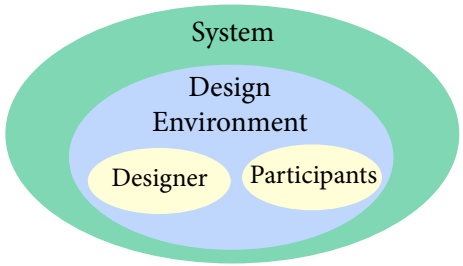
what is embodied making?

Embodied making is an action research approach that requires participation, engagement and reflection. In action research, the designer works with rather than for people, is engaged as an equal in terms of understanding the design environment, and takes a reflective stance with regard to the work being done. (1)



Embodied making requires that all participants within the design process have a strong understanding of actual situations that occur in the domain of the design. A strong understanding of these situations, and why they occur, provide key inferences for design decisions and architectural criteria.

Embodied making comes from two inter-related terms. Embodiment is a thought movement that considers the mind to be realized by the entire body and effective thinking to be inseparable from doing. Making emphasizes the active role in designers in engaged change. Embodied making is an alternative to other design methods which separate the design process from the realization process and the realization process from living with the designed results.

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In contrast to embodied making, there are a number of other design methods and frameworks that encourage the use of layers to separate concerns. The assumption in this case is that some people do the thinking as that's what they are good at, and others do the doing as that's what they are good at. Each layer is used to create specializations.

Embodied making de-mystifies the design process from belonging to an exclusive few and makes it accessible to everyone engaged in an enterprise. It encourages both doing and thinking to be enterprise-wide activities. It discourages practices where one set of people do the thinking and another set of people do to the doing. It encourages the use of minimal structures and lays emphasis on improvization. "I act, therefore I think". (2)

http://bebefeliz.com/2012/09/precauciones-basicas-del-gateo/

This belief of separation of thinking and doing is reflective of the belief of separation of mind and body, perhaps most well articulated by "I think therefore I am", creating organizations which believe that thinking should happen in one place, and the doing in another. Embodied making is designed to treat both thinking and doing integrally.

Embodied making is an inter-disciplinary approach to systems designs. It draws inspiration from several disciplines such as philosophy, architecture, mathematics, science, sociology, psychology, literature, and music. Each of these disciplines has logical and analogical lessons that have been applied to develop embodied making. Embodied making has been applied to develop software applications, human management systems, enterprise architecture, organizational structures, interior designs, and community structures.

http://www.barewalls.com/pv-401840_Grand-Central-Station.html

In practice, it is not possible to separate thinking from doing. Performing the same task twice is never exactly the same, and new circumstances, altered environments, changing roles, new insights, unforeseen situations, and unintended applications make the process of doing an active process of thinking.

Embodied making is especially suitable for designing complex systems that involve people, technology, equipment, infrastructure, and organizations. It can be used to develop designs that address human behavior, technological considerations, organizational structures, equipment utilization, and infrastructure usage. It was originally developed to address the limitations of methods and frameworks that encourage a separation of thinking and doing, or provided design methods that have a narrow focus on a single discipline or aspect of design.

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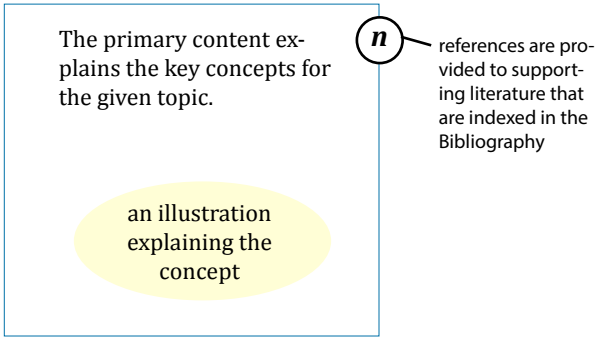
The team developing embodied making is an inter-disciplinary one, consisting of Philosophers, Sociologists, Artists, Engineers, Enterprise Architects, Interior Architects, and Programmers. This strong inter-disciplinary approach has contributed to a method that can be used to design behavioral, sociological, and technological solutions.

This document provides a combination of examples and theory. It is layered in terms of primary concepts, support text, and an exhaustive bibliography for further reading. The best way to understand embodied making is by practicing it, and we encourage readers practice the concepts on each sheet as they read the document.



Embodied making is particularly useful in finding effective solutions for complex problems. It provides the means to understand complex problems for what they are, and then provides a means to find several solutions for the same problem. It also provides the means to evaluate solution effectiveness for a given environment.

(1) Greenwood, Davyyd J., and Morten Levin. Introduction to Action Research: Social Research for Social Change. 2nd edition. SAGE Publications, 2006. (2) Lakoff, George, and Mark Johnson. Philosophy in the Flesh: The Embodied Mind and Its Challenge to Western Thought. New York: Basic, 1999.

an applied example of embodied making

The process of design with embodied making starts with listening to people in the space where we want our designs to live and rest. Stories are anecdotes as people relate them to us, and these are faithfully recorded *as they are told to us.*

1. "We share 10 meeting rooms, usually named after people to identify them, between 300 people, and the meeting rooms need to be kept locked."
2. "The receptionist helps book the room, and room users pick up the key, and usually drop it back."
3. "Although people are supposed to pick up and drop off the key with me, they rarely do. I have to run around and try and trace where the keys are."
4. "I often have back-to-back meetings, and I don't always have time to return the key."
5. "We lose keys to meeting rooms all the time and have to replace all the locks 3 or 4 times a year."
6. "We need presentation equipment for meetings."

Stories should be gathered from several perspectives. In the example of the meeting room, stories from the users of meeting rooms, building security, receptionists, moderators of meetings, visitors to the building to who come for a meeting, maintenance staff, or cleaning staff will help create a rich tapestry as the basis of designs.

As designers, we must also be conscious of our own will, and that our involvement in the design process, and the systems we realize from those designs, actively transform the environment.

W01. Desire for low cost solutions
W02. Desire not to inconvenience meeting room users.
W03. Desire to keep organizational culture intact.
W04. Desire to make meeting room usage fun.
W05. Desire to use of common locks and keys.

There is no clear or sharp distinction between wills and forces. They come from two directions. Wills comes from self awareness of the designer or requirements of the patron, and forces come from observation of patterns of behavior, culture, or nature in the design environment. By integrating the perspectives of wills and forces, designers can propose solutions that 'work'.

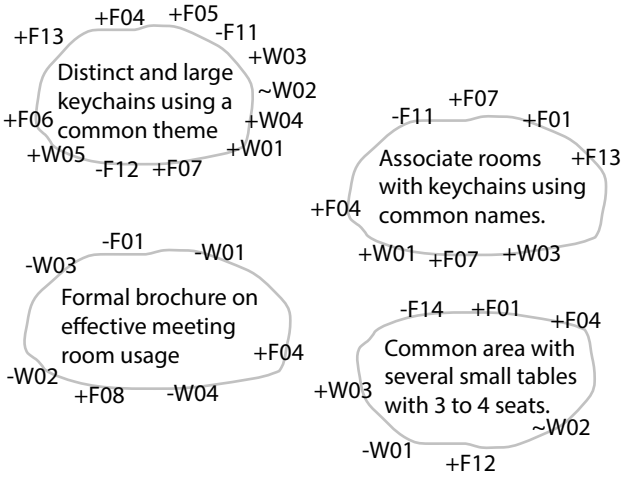
after while, a feeling of "living" the forces occurs for the designer. Throughout this process, the personal goals and objectives of the designer or designers should be explicitly stated as wills. Interactions between wills and forces reveal their conduciveness to exist in the same space.

What induces people to behave in the way they do in their environments? Or motivates them to decide on a particular course of action? These factors are called forces in embodied making. We can identify some of these forces from the stories:

1. F01. Meeting rooms are shared by a lot of people.
   F02. Meeting rooms contain expensive equipment.
   F03. Desire to protect equipment in meeting rooms.
   F04. Limited number of meeting rooms.
2. F05. Meeting rooms are booked with a single point.
   F06. Desire to pick up meeting room keys in 1 place.
   F07. Desire to return keys in 1 place.
3. F08. Tendency for people to not return keys.
   F09. Difficulty in tracking down unreturned keys.
4. F10. Individuals have several meetings without gaps.
   F11. Returning keys is often inconvenient.
5. F12. Frequent loss of meeting room keys.
   F13. Inability to distinguish keys of meeting rooms.
6. F14. Use of high-quality equipment in meetings.

As we catalog more and more stories from different perspectives, more and more forces will emerge. The objective of enumerating forces isn't to try and find as many forces as possible. In order to give designers a feeling of the space where their designs will live and rest, the objective is to capture an adequate number of forces for reflection.

An understanding of the forces and wills gives insight into the solutions that would be most likely to resolve them.



As we think about the forces, and the interactions between forces, ideas will flow on how to resolve them. Each idea should be written down as a solution component, examining how it helps resolves the immediate forces we have considered, and all the forces that emerge afterwards. There is no fixed sequence on writing any of them down.

If we are able to find an elegant solution that is both stable and reliable, and this solution would be able to balance all of these forces (let's assume for now that these stories and forces are complete), we would have created a system that would fulfill the requirements of sharing meeting rooms effectively. We can gain insight into how these forces exist in their environments by exploring how they interact with each other, by placing a (+) sign for a pleasant experience, a (-) sign for an unpleasant experience, and (~) for a neutral experience.

F01 :: -F03, -F04, +F05, +F06, +F07, -F08, -F09, -F10, -F12, -F13
F02 :: -F03, -F08, -F09, -F12, -F13
F03 :: -F01, -F02, +F04, +F05, -F08, -F09, -F11, -F12, -F14
F04 :: -F01, F02, +F03, -F08, -F09, -F10, -F11, -F12, -F13
F05 :: +F01, +F06, +F07, -F08, -F09, -F10, -F11, -F12, -F13
and so on and so forth for F06 to F09
F10 :: -F01, -F04, +F05, -F11, -F12, -F13
F11 :: -F01, -F02, -F03, -F04, -F05, -F06, -F07, +F10, -F13
F12 :: -F01, -F02, -F03, -F04, -F05, -F06, -F07, +F08, +F09, +F10..
F13 :: -F01, -F02, -F05, -F06, -F07, -F08, -F09, -F11, -F12

Understanding the interactions between forces helps designers live and experience them. For each interaction, try and imagine situations where those interactions between forces would occur. By thinking about each interaction, you will increasingly understand how all of these forces co-exist in the same space. Understanding the complex interactions has a meditative quality, and

In this example, we want to create compassion and empathy, and we can achieve this by finding analogies or metaphors that inspire those emotions. There is a natural tendency for human beings to care for their pets. Animals should be selected for the vulnerability, and a connection to the planet can be found through featuring endangered animals.

Formal and informal systems within large organizations are built with the perspectives of several individuals. There is a tendency for influential individuals to create a bias within systems in favor. To avoid this, it is important to engage at every level of an organization (if formal levels exist), and assembling an accurate picture of what is required from effective systems. Insights gained through this process of inquiry are key in making organizations efficient and effective.

© Archives of Ontario

For instance, consider the features necessary for a new company-wide computer system where your primary stakeholders are from departments representing internal financial administration. It is probable that most functions in this new system would help create stability and efficiency for internal administration but not other tasks.

When applying embodied making, it important the voices of individuals to find their way into the system design. The best person to teach you about production processes is someone working on the floor every day. This has to be balanced with stakeholders such as organizational leaders, who may have a different perspective the characteristics of an effective system. Cataloging perspectives openly will help create balanced systems that meet the needs of people across the organization.

Many systems have a tendency to be designed based on simplistic "sunny day scenarios". Organization-wide participation ensures that the essential complexity that exists in everyday tasks finds its way into the formal system.

http://thechive.com/2009/03/18/train-wrecks-through-the-years-30-photos/

Examples of some individuals bending the system to create stability for themselves range from system maintainers choosing to make upgrades at times most convenient for themselves but not for the system's users, or ERP systems that design all work tasks based solely on financial rules, or production systems structured to help management reporting.

When a formal mandate exists to design a new system, system designers tend to find themselves overwhelmed with participants who want to influence the system's design. On the contrary, when no formal charter exists, it becomes quite hard to find individuals willing to engage and provide their insights. In either case, it is best to engage with individuals in small circles, exceeding no more than 2 or 3 individuals for each session (including the designer), and widening circles progressively.

Individuals are more likely to voice their experiences and ideas in smaller circles in an informal context. The bigger the circle, the more the combination of interactions possible, which after 5 people, becomes very difficult to coordinate and manage.

http://wmposters.com/

If the system has to facilitate tasks performed by a specific group of individuals, involve these individuals in the design process as early as possible. For instance, in order to design an effective point-of-sale system, involve store sales staff who work with the system everyday as they are the most likely group with ideas on how to improve their work.

Sharing experiences and ideas with broader circles is most effectively done through records of these interactions, either in the form of written text, recorded audio, or recorded video. Records of these experiences and ideas should be easy to find and share, and others that are unfamiliar with the context of the records should be able to understand them easily.

It is often awkward to record a conversation as it is taking place. Participants may not be as open to sharing experiences as they would be without recording media or knowing that they will be quoted. Nevertheless, persisting in recording conversations makes it possible to share them, and apply them in system design.

Reluctance in recording experiences stems from either the experience being of a sensitive nature that may have negative implications of the narrator or characters in the narrative, or the experience being partially or complete untrue, or from a hidden agenda of the narrator. If an experience cannot be shared, its value in system design is limited.

Constant reflection on decision-making is required through the entire lifecycle of a system, ranging from inception, design, implementation, operation, alteration, deprecation, and retirement. Whenever there seems to be a definite course of action for a system, reflection on why this is so is valuable step to consider balanced approaches. Past practices provide experience, but they also deceptively lull us into trying to repeat the past. As fundamental and obvious as the need for reflection may be, it tends to occur a lot less than it should in daily practice.

Be wary of an obvious course of action. Why is it obvious? Is it because everyone else does it? Or because it is an existing habit? Be wary of thoughtless mimicry on emergent forms. Respect stable forms by understanding the forces that have shaped them.

http://www.allposters.com/-sp/3-Year-Old-Child-Playing-with-Doll-on-Window-Sill-of-Apartment-Posters_i3595636_.htm

It may seem that a specific set of functionality is absolutely required, but functionality that has been essential in the past may not be essential anymore. It may seem that a particular technology stack is optimal for all problems given that it is a standard of sorts, but the technology stack may have been built for another purpose.

The process of reflection must extend to the methods we employ to solve our problems. All methods, including embodied making, have their limitations. Possessing knowledge of handful of methods that are useful in different situations The process of reflection should include determining the optimal methods and the necessary frame-of-mind required to solve complex problems. No single method can predict the rich variety of situations you will face, and single-mindedly applying a method is dangerous.

When all you've got is a hammer, every problem looks like a nail. Don't bring a jackhammer when a hammer will do. A fool with a tool is still a fool. A toolbox with a variety of basic tools is often adequate for most designers.

http://www.detectamet.co.uk/stainless-steel-hand-tools.php#sthash.30sEVftl.dpbs

Embodied making is especially powerful at capturing human experience, and it complements other knowledge management techniques that are ontological, which are powerful at creating logical methods or intentional, which are powerful at reflecting processes. We strongly encourage the use of other methods alongside embodied making.

innovation, good ideas, and giving ideas their "form"

Where do "good" ideas come from? When is a solution innovative? Innovators are able to observe patterns of social changes before and as they occur, and they create products that fill the needs brought about by social changes. For instance, the instant camera managed to solve a lot of needs brought about by social changes in how families recorded moments in the 1950s. (1)

Photographs can only be seen after film has been processed; Impatience of waiting for film to be processed; Many exposures have to be taken before a roll of film can be processed; Desire to have good pictures to reflect good moments; Film is relatively expensive; Desire to share pictures with others who were not there.

http://creepypasta.wikia.com/wiki/File:Polaroid-camera.jpg

As we think about the forces, and the interactions between forces, ideas will flow on how to resolve them. Each idea should be written down as a solution component, examining how it helps resolves the immediate forces we have considered, and all the forces that emerge afterwards. There is no fixed sequence on writing any of them down.

Similarly, King Gilette recognized social changes in families in the early 1900s and provided a product that fulfilled the needs of families that increasingly spent less time together. (2)

Fathers usually teach sons how to shave; Teaching sons how to shave is an important ritual performed by fathers; Taking care of razors is part of what fathers teach sons about shaving; Tendency for working men to spend longer hours at their jobs; Desire for safety for children; Traditional razors are dangerous if improperly used; Keeping razors sharp requires constant care; Keeping razors rust-free requires constant care; Rusty razors can cause tetanus.

http://www.ukgraphicsdesigners.com/blog/2012/07/20/funny-children-adverts/

John Kemp Starley's invention of the Rover Safety Bicycle in 1885 was a stark departure from the other bicycles of the time. Called a safety bicycle because the other contemporary bikes, such as the Penny Farthing, created unstable conditions for the rider by forcing them to ride at a great height while delivering both power and steering into the large front wheel. Within 10 years of the initial invention, the basic form of the bicycle as we know it today recognizably emerged. In Starley's words, "The main principles that guided me in making this machine were to place the rider at the proper distance from the ground, to place the seat in the right position in relation to the pedals, to place the handles in such a position in relation to the seat that the rider could exert the greatest force upon the pedals with the least amount of fatigue." The design of a bicycle is a convergent problem, where attempted solutions gradually converge on one solution or answer. Automobiles and aircraft, on the other hand, have seen several transformations in their designs due to the changing contexts of fuel availability and costs, extensions to the original design based on purpose (transporting commuters, families, holiday-makers, usage for war, transporting goods, etc.), increased efficiencies, and new requirements for speed and comfort. This is perhaps reflected by the several thousand patents filed by the automotive industry each year. In contrast, divergent problems are ones that do not converge on a single solution, such as the most effective way to educate children, which is still a sphere of active debate with several alternatives. Complex systems with people working together are typically divergent problems. When divergent problems such as designing networks of roads are solved convergently, there can be results liek having homes on two sides of a highway that can only be accessed by cars.

If the social conditions around a product don't see drastic changes, the product itself tends to remain stable. Enhancements to the original product tends to be around reinforcing the original concept, and resolving the incidental forces experienced by the usage of the product.

Tendency to shave in the morning; Lack of time in the morning; Desire to show up at work shaved; Lathering-up takes time.

http://www.nextnature.net/2007/09/evolution-in-the-bathroom/

The purpose of design is to give form to ideas. The form of the product is shaped by the experience users have with it. The expectations of product users are a big influence on the form a product takes. *Consider that the first cars looked like the last horse-drawn carriages.* Changes in fuel supply, technological advances, changes in work and home cultures, and other social changes have seen the form of automobiles change continuously. (3) (4)

© Stamford Historical Society

http://www.ausbcomp.com/~bbott/cars/lutzmann.jpg

In some cases, the social conditions to design a product remain more or less stable (e.g. how people shave), and in other cases, there is continuous social change around the product necessitating its continuous evolution. In order to create innovative products capable of growth, the design process must be able to capture stable social patterns, and those that see continuous change.

Only after a few years of the first successful flight, airplanes were being used for war, transporting mail, and carrying passengers.

http://mix.msfc.nasa.gov/abstracts.php?p=1851

Designing systems embraces greater complexity than products, and creating stable systems necessitates a thorough understanding of the social conditions where they are situated. (5)

Edward Burtynsky, Highway #5, Los Angeles. © Edward Burtynsky, courtesy Nicholas Metivier Gallery, Toronto

(1) Bonanos, Christopher. Instant: The Story of Polaroid. New York: Princeton Architectural, 2012. (2) Spinosa, Charles, Fernando Flores, and Hubert L. Dreyfus. Disclosing New Worlds: Entrepreneurship, Democratic Action, and the Cultivation of Solidarity. Cambridge, MA: MIT, 1997.

(3) Alexander, Christopher. Notes on the Synthesis of Form. Cambridge: Harvard UP, 1964. (4) Hjelm, Sara I. "Semiotics in Product Design", Center of User Oriented IT Design, 2002. (5) Jacobs, Jane. The Death and Life of Great American Cities. [New York]: Random House, 1961.

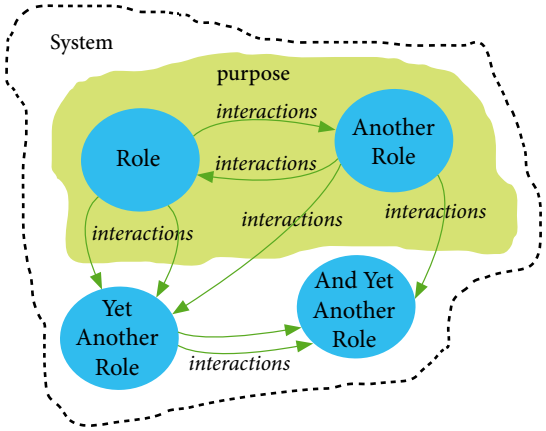
the challenges of contemporary system design

Today more than ever before, we are surrounded by systems, formal and informal, that define the quality of our lives. We encounter them in our workplaces, in our homes, on our vacations, and within our families. We encounter them from the moment we wake to the moment we sleep, and their pervasive nature steers the courses of our lives.

In chaotic situations, we yearn for these systems to have structure, and in overly structured situations, we yearn for systems to have the room for flexibility and creativity. How do we design and sustain systems that strike a balance?

The proliferation of computer systems requires that we understand the effect of technology on our lives in order to balance our own abilities with that of machines. Establishing processes, systems, and automation has become increasingly easier through improvements in technology, making it readily possible for their over-application. Our minds are adept at seeking patterns,

Systems today consist of elements like people, equipment, infrastructure, and computers. They consist of interactions between these elements, and they are held together by common goals and intentions. (1)



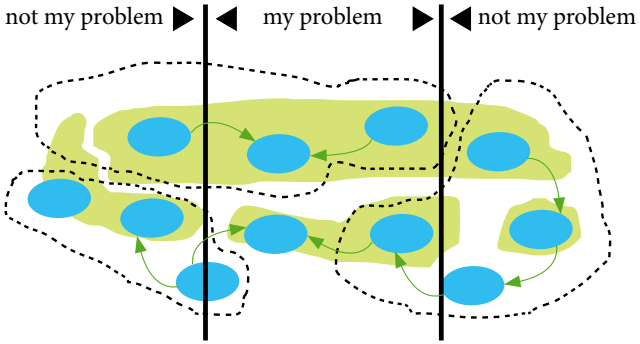
and in the quest for repeatability, we can sometimes be fooled into assuming that personal perspectives or few observations of occurrences constitute a stable pattern. Understanding the roles, interactions, and their purpose requires deep observation of how people work together. Ranging from the Skyguide system failure of the Swiss Air Traffic Control, the repeated booms

When systems fail, they can have disastrous consequences. They can cost human lives, make companies bankrupt, destroy economies, incur job losses, de-stabilize the environment and ecologies to the extent of affecting the planet, and leave the individuals that interact with them frustrated and incapacitated. When they perform well, they enrich human lives, make companies and economies prosper, create and sustain jobs, and bring stability to environments and ecologies around them. Designed well, they enrich our lives. Designed poorly, they leave us feeling frustrated and deficient. (2)

© The King Center, http://dfwhappenings.files.wordpress.com/2012/01/marchjobs.jpg

and busts of stock markets due to loose market controls, to large-scale ERP and CRM implementations that bring limited organizational benefits, and to the state of the planet today, we are surrounded by the consequences of poor systems design. Although it may sometimes seem that the next technological revolution or tool will solve all our problems, this often isn't the case.

And today, more than ever before, we are dealing with complexity on an unparalleled scale. Human populations and organizations are bigger than they have been ever before. Resources and the means to sustain ourselves are more limited than ever before. Competition is increasingly global, and the deep interconnections in systems with their environment constantly challenge their boundaries.



Operating an organization is a complex task, and we often divide these tasks based on specialization. These specializations have a tendency to form departments, and each department becomes focused on narrow concerns. The integral nature of the organization is eroded, and resembles less and less the human body or other complete systems.

And with the rapid emergence of new technologies, there is a tendency to believe that these new technologies will create systems that solve all the problems of the past. If the rationality that produced the older system remains, the new technology is only used to repeat the past more effectively. (3)

"If we implement a social networking tool inside our company, we'll definitely start working together as one company."

"With Gesture-Control, ERP systems will never be the same again."

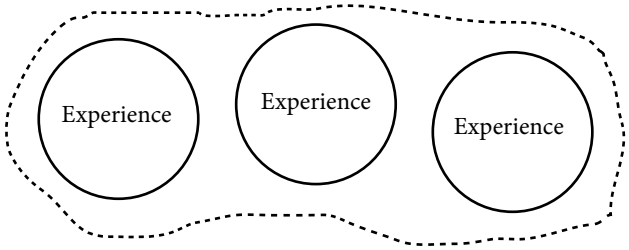
"Now that we have RFID, supply chains will never be the same again."

"Put a GPS tracker on all the meeting room keys, that'll help find anytime and anywhere!"

"All we need to do is to make everything traceable, and we'll completely stop fraud."

Today the average human living in an industrialized society has to learn how to operate around 10,000 devices, ranging from operating coffee machines to buying train tickets from machines. The faddish addition of new technology adds complexity to existing systems, and designers must be able to judiciously gauge their value irrespective of personal affinity or attachment.

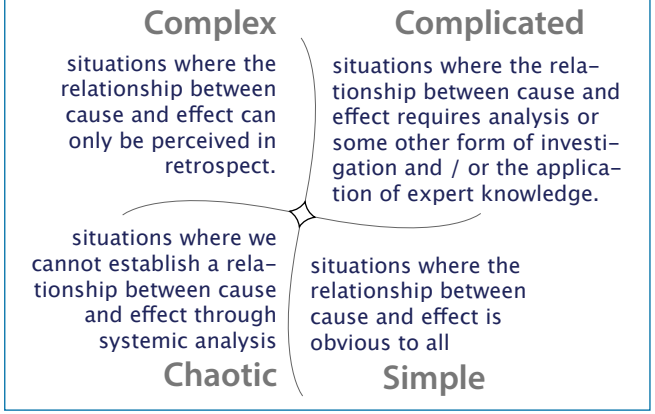
And in designing systems that solve the challenges of their environment effectively that, we must try and understand the experiences people have in those spaces. If we alter the system, we must be able to understand the new experiences that will occur in the same spaces. The people that work with and within these systems must be able to fulfill there purpose, interact effectively with each other, expand and contract their boundaries based on needs, and exist in harmony with their environments.



The term experience can be interpreted as memories or knowledge of our past, such as our work experience, or it can be interpreted as our experience of the present. As much as possible, the design process should be focused on immediate experience by constantly evaluating how much of our retained knowledge is applicable at this very moment.

(1) Meadows, Donella H., and Diana Wright. Thinking in Systems: A Primer. White River Junction, VT: Chelsea Green Pub., 2008. (2) Dörner, Dietrich. The Logic of Failure: Recognizing and Avoiding Error in Complex Situations. Reading, MA: Addison-Wesley Pub., 1997. (3) Norman, Donald A. The Design of Everyday Things. London: MIT, 1998.

A key tenet in embodied making is to understand experiences and situations to their full extent, no matter how complex or chaotic they may appear. Sense-making frameworks like the Cynefin provide assistance in understanding and analysis.



If a customer complains about the lack of clear opening times on a shop, the solution and situation in this case is simple, which is to provide visible opening times for the shop. In a more complicated situation, a customer could want to know about the best product for them, which would necessitate some interactions and analysis. Not all situations, however, can be this simple.

At each stage, try and understand chaos and complexity through stories told about experiences. As you listen to more stories and understand the forces, you might be initially overwhelmed by the volume of stories and forces. The process of finding patterns in the stories and extracting forces from them is usually an enjoyable one, and after a while you will have an adequate body of stories and derived forces.

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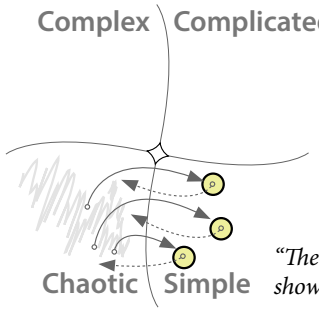
A habit that tends to exist in problem solving environments is to come up with simple solutions without understanding the true complexity or complications inherent in seemingly chaotic environments. Here the tendency is to jump straight away from chaotic situations to simple solutions, which usually bring us back to chaotic situations.



"Let's just solve the low hanging fruit!"

"Just make it happen on an iPad. That'll solve things!"

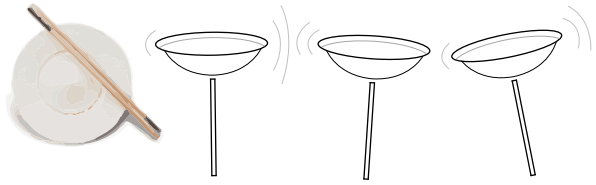
"ERP in the Cloud!"

"The CEO needs a Dashboard which shows everything we can measure

"I spend every day firefighting."

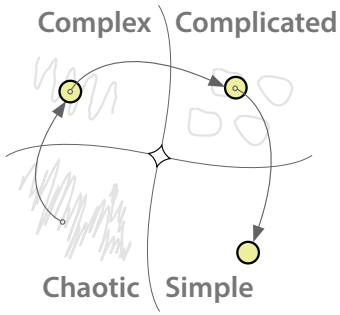
In a complex situation, a customer could show up requesting a product the business doesn't offer, and walk out of the store disappointed. In retrospect, the store owner could realize that a partnership with another nearby store would have ensured that the customer left satisfied. In a chaotic situations where no established relationship between cause and effect, such as

The moment when something feels adequate is up to the your discretion and that of your fellow designers. After this point, you will have to make a conscious effort to simultaneously derive solutions, find more forces as you determine solutions, and uncover more stories. To use the analogy of acrobats spinning plates, you will need to spin the 3 plates of stories, forces, and solutions at a balanced pace. Spin any too slowly or fast, they fall and break. Spin them all at a steady pace if possible.



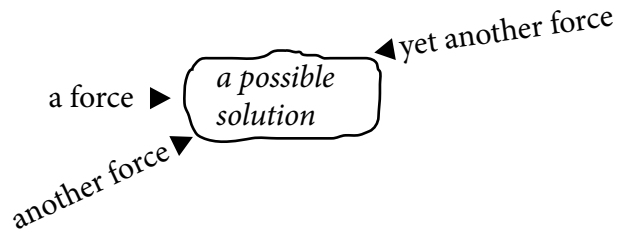
In a complex situation, a customer could show up requesting a product the business doesn't offer, and walk out of the store disappointed. In retrospect, the store owner could realize that a partnership with another nearby store would have ensured that the customer left satisfied. In a chaotic situations where no established relationship between cause and effect, such as

Embodied making encourages designers to understand the nature of chaos through experience, extract complex situations from those experiences, then come to solutions that solve complexity, from those understand complicated situations, then come to solutions that solve those complications, from those understand simple situations, and finally come to simple solutions. It's a painful and long process, but the solutions will be stable.



customers leaving despite being offered the best prices and superior service, the desire to be able to solve things still remains. By deep reflection on the chaotic, some complicated situations can be identified, such as brand perception across market segments, and solutions can be found to question with departed customers on their perception of the brand and the intangible

Embodied making treats the ability of balancing forces as requirements, rather than explicitly stating desired forms or solutions in the manner of must haves, should haves, could haves, or won't haves. In the design process, don't discount some stories or forces as being insignificant early in the design process. Also refrain from defining solution boundaries and scope in the early phases of the design process, and make an effort to understand the entire environment or eco-system where your eventual designs will exist.



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