

TERRITORY OF RESEARCH ON
SETTLEMENTS AND ENVIRONMENT
INTERNATIONAL JOURNAL
OF URBAN PLANNING

28



Digital transition for contemporary space



UNIVERSITÀ DEGLI STUDI
DI NAPOLI FEDERICO II
CENTRO INTERDIPARTIMENTALE L.U.P.T.

Federico II University Press



fedOA Press

Vol. 15 n. 1 (JUNE 2022)
e-ISSN 2281-4574

TERRITORIO DELLA RICERCA SU INSEDIAMENTI E AMBIENTE



WoS (Web of Science) indexed journal <http://www.tria.unina.it>

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Responsible Editor in chief: Mario Coletta | electronic ISSN 2281-4574 | ©
2008 | Registration: Cancelleria del Tribunale di Napoli, n° 46, 08/05/2008 |
On line journal edited by Open Journal System and published by FedOA (Fe-
derico II Open Access) of the Federico II University of Naples

Table of contents/Sommario

Editorial/Editoriale

Digital technologies for the transformation of space/ *Le tecnologie digitali per la trasformazione dello spazio*
Antonio ACIERNO 7

Papers/Interventi

Archive drawing in digital reconstructions. Unbuilt Venice in Cannaregio Ovest (1978)/ *I disegni d'archivio nelle ricostruzioni digitali. Venezia non costruita a Cannaregio Ovest (1978)*
Luca CATANA, Giuseppe D'ACUNTO, Starlight VATTANO 19

Urban Active citizenship, ecological networks and digital commons: collaborative technologies and processes for mapping and bottom-up design of a "green belt" in the eastern suburbs of Rome/ *Cittadinanza attiva, reti ecologiche e beni comuni digitali: tecnologie e processi collaborativi per la mappatura e progettazione dal basso di una "corona verde" nella periferia Est di Roma*
Luca BRIGNONE, Carlo CELLAMARE, Stefano SIMONCINI 41

Playing String Figures with Wifi in Motown: Deployment and Maintenance of MESH Networks in Detroit/ *Giochi di corde senza fili a Motown: Fare e mantenere le reti MESH di Detroit*
François HUGUET, Marine ROYER 59

Testing programme of pre-characterization for c&d waste: an innovative approach developed on the disused factory "Manifattura Tabacchi", a case study in South of Italy/ *Programma di sperimentazione di precaratterizzazione per rifiuti c&d: un approccio innovativo sviluppato nello stabilimento dismesso "Manifattura Tabacchi", un caso studio nel Sud Italia*
Mariateresa GIAMMETTI 71

Sections/Rubriche

Book reviews/Recensioni 91

Events, conferences, exhibitions/ *Eventi, conferenze, mostre* 115

Abstract

Playing String Figures with Wifi in Motown: Deployment and Maintenance of MESH Networks in Detroit

François Huguet, Marine Royer

Abstract

The paper examines, with a distinctive approach, the socio-urbanist impacts MESH wireless community networks had in the city of Detroit (USA). While relying on a comparison between these local participatory communication networks and the notion of inverse infrastructures, both analysed through the prism of multiple authors working on the question of bonds, we want to understand why such infrastructural commons, in their construction and in their maintenance, can pave the way for a more ethical, open, sustainable and inclusive “digital urban future”. Also, we will demonstrate throughout the article that the very form these networks take in Detroit — decentralized and peer-to-peer — and the reasons why people install them have an impact on the city and on the



way solidarities emerge. We shall also analyse the future Detroit may contemplate, miles away from the industrial visions the city convoked decades ago. We aim to understand how MESH networks, although wireless, weave social bonds between Detroit inhabitants thus outlining the contours of a “becoming-with each other” (Haraway, 2020).

KEYWORDS:

MESH networks, wireless community networks, maintenance, lyonnaj, commons

Giochi di corde senza fili a Motown: Fare e mantenere le reti MESH di Detroit

Questo articolo analizza l’impatto socio-urbanistico del dispiegamento di reti comunitarie senza fili MESH nella città di Detroit (Stati Uniti). Collegando queste reti di comunicazione locali e partecipative alla nozione di infrastruttura invertita e analizzandole attraverso il prisma di diversi autori che lavorano sulla nozione di “connessione”, cerchiamo di capire perché questo tipo di (comunità) infrastrutturali, la loro costruzione e la loro manutenzione è, secondo noi, in grado di costituire un ‘divenire digitale e urbano’ più etico, aperto, sostenibile e inclusivo. In questo articolo mostriamo anche che la forma di queste reti (decentralizzate e peer-to-peer) di Detroit, crea solidarietà tra le persone attraverso il modo stesso in cui la solidarietà è concepita. Analizziamo anche come a Detroit si progetta un certo futuro, lontano da quell’immaginario industriale che Detroit prevedeva diversi decenni fa. Il nostro obiettivo è allora quello di capire come le reti MESH di Detroit riescono a tessere legami sociali tra gli abitanti senza fili e attraverso il “divenire-con-altri” (Haraway, 2020).

PAROLE CHIAVE:

reti MESH, reti comunitarie wireless, manutenzione lyonnaj, beni comuni

Playing String Figures with Wifi in Motown: Deployment and Maintenance of MESH Networks in Detroit

François Huguet, Marine Royer

“We risk our human rights if we don’t take ownership and control over the Internet in a way that is decentralized.”

Diana Nucera, Director, Detroit Community Technology Project

To complete an interdisciplinary project on distributed computing¹ carried between 2012 and 2016, we followed operators for a topology of decentralized network known as MESH². Wireless mesh networks has led to the emergence of “inverse infrastructures³” (Egyedi, Mehos, 2012), user-driven and self-organizing network with a bottom-up approach that have been experiencing pretty remarkable development, taking on new forms in micropolitical technologies since 2011 (Huguet, 2016). Concepts of agency, empowerment and maintenance have emerged from these new forms, as well as unprecedented urban sociabilities implemented in a way that echoed the commons movement (Laval, 2016). From the various fields covered in this study and alongside rhizomes produced by objects and individuals we examined, we engaged in an inquiry “par le milieu” (Despret, 2015). This approach focuses on the humans and non-humans at the core of the subject of study, and how they are bonded together.

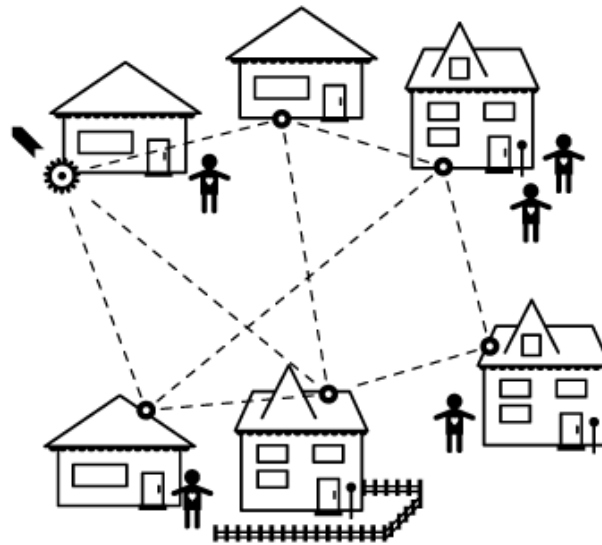


Fig. 1 - A diagram handed out during training explaining one phase of the MESH networks deployment process. Website: Neighborhood Network Construction Kit - Get the Word Out - Flyer Design - © Open Technology Institute, New America; The Work Department; Allied Media Projects Detroit; Community Technology Project - CC BY-SA 4.0.

This unprecedented ethnography was conducted more than five years ago in Detroit, epicentre of the automotive industry in the early 20th century. In July 2013, three years before the beginning of our study, Detroit became the largest city to file for bankruptcy — marking the latest development in Motor City’s⁴ slow death. This article aims to put into perspective data collected from fieldwork experience with various post-project readings. In order to appreciate a certain type of social activity “rallying support for fragile entities” (Landivar, 2021), we’ll first compare the making of communities wireless mesh networks with “lyannaj” practices as discussed by Édouard Glissant and Patrick Chamoiseau (2021), Yves Citton (2018) and Dénètem Touam Bona (2018). Lyannaj is a creole word that means joining forces in a movement for solidarity, as the expression derives from the technic of wefting vines. Then, we shall draw parallels with the “string figures” knotted by Donna J. Haraway (2020). This paper does not mean to provide an update on Detroit MESH⁵ networks situation, but rather shed a light on how the thick weave of relationships between individuals, wireless routers and community networks across Motown is shaping a sharp but fragile “becoming-with each other” (Haraway, 2020, p. 12) — and gives enlightening perspectives on more sustainable and ethical digital futures.

1. Getting to know the people who build their own Internet in Detroit

This paper does not attempt to cover the origins of MESH networks deployment in Detroit and the softwares they require to operate. These subjects have already been developed in previously published works (Huguet, 2013; 2017) and in a PhD dissertation



Fig. 2 - Andrew Reynolds, from the development team that landed a software to operate Detroit MESH network, installing a relay mast. Screenshot taken from “48217 Mesh” by Nora Mandray and H el ene Bienvenu –   Nora Mandray (2013) – www.diy-manifesto.com.

(Huguet, 2016). An account of Motor City over the same period and the reasons for its economic decline were given by numerous authors — including Sugrue, (1996) 2014; Lee Boggs et Kurashige, 2012; Gallagher, 2013. Works on American environmental justice movement and food justice by geography researcher Flaminia Paddeu (2012, 2014, 2015) also provide a detailed account on the situation. However, to get a brief overview of the conception of these inverse infrastructures and the communities rallied around them, the two following audiovisual resources are especially relevant:

- “*DIY Manifesto*”, a 2014 webdocumentary written and directed by H el ene Bienvenu & Nora Mandray. The « Mesh 48217 » episode gives details on the deployment and objectives of a MESH network in a Detroit neighborhood⁶.

- VICE magazine short film “*Meet the People Building Their Own Internet in Detroit*” directed by Lara Heintz & Jordan Debor in 2017. It explores the role of *Digital Stewards*⁷ — citizens who are setting up MESH networks and the mission they want these inverse communication infrastructures to fulfil⁸.

These two films demonstrate how MESH networks in Detroit emerged from nonpolitical organizations & non-partisan backgrounds and should be deemed grassroots movements⁹ (*Detroit Digital Justice Coalition and Allied Media Project*). These movements proved essential to Detroit (Lee Boggs and Kurashige, *op. cit.*; Gallagher, *op. cit.*) championing causes such spontaneous and self-organized movements defend advocating for a more equitable distribution of resources, fair access to healthcare, communication¹⁰, education, culture and practical environmental sustainability politics¹¹.

These grassroots movements altogether crystallised a number of issues involving digital literacy¹², internet access regarding the equipment and connections it requires, but also digital exclusion and how internet uses and infrastructures fosters exclusion. We can draw parallels between such movements, founded and deeply rooted in a city that became a preeminent example of modern capitalism decay and ruins (Lowenhaupt Tsing, 2017), and how relationships between people born in French West Indies have been conceived and described.

2. From community MESH networks to digital «lyannajisms»

The Plea for “Products of High Necessity” several Antillean intellectuals¹³ co-signed was first published in March 2009, in the midst of turmoil marked by demonstrations against “expensive life” happening simultaneously in Martinique and Guadeloupe¹⁴, and gave a definition of “Lyannaj”. Our aim is to make connections between this notion and Detroit’s current situation with MESH networks, as they involve inverse infrastructures and sociotechnical devices requiring continuous maintenance and monitoring (Denis and Pontille, 2020).

Lyannaj has helped to shape stakes and visions in various forms protest can take, whi-

le condemning the Extractivism¹⁵ deadlocks (Citton, 2018). The Lyannajist vision that consists in “allying, uniting and passing on everything that is left divided” (Glissant and Chamoiseau, 2021, p.138-139) appears relevant in its structure considering what MESH networks in Detroit mean to condemn and bring forth.

MESH networks have been emerging in Detroit since 2012, after decades of crisis have left sparsely populated neighborhoods without the equipment required for internet access (Huguet, 2016). Investing in essential infrastructure (cables network or fiber optic network either buried or aerial, interconnection hubs...) in comparison to the number of inhabitants in certain Detroit neighborhoods would not have been profitable. Internet service providers quickly made it clear they would not equip these Detroit areas but wealthier neighbourhoods following the “white flight” migration (Paddeu, 2012). Thus, they have left very wide areas to their own devices and have forced or enabled, to a certain extent, the emergence of inverse and participative infrastructure amidst the ruins and in a time of crisis, paving the way for another digital future. As they help residents of those neighborhoods build, care and recruit new network nodes to extend MESH coverage, grassroots movements — relying on public and private donations, mainly by corporate foundations — have in some way made Lyannajistes out of the residents who were committed to build and maintain the MESH communities networks.

The Lyannajist vision includes two striking analogies to the vegetal world, the first one being mycelium. What we perceive as a mushroom emanates in fact from an underground network of thin but dense filaments wefted as a mycelium. Its very existence defies our perception because it is shaped not as a thing but as a network. It is beyond our grasp, just like understanding the sociotechnical thickness of networks that provide us with information.

“Using the mycelium analogy, one can understand why most of us are extractives by default. [...] If knowing how berries, citrus fruits or mushrooms grow had been a prerequisite before eating them, we would have starved to death. It is only when resources are on the verge of exhaustion, when veins are depleting or when plants are not growing anymore that we wonder where they were coming from and how they were reaching us.” (Citton, 2018, p. 149)

As residents of these Detroit neighborhoods had no choice but building mesh networks *by themselves and for themselves*, they have helped to implement a very peculiar practice known as “infrastructural mediation” (Huguet, 2016). Such a practice, stemming from web accessibility issues experienced by residents of Detroit pauperised districts, invents and creates an unprecedented relationship with telecommunication.

Unsurprisingly, vines are used in the second analogy as they are guided by the “détour and connection principle with a great deal of creative variations zigzagging their way, going here and there, passing over and under [...] *Lyannaj* consists in assembling forces and forms, composing with minor scale and achieving a vegetable fugue.” (Touam Bona, 2018, p. 184).

Relying on the vine wefting illustration to explain the idea of digital lyannajisms helps us conceive the very peculiar relationships residents need to maintain with their MESH networks — weaving, unifying what is different and taking care of networks. The objective of the enquiry was to understand how *mediation* of a local network implied its maintenance and care for its fragility “shaping specific ways to look after things that far from halting their development, inextricably contribute to their future” (Denis and Pontille, 2020). For this purpose, residents learnt how to check roof antennas after severe weather to ensure they were still working correctly.

When we were conducting our enquiry in Detroit, we took the difficulties and hopes residents experienced seriously and tried to understand the affection they had for the MESH networks they built, for the city they lived in, for its inhabitants and for Internet, a tentacular world-object that offers a myriad of opportunities when one is granted access.

“Lyannaj must be understood in its opposition to pwofitasyon¹⁶, it can only be used genuinely when it confronts people in high places who tend to abuse power over local men and women.” (Citton, 2018, p.155)

For the people running the programs dedicated to turning Detroit residents into *Digital Stewards*¹⁷, making a wireless community network was more of a pretext to encourage people to get involved into technical, citizenship and sociopolitical actions and to challenge their neighborhood infrastructures and public services failures. In doing so, they demand « digital justice » and make it happen (on their terms).

The development of such sociotechnical devices also reveals an alternative type of civic initiatives, dedicated to urban resilience (Paddeu, 2012) and to the making of a brand new common: an *infrastructural common*. The lyannajist vision brings a refreshing perspective to the “ecology of materials” (Ingold, 2012) and to the sociotechnical thickness of these artefacts, especially regarding the “poetics of relation” (Glissant, 1990) *Digital Stewards* install in weaving solidarity and shaping a participative infrastructure that provides access to Internet, that an article described as *digital lyannajisme*:

“Solidarities should be understood as ‘liberating bonds’, another motto lyannajists hold close to their hearts. Their ambition is about creating and nurturing affections that stand halfway between objective dependency and subjective attachment. And their challenge, to imagine interlaced bonds that would pass the test of time.” (Citton, 2018, p. 159)

These findings now justify investigating these infrastructural commons that generate inventive and empowering lines of connections.



Fig. 3 - Digital Steward assembling and checking a MESH antenna – © Detroit Community Technology Project – Allied Media Project – <https://detroitcommunitytech.org/>

3. String figures and wireless networks

[Interview with the Digital Stewards group from EcoSphere project, Detroit – 15/06/2013]

Interviewer: “Things arise from the ashes says the motto of the city¹⁸ ...”

Eric Hall: “Detroit definitely is like a phoenix. There is still a viable market, although I’d rather not say it is a market but it is a breeding ground for very smart, innovative and creative people” [...] “How can we rebuild the area to make it affordable, pleasant, sustainable and safe place to live in? All these things, and so much more, are the essence of Detroit, what makes it unique and the reason why such projects work here and nowhere else. People here are ready to give it a go, we are a melting pot. And we are almost living on ground zero.”

Our second study object, Donna J. Haraway’s book *Staying with the Trouble* casts a new light on MESH networks’ deployment and maintenance. More precisely, the “SF” concept in the “*String Figures*”¹⁹ acception appears to be highly relevant regarding peculiar inverse infrastructures such as MESH networks. Just like previously discussed Lyannajism principles, Haraway emphasises the pressing need to “think together anew across differences of historical position and of kinds of knowledge and expertise” (Haraway, 2020, p. 15).

Anna Lowenhaupt Tsing (2017) explored how communities deemed vulnerable are making the best of resources they have access to, as well as means to organize their activities and interests. They not only build resilience but also a trailblazing ability to live in a world doomed to ruin. Like her, Haraway predicates there are other ways to think our relationships with “scandals of times called the Anthropocene and the Capitalocene²⁰” (Haraway, 2020, p. 9). “SF” are one of them: “String figures are like stories; they propose and enact patterns for participants to inhabit, somehow, on a vulnerable and

wounded earth.” (Haraway, 2020, p. 21)

Haraway is telling stories that all share the possibility of “partial recuperation and getting on together” (2020, p. 21) with the Capitalocene, what she perceives as “living with the trouble”. For that matter, Detroit is an interesting example of what “living in harmony” could mean and cast a new light on the Capitalocene²¹. While Motown is often described as “ground zero” by the locals²², a city that experienced total urban and economic decay, it has turned into a ruin filled with “becoming-with each other” initiatives, a place for numerous “speculative fabulations” and “realistic speculations” (Haraway, 2020, p. 21). These initiatives include the service mesh infrastructure construed as a common where each and everyone can invent “non-mimetic ways pedagogical and technological ways to render each other capable in problems novel to all of them.” (Haraway, 2020, p. 35)

Delicate arts such as MESH installation and maintenance, where people meet and build relationships in nascent material ecologies, made fragility a specific condition shared by these networks. Locals *have an effect on* — and *interact with* — MESH networks on a daily basis for them to function properly. They “receive and pass on” (Haraway, 2020, p. 22) thus playing string figures.

“Playing games of string figures is about giving and receiving patterns, dropping threads and failing but sometimes finding something that works, something consequential and maybe even beautiful, that wasn’t there before, of relaying connections that matter, of telling stories in hand upon hand, digit upon digit, attachment site upon attachment site, to craft conditions for finite flourishing on terra, on earth.” (Haraway, 2020, p. 22)

Such telecommunication systems have been largely overlooked due to a perception that they are left out of the march towards innovation. However, these typologies create bonds between locals through *lyannaj* dynamics. As well as building the world, they “show us how to look around us rather than ahead” (Lowenhaupt Tsing, 2017, p. 58).

4. Conclusion: thinking with the fragility of digital networks

In conclusion, it is crucial to stress that beyond the point of giving an analytic perspective on MESH networks’ installation and maintenance in a ruin of a city, teeming with ecocitizens incentives, we have to think *with them* to consider another urbanism. Indeed, as we devoted our attention to the *Digital Stewards*’ fragility, we understood the major role they were playing as MESH networks maintenance “technicians” as they were striving to detect equipment degradation before anyone could notice and thus before breakdowns. Being aware of these care and maintenance efforts due to a constant evolution, from almost undetectable variations to spectacular transformations, gives an inverse perspective on the digital city. From a vision relying on technological innova-

tions in a fully digital era, the city appears demiurge and magical. Also, it offers new arguments to abandon the assumptions that consider digital technology either as an instrument of emancipation or as a poison, on the contrary. “Following the people who care for things and beings sharpen our own abilities to perceive and conceive the world fragility beyond the concepts of disaster and collapse” (Denis and Pontille, 2020)

Thinking with MESH networks deployment and maintenance constitutes this “becoming-with others”, this *lyannaj*. It also outlines the conditions for more digital ethics and inclusion in a tangible way, promoting general interest (or “*digital justice*”). Speculative fabulations around Detroit MESH networks do distance us from the very grim diagnosis of the world’s situation, not to give us “reassurance” and even less turn a blind eye, pretending nothing’s wrong. On the contrary, they are making invisible things visible: observing, naming, forming, wefting “*in the minor key*” (Touam Bona, 2018, p. 184) to state the abundance of collective actions where people gather and provide themselves with the means to face destruction all together.

This is how these *wireless string figures* and digital *lyannajisms* nurture our visions with stories paving new paths braving the world’s end, beyond the anthropocene, the “Capitalocene” and the “Plantationocene” to enter the “Chthulucene” (Haraway, 2020, p. 77) where we can build a viable and liveable earth together.

ENDNOTES

1 See <https://anr.fr/Projet-ANR-10-CORD-0004> and Abécédaire des architectures distribuées (under the direction of Cécile Méadel et Francesca Musiani) from the ANR project final colloquium <https://www.presdesmines.com/produit/abecedaire-des-architectures-distribuees/>

2 Abbreviation for wireless community networks. These networks rely on wireless local area networks (Wi-Fi) to build bigger and bigger network clusters at the city scale. Some of these networks can be connected to the Internet, especially when individuals subscribe and share unlimited access through ADSL or fiber broadband under a flat-rate price. In situations where such an access is expensive or is not available, wireless community networks provide a partial and low-priced alternative (the cost of the equipment and its power supply are the only expenses). MESH, distributed mobile, decentralized mobile, wireless ad hoc, wireless community, local and autonomous networks refer in general to a single type of technology, and mostly to the community that deploys it.

3 The notion of “inverse infrastructure” refers to bottom-up, user-driven, self-organizing networks. These networks are not monitored with a centralised or up-bottom approach by government or big companies in a way they’ve been operating telecommunication networks, rail networks and power grids for decades. Instead, such networks are developed and led by citizens or small companies that managed to multiply and integrate them into larger scales, sometimes even creating global infrastructures.

4 Detroit is the largest city in Michigan (Midwestern United State). Close to the downtown area, the neo-classical Detroit Institute of Arts is famous for its murals depicting the deep ties between Detroit and the automotive industry. Painter Diego Rivera gave it the nickname “Motor City”. Detroit was also the city where the prominent soul and R&B music label Motown was founded in 1959.

5 Although we could not pursue ground research for this article after 2015, we have been following closely the development of Allied Media Project, the first organization in charge of MESH networks and training for Digital Stewards. We often speak with people, that we now count as friends, involved into the deployment of MESH networks in Detroit.

6 www.diy-manifesto.com

7 The “Digital Stewards” program provided by Detroit Community Technology Project / Allied Media Project trains neighborhood leading figures (“neighborhood leaders”) to pick up community organizing skills and techniques required to design, build and maintain MESH networks. See <https://detroitcommunitytech.org/eii/ds>.

8 https://video.vice.com/en_us/video/motherboard-dear-future-people-building-their-own-internet-detroit/59ceb5795073d0905939aeb

9 The situation is different regarding French wireless community networks where voluntary Internet providers raise concern about freedom of speech and net neutrality, rather than digital exclusions issues.

10 See projects and publications by Detroit Digital Justice Coalition (<http://detroitdjc.org/>), Detroit Community Tech (<https://detroitcommunitytech.org/>) or Allied Media Project (<https://alliedmedia.org/>), Detroit very first organization championing inclusive and community-led technologies.

11 It can include marginal variations, for instance Allied Media Project supports LGBTQI+ population and rights.

12 See The Detroit Future Media Guide to Digital Literacy (online): <https://alliedmedia.org/news/detroit-future-media-guide-digital-literacy>

13 It was signed by Ernest Breleur, Patrick Chamoiseau, Gérard Delver, Serge Domi, Édouard Glissant, Guillaume Pigeard de Gurbert, Olivier Portecop, Olivier Pulvar, Jean-Claude William. The manifesto has just been published in its entirety (Glissant and Chamoiseau, 2021).

14 The movement's motto "Lyianaj Kont Pwofitasyon" (LKP) became a symbol for the group that appeared at the same time. In creole, Kont means "against" and Pwofitasyon can be translated as "overexploitation".

15 According to the author, extractivism is defined by selective methods developed for the extraction of particular earth elements considered as resources. Such a process is only concerned with economic profit, ignoring issues of renewability and consequences of exploitation of resources.

16 Which can be translated as "overexploitation" as previously cited.

17 The Detroit digital stewards program trains groups of individuals to deploy and develop community MESH network. They are also recruited to become specialists of computer repair and recycling in their own neighborhood. For more than six months, sociodigital supervisors are volunteering to present a socio-economic action plan to revitalise their neighbourhood. Such projects consist in the deployment of MESH networks and most importantly, initiatives to encourage residents to benefit from the process — that is very often the only way to have internet access in underprivileged areas.

18 Speramus Meliora, Resurget Cineribus (We hope for better things... It shall arise from the ashes) is the Latin motto which was written on Detroit flag after the fire of 1805 which almost burnt to the ground the entire city.

19 These two letters can also refer to science fiction, speculative feminism, science fantasy, speculative fabulation, and scientific fact (Haraway, 2020).

20 The horrors she makes mention of include technological solutionism or some bitter and cynical collapseologists.

21 According to Haraway, the "Capitalocene" is another protagonist in the equation of ecological disaster, alongside the "Anthropocene" and the "Plantationocene" (Haraway, 2020, p. 91). She also suggests the concept of "Chthulucene" to introduce a new protagonist. In doing so, she points out the masculinist and exceptionalist nature attached to the word "Anthropocene" per se and believes it fails to discuss how ecological desolation, racism, slavery and colonialism intertwine. With the "Chthulucene", Haraway's aim is not to explain why our worlds are brought to the verge of ruin but to demonstrate how these ruins are underlying causes. Haraway emphasizes the impossibility to start again from scratch. Thus, the "Chthulucene" is not a statement (p. 288), but an invitation (p. 96).

22 Cf. verbatim quotations from fieldwork in the opening paragraph of this section

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