

# From Text *to Process*

**Bachelor Graphic Design Thesis by Gábor Kerekes**  
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# TABLE OF CONTENTS

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## 0. Abstract

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## 1. Introduction – The World as Text

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## 2. Literacy and power

---

## 3. Designer as agent

---

## 4. Code is law

---

## 5. Interfaces

---

## 6. The World as Process

---

## 7. Conclusion

# 0. ABSTRACT

We live in an age of unprecedented technological development. Computation has reconfigured many fundamental aspects of society, and is continuing to disrupt traditional models of social organization.

At the heart of these developments is software. Software has absorbed into itself many of the past's technologies and today it is beginning to absorb modes of governance: software is taking the place of policy.

Software changes the way we perceive, think, and argue about the world. As the age of movable type and printing fostered a certain kind of thinking – mechanical, linear, object-centered – so does the age of the software facilitate its own specific mentalities – evolutionary, interconnected, system-oriented. These changes exert a gravitational pull on the field of design, whereby the role of designers is being re-casted into that of initiators and facilitators of dynamic systems and platforms, rather than producers of physical artifacts.

In what specific ways does software frame culture, and how can graphic design use this to its own advantage? The following thesis will be an attempt to answer these questions.

As graphic design is maturing into an autonomous discipline with its practitioners increasingly seeking social and political agency, in light of the growing entanglement of social and computing systems and the proliferation of software in all aspects of life, the discipline is challenged to develop new values, skills, and practices to firmly ground itself in midst of the technological turmoils of the 21st century.

# 1. INTRODUCTION – THE WORLD AS TEXT

*One should consider the aggregate of successive environments our trajectory encounters in space-time, in a realistic world of everyday life - that scenery then constitutes the background against which the form of our action sequences and of our projects will stand out: a sort of immense, non-defined page unfolding around us. We perceive it in our field of consciousness as the frame where our actions are located, in what is beginning to be called the action landscape - a limitless text we must decipher through an effort, of which the "printing types" are the elements of the structure and the recognizable "signs," of which the "phrases" are the successive decors of our wandering, and of which the unfolding constitutes the very context of each person's life, something like a reading of the world. —*

*Abraham A. Moles<sup>1</sup>*

I conceive of graphic design as a practice of producing sites of significance and meaning through visual artifacts that serve as instruments for people to situate their actions within the world at large. As graphic designers we define the *non-defined page unfolding around us*, we make the illegible legible, the invisible visible. We place signs in space - both material and ideological -, so that this space can be navigated and pulled within our sphere of influence. We bring the unconscious into consciousness, by drawing and re-drawing the contours of what Abraham A. Moles calls the *action landscape*. We decipher the *limitless text of the world*, we reduce its infinite complexity into navigable maps by rendering its "signs" and "phrases" workable to human understanding, and by doing so, we empower both our audiences and ourselves to make sense of the

material and ideological space we inhabit. We do this hoping that our project will engender meaningful thought and action and will improve upon the conditions of lived experience.

I see Graphic Design as an instrument of reading and writing the world, of understanding it and changing its form. The particular outlook that guided my research is predicated upon the observation that in our contemporary society the "*phrases of the successive decors of our wandering*" are spelled out as programming constructs and that the "*the background against which the form of our action sequences*" is a "*limitless text*" of software. With this thesis, I aim towards and understanding of how to best position myself as graphic designer against that background.

To that end, the key question I will be trying to answer is is the following: How does software frame culture and how can graphic design utilize this to its own advantage?

In the first chapter, *Literacy and power* I explore historical examples of technological change in relation to concepts of literacy, legibility and power. I feel that these topics should be part of my inquiry as one of the implications of the growing proliferation of software is that the world is becoming increasingly illegible to us.

In *Designer as Agent* I trace back the historical origins of this notion and explore relationships between the concepts of agency, power and authorship.

In *Software as Policy* I attempt to give an account of social theories of software and provide examples of how software is elevated to the status of policy, becoming an instrument of power.

In the chapter *Interfaces*, I will describe the mechanisms by which user interfaces produce users, and what this means for the practice of graphic design.

In chapter *The World as Process* I will explore ideas of process philosophy in its relation to graphic design. I look at process as a mode of expression and give reasons for why I think it is an adequate one for representing our contemporary word.

Finally, I will attempt to pull these rather disparate topics together and distill an itinerary for a future practice of graphic design.

#### REFERENCES

1. Abraham A. Moles. *The Legibility of the World: A Project of Graphic Design*. In: Margolin V, ed. *Design Discourse: History, Theory, Criticism*. Chicago: University of Chicago Press; 1989.

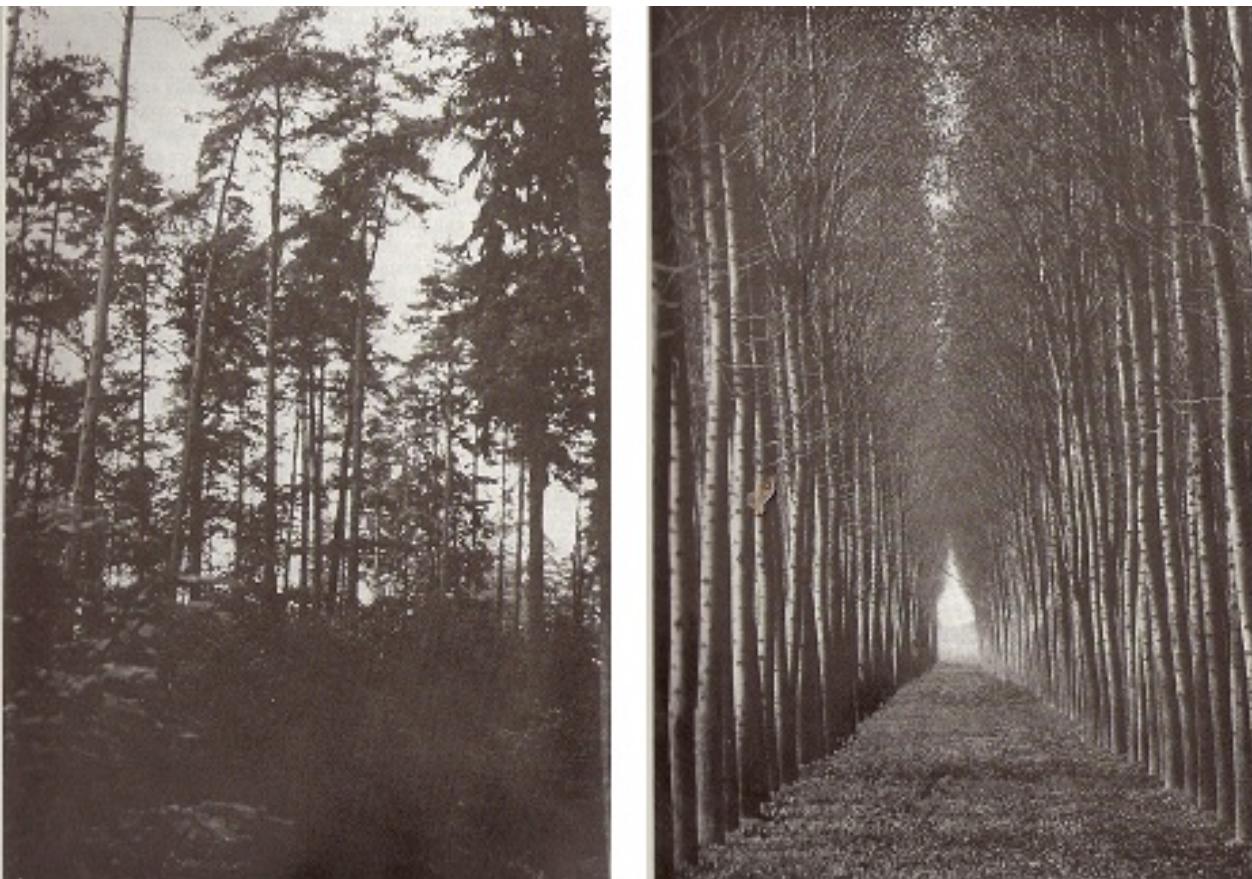
## 2. LITERACY AND POWER

Throughout history, forms of social organization were always tightly related to the ways in which information was produced, distributed and consumed. The freedom and agency of individuals and groups was structured by conditions of access to and control over information. Under feudalism, the power to author these conditions was monopolized by the clergy of the Christian Church. Their power over an illiterate society was sprung from their capacity to frame conditions of existence through religious dogmas. Johannes Gutenberg's invention of the printing press in the 15th century had unleashed a historical process that brought with it revolutions in political and scientific thinking and eventually, a radically different social order.

Until the invention of printing, knowledge could only be reproduced through the expensive and time-consuming way of copying manuscripts by hand. Book production was the monopoly of the Catholic Church which exercised total control over the types of information that could be circulated. Furthermore, literacy was the privilege of an elite and the Church's monopoly over information secured their power over the illiterate majority. Members of the clergy were the only ones that possessed the necessary means of framing reality and producing dominant ways of thinking. Possessing the power of literacy, they were the authors of the laws that structured people's daily experience.

The invention of printing technology had far reaching implications. By enabling the fast and cheap reproduction of information, alternative political views could now be effectively disseminated. Print provided the ground for the practice of public discourse and the distribution of knowledge. This slowly lead to the increase of literacy which empowered a growing number of people to question the dogmas of the Christian Church. The fast and cheap reproduction technique of printing meant that authorship over frames of reality and structures of experience was not anymore the monopoly of the clergy. Over the course of centuries, the free flow of information eroded the power of the Church giving way to the Protestant Reformation, the Renaissance the rise of market

economies, the Enlightenment, the scientific and industrial revolution and the rise of nation states.



## Illegible Natural vs. Legible "Scientific" Forests (pages 16-17 of James Scott's *Seeing Like a State*)

How could a technical innovation induce such a far reaching process of social change? Did it create this change or did it facilitate latent social forces? According to Marshall McLuhan "*[...]with the Gutenberg technology we move into the age of the take-off of the machine. The principle of segmentation of actions and functions and roles became systematically applicable wherever desired*"<sup>1(p276)</sup>

Printing technology's importance did not only lie in its enabling the distribution of knowledge, it was also a protocol of segmentation and modularization, the same protocol that gave rise to the Industrial Society.<sup>2</sup> The main thesis of McLuhan is that new technologies create new ways of framing and perceiving - a new forms of legibility - of the world, which in turn instantiate new forms of social organization. This is what McLuhan meant by the often quoted slogan "The Medium is the Message". The distribution of powers, the specialization of knowledge, the division of labor were all instances of a consciousness that the technology of printing facilitated, or in McLuhan's words: "*Print exists by virtue of the static separation of functions and fosters a mentality that gradually resists any but a separative and compartmentalizing or specialist outlook*"<sup>1(p126)</sup>



Do technological innovations inevitably create new forms of societies? McLuhan is considered to be a theorist of 'technological determinism'.<sup>3</sup> The basic assumption of this theory is that technological progress is the main driving force of the development of societies. Social determinism on the other hand inverts this relationship and posits that societies are the autonomous forces that shape technology. Both are reductionist theories that try to explain the complex relationships between technology and society in terms of a simple cause-end-effect mechanism.

A resolution of conflict between the two opposing views may be found in a synthesis of these theories. The way I see it, it is both counterproductive to see technological change as a force producing inevitable social change, but also to underestimate its potential to reconfigure society. Technologies do not exist separately from their applications. These applications are in turn determined by social forces. However, technologies facilitate certain kinds of social forces, while they repress others. The relationship between society and technology is characterized by feedback loops rather than determinism; technological and social progress are driven by the synergetic effects of both.

Between the mid-18th and mid-19th centuries Great Britain built a vast network of roads within its territory. The work entailed the development of standards and surveying methods through which land could be rendered accessible and legible. The ideals attached to the state's endeavor were akin to the ones that we see today in the self-proclaimed mission of technology companies such as Apple or Facebook: empowering communities to participate by providing them with an infrastructure to connect. The state's vision was to unite England with Scotland and Ireland under one nation and to stimulate trade and economic growth. However, the project of unification produced side-effects of exclusion. One instance of this is that lower-class travelers who could not afford the convenience of owning a carriage wagon became more segregated. Whereas before, the only means of mobility for both the members of middle and lower classes was to travel by foot, advances in transport allowed the more wealthy to seclude themselves in their stagecoaches. Whereas before, everybody had found their ways by asking directions from fellow travelers, some could now just use the ever more detailed maps produced with increasingly sophisticated surveying methods.

*Middle-class persons in a stagecoach, moving from inn to inn, equipped with pocket watches and shepherded by maps and guidebooks, had fewer practical reasons to interact with strangers. Interactions between rich and poor were reoriented around privileges of access to transport developments. Those who could afford to make use of new transportation did; those who could not afford it continued to get around as they had for generations — on foot. Privileges once enjoyed by the upper classes became the norm for middle-class travel. Isolation had the effect of stigmatizing foot travelers, now visibly marked as the wandering poor. Prejudices arose against mobile communities of journeymen.<sup>4</sup>*

The network of roads came to be an instrument of power through their use to render the territory of rebels legible and therefore controllable to the British state. These rebels were the Jacobites, members of a political movement that aimed to restore the Catholic Stuart King James II of England and his heirs to the thrones of England, Scotland and Ireland.<sup>5</sup> According to Guldi more than nine hundred miles of military roads were built connected by one thousand bridges that enabled British troops to keep the areas of Jacobites under surveillance.

*It was hoped that [roads] would also increase industry in the areas through which they passed, but this was a secondary concern; they led straight to the glens where rebel lords dominated, passing few centers of population or industry. They were funded from the same taxes that fueled other military expenditure, and they formed a major laboratory for the invention of new siting, surveying, and paving technologies in difficult territory.*



Power thus, is predicated upon the capacity of rendering the world legible. In the case of 18th-19th century Britain, this capacity manifested as the development of road networks and surveying methods to see and to rule over territories. In the case of the medieval church, it was achieved through maintaining control over the circulation of information, so that the only way to read the world was through the frame of religion. Rendering the world legible is always a process of reduction, of cultural framing.

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| County <u>Lynn</u>  |   | Ward of city <u>first, second &amp; third</u> |   |          |   |           |   |                      |    |           |    | Block No. <u>5</u>   |    | Enumeration District No. <u>18-686</u>  |    |                              |    |                         |    |          |    |                                       |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |    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|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |   |
| Township or other division of county  |   |   |   |          |   |           |   |                      |    |           |    |  |    | Superintendent's District No. <u>5</u>  |    |                              |    |                         |    |          |    |                                       |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 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|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |   |
| Name of street, or, if no street name, name, number, or description of place, or business, farm, plantation, district, etc., to which house or building belongs |   | Uninhabited place                             |   |          |   |           |   |                      |    |           |    |  |    | Emmisioned by me on <u>April 25, 1950</u> , 1950, Blue, Lynn & Patterson, Enumerator. |    |                              |    |                         |    |          |    |                                       |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |   |
| Place of abode  |   | NAME  |   | RELATION |   | HOME DATA |   | PERSONAL DESCRIPTION |    | EDUCATION |    | PLACE OF BIRTH   |    | INDIAN, INDIAN OR NATIVE LANGUAGE OF FOREIGN BORN                                     |    | CITIZENSHIP                  |    | OCCUPATION AND INDUSTRY |    | VETERANS |    |                                       |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |   |
| of each person whose place of abode is shown above  |   | to head of family                             |   | to wife  |   | size      |   | color or eyes        |    | grade     |    | place of birth of each person enumerated and of his or her parents   |    | Linguage spoken at home   |    | for other than United States |    | Occupation              |    | Industry |    | Total number of veterans in household |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |   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   |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |   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| Date  |   | Date  |   | Date     |   | Date      |   | Date                 |    | Date      |    | Date   |    | Date  |    | Date                         |    | Date                    |    | Date     |    | Date                                  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     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| 1   | 2 | 3   | 4 | 5        | 6 | 7         | 8 | 9                    | 10 | 11        | 12 | 13   | 14 | 15  | 16 | 17                           | 18 | 19                      | 20 | 21       | 22 | 23                                    | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 | 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 109 | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 117 | 118 | 119 | 120 | 121 | 122 | 123 | 124 | 125 | 126 | 127 | 128 | 129 | 130 | 131 | 132 | 133 | 134 | 135 | 136 | 137 | 138 | 139 | 140 | 141 | 142 | 143 | 144 | 145 | 146 | 147 | 148 | 149 | 150 | 151 | 152 | 153 | 154 | 155 | 156 | 157 | 158 | 159 | 160 | 161 | 162 | 163 | 164 | 165 | 166 | 167 | 168 | 169 | 170 | 171 | 172 | 173 | 174 | 175 | 176 | 177 | 178 | 179 | 180 | 181 | 182 | 183 | 184 | 185 | 186 | 187 | 188 | 189 | 190 | 191 | 192 | 193 | 194 | 195 | 196 | 197 | 198 | 199 | 200 | 201 | 202 | 203 | 204 | 205 | 206 | 207 | 208 | 209 | 210 | 211 | 212 | 213 | 214 | 215 | 216 | 217 | 218 | 219 | 220 | 221 | 222 | 223 | 224 | 225 | 226 | 227 | 228 | 229 | 230 | 231 | 232 | 233 | 234 | 235 | 236 | 237 | 238 | 239 | 240 | 241 | 242 | 243 | 244 | 245 | 246 | 247 | 248 | 249 | 250 | 251 | 252 | 253 | 254 | 255 | 256 | 257 | 258 | 259 | 260 | 261 | 262 | 263 | 264 | 265 | 266 | 267 | 268 | 269 | 270 | 271 | 272 | 273 | 274 | 275 | 276 | 277 | 278 | 279 | 280 | 281 | 282 | 283 | 284 | 285 | 286 | 287 | 288 | 289 | 290 | 291 | 292 | 293 | 294 | 295 | 296 | 297 | 298 | 299 | 300 | 301 | 302 | 303 | 304 | 305 | 306 | 307 | 308 | 309 | 310 | 311 | 312 | 313 | 314 | 315 | 316 | 317 | 318 | 319 | 320 | 321 | 322 | 323 | 324 | 325 | 326 | 327 | 328 | 329 | 330 | 331 | 332 | 333 | 334 | 335 | 336 | 337 | 338 | 339 | 340 | 341 | 342 | 343 | 344 | 345 | 346 | 347 | 348 | 349 | 350 | 351 | 352 | 353 | 354 | 355 | 356 | 357 | 358 | 359 | 360 | 361 | 362 | 363 | 364 | 365 | 366 | 367 | 368 | 369 | 370 | 371 | 372 | 373 | 374 | 375 | 376 | 377 | 378 | 379 | 380 | 381 | 382 | 383 | 384 | 385 | 386 | 387 | 388 | 389 | 390 | 391 | 392 | 393 | 394 | 395 | 396 | 397 | 398 | 399 | 400 | 401 | 402 | 403 | 404 | 405 | 406 | 407 | 408 | 409 | 410 | 411 | 412 | 413 | 414 | 415 | 416 | 417 | 418 | 419 | 420 | 421 | 422 | 423 | 424 | 425 | 426 | 427 | 428 | 429 | 430 | 431 | 432 | 433 | 434 | 435 | 436 | 437 | 438 | 439 | 440 | 441 | 442 | 443 | 444 | 445 | 446 | 447 | 448 | 449 | 450 | 451 | 452 | 453 | 454 | 455 | 456 | 457 | 458 | 459 | 460 | 461 | 462 | 463 | 464 | 465 | 466 | 467 | 468 | 469 | 470 | 471 | 472 | 473 | 474 | 475 | 476 | 477 | 478 | 479 | 480 | 481 | 482 | 483 | 484 | 485 | 486 | 487 | 488 | 489 | 490 | 491 | 492 | 493 | 494 | 495 | 496 | 497 | 498 | 499 | 500 | 501 | 502 | 503 | 504 | 505 | 506 | 507 | 508 | 509 | 510 | 511 | 512 | 513 | 514 | 515 | 516 | 517 | 518 | 519 | 520 | 521 | 522 | 523 | 524 | 525 | 526 | 527 | 528 | 529 | 530 | 531 | 532 | 533 | 534 | 535 | 536 | 537 | 538 | 539 | 540 | 541 | 542 | 543 | 544 | 545 | 546 | 547 | 548 | 549 | 550 | 551 | 552 | 553 | 554 | 555 | 556 | 557 | 558 | 559 | 560 | 561 | 562 | 563 | 564 | 565 | 566 | 567 | 568 | 569 | 570 | 571 | 572 | 573 | 574 | 575 | 576 | 577 | 578 | 579 | 580 | 581 | 582 | 583 | 584 | 585 | 586 | 587 | 588 | 589 | 590 | 591 | 592 | 593 | 594 | 595 | 596 | 597 | 598 | 599 | 600 | 601 | 602 | 603 | 604 | 605 | 606 | 607 | 608 | 609 | 610 | 611 | 612 | 613 | 614 | 615 | 616 | 617 | 618 | 619 | 620 | 621 | 622 | 623 | 624 | 625 | 626 | 627 | 628 | 629 | 630 | 631 | 632 | 633 | 634 | 635 | 636 | 637 | 638 | 639 | 640 | 641 | 642 | 643 | 644 | 645 | 646 | 647 | 648 | 649 | 650 | 651 | 652 | 653 | 654 | 655 | 656 | 657 | 658 | 659 | 660 | 661 | 662 | 663 | 664 | 665 | 666 | 667 | 668 | 669 | 660 | 661 | 662 | 663 | 664 | 665 | 666 | 667 | 668 | 669 | 670 | 671 | 672 | 673 | 674 | 675 | 676 | 677 | 678 | 679 | 680 | 681 | 682 | 683 | 684 | 685 | 686 | 687 | 688 | 689 | 690 | 691 | 692 | 693 | 694 | 695 | 696 | 697 | 698 | 699 | 690 | 691 | 692 | 693 | 694 | 695 | 696 | 697 | 698 | 699 | 700 | 701 | 702 | 703 | 704 | 705 | 706 | 707 | 708 | 709 | 710 | 711 | 712 | 713 | 714 | 715 | 716 | 717 | 718 | 719 | 720 | 721 | 722 | 723 | 724 | 725 | 726 | 727 | 728 | 729 | 730 | 731 | 732 | 733 | 734 | 735 | 736 | 737 | 738 | 739 | 730 | 731 | 732 | 733 | 734 | 735 | 736 | 737 | 738 | 739 | 740 | 741 | 742 | 743 | 744 | 745 | 746 | 747 | 748 | 749 | 740 | 741 | 742 | 743 | 744 | 745 | 746 | 747 | 748 | 749 | 750 | 751 | 752 | 753 | 754 | 755 | 756 | 757 | 758 | 759 | 750 | 751 | 752 | 753 | 754 | 755 | 756 | 757 | 758 | 759 | 760 | 761 | 762 | 763 | 764 | 765 | 766 | 767 | 768 | 769 | 760 | 761 | 762 | 763 | 764 | 765 | 766 | 767 | 768 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855 | 856 | 857 | 858 | 859 | 850 | 851 | 852 | 853 | 854 | 855 | 856 | 857 | 858 | 859 | 860 | 861 | 862 | 863 | 864 | 865 | 866 | 867 | 868 | 869 | 860 | 861 | 862 | 863 | 864 | 865 | 866 | 867 | 868 | 869 | 870 | 871 | 872 | 873 | 874 | 875 | 876 | 877 | 878 | 879 | 870 | 871 | 872 | 873 | 874 | 875 | 876 | 877 | 878 | 879 | 880 | 881 | 882 | 883 | 884 | 885 | 886 | 887 | 888 | 889 | 880 | 881 | 882 | 883 | 884 | 885 | 886 | 887 | 888 | 889 | 890 | 891 | 892 | 893 | 894 | 895 | 896 | 897 | 898 | 899 | 890 | 891 | 892 | 893 | 894 | 895 | 896 | 897 | 898 | 899 | 900 | 901 | 902 | 903 | 904 | 905 | 906 | 907 | 908 | 909 | 900 | 901 | 902 | 903 | 904 | 905 | 906 | 907 | 908 | 909 | 910 | 911 | 912 | 913 | 914 | 915 | 916 | 917 | 918 | 919 | 910 | 911 | 912 | 913 | 914 | 915 | 916 | 917 | 918 | 919 | 920 | 921 | 922 | 923 | 924 | 925 | 926 | 927 | 928 | 929 | 920 | 921 | 922 | 923 | 924 | 925 | 926 | 927 | 928 | 929 | 930 | 931 | 932 | 933 | 934 | 935 | 936 | 937 | 938 | 939 | 930 | 931 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1013 | 1014 | 1015 | 1016 | 1017 | 1018 | 1019 | 1020 | 1021 | 1022 | 1023 | 1024 | 1025 | 1026 | 1027 | 1028 | 1029 | 1020 | 1021 | 1022 | 1023 | 1024 | 1025 | 1026 | 1027 | 1028 | 1029 | 1030 | 1031 | 1032 | 1033 | 1034 | 1035 | 1036 | 1037 | 1038 | 1039 | 1030 | 1031 | 1032 | 1033 | 1034 | 1035 | 1036 | 1037 | 1038 | 1039 | 1040 | 1041 | 1042 | 1043 | 1044 | 1045 | 1046 | 1047 | 1048 | 1049 | 1040 | 1041 | 1042 | 1043 | 1044 | 1045 | 1046 | 1047 | 1048 | 1049 | 1050 | 1051 | 1052 | 1053 | 1054 | 1055 | 1056 | 1057 | 1058 | 1059 | 1050 | 1051 | 1052 | 1053 | 1054 | 1055 | 1056 | 1057 | 1058 | 1059 | 1060 | 1061 | 1062 | 1063 | 1064 | 1065 | 1066 | 1067 | 1068 | 1069 | 1060 | 1061 | 1062 | 1063 | 1064 | 1065 | 1066 | 1067 | 1068 | 1069 | 1070 | 1071 | 1072 | 1073 | 1074 | 1075 | 1076 | 1077 | 1078 | 1 |

In the following chapter, I will take a closer look at this issue from the perspective of graphic design and what this means in terms of social agency and the role of authorship within our discipline.

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### 3. DESIGNER AS AGENT

Designer as author, citizen, cultural critic, activist. Moving away from the notion of design as commercial service, current thinking on design is trending towards redefining the role of the designer as an independent social agent, who brings critical issues of contemporary society into view. The designer is not waiting anymore for the phone call or e-mail of a potential commissioner, s/he takes an active role in both the initiation and production of projects. And projects, that are not aimed at the manufacture of desires for the latest consumer products, but at amplifying positive social forces that are in line with the designer's own values or exposing the shortcomings of dominant modes of thinking. These relatively new ideas about the designer's identity can be traced back to the 1980's, when the field of design was disrupted both by the proliferation of post-modernist thought and the introduction of the personal computer as the primary design tool.

The concept of post-modernism has different interpretations. Some scholars see it as a description of style: "*a rejection of the traditional visual forms of modernism*"<sup>1</sup>, while for others, such as Frederic Jameson, "*it is also a periodizing concept whose function is to correlate the emergence of new formal features in culture with the emergence of a new type of social life and a new economic order - what is often euphemistically called modernization, postindustrial or consumer society, the society of the media or the spectacle, or multinational capitalism.*"<sup>2</sup> However, for the purposes of finding out how the notion of "designer as social agent" emerged, finding an exact description of post-modernism is not so important; rather, an understanding of the sentiments it brought about may be more helpful: disappointment, cynicism, disenchantment. These sentiments, of course are strongly related to the new social order of the consumer society, to the increasing media saturation and to the expansion of multinational capitalism that Jameson is describing.

Modernist graphic design was concerned with the pursuit of universality by "*an objective attitude in the presentation of the subject*".<sup>3</sup> With the global expansion of capitalism and the ever increasing commodification of all aspects of life, this view could no longer be

justified. As multinational companies increasingly invested in the creation of attractive brand-identities graphic design's role in supporting these developments became evident. In his book, the Society of the Spectacle, Guy Debord has powerfully expressed the importance of images in supporting the commodification of life: "*The present stage, in which social life has become completely dominated by the accumulated productions of the economy, is bringing about a general shift from having to appearing — all "having" must now derive its immediate prestige and its ultimate purpose from appearances.*"<sup>4</sup>

The realization that graphic artifacts and representation always frame the world in specific ways resulted in the disillusionment with principles of modernism and ignited a rebellion against them, both in the stylistic aspects of design, and in graphic designers' seeking for greater autonomy. A growing awareness had started to develop within the field, that graphic artifacts are always in support of specific outlooks, and as such, graphic design is a major form of cultural and social production. A new, critical sensibility has gained foothold in the consciousness of graphic designers and many of them shifted their efforts towards greater social awareness.

The proliferation of personal computers during the 1980's and the introduction of desktop publishing software, access to design tools had opened to everyone. Now that anybody who had a computer could practice graphic design, it became even more urgent to contribute more than technical production skills. As a result, the role of designers as cultural agents had intensified.

This is illustrated by the discourse on the question of authorship and agency of designers that continued in the 90's. Rick Poynor's article 'Designer as Author' published in 1991 in the UK magazine Blueprint, contemplated how the typographic work of Neville Brody and Jonathan Barnbrook went beyond the mere representation of a client's message.<sup>5</sup> In 1996 Michael Rock wrote an essay with the same title for Eye magazine, arguing that it is a feeling of insecurity over the value of graphic designers' work that fuels the preference of originating content versus only giving form to content.<sup>6</sup> In 2005, Michael Rock came back with 'Fuck Content', published in Multiple Signatures, in which he re-framed the visual treatment of content as being "*a kind of text itself, equal to, and as complex and referential as traditional forms of content*".<sup>7</sup> In his 2006 contribution to the discussion entitled 'Research and Destroy', Daniel van der Velden (Metahaven) argued that "*today, an important graphic design is one generated by the designer himself, a commentary in the margins of visual culture*".<sup>8</sup> In his 2007 essay 'Designers and Dilettantes', published on Design Observer, Dmitry Siegel asked the question 'If the designer is author, what becomes of the designer as designer?' and put forward the argument that designers can better utilize their agency and have an impact in the commercial arena.<sup>9</sup>

It is now 2016 and discussions on the social agency of graphic designers is still a topic of discussion. At this point I feel that it useful to take a step backwards and try to clarify what the notion of agency really means and what relation it has to authorship.

In my interpretation, agency means the capacity to engage in actions towards specific goals or in other words, the ability to bring about changes and consequences in the world at large. As such, agency is a notion synonymous with the notion of power. The materialization of one's agency is the exercise of one's power.

If agency is the *capacity to exert power* then authorship is a

specific role in which this capacity can be utilized; it is a *form of exerting power*. It is a role through which the the capacity of shaping people's minds can be utilized by asserting arguments through speech, writing or other communicative artifacts. Authors construct meaning through communicative actions or artifacts in the hope of exerting influence on the thoughts, beliefs and attitudes held by the recipients of the their work, thereby reshaping the recipients' relationship to the matter at hand and subsequently their courses of action. Constructed meaning can be mediated to the recipients by different artifacts, each of which possess specific affordances to persuasion. It is different to make arguments in speech, writing, images, moving images, graphics, typography or any combinations of these.

How might we construct compelling arguments about our contemporary world? What rhetoric devices can we employ to effectively represent the current state of affairs? Before I attempt to answer these questions, I will move on to explore the concept of the *Network Society* and the extent to which software functions as a cultural frame and instrument of power.

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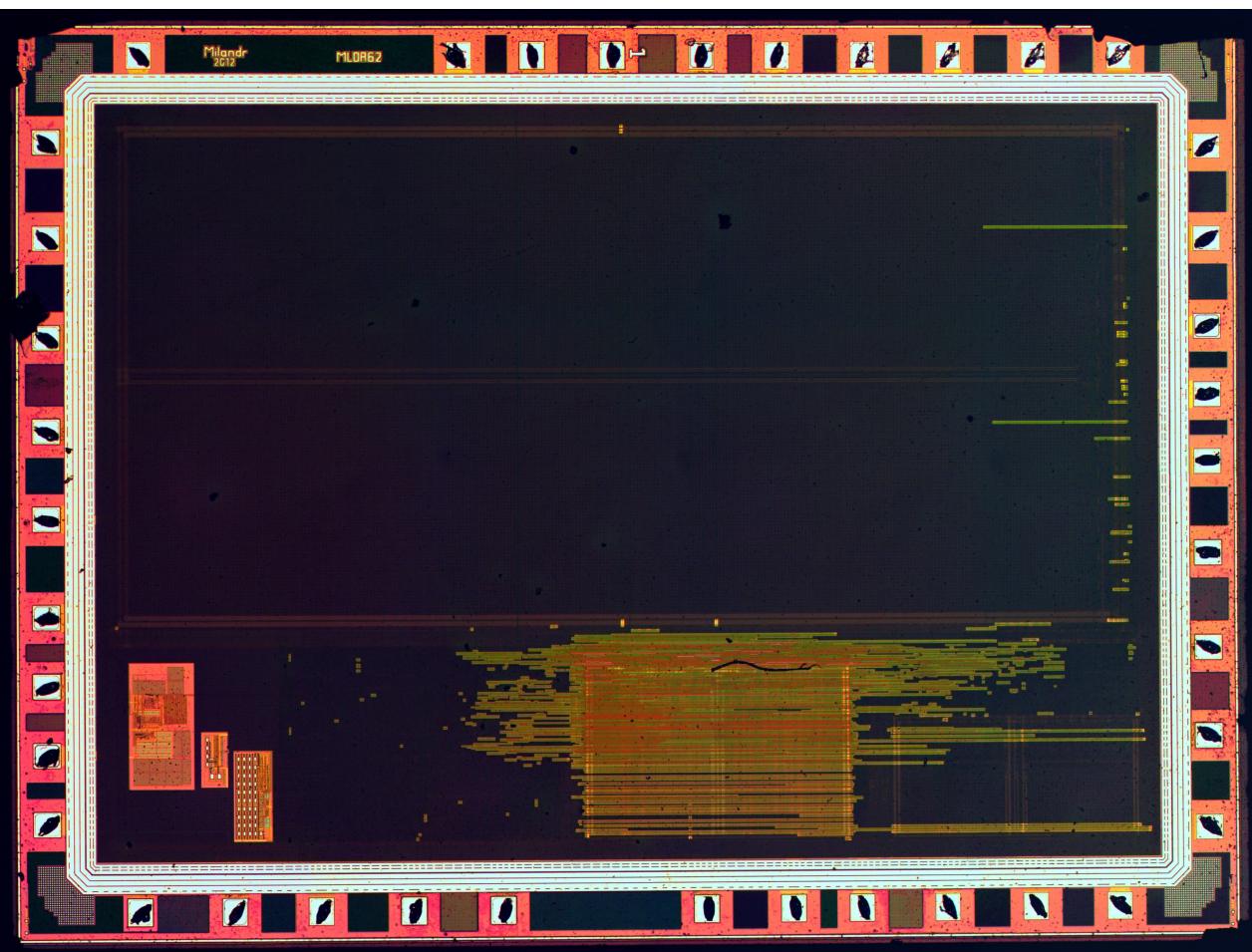
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## 4. CODE IS LAW

### 4.1 THE NETWORK SOCIETY

According to sociologist Manuel Castells, the current social paradigm we inhabit is what he named *the Network Society*. In '*Materials for an Exploratory Theory of the Network Society*'<sup>1</sup> he writes: "*The network society is a specific form of social structure tentatively identified by empirical research as being characteristic of the Information Age.*" By social structure he means "*the organizational arrangements of humans in relationships of production/consumption, experience, and power, as expressed in meaningful interaction framed by culture*" whereas by Information Age he refers to "*a historical period in which human societies perform their activities in a technological paradigm constituted around microelectronics-based information/communication technologies, and genetic engineering.*"

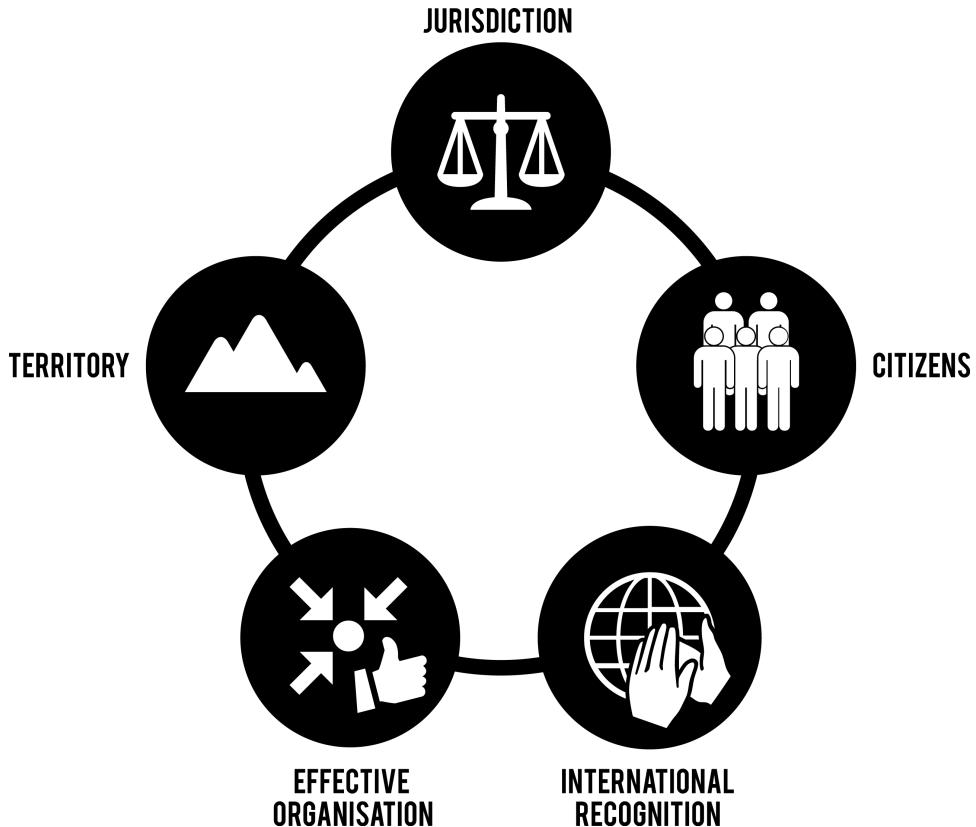
In last two decades we have entered a new technological paradigm characterized by the global expansion of networked computing technologies. Castells writes that networks have been an important part of social organization since antiquity, but the power of these networks were limited by the communication technologies of their age. He goes on to argue that the ongoing revolution in our communication technologies - underpinned by the exponential increase of information processing power and the simultaneous proliferation of information networks - enabled a social development which he describes as a kind of decentralization of power relations. A shift from "*hierarchical bureaucracies based on the vertical integration of resources and subjects as the expression of the organized power of a social elite*" that characterized the social organization of the industrial age to the contemporary social arrangement consisting of a set of interconnected nodes where power is distributed over a multiplicity of centers.<sup>2</sup>



Castells developed his theory of the Network Society during the 1990's, a time when the *Internet Revolution* was seen through utopian visions and surrounded by great deal of optimism. While his account of the interplay between technological and social forces and his emphasis on networks as the primary form of social organization make up a useful frame through which to think about the ongoing changes that are taking place within contemporary societies, the emergence of global internet platforms since the turn of millennia unfortunately counters the narrative of decentralization and the flattening of vertically integrated powers. The corporations whose products and platforms are the main facilitators of the current information revolution constitute a new form of *social elite*, whose ideologies and software products are new *expressions of organized power*.

Castells identifies two major ways power is exercised: violence (or the possibility of it) and persuasion, the transformation of people's minds. Power relations used to exist within easily identifiable territorial boundaries. These territorial boundaries were formed by nation-states through claiming the monopoly of violence within a given territory and propagation of nationalist sentiments within this territory. Nation, state and territory thus used to define the boundaries of a society.<sup>3</sup> The accelerating process of globalization from the 1980s onwards has weakened the role of nation-states and the geographical boundedness of power. Although nation states did not disappear, today "*the national boundaries of power relationships are just one of the dimensions in which power and counterpower operate.*" Global economic and communication networks have transcended the geographical boundaries of nation states, and under these conditions the role of states have been reduced to that of nodes within these global networks.<sup>3</sup>

Cloud platforms such as Google, Facebook, Apple or Microsoft are some of the newest materializations of this process. Castells names one of the most crucial forms of power in the network society: network-making power. He defines it as the "*power to program specific networks according to the interests and values of the programmers, and the power to switch different networks following the strategic alliances between the dominant actors of various networks*"<sup>4</sup>



Programming and switching are terms borrowed from the field of computer science that he uses as metaphors to describe the constitution of power within a network. As such, their meanings are ambiguous. Programming simultaneously means the actual composition of computer code, but also legal code; the erection of policies that govern the mechanisms of the network. Switching borrows from the linguistic construct of the *switch statement* in programming languages<sup>5</sup>. In programming it is used to control the flow of execution of a computer program, but in its social dimension, it denotes the ability to connect and to ensure the cooperation of different networks.

What these terms hint at is that social processes have become tightly coupled with software processes: the construction of computer code conditions the construction of society and vice versa. The meaning of legal code and computer code collapse into one another.

A fitting example of this is Google. Its executive chairman Eric Schmidt embodies the essential characteristics of a switcher. He connects the information network of Google to the political network of the United States. In 2008, he was an informal advisor and major donor during Barack Obama's presidential campaign. When Obama was elected, Schmidt became a member of Obama's transition advisory board and later a member of the United States President's Council of Advisors on Science and Technology (PCAST).<sup>6</sup> He is an

interface between the corporate interests of Google and the political interests of the United States.

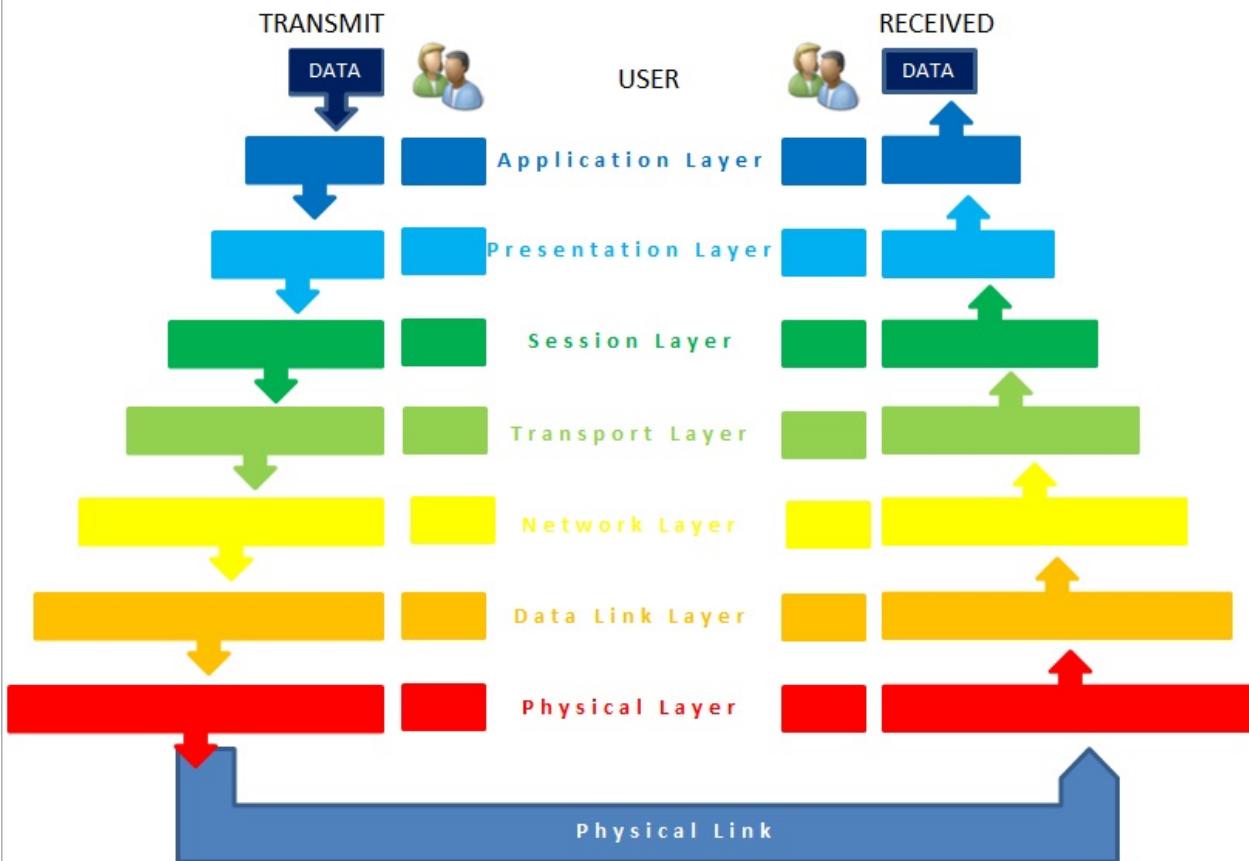
In terms of programming, the past conflicts between Google and China illustrate how values and interests manifested in the programming of a network can create points of friction with state power. The conflict was essentially a conflict of interests around the questions of freeness of information flow and censorship. It involved a Chinese cyber-attack on Google, to which Google responded by lifting its self-censorship. Years of battles entailed and in the process Google has lost almost all of its marketshare in China.<sup>7</sup>

## 4.2 THE STACK

What we see is that software platforms are deforming the traditional geography of politics predicated upon the territorial integrity of nation states, and are creating a new form of polity in their own image,<sup>8</sup> the laws of which are the actual code that makes up their software.

**Benjamin Bratton's theory of The Stack<sup>9</sup>.** Borrowing from the TCP/IP - OSI<sup>10</sup> model of communication protocols he describes current and future societies as being part of a hardware-software stack.

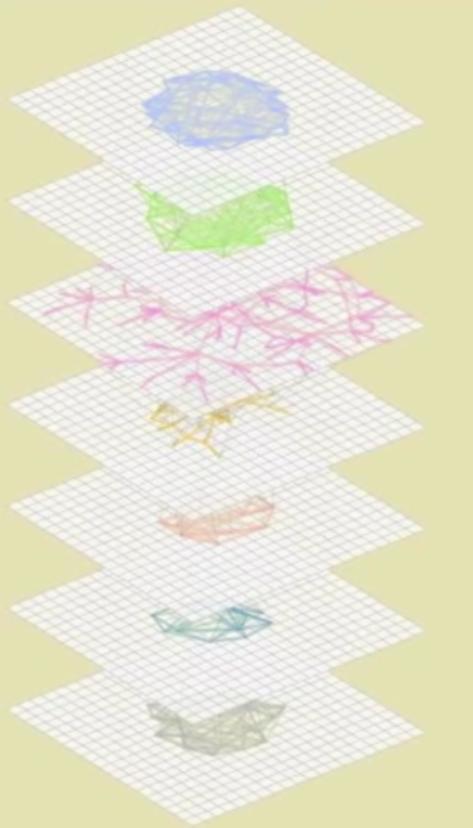
7 Layers of the OSI Model



In a discussion about The Stack with Metahaven he says:

*Right now the geopolitics of the Cloud are defined by a clash between State and non-State organizations [...] with decentralized networks in between. In the coming years, the geopolitics of the Cloud will be defined by the tension and conversion of States and Clouds into one another: States becoming Cloud-based platforms, and Cloud-based platforms taking on more and more practical forms of sovereignty—identity, geography, mobility. So a Cloud Polis, we might imagine, would represent other weird kinds of “sovereign” software/State platforms that are probably not bound to specific spots of territory in the same way as the Westphalian nation-state was. They might be more effective and democratic, or more totalitarian, more or less elective than the models we have now.*

*The Stack* is the totality of technologies, materials, human and non-human actors that in one way or another constitute part of what Bratton calls a planetary-scale computational megastructure. The Stack includes cloud platforms, servers, laptops, smart phones, ubiquitous sensors, the conflict minerals these are made of, smart energy grids and cities, ambient intelligence, interfaces, and their users. It is a computational layer that envelopes the crust of the earth. Instead of seeing these parts in isolation, Bratton proposes to view them as parts of an accidental megastructure, that layer by layer align themselves into a Stack. The theory of The Stack aims to fill a theoretical void concerning how the transformations driven by computing technology distort and reconfigure modes of political participation, citizenship and geography. What sort of agency can we possess within the Cloud and how can we utilize it?



**:: Earth ::**

**:: Cloud ::**

**:: City ::**

**:: Network ::**

**:: Address ::**

**:: Interface ::**

**:: User ::**

There is an asymmetric relationship of legibility between Users and the Cloud. Consider the psychological experiment Facebook conducted on its users in 2012. Facebook deployed code that manipulated the emotional content of the news feed of users by either making the sentiment of the content more positive or negative. They found that people were more likely to express similar emotional states in their own posts to what they were exposed to. While setting aside the question of whether this experiments proves anything significant, it does demonstrate an unequal relationship of power, that is users are legible to the cloud, while the cloud is illegible to users.



To further elaborate on this condition, let's take another company that epitomizes the practice of power through software: Uber. Uber is an online platform and mobile app through which customers in need of a ride are connected to drivers that use their own cars, i.e. informal taxi drivers. The Canadian film-maker Andrew Callaway conducted an experiment of serving Uber customers for a month in San Francisco and published an article '*Apploitation in a city of instaserfs*' to summarize his experiences. He writes:

***Realistically, people aren't driving around strangers because they love it. They do it because they need to earn a living and it's been hard in America since 2008. Workers are grateful for what they can get and here it's the companies who have all the control. The standard ride-sharing or courier app's business model looks something like this:***

- 1. When introducing your app into a new city, take heavy losses by over-paying drivers and under-charging customers.***
- 2. Offer drivers cash bonuses to get their friends to sign up.***
- 3. Once you've got a steady supply of drivers invested in the app, start lowering their pay.***

*The companies don't send out an apologetic email letting drivers know a pay cut is on the way. It happens inconspicuously through "upgrades" to the app, which can often change fare and payment rates. Only drivers with enough extra time to carefully analyze their earnings will notice that the new terms don't work in their favour. After enough pay cuts, some will quit, but many in the workforce buy cars specifically to become a part of the sharing economy and end up stuck, continuing to work for less money or switching to one of the other apps.<sup>11</sup>*

What becomes visible through these cases is a new form of social contract that structures conditions of everyday experience, labor, consumption and power. Lawrence Lessig has already outlined this condition in his essay 'Code is Law' in 2000.<sup>12</sup> At that time, the internet seemed like a space impossible to submit to any kind of regulation. It was commonly thought that by its very architecture it could guarantee liberty. That has turned out not to be true. Lessig foresaw what would unfold in the coming decades: if legal code is not implemented in computer code, computer code will displace legal code. If code would not implement governmental interests, it would implement private interests.

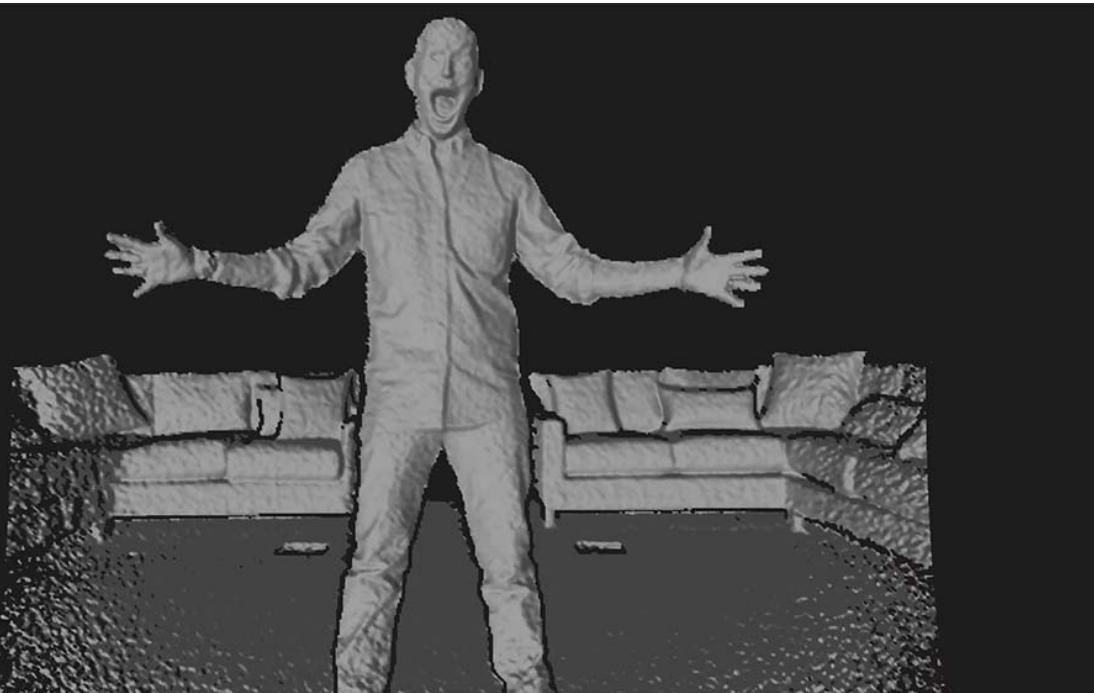
This is where we are today. Cloud platforms are displacing state power. Their software constitutes the laws that set the conditions for and govern our social interactions and everyday experience. These laws are proprietary, developed in the private code repositories of cloud platforms. We are fully transparent to them, while they are fully opaque to us.

**Index.** These groups of data were disclosed by facebook (click for more details):

|  |                                      |   |   |
|--|--------------------------------------|---|---|
| 00. <a href="#">Target</a>                 | 13. <a href="#">Date of Birth</a>    | 28. <a href="#">Machines</a>              | 43. <a href="#">Privacy Settings</a>    |
| 00. <a href="#">Date Range</a>             | 14. <a href="#">Education</a>        | 29. <a href="#">Messages</a>              | 44. <a href="#">Profile Blurb</a>       |
| -----                                      | 15. <a href="#">E-Mails</a>          | 30. <a href="#">Minifeed</a>              | 45. <a href="#">Realtime Activities</a> |
| 01. <a href="#">About Me</a>               | 16. <a href="#">Events</a>           | 31. <a href="#">Name</a>                  | 46. <a href="#">Recent Activities</a>   |
| 02. <a href="#">Account End Date</a>       | 17. <a href="#">Family</a>           | 32. <a href="#">Name Changes</a>          | 47. <a href="#">Registration Date</a>   |
| 03. <a href="#">Account Status History</a> | 18. <a href="#">Favourite Quotes</a> | 33. <a href="#">Networks</a>              | 48. <a href="#">Relationship</a>        |
| 04. <a href="#">Address</a>                | 19. <a href="#">Friend Requests</a>  | 34. <a href="#">Notes</a>                 | 49. <a href="#">Religious Views</a>     |
| 05. <a href="#">Alternate Name</a>         | 20. <a href="#">Friends</a>          | 35. <a href="#">Notification Settings</a> | 50. <a href="#">Removed Friends</a>     |
| 06. <a href="#">Applications</a>           | 21. <a href="#">Gender</a>           | 36. <a href="#">Notifications</a>         | 51. <a href="#">Screen Names</a>        |
| 07. <a href="#">Chat</a>                   | 22. <a href="#">Groups</a>           | 37. <a href="#">Password</a>              | 52. <a href="#">Shares</a>              |
| 08. <a href="#">Checkins</a>               | 23. <a href="#">Hometown</a>         | 38. <a href="#">Phone Numbers</a>         | 53. <a href="#">Status Updates</a>      |
| 09. <a href="#">Connections</a>            | 24. <a href="#">Last Location</a>    | 39. <a href="#">Photos</a>                | 54. <a href="#">Vanity</a>              |
| 10. <a href="#">Credit Cards</a>           | 25. <a href="#">Linked Accounts</a>  | 40. <a href="#">Physical Tokens</a>       | 55. <a href="#">Wallposts</a>           |
| 11. <a href="#">Currency</a>               | 26. <a href="#">Locale</a>           | 41. <a href="#">Pokes</a>                 | 56. <a href="#">Website</a>             |
| 12. <a href="#">Current City</a>           | 27. <a href="#">Logins</a>           | 42. <a href="#">Political Views</a>       | 57. <a href="#">Work</a>                |

The Stack thickens. As more and more devices, sensors and artificial intelligence is deployed in the coming decades, it will become increasingly saturated and illegible. When we accept end-user-license-agreements we become part of the Stack, and we agree to the code that governs its logic, without being fully aware of its contents. Academics such as Bratton have taken on the role of symbolically dismantling the layers of the Stack in order make it more legible.

The same challenge could also be articulated within the domain of graphic design. As I see it, graphic design's role is to render spaces legible - be it material space or the space of ideas -, so that one can better situate oneself within these spaces and become more able to assert one's own life project.



In fragments and in a reduced form, the Stack already makes itself visible to us through the layer that exists in-between us, its Users, and the rest of its parts. This layer is the graphical user interface and it is the layer that most readily lends itself as an object of designation to the discipline of graphic design.

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# 5. INTERFACES

## 5.1 TRANSLATION OF VOLTAGE DIFFERENCES

An interface is a surface or a boundary at which two independent systems connect and interact. The term is used in biology for the common boundary between living beings and their environment (such as the skin), in chemistry for the boundary between two different phases of matter (such as an insoluble solid and a liquid), and in social science for the areas or points where two or more social groups connect.<sup>1</sup> Most commonly though, the term is used in computing, referring to the boundary through which two separate components of a computer system exchange information. One such boundary is the graphical user interface (GUI), through which interactions between humans and machines occur, and which will be the focal point of this section.

Today user interfaces are the main sites at which graphic design is produced. For this reason, I find it important to understand how these artifacts perform their functions and what effects these functions entail. Through the following text I would like to show that interfaces are not simply surfaces that make the use of computers convenient, but also ways of cultural framing that shape our practices and perceptions about the world.

The world is increasingly permeated by software. It is in traffic-control systems, cashier desks, ATM kiosks, cars, trains, airplanes, microwaves, washing machines, medical equipment, fitness trackers, watches, cameras, phones, servers, personal computers. We are moving towards a time in which every square inch of the world will process and emit information and all of this will be facilitated by software.

Despite its proliferation, the meaning of software is challenging to define. According to Wikipedia, it is *any set of instructions that directs a computer to perform specific operations*.<sup>2</sup> It is interesting to note that software is widely considered as being separate from hardware: an immaterial layer on top of it. Friedrich Kittler argued differently: "there is no software" because all computing operations ultimately come down to *signifiers of voltage differences*<sup>3</sup>.

Software can be likened to language: it can be thought of as a system of representing and manipulating symbols. It is the tool to represent the voltage differences mentioned by Kittler, that is: hardware operations. At the lowest level of representation there is a direct correspondence between software and the architecture of the hardware it controls. Such representations are written in low-level, so-called assembly languages, where constructs of the programming language directly denote specific actions of the underlying hardware. In the early days of computing, programs were written as direct instructions to the machine in assembly languages. Later, high-level programming languages were designed to abstract these operations. They allow the writing of human readable code that is automatically translated to machine code by the processes of compiling or interpretation. By separating instructions from the machine, they make hardware invisible, or rather, they translate its appearance into understandable forms.

Software is mounted on top of hardware as a stack. (Here I am not talking about Benjamin Bratton's Stack, although his theory is a particular interpretation of the same concept. Stacks are a recurring pattern of organization within computer science. see Wikipedia articles *Stack (abstract data type)*<sup>4</sup> or *Call stack*<sup>5</sup>). In-between the layers of the stack are interfaces that abstract the details of the underlying layer. The higher a piece of software is located within the stack, the higher the abstraction it provides from the machine. The highest level of abstraction is the graphical user interface.

Through the example of a mouse-click fired upon a button within a web-interface, for a brief while I would like meditate on the complexity that is abstracted by the user interface. When a mouse button is clicked, the mechanical switch behind the button closes an electrical circuit. An electric signal is sent through a wire to the computer's *Universal Serial Bus (USB)*<sup>6</sup> outlet, which connects to the USB Controller on the computer's motherboard. The USB Controller generates a so-called *interrupt-request*,<sup>7</sup> an alert to the processor to a high-priority condition that needs immediate processing. The processor suspends all its current activities, saves its state and executes a function called an *interrupt handler*<sup>8</sup>. The interrupt handler is part of the operating system. It reads the information associated with the mouse click event from the USB Controller into the computer's main memory, and puts it into the so called *event queue*<sup>9</sup> - a messaging-system used for the inter-communication of separate processes - of the operating system. Web-browsers, like most GUI applications employ a programming construct called the *event loop*<sup>10</sup>. The event loop runs every few milliseconds, over and over again while the application is open, processing incoming events from the operating system's event queue. The event loop dispatches each event to its designated event handler implemented by the specific application. In the case of a web-browser, the event handler is a JavaScript (the scripting language used to build dynamic web-pages) function that was registered on the button the click was fired on. This final JavaScript function then executes the functionality attached to the button.

Interfaces make computation legible. They distill the bewildering entanglement of components and instructions into a form that makes sense to the user, and through which one can engage in meaningful interactions with the software one uses. Buttons, windows, icons, browsers, clicking, surfing, e-mail, the

cloud: these are all powerful metaphors that ultimately provide a meaningful face for the underlying binary data and operations our machines work with.

The process of abstraction that interfaces perform is a process of rendition which entails a set of decisions about what to hide and what to reveal of the underlying complexity. Inasmuch as they are based on the designer's intentions to achieve a particular end, these decisions are politically charged. Most generally, this is the establishment of meaning in relation to hardware. The BIOS (Basic Input/Output System) abstracts details of the hardware, the operating system (OS) abstracts the BIOS, applications abstract the OS, and the graphic user interface abstract the application.<sup>3</sup>

Hardware itself is meaningless, it is the stack of software mounted on it that gives it purpose, making it able to perform functions we intend it to; and it are interfaces through which one's intentions are translated into functions of software.



However, through the abstraction of computing processes into familiar metaphors, interfaces also define the space of possibilities in which one's intentions can exist. They define what intentions are actually possible to hold, what processes one can or cannot initiate. By their design, interfaces give form to both ends that they connect: both to computation and to the user.

As Wendy Hui Kyong Chun argues,  
*"Software, or perhaps more precisely operating systems, offer us an imaginary relationship to our hardware: they do not represent transistors but rather desktops and recycling bins. Software produces "users." Without OS there would be no access to hardware; without OS no actions, no practices, and thus no user."*<sup>11</sup>

Interfaces define users and their relationships to the things they connect them to. By showing and hiding, by framing the system they are attached to in a specific way, they enable certain perceptions and actions while eliminating others. It is through this mechanism that the *like* button of Facebook transforms one's notion of value and the *profile* changes one's notions of identity and social relationships. Thereby, interfaces are not mere surfaces, mediating information and computing functions, but productive forces, or as Alexander Galloway puts it, *"An interface is not a thing, an interface is always an effect. It is always a process or a translation."*<sup>12</sup>

## 5.2 IN GRAPHIC DESIGN

The introduction of personal computers and desktop publishing software with graphical user interfaces during the 1980's had far reaching consequences for the discipline of graphic design. Many forms of work that graphic design was dependent upon and which formerly required specialized skills could now be done on a PC. Authoring software freed graphic designers from having to rely on the work of production artists, photomechanical technicians, key-liners, paste-up artists, typesetters, color separators, and even some printers.<sup>13(p23)</sup> It did so by encoding the procedures involved in these crafts into computational processes, and remediating them through a user interface. Now that the user interface democratized the access to design tools and anyone with a computer and the right software packages could practice graphic design, the field was pressured to redefine itself to protect its relevance. A direct consequence of this is that increasingly, graphic designers defined themselves as authors. However, if production of design was now mediated by user interfaces, and if one recognized their productive effect on users', the notion of authorship would have to be reconsidered. Lev Manovich argues that

**"We can say that all authorship that uses electronic and computer tools is a collaboration between the author and these tools that make possible certain creative operations and certain ways of thinking while discouraging others. Of course humans have designed these tools, so it would be more precise to say that the author who uses electronic / software tools engages in dialog with the software designers."<sup>14</sup>**

Designers do not only produce through software, but - in a dialogical relationship with the engineers who created that software - they are also being produced by it. As digital media have become the dominant modes of communication, assimilating the function of printed matter into itself, graphic designers need to go beyond the limitations of the user interface and embrace it as an object of design.

During the 80's and 90's this might have been too great of a leap for practitioners of a field that is primarily occupied with "right-brain", creative work. High level programming and scripting languages such as Java, Python and JavaScript started to emerge during the 90's, but they were not particularly well suited yet for artistic and design purposes. Tools that would ease the learning curve and make efficient applications of these languages to the design process had not been developed until the 2000's.

One such tool, Processing was released in 2001. *Processing is a flexible software sketchbook and a language for learning how to code within the context of the visual arts.*<sup>15</sup> It was initiated by Casey Reas and Benjamin Fry at MIT Media Lab with the purposes of *promoting software literacy within the visual arts and visual literacy within technology.*<sup>15</sup> Processing is both a programming language and a development environment built in Java. Being a high-level language it greatly reduces the amount of knowledge and time needed to produce visual material by the means of code. It is one of the easiest entry points for visual artists and designers to go beyond the confines of the user interface. Although Processing has a GUI of its own - its integrated development environment (IDE)<sup>16</sup>, it is not an interface attached to a set of predefined functionalities such as the case with Adobe authoring software, it is a tool to create new tools.

Learning tools such as Processing is of paramount importance in today's landscape of information as a significant proportion of cultural information can only be represented by developing custom software tools. In 2013, the Norwegian research organization SINTEF<sup>17</sup> claimed that 90% of the world's data up until that point was generated over the course of the two preceding years.<sup>18</sup> As the amount of data being produced is on an accelerating rise, this percentage must be even higher today. Most of this data is in a raw form, that is, it has not been subjected to any kind of processing. As such, it is meaningless.

The phenomenon of Big Data begs the question of whether generating so much data is actually solving any problems or whether it just blinds us to the fact that these problems might not have been

articulated properly. Nevertheless much of the cultural artifacts that humanity produces today is in the form of data. With the methodologies of digital anthropology, stories can be excavated from this data and humanity can be rendered visible.

Graphic designer Richard Vijgen's practice is preoccupied with this exact challenge. He *"investigate[s] new strategies to find the big stories in big data through research and design."*<sup>19</sup> One of his projects, The Deleted City<sup>20</sup> - written in Processing - is a fitting example of how graphic design can cross the threshold of the user interface and in fact, create one of its own in order to extract stories hidden in raw data. The project is an interactive visualization of GeoCities, the first large-scale social network that emerged on the internet. GeoCities was a free web-hosting provider modeled after the concept of the 'city', where amateur internet enthusiasts could host their own *home-pages* and share information about themselves and the topics they were interested in. When in 1999 it was acquired by Yahoo! it was the third most visited website on the internet.<sup>21</sup> Over the course of the 2000's, as other social networks such as MySpace and Facebook gained popularity, GeoCities had lost most of its users and in 2009, Yahoo! decided to shut the website down. At this point it contained at least 38 million user-built pages. A group of digital archivist, the Archive Team whose mission is to save valuable websites and data from being lost, created a complete backup of GeoCities, amounting to 650 gigabytes of data. Richard Vijgen's project is essentially an interface that allows one to browse this archive.

Although Richard Vijgen's project is a great example of how abstract data can be re-framed through custom software tools and thereby bringing audiences closer to a subject matter, data-visualization projects in certain cases might produce the opposite effect. In their conversation *Suspicious Images, Latent Interfaces*<sup>22</sup>, Benjamin Bratton and Natelie Jeremijenko critique environmental data-visualization projects on the ground that they spectacularize information, thereby distancing audiences from perceiving their own relationships and responsibilities in regards to pressing environmental issues. In their view, these data-visualization projects masquerade as interfaces, while in fact, they subvert the notion of the interface. *They imply there must be an expert - an expert system - somewhere making use of this information in a way that is somehow having some effect. (Bratton)*

Such projects however inspire important questions that can be asked in regards to interfaces, but which I think can also be directed to graphic design in general. In the words of Bratton:

### ***How can monitoring become the redesign of what it monitors? How does the image become an image-instrument?***

In an attempt to find answers to these questions, in the following chapter I will look at the medium of *process* and its potential to compose images into instruments.

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## 6. CONCLUSION

*"A text more or less decipherable, more or less legible, more or less intelligible, is offered to us as a given in an active reading of every moment. To what extent would the legibility of that context condition the very development of our own action? Through that poetical metaphor, the task of the graphic designer clearly appears: to increase the legibility of that environment, something that will permit us to reserve our efforts for the accomplishment of our autonomous actions."<sup>1</sup>*

Literacy is the capacity to read and to write. This capacity allows us both to extend our understanding of reality and to assert new realities that are better aligned with the conditions we desire. Literacy empowers us to become authors of the conditions of our existence and thus it forms the basis for our individual agency.

The question of literacy demands closer attention in light of the accelerating technological developments we are witnessing today. Intrinsic to these developments is the invisible, immaterial artifact of software. The mechanisms by which our contemporary world operates are encoded in this peculiar type of executable text. Software has assimilated into itself previous technologies of communication, finance, logistics, mobility and it is now beginning to absorb instruments of governance. Software is becoming the *limitless text, of which the phrases are the decors of our wandering, and of which the unfolding constitutes the very context of each person's life.*<sup>1</sup>

Technology is forming a megastructure that is beginning to envelope everyone and everything, framing our world with its expressive power. Yet our ability to decipher the text in which it's written is limited. Historical accounts can teach us a lesson about conditions where literacy was a privilege of an authority and where this authority monopolized the means of "*organizing the world's*

*information".*

The growing opaqueness of the world presents itself as a design challenge, demanding that we render it more legible. In order to achieve this, we need to learn to think with the logic of software: procedure.

Generally speaking, the discipline of graphic design has so far had a rather superficial engagement with the culture of software. Graphic designers have only relied on the graphical user interface to produce other artifacts, and in turn they have been produced by it. The interface lends itself as a powerful instrument of cultural framing, but it demands software literacy in order to be written.

Given the current state of affairs, I believe a deeper engagement with the technical and theoretical aspects of software is necessary. In order to face the challenge of deciphering the text of our contemporary world, we need to become literate in the reading and writing of software. That is not to say that all graphic designers must become programmers - just as not everyone literate in natural languages would become writers and poets. Nevertheless, acquiring elementary programming skills will help to think and reason procedurally.

Understanding software is fundamental to understanding contemporary society, and thus a prerequisite to materializing the ambition of somehow even shaping it. In order to arrive in the 21st century and meet the challenges of our age, one potential route for graphic design to take is to align itself with the discipline of computer science. Only in the spirit of multi-disciplinarity will it be possible to pioneer new frames of representation that are adequate to render the text of our contemporary world legible.

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