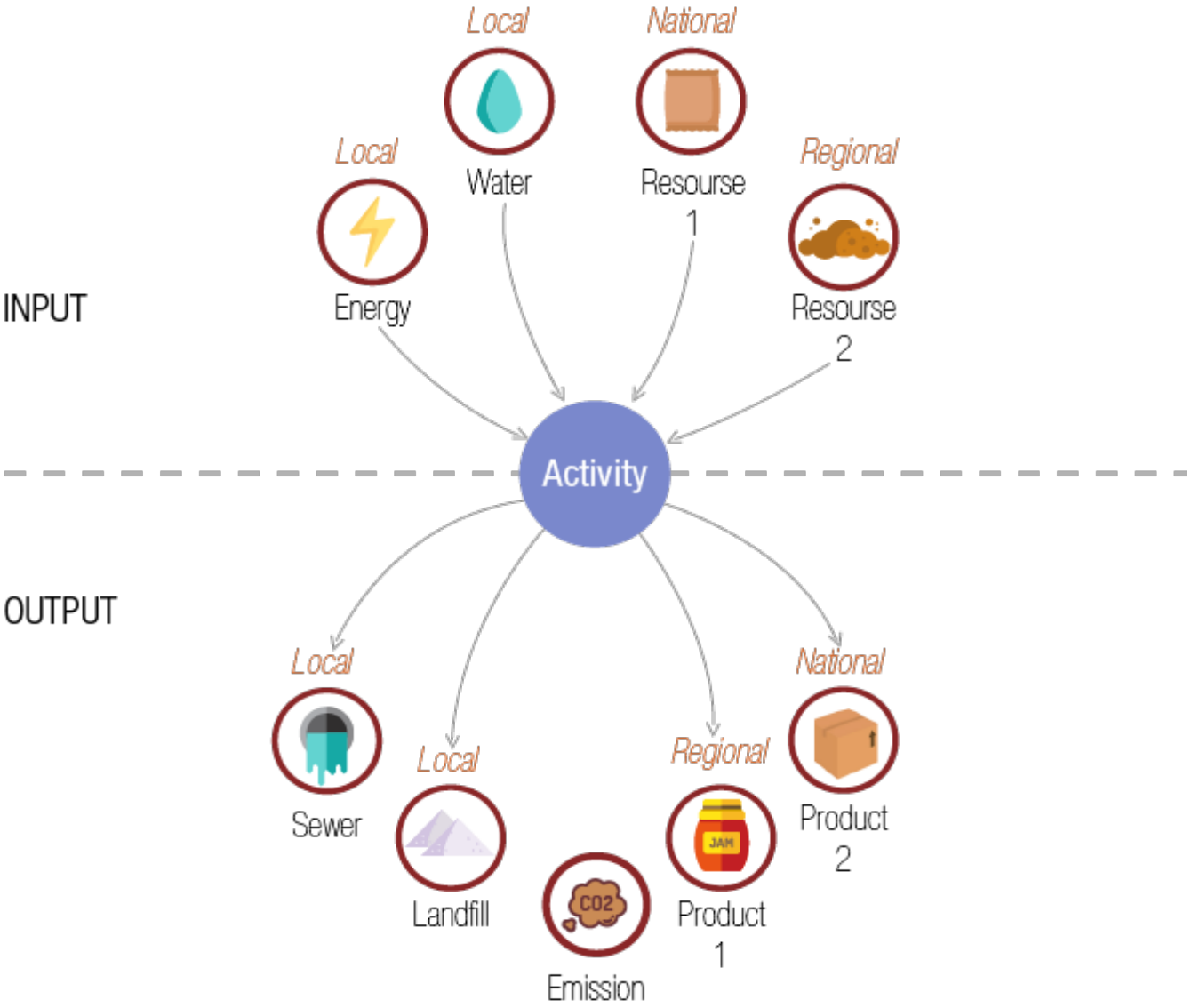


Diagram 2. Schema of the incoming (input) and outgoing (output) resources; Taken from: RETRACE

In this phase (*diagram 2*) is visualized the incoming resources (input) necessary for the product development, and the emissions (CO2 from transport, energy, etc.) and resultant material (output) of the production process in an activity. Like the previous system, the inputs and outputs are differentiated in levels where each resource comes from, and where the resulting material goes.

Actions that form activity with one´s own Input and Output

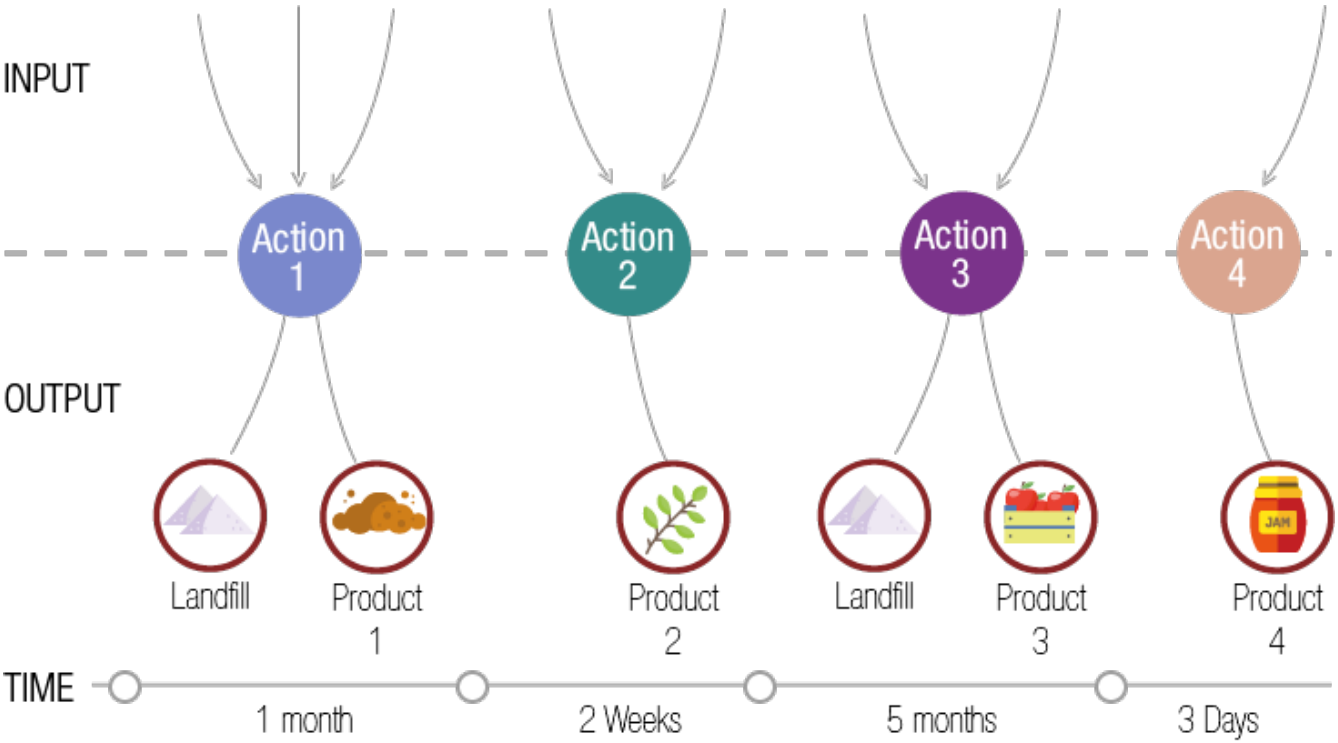


Diagram 3. Schema of actions that make up an activity; Taken from: RETRACE

This scheme (*diagram 3*) is a continuation of the previous diagram, it represents the different actions that are carried out during a process. Like the previous one, the inputs and outputs of each individual action are indicated within the system, allowing to understand the essential qualities of each one and the weight or influence that they have on the others. In this way, identify which ones use the most input or generate the most outputs. The timeline marked at the bottom emphasizes when the actions are performed, see their development over time. The result is a general perception of the specific process with the various flows of resources divided into individual actions.

As mentioned earlier, every system is formed by different subsystems that are connected to compose the complete system (*diagram 4*). Once identifying the flows of materials and energy that enter into each action or activity (subsystems), the levels where they come from and the connections they generate, the complete system will be built step by step.

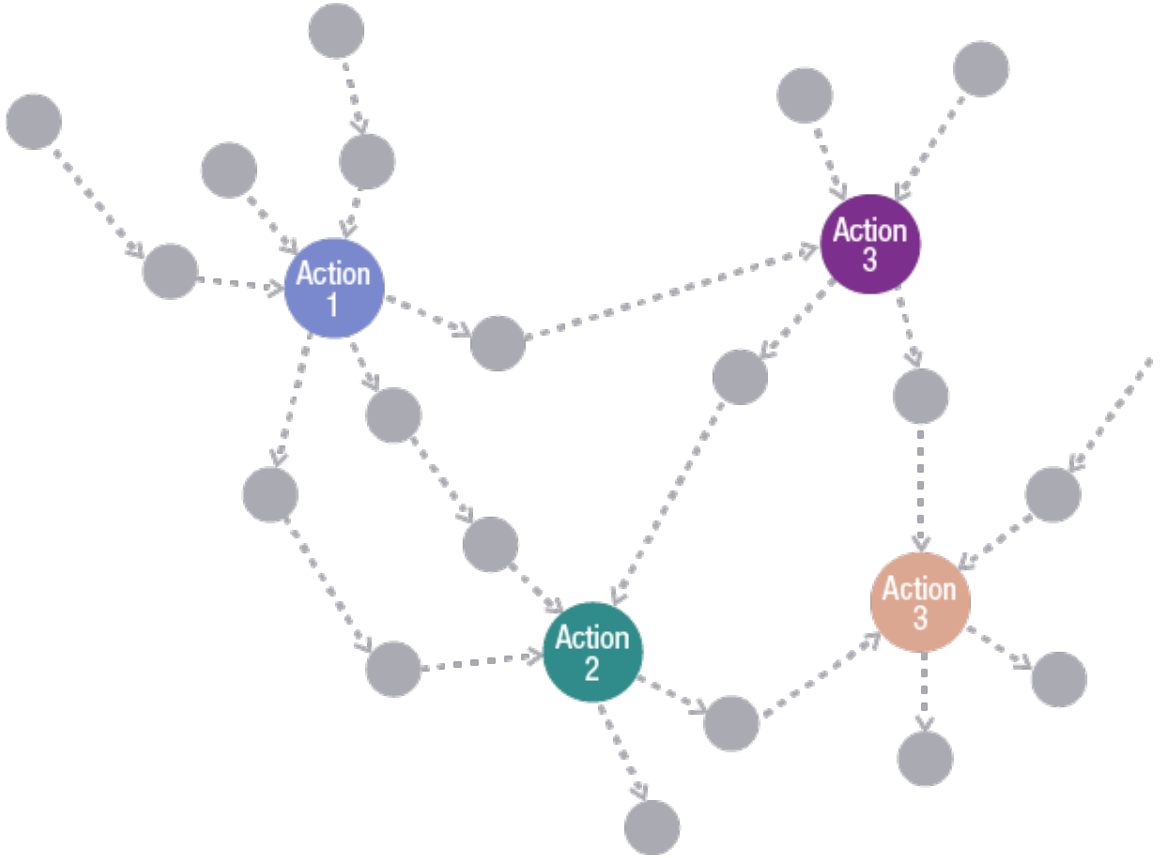


Diagram 4. Relationships between systems (actions)

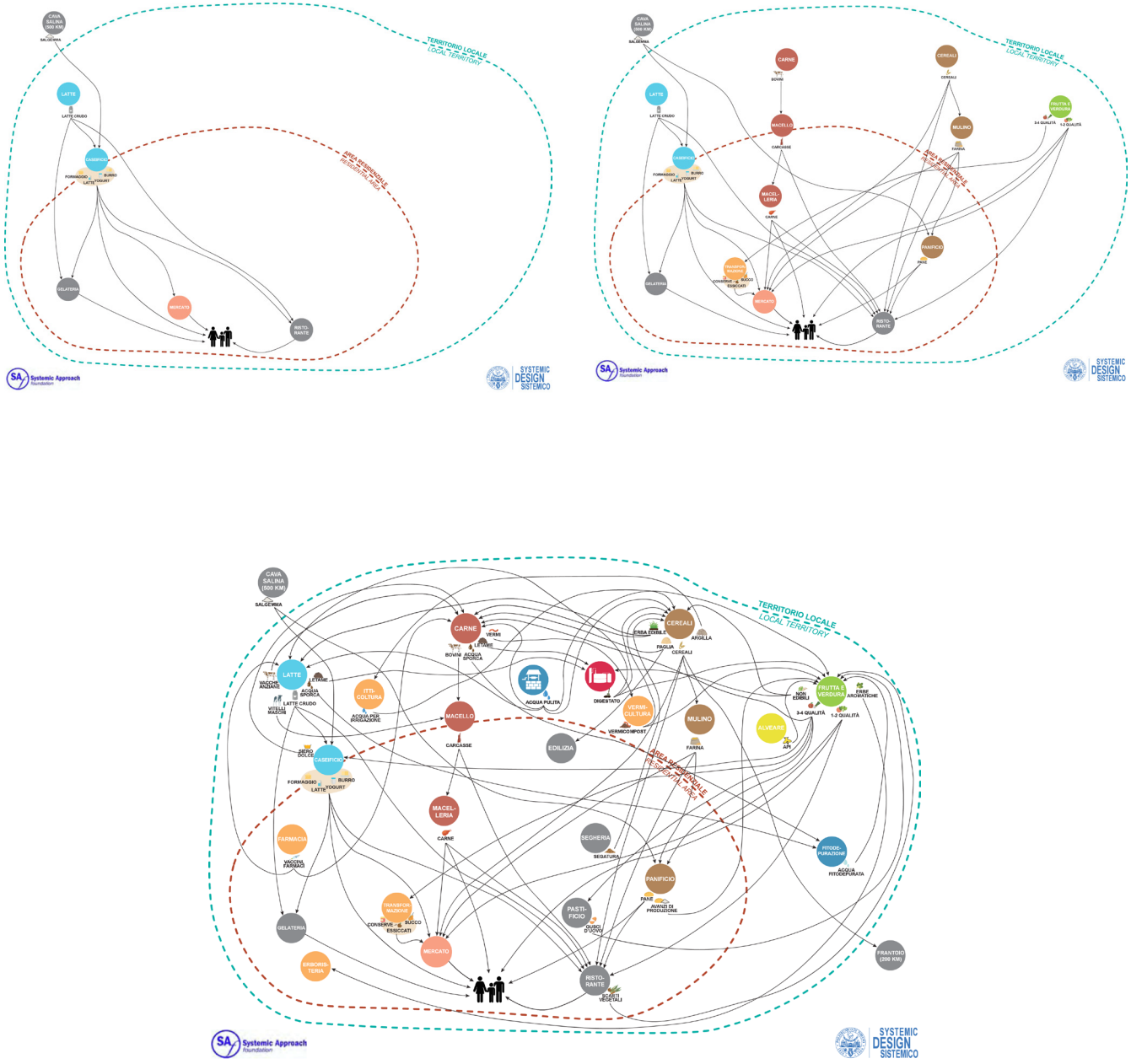


Diagram 5. Luigi Bistagnino, schemes of Macrosystem of the territory, step by step

In this example (*diagram 5*), the activities are divided into three levels: residential area, local territory, and external; this is where the system's activities are developed. It repeats what has been seen in the other diagrams, starting from an action marking the flows of materials necessary for that operation, where they come from (inputs), what they generate (outputs) and where they go. As all the components of an activity are pointed out, they start forming relationships with other activities and so on until the whole system is completed (*diagram 6*).

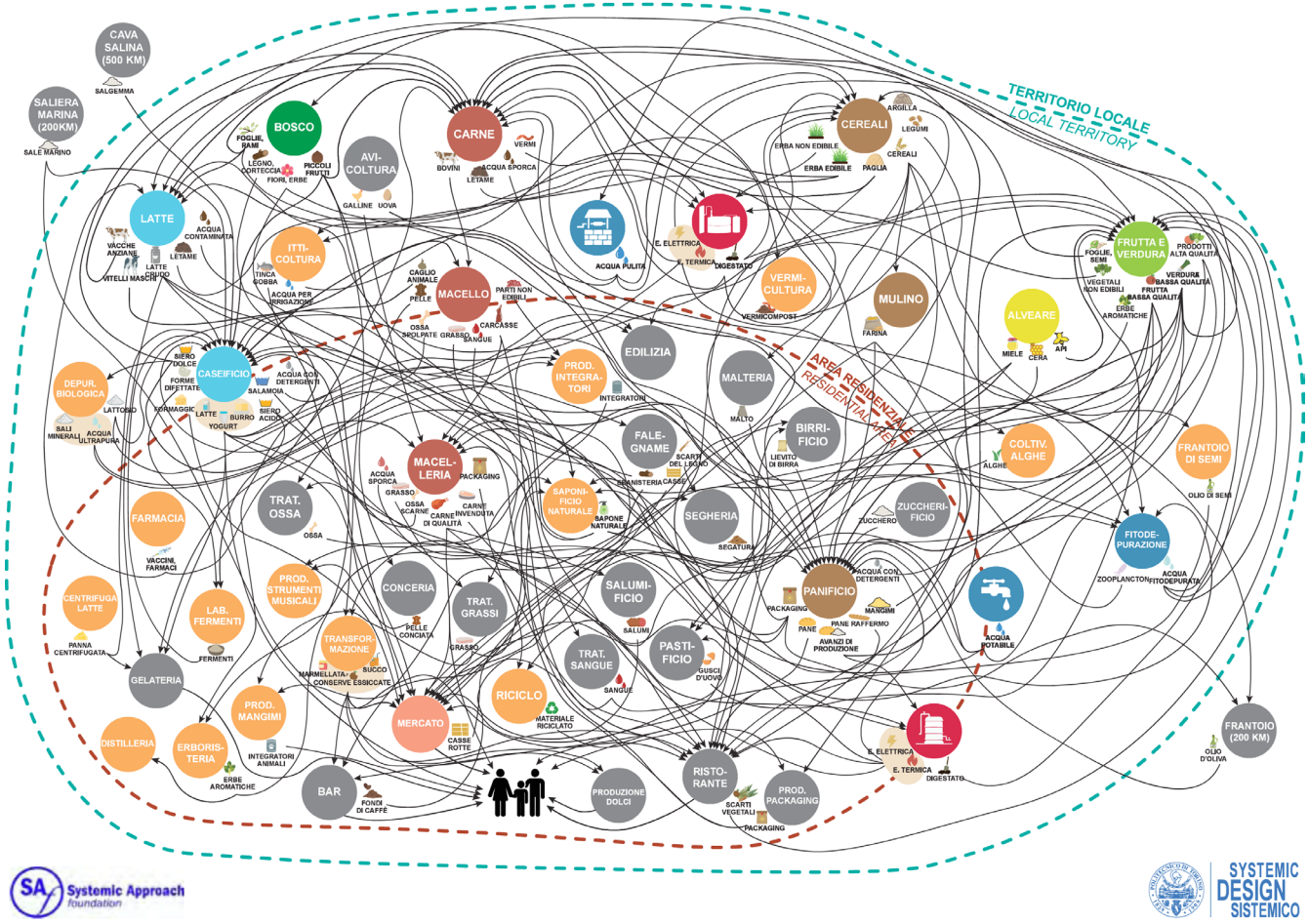


Diagram 6. Luigi Bistagnino, scheme of whole system

Tomás Maldonado

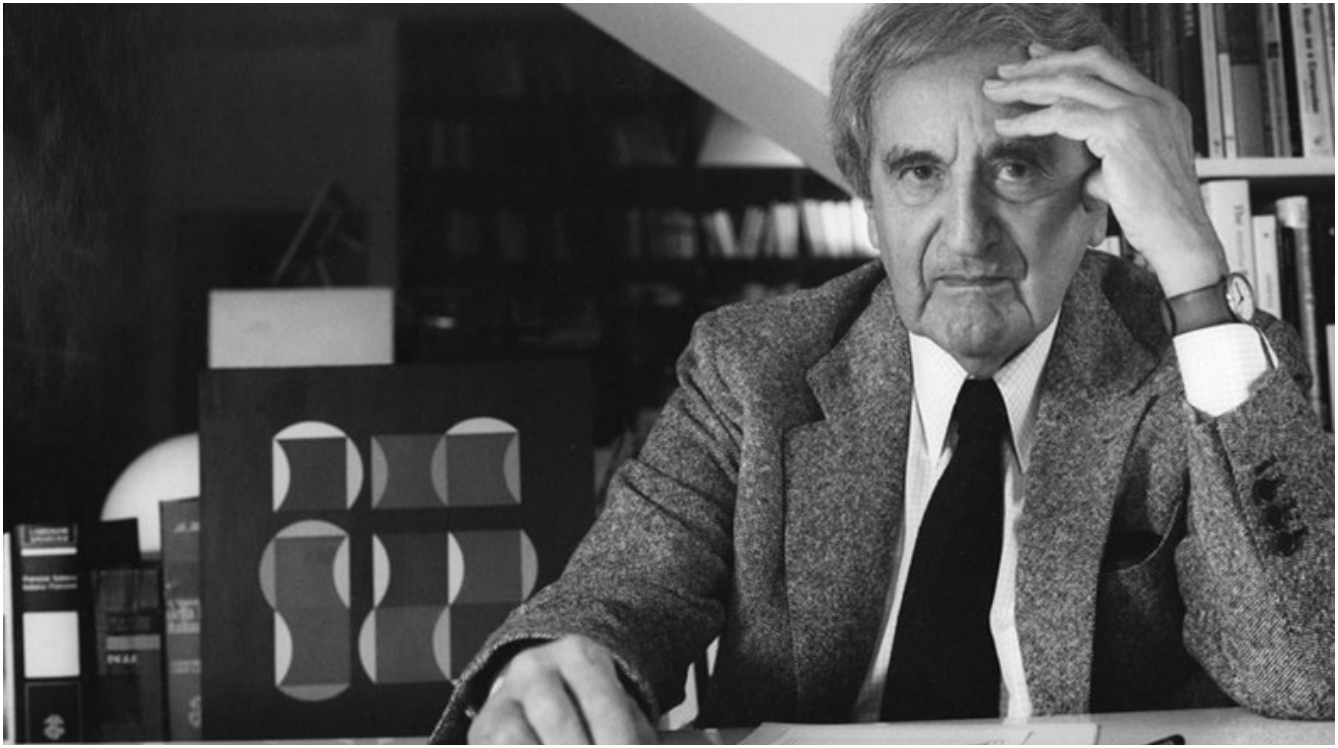


Image 14. Tomas Maldonado. Taken from: https://www.floornature.it/addio-tomas-maldonado-14258/

Tomas Maldonado was a painter, industrial designer and theoretician of Argentine design. He had a great influence on the thinking and practice of design in the second half of the 20th century, especially his contribution during his work in the Hochschule fur Gestaltung (Ulm school, 1953 - 1968) where he promoted the Design Theory, and in particular was the first to apply computational approaches in Architecture and Design (Neves & Rocha, 2013)[18]. During the direction of Maldonado, the curriculum of the Ulm school focused on more concrete theories and design approaches, wishing to create a closer relationship between science and technology, broadening its perspective applying technological approaches to design.

18. Neves, I. C., & Rocha, J. (2013, November 25). The contribution of Tomas Maldonado to cientific approach to design at the beginning of computational era. Lisboa: FCT- Fundação para a Ciência e a Tecnologia.

From this idea emerged several disciplines such as Economics, Sociology, Mathematics, Operational Research, Statistics, Set Theory, Cybernetics and other subjects dealing with the history of science and machine theory (Bagtazo, 2016)[19].

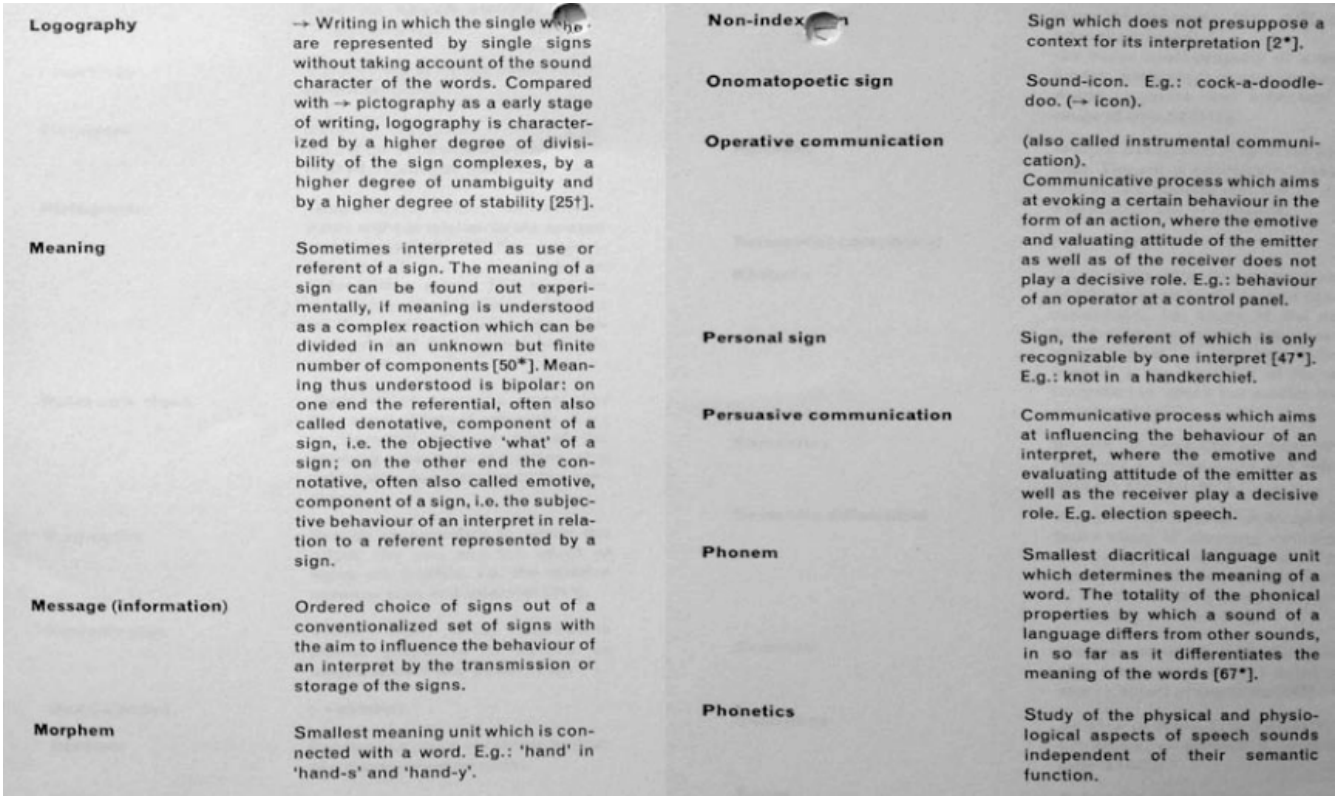
Maldonado also taught Industrial design and Visual communication, also known as semiotics, the study of signs and symbols, and how they are used; it was here (Ulm school) that semiology is applied for the first time in design, which will be the focus in this case study.

Semiotics describes the processes of communication within human societies, not in terms of the exchange of messages, but in the **creation of meaning, of the action of signs, of semiosis, of meaning production processes, systems of meaning, of cultural developments or symbolic exchanges** (Videales, 2008)[20]. Semiotics was for Maldonado the means to apply his "scientific operationalism", they no longer worried about the names of things, or things themselves, but by real knowledge.

In 1961 he published the definition of 94 items of "Semiotic Terminology" (Glossary of semiotics), these definitions were thought to serve as a set of analytical tools, improving the semiotic discourse in the design (*image15*).

19. Bagtazo, C. (2018, November 25). Tomás Maldonado's Analogical computer design & pre-digital art. Retrieved from BAGTAZO: https://www.bagtazocollection.com/blog/2016/4/18/deisgn-study-toms-maldonados-ulm-model

20. Videales, C. E. (2018, November 25). La relacion entre la semiotica y los estudios de la comunicacion: un dialogo a construir. Retrieved from SciELo: http://www.scielo.org.mx/scielo.php?script=sci_arttext&pid=S0188-252X2009000100003



Logography
→ Writing in which the single words are represented by single signs without taking account of the sound character of the words. Compared with → pictography as a early stage of writing, logography is characterized by a higher degree of divisibility of the sign complexes, by a higher degree of unambiguity and by a higher degree of stability [25†].

Meaning
Sometimes interpreted as use or referent of a sign. The meaning of a sign can be found out experimentally, if meaning is understood as a complex reaction which can be divided in an unknown but finite number of components [50*]. Meaning thus understood is bipolar: on one end the referential, often also called denotative, component of a sign, i.e. the objective 'what' of a sign; on the other end the connotative, often also called emotive, component of a sign, i.e. the subjective behaviour of an interpret in relation to a referent represented by a sign.

Message (information)
Ordered choice of signs out of a conventionalized set of signs with the aim to influence the behaviour of an interpret by the transmission or storage of the signs.

Morphem
Smallest meaning unit which is connected with a word. E.g.: 'hand' in 'hand-s' and 'hand-y'.

Non-index[illegible]
Sign which does not presuppose a context for its interpretation [2*].

Onomatopoetic sign
Sound-icon. E.g.: cock-a-doodle-doo. (→ icon).

Operative communication
(also called instrumental communication).
Communicative process which aims at evoking a certain behaviour in the form of an action, where the emotive and valuating attitude of the emitter as well as of the receiver does not play a decisive role. E.g.: behaviour of an operator at a control panel.

Personal sign
Sign, the referent of which is only recognizable by one interpret [47*]. E.g.: knot in a handkerchief.

Persuasive communication
Communicative process which aims at influencing the behaviour of an interpret, where the emotive and evaluating attitude of the emitter as well as the receiver play a decisive role. E.g. election speech.

Phonem
Smallest diacritical language unit which determines the meaning of a word. The totality of the phonical properties by which a sound of a language differs from other sounds, in so far as it differentiates the meaning of the words [67*].

Phonetics
Study of the physical and physiological aspects of speech sounds independent of their semantic function.

Image 15: Tomas Maldonado 1959/60: "Glossary of Semiotics" (Neves & Rocha, 2013)

He developed a system of symbols for electronic data processing machines (ELEA 9003) for the programmers of the Olivetti Typewriter company. This project was carried out in collaboration with the German designer Gui Bonsieppe; it consisted in analyzing existing sign systems and elaborating an alphabet for a new sign system.

The alphabet was divided into two classes of signs: basic signs, similar to nouns in a language, and determinatives, in the same way, adjectives and verbs work. The references of the basic signs are the functional units of a system, such as, magnet strip, punch hole writer, disk memory, etc. For the determinatives, they were mostly reference to states and processes carried out by the machines; that is, "ready", "compare", "working" (*image 16*). The square was used as a form of fundamental geometry for the basic signs. For example: "The sign for writing, for example, was incorporated into the sign for punch tape writer and the sign for reading was the reverse of writing in order to make them easier to recognize". This symbolic language helped build the early stages of computer science (Nerves, Rocha, & Duarte, 2014)[21].

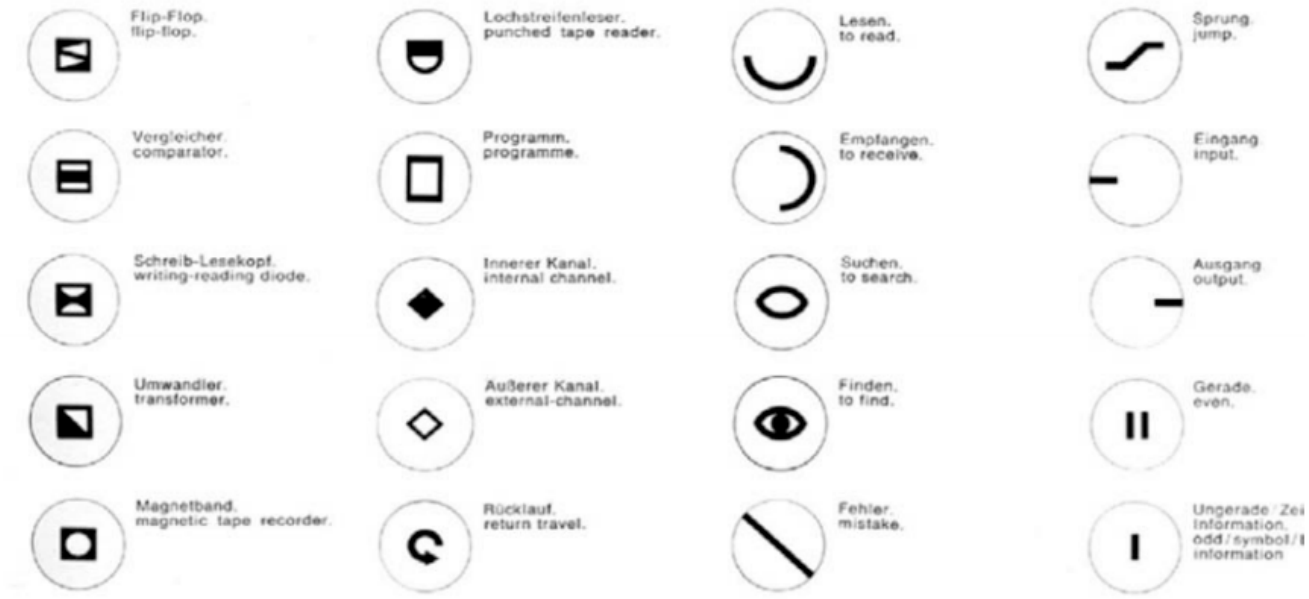


Image 16: ELEA 9003 Computer System, design for the alphabet of a new sign system

This form of **communication through signs and signals, according to Maldonado, constitute the structural core of the daily reality of communication in society**; they are relatively fixed points that give stability to each linguistic community. (Maldonado, 1974, págs. 67-74)[22]. Humans are a species with the continuous desire to **create meaning to the creation and interpretation of signs**, these can take the form of words, images, sounds, smells, and tastes, but only become signals when they are given meaning.

Other exponents of semiology such as Ferdinand de Saussure and Charles Sanders Peirce propose theories that define how a sign is composed. **Saussure** divides it into two components: **Signifier and Signified**. The signifier is the form that the sign takes, it can be a word or an image (realistic or abstract); the signified is the concept it represents; the result of the association of the signifier and the meaning will be the sign (*diagram 7*).

Pierce adds the **value of the interpreter** (*diagram 8*); who receives the message of the sign, considering not only the object and what it represents but also the process of interpretation and how it is understood in the mind of the observer, which can change depending on the social-cultural context.

21. Nerves, I. C., Rocha, J., & Duarte, J. P. (2014). Computational Design Research in Architecture: The legacy of Hochshule Fur GestalTung, Ulm. International journal of architectural computing, 13-17.

22. Maldonado, T. (1974). Avanguardia e razionalia. Torino: Giulio Einaudi editore s.p.a.

Diagram 7: Theory of Saussure

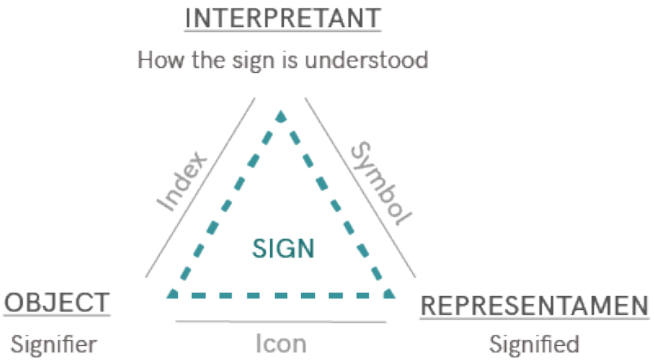


Diagram 8: Theory of Pierce

Semiotics provides a potentially unifying conceptual framework and with different methods that can be used across different practices to communicate what they want (Chandler, 2017)[23].

Semiotics may not be a discipline in itself, but it can be a research focus to apply in search for a better communication to different actors in the project DYCLE.

Chineasy

ShaoLan, a young businesswoman in London of Taiwanese origin has created an innovative method that allows you to learn Chinese in a fast and fun way. With more the over 20,000 characters, it is not an easy language to learn, this is how with the implementation of a visual system it has transformed simple and common Chinese characters into illustrations making them more memorable to the reader.

They started by studying and breaking down thousands of characters into basic building blocks called radical (figure 1), thus identifying 100 components that are repeated and associating each of them to an image that reflects its etymology that allows remembering the meaning faster.

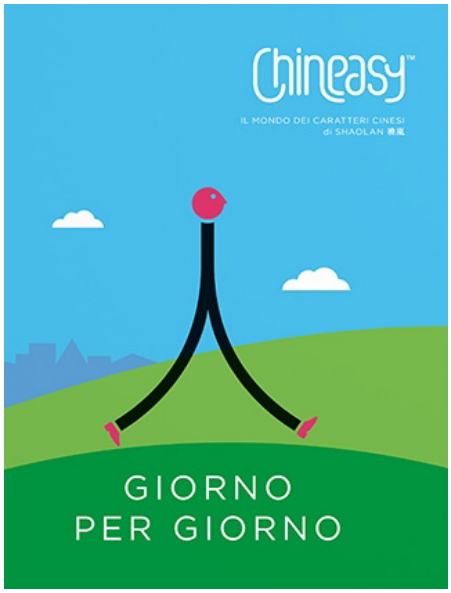


Image 17: Chineasy Book. Taken from: https://www.ippocampoedizioni.it/grafica-illustrazione/430-chineasy-giorno-per-giorno.html

23. Chandler, D. (2018, November 27). Semiotics for Beginners. Retrieved from http://visual-memory.co.uk/daniel/Documents/S4B/sem10.html

Image 18: Chineasy, basic blocks, ShaoLan, 2013.

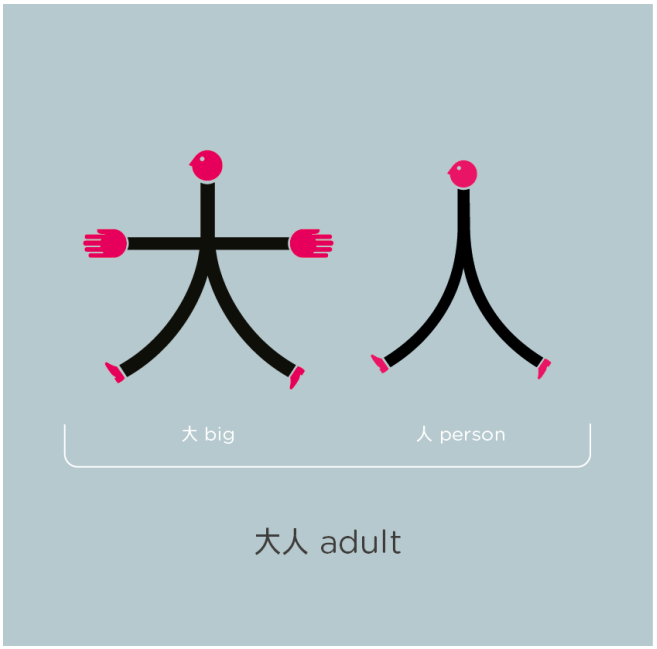


Image 19: Chineasy, ShaoLan, 2013.

This method allows you to easily understand the meaning of the character without having to have prior knowledge of the language.

Combining several of these components creates new and more complex characters (Minchot, 2014)[24], it becomes a game that everyone can understand.

For example, when learning which is the ideogram used to represent the concept "person", it will be relatively simple to assimilate also the one that means fire, it would be associated to the image of a scared man trying to escape the flames (ShaoLan)[25].

The sign for "big" is represented by a person stretching their arms as saying, "it was that big", combined with the character of "people" it forms "adult" (*image 19*).

24. Minchot, P. (2018, Dicember 2). Chineasy. Retrieved from Experimenta: https://www.experimenta.es/noticias/grafica-y-comunicacion/shaolan-chineasy-chino/
25. Chineasy (Director). (2014). ShaoLan's Chineasy: Lesson 1 [Motion Picture].

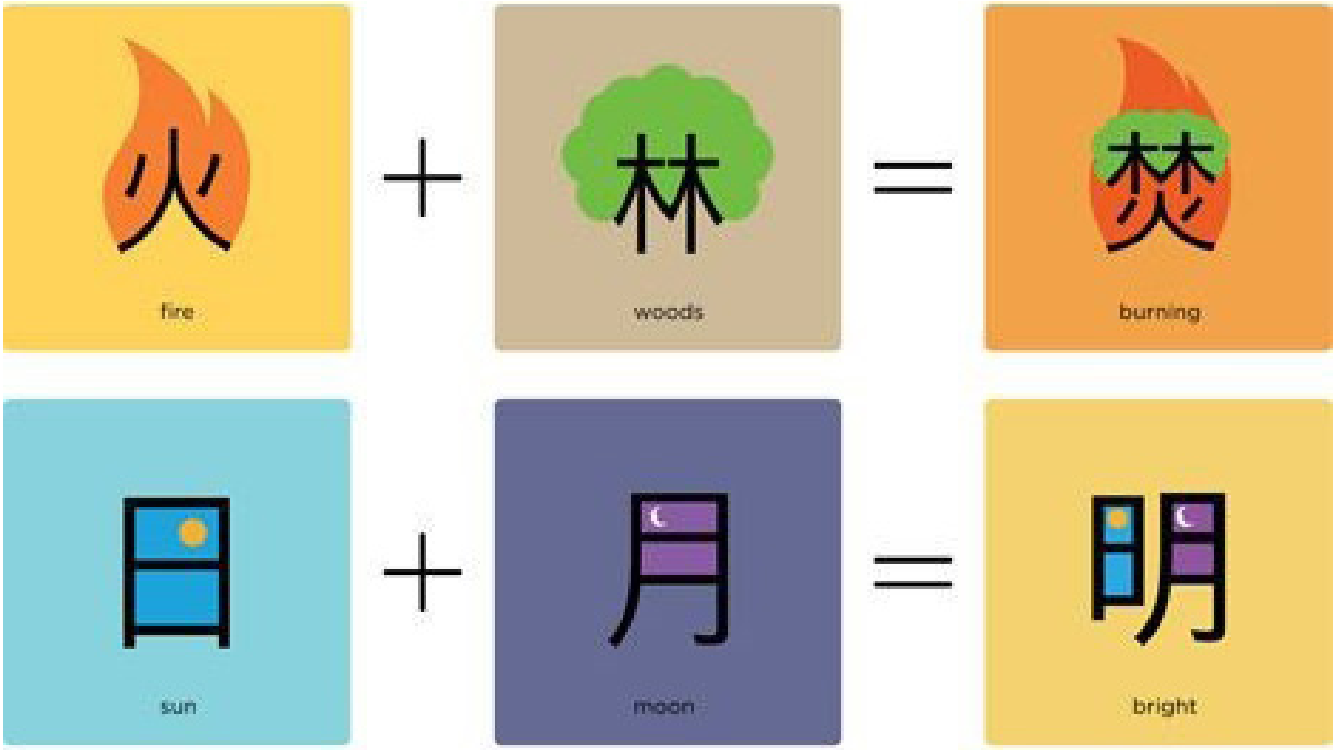


Image 20: Chineasy, combinantion of caracters, ShaoLan, 2013.

In view of the results, the illustrations allow remembering the meaning of the ideograms, a conventional image that is used to represent an idea without including words that signify it. The speed with which it is perceived, and its universality are the main features of these elements, is a combination of writing and image, communication and visual arts that converge as two sides of the same coin.

Shift from a linear to a systemic visual communication

-In order to achieve a systemic visual communication, the channel is of great importance as long as it is not separated from the other components (receiver, transmitter, etc.)

-This form of communication can be transmitted in the form of data, patterns, connections, and values.
The visualization of information in graphic form allows the interest in the message to increase up to 89% and in turn facilitates the ability to analyze and retain information.

-Being considered a universal language, it must be taken into account that it can be understood differently depending on the context, that is why it is important to study the receiver and the context in which it is found.

-A way to organize and identify the information or message that wants to be conveyed is through a discipline called Visual thinking, which helps to determine the approach to represent in a graphic way, information or ideas. Depending on the type of message and the intention with which the user is approached, the type of visualization of the ideas will change.

-As systemic designers, in order to achieve a systemic communication, it should be considered the guidelines of systemic design previously shown and also maintain a balance between the factors of Soundness, Attractiveness, and Utility.

-It is important that these factors are considered from the beginning and not aspects that are considered an addition.

-It should not be forgotten that it is, in the end, the receiver's decision to choose between all the information, what to explore and how deeply.

-It is also important to consider certain characteristics in the graphic representation that can influence the perception of the content.

-There were analyzed good case studies like Munari, where he uses great creativity in his projects, with the implementation of graphics that help retain better the information by encouraging the reader to form his own story and allowing him to be the protagonist, thus creating cognitive relationships with the content. For him, books are the vehicle that makes it possible to use all five senses and makes great emphasis on the democratization of knowledge in them, its content should be understandable to everyone, in this way the graphic part play an important role because it is universal.

-In the same sense, Chineasy shows an innovative dynamic to learn a new language through a visual system, proving the effectivity of visual communication when trying to simplify a piece of information so is better understood by the receiver.

-Maldonado gives great importance to semiotics (also known as visual communication), through his studies of signs and symbols he intended to create new meaning from them, also considering what has been mention before, how these signs can have different meaning de-

pending on the interpretant (who is seeing the sign).

-It is important to understand the different targets in order to know the information they need.
-When talking of a systemic communication, Bistagnino shows the main aspects that constitute them, by identifying all the actors involve (targets) in each activity and the flow of material that come and go from each of them.

Case of Study: Diaper Cycle Project (DYCLE)

3

Introduction to DYCLE

What is it?

Image 1: From left to right Christian Schlon, Ayumi Matsuzaka, Tom Snow. Taken from: DYCLE files

DYCLE is a project started by **Ayumi Matsuzaka**, in collaboration with **Christian Schloh** in 2015 in **Berlin - Germany**. It essentially consists in revolutionizing the production, use, and disposal of baby diapers; Thanks to this initiative, they are no longer considered a waste but a nutrient for plants, transformed from a simple and ancestral process that becomes fertile soil. The idea arises as a solution from the large amount of waste left by this product both in Germany and globally (Matsuzaka, 2015)[1].

Experiments conducted by **Ayumi Matsuzaka** showed that the **biodegradable diapers available in the market are not 100% compostable**, therefore, they are not suitable for a circular system. Thus, it was necessary to design a new diaper that could be transformed into fertile soil substrate.

Only in **Germany**, disposable diapers represent **500,000 tons** of waste per year, and in Europe they represent up to 2-3% of municipal waste, representing

1. Matsuzaka, A. (2015). DYCLE - Diapers Cycle. Berlin.

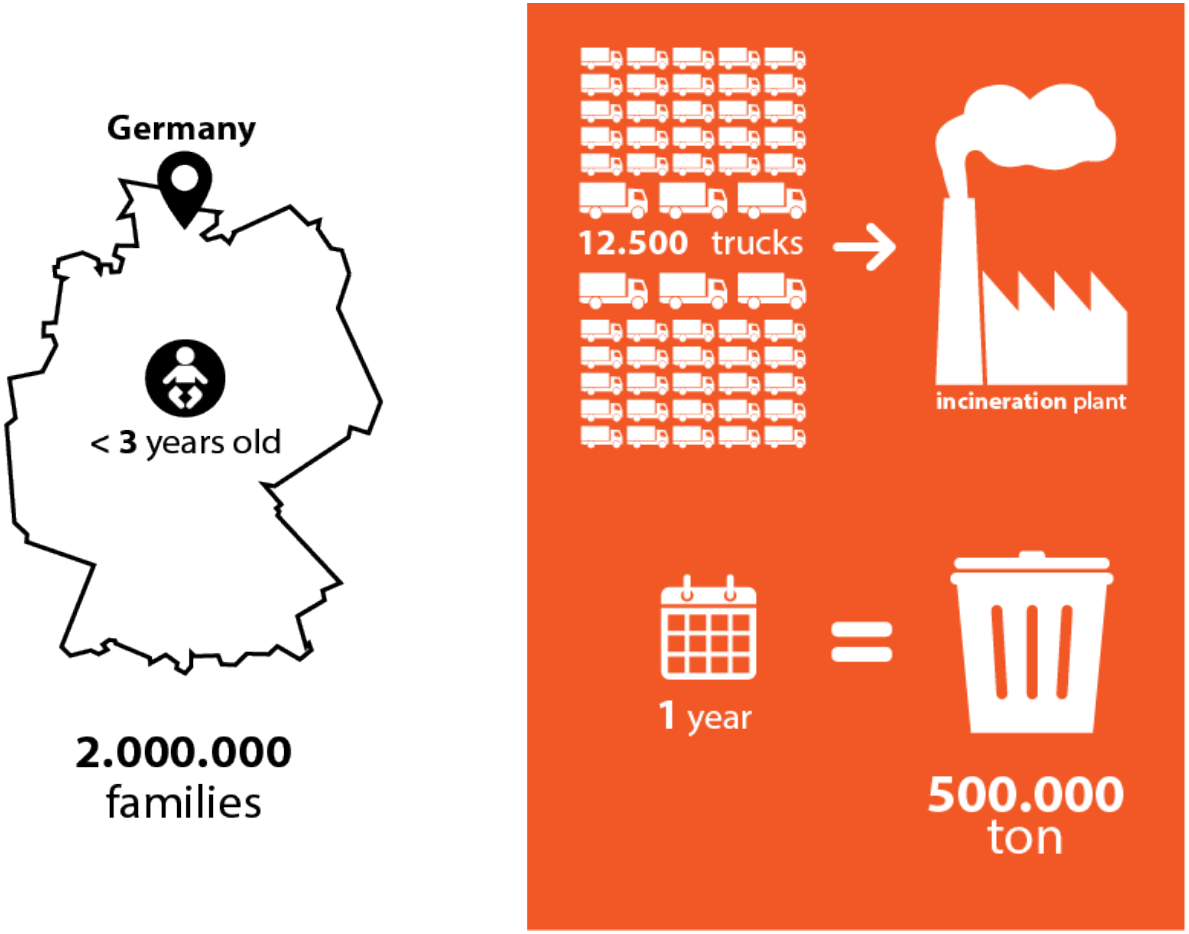


Image 2: Problem, Amount of diapers waste in Germany; Taken from: https://dycle.org/en

between 6-15% of the remains of the entire continent (Arquillos, Davies, Colbach, & Lennon, 2008)[2]. The adequate treatment of this merchandise is not currently defined, the most **common destinations are landfills or incinerators, which do not allow the degradation process** (Lopez, Matsuzaka, & Schloh)[3].

The problems of this product do not arise only from the distribution phase or the way it is discarded, it starts from the product development, especially with the number of **chemicals and water used for its manufacture**. Hence the need to change the entire production cycle. The biggest challenge facing the DYCLE project is the

2. Arquillos, L., Davies, P., Colbach, H., & Lennon, C. (2008). EDANA Sustainability Report. Edana, 12-40.

3. Matsuzaka, A. (2015). DYCLE - Diapers Cycle. Berlin.

competition with the big companies, the diaper industry has been active for more than six decades with striking proposals for the consumer, making the product more and more accessible to the users.

The infrastructure, both in production and in logistics, and advertising, require large investments, not to mention research to develop products that are friendly to the environment. Perhaps this is the breaking point with the DYCLE project: while **their proposal is 100% biodegradable, and reusable in the agricultural and reforestation process**, there has appeared new products in the market that are cataloged as biodegradable and friendly with the environment but in reality, they are only 80%. The matter is not transformed, and because it has a component like the polymer it is highly polluting.

Facing these big multinationals that have the help of the financial sector and enough support from the technology sector is very complicated, but not impossible. DYCLE, although it has much to grow, it has the advantage of facing a changing world, that is slowly returning to nature. In the midst of changing global public policies, multinationals are forced to take preventive measures to save the planet, we are facing an era of revolution of thought that seeks to conserve, protect and renew our habitat.

This is the fundamental concept of DYCLE, the way in which it proposes the use of biodegradable materials without any type of chemical, reducing the waste of other resources such as water and energy for the process, and converting the waste into another material that will serve as composting or fertilizer that will help recover the deteriorated land in a shorter time.Besides, it will contribute to the deforestation diminishing in record time.

Since the summer of 2017, DYCLE has developed a pad (inlay) for diapers **100% biodegradable** thanks to the help of crowdsourcing, universities, scientists, enthusiasts, and professionals from different areas. They have carried out tests and workshops to verify the effectiveness of the project, including a workshop for making the inlays manually in 2015 and a trial of the system with different families in 2015 and 2017 (Matsuzaka, 2015)[4]; At this moment they are in the process of acquiring a semi-automatic machine to facilitate the production of diapers.

DYCLE´s objectives are change the current business idea, move from a linear vision to a circular, where there is no residue or waste. To achieve this, they are in need to develop an effective form of communication, not only verbal but visual, that can communicate information and values to the different actors that are part of the project and those who wish to implement it themselves (stakeholders, entrepreneurs, parents, etc.).

They have plans of **publishing a book** in 2019, it will be a compilation of the entire system. With it, they seek to **attract more people to participate** and to facilitate those who wish to apply it elsewhere. It is here the purpose of this thesis, to find a way to communicate

4. Matsuzaka, A. (2015). DYCLE - Diapers Cycle. Berlin.

the project and its values (resources, community, work opportunity, fertile soil for quality food) based on systemic communication.

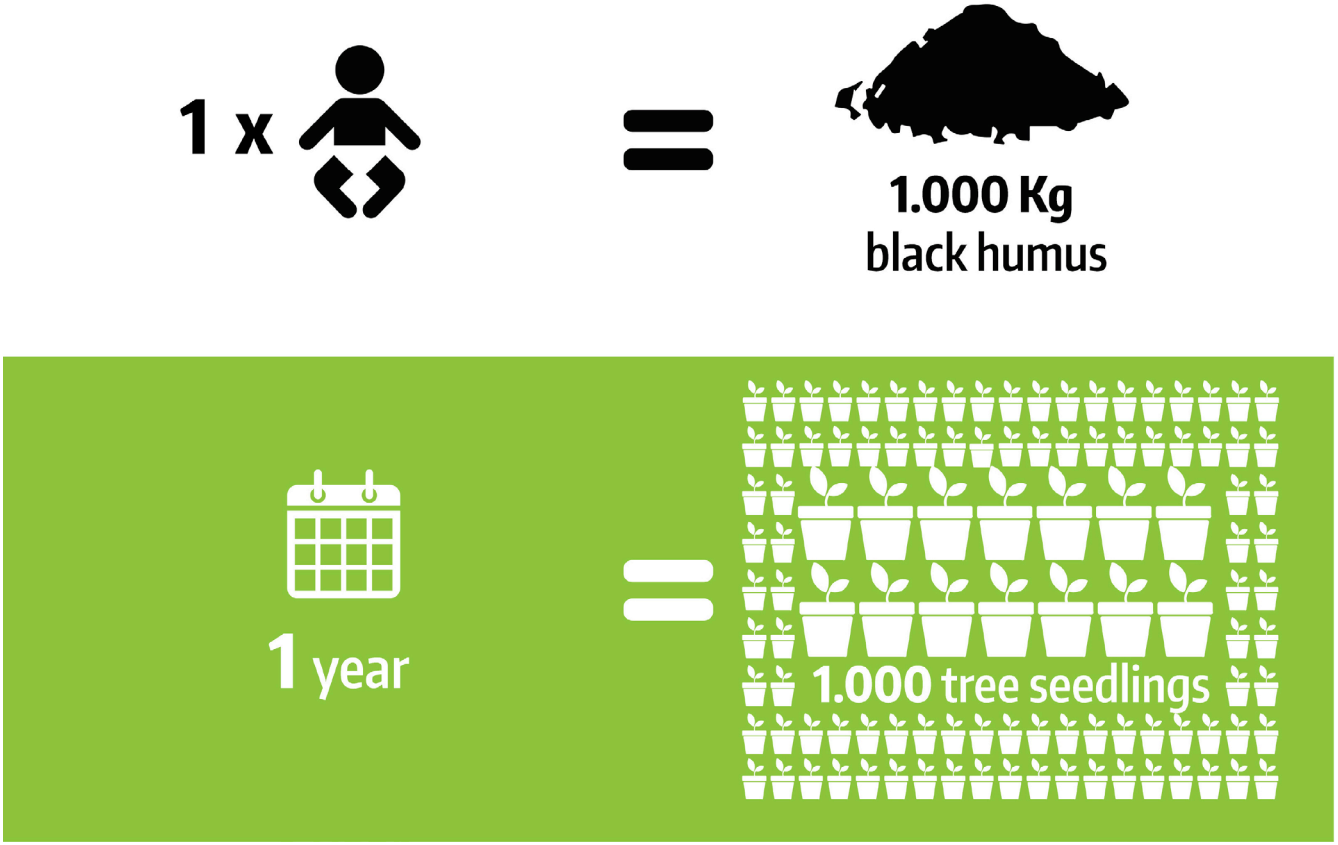


Image 3: Solution; Taken from: https://dycle.org/en

"Through a diapers collection system and converting diapers waste into black soil, which will subsequently be used for growing trees and plants locally (...) Harvest from the trees could be procured for baby food and juice production, thus closing the nutrients and materials cycle of baby diapers. DYCLE estimates that a 1000kg of black earth can be produced from one year's supply of diapers from a single child."

Field research

Understanding the system

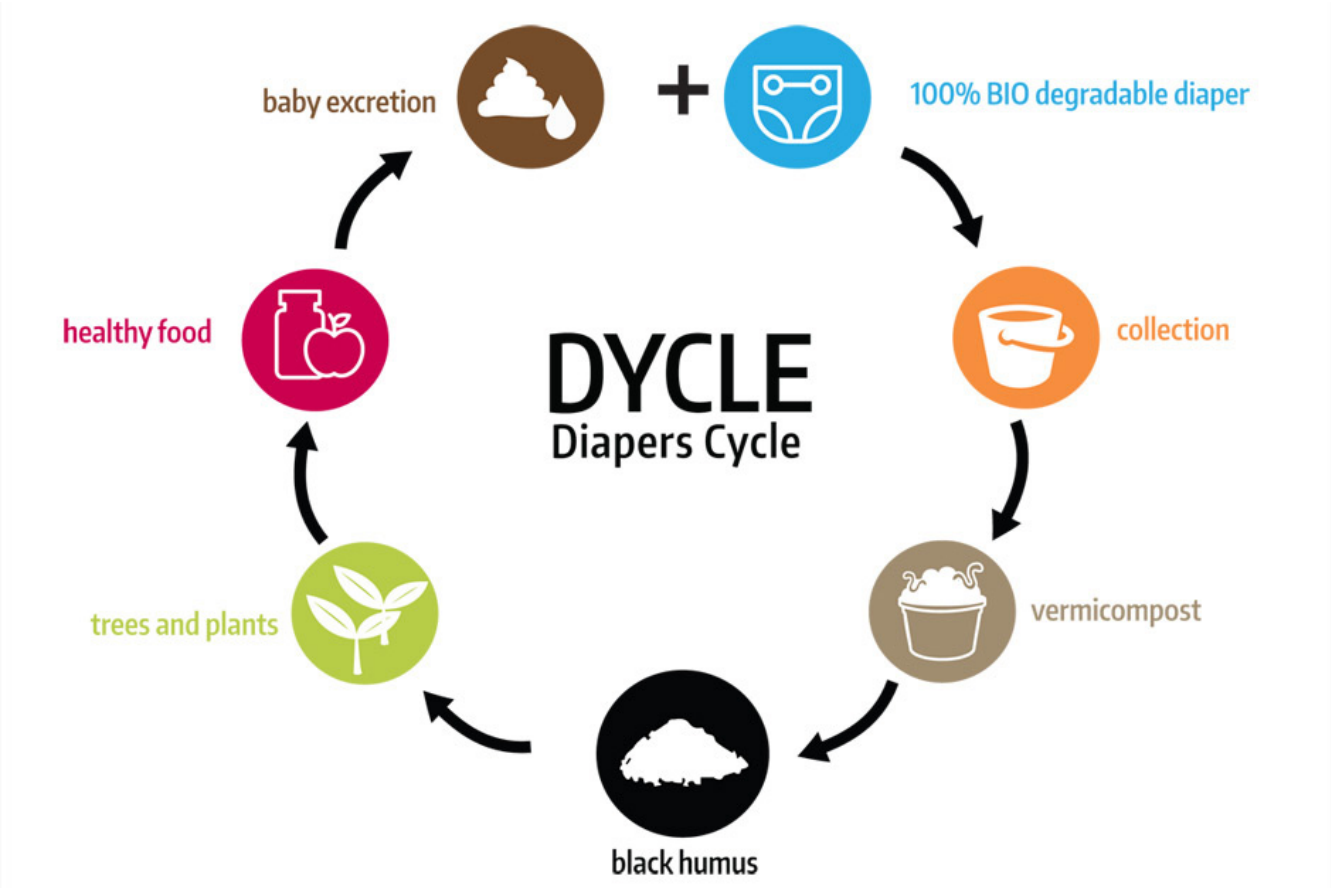


Image 4: Dycle System; Taken from: https://dycle.org/en

The transformation of urban solid waste or urban waste is an environmental problem that worries everyone worldwide. DYCLE proposes a process developed experimentally in the territory of Berlin-Germany. It consists of rethinking the transformation cycle of some of the most polluting waste by its composition of cellulose, polyester and super absorbent polymers which is highly consumed and has a high impact in the environment: disposable diapers. In the same way, it searches for its production to be carried out in a friendly way with the environment. The organization suggests that this

transformation is developed through the **exchange of nutrient flows, generating an autopoietic system with multiple interconnected processes, whose waste tends to be reduced to zero emissions, likewise it takes up an ancestral practice such as the production of the "Terra Petra".**

The approach consists of different stages that involve: the production of diapers, the dynamics with the parents, the production of a fertile soil (*Terra Preta*) and finally, the options that the soil have to be used or consumed.

These flows in the system begin with a ***first stage*** in which the **inlay** is created, this must be close to the community where the project is intended to be implemented in order to minimize the carbon emissions that transport can generate. The manufacture of the inlay consists of ***Biochar, coffee powder***, ***natural fibers of hemp***, ***cellulose***, ***starch***, and ***bioplastic***. These materials, except for the bioplastic which is produced in **Estonia**, are mainly local and renewable resources, without any chemical treatment.

The semi-automatic machine that will make the inlays, projects a production to supply 100 families per month (*1 family with 1 baby needs 35 diapers a week - 140 diapers per month, the machine will have a capacity of producing ~14.000 diapers per month*).

The proposal, besides suggesting a friendly solution to the environment, contains pedagogical principles in most of its phases.

The ***second stage*** is perhaps the one with more interaction with the consumer and the greater feedback of the project is achieved. This consists of the delivery of the **kit** to the parents at a meeting point where the collection and distribution activity will take place, usually in local community centers, kindergartens, Coffee Shops, etc.

Families should be concentrated within a radius of **1 km** from the meeting point, this in order to create social values; parents have the opportunity to meet

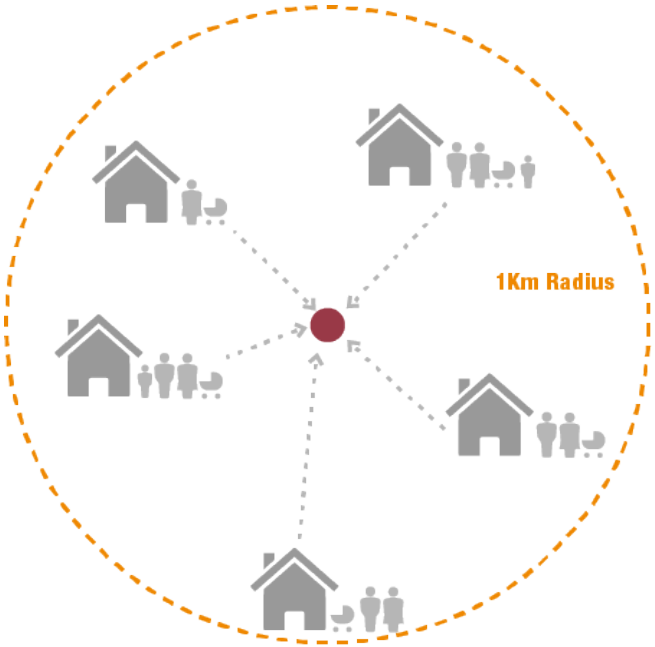


Image 5: Area of activity. Taken from: Dycle

and share information, exchange clothes, toys, etc. Thus, building community (Lopez, Matsuzaka, & Schloh)[5].

Meetings with parents occur every one or two weeks when someone from DYCLE team is present for the project communication or waste storage, normally this happens on Saturdays when a regular meeting takes place.

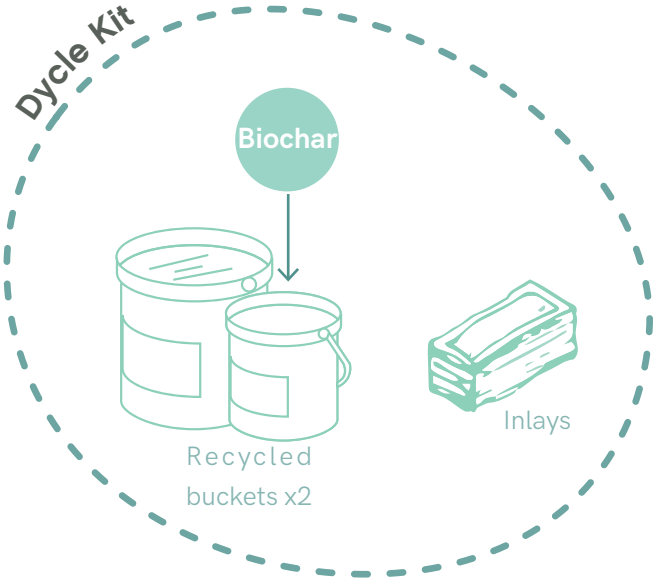


Diagram 1: Dycle kit

The **kit** consists of: supply of bio based inlays, a carton-board to make pressure, and two buckets that comes from university canteens that have been reused; the first bucket of 10-liter is used to store the used diapers, and the second bucket of 5-liter contains about 2-3 liters of charcoal (The charcoal is previously mixed with a catalyst that contains microorganisms that will later help with the process of fermentation of the *Terra Preta*). The inlays are used with outer-pants, the latter is reusable and washable. Parents can replenish their supplies (charcoal and inlay) at the meeting point whenever necessary.

A ***third stage*** involves households directly, the parents and other family members will intervene directly in the process of storing and collecting the used inlays in the 10-liter bucket with some charcoal on it, this helps reduce odor and starts the fermentation process.

Once is full, it will be taken back to the meeting point where the ***fourth stage*** will take place, there will be a 60-liter barrel that will store all the waste from the community while continuing its fermentation process, the barrel will be available to parents at any time, with a key with which they can access.

Image 6: Inlays residue in buscket; Taken from: Dycle

5. Lopez, E., Matsuzaka, A., & Schloh, C. (n.d.). Systemic Design towards sustainability in the diaper system. Berlin.

Continuing the cycle, in the ***fifth stage***, the content of the barrel will be collected every 1 or 2 weeks (more often if necessary) and will be taken to the specialized point to be transformed it into *Terra Preta*. The material will be treated, applying organic residues and cow manure to obtain approximately 12 months a high-quality soil in nutrients (*Terra Preta*).

Image 7: Terra Preta; Taken from: Dycle

In the ***sixth*** and ***final stage*** will be as a result the "*Terra Preta*" converted into raw material that will have multiple uses depending on its marketing, needs and market possibilities; It can be used by farmers, tree nursery, etc., or in collaboration with local entrepreneurs, or by the community.

Among the different alternatives for the use of this enriched soil, free of chemicals is the local production of fruit, vegetables, and legumes that satisfy consumption and ensure greater quality and well-being, as there are no contaminating agents that harm health. The community of farmers can use them for their crops. Tree nursery can use it to plant their trees and provide grafts to farmers, the city, or the participating community itself to plant their own trees and produce their own food. As well as creating values and social interests in companies and in the local economy. With the income generated by *Terra Preta*, the project is intended to be affordable for parents and the community in general; this final product will be commercialized exclusively and as a property of DYCLE.

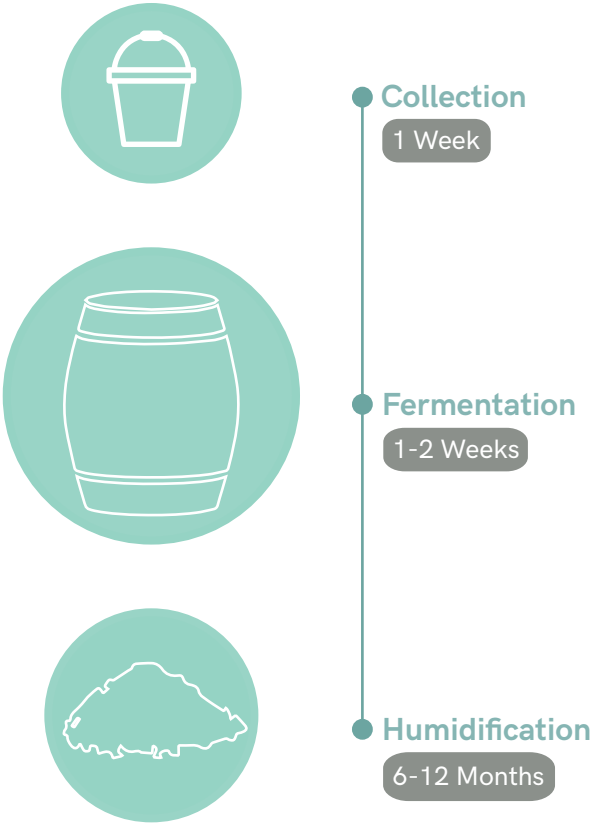


Diagram 2: Terra Preta Process

Understanding the production process

As mentioned, in **Germany**, approximately **500,000 tons** of diapers are used per year, which are discarded in away that is not friendly to the environment, contributing to produce greater emission of polluting gases into the atmosphere. The DYCLE project was born to provide a solution to this need with a simple proposal that takes up the natural cycles, such as the decomposition of matter from an organic process rich in nutrients based on charcoal, thus making it soil friendly to the environment, allowing the recovery of arable land in short periods between one crop and another.

Ayumi Matsuzaka, founder, and **Christian Schloch**, co-founder, propose the production of a **100% biodegradable inlay diaper** compatible not only with the environment but also healthy for the babies, which due to its composition of chemical-free materials does not harm their health; and transformation in fertile soil through the composting process (Matsuzaka, 2015)[6]. As mentioned above, it consists of biochar, and coffee powder, natural fibers of hemp, cellulose, starch, and bioplastic.

The production process begins with a ***first step*** of measuring and mixing the materials for the absorbent pad. **DYCLE** proposes 2 types of diapers: one for newborns with a weight of 24 g of 28cm x 13cm, and another with a weight of 46 g of 40cm x 18 cm. They are composed of two types of hemp fibers (a long one of 2 g and another short of 18 g.), and a mixture of three different types of powders (26g): biochar, hemp, and coffee (leftovers from local brands). Once the mixture is prepared, in the ***second*** and ***third stage*** the contents are poured into an aluminum mold, which is inserted in a pressure machine to stabilize the absorption mixture. In the ***fourth stage***, it is attached, by means of a heat selling machine, a layer of cellulose (2g) on the upper part and a layer of bioplastic (2g) in the lower part of the absorbent pad. Once this phase is completed, the inlay will be taken (baby 50g, newborn 25g) to a ***fifth stage***, where a machine will be used to sterilize the inlays, prior to its use.

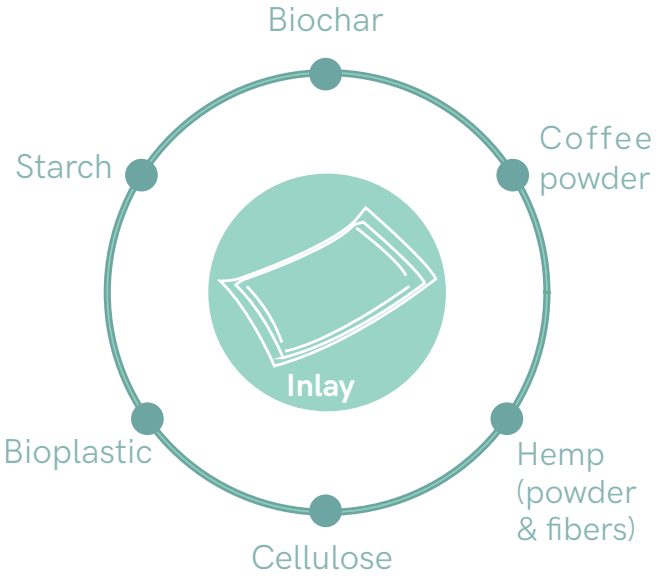


Diagram 3: Inlay components, Dycle.

6. Matsuzaka, A. (2015). DYCLE - Diapers Cycle. Berlin.

The ***sixth*** and ***final stage*** consists of the delivery of the kit to the parents mentioned in the previous system; an important aspect is that these inlays will not be delivered in a package, **DYCLE** intends to apply a Japanese technique called ***Furoshiki***, which consists of the use of a traditional square cloth used to wrap.

Image 8: Furoshiki; Taken from: https://furoshiki-shoes.com/es/content/7-todo-lo-que-debe-saber-sobre-los-zapatos-furoshiki

Current visual communication with the users

A project like DYCLE based on values and principles that people are starting to acquire or to implement in their own lives, needs the help of a clear, effective and engaging communication in order to make it visible and to obtain the place it should have in societies. Until now, these aspects have not been considered enough to achieve the impact a project of this importance should have. The current communication of this organization has been adapting to many doubts and questions that over time, people have been asking. The method DYCLE uses, limits to answer graphically these concerns and doubts every time a question comes up. Hence, the information of every part of the project have been struggling to be communicated at its best. In addition, it does not recognize these actors as users. Therefore, there has not been any user analysis. As seen before, this identification of the target is of great importance in order to achieve an effective communication (Matsuzaka & Schloch, 2018)[7]. Among the different channels of communication used are:

- **Short videos:** for the general public and sometimes for competitions.

- **Presentations:** consists of an annual report for insiders and participants, in order to make them feel part of the development of the project.

7. Matsuzaka, A., & Schloch, C. (2018, November 6). Dycle current communication. (A. Cuervo, & C. Espinosa, Interviewers)

Image 9: Website; Taken from: https://dycle.org/

Image 10: Remise FAMAE; Taken from: Dycle

- **Blog:** in this way, they update their development on a website and share on social networks (Facebook and Twitter) usually dealing with topics related to sustainability, DIY, entrepreneurship, local events, babies and community. In this way, readers have access to all their information.

- **Newsletter:** it is another channel used to inform the readers (mostly parents) about new developments in the project. This is done at least every two months.

- **Questionnaires:** this is aimed at those who are interested in starting the same business model elsewhere. In order to know the information, they want and respond in such a way.

- **Stands:** these are situated at events related to the topic of the project, this allows them to communicate directly with users, listen to their questions, and like workshops, get feedback from their experiences.

- **Workshops:** with them, they have the opportunity to share their knowledge and get feedback through the experience of others and thus improve their process.

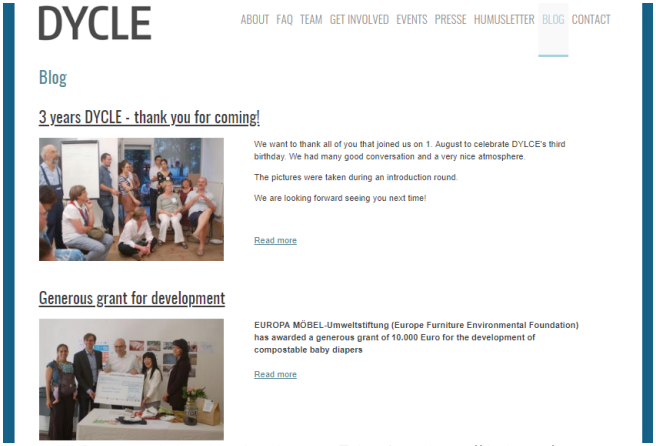


Image 11: Blog on website with related events; Taken from: https://dycle.org/

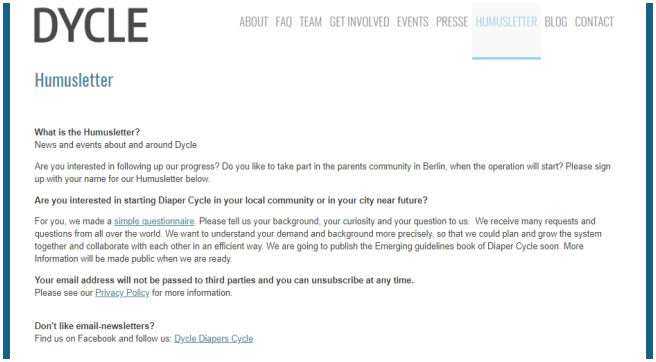


Image 12: Humusletter on website; Taken from: https://dycle.org/

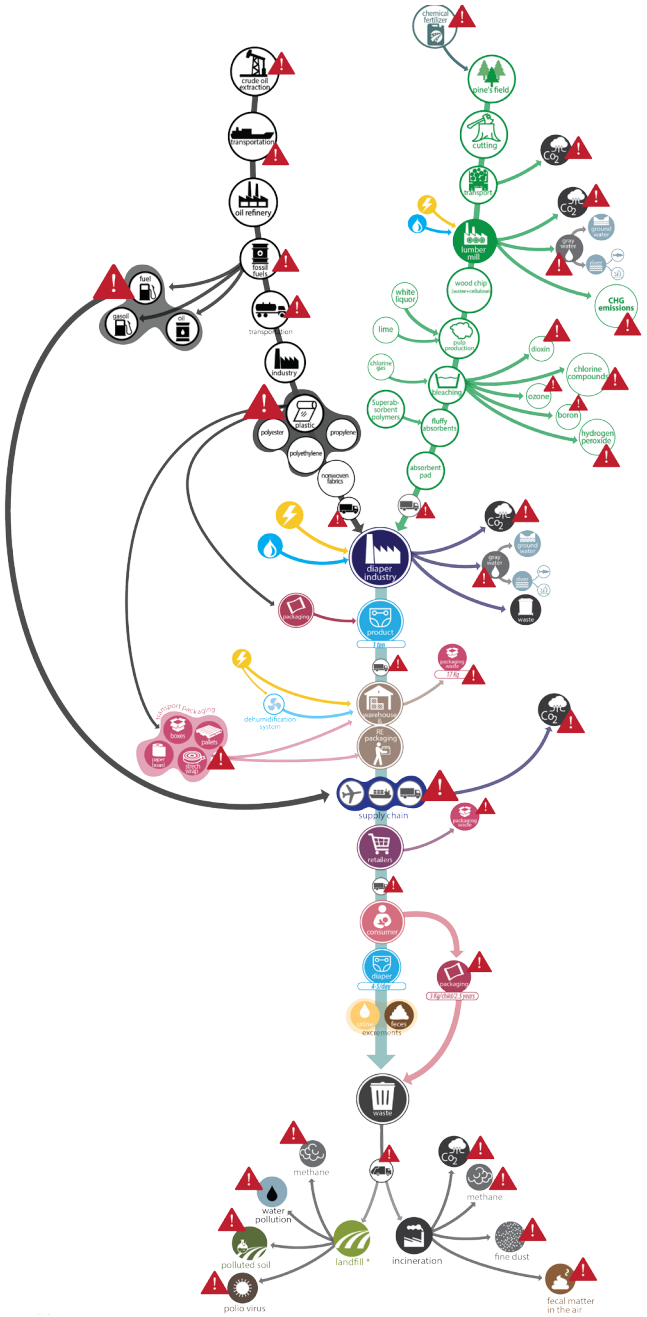
Image13: DYCLE exhibition in Winterthur museum, Zurich ; Taken from: https://www.gewerbemuseum.ch/ausstellungen/food-revolution

Image 14: Diaper production day; Taken from: https://dycle.org/

DYCLE emphasizes the direct, face-to-face contact, they prefer to transmit their ideas generating direct experiences with people. Their communication has been developed by trial and error without a fixed methodology.

As the project has grown, they have faced the need to attract more participants to obtain financing, spread their knowledge and collaborate with others (stakeholders, entrepreneurs, etc.). Thus, it has emerged the necessity to create a book containing the records of all information of the project, in order

Image 15: Workshop. Diaper production day; Taken from: Dycle



to facilitate exposure to those interested in **DYCLE** and allowing its implementation elsewhere. However, the focus of the visual representation of the system has been scarce, there are only some schemes made by **Eliana López Gherardi** that show the production of the current linear model, identifying the problems generated by the diaper manufacturing process, and another based on the systemic view that shows the flow of materials proposed by the **DYCLE** project, nonetheless still incomplete missing also aspects to consider and values to communicate.

Image 16: LINEAR FLOWS, disposable diaper production process ; Taken from: Dycle

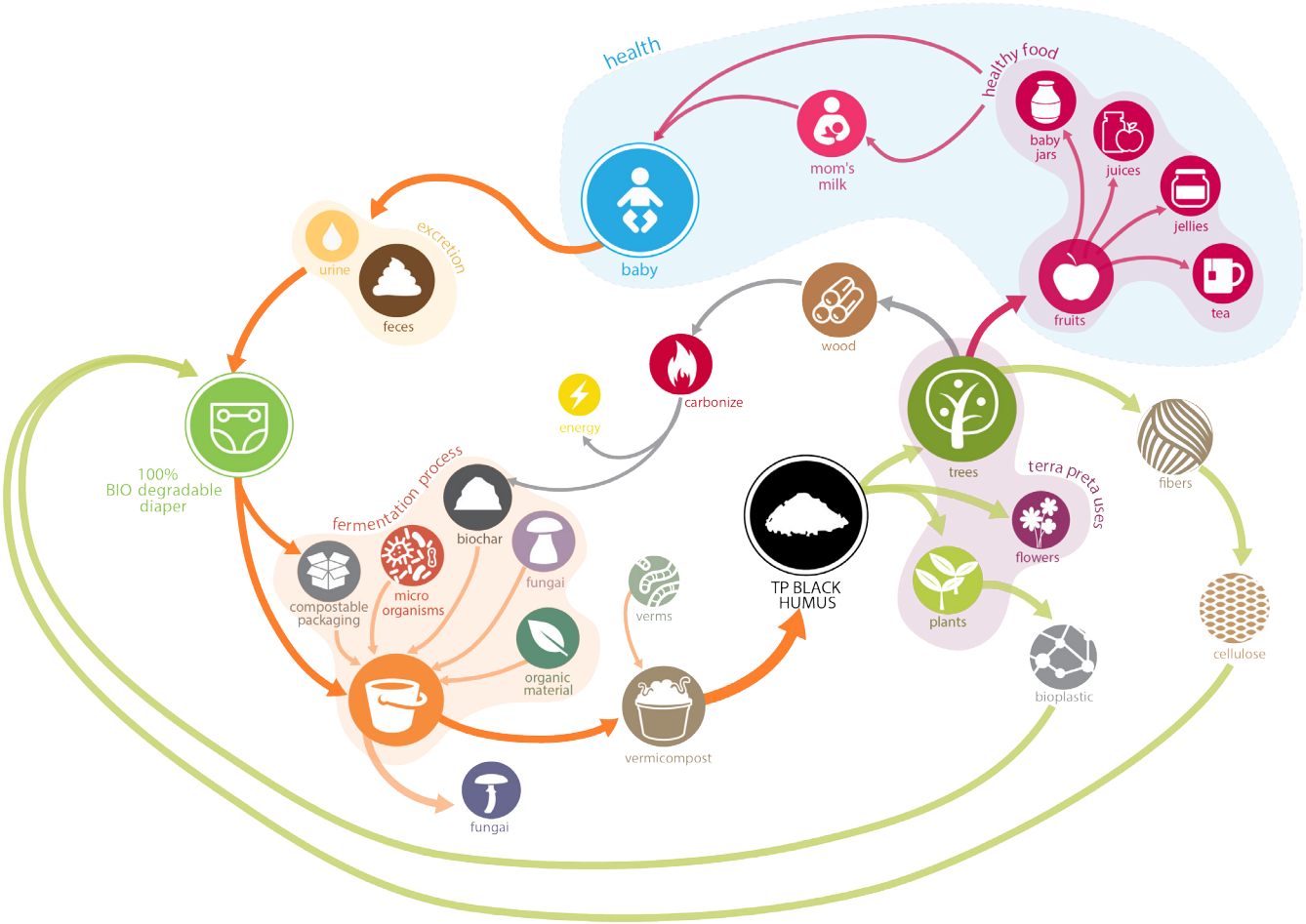


Image 17: SYSTEMIC FLOWS, DYCLE - diaper cycle; Taken from: Dycle

Systemic analysis

When immersing in the complex system of DYCLE and its dynamics, the first approach was understanding the context and the system by organizing all the existing information, completing the missing one, analyzing each component of the system and identifying its users.

After the field visit to Berlin, it was possible to elaborate a first detailed scheme of the current system, which was organized considering the aspects seen in the methodology of Luigi Bistagino.

First, four phases were identified according to the actors involved in the project; each phase was assembled individually, identifying their main activities and their respective inputs and outputs. Once the four phases were defined, they were grouped into a complete system, showing the connections and relationships among themselves.

In this way, it was possible to realize that despite being a project that currently provides many solutions through relationships, input-output, autopoiesis, acting locally and that has many values to be transmitted; It continues to have several critical factors that must be considered and pointed out.

Thus, through a systemic analysis, it was possible to identify five main problems to which several solutions based on the guidelines of systemic design were proposed respectively.

In order to make understandable the representation, certain criteria were considered for its organization:

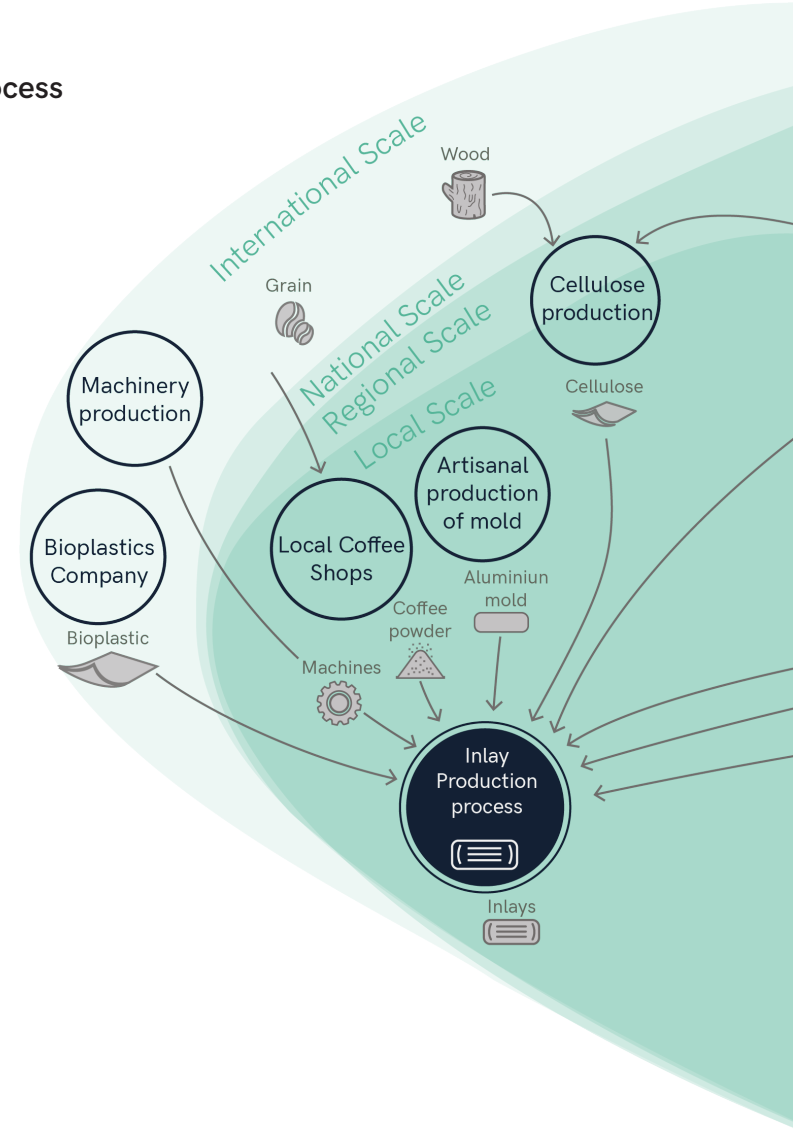
Each activity is represented by a circle surrounded by a thin line, these have four different colors that means a phase in the system. From above these circles, arrive the inputs necessary for developing the activity, then the outputs come out below.

The circles without the line around them, represent the source where the inputs are coming from. It is worth to mention the important role that the background plays in the schemes, it represents the territorial scale in each phase. The following schemes represent, in order, the construction of the system.

Analysis of the current system

First phase of the system - Inlay production process

Phase where the suppliers act



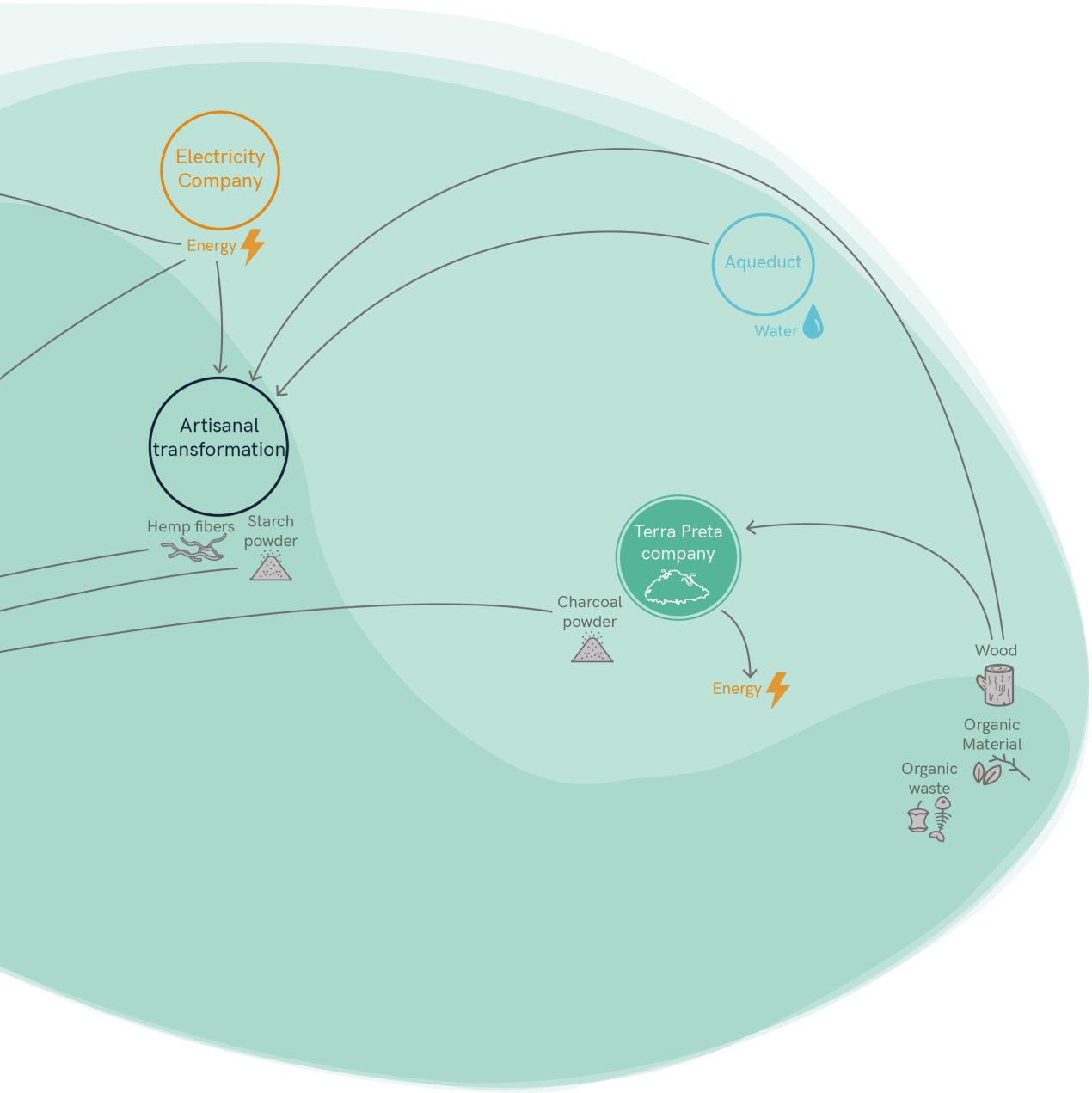
Production of inlays
Phase where the suppliers act

Production of Terra Preta
Phase where the soil producers act

Input-output

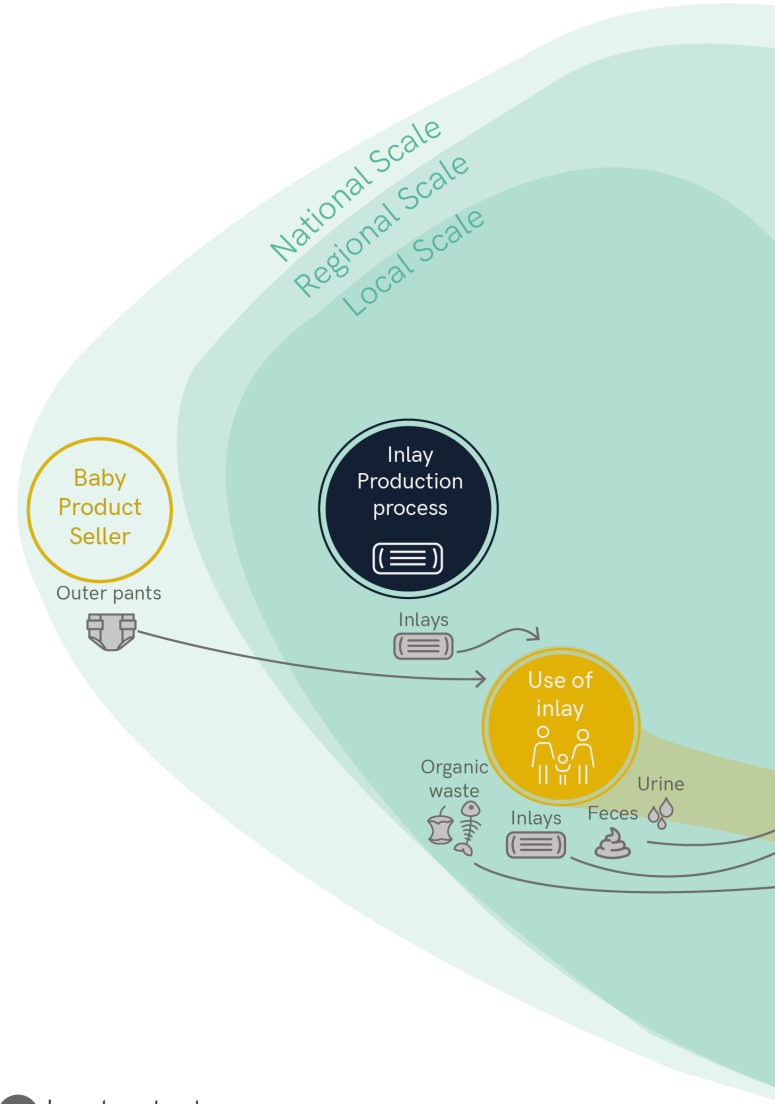
Energy

Water


Electricity Company
Energy
Aqueduct
Water
Artisanal transformation
Hemp fibers
Starch powder
Terra Preta company
Charcoal powder
Energy
Wood
Organic Material
Organic waste

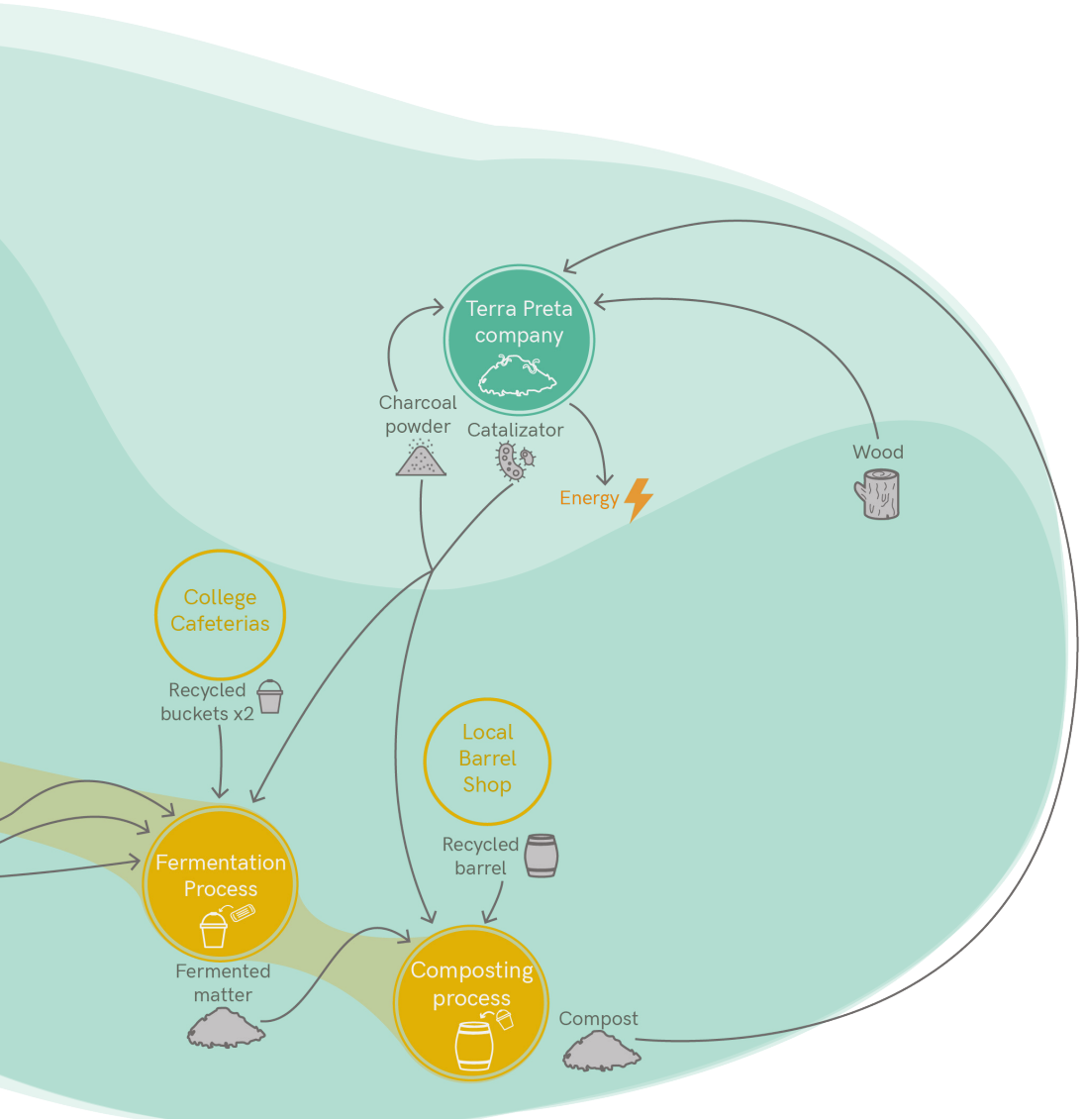
Second phase of the system - Use of inlay/fermentation/composting

Phase where the community act



- Production of inlays
  Phase where the suppliers act
- Use of inlays/fermentation/composting
  Phase where the community act
- Production of Terra Preta
  Phase where the soil producers act

- Input-output
- Energy


Terra Preta company
Charcoal powder
Catalizator
Energy
Wood
College Cafeterias
Recycled buckets x2
Local Barrel Shop
Recycled barrel
Fermentation Process
Fermented matter
Composting process
Compost

Third phase of the system - Production of Terra Preta

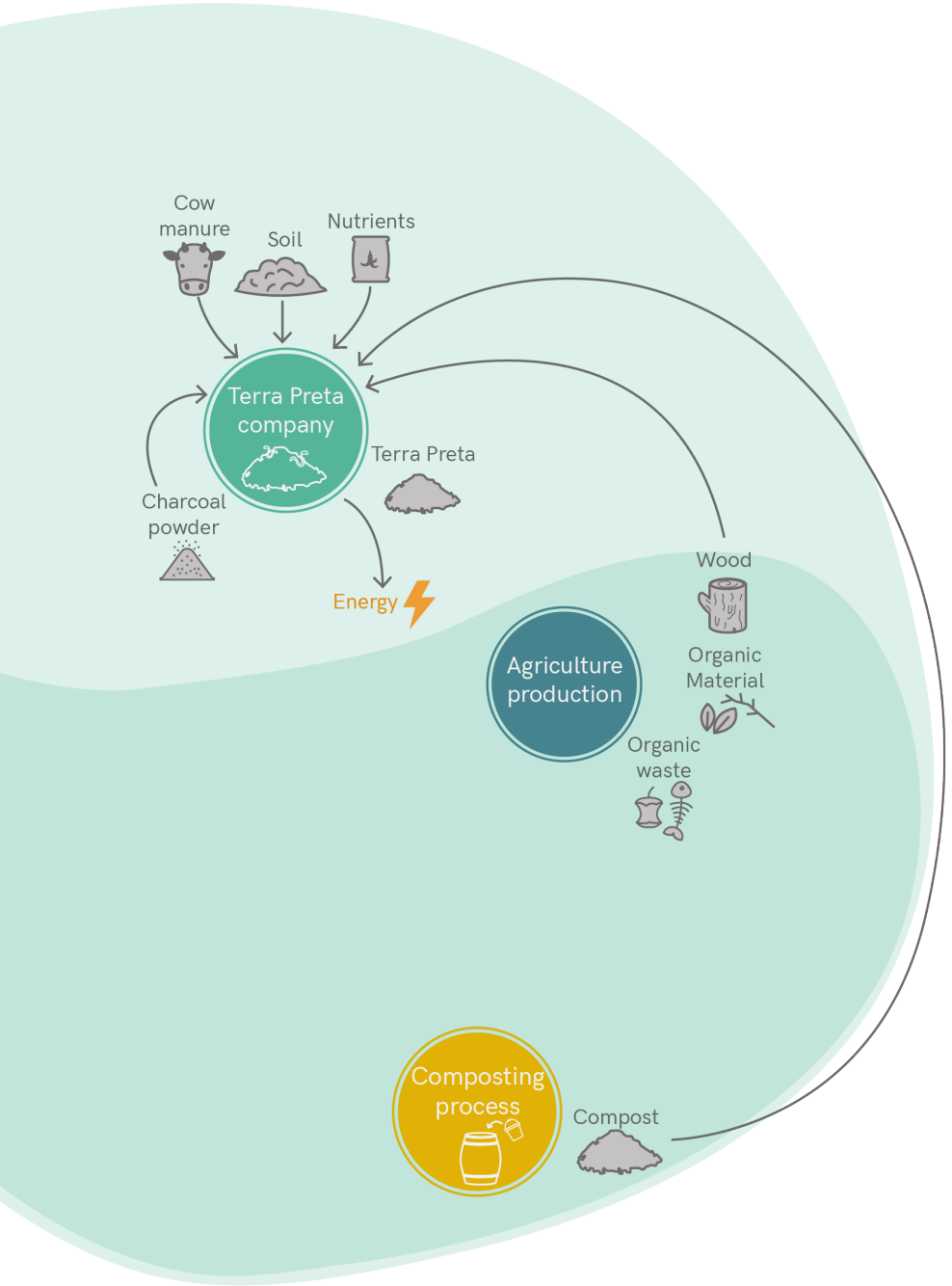
Phase where the soil producers act

Composting
Phase where the community act

Use of inlays/fermentation/composting
Phase where the community act

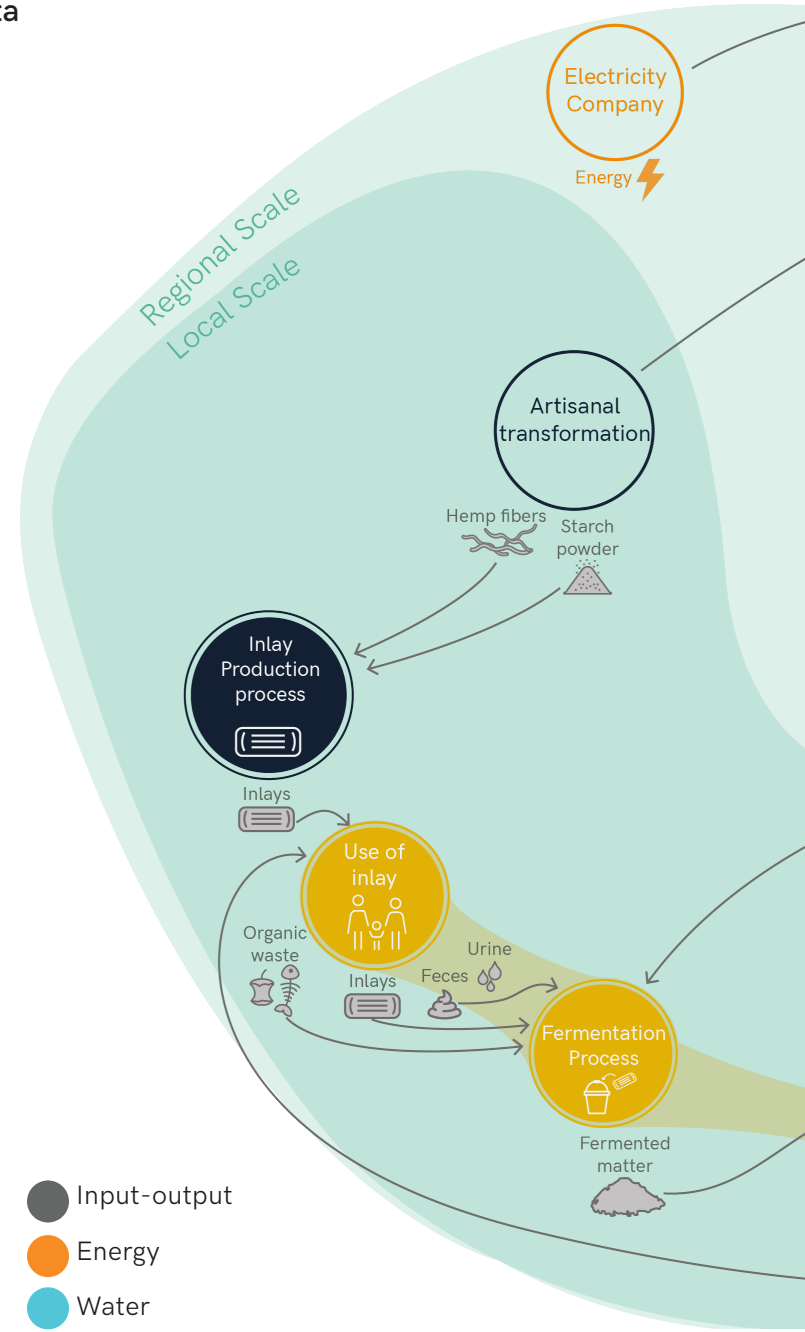
Production of Terra Preta
Phase where the soil producers act

Energy


Cow manure
Soil
Nutrients
Terra Preta company
Terra Preta
Charcoal powder
Energy
Wood
Organic Material
Agriculture production
Organic waste
Composting process
Compost

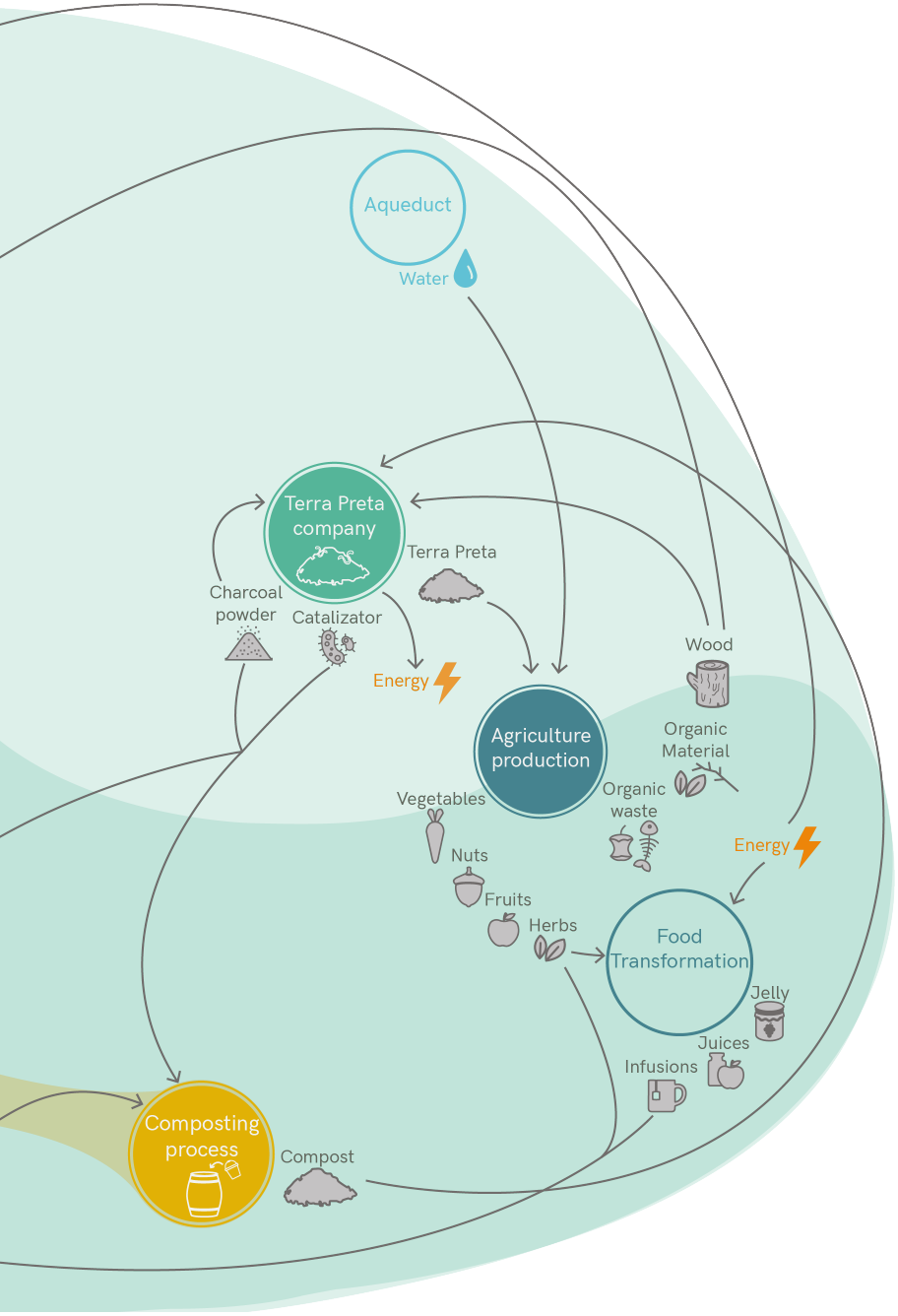
Fourth phase of the system - Use of Terra Preta

Phase where the consumers act

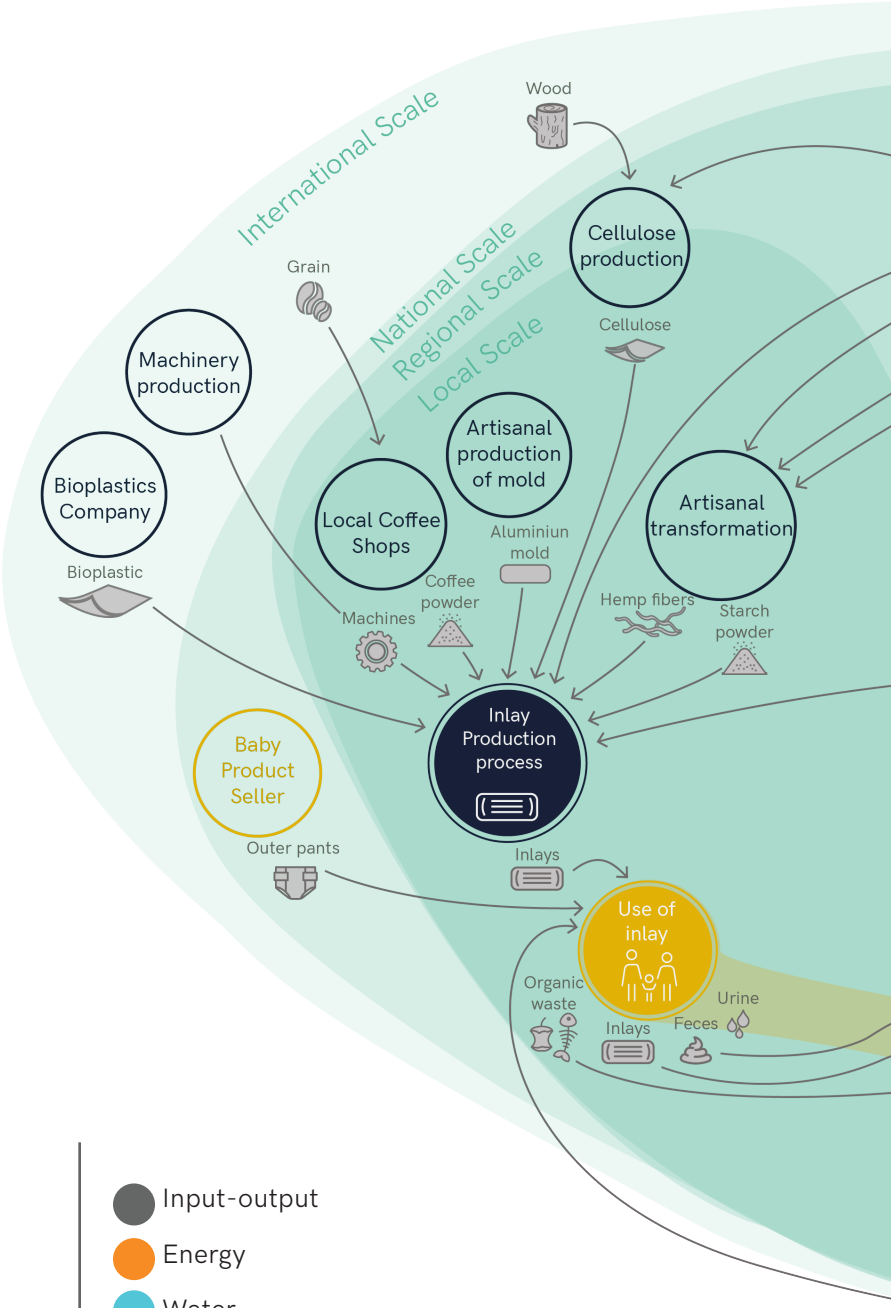


- Production of inlays
  Phase where the suppliers act
- Use of inlays/fermentation/composting
  Phase where the community act
- Production of Terra Preta
  Phase where the soil producers act
- Use of Terra Preta
  Phase where the consumers act

- Input-output
- Energy
- Water

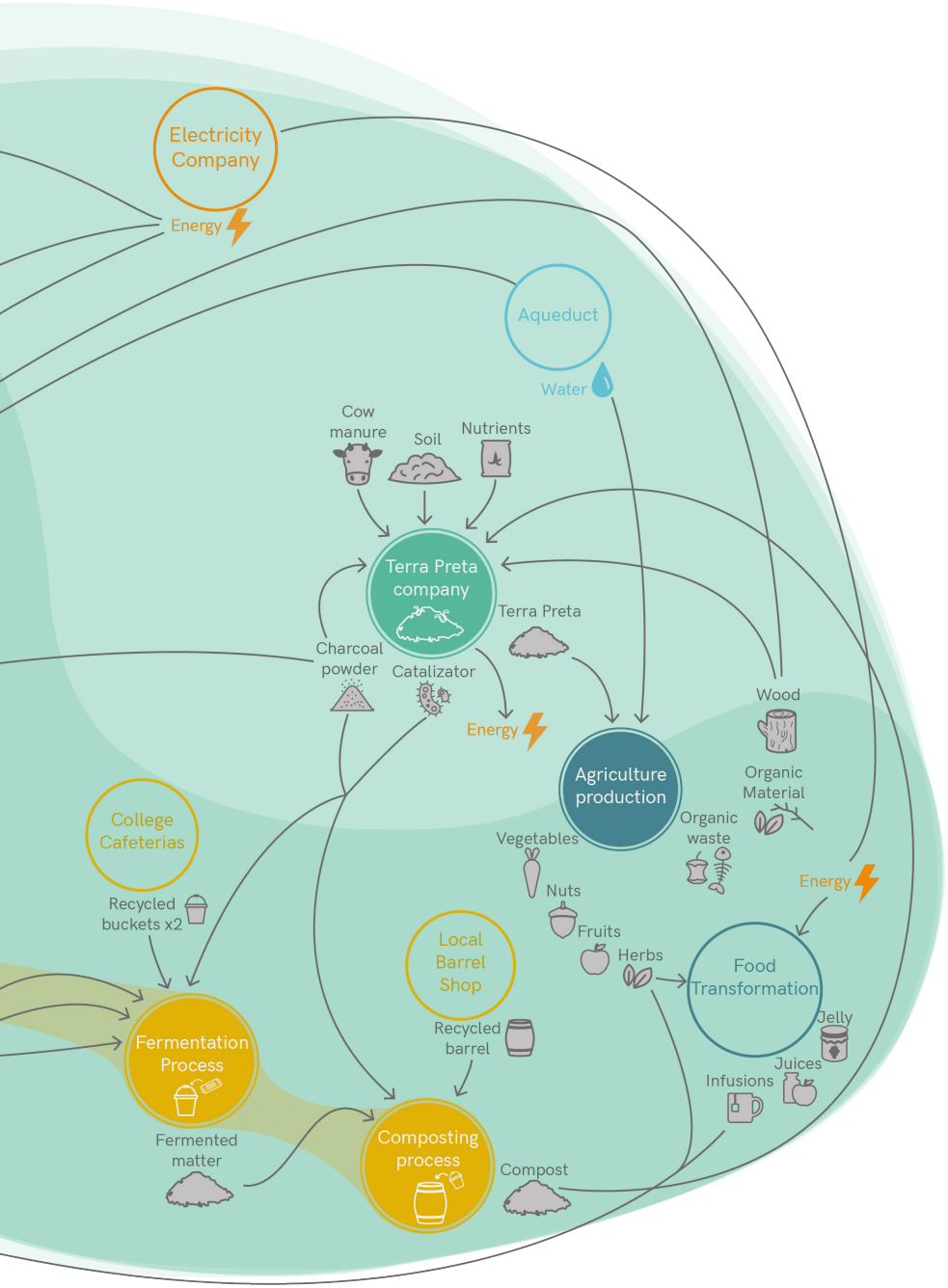

Aqueduct
Water
Terra Preta company
Terra Preta
Charcoal powder
Catalizator
Energy
Wood
Agriculture production
Organic Material
Organic waste
Vegetables
Nuts
Fruits
Herbs
Energy
Food Transformation
Jelly
Juices
Infusions
Composting process
Compost

Complete scheme of the current system



- Production of inlays
  Phase where the suppliers act
- Use of inlays/fermentation/composting
  Phase where the community act
- Production of Terra Preta
  Phase where the soil producers act
- Use of Terra Preta
  Phase where the consumers act

- Input-output
- Energy
- Water


Electricity Company
Energy
Aqueduct
Water
Cow manure
Soil
Nutrients
Terra Preta company
Terra Preta
Charcoal powder
Catalizator
Energy
Wood
Agriculture production
Organic Material
Organic waste
Vegetables
Nuts
Fruits
Herbs
Energy
College Cafeterias
Recycled buckets x2
Local Barrel Shop
Recycled barrel
Food Transformation
Jelly
Juices
Infusions
Fermentation Process
Fermented matter
Composting process
Compost

Analysis of problems

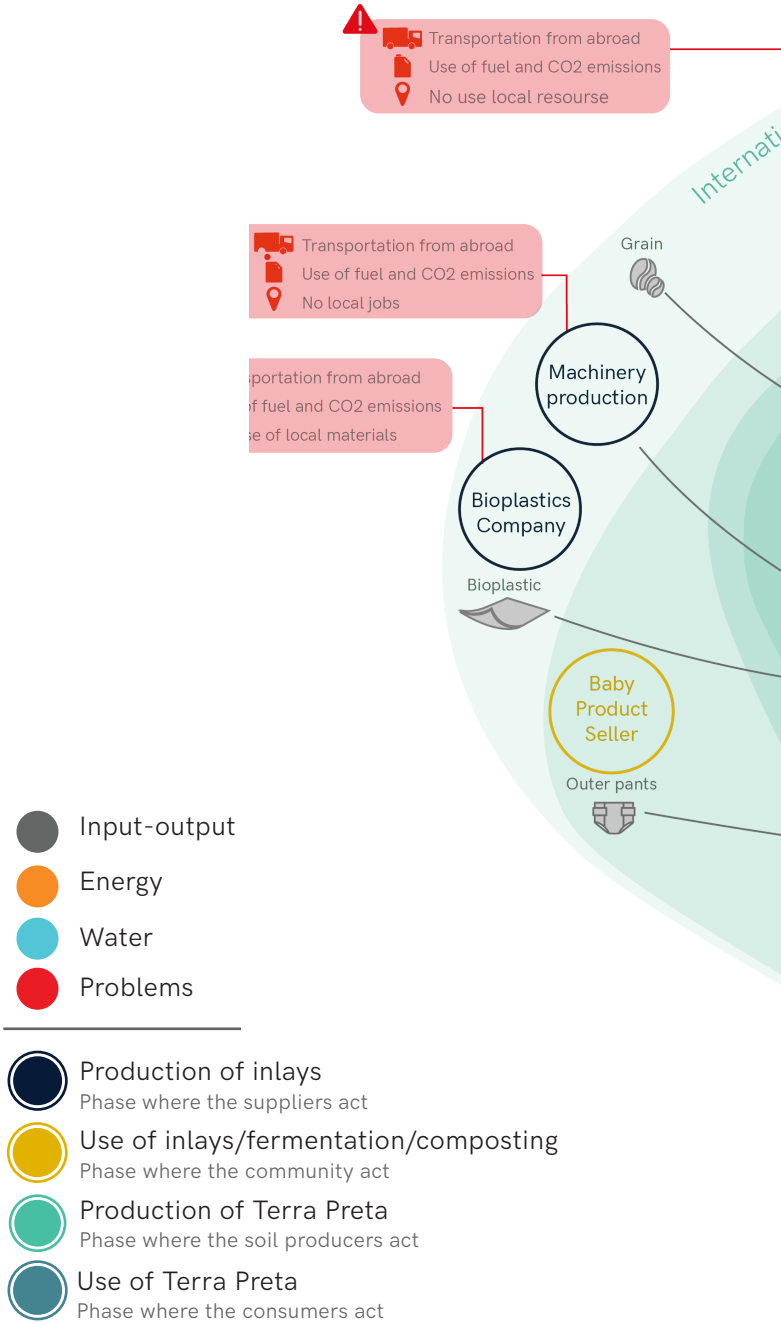
This scheme gave way to the identification of some critic points in that do not let the system flow adequately. There were identified five main problems related to the energy, water and territorial scales. Specifically, the problems founded were:

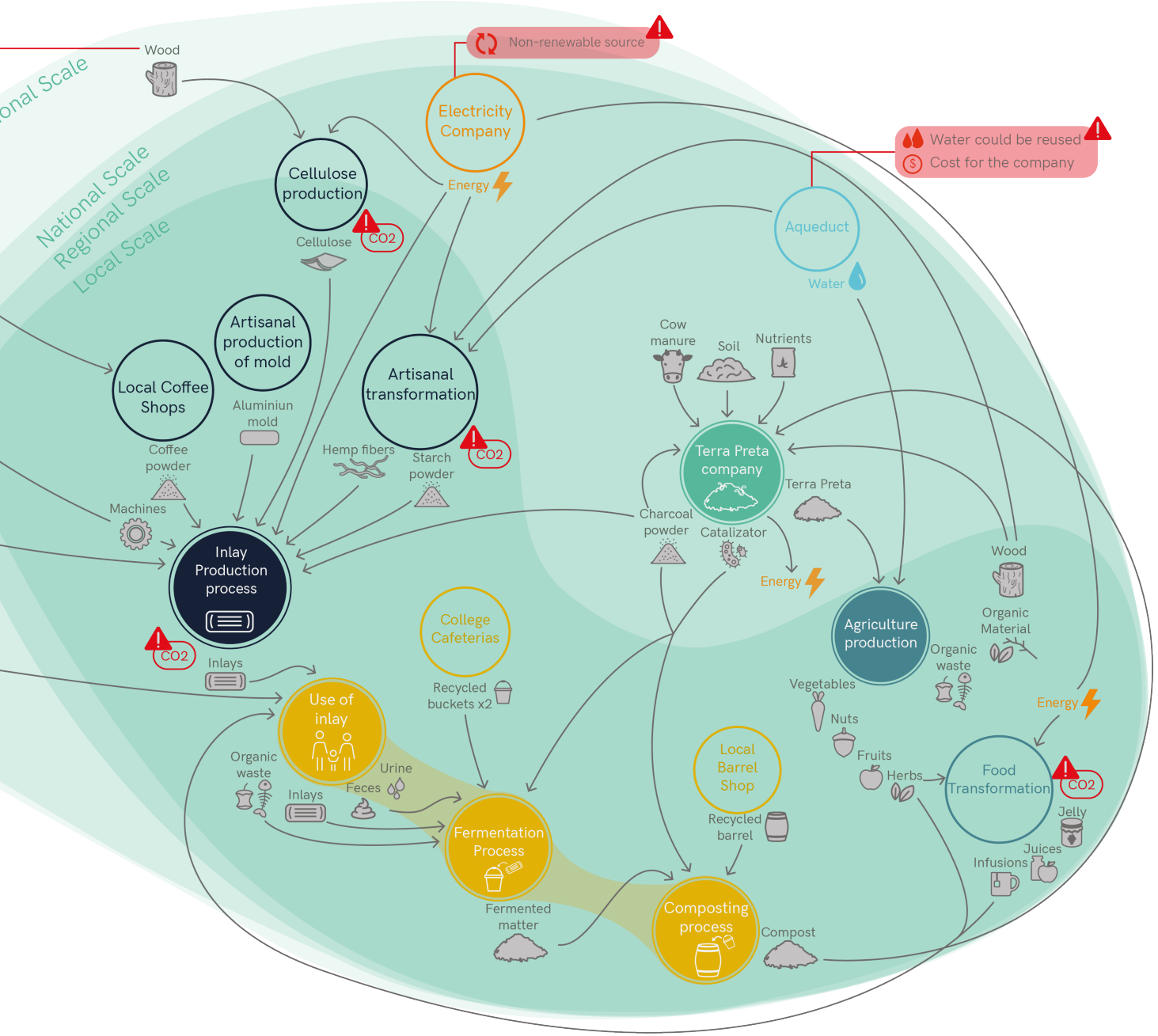
• The materials of bioplastic, cellulose, and machines necessary for the process of production of inlays are located on an international scale, thus requiring different means of transport and therefore the output of their activity generates CO2 emissions.

• The water used in the stages of cultivation and transformation requires a rethinking that leads to the reuse of this resource.

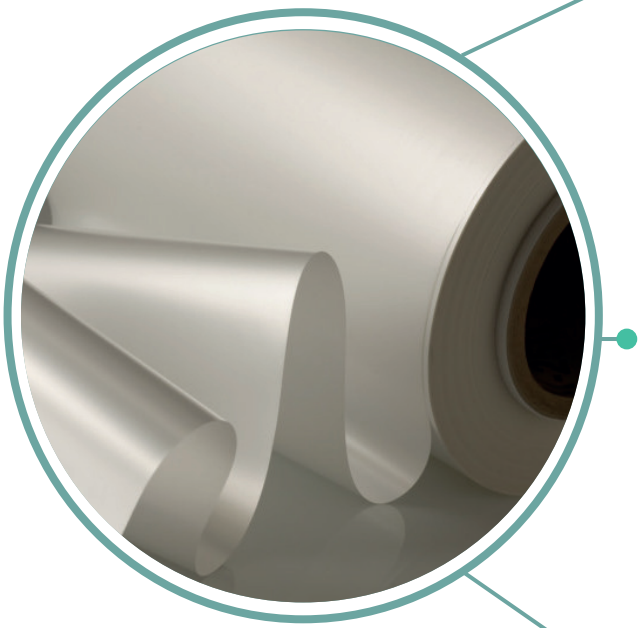
• In the same way for energy, being this a systemic project, it is necessary to find other renewable energies that are efficient and climate-friendly in order to be less dependent on fossil fuels. According to these problems, it was carried out a research for different solutions considering the context in which the project is located. Thus, managing to define the Systemic project, where among all the options investigated there were chosen the most appropriate solutions in order to achieve a better systemic flow.

In the following diagrams the problems are explained further, as well as the solutions given to each of them.




onal Scale
National Scale
Regional Scale
Local Scale
Wood
Non-renewable source
Electricity Company
Energy
Cellulose production
Cellulose
CO2
Water could be reused
Cost for the company
Aqueduct
Water
Artisanal production of mold
Aluminiun mold
Local Coffee Shops
Coffee powder
Machines
Artisanal transformation
Hemp fibers
Starch powder
CO2
Cow manure
Soil
Nutrients
Terra Preta company
Terra Preta
Charcoal powder
Catalizator
Energy
Inlay Production process
CO2
Inlays
College Cafeterias
Recycled buckets x2
Agriculture production
Wood
Organic Material
Organic waste
Vegetables
Nuts
Fruits
Herbs
Energy
Food Transformation
CO2
Jelly
Juices
Infusions
Use of inlay
Organic waste
Inlays
Urine
Feces
Fermentation Process
Fermented matter
Local Barrel Shop
Recycled barrel
Composting process
Compost

Problem #1 : Bioplastic

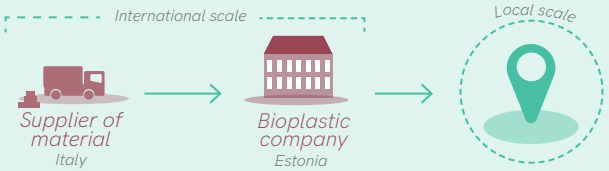


Bioplastic

Problems

- Transportation from abroad
- Use of fuel and CO^2 emissions
- No use of local materials

Current situation



The production site in Estonia receives the raw material from Italy.
The bioplastic is then transported to Berlin.

Amount

28 Kg
Of bioplastic per month

1466 Km
From Berlin

Image 18: Bioplastic film; Taken from: http://biopolymers.nl/taghleef-unveils-bio-based-film/

Solutions: Bioplastic

Find local companies in Germany that can provide the material with the same characteristics using local resources. Thus, reducing the distance of transportation, promoting the use of local materials, creating local jobs and making the capital stay in the territory.

BIO-FED

Materials: PBAT, PLA, PBS, PHA, PA, Bio-PA, starch, biobased engineering compounds, biobased and biodegradable masterbatches[8].

Cologne
Location

570 Km
From Berlin

- Use of local resources
- Located at National level
- Capital stays in the territory
- CO2 emissions

FKuR Kunststoff

Materials: Bio-PE, Bio-PA, Bio-PET, PLA, biodegradable PLA-Blends, cellulose ester blends[9].

Willich
Location

577 Km
From Berlin

- Use of local resources
- Located at National level
- Capital stays in the territory
- CO2 emissions

BIOTEC

Materials: PLA, biodegradable polyesters, biodegradable starch blends, TPS/ Starch[10].

Emmerich am Rhein
Location

590 Km
From Berlin

- Use of local resources
- Located at National level
- Capital stays in the territory
- CO2 emissions

8-10. European bioplastics. (2019, January 18). Members list. Retrieved from European bioplastics: https://www.european-bioplastics.org/about-us/members-membership/members-list/

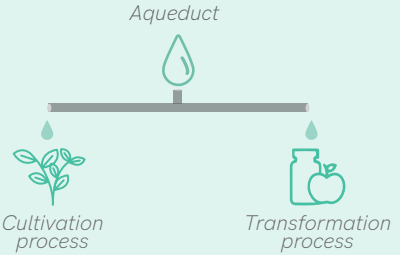
Problem #2: Water

Water

Problems

- Water could be reused
- Cost for the company

Current situation



The water used for the cultivation and the transformation process, is currently provided from the regional aqueduct.

Amount

20L
For a plant of apple per day[11]

170L
Production of a glass (250ml) of apple juice[12]

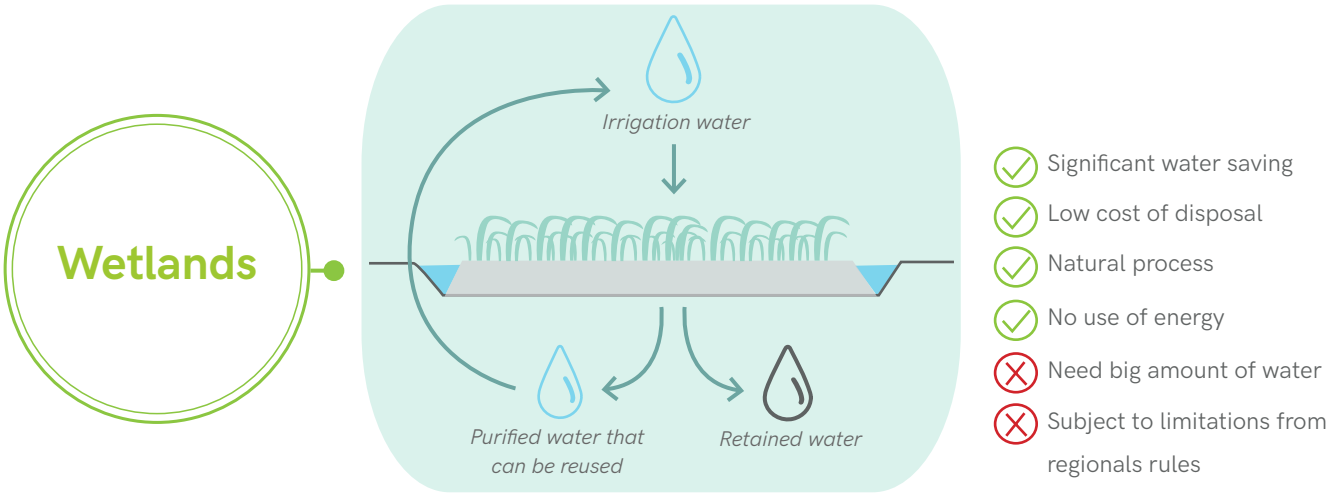
Image 19: Water; Taken from: https://www.africanews24-7.co.za/index.php/southafricaforever/cape-town-launches-water-map/

11. Antonio Requena, G. N. (2011, October 21). Water use of young apple trees drip-irrigated. Retrieved from SciELO: http://www.scielo.org.ar/scielo.php?script=sci_arttext&pid=S1853-86652012000100004&fbclid=IwAR31CenRd20uEJthVsSntXTv3DvJUUVv-d8doI7PRTPPTfu4wrBuLSnEOrA

12. FAO. (2012). AGUA PARA ALIMENTOS. Retrieved from http://www.fao.org/assets/infographics/FAO-Infographic-Virtual-Water-es.pdf

Solutions: Water

The reuse of treated wastewater can provide important environmental, social and economic benefits. Among the many alternatives that exist, is the use of artificial wetlands as a mechanism for the treatment of discharges of contaminated water that results from the cultivation process; This method uses the capacity of the natural ecosystem to eliminate the organic load and other contaminations are decomposed. This can be an important source to reduce dependence on the surface water source[13].

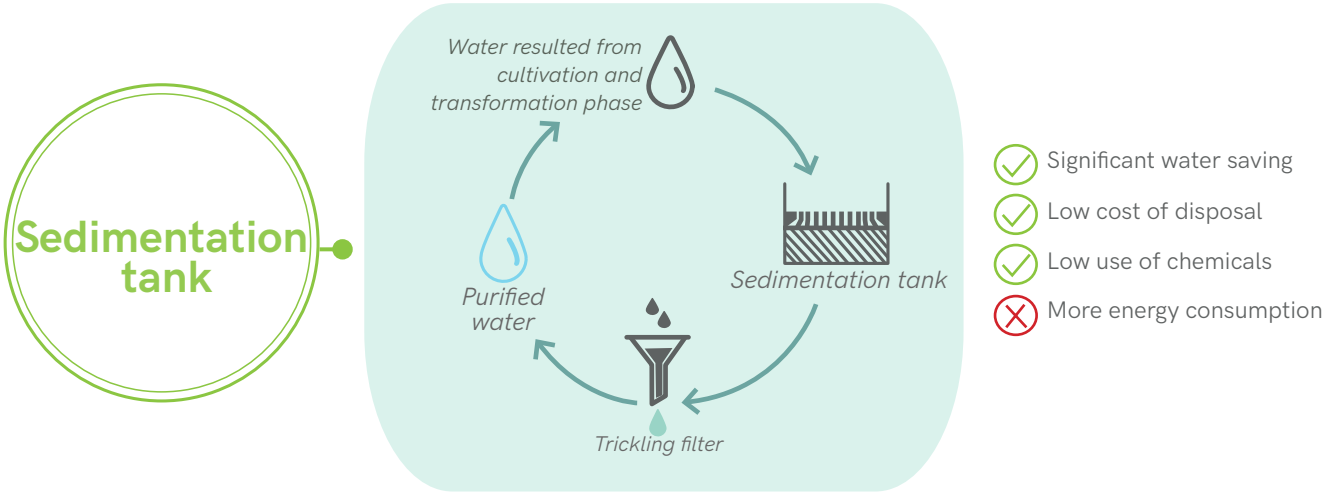


13. Prathap, M. G. (2019, January 20). Constructed Wetlands for water quality. Retrieved from ResearchGate: http://agris.fao.org/agris-search/search.do?recordID=AV2012010153

Solutions: Water

Regarding the transformation phase, another option is the use of a sedimentation tank; this allows the suspended particles to settle out of the water or wastewater as they flow slowly through the tank, which provides some degree of purification.

The result will be a layer of accumulated solids, called sludge, formed at the bottom of the tank and removed periodically. This method must be followed by a secondary treatment of drip filter to increase the efficiency of the purification[14].



14. Britannica, E. (2019, January 20). Enciclopaedia Britannica. Retrieved from Sedimentation tank: https://www.britannica.com/technology/sedimentation-tank

Problem #3: Energy

Energy

Problem

Non-renewable source

Current situation

Use of non-renewable energy for machines in the production process of inlays.

Amount

Sealing machine	*Compressing machine*	*Sterilizer machine*
380 V	220 V	380 V

Image 20: Energy; Taken from: https://www.silam.com/aplicaciones/transmision-electrica/

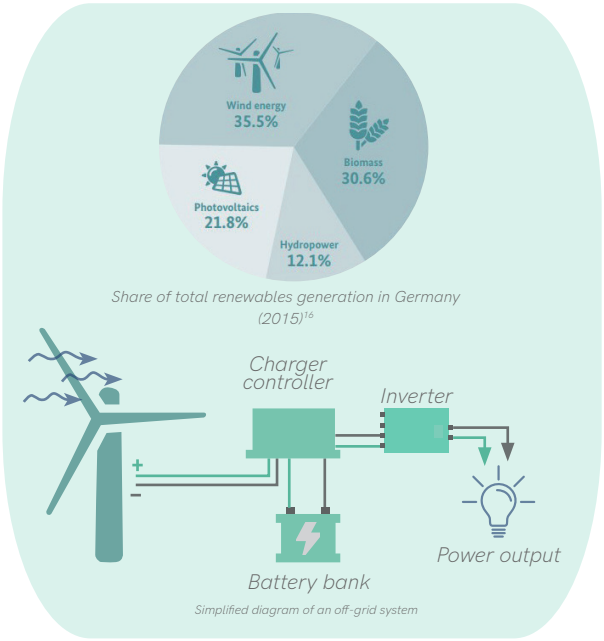
Solution: Energy

The use of renewable energies that are efficient and climate-friendly play a key role to be less dependent on fossil fuels and to protect the environment.

According to a study conducted in 2017 with regard to the transformation of the energy system in Germany[15], the wind potential in the country is significantly higher than solar energy or other energy sources (biomass, photovoltaic, hydroelectric), due to its greater stability in the energy generation.

It also shows that the regions located northwest, including Belin, due to its privileged climate are more appropriate for the implementation of wind turbines.

Wind turbins



- Renewable source
- Stable source in the teritory
- No use of energy
- No CO2 emissions
- Need local laws and zoning regulations

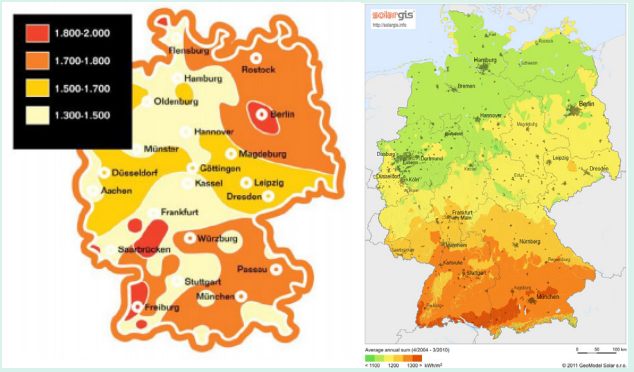
15-16. Energie wende. (2017). La Energiewende alemana. Berlin: Ministerio Federal de Relaciones Exteriores.

Germany, as one of the leading countries in the use of photovoltaic solar panels as renewable energy, this method currently provides over 20 percent of the electricity from renewable sources in the country[17].

Although Belin, due to its location, does not have as much investment in this alternative compared to the southern region of Germany, it can still generate between 1,100 and 1,200 kWh / m2 of energy. Considering that DYCLE is a small-scale project, it does not need a large source of energy, only enough so to reduce the Co2 emissions.

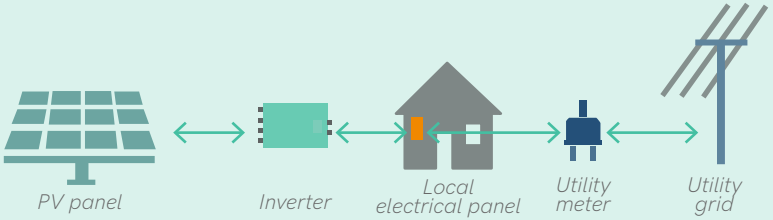
The application of grid-tied system for solar panels is the least expensive to install and the simplest to operate and maintain. As the sun's energy turns into electricity, the rest that is not used can be credited by feeding it to the utility network through the meter[18].

Photovoltaic (PV) solar panels



Area of Germany with more hours of sunshine (h/year) and Solar irradiation[19]

- Renewable source
- Stable source in the teritory
- Low maintenance
- Its efficiency may vary dependig on the day



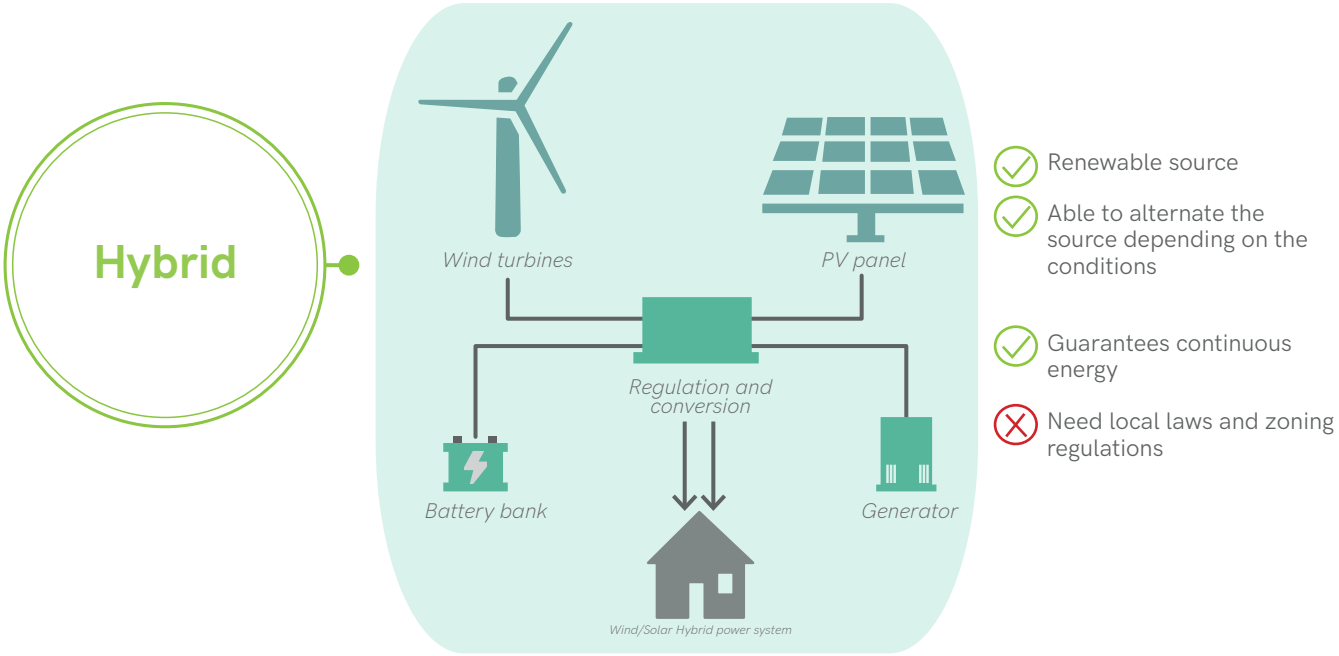
Scheme of a grid-tied system

17;19. Alvarez Pelegry, E., & Ortiz Martinez, I. (2016). La transición energética en Alemania. Bilbao: Orkestra, Instituto vasco de competitividad .

18. Solar Oregon. (2019, January 15). Solar Electricity for Homeowners. Retrieved from http://solaroregon.org/how-to-go-solar/solar-electricity-for-home-owners/utilities-connectedoff-grid/

Considering that the efficiency of the previous systems tends to vary at different times; the first system, for example, the wind speed is low in the summer when the sun shines brighter and longer, and stronger in the winter when there is less sunlight available.

Because the maximum operating times for wind and solar systems occur at different times of the day and year, a hybrid system of wind and solar energy can become another option to duplicate the generative energy that these systems would normally produce individually[20].

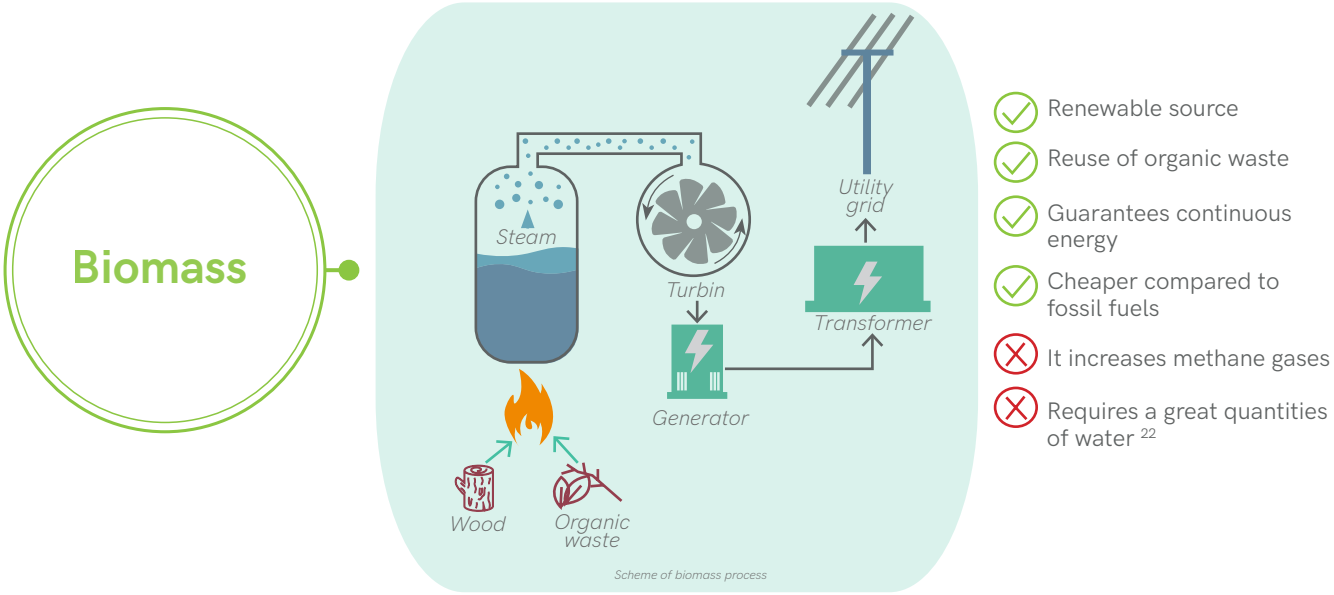


20. Sorensen, J. (2019, January 15). 5 Home Renewable Energy Options You've Never Heard Of. Retrieved from https://www.thespruce.com/home-renewable-energy-options-4102025

Taking advantage of the carbonization activity carried out by the company responsible for doing the Terra preta that is part of the DYCLE system, it can be proposed to obtain biomass as a source of energy through them.

This process consists of converting any type of organic waste into a type of coal through a direct combustion system. The biomass is first burned in a combustion chamber or a furnace (already present in the company) to generate hot gas, which is fed to a boiler to generate steam, which is expanded through a steam turbine or a steam engine to produce electrical energy[21].

The mentioned company would need to have the appropriate facilities for the transformation of this matter, and be connected to an electric network to supply the energy.



21. FEMP. (2019, January 15). Biomass for Electricity Generation. Retrieved from Whole Building Design Guide: https://www.wbdg.org/resources/biomass-electricity-generation

22. Rinkesh. (2019, January 16). Various Advantages and Disadvantages of Biomass Energy. Retrieved from Conserve energy future: https://www.conserve-energy-future.com/advantages_disadvantages_biomassenergy.php

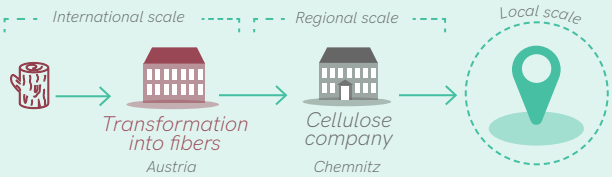
Problem #4: Cellulose

Cellulose

Problems

- Transportation from abroad
- Use of fuel and CO2 emissions
- No use local resourse

Current situation



Currently using a non-woven material taken from a company in East Germany near Chemnitz that uses sustainable fibre supplied by a company abroad.

Amount

28 Kg
Of cellulose per month

~737 Km
Distance from Austria

Image 21: Cellulose; Taken from: https://www.imagenesmi.com/im%C3%A1genes/hemp-linen-fabric-9f.html

Solutions: Cellulose

Search for a local agriculture in Germany to extract the raw fiber for the absorption core, instead of the nonwoven material that is currently used. This can be, for example, hemp, wood fiber, bamboo, sugar cane, banana leaves, etc.

For this solution, two companies were found dealing with hemp cultivation in Germany, where it may be possible to obtain the raw material for the transformation process.

Hanf Farm GmbH

Materials: Products include hemp sowing seed, food grade seed, de-hulled seed, flour, protein powder, dried leaves (cut or ground), fiber and shivs[23].

Berlin
Location

0 Km

- ✓ Local resources
- ✓ More control of the resources used
- ✓ Local jobs
- ✓ No transportation emissions
- ✓ Capital stays in the region
- ✗ Local regulations

Hanf-zeit

Materials: Grower, processor, hemp food, products, etc. Raw material, food, fragrance & incense, sweets, CanaFit, cosmetics, CBD products[24].

Steinheim
Location

380 Km
From Berlin

- ✓ Regional resources
- ✓ More control of the resources used
- ✓ Regional jobs
- ✓ Capital stays in the region
- ✗ Local regulations
- ✗ Still emits CO_2 emissions

23-24. HempToday. (2019, January 20). Hemp Farming Companies. Retrieved from https://hemptoday.net/connect/business-category/farming/

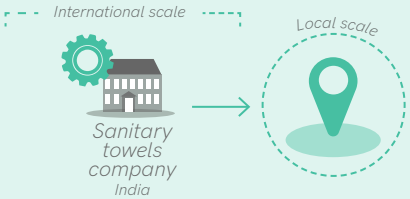
Problem #5: Machines

Machines

Problems

- Transportation from abroad
- Use of fuel and CO2 emissions
- No local jobs

Current situation



The development of the semi-automatic diaper machine for the production process is done with their partners abroad.

Amount

Sealing machine	Compressing machine	Sterilizer machine

Image 22: Machine; Taken from: https://www.pexels.com/search/machine/

Solution: Machines

The semi-automatic machines in the production process do not require high complexity; they can be found in the market and modified according to DYCLE's needs. A possible solution can be find a local manufacturer company in Germany that provide the three machines or at least their components to build it.

Services: Manufacturing, customized parts, components, assemblies & housings in metal & plastic. Specialist in made-to-order production of mechanical components by a range of manufacturing processes[25].

Teltow
Location

50 Km
From Berlin

- Regional resources
- Regional jobs
- Capital stays in the region
- Still emits CO2 emissions
- Is subject to the company policies

25. G.W.P. (2019, January 17). Prototypes & Initital batches. Retrieved from https://www.gwp-ag.com/company/profile/index.html

Systemic project

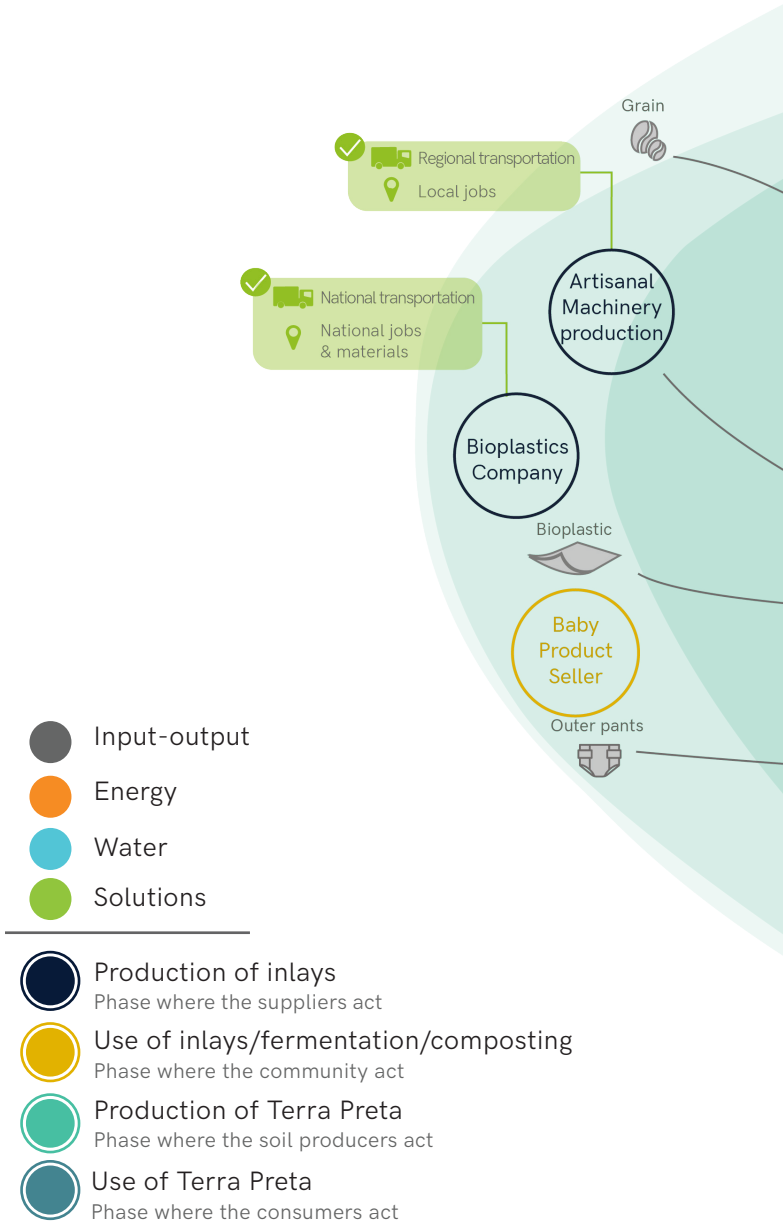
Among all the solutions identified, there were chosen the ones that fit in the conditions and re-quirements of DYCLE`s context:

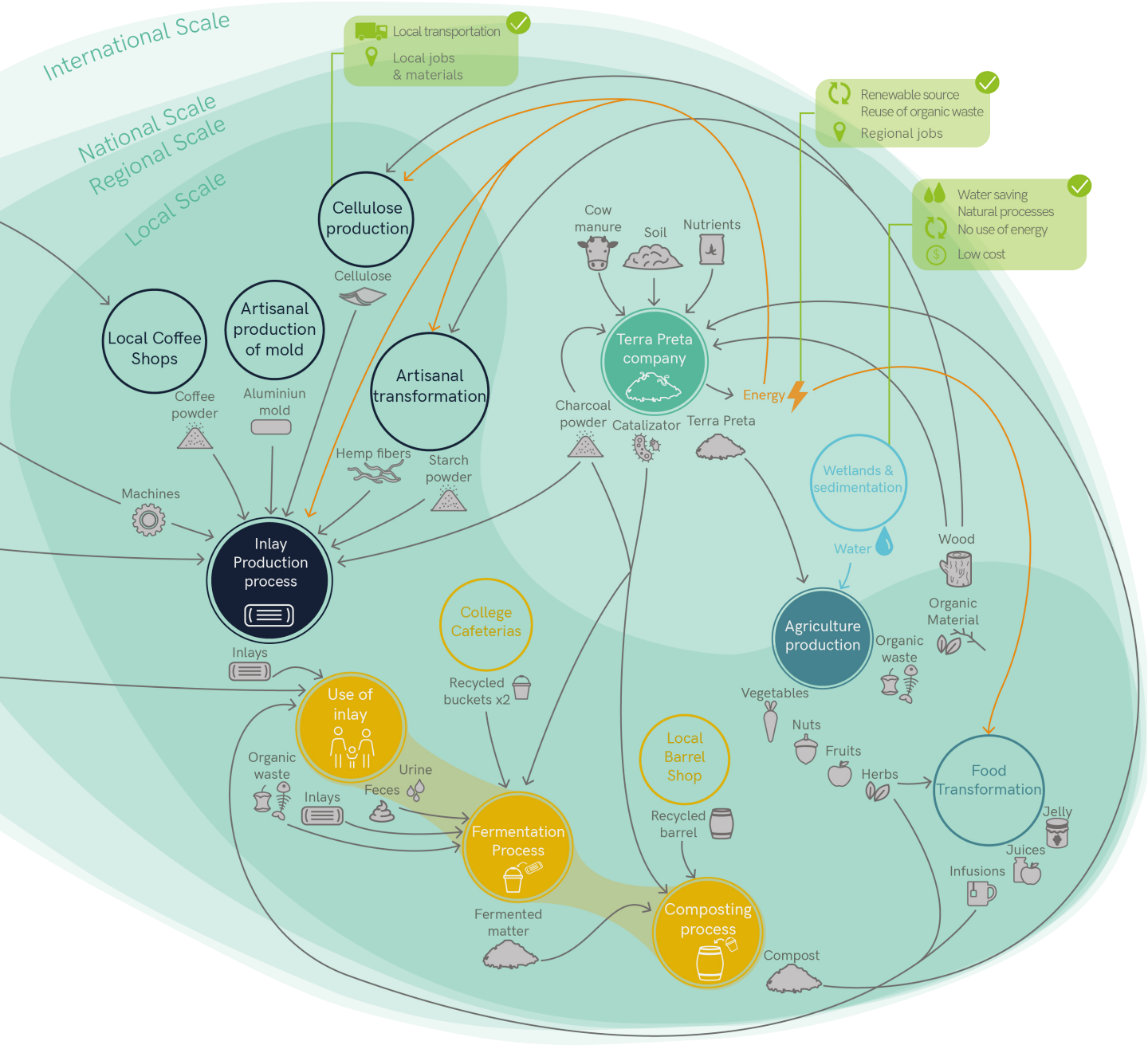
- For the bioplastic, it was chosen a company located at a national level that has the characteris-tics necessary to be able to provide the needed material using local resources. In this way, the distance of transport is reduced, promoting local materials, creating job opportunities and mak-ing the capital stays in the territory.

- In the use of water two options were chosen: First, for the cultivation process, it will use artificial wetlands that through a natural process it removes contaminants present in the water re-sulted from the irrigation of the fields. Then, for the transformation process, the use of a sedi-mentation tank will help, in the same way as the wetlands, to purify the water resulted from the process and use it again.

- For the energy, the carbonization activity carried out by one of the existing companies in the system (Terra Preta company) will be used to obtain biomass, generate electricity through it, and used it for the production process of inlays.

- For the cellulose, as well as in the bioplastic solution, it was chosen local hemp agriculture to extract the raw fiber that will be used to manufacture this product and change the material cur-rently used for a local one, thus, promoting the use of local resources and genera-




International Scale
National Scale
Regional Scale
Local Scale
Local transportation
Local jobs & materials
Renewable source
Reuse of organic waste
Regional jobs
Water saving
Natural processes
No use of energy
Low cost
Cellulose production
Cellulose
Local Coffee Shops
Artisanal production of mold
Artisanal transformation
Coffee powder
Aluminiun mold
Hemp fibers
Starch powder
Machines
Inlay Production process
Inlays
Cow manure
Soil
Nutrients
Terra Preta company
Energy
Charcoal powder
Catalizator
Terra Preta
Wetlands & sedimentation
Water
Wood
Organic Material
Agriculture production
Organic waste
Vegetables
Nuts
Fruits
Herbs
Food Transformation
Jelly
Juices
Infusions
College Cafeterias
Recycled buckets x2
Use of inlay
Organic waste
Inlays
Urine
Feces
Fermentation Process
Fermented matter
Local Barrel Shop
Recycled barrel
Composting process
Compost

ting more jobs opportunities.

- For the machines, it was found a local company that among their products they produce a biodegradable diaper. This can give the possibility to take their machines as a reference and modify them according to the needs of DYCLE. Promoting in this way, the local jobs and reducing the distance from where these machines are acquired.

With these solutions, a scheme will emerge showing how the ideal system should work. These modifications in the system make improvements in the flow of materials and show a decrease in the negative outputs that it generates. This can be a first approach to how the system can be developed.

Problems and opportunities

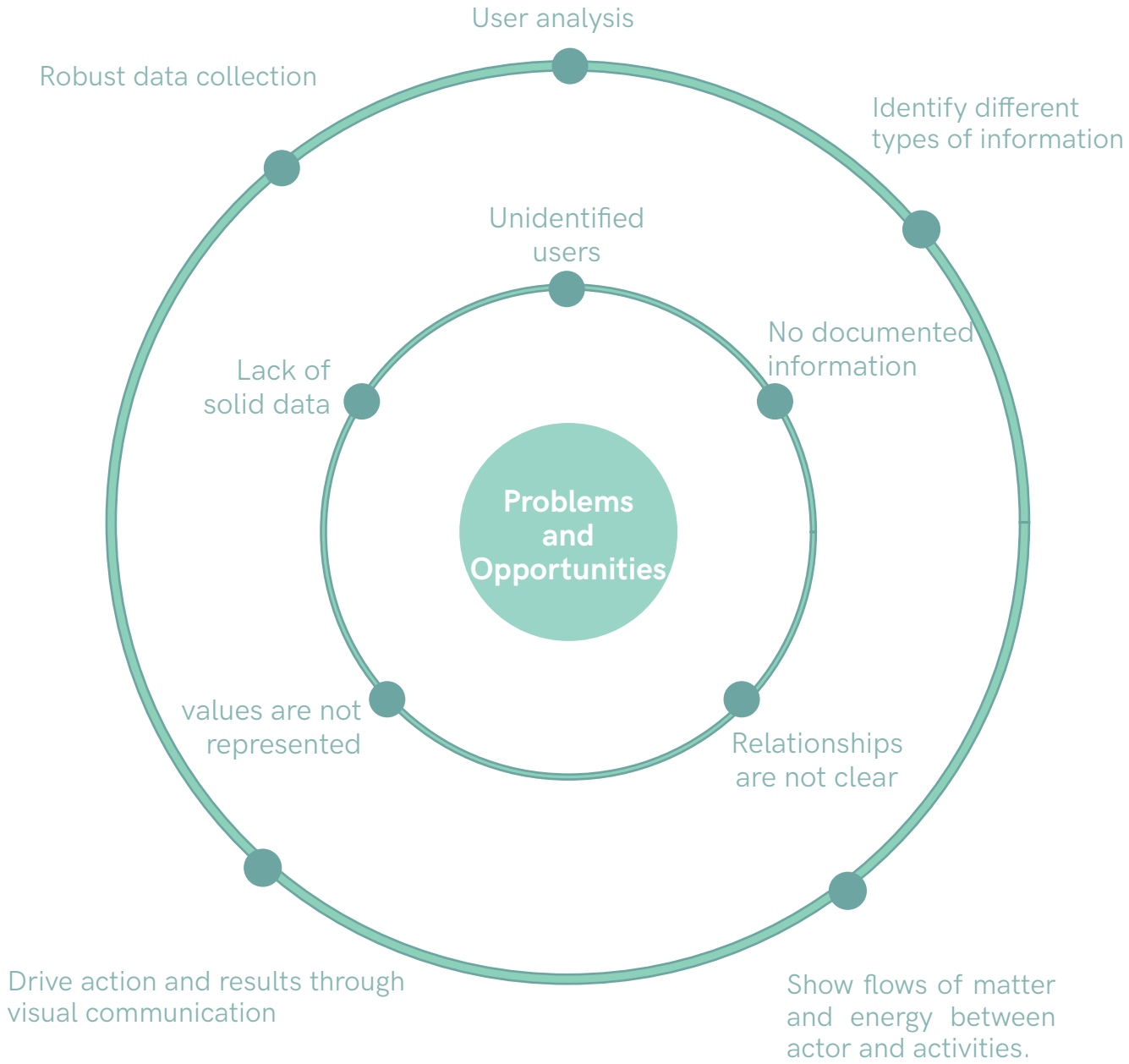
DYCLE proposes an almost artisanal method of elaboration and transformation of a high consumption product, that after going through a process will return to nature without altering the environment. It shows great benefits on a local scale as it covers stages from production to consumption, highlighting the use of local resources. In this way, there are several gains found throughout the whole cycle such as the creation of coexistence and connectivity of human resources with the environment, the creation of new jobs opportunities and generation of values on issues that are usually not considered.

After having done the research and analysis of the activities it was possible to identify some problems and opportunities regarding the communication aspect, which will be developed from the systemic point of view.

One of the biggest problems of DYCLE is the fact of not knowing who their users are, since it is a big project with different fields of actions, they receive a lot of different questions depending on the phase people want to take part of. DYCLE has not been able to identify their users until now, hence, they haven't made any analysis of them in order to create a channel of communication based on them.

Considering that DYCLE is a project that is in a phase of experimentation, only being tested in 2015 and 2017, there is a lack of solid data which generates confusion regarding the steps of the process. There is not enough documented information and the one they have, was created through their experiences of trial and error throughout the process, which has not been analyzed correctly, hence, they do not know how to transmit the values they seek to communicate to the users. This situation offers the opportunity to define the different actors and to analyze them according to the information they require.

It is then necessary to identify the different types of information that are transmitted in a systemic project like DYCLE (process, the flow of material, relationships, connections, quantities, etc.) in order to achieve better clarity of the process and engage people to participate in it. In addition, the few graphic representations of the project are not completely accurate, does not show every relationship and the important values of the phases. With better graphics communication, the aim is to help the different users understand the whole system and find the information that is of most interest to them.


User analysis
Robust data collection
Identify different types of information
Unidentified users
No documented information
Lack of solid data
Problems and Opportunities
values are not represented
Relationships are not clear
Drive action and results through visual communication
Show flows of matter and energy between actor and activities.

Project Approach

4

Introduction

In this chapter, the analysis of the problems identified in DYCLE's current communication that will give place to the design process for the project will be carried out. First, is going to be explained the methodology that was done with DYCLE, in which it was possible to identify the four main actors that are involved in the system.

With the help of the information and questions provided by the organization and the use of the Empathy map, it was also determined the profile and requirements of each user to have in mind when developing the graphics information of the project. In order to make a more detailed analysis of the problems found, the views seen in the phase of research and analysis previously chapters of systemic design (guidelines) and visual communication will be applied. This will give way to define the general and specific objectives of the project to shift the current linear communication model in DYCLE.

After having identified the objectives, the proposal was guided to a visual communication that helps represent and transmit key information about DYCLE´s project; its concept was defined based on the most important values that inspired the organization's development.

The justification of the paper consists in a recount of the research, explaining why the visual channel was chosen as a means of communication, followed by the limits that will be further continued in the thesis.

User analysis

Defining the users

After the field visit to DYCLE, it was seen that the users haven't been correctly identified due to the lack of documentation, understanding of the system and to the experimental dynamic with which the project has been developed. Hence, **there was no analysis available of them (users) that could help define who they were and their needs.** That is why, along with Ayumi Matsuzaka and Christian Schloch, founders of DYCLE, there was a design thinking session in which based on their stories, experiences, and information about all aspects of the project, it became possible to make the first approach for understanding the system, all its components and specifying the different users that participate in each of the phases in the system.

Starting from the current diagrams that explain DYCLE's system (from the making of the diaper to the production of healthy food and the excretion of the baby), it was possible to identify each actor that intervenes in every activity in the diagram. With some of the stakeholders identified by them (companies and partners), such as the companies that provide the raw material for making the diaper, the compost and those who will use the product of Terra Preta (*image 1*).

One of the most important contributions made during this session was pointing out some targets that were not consider as such, this, by doing a bottom-up approach (Strategy of information processing based in incoming data by designing individual parts in detail to later link

Image 1: First approach to the system and its users. Photo taken by: Camila Espinosa

them to form bigger components which in turn are connected to form the complete system)[1], **a concrete classification of the actors into four users was achieve**, this was also of great importance for the development and understanding of the project phases.

These four users were based and related not only to the **reinterpretation of the phases in the system made, but also by DYCLE's database** which was accessed by first hand, containing all the doubts and questions asked by each person interested in participating or being informed about the project. These data were formed by questions sent to DYCLE's official email from their website www.dycle.org and questionnaires made for the people or companies that wanted to be involved in the development. **These questions were categorized and related to the users and to the phases of the system, allowing in this way to clearly identify the relationships between these elements bringing to light the information that each target needed or wanted from each phase.** Thanks to these, it was possible to understand more deeply the users. (*image 2*)

All of this was made along with Ayumi and Christian, thus, it was approved by them as a first approach. The users identified from this analysis are:

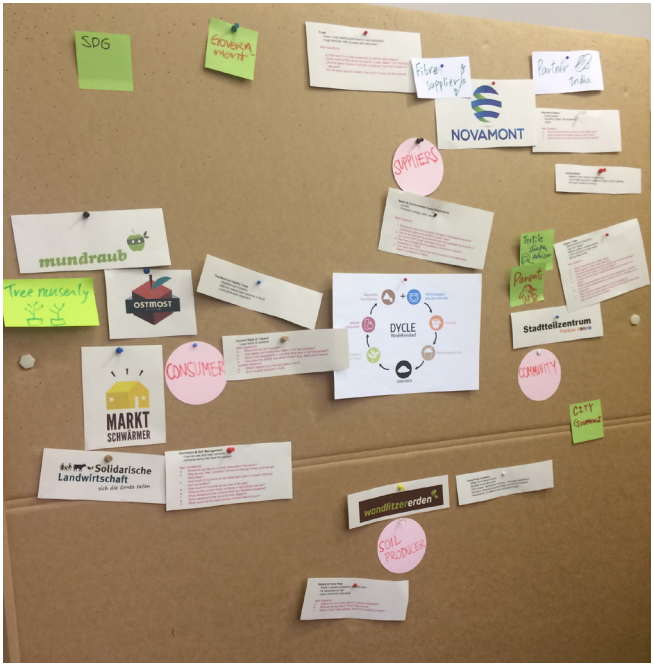


Image 2: Relationship between the information asked frequently, the phases of the system and the users defined. Photo taken by: Alejandra Cuervo

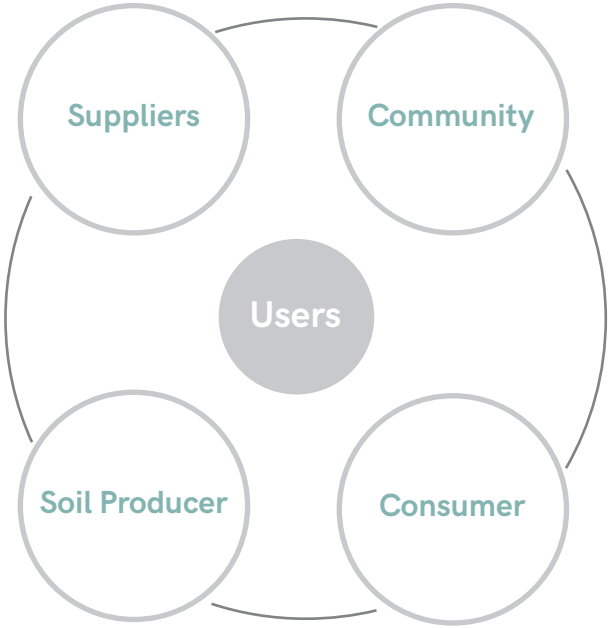


Diagram 1: four defined users.

1. casati gallery design. (2018, 12 11). casati. Retrieved from http://www.casatigallery.com/designers/bruno-munari/

All this discussion and exchange of information was able to give a clear view of who the users were and a general view how what they needed. Later in order to make a more detail analysis of every target, it was found a tool commonly implemented to find the needs and wants of each different user, in this case, it was used the Empathy map. This method is used for understanding audiences, including users, customers, and other players involve. Traditionally Empathy maps are split into 4 quadrants (says, thinks, does, and feels), other authors have added, such as Dave Gray, more questions and aspects to consider, for example, in how the user thinks and feel, what are the Pains (fears, frustrations, anxieties) and Gains (wants, needs, hopes, dreams) in order to provide a more deeper analysis into who the user is as a whole (Gray, 2017)[2]. For this analysis, the objective is to provide detail information about the profile and requirements to have in mind for the development of the graphics information for the project.

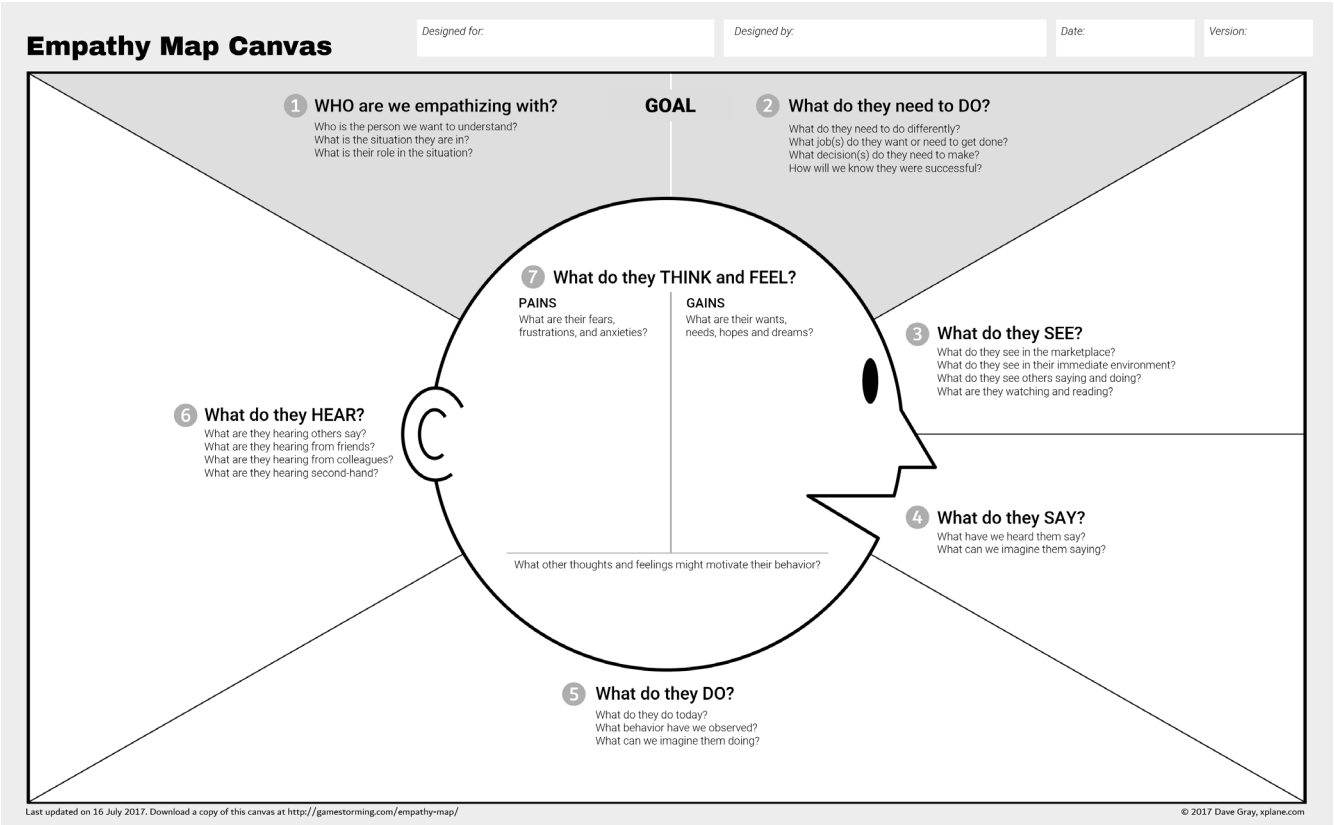


Image 3: Empathy map: Taken from Gamestorming: https://gamestorming.com/empathy-mapping/

2. Gray, D. (2017, July 14). Empathy maps. Retrieved from Gamestorming: https://gamestorming.com/empathy-mapping/

User #1 - Suppliers

It is formed by those who will provide the raw materials such as bioplastic companies, sanitary towels companies, baby product seller, local coffee chops, Terra Preta company, cafeteria. The majority can be found locally with only very few that are international. They have in common their desire to make their work or product recognized, they also worry in making these not a problem but a solution for environmental problems. Overall, they want to make a difference and a change in the world.

Image 4: German diapers company; Taken from: https://www.disana.de/kollektion/produkt/hoeschenwindel/

Image 5: Coffee shop in Berlin; Taken by: Alejandra Cuervo

Image 6. Terra preta center; Taken from: http://www.wandlitzer-erden.de/naehrstoffquelle-humus/

Image 7: Bioplastic supplier; Taken from:http://biopolymers.nl/taghleef-unveils-bio-based-film/

Image 8: Machine suppliers; Taken by: Ayumi Matsuzaka

Empathy map - Suppliers

What do they think and feel?

Pains

-Their products will not be accepted in the market
-Not understanding what their role in the system is
-Their participation in the system will not be effective
-Not acquiring feedback loops of any kind of value

Gains

-Make their work and products be recognized in the context
-Make a change in the world
-Undesrtand how can they participate in the project
-Contribute to the circular economy

What do they hear?

-World news
-World leaders opinions
-Actualizations and news about technologies and materials from their field
-Field leaders opinions and actions
-Questions from their costumers

What do they do?

-Reports about their products' characteristics
-Looking for buyers
-Sell their products with conviction
-Show the benefits of the product compared to others
-Find a way of making part of a whole sustainable system
-Get raw materials and transform them

What do they see?

-World news
-Books and reports from their work field
-Other companies' innovations

What do they say?

-Care about the environment
-Care about society
-Want to make a change
-Want to make part of a systemic project

Scheme 1. Suppliers empathy map

User #2 - Community

Image 9: Christian Schloch explaining the system to the community durin a workshop in Belrin; Taken from: DYCLE database

The community includes the parents, baby health advisors, and of course the babies. These users develop their daily activities at a local level, in this case, Berlin. They have in common the concern for the future and the welfare of their family and friends; That is why they seek to be informed about activities that they can implement to their lifestyle in order to help the world change.

Image 10: Parents; Taken from: DYCLE database

Image 11: Babies; Taken from: DYCLE database

Empathy map - Community

What do they think and feel?

Pains

-Not knowing how to help the environment
-Lack or bad information
-Baby and family welfare
-Make bad decisions
-Feels anxious about the future
-Overwhelmed by their conext

Gains

-Be updated and informed
-Make a change in the world
-Undesrtand how can they participate in the project
-Health of the baby
-Being part of a community
-Contribute to the circular economy

What do they hear?

-World news
-World leaders opinions
-Friends, family and colleagues opinions
-Social media
-Specialized advisory
-Opinions about sustainable development
-Opinions regarding the babies health

What do they do?

-Work hard at their job
-Try to be informed and updated
-Meet new people
-Try to change the world by doing little actions
-Help families take care of their babies

What do they see?

-World news
-Books of their interest field
-Social media
-New products in the market
-Publications of specialized advisory

What do they say?

-Want to help the environment
-Want the best for their families and friends
-Their baby to be healthy
-Make a change in the world

Scheme 2: Community empathy map

User #3 - Soil Producer

The soil prodcuer center take an important role in the system. In here can be found scientist or specialized professional that are deeply concern about the environment, especially the degradation of soil. They search for new methods and techniques to take care of the soil, stop its degradation and give other options to those who use soil in their work.

Image 12: Soil producer center Germany; Taken from: http://www.wandlitzer-erden.de/

Image 13: Rich soil producers; Taken from: http://www.wandlitzer-erden.de/

Image 14: Rich soil; Taken from: http://www.wandlitzer-erden.de/

Empathy map - Soil Producer

What do they think and feel?

Pains

-Not being accepted in the market

Gains

-Recognition of the benefits of Terra Preta
-Reduce the use of chemicals in agriculture
-Welfare of societies and nature
-Regenerated soil
-Contribute to the circular economy

What do they hear?

-World news
-World leaders opinion
-Reports
-Actualization and news regarding new methods and technologis
-Doubts and questions from customers
-Opinios and recomendations from colleges

What do they do?

-Make informs and reports about quality of Terra Preta
-Looking for buyers and new fields of action
-Transform waste
-Find resourses
-Make the treatment for compost

What do they see?

-World news
-Books and reports from their work field
-Similar products on the market
-Other companies innovations in the market
-Opportunities for the product to be use

What do they say?

-Benefits from using Terra Preta, and why it should be use
-Care about the environment
-Stop industrial agriculture
-Give back value to earth

Scheme 3: Soil producer empathy map

User #4 - Consumer

It is formed by farmers, tree nurseys, community, social services (tree nursey), and food producers always in the locality, promoting local economy. They have in common their desire to look for innovative and natural products and methods that don't harm their environment. They like products that are healthy and of good quality.

Image 15: Community; Taken from: DYCLE database

Image 16: Tree nursery; Taken from: https://opentransfer.de/willkommen-in-der-open-transfer-accelerator-community-mundraub/

Image 17: Farmers; Taken from: DYCLE database

Image 18: Healthy food producers and consumers; Taken from:https://marktschwaermer.de/de-DE/p/provide

Empathy map - Soil Producer

What do they think and feel?

Pains

-Not being accepted in the market
-Future degradation of the soil
-Decline of food quantity and quality

Gains

-Reduce the use of chemicals in agriculture
-Sustainable process
-Welfare of societies and nature
-Contribute to the circular economy
-Healthy products
-Recognition in the market

What do they hear?

-World news
-World leaders opinion
-Reports
-Actualizations and news regarding new methods and technologies
-Doubts and questions from customers
-Opinios and recomendations from colleges
-Importance of taking care of the soil
-Importance of healthy food

What do they do?

-Looking for buyers
-Better quality food

What do they see?

-World news
-Books and reports from their work field
-Other companies products in the market
-Opportunities for jobs

What do they say?

-Care about the environment
-Stop industrial agriculture
-Promote local production
-Healthy food for families
-Benefits of applying a circular model to their system

Scheme 4: Soil producer empathy map

Clasification of the information needed

In the field visit to DYCLE´S organization, the following information classification was created after analyzing the most frequently asked questions in the database. Being this, made up by questions collected from the official mail, the official website contact (www.dycle.org) and questionnaires made by DYCLE for the interested parties. These questions were categorized and related to the users and phases of the system, being able to understand the interdependencies and making clear the relationships between them. In this way, the information each of them was seeking for, was captured.

Suppliers

- How many percentages of cotton production is used for baby diapers?
- How much of fluff pulp do we need for baby diaper?
- For the same volume of fluff pulp to produce, how much water do we need?
- In the same amount of water, how much of crops can we produce?
- Wasted in high volumes in diaper factory
- Lots of water required for treatment of cotton and other materials
- Water no longer available for drinking

Community

- What is the demand from parents to each diaper type?
- What is positive and negative aspects to each diaper?
- What is the advice to find the best one for fresh parents?
- What is the global annual diaper waste?
- What happens to most diapers after use?
- How many disposable diapers are produced per minute in average?
- What is the main material in high-tech designs?
- In which countries most of disposable diapers are produced in the world?
- What are superabsorbent and what is the consideration in health?
- Is it true superabsorbent are neutral in soil? (no damage and no beneficial)
- Which production steps cause the most CO2 emissions?
- How do the leaders build up the monopolized market and how do they occupy the industry?
- Main environmental damage of disposable diapers at incineration plants and landfills?
- How do we calculate by ourselves how many garbage we produce in community?
- How many garbage do we produce in Germany? In Berlin?
- How many liters of crude oil we need to produce one disposable diaper?

Soil Producer

- What Terre Preta is exactly?
- Benefits to soil and plants
- The process – fermentation, biochar – thorough explanation
- Structure, chemical properties (retaining H2O and nutrients)
- How and why its different from compost process

Consumer

- Why is the top soil important?
- How rapidly soil fertilizer went down in the last decade?
- What is the background in industrial level and in farming system?
- How does this fertility lose affect plants? (e.g. destructive insects, weather influence)
- What is happening to eco system then?
- How we use and lose nutrients
- Nutrients being lost from the system
- Where do we dig out mineral resources in the world?
- Why do we lose nutrients? Where do they go? How could we get them back?
- How much nutrients do we need each year in current chemical farming system?
- What do the current linear nutrients in agriculture look like?
- What happens to the nutrients from our sanitation system?
- What would be the ideal circular nutrients flow in the future?

Key need of the users

Suppliers

- Spread the values and benefits of their work and products
- Be recognized in their context and by the public in general
- Relaible and clear information sources for their projects and innitiatives
- Complete data
- Easy acces to different types of information
- Keep themselves uptaded about the world's problems, projects and innitiatives they could take part in, related to their context
- Find partners to work with
- Need to be inform about systemic approach to improve their processes

Community

- Easy access to clear and reliable information in order to know how to start acting acording to their beliefs
- Learn and understand more about sustainble development and its systemic relationships in order to make right decisions in the future
- Be informed and updated about innovative innitiatives and projects to take part of

Soil Producer

- Spread the values and benefits of their work and products
- Find partners to work with
- Be recognized in their context and by the public in general
- Relaible and clear information sources for their projects and innitiatives
- Complete data
- Easy acces to different types of information
- Keep themselves uptaded about the world's problems, projects and innitiatives they could take part in, related to their context

Consumer

- Find partners to work with
- Relaible and clear information sources for their projects and innitiatives
- Easy acces to different types of information
- Keep themselves uptaded about the world's problems, projects and innitiatives they could take part in.

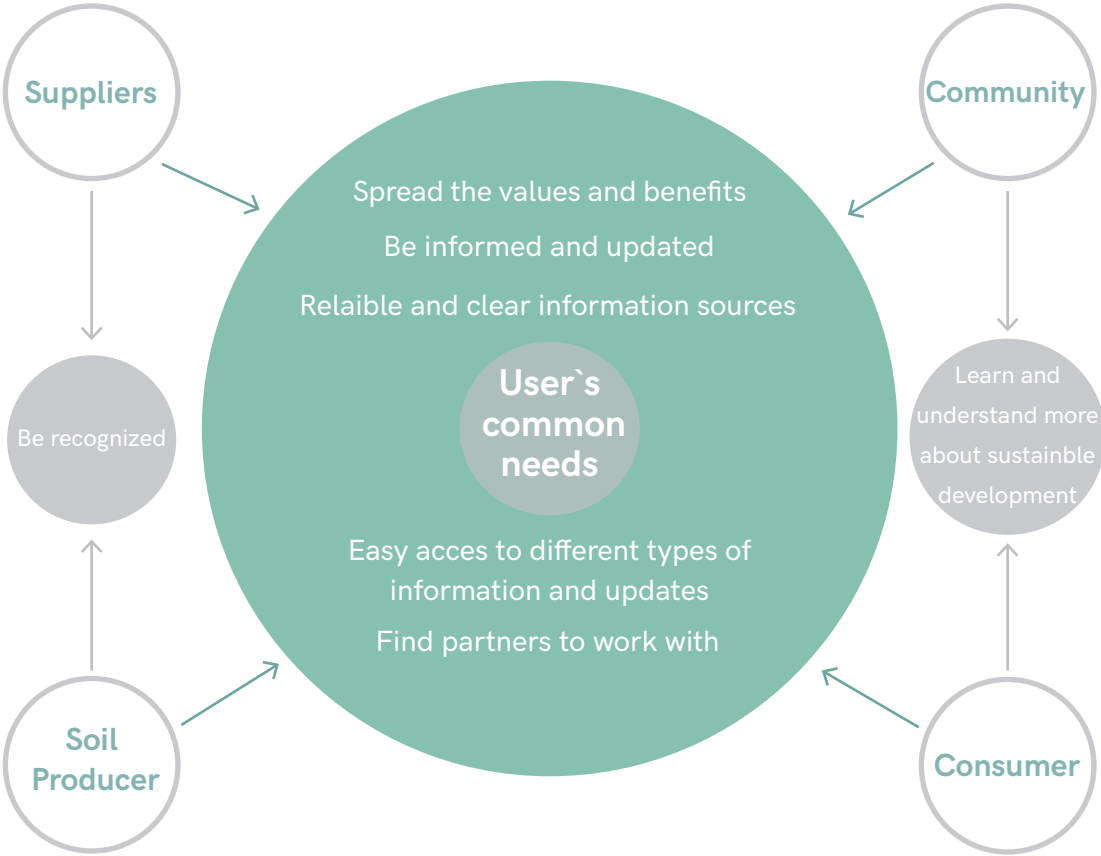


Diagram 2: Resume of DYCLE´s users needs

Problem analysis

Problem analysis

DYCLE as it has been mentioned before, is a project where the principles of circular economy are put in practice in order to present a new business model as an answer for the current problems this product has been generating to the environment. However, the current methodology in which it has been developing has caused a series of problems regarding the handle of the information and communication aspects that will be presented later.

Before starting, it is necessary to consider the research and analysis phase previously done in the chapters of systemic design (guidelines) and visual communication in order to apply them to identify from its view the problematics that will be treated in this thesis. Looking at the problems from the aspects identified in the **systemic design guidelines**, it is found:

It has not been given the proper importance to the identification of the users (receivers), by not having done a proper analysis of each of them, their needs and their contexts are put aside resulting in a lack of clarity when transmitting through a graphic communication, which does not allow the user who sees the information to generate meaning from it, and also making their role in every phase confusing. In this way, **the man is not the protagonist**, and it is mainly thought about the information and data that wants to be transmitted.

The current communication does not generate a rich **exchange of relations or a continuous flow of matter and energy**, since the lack of data and clarity in the communication channels has caused the loss of those who show interested in the project, by not understanding the system or being unable to find the information they want, they give up looking for it. In this way, the project is losing new relationships both within itself and the external context causing it to stop receiving contributions from this exchange that can help the project to nurture itself and evolve. It is not clear within the project itself what should be transmitted to each user, what their interests and needs are; hence, the communication confusing and unclear.

Furthermore, **the flow of information stagnates** by not using the correct channels for each one of the users, making impossible the continuous exchange of knowledge among all the actors of the system. Another aspect that has been forgotten is the analysis of the **context** of the users, each actor has different identities and backgrounds, hence will understand the information different. Once they have been identified it will show different ways of communication. Currently, DYCLE has only considered the role of the actors at the local level, leaving behind the actor in the global level making it difficult for them to generate their own meaning and knowledge, and above all to adopt practices like DYCLE.

Regarding the **visual aspects** of the project, it is seen again the lack of analysis about the type of information that is going to be transmitted. The fragmented communication has no relation between them making it difficult to understand the systemic relationships that the project should have.

Utility: the lack of functional and effective communication makes the visual representation unable to achieve its objectives to the point of being useless.
Soundness: there is no reliability regarding the information created by the communication channels since there are not concrete relationships with the different actors and users, most of the data are subjective to assumptions.
Attractiveness: they don't take into consideration the UX when delivering the information, neither an esthetic aspect that can attract the user.

The problems identified will give a guide of which should be the objectives of the project in order to shift the actual linear communication model in DYCLE, and the information that is going to be transmitted to each user and how. This, by improving the graphic representation and making a deeper analysis of the users, the project operation and component from a systemic view. The channel that will be developed in this thesis will offer the possibility to the local networks to understand, create knowledge y operate. In the same way as an accessible tool for global actors as well.

For the development of this analysis, it was used a methodological tool that helps to break down and identify the problem of a project, which is tried to solve by analyzing cause-effect relationships[3].

The problem tree works by making an analogy to a tree. First, understanding what the main problem is, then focusing on its roots, where the causes of the problem will be found. Finally, the branches represent the effects or consequences. This will be complemented later with another analysis tool called solution tree.

3. UNESCO. (2019, 01 19). UNESCO. Retrieved from http://www.unesco.org/new/es/culture/themes/cultural-diversity/diversity-of-cultural%20expressions/tools/policy-guide/planificar/diagnosticar/arbol-de-problemas/

Problem Tree

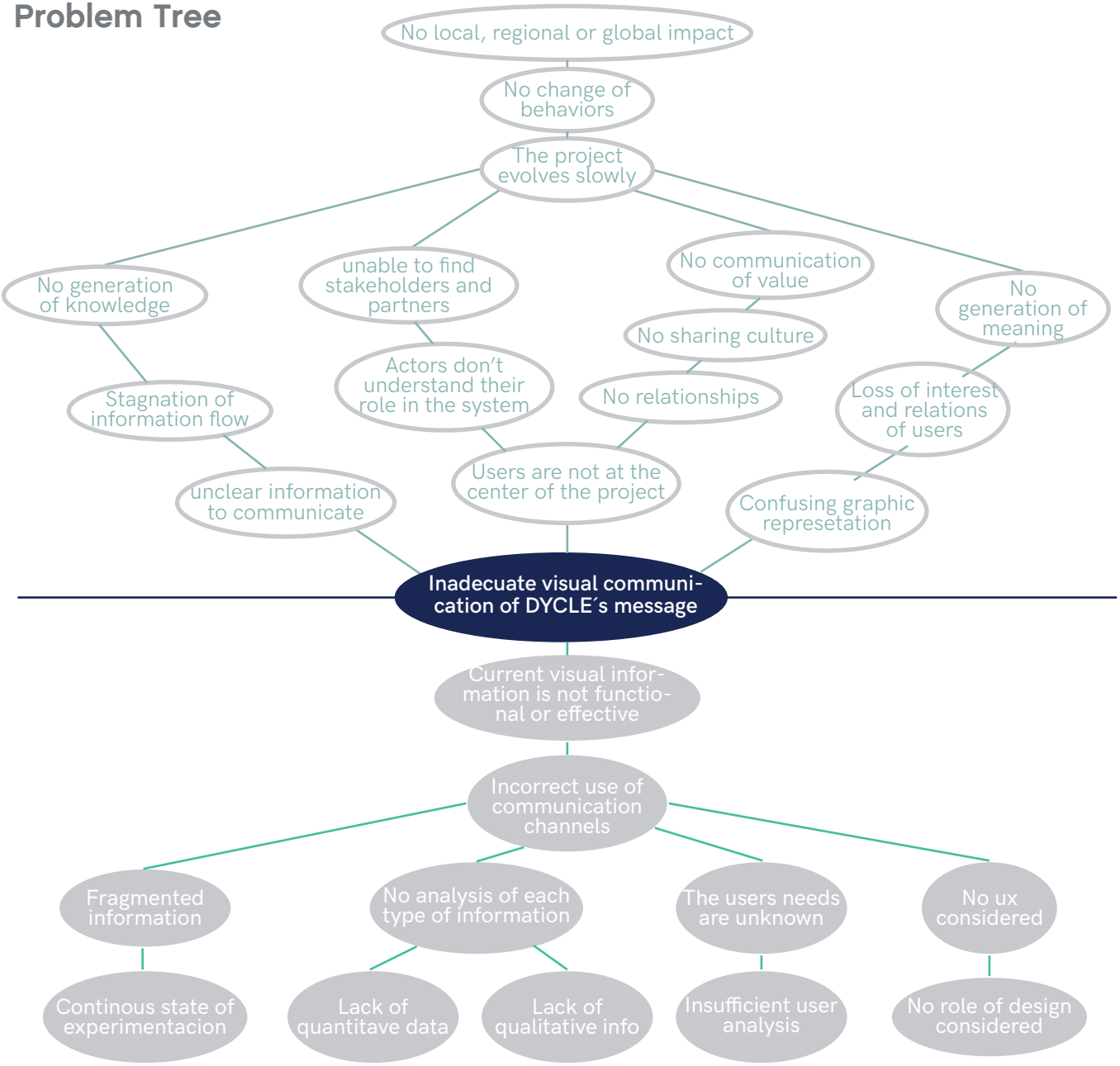


Diagram 3: Causes and effects of DYCLE´s communication problems

Project objectives

To define the project's objectives, it was used a methodological tool that helps determine the areas of intervention that the project proposes. The objective tree helps to translate the negative aspects found in the problem tree into positive statements. In this way, from bottom to top, the causes become means (how the objectives will be achieved) and the effects in ends. (Tingo, 2016)

General Objective

Develop a channel of visual communication that helps represent and transmit key information about DYCLE´s project; adapted to the specific users of the project and shaped by the main guidelines of systemic design and visual thinking.

Specific objectives

Make visual information functional and effective

- Make a proper analysis of the users and their needs, so that they are at the center of the project.
- Present useful information for each user in order to define their role in the system.
- Complete and connect the information and data in each phase by gathering and verified it.
- Intervention of design in the information visualization in order to consider the aesthetic aspects and the UX when presenting it.

Better understanding of the whole system

- Make a proper analysis of the users and their needs, so that they are at the center of the project.
- Present useful information for each user in order to define their role in the system.
- Improve communication and relationships between actors, by sharing and creating culture and thus, generating a continuous flow of information.
- Make comprehensible the systemic relations in the project in order to generate meaning and knowledge.
- Give great importance to the communication of values of the project triggering a change of mindset and behavior, in that way, the number of participants and stakeholders will increase and make a local, reginal and global impact.
- Intervention of design in the information visualization in order to consider the aesthetic aspects and the UX when presenting it.

4. Tingo, J. (2019, January 31). Proyecto educativo tingo. Retrieved from https://proyectoeducativotingo.wordpress.com/2016/05/19/arbol-de-objetivos/

Objective Tree

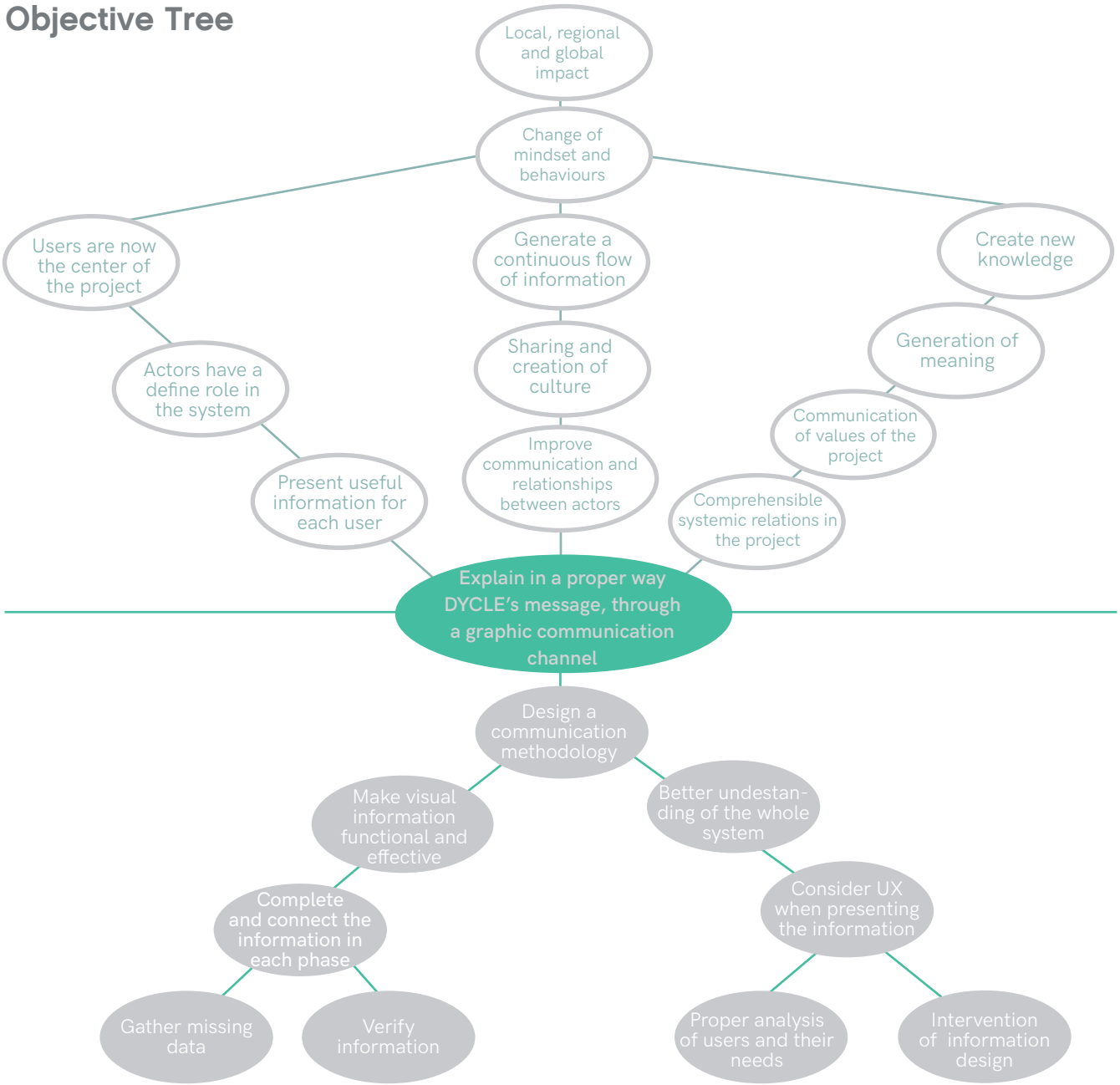


Diagram 4: Objectives of the project

Relation between problems and objectives

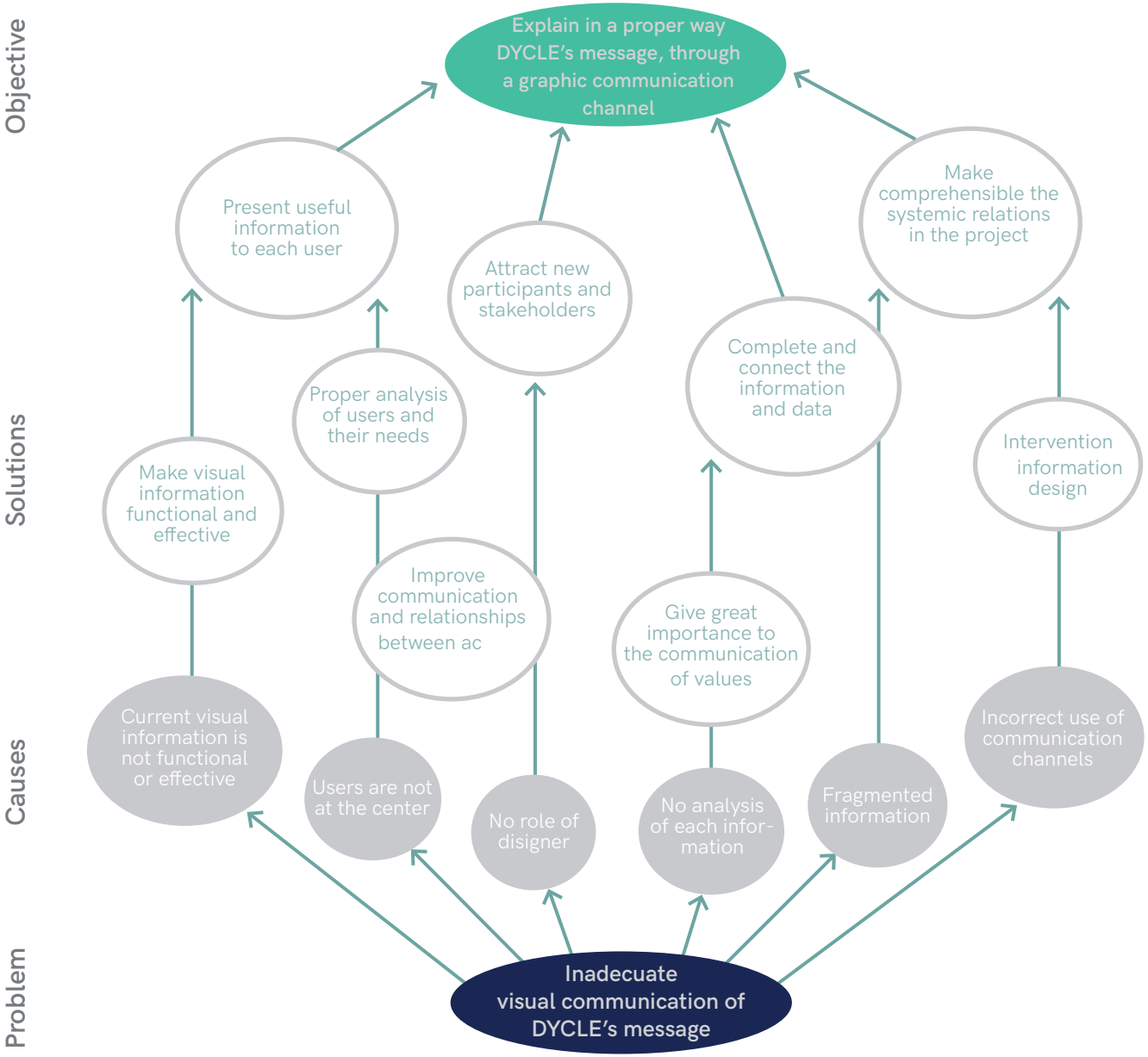


Diagram 5: Project's problems, and solutions.

Project proposal

Improve the current form of visual communication of DYCLE's message by making use of the graphic representations that will be responsible for transmitting, in a proper way, the different types of information to the respective identified users (suppliers, community, soil producer and consumers).

The graphic representation may vary between diagrams, schemes, infographics and illustrations relative to the intention of the message, which can be data, processes, relationships, connections, and values of the project; being the latter of great importance in order to generate meanings and knowledge in each of the users, thus attracting more participants to achieve an impact at local, regional and global level.

These graphic representations will be delivered to the recipients through a physical book which is currently being developed by DYCLE.

Project concept

“Shaping messages for change”

The concept of the project was created based on some of the most important values and concpets with which it was developed and inspired. Concepts such as *Design, Regeneration, Participation, Information, Values, Knowledge, Meanings, Relations, Impact, Behaviors, Culture, Community, Society, Sustainability and Systems* were considered for the representation.

With the sentence presented above, it was possible to sum up the relations between these concepts; each word of the sentence evoke some them.

SHAPING: refers to Design, Regeneration, Participation

MESSAGES: refers to Information, Values, Knowledge, Meanings, Relations

CHANGES: refers to Impact, Behaviors, Culture, Community, Society, Sustainability, Systems

Project justification

In order to have a project with reliable bases and solid background, it was carried out a first phase consisting of desk research where it was seen the theories and concepts of systems and communication, including an analysis on visual communication, with diverse cases studies from different authors and fields. In addition, to a second phase of field research in DYCLE's organization that allowed a first approach to understanding the project.

All above, gave place to a design process where it was first delimited the problems found, the identification of the users, establishing the general and specific objectives, making way to the project proposal for the development of a channel of visual communication that helps represent and transmit key information about DYCLE´s project.

In first place, after doing the field research and analyzing the current situation of the organization located in Berlin, and based on the information found in the thesis of Signori regarding systemic communication and Visual thinking by Dave gray, it highlighted the importance of the channel in the process of communication, thus, the need to improve the current channel of communication in DYCLE, specifically for a visual representation of information, values, patterns, connections and relationships because it has the advantage of increasing the interest in the message up to 89%, facilitating the ability to analyze and retain the information. In addition to being considered a universal language, it can be understood by a lot of people.

It was clear after this research and the analysis done in the case studies, that the development of a visual channel is the most suitable option to fully communicate and develop the project because:

1. It makes understandable the systemic relations in the system to people from different background.

2. It's possible to communicate the data, processes, relationships, connections, and values of the project.

3. Is possible to transmit, in a proper way, the different types of information to the respective identified users.

4. it facilitates the spread of information, thus, attracting more participants to achieve an impact around the world.

5. It gives the opportunity to communicate the project values and knowledge in a clearer way.

Limits of the project

- **The format required by DYCLE is an e-book, with the possibility of printing. That is why the proposal must be developed within the limits that the format implies.**

- **Due to the experimental state of the project, there is some information that is based on trials and that could be modified in the future steps of the project. In addition, there are some phases of the system that are not enough documented or developed.**

- **The graphic style of the book has not been defined, so the proposal might not be the final design that is going to be published in the book.**

- **For the final development of the project, it should be considered a multidisciplinary work with graphic designers and illustrators.**

- **The project was based on DYCLE´s case of study, but it aim to be an example for other systemic projects.**

Design Process

Visual thinking

Classification through "Visual Thinking" methodology

As mentioned before, visual thinking is a methodology proposed by Dave Gray that seeks to organize and convey complex and confusing content. The methodology consists of the classification of information in a matrix with 6 possibilities based on two variables: the type of information, and the intention with which it wants to reach the receiver of the message.

During the methodology, the matrix was adapted to the order of the phases of the system. Within these phases, it was included the previously made classification of the quetsions that each user asked in each phase. This classification was possible by knowing the needs of the users.

After applying the methodology to the project information, it was possible to classify the information, thus finding patterns and predominance in some types of information and the purpose they had. In this way, some guidelines were recognized to **prioritize** information in the design development.

Phase 1: Inlays making

Type of information	Ways to visualiza ideas	Intention or purpose
o Step by step: - "How to make an inlay"	Time - Flow - Sequence	Pactical
o Values: - Health for the baby - Natural, Biodegradable materials - Non chemical products - Job opportunities - Reinforcement of culture and community - Local resources	Relationships	Emotional
o About materials: - Quantities - "Where do they come from"	Relationships	Pactical Emotional Logical
o Comparison of impact	Difference / contrast	Pactical
o About stakeholders needed in such project o System relationships	Relationships	Pactical Logical

Phase 2: #1 - Distribution of kit

Type of information	Ways to visualiza ideas	Intention or purpose
o About the Kit: - "How can I get my Kit" - "Where do I pick it up" - "What should I bring" - "How much does it cost" - "Which elements does the Kit have "	Relationships Time - Sequence Comparison with normal diaper	Pactical
o About materials of the Kit: - "Where do they come from" o Non chemical products	Relationships	Pactical
o Values: - Textile diaper advisor - Networking - Events - Support between community - Reinforcement of culture and community - Benefits for the baby and family - Local resources	Relationships	Emotional

Phase 2: #2 - Use of inlay / Collection in bucket

Type of information	Ways to visualiza ideas	Intention or purpose
o Step by step: - How to put the inlay in the outer pants; Use of diaper; How to collect them properly in the bucket - "How often should I change the inlay"	Time - Flow - Sequence	Pactical

○ Values: - Health for the baby (No infection, allergies or irritation)	Relationships	♡ Emotional

Phase 2: #3 - Collection in barrel

Type of information	Ways to visualiza ideas	Intention or purpose
○ Step by step: - "After how many days should the bucket be taken to the community center, then put into the barrel"	Time - Flow - Sequence	Pactical
○ "What happens after I take the bucket to DYCLE" ○ Which are the outputs	Relationships	Pactical Emotional

Phase 3: Terra Preta company

Type of information	Ways to visualiza ideas	Intention or purpose
○ Step by step: - "What elements are added" ○ About the process	Time - Flow - Sequence	Pactical
○ About materials: - "Where do the resources come from" - Structure and chemicals properties	Relationships	Pactical Logical
○ What is Terra Preta exactly ○ Benefits of Terra Preta to soil and plants ○ Difference with compost ○ Cost of Terra Preta	Difference / contrast	Emotional Logical

o Values: - No waste - Capacity to retain water - Understand the value of soil - Rediscovery of an ancient and good traditional practice - Introduction to a good practice in the agricultural sector	Relationships	Emotional Logical

Phase 4: Use of Terra Preta

Type of information	Ways to visualiza ideas	Intention or purpose
o After the Terra Preta is done it can be used by: - Different options o System relationships	Flow - Sequence Relationships	Pactical Emotional
o Background of industrial farming system: - Fertilizers / Intensive agricultu-re / Deforestation / Loss of nu-trients / Degradation of soil	Difference / contrast	Emotional Logical
o Values: - Why is the topsoil important? - Benefits and nutrients of Terra Preta used for purposes of community - Less risk for farmers due to the quality of soil - Support from the community to the farmers - Recovery of good topsoil generates variety of production	Relationships	Emotional Logical

- Outputs are now rew materials for the region - Capital stays in the region - New business model - Collaboration between local companies increase the local economy - Direct connection between producers and consumers - Healthy products - Health improvement - New markets - Job opportunities - Stimulate entrepreneurship - Awareness of the value of soil and local resources	Relationships Difference / contrast	Emotional Logical

After the classification of each information needed in every phase, there were identified three types that will be later organized for the visual representation. Among them, there were some more predominant than others:

- The practical information includes the representations of the sequences or flows (step by step) in a process; it shows how an activity is carried out, the quantities of materials, its costs, and characteristics. In this way allowing to understand what to do and how is it done.

- The emotional information, being more predominant, focuses mainly on the values of each phase. These values are the result of the relationships that occur in the process. Its purpose in showing the positive aspects is to involve people and show the opportunities and benefits that it could generate.

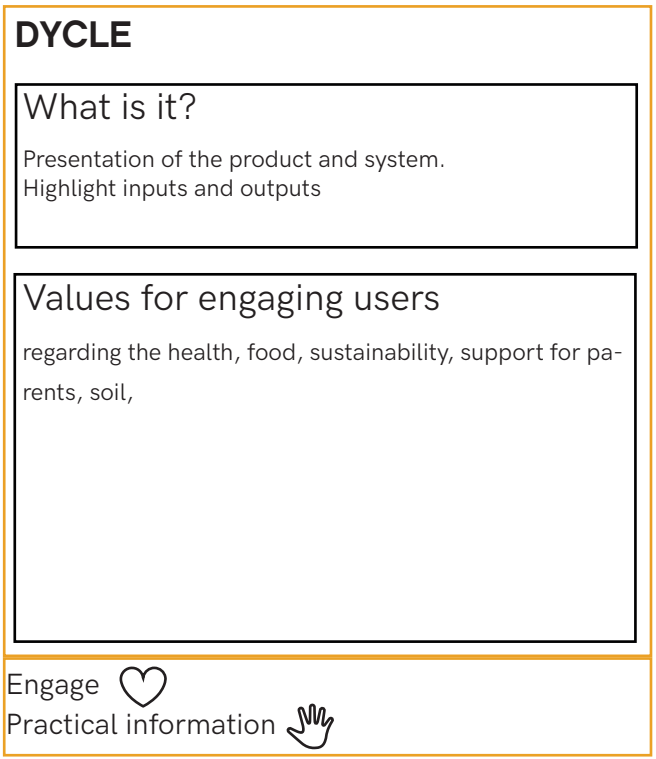
- The logical information shows the relationships and connections between the actors in the system; where the components in the process come from and the different actors that participate. it also shows the comparison between two pieces of information, this allows the readers to have their own thoughts and conclusions.

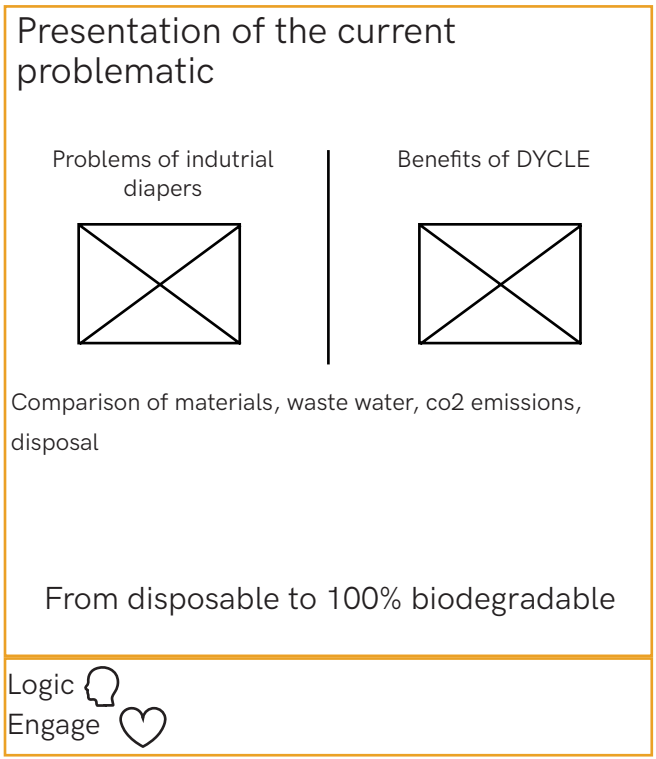
Architecture of the information

In order to present the graphic content, the most convenient way of conveying it, is through a brochure that considers the users and the kind of information classified through the matrix.

The first approach to the brochure was defining the structure or skeleton it will have. This, by taking into account the requirements and the guidelines of the information.

The following sketches show the totality of the information desired and requested by the users, the way they should be separated following the order of stages of the system and a hierarchization of the information.

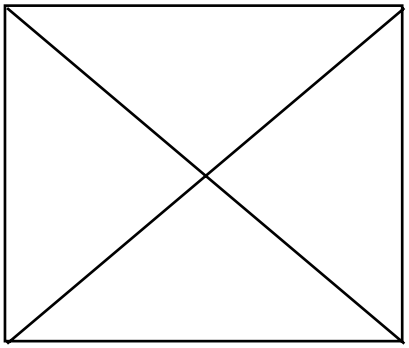




But, how does it work?

Systemic scheme

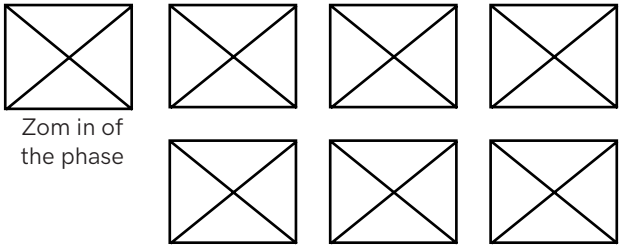
Further explaination of the system. Introduction to the 4 phases.



Want to know how?

Logical
Engage

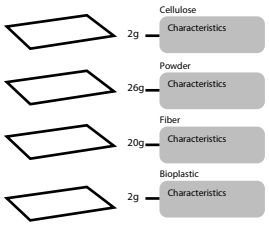
Production of inlays



Zom in of the phase

Steps of the production of one inlay

Materials

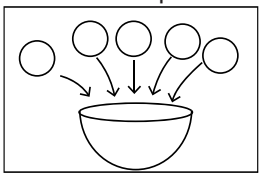


Values of the phase

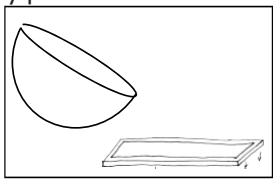
regarding materials, job opportunities, local resources, benefits fot the family, support between community

Logical
Practical information
Engage

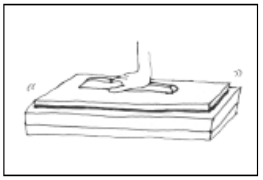
Zoom in of steps for the inlay production



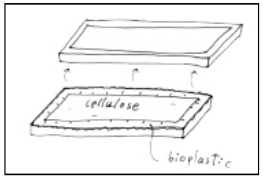
1. mixing materials



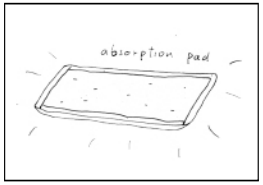
2. pour into mold



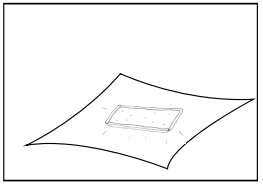
3. Compressing



4. Heat sealing



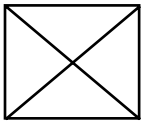
5. sterilizing



6.Inlay delivery

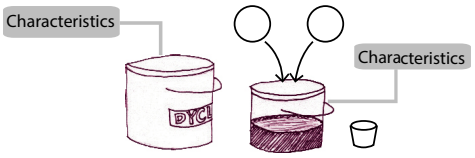
Images 1: Taken from Ayumi Matsuzaka

Distribution of the kit



Zom in of systemic scheme

Materials



Where does it come from?
How much does it cost? what does it include?

where?

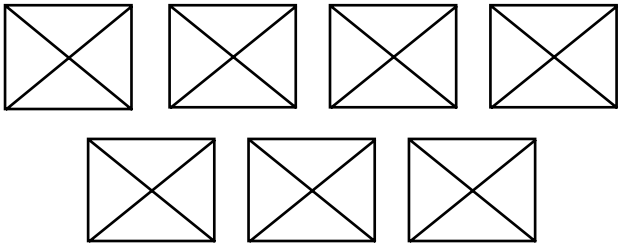
Events
Markets
Networking
Advisory

Values

Support between community, exchange of toys and clothes, textile advisor, baby training

Engage
Practical information

Use of inlays and fermentation

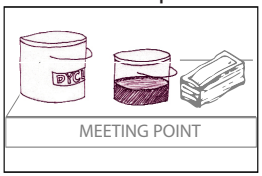


What is happening in the bucket and barrel?

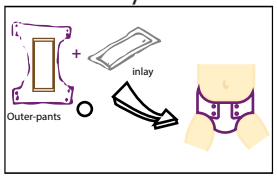
Values and benefits the project users are taking part of

Engage
Practical information

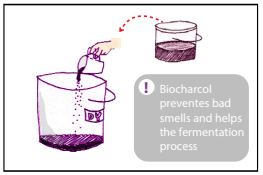
Zoom in of steps for the use of the inlays



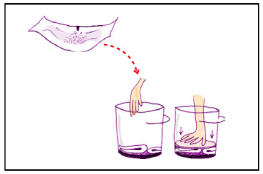
1. Collection

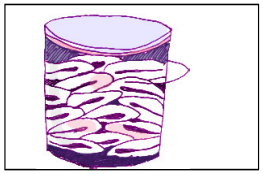


2. Use of inlay

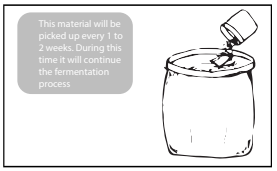


3. Collection in bucket

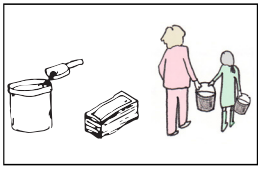




5. Full the bucket



6. Disposal

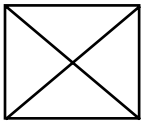


7. Replenishment

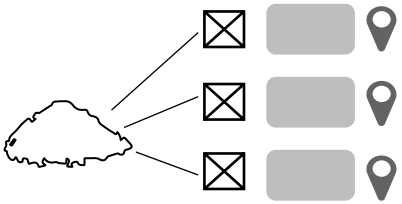
Images 2: Taken from Ayumi Matsuzaka

Production of terra preta

Materials



Zom in of systemic scheme



what is it?

Ancient traditional practice

Differences with compost

Compost

Characteristics

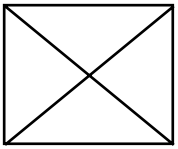
Terra preta

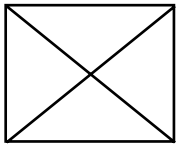
Characteristics

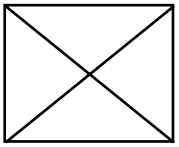
Logical

Practical information

Engage







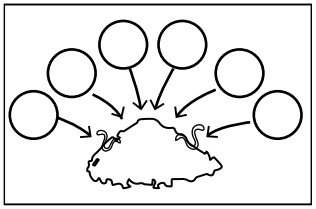
Values

Retain water, no fertilizers, no waste, price

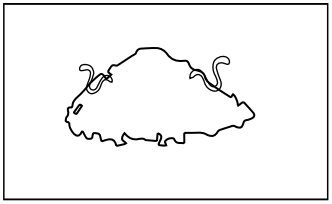
Engage

Practical information

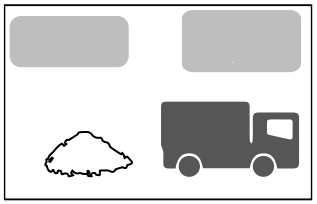
Zoom in of steps for the use of the inlays



1. Treatment

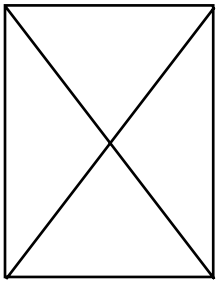


2. Terra preta making

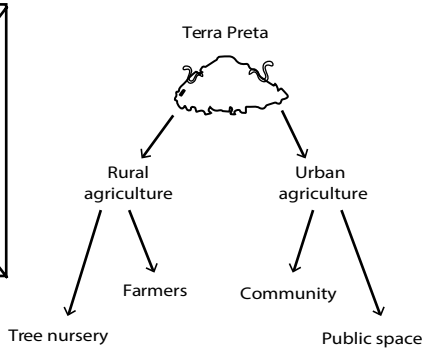


1. Distribution to consumers

Use of terra preta



Zom in of systemic scheme



Values

Healthy food
Resorces for the system flow
no waste
just resources

Logical
Practical information
Engage

But why is this important?

Values

Need of helathy food
Get nutrients back
Advantages of local production
Community
Regenerate soil
Ideal nutrient
Fertility
Flow
Local resources
Health
Relations
participation
Sustainability

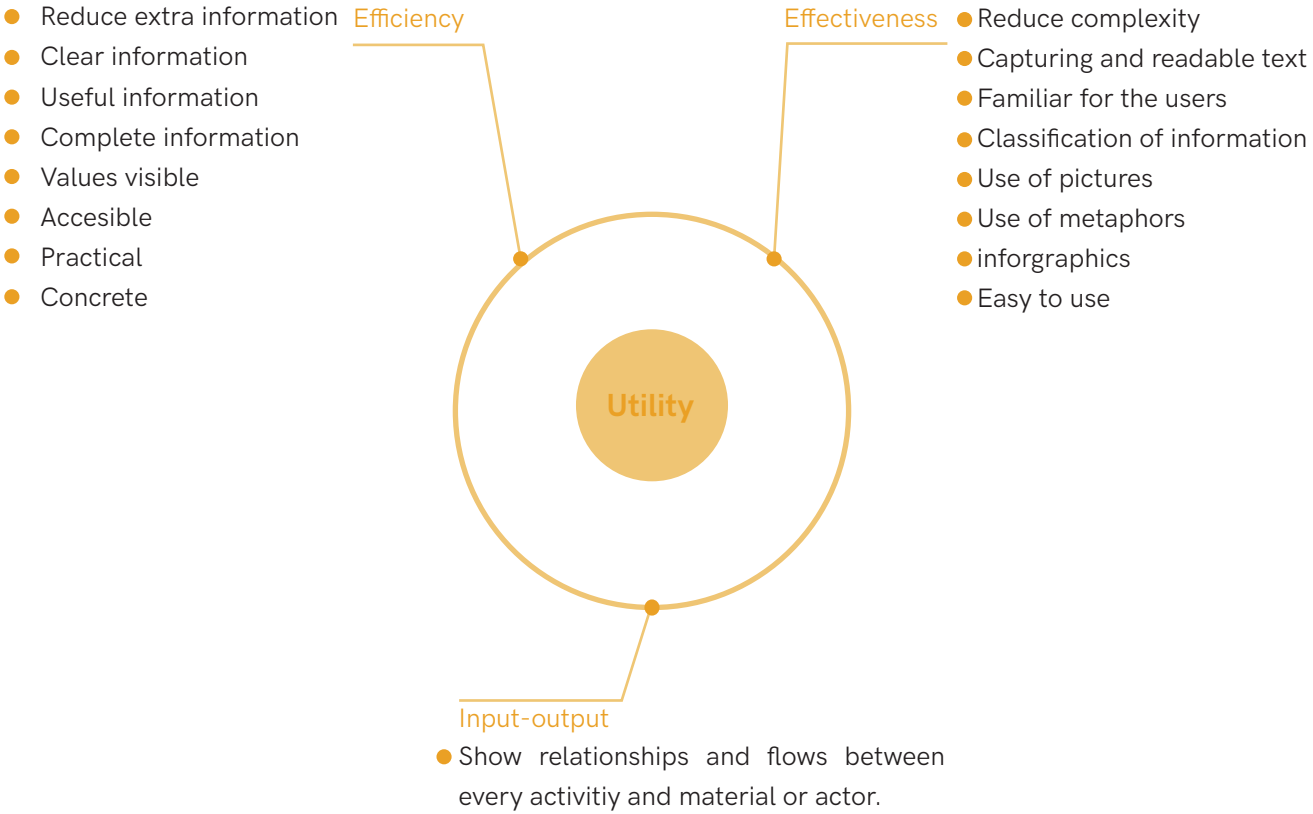
Engage

Requirements

Information visualization design requirements

Utility, soundness and attractiveness were three main requirements once stated by the Roman architect Vitruvius in 25 b.c. Based on these, Andrew Vande Moere and Helen Purchase developed a research paper where the triad is related to the design process of information visualization.

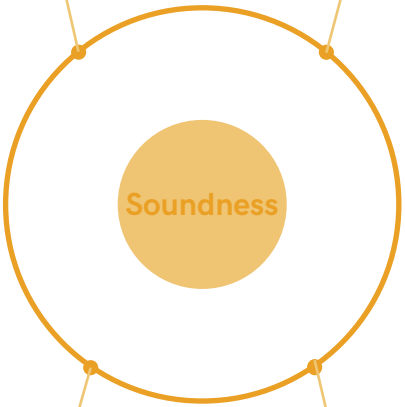
As mentioned in Chapter two, every developer should balance these three requirements in order to achieve a succesfull design of information visualization. Then, based on each of these these requirements, the determinants were stablished. These were merged with the requirements for a successful systemic communication



- Consider the perception of the users
- Make use of visual hierarchy in terms of color, typography, contrast, alignment, repetition, Rhythm, size, white space.
- Reach Unity

- Considering the four types of users (Suppliers, community, soil producer and consumers) it should be sober but friendly.

- Consideration of UX for creating a user friendly design where the user satisfaction is important to achieve. This by taking into account their needs and forms of interpretation



Versatility

- Fit for different users, each of them can decide which information have
- Understood by several contexts
- Helpful for several contexts

Mecanism

- Presented as part of an e-book developed by the organization with the possibility of printing
- Brochure

Autopoiesis

- Creation of meanings, thoughts and ideas that regenerate the system

Relationships

- Enrich the system with relationships between people, products and resources

Visual language requirements

In order to achieve the appropriate representation of the system, first, the requirements were established; then, the different types of information were set. Finally, a first approach to the structure of the brochure, where the graphic elements are going to be presented, was made.

This gave way to define the visual requirements for the development of the brochure. For this to happen, the website "Material Design" was considered for creating a "visual language that synthesizes the classic principles of good design"[1].

Based on this, the key guideline is creating a theme for the product, in this case, the graphics in the brochure. The theme refers to the customization in order to achieve a better reflection of the project.

For implementing the theme, there must be considered four principles: color, typography, shape, icons.

Color

The principles of color are:
- Color indicates relations between elements, hierarchy and show levels.
-Text and elements of the graphics should be legible and contrast in all backgrounds.
-Reinforce the expression and attractiveness.

A **primary and a secondary color** were chosen for the brochure, looking for a suitable representation of the project concept, based on the perception and meaning of each one. Dark and light variants of each color can be applied to the design.

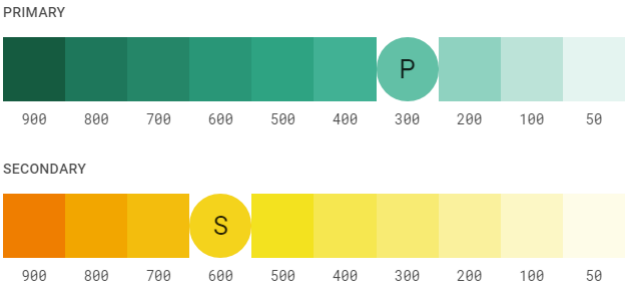


Image 3: Primary and secondary colors. Taken from: https://material.io/design/color/the-color-system.html#

The firts primary color is named "ocean green". It Is a shade of green-cyan, its color code is #57b99d and represents an open communication, clear thinking and thoughtfulness. The secondary color is "urobilin". It is a shade of yellow, its color code is #e1b204 and represents warmth, positivity, "increased mental activity, helps activate the memory, encourage communication, enhance vision and build confidence".[2] All these are principles that evidence the concept of the project.

1. Material foundation. (2019, february 7). Material foundation. Retrieved from https://material.io/design/introduction/#
2. Bourn, J. (2019, february 7). Bourn creative. Retrieved from https://www.bourncreative.com/meaning-of-the-color-yellow/

Ocean green
#57b99d

Urobilin
#e1b204

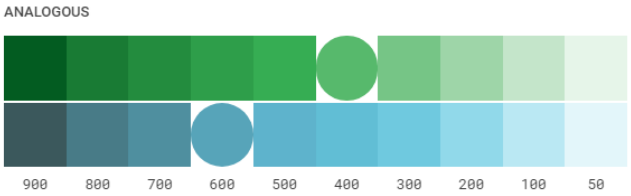


Image 5: Analogus colors of "ocean green". Taken from: https://material.io/design/color/the-color-system.html#

Based on the primary color "ocean green" other two **analogous colors** were elected to conform the palette of colors that will be used. In this case, just the blue gradient was elected.

Yankees blue
#172138

Queen blue
#418391

In addition to all these possible combinations of colors for the design, the category "On" colors must be established. This category refers to the colors of the elements such as text or icons that appear on top of surfaces and that must assure legibility. The default colors for this category are white, black and gray.

White
#FFFFFF

Black
#000000

Granite gray
#62655c

Besides these default colors, the primary and secondary colors can be used with its variants, depending on the backgrounds.

Sometime there are categories outside of the main color theme. **Additional colors for data visualization** can be used and they are still part of the color palette.

#f1890a Energy section

#61c3d7 Water section

Typography

Typography help to make clear and efficient the content of the message. Choosing the scale will lead to make further decisions like font style and details that captures the attention of the reader.

Scale Category	Typeface	Font	Size	Case	Letter spacing
H1	Roboto	Light	96	Sentence	-1.5
H2	Roboto	Light	60	Sentence	-0.5
H3	Roboto	Regular	48	Sentence	0
H4	Roboto	Regular	34	Sentence	0.25
H5	Roboto	Regular	24	Sentence	0
H6	Roboto	Medium	20	Sentence	0.15
Subtitle 1	Roboto	Regular	16	Sentence	0.15
Subtitle 2	Roboto	Medium	14	Sentence	0.1
Body 1	Roboto	Regular	16	Sentence	0.5
Body 2	Roboto	Regular	14	Sentence	0.25
BUTTON	Roboto	Medium	14	All caps	1.25
Caption	Roboto	Regular	12	Sentence	0.4
OVERLINE	Roboto	Regular	10	All caps	1.5

Image 6: The Material Design type scale. Taken from: https://material.io/design/typography/the-type-system.html#type-scale

Among these 13 categories of the type scale presented by "Material Design", the scales most suitable for our purposes were selected. Likewise, the fonts were chosen based on the neutrality of the different users and the requirements of the project requested. That is why both of them have a mechanica and rigid structure but at the same time, count with friendly characteristics and open curves letting have a more natural reading rhythm.

Two different Google fonts were selected. The first one was **Cabin Condensed** , a condensed san serif with a touch of modernism. "Modern proportions, optical adjustments, and some elements of the geometric sans. The weight distribution is almost monotone, although top and bottom curves are slightly thin."[3] The second one was Raleway, an elegant sans-serif typeface family that permits an adequate reading with open curves that gives it a friendly and involving air.

The type scales with the fonts elected were:

H3
H4

Cabin condensed

Subtitle 1
Body 1
Caption

Raleway

3. Google . (2019, february 9). Google fonts. Retrieved from https://fonts.google.com/specimen/Cabin+Condensed?selection.family=Cabin+Condensed

Shape

There were chosen two basic types: geometrical, and organic shapes, that based on the perception and meaning of each one will help add interest, invoke feelings or organize elements in the design.

Geometric Shapes

These are the simplest, most common shapes of all: squares, circles, and triangles and other derivatives like rectangles, ovals, and polygons. They are in general symmetrical and instantly recognizable for everyone.

Squares
are reliable, give stability and suggest order[4]

Circles
represent completion, wholeness and harmony[5]

Triangle
represnt direction and power[6]

Squares and rectangles give a sense of stability and assurance but also easily fall to the background outline. They can be applied in the design as good support for important elements, such as the texts or technical information. They are not meant to grab attention, but merely add an aesthetic to the design (Haider, 2019) [7].

Circles represent eternity and integration, providing a sense of community; it can also give the idea of constant movement, a cycle or continuing action[8]. They are very noticeable and are able to capture more the attention of the reader. This can be useful for presenting predominant information in the design, make comparison or show relations.

Solid

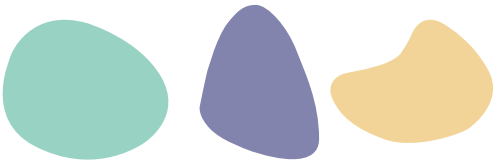
Round composition

Ring or band

Triangles have two meanings depending on the position. When pointing up they represent stability and power when pointing down they suggest instability[9] or something negative. In design they can as the same purpose of arrows and pointers to conveying a message of moving forward, show directions, give an order or show relationships.

Organic Shapes

Natural or organic shapes are those that represent things in nature or things around us. These kinds of shapes are mostly asymmetric, and their kinds of lines can vary.



4-7; 9. Velarde, O. (2019, february 8). The Meaning of Shapes and How to Use Them Creatively in Your Designs. Retrieved from Visme: https://visme.co/blog/geometric-meanings/
8. Haider, Q. (2018). Using shapes in Designing. Retrieved from Design Studio: https://blog.postermywall.com/design-studio/2017/7/using-shapes-in-designing

They can be used on their own as a single element or as part of a larger composition[10], to contain information or represent, in the case of the project, the sequences of each phase to show how is done. It works as a way to capture the attention of the reader, by highlights a specific piece of information in the design.

Icons

The icons will be used to represent components in the design, actions or activities. They are especially useful when creating graphics because they convey messages quickly, minimizing the use of text and are able to call attention to certain key messages[11]. It is necessary to set some principles to guarantee coherence across the brochure to maintain visual consistency.

Icon shapes

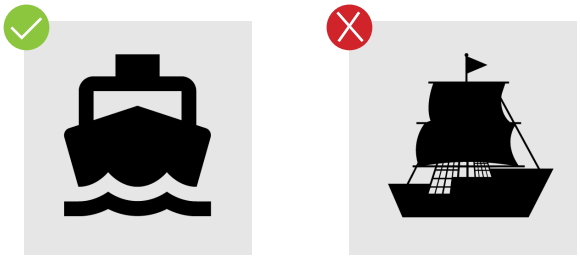


Image 7: Simplify icons for greater clarity and legibility; Taken from: https://material.io/design/iconography/system-icons.html#system-icon-metrics

Each icon will be reduced to its minimal form, using geometric and consistent shapes, and expressing the essential characteristics[12] of what is representing. This will give greater clarity and legibility to the reader.

Sharp and rounded icons

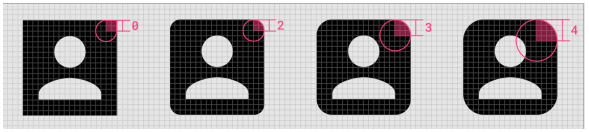


Image 8: Recommended corner radius values are between 0dp and 4dp; Taken from: https://material.io/design/iconography/system-icons.html#icon-themes

Sharp icons display corners with straight edges, that allows it to remain legible even at smaller scales. Instead, **rounded icons** use corner radius that pairs well when accompanied with heavier typography, or circular elements[13]. Taking this into consideration, since most icons are of a bigger scale is better to apply rounded icons to the design.

Outlined icons

Image 9: Unfilled icon; Taken from: https://material.io/design/iconography/system-icons.html#icon-themes

For the design, it will be applied an unfilled icon system, defined only by a consistent stroke. A thinner stroke implies lightness, which gives the icons a lighter style[14] and making it easier to harmonize with other information.

10-11. Velarde, O. (2019, february 8). The Meaning of Shapes and How to Use Them Creatively in Your Designs. Retrieved from Visme: https://visme.co/blog/geometric-meanings/
12-14. Material foundation. (2019, february 7). Material foundation. Retrieved from https://material.io/design/introduction/#

Two-tone icons

The use of two-tone icons can complement the unfilled icon system by adding dimension; the contrast between stroke and fill colors can improve the legibility without making it too heavy for the reader[15].

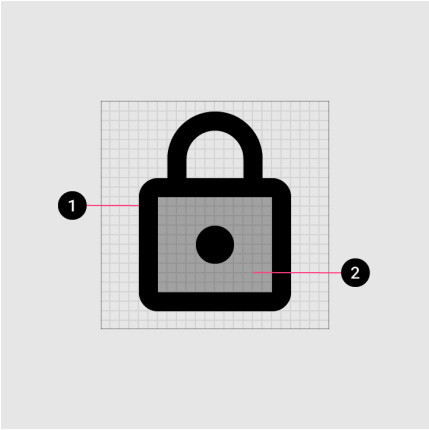


Image 10: Two-tone icons; Taken from: https://material.io/design/iconography/system-icons.html#icon-themes

1. Stroke
2. Transparent fill

"Icon strokes must be 87% on light backgrounds and 100% on dark backgrounds. Fill color can vary depending on the tone of the background" (Material Foundation, 2019)[16]

15-16. Material foundation. (2019, february 7). Material foundation. Retrieved from https://material.io/design/introduction/#

Sketches and first approaches to the prototype

Linear intepretation of the system

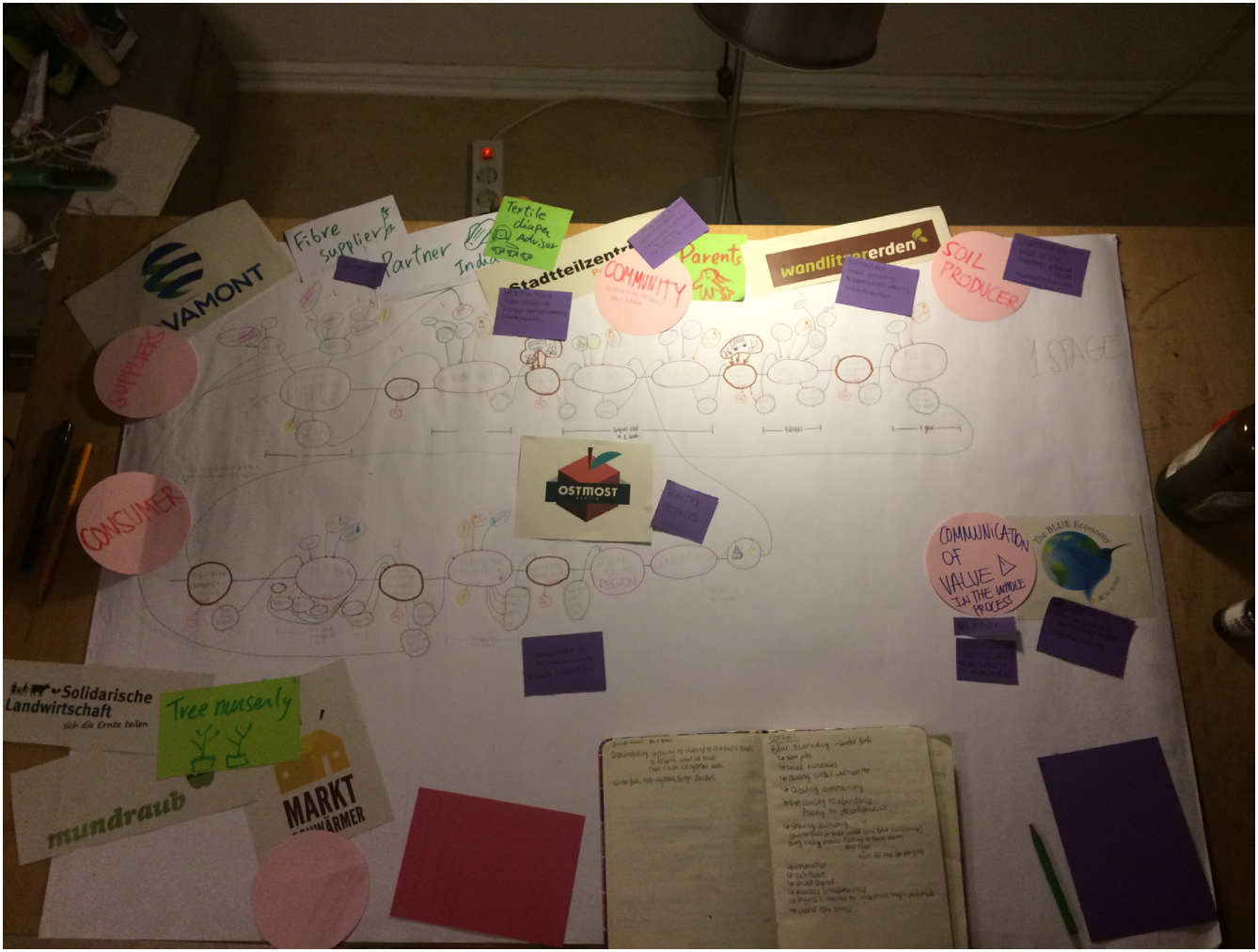


Image 11: First linear interpretation of the system. Taken by: Alejandra Cuervo

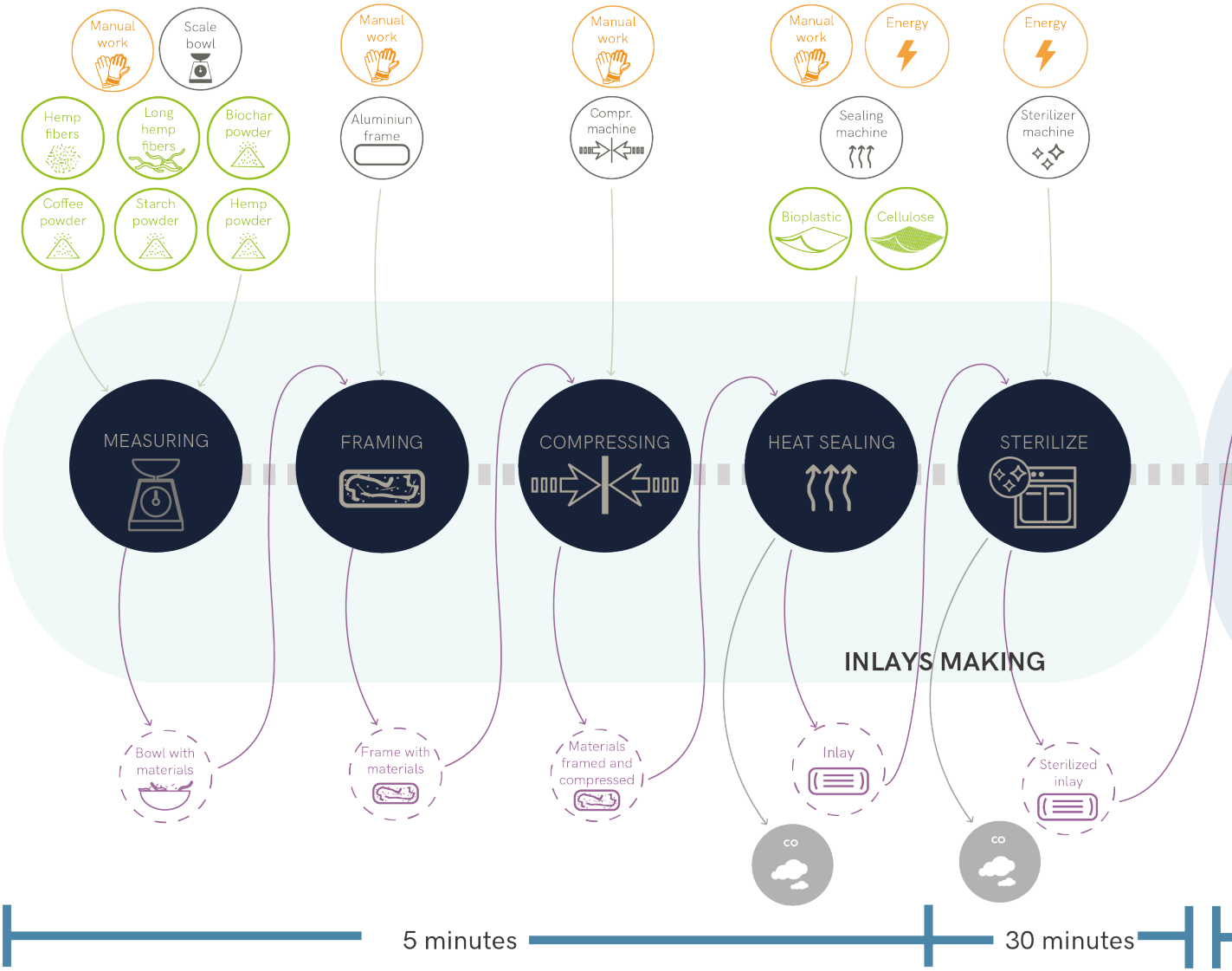
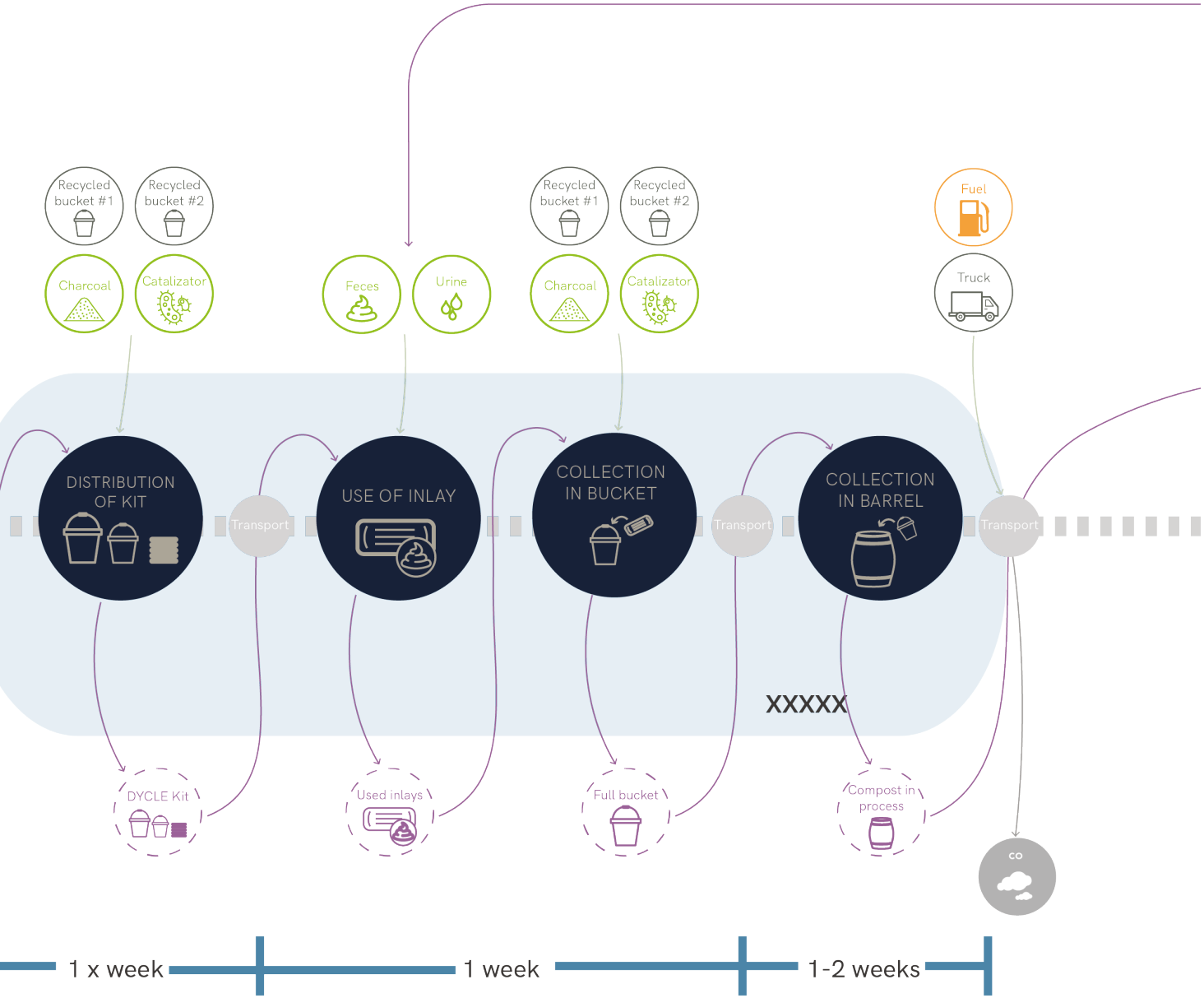
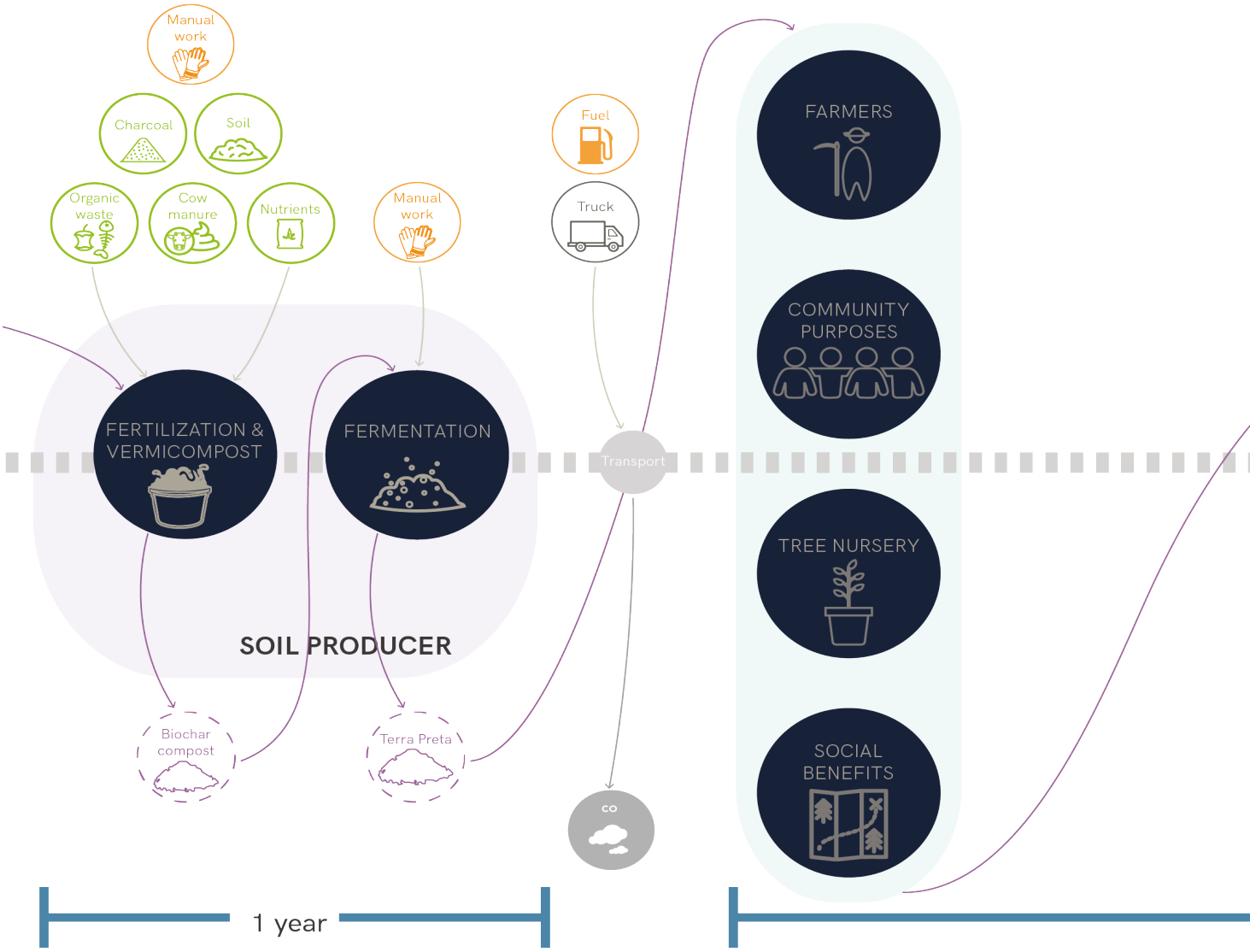
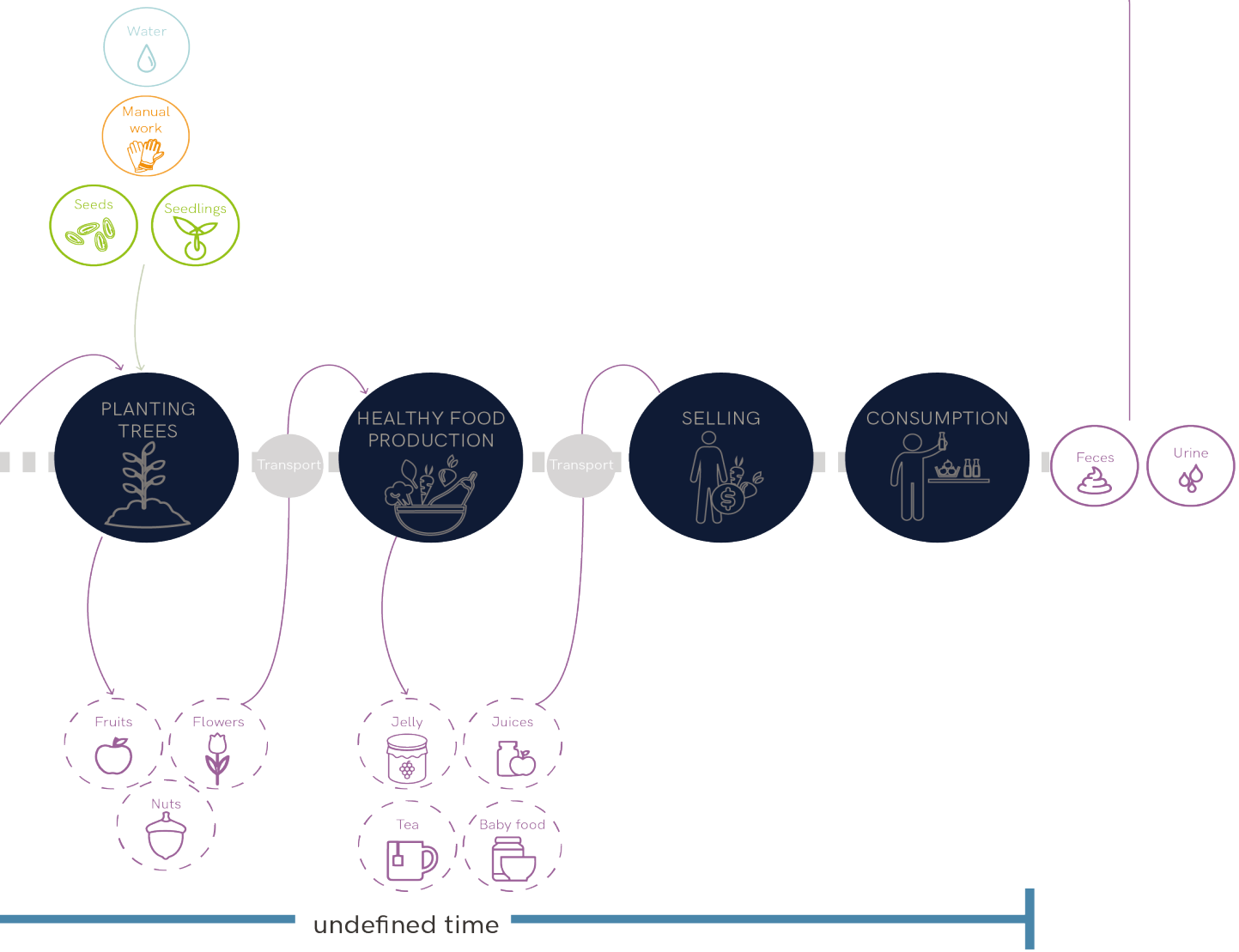


Image 12: First linear interpretation of the system in digital. Taken by: Alejandra Cuervo


Recycled bucket #1
Recycled bucket #2
Charcoal
Catalizator
Feces
Urine
Recycled bucket #1
Recycled bucket #2
Charcoal
Catalizator
Fuel
Truck
DISTRIBUTION OF KIT
Transport
USE OF INLAY
COLLECTION IN BUCKET
Transport
COLLECTION IN BARREL
Transport
XXXXX
DYCLE Kit
Used inlays
Full bucket
Compost in process
CO
1 x week
1 week
1-2 weeks


Manual work
Charcoal
Soil
Organic waste
Cow manure
Nutrients
Manual work
Fuel
Truck
FARMERS
COMMUNITY PURPOSES
TREE NURSERY
SOCIAL BENEFITS
FERTILIZATION & VERMICOMPOST
FERMENTATION
Transport
SOIL PRODUCER
Biochar compost
Terra Preta
CO
1 year


Water
Manual work
Seeds
Seedlings
PLANTING TREES
Transport
HEALTHY FOOD PRODUCTION
Transport
SELLING
CONSUMPTION
Feces
Urine
Fruits
Flowers
Nuts
Jelly
Juices
Tea
Baby food
undefined time

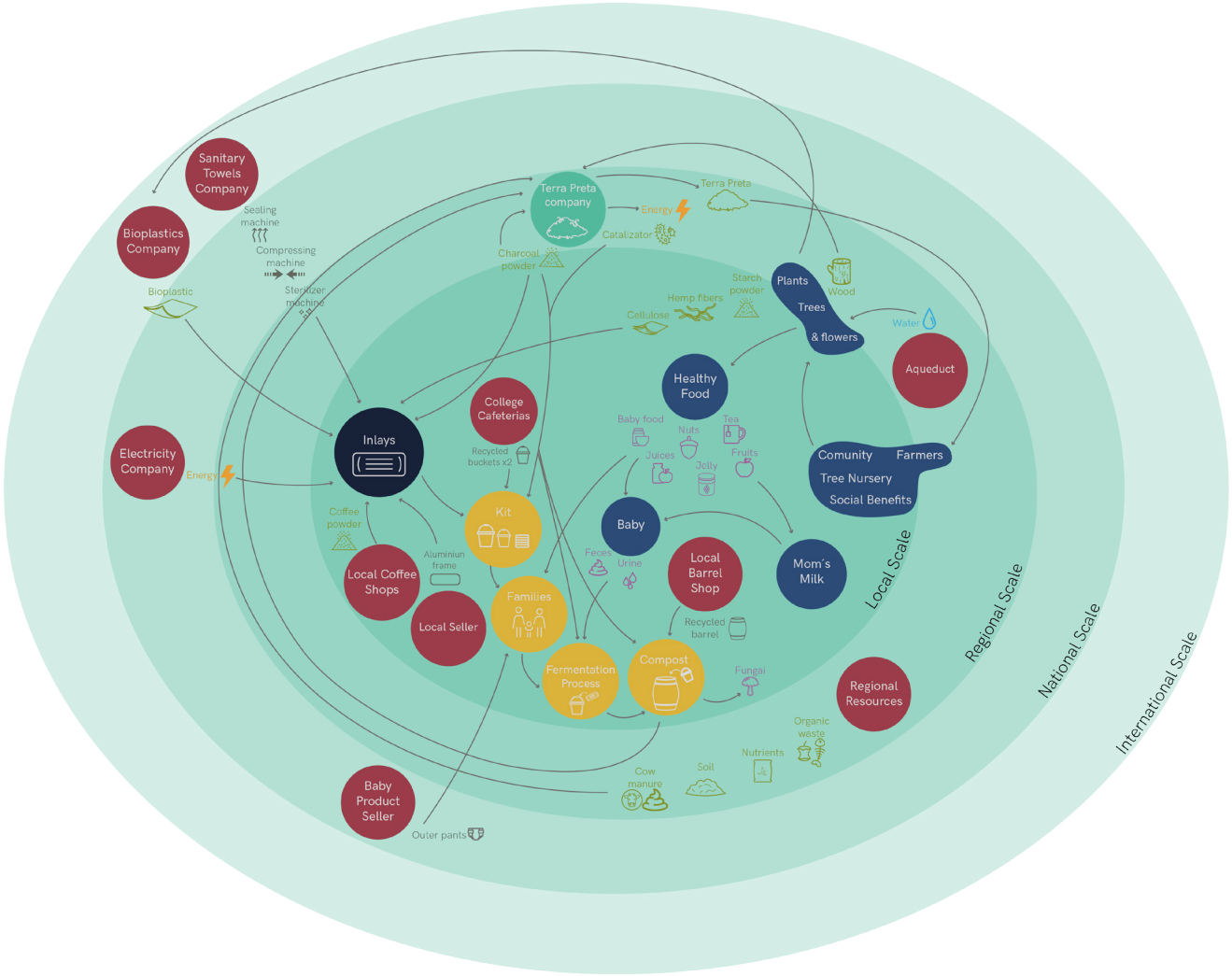


Image 13: Firts systemic interpretation of the system in digital. Taken by: Alejandra Cuervo

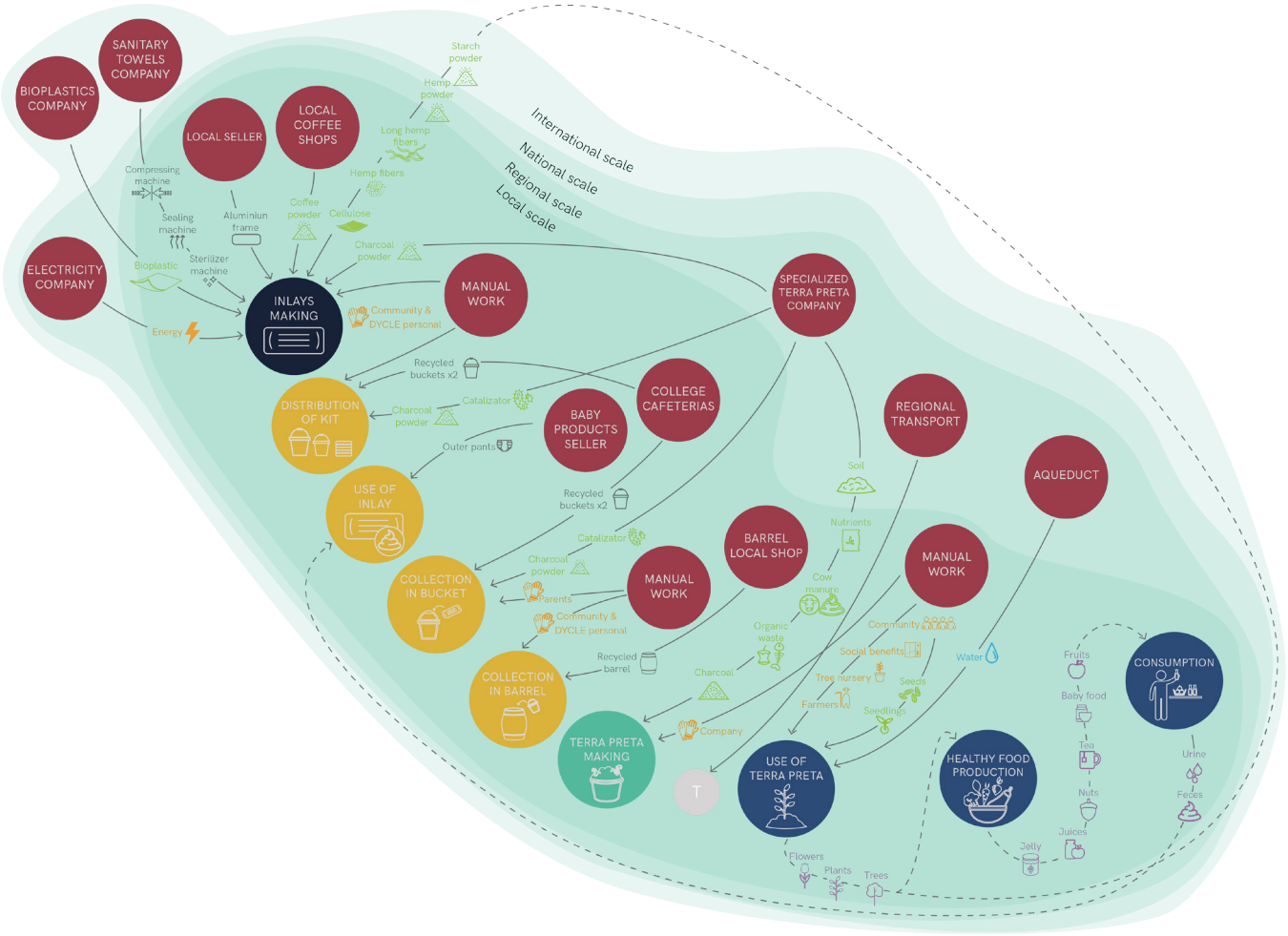


Image 14: Systemic interpretation of the system in digital. Taken by: Alejandra Cuervo

Prototype

The first approach to understanding the system was done manually during the field visit to DYCLE; in here it was identified the activities and the input and outputs materials, the users of each phase and the values that the process generates. Nonetheless in maintained a linear representation even after moving it to digital, the key elements of connections and relationships between the activities weren't evident even though it was already a systemic project.

From then on, several tests were done in order to lose the linearity in the representation, in some of them the connections started to become more clear, but it wasn't until the requirements were applied based on the systemic guidelines and the research on visual communication that a proper diagram was achieved. this was able to present to the users, the connections between activities and the transition of the materials from one another and how their role in the project.

After making the systemic scheme, classifying the type of information needed by users and defining the visual language requirements, it was possible to start the prototype of the information in each phase which will be presented and explained a continuation. It's important to mention that even though this prototype will be presented in physical form according to DYCLE's request, this is not the only way in which this information can be shown to the users, there can be a more dynamic and flexible way to present it to them.

Current introduction to the project

This was the first page of a type of visual communication, in this case, a brochure DYCLE made in order to explain one of the phases of the system. This is the way how DYCLE presented itself to its users in Berlin.

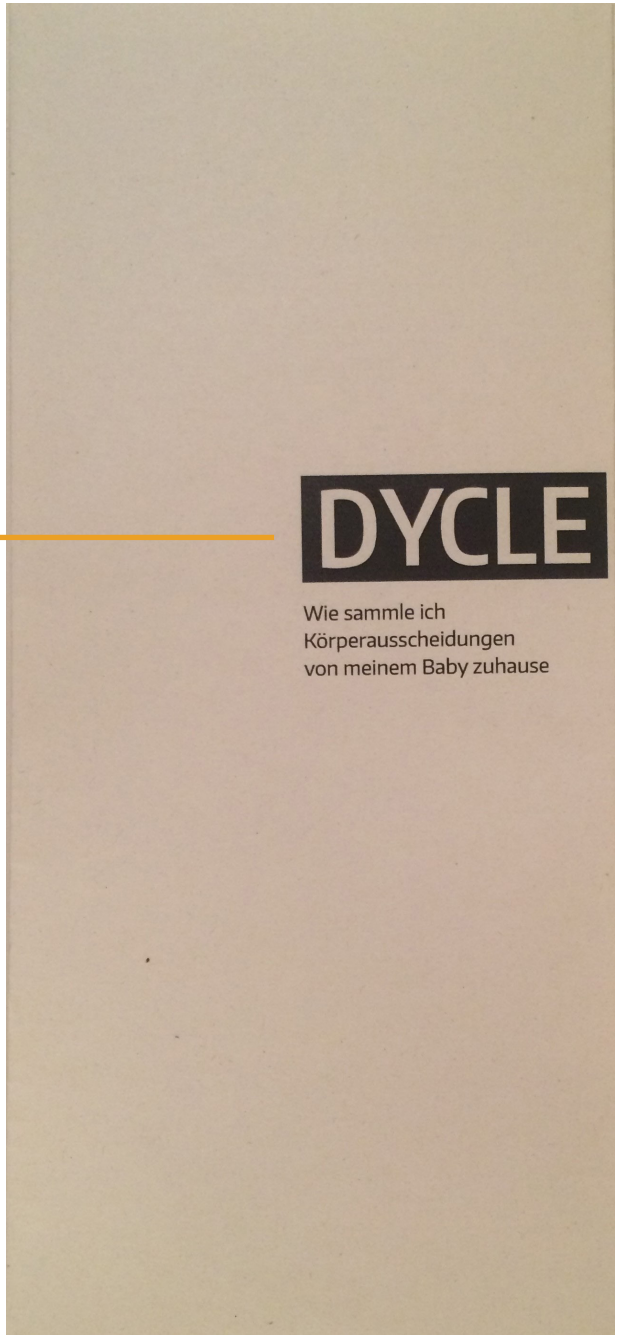


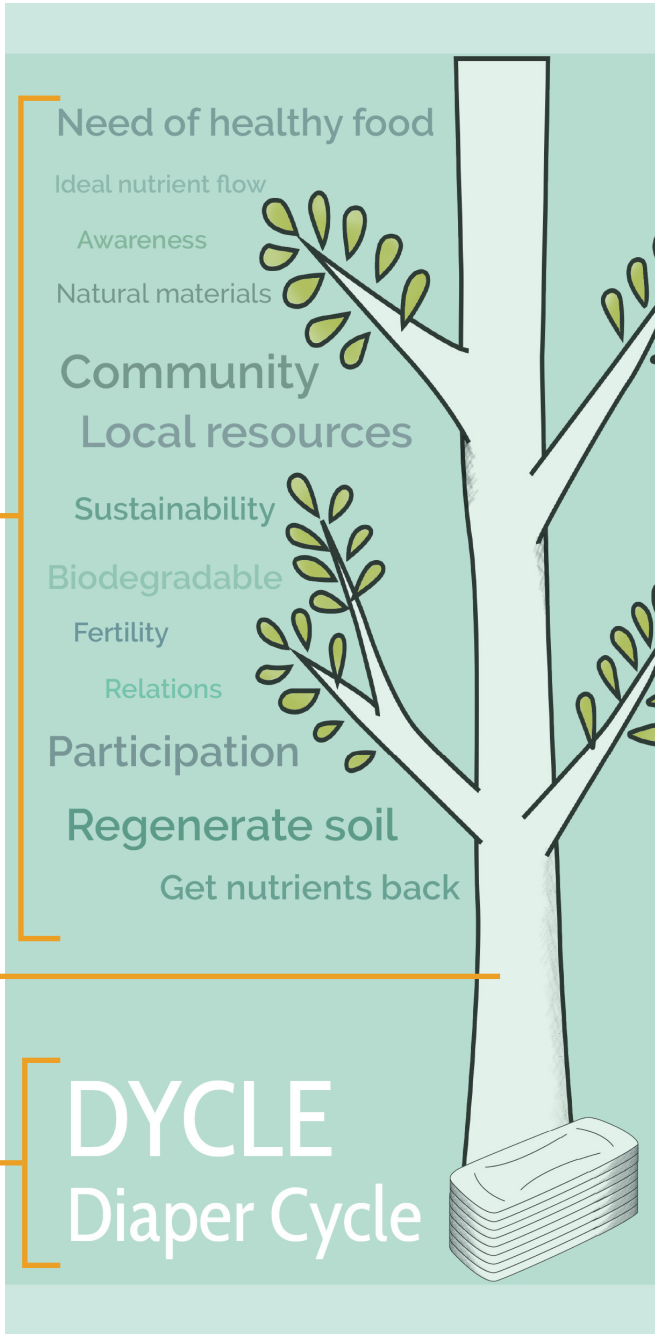
Image 15: Brochure made for the explaining the dynamic in phase 2, where families are involved; Taken from: DYCLE

Proposal for the introduction to the project

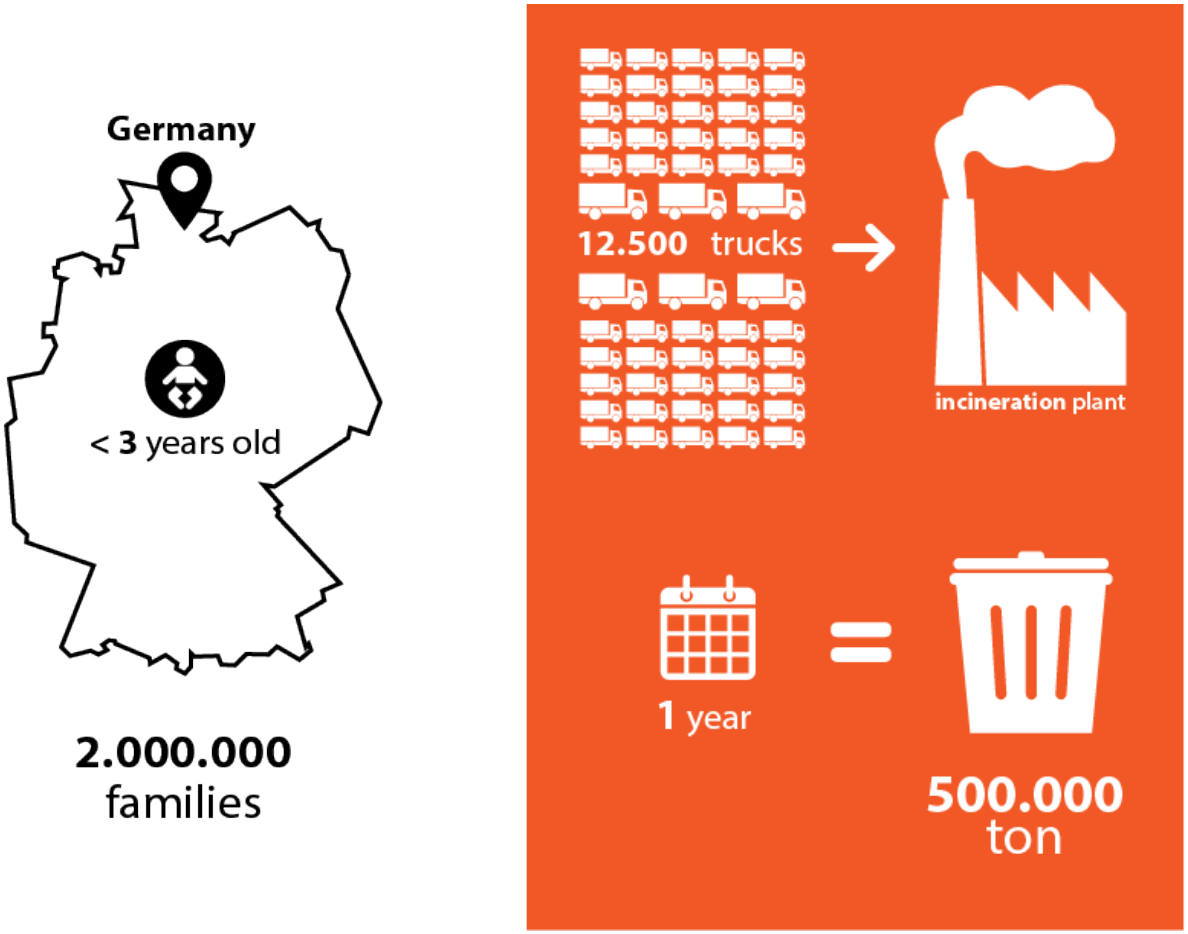
Communication of important concepts on which the systemic project is based, in order to enhance the values and capture the attention and consciousness of the readers. For making a subtle intervention, the colors chosen were a gradient of the primary color "Ocean green".

Handmade illustrations in order to give the visual communication a friendly style. Also, the amount of color in the illustrations is minimal, so that it does not take away the role of other elements.

The same type of font to avoid making an abrupt change of the style. The background color contrast with the typography, capturing the readers while representing open communication and clear thinking.



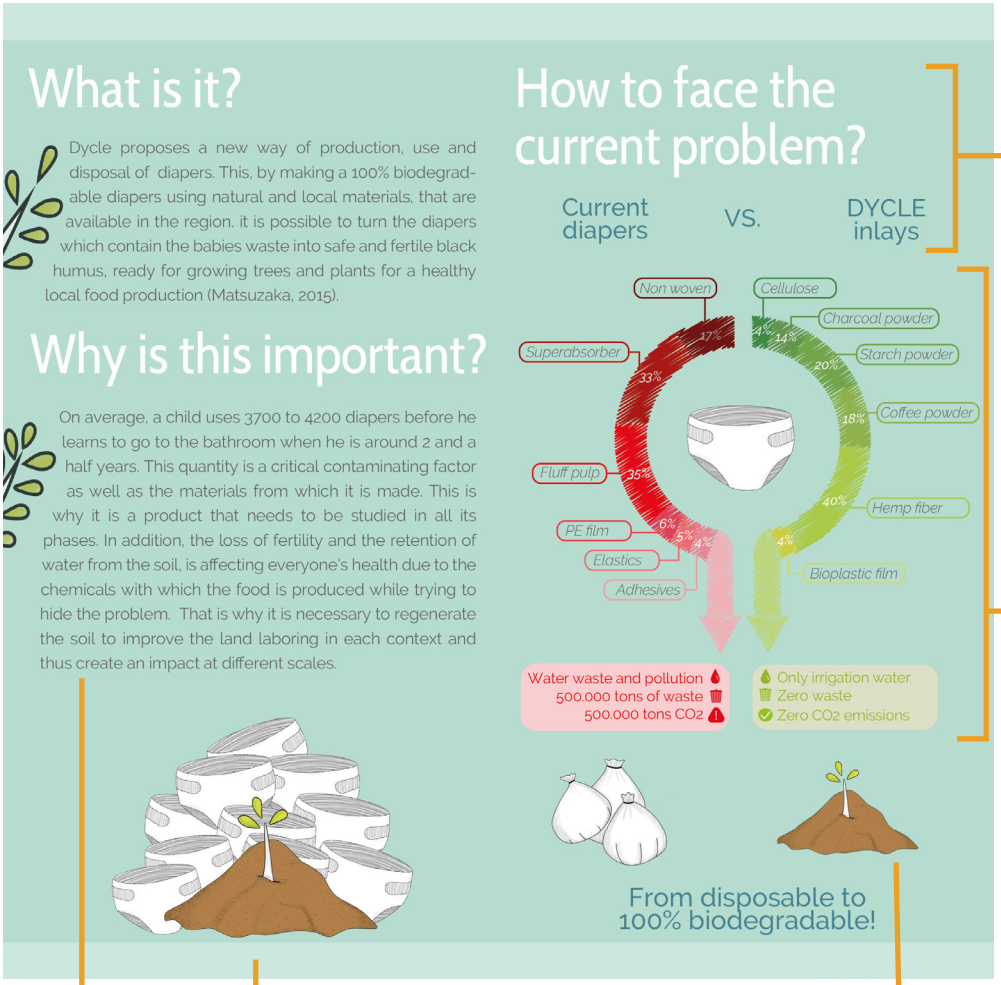
Current infographic for explaining the problem of diapers



The information is disconnected. Likewise, the user's experience was not considered, resulting in a non-captivating graphic style. Also, the icons are standard designs, not relating specifically for the project.

Image 16: Problem, Amount of diapers waste in Germany; Taken from: https://dycle.org/en

Proposal for explaining the current problem of diapers



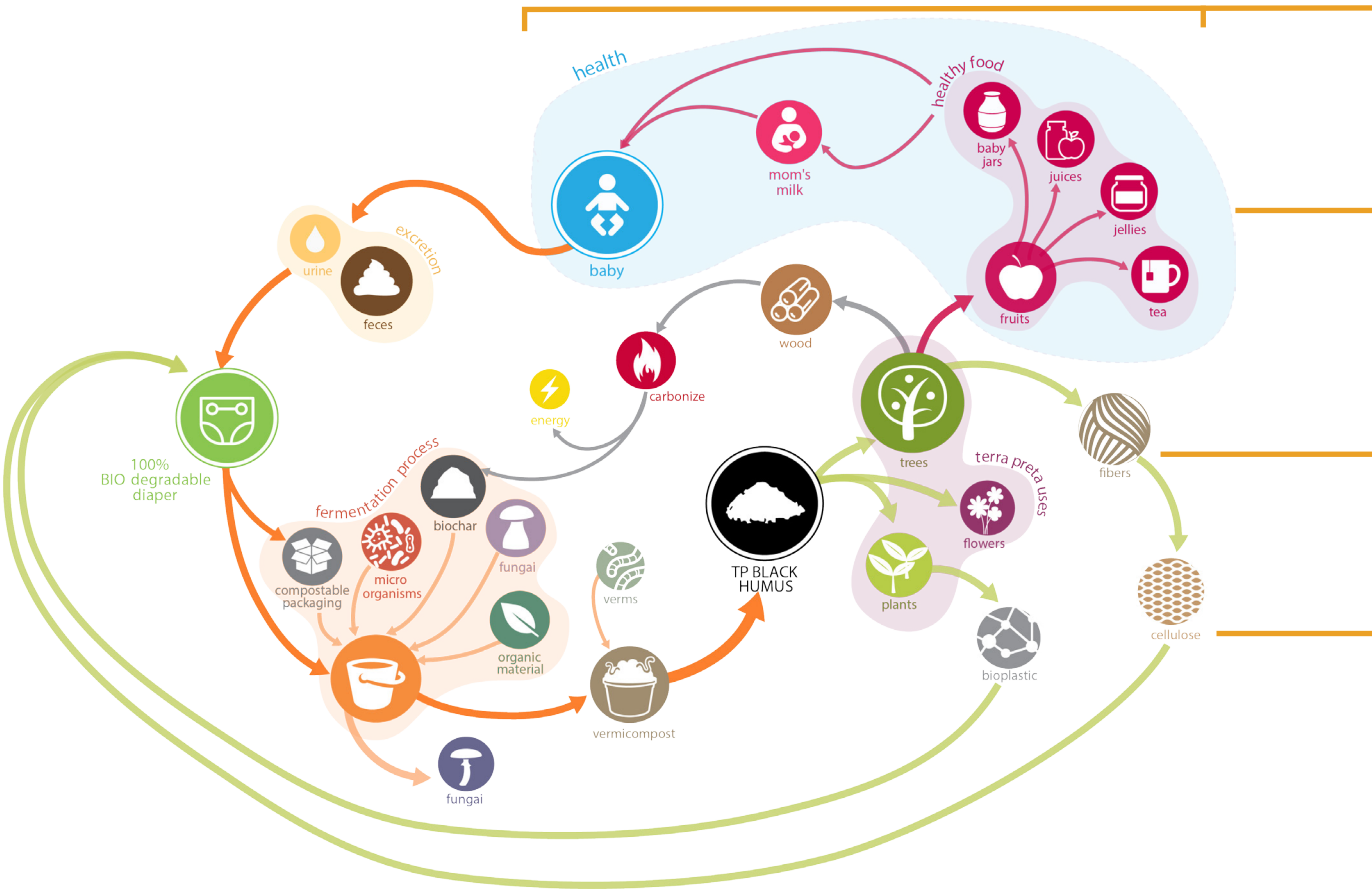
Use of different fonts for contrasting and capturing the attention of the readers.

Appealing infographic that manages to express all the information needed but does not overwhelm the receivers. The colors used, make clear the distinction and comparison intended for the problem and the solution. The arrows give reading fluency and understanding.

Brief explaination of the importance of the system and the advantages of participate in a such a project. The fonts used are sober but friendly, easy to read and does not overwhelm the reader.

Handmade illustrations designed specifically for the project, that allows a coherent perception and acts according to the concept. The minimal amount of color does not overwhelm the user.

Current systemic diagram



In this diagram the information is incomplete, there are missing steps and activities in the system.

Image 17: SYSTEMIC FLOWS, DYCLE - diaper cycle; Taken from: Dycle

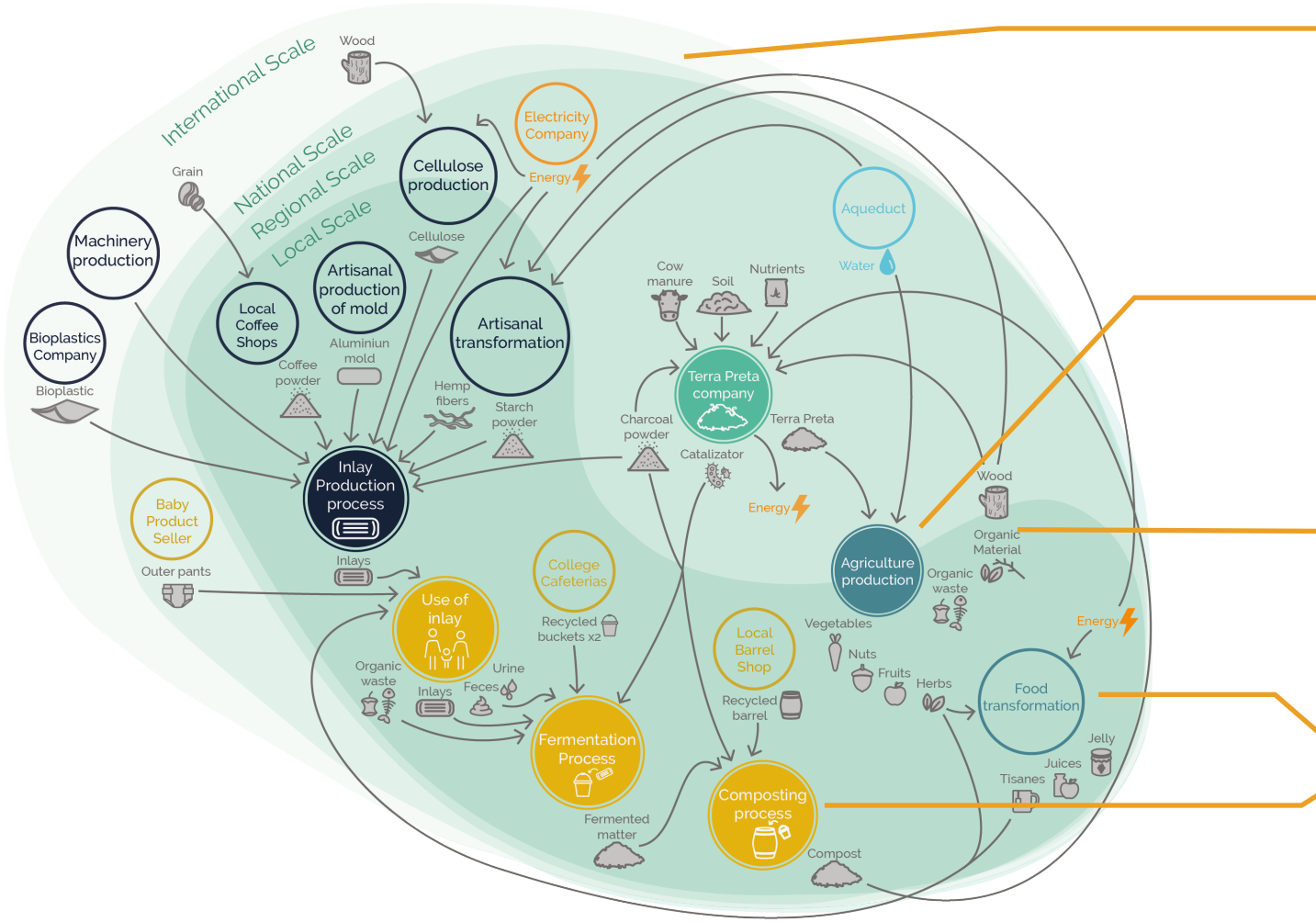
The values in the participation of the parents are not shown in any part of the diagram

The different sizes in the icons give the impression that some of them are more important than others.

The use of different colors and style of icons overwhelms the diagram and making difficult to understand the connections between them and differentiate between activities and materials.

The user's experience was not considered, resulting in not being possible to identify which are the inputs and outputs, and at what scale to they come from, making the relationships and the role of each user unclear.

Sytemic diagram proposal



The diagram shows the different scales of the system, by pointing out where the materials come from and their end, it is possible to understand the relationships that are generated at different levels.

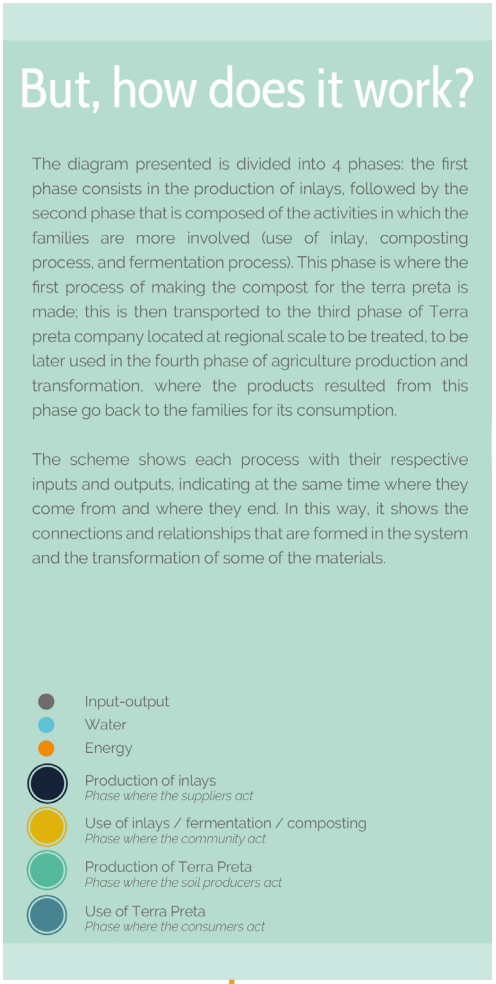
The scales are differentiated by using a gradient of the primary color "Ocean green", that helps contrast the colors in the diagram.

The activities are differentiated more clearly from the material, and the connections are more evident. By using fewer colors, the diagram is not too heavy for the readers and show exactly in which phase each activity belongs to.

For making a contrast between the stroke and fill colors in the icons, the default color "granite gray was chosen; this improves the legibility without making it too heavy for the reader.

Two different types of circles are used to differentiate the activities in DYCLE's process and the other activities that are external. This also helps to make it more legible and not too overwhelming to the reader.

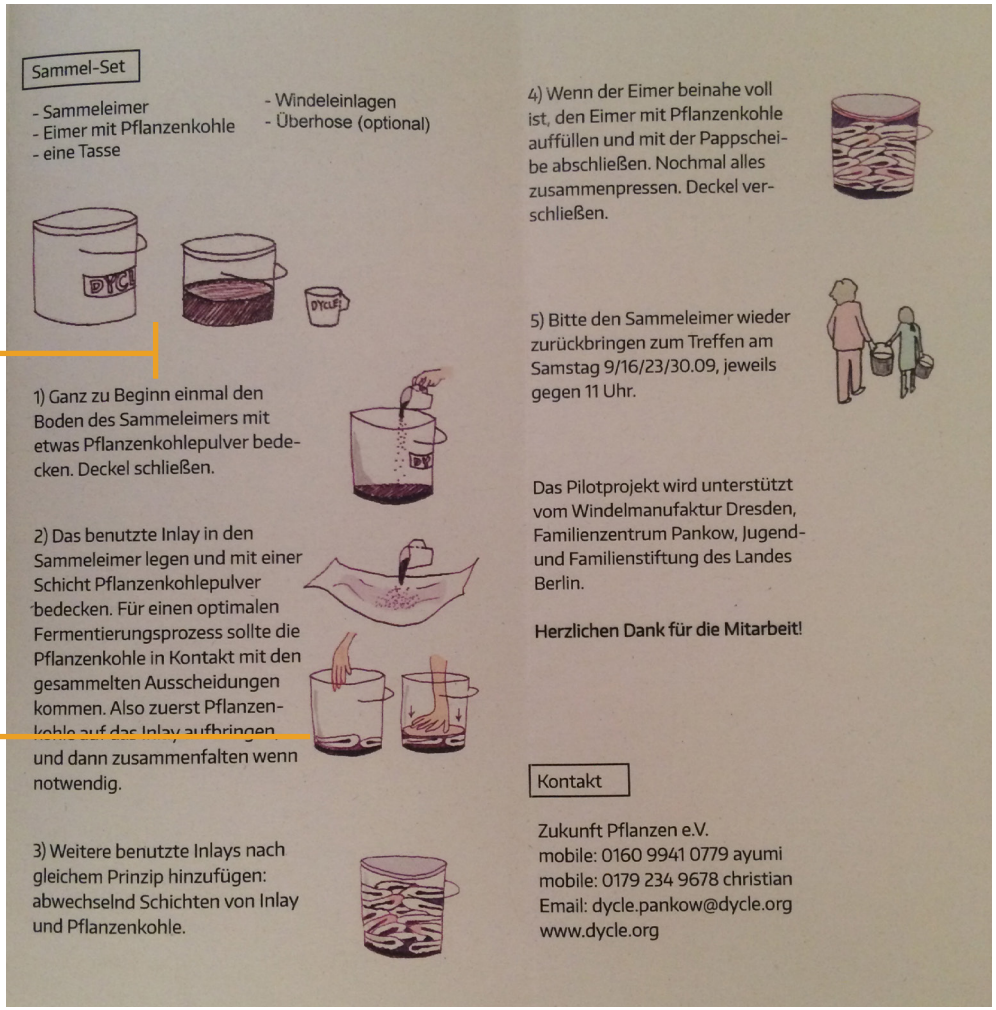
In addition, there is a brief explanation of how the system works. This cannot be too extended so as not to tire the reader. This is accompanied by a small legend that indicates what the shapes and colors refer to in the diagram.



Current visual communication

The text overwhelms the illustrations, making it difficult to follow them at the same time.

The values and purposes the components in this phase are not fully communicated.



Besides being the only type of visual communication implemented currently by DYCLE. There is no contrast of color or typography, making the whole representation look monotonous and not attractive to the reader.

Image 18: Instructions of phase 2. Taken from: Dycle

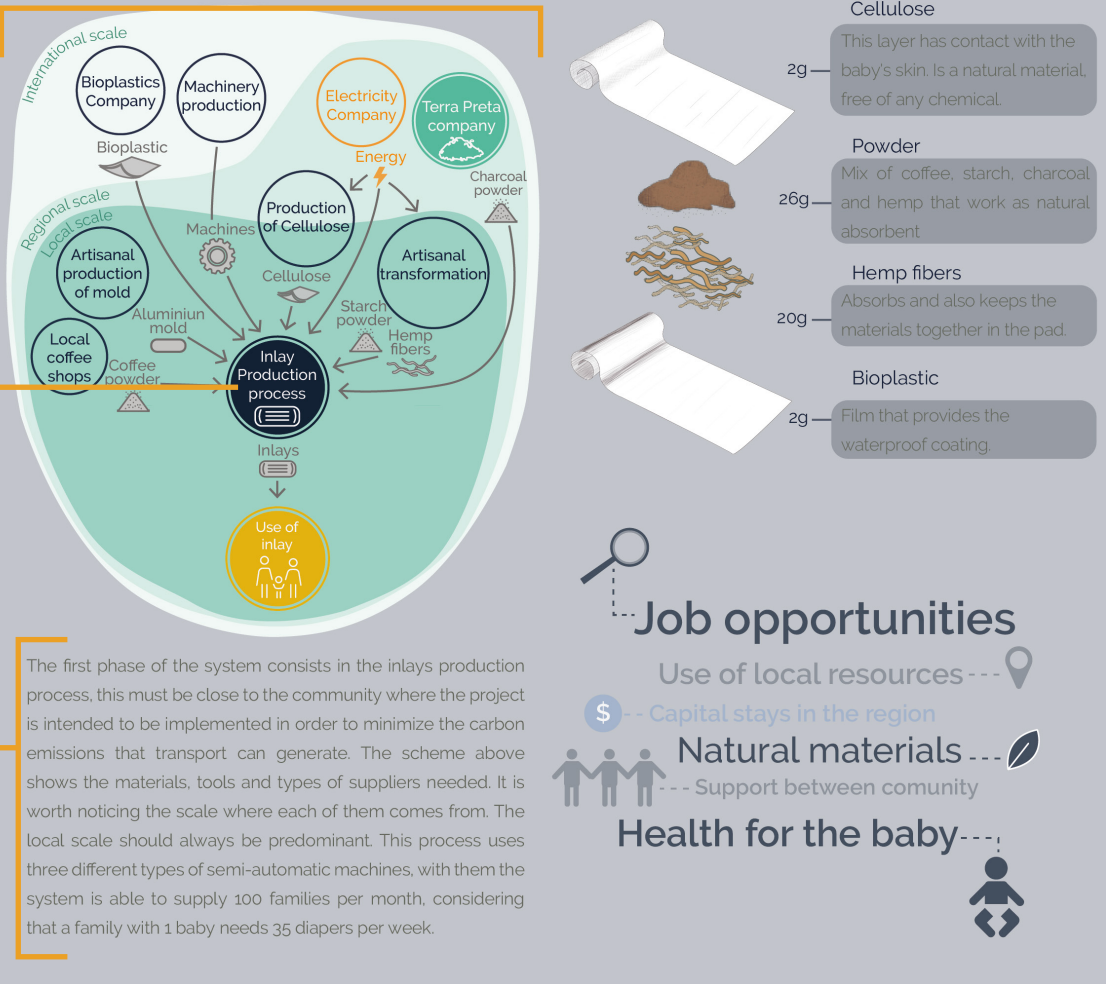
Proposal

The same colors and shapes of the systemic diagram scheme are kept so that the readers are able to identify in which phase they are in reference to the whole system, understanding better the relationships.

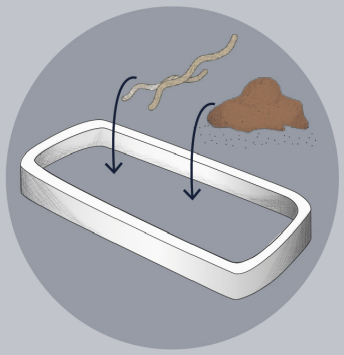
Explanation of the materials in the inlay, accompanied by handmade illustrations, makes the information more memorable to the reader.

This phase is identified with the color "Yankees blue".

Brief explanation of how the phase works.

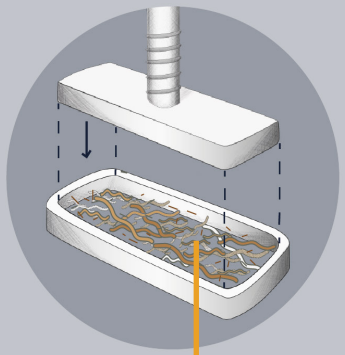


The first phase of the system consists in the inlays production process, this must be close to the community where the project is intended to be implemented in order to minimize the carbon emissions that transport can generate. The scheme above shows the materials, tools and types of suppliers needed. It is worth noticing the scale where each of them comes from. The local scale should always be predominant. This process uses three different types of semi-automatic machines, with them the system is able to supply 100 families per month, considering that a family with 1 baby needs 35 diapers per week.



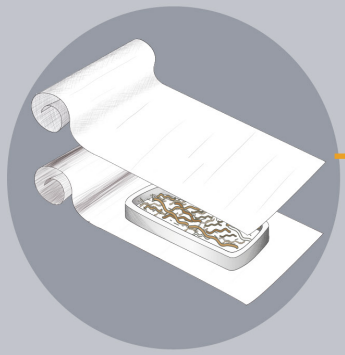
1. Mold

After measuring the ingredients, pour the mix into the mold.



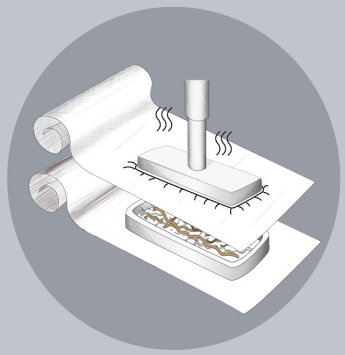
2. Compressing

Press the mixture to stabilize the fibers and form the absorption pad.



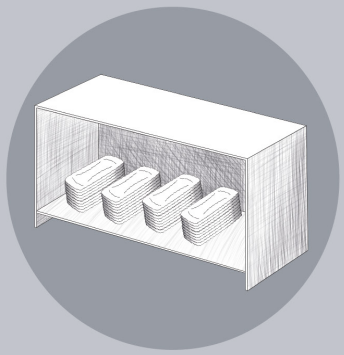
3. Heat sealing

Place the mold between the bioplastic and the cellulose.



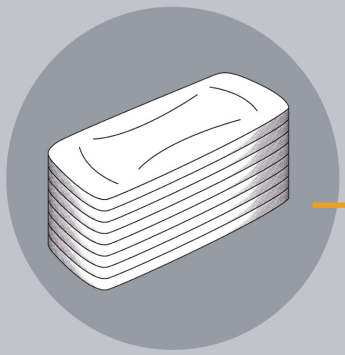
3.1 Heat sealing

Seal the pad in between the cellulose and bioplastic film to have the inlay.



4. Sterilizing

Sterilize the inlays for 30 minutes in the machine before using them.



5. Inlay delivery

Now the inlays are ready to use. They can be found in the designated meeting point of DYCLE.

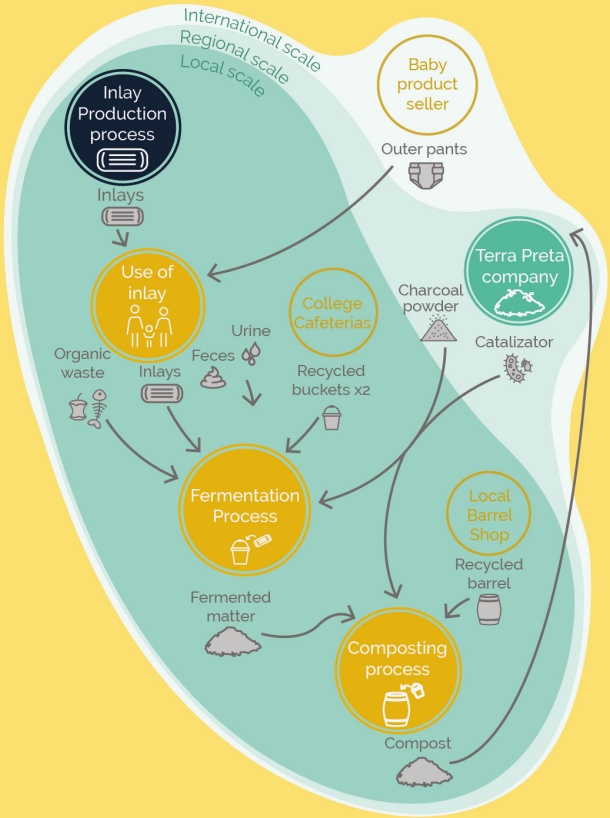
The explanations in the sequences of step by step in every phase are accompanied by a handmade illustration that helps the reader understand the information given more easily.

The minimal amount of color does not overwhelm the user and highlights the important part of the process.

Circles are used to highlight the illustration of every step, make them more noticeable to capture more the attention of the reader.

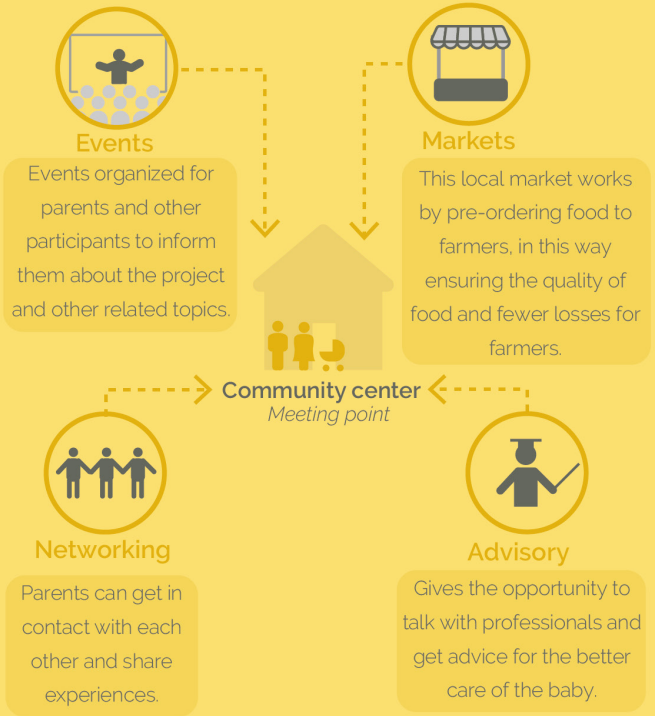
Brief explaination of evey step in the process. The fonts used are sober but friendly, easy to read and does not overwhelm the reader.

Distribution, use and disposal



This phase consists of three main activities: Use of inlay, fermentation process and composting process. In here the parents are directly involved in the transformation of the inlay with the baby's waste into a fermented matter that will later become the compost the will be converted to Terra Preta in the next phase. The families should be within a range of 1 km from the meeting point, where they pick up the kit.

Where?

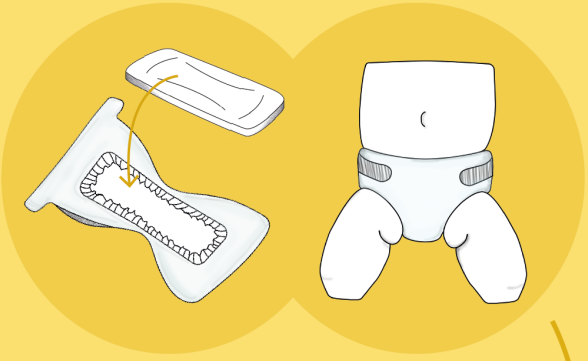


Kit elements

Step by step

1. Distribution of kit/replenishment

Collection of kit in the community meeting point. It will be within a range of 1 km. /Replenishment of charcoal and inlays in the same place.



2. Use of inlay

Insert the inlay in the Outer-pants and adjust them to the baby waist. It is recommended to change it every 5 hours.

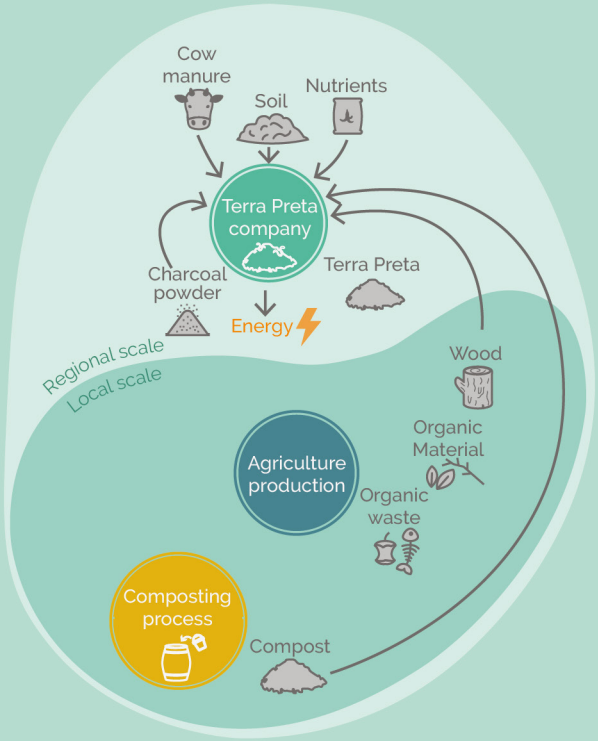
3. Collection in bucket/Fermentation

Pour charcoal into the bucket #1 (10L). Then, throw the used inlay in the same bucket. Repeat until the bucket is full, press and close. At this moment the **fermentation** process begins

4. Collection in barrel

Go back to the meeting point and empty the full bucket in the community barrel. At this moment the **composting** process begins.

Production of Terra Preta

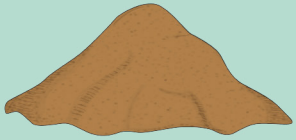


What is it?

Terra Preta refers to a type of dark and very fertile soil found in the watershed of the Amazon River. This anthropic technique was probably created by pre-Columbian Amazonian communities 2,000 to 500 years ago because their composition of nutrients and proportions are not found commonly in nature. It is usually composed of remains of charcoal, fragments of pottery, bones, traces of human feces, ashes and fish bones.

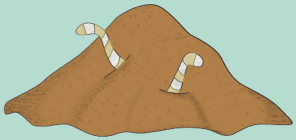
Is it different from normal compost?

Compost



Organic matter
Manure
Nutrients

Terra Preta



Organic matter
Manure
Nutrients
Charcoal
Feces & urine
Recovers soil faster
Retains more water

Local resources

Reuse of materials

Retains water better

No waste

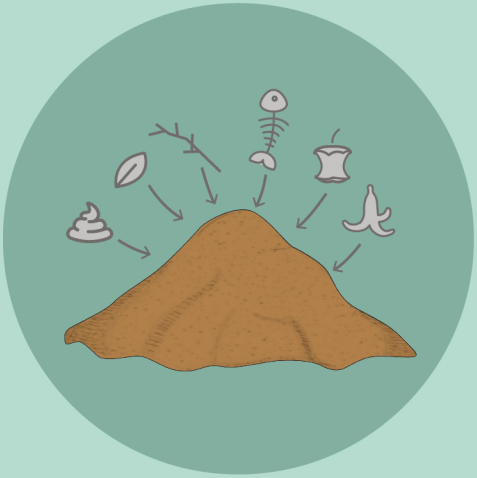
Good practice

No fertilizers

Step by step

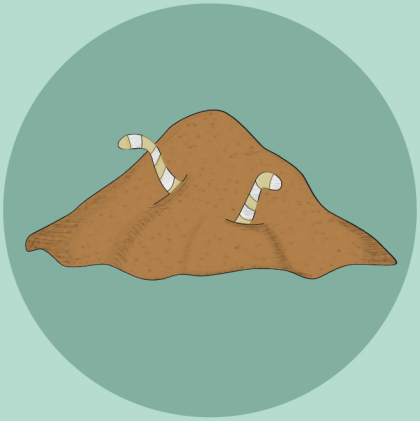
1. Compost transport

Transport of compost every 1 to 2 weeks to the Terra Preta company located at regional level.



2. Treatment

Cow manure, soil, nutrients, charcoal and organic material are added to the compost. These inputs come from the local and regional scale.



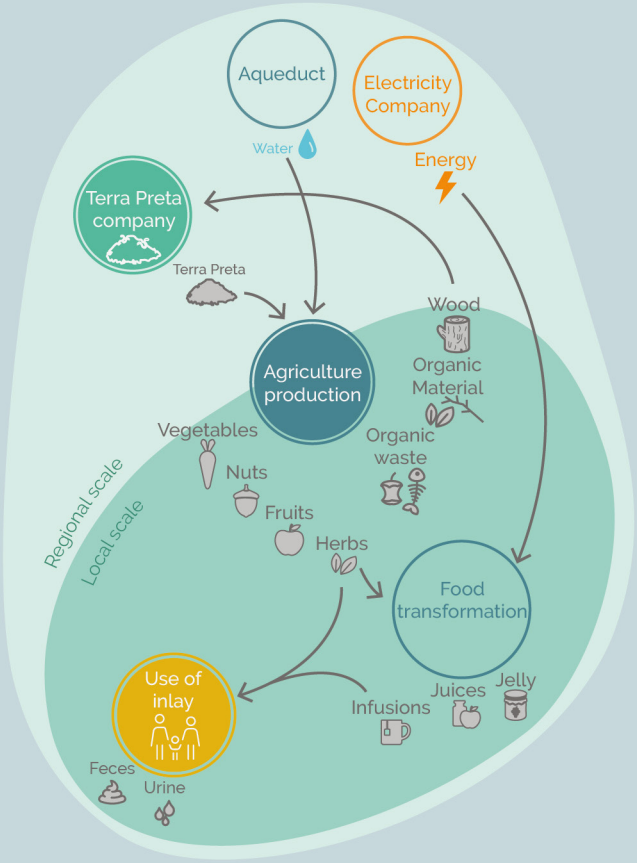
2. Terra Preta making

This process is repeated while mixing the soil frequently during 6 - 12 months until obtaining high-quality humus.

2. Transport to consumers

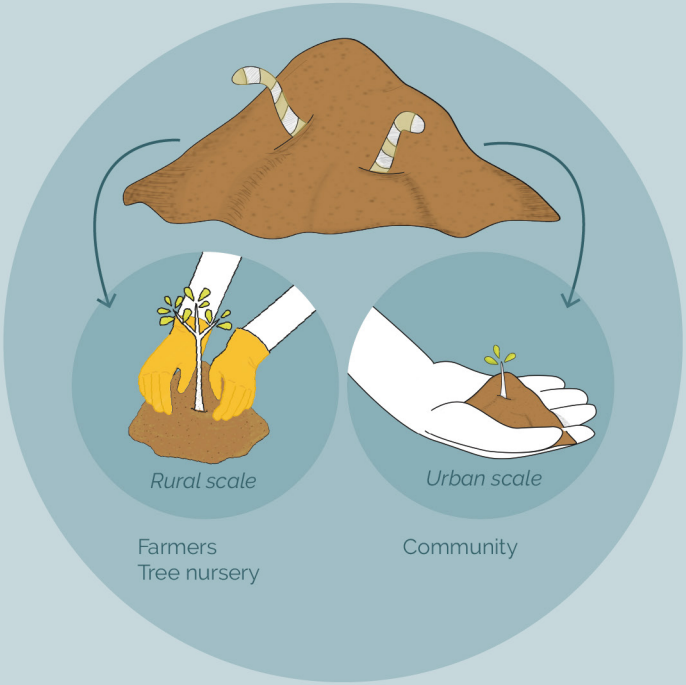
The finished Terra Preta is transported to the different consumers that will benefit from it.

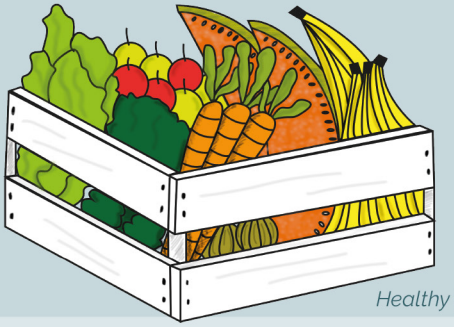
Use of Terra Preta



Dycle proposes different users for using the Terra Preta to improve the quality of the soil and thus, their products. Among them: the community, farmers of the region, and social services that plant trees in the city. Whichever it is, the harvest of these trees, either at the rural or local level, will benefit the community by giving products that are healthy and of good quality. Imagine and create different possible uses for it!

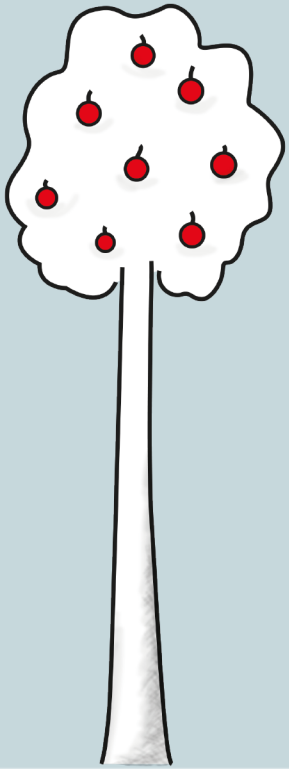
These are just some options...

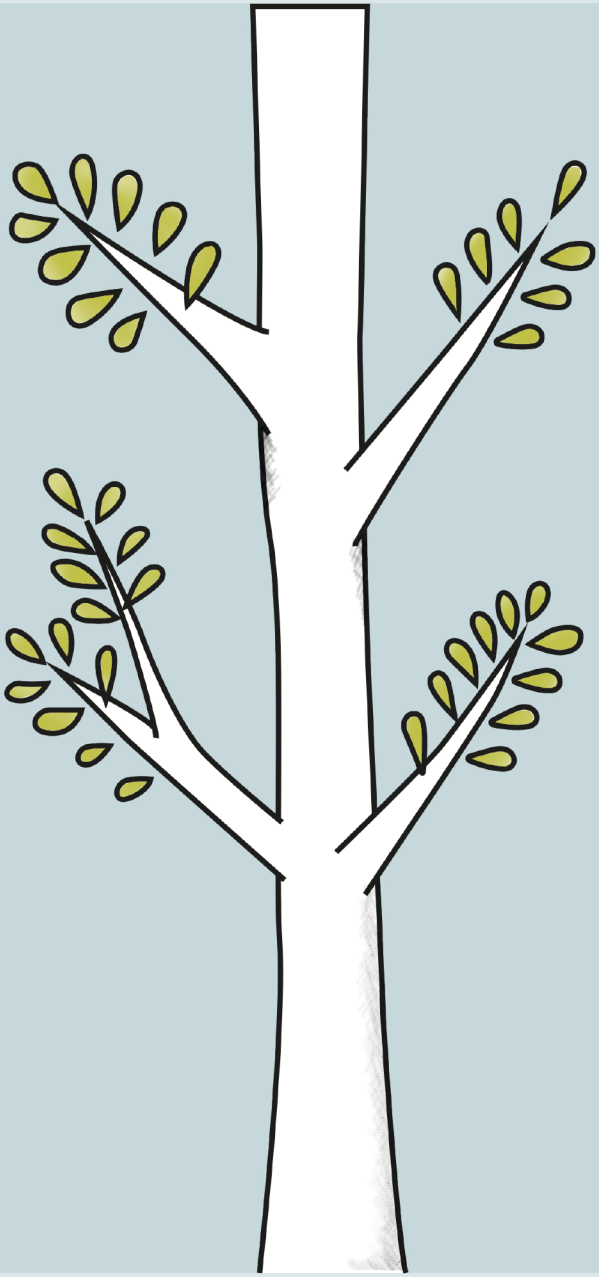




Healthy food


Healthy food
No waste
Local production
Resources for the system flow
Support from local community
Networking
$
Capital stays in the region





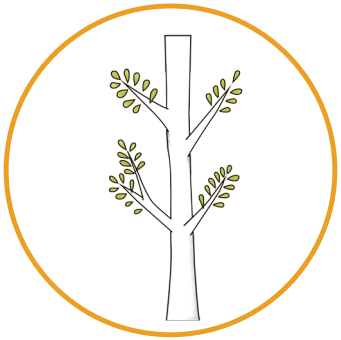
This phase is identified with the color "Urobilin".

Each phase communicates important concepts that are generated in the process, in order to enhance the values and capture the attention of the readers. For making a subtle intervention, the colors were chosen change depending on the phase they are; in this case the colors were a gradient of the primary color "Urobilin".

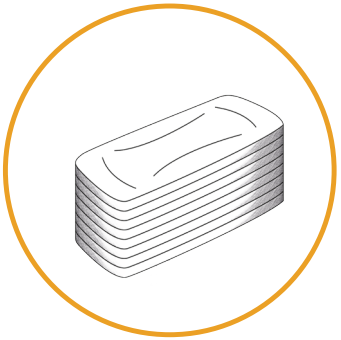
To improve the understanding of the text, in this case, information about what is happening in the barrel with the compost that is made from the used inlays, are always accompanied with handmade illustrations that helps the reader understand more easily the process.

The size of the font change depending on which values are more present.

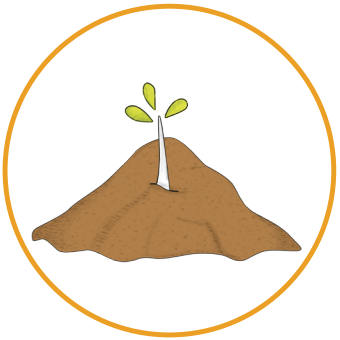
Illustrations for the presentation of the project



Tree



Inlays

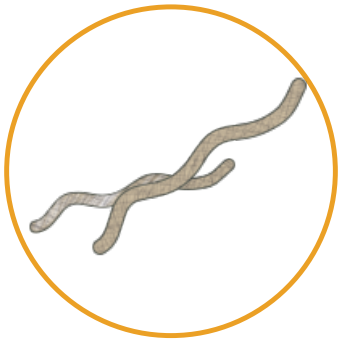


Soil with plant

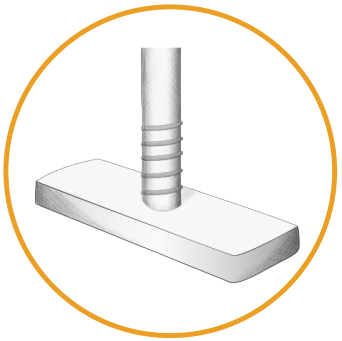
Diapers

Landfills

Illustrations Phase #1



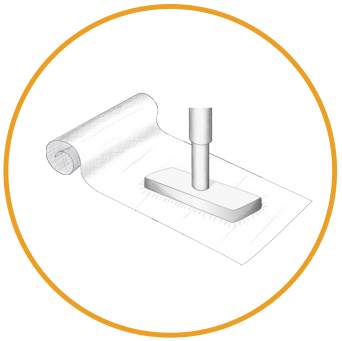
Hemp fiber



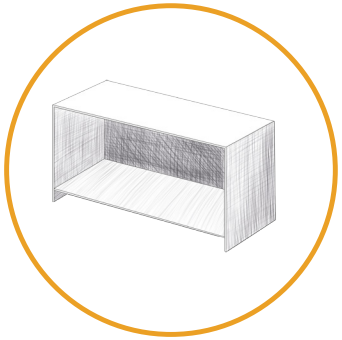
Pressing

Bioplastic

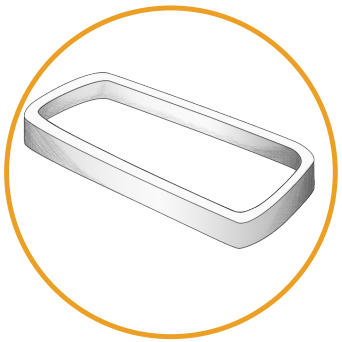
Cellulose



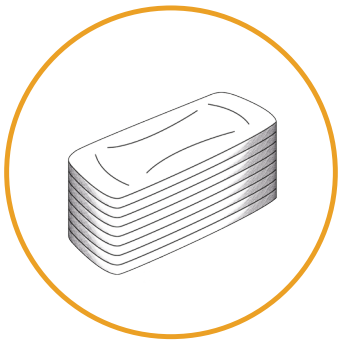
Heat selling



Sterilizer



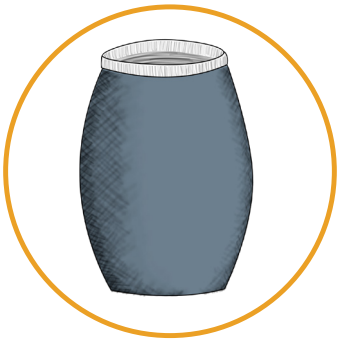
Mold



Inlays

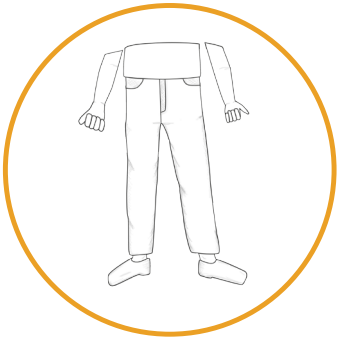
Illustrations Phase #2

Buckets

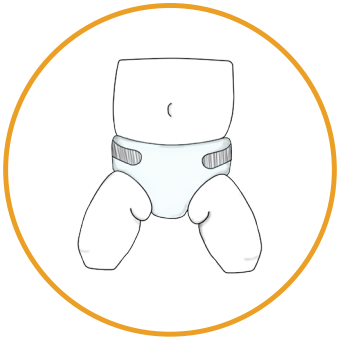


Barrel

Parents and inlays

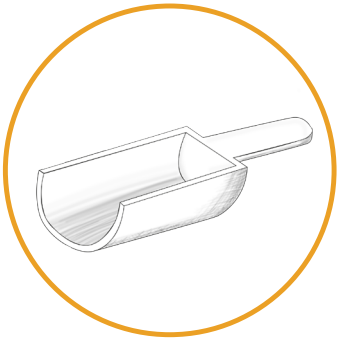


Men with buckets

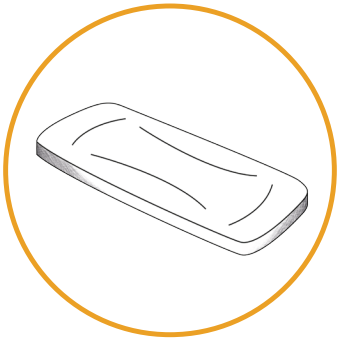


Baby

Outer-pants



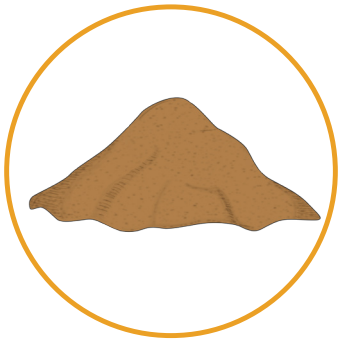
Shovel



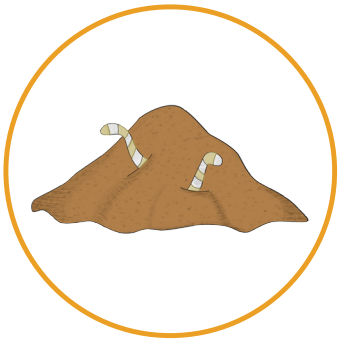
Inlay

Disposal in barrel

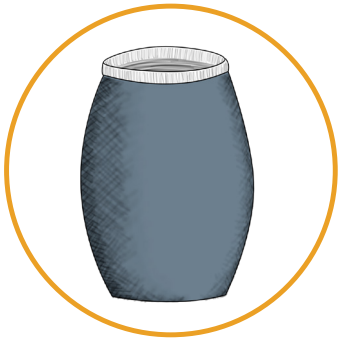
Illustrations Phase #3



Soil



Terra Preta

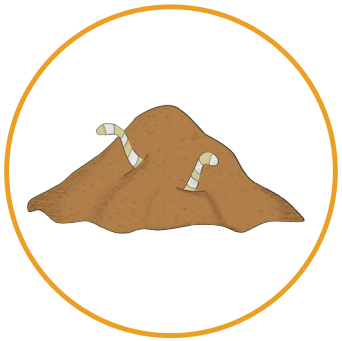


Barrel

Camion

Hands with gloves and plant

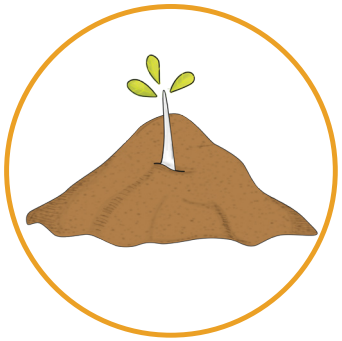
Illustrations Phase



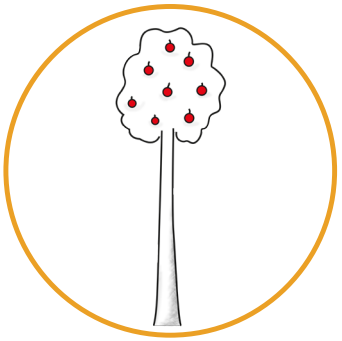
Terra Preta

Hand with soil

Hands with gloves and plant

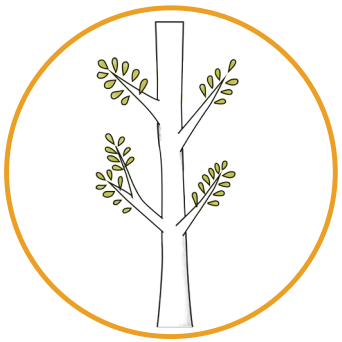


Soil with plant



Apple tree

Fruits and vegetables



Soil with plant

Conclusions and future developments

6

Conclusions

The work in this thesis consisted of taking DYCLE's systemic project as a case of study with the general theme of how, it should be communicated through the principals of systemic design. Being an entrepreneurial initiative full of values and relationships that should be disseminated, the organization needed to achieve a way to convey their values and knowledge to their users. For this, the communication aspect was considered to have an important role which needed to be studied carefully to determine the correct way to transmit its message

The main objective of the project was to create a channel of communication in order to improve the current visual communication of DYCLE's message through the use of graphic representations that will be responsible for transmitting, in an appropriate manner, the different types of information to the specific users. This objective could not be achieved 100% without first understanding what should be considered in a systemic communication, and also have a clear vision of the different connections, relationships and values that exists in DYCLE's system.

Theoretical framework

In order to understand the origins of the systemic methodology, it was important to make a brief analysis of the theoretical foundations of systems theory and communication throughout history. By doing this, it was possible to find similarities between both fields, thanks to the five guidelines (men in the center, autopoiesis, local action and input-output) that characterize the dynamics of these disciplines and that were taken as requirements later in order to develop a systemic communication.

Once these guidelines were established, it was possible to identify a common critical factor: the linearity, not only in its conceptual form but also in the visual interpretation of the theories. By knowing the important role played by communication in the generation of meanings, knowledge and relationships in societies, the problem demanded a new orientation through systemic design. Therefore, it was found that it was required to choose the correct channel without isolating it from the other components in order to achieve successful communication. In this case, the visual communication channel was chosen primarily because of its effectiveness in increasing the interest of the recipients, thus creating knowledge and awareness.

Choosing the right channel

Once the communication channel was determined, it was necessary to know how to create the visual content that could transmit all the information, knowledge and ideas. For this, the methodology called "Visual Thinking" was chosen as a way to help classify and organize the information, according to the type and intention of the message.

In addition to the insight provided in this analysis, it was necessary to study different cases in both systems theories and visual communication in order to understand how these disciplines have been communicated to the public, and also to explore more innovative ways that are being implemented to improve the message's transition. These perspectives generated ideas regarding what aspects should be considered when developing the communication channel of the project.

After all this analysis, it was concluded that the development of a visual channel is the most appropriate option to fully communicate the key elements of the project since it represents several advantages, such as being able to make the autopoietic relations in the system more understandable for people of different backgrounds; this allows to transmit the data, processes, relationships, connections and values of the project in a clearer way to the respective identified users. Furthermore, it facilitates the spread of information, so it attracts more participants to achieve an impact at different scales.

DYCLE's project analysis

In relation to the understanding of DYCLE´s Project, a field investigation was crucial to explore the current operations and communication methodology: know their history, how the project came about, the different processes and components that are part of it, and how the system works as a whole. This showed the problems and opportunities that they face and identified the important aspects that were considered later in the design approach.

Besides intervening in the current communication of the message, a systemic analysis was carried out, pointing out the current problems of the system. These problems were studied in such a way that several solutions were provided to each one of them according to the context of the project. Having solved the problems in the system, a scheme of the systemic project was able to emerge.

Main choices of the project

The combination of the theoretical and field research gave way to define the main focus of the project towards the development of a communication channel that helps to represent and transmit information about DYCLE´s system. This allowed to define three main requirements that shaped the prototype design of the information visualization.

The main decisions of the project were made, taking into account the study of the user´s needs that were based on the empathy maps and the questions of the different types of users (Suppliers, consumers, soil producers, community) taken from DYCLE´s database, giving a clear view of what they were interested in knowing about the project. These questions were classified in relation to the users and the phases to which they belong in the system, allowing this way to clearly identify the relationships between these elements and discover the information that each target needed from each phase.

After the analysis of the requirements and the classification of the different types of information, a first approach to the structure of the brochure, where the graphic elements were going to be presented, was made. This gave way to define the visual design requirements for the development of the brochure.

Then, all the reasoning around the style decision was provided to decide color, fonts, and styles that were used to build the diagrams, schemes, infographics, and illustrations, that respond to the needs and values the

project seeks to transmit, to finally arrive in a prototype that translates all the project work to a useful graphic content so that the users understand the project more clearly.

Future developments

The project was developed until the prototype met the requirements of the design and the main needs of the different users, but it should be mentioned that it is not the only way in which the guidelines can be applied and, although the objectives were achieved, it has room for a deeper work in regard to the improvement in the dynamic in which the users interact with the information.

Given that one of the boundaries of the project was that the designs would be presented in a physical book, which limits the interaction of the users with the information, the additional step to present it, is where users have more interaction and flexibility when deciding what to look for. Enabling the implementation of this type of communication in a more dynamic way and encouraging the ludic aspect. This can be possible through the use of interfaces that can show the relationships better, allowing the user to be the protagonist, choosing among all the information that is provided and building his own brochure based on that.

This future plan could be achieved by doing a deeper analysis with the help of a multidisciplinary team, so that these guidelines can be used as a reference for other systemic projects and help them improve the transmission of their message.

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