

# Wallace and the *Machines*

*The Curse of the Were-men's Disconnection*

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# 0\_Abstract

There's a personal thought-provoking scene from *Wallace & Gromit: The Curse of the Were-Rabbit* (2005), where Wallace engaged in his morning routine through the act of translation and dress up (*fig. 1, 2*). Surprisingly, this is all done automatically through the help of his artefacts<sup>1</sup>, which the creator is left indulging on his dining seat, far from his bed, to ponder the possibility of a better iteration. Afterwards, Wallace begrudgingly comments on Gromit's presented choice of healthy diet for him (*fig. 3*). This personally strikes me as an interesting connection between man and cybernetics as the cybernetics orders have been updated with the latter becoming more recursive and intelligent to a point that modern artefacts, using machine learning technology, can predict our own thoughts and actions. The imagination of Wallace being left on his seat, merely self-indulging with the artefacts constantly self-updating and tending to him, presents an utopian ideal — And thus, the vision of modern cybernetics manifesting in automation and intelligent architectural form will be pursued through this essay.

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<sup>1</sup> In the context of this essay, the artefact is defined as the utility object, designed to delegate menial task by human.



# 1\_Introduction

The thought-provoking scenes from *Wallace & Gromit: The Curse of the Were-Rabbit*<sup>2</sup> was chosen to analogically encapsulate the relationship of Wallace's machineries and Gromit, his artificial intelligence servant. It displays the constructivism through Wallace's dialogue with Gromit, who is mute, and with himself. The dialogue is also considered a train of thought from his own vocal reasoning. Thus, we find ourselves meanings in the bridge that connects the human user, the man-made machines, and the intelligence deviation. All contained within the universal theory of cybernetics. The essay acts as a counterpoint to Ippolito Pestellini's lecture on post-human paranoia, which artificial intelligence is the subjugation, and the byproduct is the banal architecture.<sup>3</sup> — This is entirely false as human's novelty still remains a mystery, and by negotiating our position as an equal node with the machines for a common goal within the cybernetics network, the beauty in architecture will be the by-product from the epistemology.

Cybernetics is the science study of the communication and governance between man, machine, and animal<sup>4</sup>. Coined by Norbert Wiener in 1948, it has undergone a development to include the human observer as part of the governing network as a successive definition of the second order by von Foerster and a derivative by Gordon Pask in 1976. In the following years, the notion plays an important role developing the field of architecture, medicine, psychology, physics, sociology...etc, as science seeks to understand and master nature<sup>5</sup>. Now with the inclusion of *Big Data*<sup>6</sup> in the Information Age, the machines have evolved to be irrationally intelligent, built to brute-force a meta understanding of data granularity, something that lies outside human cognition.<sup>7</sup> Therefore, the essay seeks a personal understanding of the interrelationship between man and machines through the past and present. This is divided between the rise of cybernetics from 1940s to 1980s, and the hitherto of the notion in the 2000s, concerning the meta machines.

The essay presents two key questions for each time periods. The first being:

**How does the convergence between cybernetics and architecture improve lifestyle and architectural quality?**

This pursues the objectivity of the cybernetics utilisation between man and machines as both pursue an established goal. Furthermore, it is presented with theoretical and built precedents to understand the correlation between the two subjects as they engage within the system. It is an important inquiry as it follows the same principle of modernist approach from Ippolito's claim. By doing so, it opens up with a second question for the two periods:

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<sup>2</sup> "Wallace & Gromit: The Curse of the Were-Rabbit (2005) — Bunny Breakfast Scene (1/10)", Youtube video, 3:07, posted by MovieClip. 17 January 2019.

<sup>3</sup> Pestellini, Ippolito and Otero, Mariana, "Invisible Cities: Architecture for Non-humans", Lecture, Sponsored by Royal Academy, United Kingdom, 4 March 2019.

<sup>4</sup> "the scientific study of how information is communicated in machines and electronic devices, comparing this with how information is communicated in the brain and nervous system", Cambridge Dictionary, "Cybernetics". Google cached 30 March 2019.

<sup>5</sup> The Editors of Encyclopaedia Britannica, "Cybernetics". Britannica Online, 1998. Revised 2014.

<sup>6</sup> "very large sets of data that are produced by people using the internet, and that can only be stored, understood, and used with the help of special tools and methods", Cambridge Dictionary, Google cached 30 March 2019.

<sup>7</sup> Anderson, Chris. "The end of Theory: The data deluge makes scientific method obsolete". The Wired. 23 June 2008.

## How do good/bad<sup>8</sup> goals in a cybernetics conversation lead to an interesting lifestyle and architecture?

This expounds critically as it concerns the moral understanding of the goal and the effects of the outcome regarding the two subjects and the environment, which are being used as the domain for the cybernetics network. This is inspired by von Foerster's second order definition where the wider scope of environmental morality is being used as a means to measure the heuristic nature of the topic, also known as homeostasis.

*Gordon Pask's Conversation Theory*<sup>9</sup> from his cybernetics investigation is the impetus of this framework as he sought to understand the novelty behind recursive interactions between man and machine. The notion is used to analyse moments of conversations between man and machines in the cartoon clip to understand the creation of novelty and exchange of knowledge. The clip from *Wallace and Gromit* is chosen as it expresses the anthropomorphism of machine intelligence as it inherits an inert tendency of human characteristic through the delegation of menial tasks. Here, Wallace is an eccentric inventor, who bears the characteristic of the human subject in constant pursuit for knowledge in the cybernetics theory<sup>10</sup>. As for Gromit, the 'humanoid' dog is the artificial intelligence machine counterpart. Moreover, the backdrop is the ground for reality due to it being an English dwelling in the 1950s. Bruno Latour's essay '*Where are the missing masses, sociology of a few mundane artefacts*' mediates the theory and the analogy, which he elevates machines to the same status as man through selective attributes; this will be used to evaluate the coupling's quality<sup>11</sup>.

Challenges arise from the essay detailing the complicit use of personal data variables and government surveillance totalitarian control. The acknowledgements can be seen through the recent Cambridge Analytica leaks,<sup>12</sup> questioning the ethics of shared ownership between the users and the providing parties<sup>13</sup>. Even though, it informs the subject regarding the political dimension concerning the interaction and interrelationship between the human observers, it strays far off from the objective argument with the human (Wallace) as the sole master in the cybernetics hierarchy as mentioned. Nevertheless, by critically addressing the key questions on the past and present relationship between man and machine, the essay will provide an argument on why an artificial intelligence totalitarian dystopia is not true.

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<sup>8</sup> In the context of this question, 'Good/ Bad' are defined as follows:

Good: Computational morality in cohesion with user's objective.

Bad: Undesired outcome incoherent from user's objective.

<sup>9</sup> Pask, Gordon. "*Conversation Theory: Application in Education and Epistemology*", Elsevier, 1976. pp 14 - 27

<sup>10</sup> Aardman Animations, "*Films: Wallace*", Wallace and Gromit, Website, Copyright 2019.

<sup>11</sup> Latour, Bruno, "*Where are the missing masses, sociology of a few mundane artefacts*". In *Shaping Technology-Building Society. Studies in Sociotechnical Change*, Wiebe Bijker and John Law (editors), MIT Press, Cambridge Mass. pp. 225-259, 1992

<sup>12</sup> Cadwalladr, Carole and Graham-Harrison, Emma, "*Revealed: 50 million Facebook profiles harvested for Cambridge Analytica in major data breach*". The Guardian, 17 March 2018.

<sup>13</sup> Chandler, David, "*A World without Causation: Big Data and the Coming of Age of Posthumanism*". *Journal of International Studies* Vol. 43, Millennium, 2015. pp 833-851



*(figure. 1) Wallace signalling Gromit to activate the machines.*



*(figure. 2) The act of delegating translation.*



*(figure. 3) A Choice of 'hearty' breakfast.<sup>14</sup>*

<sup>14</sup> "Wallace & Gromit: The Curse of the Were-Rabbit (2005) — Bunny Breakfast Scene (1/10)", Youtube video, 3:07, posted by MovieClip. 17 January 2019.

## 2\_Cybernetics and Architecture Convergence

**What is Cybernetics? What leads to Cybernetics Architecture? How does the convergence enhance the quality of architecture?**

### 2.1 Cybernetics

Cybernetics is a field of study that originally explores the relationship between the observing systems and its domain, the variable.<sup>15</sup> The movement began in post World War 2 United States with a core group of global, interdisciplinary and notable figures including Norbert Wiener, Heinz Von Foerster, and Gordon Pask. For Wiener, the study begins as an escalation from traditional linearity of electro circuit network, where the variables are limited to capacities, inductance, and resistance. It is his objective to propel it into an independent discipline after learning that various science disciplines are tinkering with the similar notion, at a meeting in Princeton 1943-1944. It expands with a wider scope of statistical measurement and information storage from a holistic approach of quantitative and qualitative analysis of the artefacts themselves. This would lead to a better cohesion with control theory and potentially inducing an ideal system of feedback loop — a crucial integration of the artefact with the notion of cognition, storage, and evolutionary successive actions. The subject can ‘learn’ and ‘act’ from what it sees, also known as the feedback.<sup>16</sup>

Wiener attempts to implement the notion into his theoretical development of the automated anti-aircraft gun, which uses the ‘learning’ and its ‘experience’ to develop a predictive system, freed from its linearity. An important early indication of machine learning using predictive statistical models is that the anti-aircraft gun can compute a perfect projectile path ahead of the target, whereas humans rely on recursive experience. However, the limitation occurs with limited data storage technology, and the artefact depending on a human-operated radar for the input rather than being a sole operator.<sup>17</sup> Conclusively, he hypothesises that a network of interconnected artefacts — “*ultra-rapid computing machine...consecutive switching device*” forming a similar model to that of the biological human nervous system (electro impulses activating muscles) would be the ideal solution. In the context of the cartoon, the historical theory can be seen when Wallace signals Gromit from his bed, which allows Gromit to activate a succession of levers, extrapolating beyond Wallace’s initial command, to translate his master from the bedroom to the living room.<sup>18</sup>

Many limitations presented in the original theory are later covered by Heinz von Foerster between 1968 and 1975 as cybernetics theory emerges from its gestation. He supersedes Wiener’s theory with an additional layer of complexity, redefining the legacy as the ‘*first order*’, as the simple form of cybernetics. Whereas the ‘*second order*’ breaks the fourth wall, in the ‘*observed*’ cybernetics system, and includes the user, defined as the ‘*observer*’, to complete a wider loop of cybernetics as causality is pursued to the fullest

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<sup>15</sup> The Editors of Encyclopaedia Britannica, “Cybernetics”. Britannica Online, 1998. Revised 2014.

<sup>16</sup> Norbert Wiener, “Cybernetics or the Control and Communication in the Animal and the Machine”. The MIT Press; Second edition, March 1965. Kindle edition, location 297 of 2,909.

<sup>17</sup> “Norbert Wiener - Anti-Aircraft Gun”, Youtube video, 03:00, posted by “We’ve Come So Far”, 13 May 2018.

<sup>18</sup> “Wallace & Gromit: The Curse of the Were-Rabbit - Bunny Breakfast Scene”, Movieclips. 01:21 - 01:50/ 3:07

extent. The domain of human cognition is involved, as a nod to morality.<sup>19</sup> Von Heinz urges that the construction of data information from the observed system should be made perceivable by human cognition as the circulative notion of recursion and the improvement of the system require the participation of the user as well. The data produced by the artefact is opened for interpretation amongst the observers as each person engages from a personal subjective angle. The cybernetics observer, who engages in objective data collection from a specific phenomenon, is then judged subjectively from the observer, whose interpretation is different. Unlike an objective quantitative data collection process, including human cognition in the process, and its subsequent subjective judgement can also facilitate qualitative data collection processes. Therefore, the adaptation includes the observer in its process.<sup>20</sup> This can be Wallace conversing: thanking Gromit in his engagement with the lever activations; pondering the narrowed chute gap; and being astounded by the unfavourable choice of the presented meal.<sup>21</sup> The relationship of each member within the system upholds the value of autopoiesis, crucial to the approach of constructivism, of which is well within Pask's cybernetics theories.

The second cybernetics order introduces a new philosophy of science, succeeding the old model of Newtonian science, by helping scientists critique old theories. However, the notion has remained stagnant ever since.<sup>22</sup> Nevertheless, the moral inclusion of the human observer within the cybernetics system presents the user as part of the holistic interrelationship between all artefact nodes, rapturing a hierarchy of linearity. It also shows a recursion of all participants evolving through an heuristic process by interacting for a pre-established goal. Thus, the physical and theoretical interactions between the nodes can be considered a 'conversation' as expounded by Gordon Pask's *Conversation Theory*.

## 2.2 Gordon Pask and the Cybernetics of Design

Regarding the design aspect of cybernetics, Gordon Pask comes across as the impetus of the movement. He became deeply involved in the realm of cybernetics after attending a lecture by Weiner in Cambridge in the 1950s, where Pask completed a MA in natural science. He was inspired by the epistemology of cybernetics and the parallel analogy to the biological human nervous system. Pask offered a transdisciplinarity viewpoint of the subject due to exposure in many academic fields through his multifaceted academic degrees.<sup>23</sup> Upon graduation from Cambridge in 1952, Pask set up his private consulting firm, *System Research*, where he provided important research to the USA and the United Kingdom military and defence branch. These are included amongst his 250 publications and projects upholding the value of cybernetics epistemology.<sup>24</sup>

Being a second generation of cyberneticians during the expansion of cybernetics in the 1950s, Pask designed several advanced artefacts that are later on, hailed as intellectual performative machines that

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<sup>19</sup> von Foerster, Heinz. "Understanding - Understanding: Essays on Cybernetics and Cognition".

<sup>20</sup> Goldstein, Jeffrey. "Heinz von Foerster and the second-order cybernetics". *Journal of Emergence: Complexity and Organization*, Adelphi University, 30 Jun 2017.

<sup>21</sup> "Wallace & Gromit: The Curse of the Were-Rabbit - Bunny Breakfast Scene", Movieclips, 01:21 - 01:50 / 3:07

<sup>22</sup> "Stuart A. Umpleby: Second Order Cybernetics Then and Now (Heinz von Foerster Lecture 2013)", Youtube video, posted by "Heinz von Foerster Gesellschaft", 22 November 2013.

<sup>23</sup> Pickering, Andrew. "The Cybernetic Brain". University of Chicago Press, April 2010. Kindle edition, location: 270 of 1053.

<sup>24</sup> Chroust, Gerhard. "Gordon Pask, 1994". *International Federation for Systems Research Newsletter* 1994. Vol. 13 no. 2 (33) July.

engage in a ‘conversation’ with the user through a series of interactions and algorithmic assortments.<sup>25</sup> Pask’s learning from his built artefacts, is noted in the publication of his *Conversation Theory* publication in 1978. He expands the notion of the ‘*second order*’ cybernetics theory for better recursion of cybernetics through the engagement in learning and negotiation; the observer looks through a holistic interaction and understanding the variables of the observed artefacts.<sup>26</sup> Analogically, Wallace’s engagement with Gromit on various topics, enables a closer understanding as Wallace negotiates his opinions to understand general issues from Gromit’s view, and the surrounding artefacts. This results in Wallace’s heuristic thinking of what he would progress on. The following are two most related Paskian artefacts displaying the heuristic nature of the second order of cybernetics.

### ***Musicolour, 1953***

The artefact (*fig. 4*) requires the user to play a keyboard, and is connected to a speaker, which then acts as an input into a box that reacts by shining lights. This causes a feedback loop. The keyboard can be played through tones (bass, piano, drum, etc...). The lights themselves are displayed independently with different colours which are distributed through the performance space. The installation can be performed anywhere, particularly in this case, it is done in a music concert. The projections from the light module are shone on different mediums including the drape fabric, or the blank wall. The interaction is done when the user engages and the music box responds intellectually to repetitiveness from the user’s performance.<sup>27</sup>

In the case of a monotonous play, the music box will cease to react — a social indication of boredom. It’s memory box, the brain, detects a flat line in pattern hence it ceases the lights from functioning. Moreover, the algorithm written by Pask distinguishes a genuine musical piece from monotony and randomness. This forces the user to engage in a constant creative pattern. An allographic scenario of a conversation in which the user is self-persuaded to change his topic with the counterpart, while remaining coherent and interesting avoiding a ‘boring’ conversation.

### ***Colloquy of Mobiles, Cybernetics Serendipity, London, 1968***

‘Colloquy’ means conversation. Pask’s most profound artefact (*fig. 5*). The physical manifestation of his radical constructivism can be seen through a series of sculptures interacting amongst themselves. The three dominating organic figures on the outer rim are modelled as the ‘females’ while the two inner thin body ones are ‘males’. Additionally, the female sculptures are integrated with mirrors. Alternatively, light projectors are installed on the males. All of the figures rotate on their own central axis with the males projecting the lights constantly. Clearly as presented, these rotating bodies hold their own programmed intelligence. Upon the rotating frequency of two genders and their perfect alignment, the projected light would then be reflected from the female and back to the male body. This ceases the action of the two genders resonating bodies and both would produce noises as a display of arousal. A boredom mechanism kicks in upon a flat line pattern in the interaction. The interacting bodies would then regress back to their original sole motive of rotation. Most importantly, this is the first public display of artefacts in

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<sup>25</sup> Pangaro, Paul. “Obituary to *The Guardian*: Gordon Pask”, Pangaro, 16 April 1996.

<sup>26</sup> Pangaro, Paul. “*Cybernetics And Conversation*”, Pangaro, May 1996.

<sup>27</sup> Haque, Usman. ‘The Architectural Relevance of Gordon Pask’, John Wiley & Sons Ltd, 2017

conversation.<sup>28</sup> The playfulness of the artefacts judging from their forms, as well as interaction of intelligence were well-received from the public. Yet in contrast to Pask's preceding artefacts, this one takes on a human scale form with its simplistic, anthropomorphic behaviour.

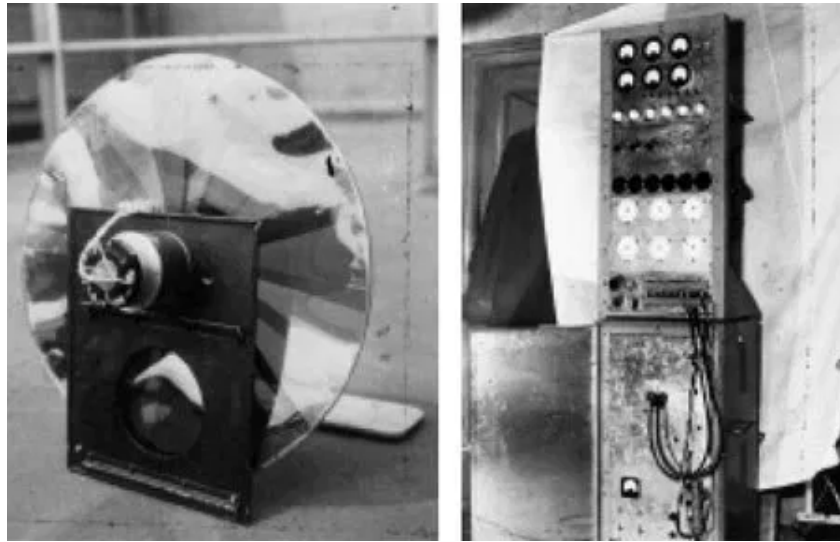
The following artefacts remain crucial towards Pask's conjuration of *Conversation Theory*. Boredom is an attribute, representing the stalling of the recursive progression within the cybernetics network.<sup>29</sup> The interaction without any novelty presented in every cycle would collapse into a loop, denoting a repetition of the same statement without an evolution of ideas. It is important to note that *Musicolour* was one of the early artefacts that materialised from the derivative of Pask's second order of cybernetics as it proves that the theory works in practice. Early display in permutations of music notes are also shown through the artefact as the user and the system work together. Later on, *Colloquy of Mobiles* materialised the anthropomorphism aspect of the artefact-artefact interaction through the caricature of gender sexualisations. More importantly, the public display artefact also allows the visitors to participate within the network with their own torchlight to light up (interact) the 'female' artefact. Pask perfectly materialised his theory through the anthropomorphism of his design to resonate with human's scale of interaction. This precedes his ambitious attempts to bring design on the larger scale of architecture with Cedric Price later on.<sup>30</sup>

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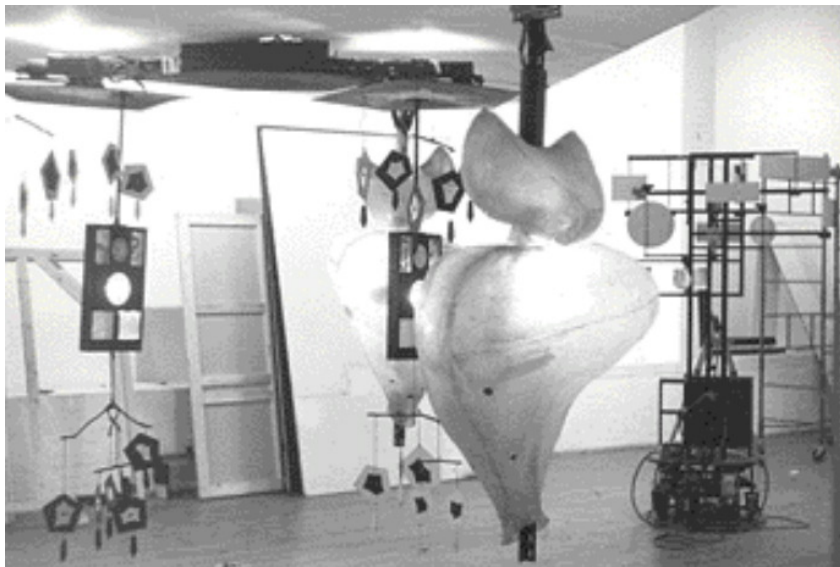
<sup>28</sup> Ibid.

<sup>29</sup> "Gordon Pask - On Consciousness", Lecture, February 1995, Youtube video, posted by AA School of Architecture, 01:00:14, 5 May 2015.

<sup>30</sup> Andrew Pickering, *The Cybernetic Brain*. Location: 6,523 of 10,503.



(figure. 4) *Musicolour*, 1953.<sup>31</sup>



(figure. 5) *Colloquy of Mobiles*, 1968.<sup>32</sup>

<sup>31</sup> Ruairi Glynn, "An Image of Pask's *Musicolour*. The First Interactive Installation that had the potential to bored of people's behaviour". Photograph.

<sup>32</sup> "Cybernetic Serendipity Archive, Gordon Pask, *Colloquy of Mobiles*, exhibition view, ICA London", 1968. Photograph.



## 2.3 Cybernetics of Architecture and Cedric Price

*“What is the value of it now — what is useful about it now, for you?”*, Cedric Price.<sup>33</sup>

Gordon Pask believes architecture and cybernetics share similar notions as they both set out to investigate the governance of organisational systems through negotiations of theories and resources. The creation of architectural artefacts is done as a progressive process. The enigma of subjectivity can be filled with the coupling of cybernetics as Pask argues.<sup>34</sup> Cedric Price and Gordon Pask met at Cambridge in the 1950s, and Pask became engaged with the realm of architecture through his frequent critic role at the Architecture Association in the late 1970s, and his lead cybernetician role in Price’s radical work of the *Fun Palace*, early 60s.<sup>35</sup>

Post-war Britain sees rapid radical changes in policies and an ever-evolving redefinition of the mindset towards an ideal society. Cedric Price is well-known for his adaptation of architectural programmes, with cybernetics, along with his daring design pushing the stagnating movement of Modernism towards its truest fidelity. Price believes in the potential of each individual, manifesting as a ‘creative labourer’, and whose learning process should not stagnate at any time.<sup>36</sup> This is personally seen as astounding given the current calling for continuous global creative endeavours in lieu of the coming post-Fordian age. Perhaps this is a projection to the idealist post-Fordian Wallace, who is ever creative and constantly engaging in subjects upon waking up in the morning. Nevertheless, Price’s radical approach to architecture acts as a precursor to inspire modern iconic construction of the *Millennium Dome*, the *London Eye* and the *Pompidou Centre*. A dissection of *Fun Palace* and *Generator* as Price’s polemical impetus is warranted.<sup>37</sup>

*“Architecture should have little to do with problem-solving — rather it should create desirable conditions and opportunities hitherto thought impossible.”*, Cedric Price.<sup>38</sup>

### ***Fun Palace*, 1962**

*Fun Place*’s design is drafted by a collaboration between Cedric Price and Joan Littlewood, a radical theatre director of her time (*fig. 6*). It is Littlewood’s argument to blur the distinction between the essence of ‘work’ and ‘play’. This is from her projection of a decrease of labour in the Fordian age coupled with an increase in wealth and social liberty. Hailed by *Architecture Review* as the first ‘automated architecture’, the concept is described as a series of mechanical structures that adapt to the fluctuating needs

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<sup>33</sup> Hardingham, Samantha and Rattenbury, Kester. “*Supercrit #1 Cedric Price: Potteries Thinkbelt*”. Routledge, 24 December 2007, p.11

<sup>34</sup> Pask, Gordon. “*The Architectural Relevance of Cybernetics*”, *Architectural Design*, September, 1969, issue No 7/6, John Wiley & Sons Ltd, London. pp 494-6

<sup>35</sup> Frazer, John H. “*The Architectural Relevance of Cybernetics*”. *Systems Research*, Vol.10, No.3, 1993, MCB UP Ltd, 2001.

<sup>36</sup> Murphy, Douglas. “*Cedric Price (1934-2003)*. *Architecture Review*”, 5 January 2018. pp 43-48.

<sup>37</sup> Millmo, Cahal. “*Cedric Price: The most influential architect you've never heard of*”, *Independent*, 10 November 2014.

<sup>38</sup> Cedric Price, “*The Square Book*”, Volume 7 of *Architectural Monographs Paper*, Wiley, 21 January 2003. p.11.

and desires of the inhabitant. Her aim was to promote spontaneous curiosity through the labyrinth-like automated space assortment, cooperating with Price and Pask to materialise the idea.<sup>39</sup>

This is achieved through a series of variables from the user's activities. Cedric assembled a cybernetics committee to formulate the function, including Gordon Pask and multi scientific disciplines. The think-tank came up with means of data collection through electronic sensors and response terminals. Being the observing system, the architecture algorithmically processes and instructs the mechanical enclosures (wall and ceilings) and walkways (staircases and pathways) to shift themselves, forming a predicted ideal space for the trends. By doing so, the architecture is programmed to reshuffle its internal partitions and walkways to provide spaces for the intended anticipated activities (*fig. 7*). The act of mechanical and automated reshuffling reduces physical and mental constraints for all parties responsible for the procurement of the architecture.<sup>40</sup>

Pask simplifies the complex human programme assortments into simple logic gate syntax diagrams, thus noting the programme specific functions as goals, which are drawn out as output signage rectangles (*fig. 8*). The cluster of programmes are done in 3 feedback loops as the dash lines indicate interconnectedness between a few human actions that inform each other. Furthermore, the proposed intelligence system is supported by a sophisticated processing system, the '*Pillar of Information*', using game theories through cybernetics. It would archive user's history, allowing it to grow towards a more cognitive state as the forum's history becomes richer and complex. The efficiency increases with higher-order tensions.<sup>41</sup>

Given the technological limitation of the time, Price hoped the computing system would soon predict future trends. Although the concept was not fully realised due to insufficient funding and council approval, its virtuous behaviour run parallel with computer programs. With regard to limitations in technology, the topic could possibly be revisited through the modern day utilitarian paradigm with advancement in computational and architectural technologies, that Price springboarded to complete the oil rig that resembles his *Fun Palace*.<sup>42</sup> The pipe dream would have cost less than the built Pompidou Centre, given the adjusted inflation of £751.77 m<sup>43</sup> versus the palace fee of £38.88 m,<sup>44</sup> still less than his inspired oil rig's average price of £497.90 m<sup>45</sup>. Yet the insufficient faith by the government and the crisis in the 70s, the project did not go through.<sup>46</sup>

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<sup>39</sup> Littlewood, Joan. "*Non-Program: A Laboratory of Fun*". (The Drama Review: Architecture/ Environment, 1968: Cedric Price Works 1952 - 2003, "A Forward-minded retrospective: Drama Review: Architecture/ environment", 1968, pp 130-134.

<sup>40</sup> Hardingham, Samantha. "*Cedric Price works, 1952-2003 : a forward-minded retrospective*". Canadian Centre for Architecture (CCA), 2016.

<sup>41</sup> Stanley, Matthews. "*The Fun Palace as Virtual Architecture: Cedric Price and the Practices of Indeterminacy*". Journal of Architectural Education, ACSA, 2006, pp.39-48.

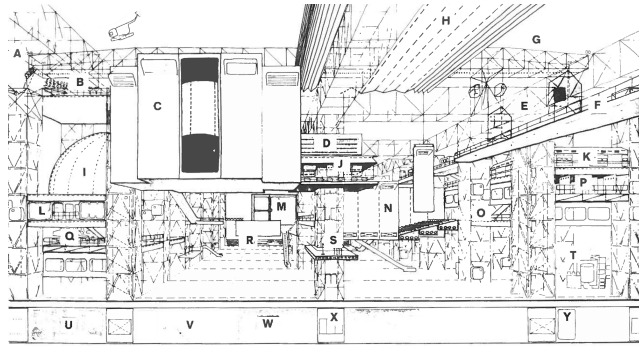
<sup>42</sup> Price, Cedric. "*Time: Architecture's Touchstone*". "Cedric Price Works 1952 - 2003, A Forward-minded retrospective". Time: Architecture's Touchstone 13th Annual Reyner Banham Memorial Lecture Victoria & Albert Museum, London, 23 March 2001. pp 478 - 489.

<sup>43</sup> Rogers Stirk Harbour + Partners Architect. "*Centre Pompidou*", Design Building Wiki, 18 February 2019.

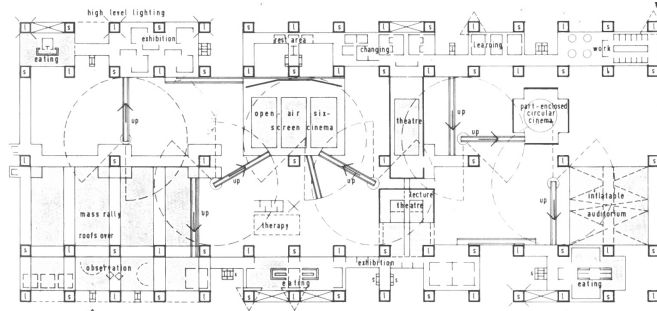
<sup>44</sup> Bank of England Inflation Calculator.

<sup>45</sup> Lioudis, Nick K. "*How do average costs compare among various oil drilling rigs?*", Investopedia, 27 February 2018.

<sup>46</sup> Littlewood, Joan, "*Non-Program: A Laboratory of Fun*". pp 130-134

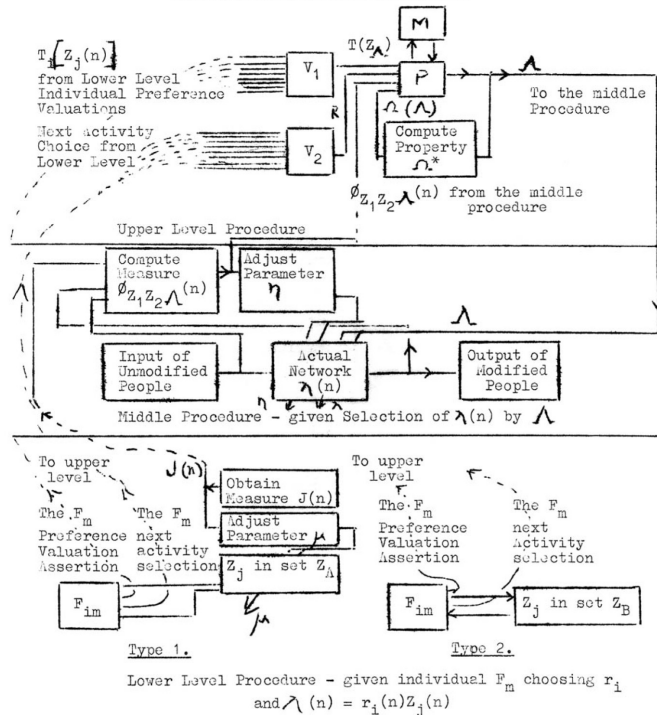


(figure. 6) Interior Perspective drawing of the Fun Palace.<sup>47</sup>



(figure. 7) Diagrammatic Plan.<sup>48</sup>

Organisational Plan as Programme



(figure. 8) Cybernetic Diagram from Gordon Pask.<sup>49</sup>

<sup>47</sup> Price, Cedric. *The Fun Palace*. Scanned drawing.

<sup>48</sup> Price, Cedric. *Fun Palace Project*. Scanned drawing.

<sup>49</sup> Pask, Gordon. *Cybernetic Diagram for Fun Palace*. Scanned drawing.

## The Generator, 1976

A decade after Price's radical 'Fun Palace' and 'Potteries Thinkbelt', he collaborated with John and Julia Frazers, who pioneered in 'seeding' techniques in their work, '*The Reptile system*' in his tenure at Cambridge.<sup>50</sup> The design is called *The Generator* (fig. 9) and was done for the CEO of the Gilman Paper Company, who wished for an impermanent house with the owner assuming an ongoing authorship of the design, creating a conversation between his habitation and the architecture.

*The Generator* was critically acclaimed as the first intelligent building. The concept is done through a modular structure (3.5 x 3.5 x 3 m), built with manufactured components (cladding wall panels, ME parts, furnitures, pathways, etc...) and assembled by an in-situ crane operator. Together, the structure could be assembled through 43 millions different variation through state of the art computational simulation. However, functional variations, the 'menu', are done through a series of 24 unique cross-referenced syntax human activities from the inhabitant (playing the piano, washing up, sleeping, etc...) (fig. 10). The inhabitant interacts with the observing system through the microprocessor controlled unit that can print out instructional layouts for the crane operator.<sup>51</sup>

The concept inherits cybernetics features from the *Fun Palace*, ranging from variables to computing logics. However, the occupancy is reduced down to the CEO's family household and by doing so, it increases the number of syntax complexities from one individual, in comparison to limited variations due to democratic voting of the mass. Moreover, the structure becoming 'bored' (see Cedric Price's *Musicolour*) was in Price's final design outlines with Frazer. Regarding boredom, the cybernetics emotion is expressed through insufficient creative desire from the inhabitants and thus, the building must be allowed in itself to change their living patterns. By doing so, it forms a perfect feedback loop between the observer and the observed as their design intentions influence each other. The independence allows the structure to become more natural and intelligent thanks to the seeding application.<sup>52</sup>

## Precedents' Outcome

Cedric Price's attempts to govern the entire inhabitation of the *Fun Palace* falls short due to the attempts of generalising that entropic human learning is applicable to every human being. The crane is placed there to be the sole responsive system, though it's role is important as it is the impetus of the adaptive function in the architecture. Given individuals' internal complexity and learning curiosity, Cedric faced limitations in outlining the domains of variable wanted learning<sup>53</sup> (fig. 11). This is listed in the holistic approach to construct an ideal programme, then passed on as algorithms for the system. Therefore, a collective of present and future inhabitants would present a complication as they pose an astronomical amount of permutations. In a critical sense, Price presented a case of homogeneity through his attempts

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<sup>50</sup> Frazer, John H. "An Evolutionary Model", Architecture Association, December 2009. pp 65 - 75

<sup>51</sup> Khara, Aksa. "The Generator Project", Interactive Architecture Lab, 6 May 2015.

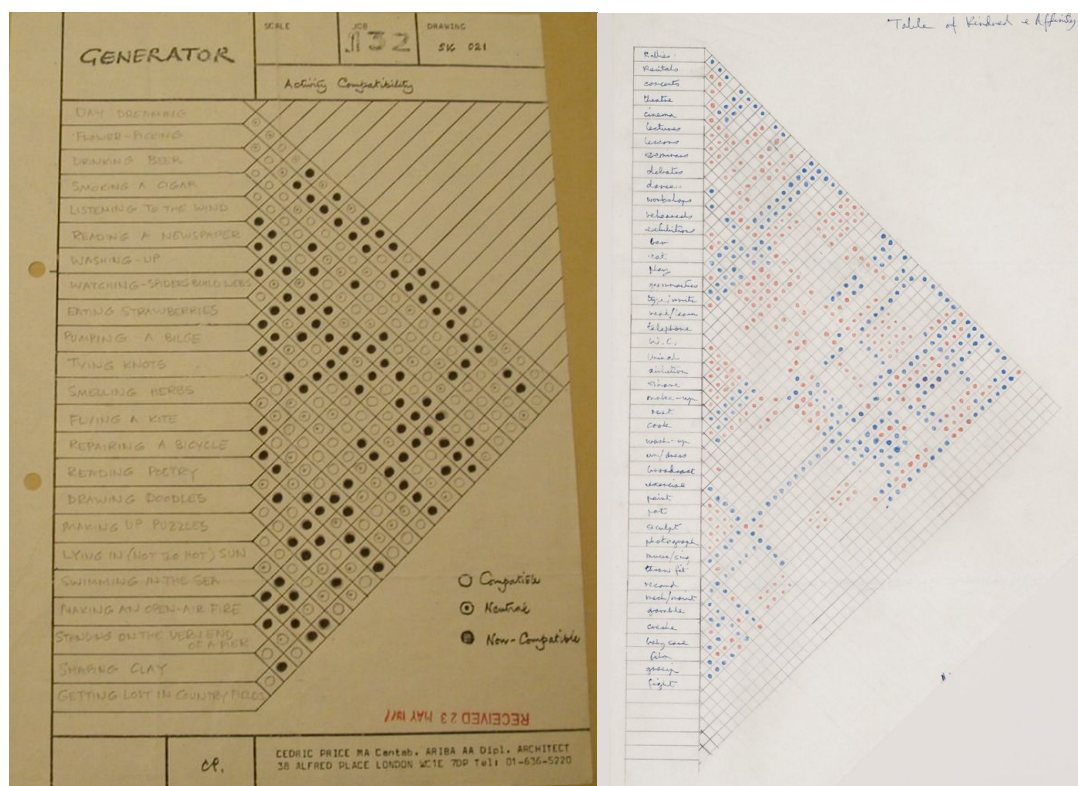
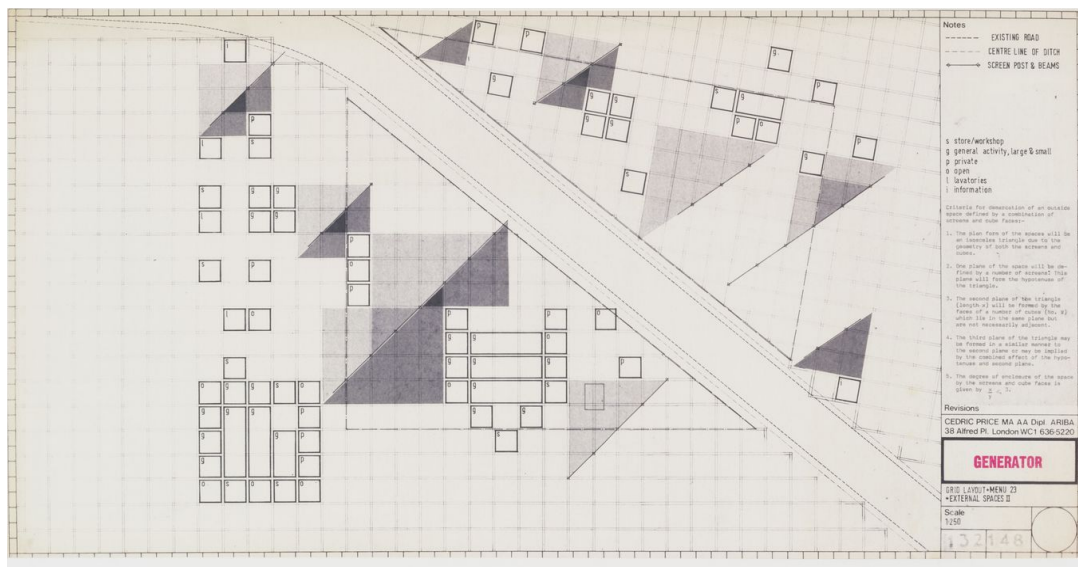
<sup>52</sup> Furtado C. L, Goncalo M, "Cedric Price's Generator and the Frazers' systems research". Technoetic Arts: A Journal of Speculative Research Volume 6 Number 1, Intellect, 2008. pp 55 - 72

<sup>53</sup> "How Design and Cybernetics Reflect Each Other", Glanville, Ranulph, Lecture at Relating Systems Thinking & Design 3 Symposium (RSD3), 14 October 2014, Youtube video, 44:14, posted by ascybernetics, 23 October 2014.

towards promoting novelty. Of course, the limitation of computing speed and storage would still be considered, though the problem still remains.

Comparatively, to *the Generator*, Cedric Price accessed the programme through a more focused living domain, which leaves less room for humanistic uncertainties of the characters. Downsized to a family household number, the brief's opportunity here derives from the client who wishes to be part of an ongoing authorship on his own design of the architecture. There are 12 different living qualitative criteria shared between the occupants, that can be judged quantitatively by the computers, that produce different layouts for the shuffling if the activities stall. The opportunity here does not concern the creation of a new living style, but rather pushes a constructive conversation between the host to decide whether this brand new living style is opportunistic or it produces more constraints. In conclusion, the constructive negotiations between the inhabitants and the computer produces novelty.

Throughout the integration of cybernetic theories, the involvement of the user-observer, in the network of system observers and the observed, promotes a notion of individuality through recursive conversational engagement between the interrelationships. Wallace, who only knows so much about himself, continues to learn more through his interaction and conversation with Gromit and his artefacts. Price's promotion of opportunities and novelty against boredom from his cybernetics architecture works well in theory, though the practice is hindered by the opportunity cost from the clients. However, the successors of the Paskian artefacts have proven otherwise; specifically that the notion does work on human scale and was well-received by the public from the *Cybernetics Serendipity* exhibition. It is learnt that the richness of syntax associated programmes promotes novelty in design outcomes.



<sup>54</sup> Price, Cedric. “Menu 23 and External Spaces II”. Scanned drawing.

55 Price, Cedric. "Chart of activity compatibility for Generator". Photograph.

<sup>56</sup> Price, Cedric. "Analytical table of kindred activities, Fun Palace". Photograph.



## 3\_Task Delegations and Goals Conservations

**How does providing a ‘bad (mistakes) /good goals’ cybernetics conversation lead to better lifestyle and a better architecture?**

Nicholas Negroponte, who is the co-creator of *MIT Media Lab* (1986) and *the Wired* magazine (1992),<sup>57</sup> asked Gordon Pask for a contribution to his book, *the Soft Architecture Machines* (1976). Pask returns the favour, lamenting the same adherence with Negroponte, for heuristics of the role between man and artefacts uniting as the designer.<sup>58</sup> The interface takes possession in metalanguage (syntax), where both perspectives boundaries are neutralised. The subjects can share desires and intentions towards a common established goal. The heuristic nature of both man and artefact allows them to accommodate each other, through variables from their parameters. This relationship allows the human to provide the artefacts with updates and the succession would ideally entail a reply back with potential answers. Upon the closure of a ‘task’, the heuristic aspect pushes the interface to expand. Both would evolve beyond their original knowledge.<sup>59</sup> The phenomenon is shared across the industrialising landscape of continental United States where cybernetics architecture dwells ubiquitously as Alex MacLean and James Corner rediscover through their unique perspectives. Corner’s definition of ‘*to measure*’ is translatable as their attempt to quantify phenomena as a learning tool to enrich lifestyle through using cybernetics. Additionally, Bruno Latour provides his understanding of an artefact principle as a social theory, which will be used throughout.

### 3.1 Common goal

As society pursues the American dream, the natural landscape acts as a rich canvas to test goals and to pursue novelties towards civilisation through industrialisation. The natural wilderness possesses an eternal conversation of its own, thus warrant an intervention to partake a role within the loop. Any requirement that lies beyond mere human capability is then delegated to machineries, including menial tasks that are frictional towards progress. Outlined as ‘*occupy, control, and manipulate*’, Corner links the landscape as an ‘*immense construction site of mechanisms and instruments, each working to optimise efficiency and utility*’.<sup>60</sup>

The establishment of the genesis-cybernetics and autopoiesis enables man’s poetic and systematic understanding of nature. The machine scales with the given domain as a means of controlling a ‘small’ swirl of entropy. Megastructures, including concrete dams, are astounding as their sole purpose is to control the wrath of water. Successful control results in passive water reservoirs, irrigations, and hydroelectric power. *The Hoover Dam* generates 4.1 billion kilowatts per hours, and the distribution of 9.2 trillion gallons of water across millions in the South-West of US. Not only did the construction lead to the creation of new

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<sup>57</sup> MIT Media. “Nicholas Negroponte”. MIT Media Lab, Google Cached, 30 March 2019.

<sup>58</sup> Negroponte, Nicholas. “*Toward a Theory of Architecture Machine*”. *Journal of Architectural Education* (1947-1974), Vol. 23, No. 2 March, 1969, Taylor & Francis, Ltd. pp. 9 - 12

<sup>59</sup> Pask, Gordon. “*Aspect of Machine and Intelligence*”. *Soft Architecture Machines*, MIT Press, 1976. pp. 7 - 31

<sup>60</sup> Corner, James and MacLean, Alex S, “*Measures of Land*”, in *Taking Measure Across the American Landscape*. Yale University Press, 1996. p 41



towns, but it also served as a principle, founding the domain of particular infrastructures later, expanding goals and opportunities.<sup>61</sup> The giant monolith scaling the landscape allowed the inclusion of man into the environmental conversation with nature. The creation of a dam and the emergence of cybernetics appear to have a very similar infrastructural function. A dam attempts to mitigate the entropy of the natural landscape for the benefit of human practice and the ordered development of civilised society. In a similar way, cybernetics, the modern tool for order, attempts to mitigate the entropy of human practice and the way civilised society is developing by providing an ‘infrastructure’ similar to that of the dam, this time ordering human activity, by using the input of human activity. Cybernetics pursues its definition of ‘governing’ results in fantastic infrastructural landscape, also vastly beneficial to human.

Corner further outlines the method of genesis-cybernetics as ‘*traditional*’, which mankind scales its intrinsic goals and ambitions in relation to aspects of nature as a direct means of governing. This comes with their re-negotiation with the method by relating their human bodies with the proposed cybernetics system. *The Hoover Dam* scales up monolithically with the river body as the population of Black Canyon attempts to ‘tame’ the Colorado river.<sup>62</sup> The re-negotiation of cybernetics systems between human and mechanical agents is then done through the concept of ‘*anthropomorphism*’, meaning it not only has a human input but also a human-like output, rendering it a less monolithic infrastructure.

We see ourselves relatable on a smaller architectural scale. Wallace is located at 62 West Wallaby Street, Wigan within the setting of the 1950s.<sup>63</sup> His house bares similarity with the neighbourhood’s style of a typical English terrace house as part of urban planning schemes. This results in the topography of ‘two-up, two-down’.<sup>64</sup> Wallace cultivates the given environment with his cybernetics, which Latour explains the intricacies of, through ‘*anthropomorphism*’ and ‘*delegations*’.

Upon waking up in the morning, Wallace signals Gromit to activate the lever. The rigid bar is connected to a complex, mechanical network, which allows him to ‘*translate*’ to the living room from his bedroom.<sup>65</sup> The construct is scaled perfectly into Gromit’s palm. The human, ‘*anthropos*’, characteristic attribution of the machine lever’s form, ‘*morphos*’ being ergonomically designed for a human hand, allows a thoughtless interaction. The lever is engineered as an input representation (‘safe-looking’ from the human perspective) on the interface that hides the hazardousness of the contraptions that powers the entire cybernetics system.<sup>66</sup>

Through the translation goal, he prescribed the non-human contraptions to rotate his bed in upward position, in order to utilise gravity, to allow a downward translation. This ‘*figurative*’ actor frees Wallace from the menial task of getting up and walking forward and downstairs that requires the whole complex bodily actions. The master was even thrilled by the accommodating free fall, coming from just one

<sup>61</sup> “*Building the Hoover Dam | The B1M*”, Cortese, Dan, Youtube video, 06:50, posted by The B1M, 15 August 2018.

<sup>62</sup> The Bureau of Reclamation, “*The Story of Hoover Dam*”, The Bureau of Reclamation, August 2017.

<sup>63</sup> Wigan Today. “*A cracking town, Gromit*”, Wigan Today, November 2005.

<sup>64</sup> “*a small house on two levels that has just two main rooms on the ground floor and two bedrooms on the top floor*” — Cambridge Online Dictionary, “*two-up, two-down*”.

<sup>65</sup> “*Wallace & Gromit: The Curse of the Were-Rabbit - Bunny Breakfast Scene*”, Movieclips, 01:32/ 3:07

<sup>66</sup> Latour, Bruno. “*Where are the missing masses, sociology of a few mundane artefacts*”. p 159

communication with the lever — One common goal, a simple communication, an efficiency with a few actions, and the beauty of mechanical novelty with guaranteed thrill.

## 3.2 Homeostasis and Conservation

Being established as the genesis-cybernetics system of a goal, the artefact's continuing existence is ruled out as the system's homeostasis, thus steering both observer and observed elements into the neutrality of goals. This is done through either the positive feedback loop of desired goal; the negative feedback of mistakes and subsequent correction; and finally alterations.<sup>67</sup>

This is applicable to Wallace as he is anything but a perfect human. The flaws are shown through humours, as seen in the movie. In this particular scene, we see his weight gain enacts difficulty upon exiting the built portal through the floor.<sup>68</sup> As a comical remark, he enquires assistance from Gromit, which then activates a correctional 'hammer' to 'amplify' his translation goal by slamming him through. The design of the spatial conditions in this case, benefits from the use of cybernetics, essentially the knowledge input that the bed rotation is no longer sufficient for Wallace's spatial translation. The original mechanism has failed before and needed to be fixed with an additional integration. This is not far off from a complete alteration.

However, Latour discusses the paradox of the safety feature in his car, namely the system of the seat belt. By dissecting the designer's intent in the safety system, we reveal '*moral*' has been implemented with a premonition to prevent future accidents. This exists in Latour's seatbelt as it possesses a long line of negotiations and delegations between the law and the manufacturer. The negative feedback is demonstrated through Latour's inherent resistance to put on the seatbelt, which triggers the sound-alarm feature and produces the attributes of annoyance, as a corrective measure to steer him into completing the goal by fastening the seat belt — '*high-pitched, so relentless, so repetitive, that I cannot stand it*' as the author expresses his frustration towards the as expectations of the design by the creator. From the machine's perspective, the mechanical cybernetics simply reacts as synonymous with 'error' when the seatbelt is not fastened, as the target value is different to the pre-established correct value. The paradox is lamented with another utilisation with the ever-annoyingly seatbelt can be released in a fraction of a second in the situation of a crash.<sup>69</sup> We tend to forget that our companion cybernetics are delegated originally as life saving features, despite their disguise as an annoying negative feedback element.

Through the means of homeostasis, a succession of constructive conversations would lead to the truer sense of epistemology. In reality, this costs the host, liberty in time and resource. Here, the liberty is, grounded by the reality of scarcity. The trial and error process of a conversation will continue until the host reaches a goal or both the host and the artefacts stop trying. Corner explains the thirst for complete governing over nature and humankind reveals a dichotomy between opportunities and costs. With the former being successions of conversations, and the later being vulnerabilities in environmental, economic,

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<sup>67</sup> Pask, Gordon. "An Approach to Cybernetics". Hutchinson & Co. Publishers, Third Edition 1970, pp 50 - 72

<sup>68</sup> "Wallace & Gromit: The Curse of the Were-Rabbit - Bunny Breakfast Scene", Movieclips, 01:31 - 01:54/ 3:07

<sup>69</sup> Latour, Bruno. *Where are the missing masses, sociology of a few mundane artefacts*. pp 152 - 153

social and ethical matters.<sup>70</sup> We awed at the impressive feats of engineering, including Price's dream oil field infrastructure, but the environmental and moral costs are the trade-off. Paradoxically, as part of realisations from more 'measuring', we correct ourselves again with the utilisation of greener fuels and self-regression of carbon footprints through more constructive intervention, including recycling and cycling.

Nevertheless, the advancement in computer science allows us to formulate a closer understanding with our mechanical companions through the increasingly anthropomorphic character of interactions between human and artefact. This ever-evolving conversational intelligence, induces the revolution in cybernetics as the paradigm of industrial age slowly shifts into the information age in the new millennia.

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<sup>70</sup> Corner, James and Maclean, Alex S, "*Taking Measure Across the American Landscape*". pp 25 - 37



## 4\_Cybernetics in the Information Age

**What is the information age? How does the birth of Artificial Intelligence relate to cybernetics? How does the cybernetics aspects of the information age improve lifestyle and architecture?**

### 4.1 The Information Age

We see ourselves living in a post-industrial age where global information of all possible measurements are accessible and controllable —The Information Age. The impetus started in 1948 with Claude E. Shannon's theory of encoding qualitative variables into binary code (I and O), inspired by the Boolean logic gates of on and off. By doing so, the variables can be packed from one end, delivered and unpacked with lossless information for the observing system and the human observer. This frees the system from friction and data loss of analogue-mechanical translations.<sup>71</sup>

Though cybernetics has influenced many pioneering contributors, its historical theory of second order still remains unchallenged.<sup>72</sup> Originally manifested in the physical form, it later took a cyberspace form through the creation of the internet in the information age with the internet being the canvas for a vast collective of cybernetics artefacts. The world's attitude is changing rapidly with 56.1% of the world population using the internet.<sup>73</sup> We also live in an unprecedented time, where over a third of the world population is born into informatic connectivity. Therefore, the idea of mobile connection being non-existent, is projected as a mystery to the emerging generation Z.<sup>74</sup> This notion of lifestyle is supported by the United Nations as it proclaims the internet is also a human right.<sup>75</sup> This chapter will therefore dissect information age's connection with cybernetics.

Concerning modern day observed variables, they are now done by the ubiquitous sensors, installed into everyday mundane artefacts. The proliferation resonates with the increase of consumerism as corporations continue to innovate towards the users' wants and needs. These sensors' data flow is achieved through the communication of the sensor's diagnostic gates within their individual closed systems but also with each other, and then projected into the internet database for the manufacturers to monitor the progress — a casual cybernetics approach.<sup>76</sup> The cybernetics found themselves to be connected to a global grid, the infrastructural scale can be in communication with the human's personal devices if both are connected on the same channel. As far as the dwellers are concerned, the deluge flow of information in a household can also be personally tapped and controlled in the advent of 'smart home'.<sup>77</sup> Humans are now augmented

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<sup>71</sup> "Claude Shannon - Father of the Information Age", Youtube video, posted by University of California Television (UCTV), 29:31, 16 January 2018.

<sup>72</sup> "Stuart A. Umpleby: Second Order Cybernetics Then and Now (Heinz von Foerster Lecture 2013)", Youtube video, posted by "Heinz von Foerster Gesellschaft", 22 November 2013.

<sup>73</sup> Internet World Stats, "Internet Usage Statistics: The Internet Big Picture", Internet World Stats, Google Cached, 31 March 2019.

<sup>74</sup> Miller, Lee J and Lu, Wei. "Gen Z Is Set to Outnumber Millennials Within a Year". Bloomberg, 20 August 2018.

<sup>75</sup> Sandle, Tim. "UN thinks internet access is a human right". Business Insider, 22 July 2016.

<sup>76</sup> "How It Works: Internet of Things", Youtube video, posted by IBM Think Academy, 03:38, 3 September 2015.

<sup>77</sup> "IBM Services | Client Stories | Inwido: Building Smart Homes in Europe", Youtube video, posted by IBM Services, 02:48, 5 June 2018.

cyborgs, hybrid of machines and men, as they are attached to the sacrosanct smartphone.<sup>78</sup> This emerged as humanity fully realised the potential of their own body and wanted to advance into the cybernetics landscape. By acting as a gateway interface, the argumentation allows humans without basic technical knowledge to become more connected through the use of user-friendly interfaces.<sup>79</sup> The integration proliferates as well on an architectural level, where artefacts embedded with sensors and informatic connections to larger cyber environments, beyond the individual building's physical environment, projects 21st century lifestyle over older buildings.

## Artificial Intelligence

We see *Artificial Intelligence* (AI) as a current important foothold in technology as it partakes within the grid of conversation in the cyberspace as well as the physical cybernetics world. These are exhibited in the proliferation of consumerism, as an example Google Search AI search engine<sup>80</sup> and the Uber driverless car research<sup>81</sup>. In essence, AI is understandable as the technology possesses attributes from both human and machine observers but is never entirely either.<sup>82</sup> As a derivative from Cybernetics, it uses input variables to compute (through a universal machine platform) solutions by mimicking human intelligence through the artificial system. Analogically, the union of Cybernetics and AI's Venn diagram shares the common goal of pursuing an understanding of the ambiguous environment through respective methods of epistemologies. Though, the approach of the former seeks a more thorough understanding through circular interactions and perpetual questioning while the later sees the world as it is.<sup>83</sup> Ultimately, AI's participation is acknowledged by Gordon Pask in 1976, which human and machines engage in 'conversations' while both pursue their own defined goals.<sup>84</sup>

Currently, the hitherto developments of AI are triumphed with trials of mimicking the perfect human reasoning. While the ideal universal AI operates nowhere outside other than the domain of a singular cognitive task, it is the impetus pursuit for commercial industries.<sup>85</sup> Furthermore, to perform such tasks, AI borrows the notion of human's pattern perception, though it expands more with capability to read and process the magnitude of '*Big Data*'.<sup>86</sup> By utilising deluges of data, it can recognise statistical patterns, which resemble human scientific rationale, also known as *Machine Learning*.<sup>87</sup> To move closer to Gromit's anthropomorphism standard, computer scientists trains a network of artificial neuron networks (pool of algorithms) through combinations of supervising, predictive, and reinforced training to weigh in the possible resemblance of cognitive ability from the human brain's neural network. Thus, this expands into

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<sup>78</sup> Harari, Yuval Noah. "*Homo Deus: A Brief History of Tomorrow*", Vintage Digital, Sept. 2016. pp 45 - 50.

<sup>79</sup> Picon, Antoine, "*Chapter 1: The Advent of the Smart City, from Flow Management to Event Control*", *A Spatialised Intelligence*, John Wiley & Sons Ltd, October 2015, pp 23 - 66.

<sup>80</sup> Moz, "*Google RankBrain: What is Google RankBrain?*", Moz, Google Cached, 31 Mar 2019.

<sup>81</sup> Johnson, Leif, and Fitzsimmons, Michelle, "*Uber self-driving cars: everything you need to know*", techradar, 25 May 2018.

<sup>82</sup> "the study of how to produce machines that have some of the qualities that the human mind has, such as the ability to understand language, recognize pictures, solve problems, and learn." Cambridge Online Dictionary, "Artificial Intelligence".

<sup>83</sup> Pagaro, Paul, "*Origins of AI in cybernetics*", *Cybernetics: A Definition*, Paul Pagaro, 2013.

<sup>84</sup> Pask, Gordon. "*Aspect of Machine and Intelligence*". Soft Architecture Machines, MIT Press, 1976. pp. 7 - 31

<sup>85</sup> Marr, Bernard. "The Key Definitions Of Artificial Intelligence (AI) That Explain Its Importance", Forbes, 14 February 2018.

<sup>86</sup> Bottazzi, Roberto. "*Digital architecture beyond computers*", Bloomsbury Visual Arts, 2018. pp 34 - 37.

<sup>87</sup> Bell, Lee, "*Machine learning versus AI: what's the difference?*". The Wired. 1 December 2016.

*Deep Learning*, and the triumph is made possible with *Big Data* of human footprints in the cyberspace with the increase of experts, from almost none in 2014, to 41,000 today.<sup>88</sup>

*Machine learning* can act as a learning tool for the users. It helps users to control the entropy of a system with computational power and provides permutations of constraints and outcomes. It retains the notion of cybernetics allowing users to engage with the interface, through organisation and descriptive design. Arguably, it eliminates possible intrinsic paths and provides the best statistical results. However, concerning the second order notion and the conversation theory branch, the novelty lies with users' decision-making in the end when results and intrinsic decision-making are required.<sup>89</sup> We can see this from Price's *Fun Palace* and *Generator*'s possible configurable permutations.

However, in *Deep learning*, the training aspect is rife with homogeneity from the AI perspective. It is a conundrum as the decision process is presented as a black box and the outcome mimics human thinking, and the idea of individuality becomes insignificant. Also, the gathered data only consists of the 'past' and 'present' human cognition. This correlates to a static architecture that ingrains a 'boring' lifestyle into the inhabitant as spontaneity and provocation of environmental changes are ruled out as noises. Interestingly, the current definition of AI learning stray closer to Weiner's first order definitions of cybernetics as it bares similarity in a 'total governing' of the subject. However, as von Foerster and Pask expanded into the ethical domain with the second order definition, the approach must be the same — The constructive novelty of human being must be pursued at best interest.

## 4.2 Modern Cybernetics Architecture and Design

**What are the modern applications of Cybernetics in Architecture and how are they beneficial?**

### Architectural Integration

Regarding the pursuit of an ideal living scenario for Wallace, the following expounds on the current cybernetics hitherto as the protagonist is a self-driven individual, who utilises artefacts to scale his Wigan house 7 decades ago. In the modern day, with our general understanding in artificial intelligent and cyberspace, we can gain an insight to the possibilities of his dwelling from the precedents.

Fluid decision-making stems from the ability to understand the surrounding environment as well as Wallace's goal to implement a sophisticated living. His modern artefacts' mechanism does not occupy a significant part of the dwelling's volume but rather melds in with the environment. The organic form couples with the negotiation of personal and external constraints, through Wallace's interrelationship conversation. The approach is achieved through the notion of machine learning with the protagonist engaging in the conversation with the technology through access to advanced modern computers. This practice exists with *Autodesk Generative Design* using topology optimisation with AI.<sup>90</sup> In collaboration

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<sup>88</sup> Eckerson, Henry H., Eckerson Group, "*Deep Learning – Past, Present, and Future*", KDNuggets, May 2017.

<sup>89</sup> Hebron, Patrick, "*Rethinking Design Tools in the Age of Machine Learning*", Towards Data Science, 29 March 2018.

<sup>90</sup> Autodesk, "*Generative Design*", Autodesk Solution, Google cached 29 Mar 2019.

with Philippe Starck, Kartell, and Autodesk AI, the coupling produces a chair in conscience with goals of achieving comfort, structural integrity, and the designer's interpretation of aesthetics (*fig. 12*). Starck also expresses the heuristic change in traditional design decision-making when coupled with AI, though he retains his novelty as the counterpart adapts intellectually.<sup>91</sup> Autodesk reinforced the AI's role is to be an aiding tool as the authorship of novelty remains ultimately to the designer.<sup>92</sup>

Freedom of translation, away from frictional mechanical systems, is a modern concept in the advent of wireless information transmission. The total control of home appliances, the artefacts, is now done through simplifying design with dynamic movement from the 'localised' artefacts. Critically, Wallace's translation of mechanical artefacts still retain static elements as it is ingrained into the given environment of his dwelling. We see the modern application of 'smart home'<sup>93</sup> taps closer to the recurrent loop of cybernetics as the 'wireless' connection wires the user through the cyborg integration of personal laptop and smartphone. The ingenious design of *Ori System* by MIT Media Lab dynamically transforms into different permutation of furnitures, providing the user's programmatic needs without the excess use of space (*fig. 13*). This eliminates further actions of mundane tasks of movement from the user within a confined space.<sup>94</sup> Thus, users can still manually reconfigure the *Ori System* in case of power failure. Interestingly, the manual task of delegating tasks is also provided through virtual home assistants with the likes of *Alexa*<sup>95</sup> through vocal communication.<sup>96</sup> The wireless cybernetics network allows new types of interactions between artefact and user, going beyond tangible outcomes like Wallace's contraptions, towards intangible conversations like in the example of *Local Warming*. Created by MIT Senseable City Laboratory, *Local Warming* uses infrared energy beam, and the localised artefact orients to concentrate heat on specific mobile targets, in order to efficiently utilise energy (*fig. 14*).<sup>97</sup> The autonomous agents counter the homogeneity elements of environmental heat and comfort which also supports the individuality of the inhabitants within the dwellings.

## **Mechanical Companion, aka G.R.O.M.I. T**

While stuck in the hole, Wallace enquires Gromit for help. The servile companion broke the fourth wall by gazing at the audience. He anticipates the human needs which he expresses by referring to us.

Nowadays, the robotic arm, which bears Cedric Price's 'deus ex' crane utilisation, is a succession through more complex mechanisation of human kinematic chains, thus mimicking fluid actions. Delegated to couple with the '*anthropomorphic*' environmental aspect of the artefacts, created originally for

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<sup>91</sup> Jordahn, Philippe, "Philippe Starck, Kartell and Autodesk unveil 'world's first production chair designed with artificial intelligence'", Dezeen, 11 April 2019.

<sup>92</sup> Autodesk, "Demystifying Generative Design: For Architecture, Engineering, and Construction", Autodesk Solution, Google cached 29 Mar 2019.

<sup>93</sup> "a dwelling equipped with systems and appliances that can be operated remotely using a computer or mobile phone", Collins Dictionary, "Smart Homes".

<sup>94</sup> Matheson, Rob, "Robotic interiors", The MIT News Office, 31 January 2018.

<sup>95</sup> Reisinger, Don, "Who (or What) Is Alexa? We Explain Amazon's Digital Assistant", Tom's Guide, 7 November 2016.

<sup>96</sup> Shieber, Jonathan, "Ori Systems brings the robotic furniture of the future to apartments today", Tech Crunch, 31 May 2017.

<sup>97</sup> MIT Senseable City Laboratory, "Local Warming", Carlo Ratti Associati, 3 March 2013.



humans.<sup>98</sup> Moreover, the robotic arms are mass manufactured in the post-fordist era<sup>99</sup> as their brains are centralised in the server with packaged algorithmic instructions. Equipped with multiple axes, the robotic arms can operate for longer durations than human. Efficiency is optimised through the collaboration between robots and humans as the one fills in each other's incapacities. This application of companionship in manufacturing shows robotics are solely imperfect in the modern day as they require the dynamic thinking human companion to infill the missing mass a deficit of correlations over causation.<sup>100</sup>

The humanoid robot has evolved to resemble its human counterparts to utilise and integrate within human environments with its bipedal legs (*fig. 15*).<sup>101</sup> The Boston Dynamics *Atlas* expands the domain of tasks to hazard territories where the risks are high. As being scaled down to menial tasks, the humanoid artefact can be seen doing dishes and its canine version is set to be commercially released in late 2019 (*fig. 16*). The training was done through machine learning and cyber simulations, and so humans may not participate in its thinking process. However, training can be a means to engage in a conversation with the artificial intelligence. It is also crucial for the user to understand the thinking of the robotic artefacts as a means of ethics and safety as a preemptive measure towards malfunctions posing significant risks. Boston Dynamics designed the robotic dog to be a customizable platform of technical support for hardware and software as well as an educational tool to share with the consumers.<sup>102</sup> Pask outlines the illogical conclusions towards 'maverick' machines as it is rather badly designed from the maverick intent of the creator.<sup>103</sup> It seems we need to judge the ethics and morals of the manufacturer through their intentions and goal.

The precedents denote the fact that the hitherto modern intelligent machine still requires to engage in conversations with a human to complete each other's goals. However, this in turn requires the user to converse with the knowledge of computer science. The integration of AI presents calculations of compatible permutations posing the question of whether the 'jittering' notion of boredom could push novelty if the options have been 'fully' explored. We also see the development of the artefacts' design morphology reducing spatial cluttering and expanding task and goal ambitions. On the contrary, the more AI transverses into *Deep Learning* territory, the more difficult it will be to logically understand as it operates less as a cybernetics grid but more as an unpredictable human agent.

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<sup>98</sup> Simon, Matt, "The Wired Guide To Robots", The Wired, 17 May 2018.

<sup>99</sup> "First robotic arm was developed in 1962 by George Devol and marketed by Joseph Engelberger", Moran, Michael E, "Evolution of robotic arms", Journal of Robotic Surgery, 1 May 2007; 1(2), pp 103–111.

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<sup>101</sup> System Administrator, "Two legs good", The Engineer, 22 November 2000.

<sup>102</sup> "How Boston Dynamics' Robots Became Internet Favorites | WIRED", Youtube video, 04:42, posted by The Wired, 20 December 2018.

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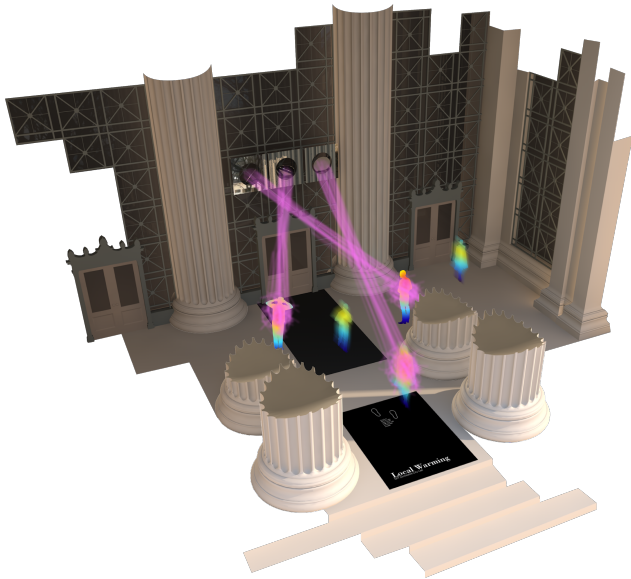
(figure. 12) Product of a conversation between designer and AI.<sup>104</sup>



(figure. 13) Artefact morphology (One Room a Hundred Ways).<sup>105</sup>

<sup>104</sup> "A.I. For Kartell By Starck, Powered By Autodesk", Video screenshots, posted by Starck, 00:55, Vimeo, 9 April 2019.

<sup>105</sup> "One Room a Hundred Ways" - ORI Systems - Designed in collaboration with Yves Behar and fuseproject", Video screenshots, posted by BX Films, 00:55, Youtube, 7 September 2019.



(figure. 14) "Local Warming" Static, yet, dynamic artefact.<sup>106</sup>



(figure. 15 & 16) Robotic Human, and Dog doing menial tasks.<sup>107 108</sup>

<sup>106</sup> MIT Senseable City Laboratory, "Local Warming: Media Press Release", Diagram, and Photograph, Carlo Ratti Associati, 3 March 2013.

<sup>107</sup> Boston Dynamics, "Atlas: The World's Most Dynamic Humanoid", Photograph, Boston Dynamics, Google Cached 29 March 2019.

<sup>108</sup> Boston Dynamics, "Spot mini: Good Things Come in Small Packages", Photograph, and Video Screenshot, Google Cached 29 March 2019.



## 5\_Homeostasis in the New Paradigm

**How does providing bad (mistakes) /good goals' cybernetics conversation lead to better lifestyle and better architecture?**

We acknowledge the creation of machines and the conjuration of cybernetics, to stem from our grandiose attempt to subjugate the environment, optimising our interrelationship with it and pursuing epistemology. As a follow up from chapter 3, it is discovered that our misjudgement within the system is calculated through the means of homeostasis, also as theorised by Gordon Pask. The following expounds from the original understanding, from traditional artefacts, to now coupling with artificial intelligence.

Regarding *Deep learning*, we interpret similar notions from Latour as we borrow the same seat belt signal phenomenon through his constraints. This is enacted from the 'law of the excluded middle', and is considered "logically inconceivable and morally unbearable", the manufacturers whose 'pre-inscriptive' conversation excluded Latour from engaging in personal constructivism by only being given the end product. He is nothing but an end user of the artefact, and in great social faith, he is expected to trust the device entirely. Although he praised the sophistication of the artefact, Latour fought back by disconnecting the 'inconceivable' artefact off his system sensor as it frustrates him.<sup>109</sup> The predetermined trust expects Latour to behave obediently with supporting data, as "socially logically" impossible. The conundrum, here, lies in the clash of social and individual morals and objectives. This is comparable to the homogeneous data deluge that contrasts against the individual noise - Latour's resistance towards the product. The counter logical behaviour is explained by Latour through his description of the hotel door artefact it could not anticipate the differentials aside from acting as a mere mechanism to grant access through the facade.<sup>110</sup> This action requires the human groom who is naturally intuitive. However, these criteria would only be achievable when the groom accumulates experience.<sup>111</sup> At last, Latour presents a case of alteration as the homeostasis of the product goal does not reflect his personal moral reasoning. Bringing back to the notion of Deep learning, the AI will evolve to detach itself from the general homogeneity and to steer closer to the user's individuality. This requires the cost of time and patience as Deep Learning requires a significant individualistic noise to differentiate itself. The user will need to keep resisting until all goals are aligned. Here we see at the beginning of the movie with pictures of Gromit's development by Wallace over time and it denotes the AI is nothing but a child and requires fostering and a symbiosis to achieve individuality.

Moreover, we also acknowledge error. As we attempt to overcome past misjudgements from the biopsies of cybernetics approach, and as entropy ensures, we encounter new problems from the current existing state. Wallace cut a hole on the floor as part of his approach to speed up the translation. He then encountered an error with his gradual weight gain, preventing him from fitting through the hole. In the modern context of machine learning, with the input of human data, Wallace's linear weight gain would have been accounted given the data flow for the AI, subsequently requiring a non-static, adaptable system. We also look at the veracity of data added later on in the description of 'Big Data'. If machine learning was

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<sup>109</sup> Latour, Bruno. *Where are the missing masses, sociology of a few mundane artefacts*. p 152

<sup>110</sup> Ibid, p 154

<sup>111</sup> Ibid, p 161

to be used in assistance to the translating act, it would evolve itself through the sole goal of accessibility.<sup>112</sup> Comparatively, static machines behave as stated. Wallace instinctively noticed the inconsistency in weight gain and so his commentary is an acknowledgement of his gradual ‘mistake’. Regarding cybernetics, the original control of Wallace scaling his home ended up controlling him in the end. There was no need of complex machine learning when the mistake originated from the user. This is an illustrative example of the second order where the hierarchical user ended up questioning his food consumption moral due to the malfunction of a system designed for another intent.

Judging from the pessimistic side, Pask’s *Conversation Theory* would be nullified as machines are taking over humans in the process for technological progress, detrimental to constructivism as humans cannot participate in the ‘illogical’ internal conversation of an AI system within itself. However, as his theory pointed out, the AI machine is just a node within a wider inter-connectivity of nodes among humans and their goals, given the heuristic nature of both humans and AI systems still stands.<sup>113</sup> Here, Gromit represents the deep intelligent machine. He is the representation of ‘*anthropomorphism*’, as Latour pointed out. The mute dog possesses the attributes of a thoughtful intelligent machine, as well as being obedient to tasks delegated by Wallace. From the scene, we now see that Wallace is a human node amongst his designed machines scaling the environment. Wallace ‘converses’ with Gromit, who then converses with the machine, which then converses with Wallace. The epistemology here is that Wallace learns of his weight gain and Gromit presents him with a healthy meal as an attempt to help Wallace fit through the hole again. Artificially intelligent machines are a needed companion for the human occupant within a cybernetics lifestyle. The comparison can also be made in the TV series of ‘The Jetson’, which Rosie, Jetsons family robot (*fig. 17*), takes care of her family while they focus on other useful goals, or in the Pixar animation WALL-E with the tending robot EVA (*fig. 18*).

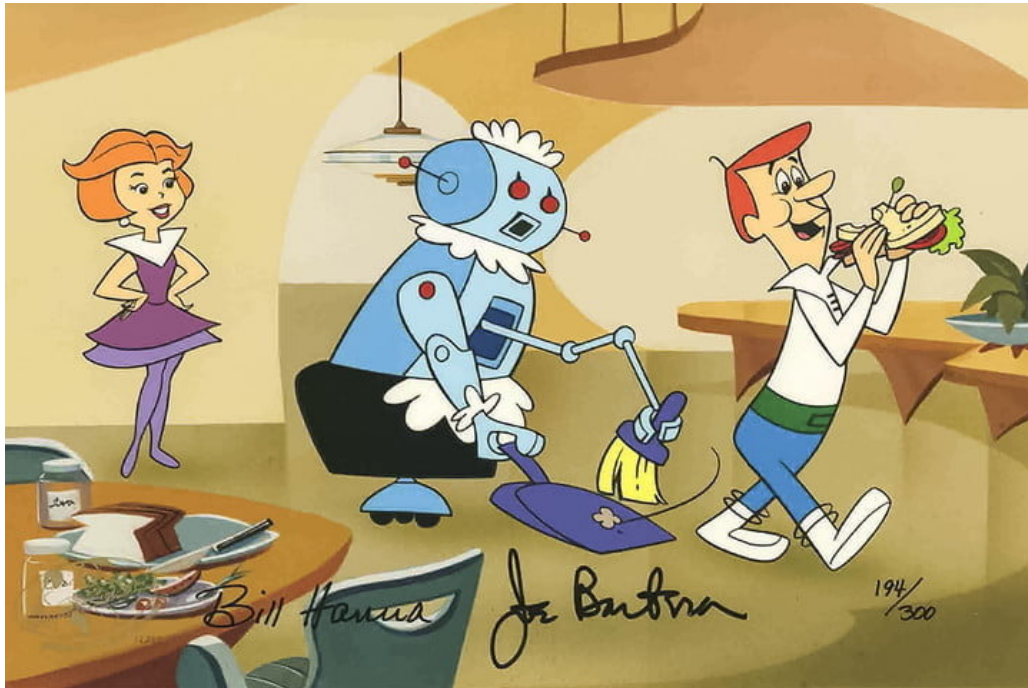
The contemporaries of Machine learning and Deep learning AIs enrich the conversational progress within the system between the human host and the, now, conscious artefacts. These intelligent nodes require an inter-relational understanding through more subsets of conversations. Thus, through the negotiation, the host can constructively utilise the full potential of AI to obtain his goal of system entropy control. However, by doing so, the host must understand the paradox between the AI notions stemming from its humanistic aspect, the misguidance of itself.

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<sup>112</sup> Parisi, Luciana, “Reprogramming Decisionism”, e-flux, Journal #85 - October 2017.

<sup>113</sup> Pask, Gordon. “*Conversation Theory: Application in Education and Epistemology*”, Elsevier, 1976. Pp 14 - 27





(figure. 17) Rosie performing menial tasks, while George having a meal. A vision of the Space Age in 1963.<sup>114</sup>



(figure. 18) EVE engages with WALL-E as he is teaching her how he compacts debris. A vision of the 29<sup>th</sup> century cybernetics conversation in 2008.<sup>115</sup>

<sup>114</sup> "The Jetsons Technology Robotic Assistants", Digital Print, Hollander, Matt, "How close are we to living in 'The Jetsons'? Checking in on our smart-home future", Digital Trends, 26 June 2018.

<sup>115</sup> Screenshot 0:21:45/ 1:12:24, "WALL-E", Amazon Video, Directed by Andrew Stanton, Walt Disney Studios Motion Pictures, 18 July 2008.





## 6\_Conclusion

The future of cybernetics architecture in this essay contradicts Ippolito's rendition of a banal post-human architecture as his statement operates under the assumption of humans as disengaged hedonistic consumers and ignores their adaptive and heuristic nature. It is learnt that the augmented life of Wallace is replicable in reality, but it requires the occupant of the architecture to be heuristic and in constant pursuit of epistemology. In today's society, the aforementioned notion of heuristic nature is not applicable to everyone. However, it is also learnt that the world is preparing for the advent of a Fourth Industrial revolution through education, by implementing computer science in school curricula as well as opening boot camps to those interested. The development of cybernetics is largely beneficial to tech-savvy crowds that emerge from today's young generation as well as the upcoming generation Z.

The rise of cybernetics, since its origin, has accelerated knowledge constructivism in many fields. It's creation of cognitive machineries improve lifestyle in society through delegation of menial or time-consuming tasks. Gordon Pask successfully demonstrated the possibilities of charting out human's novelty through enforcing production of innovative permutations of a specific activity by integrating the notion of boredom. We also see cybernetics attempting to expand on an architectural scale by Cedric Price, though it could be stated that only *The Generator* steers as close to Pask's vision of conversational constructivism as it allows the inhabitant to interact directly with their home system randomising the permutations of possible dwelling shapes if there is no dynamism in the lifestyle activities. It is important to note that the negotiation takes place between the two subjects of the user and the artefact as opposed to the *Fun Palace*'s mass control. As far as morals are concerned, the host's input would always be constructive even if it was of destructive nature. Artefacts can also entail a correctional nature that steers the user's ongoing mistakes towards the original intended goal. Paradoxically these mistakes would be beneficial, as the creator's intent would be questioned about whether it is beneficial for society or whether it is radical in a destructive way. Nevertheless, the final outcome is left ultimately to the users' liberty, whether they wish to converse with the artefact through constructive measures.

As the notion of cybernetics is introduced into the cyberspace during the Information Age, we see more fluid interactions, especially with ever-increasing computational speeds. Human cognition remains unchanged, though it adapts with the systems more as a lifestyle integration. People are now more symbiotically connected to their appliances with the proliferation of smart devices. However, machines are developed at a breakneck speed to the extent where their cognition and intelligence are beyond human rationality, given Machine Learning and even more with *Deep Learning*. Ippolito's paranoia of losing control contrasts with Pask's theory, where humans should not be the apex but rather share an equal relationship with machines in the pursuit of common goals. Physically, the robotic function of machines overcame its static form to become more compatible with the environment and human. By adapting its morphology and through wireless communication, the functions, that are driven by granularity of intelligent data and recursive interactions with humans, generated dynamic organic forms. As an agreement with Price's *Fun Palace* failure and Ippolito's statement, we should not build architecture as an artificially-intelligent-machine for living rather a canvas space for the cybernetics conversation to take place. The notion of AI is instead scaled down to companion scale for human, serving an equal role with its counterpart. In the modern age of homeostasis, the proliferation of homogeneous judgement from intelligent machines

requires the host to resist in order to re-introduce individuality back into the recursion. Otherwise, the host would need to train the intelligent machine personally from ground up.

Nowadays, Wallace and Gromit's architecture would be free from the cluttering of mechanical translating cogs but would be rather simplified, thus making spatial savings for more creative expansions. Additionally, Wallace's goals are driven by his novelty of opportunities, modern day Wallace would be given a more intelligent and more abstract companion to scale his house in Wigan within the cybernetics grid. Finally, the utopian vision here is not Wallace sitting by himself while his machines predict and cater his next move, but rather a similar scenario to the existing yet with neater and organic machines, and of course the AI companion, Gromit. The producers envision a near future architecture setting in a 1950s backdrop of Wigan. Wallace is clearly ahead of his times. As cybernetics perpetuates since the initial Industrial Revolution, society is under constant pressure for progressive education while mundane industrial tasks are exponentially delegated to machineries on the advent of the Fourth Industrial Revolution.<sup>116</sup> There are attempts to introduce those issues to the public, from open source coding academy to MIT online programs, dedicated to educate the public to partake in the conversation with cybernetics.<sup>117</sup> The radical constructivism of Gordon Pask sees itself resonating with the generation Z. They embrace novelties as the crowd seeks out individualism over homogeneity. Being part of the interconnected global conversation, they are self-aware and more optimistic than their generational predecessors and are willing to be challenged.<sup>118</sup> The crowd is purportedly entrepreneurial and innovative through their intuition and productivity.<sup>119</sup>

While this essay investigates the possibilities of a future post-human architecture, it also establishes an optimistic perspective on the relationship between humans and artificial intelligence. Society dwells on dystopian scenarios of machines replacing humans, though it should steer further towards humans' heuristic nature and the benefits that could come from active engagement with the artefacts, therefore understanding and actively pursuing the opportunities that are presented to us (*fig. 19*).

*'Architecture should have little to do with problem-solving — rather it should create desirable conditions and opportunities hitherto thought impossible.'*, Cedric Price.<sup>120</sup>

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<sup>118</sup> Kane, Libby, "Meet Generation Z, the 'millennials on steroids' who could lead the charge for change in the US". Business Insider, December 2017.

<sup>119</sup> Marcie, Merriman. "What if the next big disruptor isn't a what but a who". Ernest Young, May 2018.

<sup>120</sup> Cedric Price, "The Square Book", Volume 7 of Architectural Monographs Paper, Wiley, June 2003. p.11.



*(figure. 19) Companions.*<sup>121</sup>

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<sup>121</sup> Scene 00:01:28/ 01:23:05, "Wallace & Gromit: Curse of the Were-rabbit", Amazon Video, Directed by Nick Park, Steve Box. DreamWorks Pictures, 4 September 2005.



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## **Architecture for Non-humans: Ippolito Pestellini and Mariana Otero Invisible Cities**

***Transcript. 4 March 2019. Transcript by Minh Tran***

*Words or phrases in square brackets indicate lack of clarity in audio, or otherwise are explicitly notated*

*MC:*

Introductions etc. [audio is mostly unclear]

*Ippolito:*

While our datafied existences are progressively documenting lives, and remote dimensions, the materials and special consequences of data production and consumptions remain unanticipated. Our current investigation is an attempt to navigate through the implications, controversies, and conflicts of the planetary system of digital infrastructure, more specifically we are trying to look at the opportunities and challenges that new [special] forms conceived in design not for humans, such as data centres, but not only data centres, offers a way to rethink our relationship with machines.

To give you some more context I start from an obvious comparison; and what you see here are the ten most powerful companies in the world in 1998. Here are the ten most powerful companies in 2018. Oil, goods and medicine have been replaced by data. This is a picture of power today. And this is why it is our [unclear] to anticipate this as architects. The shift of power is mirrored in the exponential growth of data, production and consumption. According to science daily 90% of today's data has been created in the past two years. And as data grows exponentially so does the massive planetary system of digital infrastructure. The connectivity atlas, you may call it. Brings together the mesh of submarines and fibre optic cables, landing stations, switch points, data centres to the domestic and personal devices that regulate our lives.

To give you a slightly more concrete idea of how digital infrastructure looks like, you can follow the journal I found, [unclear] data park. Between New York and London, through the [AT&T 14 cable], which has been in operation since 2001.

The journal starts by interrogating the data centre in NYC, a beautiful and rare centre of urbanised tower [unclear], our data pack moves at the speed of light from the shores of New Jersey, where it goes to a cable landing station that is quietly sitting in the middle of a residential area. A box of servers disguised as a weird conglomerate of suburban homes. Reasons for this are security, privacy and yet this looks so irrational and grotesque. You may think that architects are actually needed in this case. Our data pack finally

reaches the shore and the open sea and it's interesting to think that a pristine and beautiful landscape like this one anticipated to the [planetary] system of computation. Our data pack moves to the bottom of the Atlantic through fibre optic and reaches the shores of Cornwall. The exact data landing point is marked by a little sign. The data pack reaches a small construction which is again the landing station. Finally, it reaches a large scale [unclear] and arrives close to London. The centres are fast growing and new urban prototype the centres are the nodes of the infrastructure networks and despite being the crucial components of our cultures social and economic landscapes they stand as anonymous and discrete.

They are building of incredibly large scale, [example of Chinese data centre, second biggest in world] they often are found in conglomerates outside of metropolitan areas and next to massive resources of energy. They generate a new form of pseudo – urbanism.

But when we look more in general at the non-urban, and when we think about the centres, despite being needed for the 21st century, and beyond, they share common ground with the architecture of large scale [unclear] production. Picture of silo in Kansas [context required] It is not meant for humans, it is built to store grain and it is a long-used infrastructure method. An architecture surplus, like the centre are architectural surplus of data. Sometimes this relationship is incredibly blatant, the [Yahoo] chicken coop, it is built from the model of an actual chicken farm, with the top it's sections acting as the back of its inclination system.

[Image context needed – assume uncertainty]

In this context the work of media artist and filmmaker [unclear] she was trying to investigate or talk about the obstruction of large sets of data in relation to military operations. Similar vocabulary - Data farming and harvesting, mining and extraction are embraced. But going back to the [sea] as architectural objects and seeing how the centre is banal, anonymous, opaque, secretive. It reflects, often, the [beautiful] relationship around our data between its end-users and state or corporate entities. What you see here is an AT&T building in Washington that are talking to the investigative [unclear] Through the course of the surveillance programmes [audio is very unclear in this section]

The difference between the front and back end of a digital platform like Google or Facebook, can be found in the architectures. On the one hand the headquarters, transparent, permeable, accessible, and on the other hand the data centres, anonymous, impermeable and impenetrable. The headquarters reflect the friendly look of the platform online, while the data centres where all data is actually managed, and our

privacy is actually challenged. Yet inside things are different or appear to be different. When you look for data centres often these are the images you get: suggesting a new extreme environment or on the other hand suggesting a new form of techno [unclear]

Clearly inspired by sci-fi, a Google data centre in NYC, is actually Hackers, released in 2005. Switch [unclear] 7 is actually Tron. Switch supernap is actually 2001 Space Odyssey. [image context required]

James [unclear name] Years ago, talks about this issue, he writes, inside the building are deliberately designed to look like what you would hope the internet to look like, they are mean to feel very exquisitely made to the sci-fi sensibility of engineers. This is for many reasons. To set server space you need to appeal to engineers or to the imagery of metal engineers. The reality is far less exciting -picture – through a number of facilities [unclear audio].

But the media landscape investigates the relationship between humans and more specifically machines as automation, discussing more in depth, is redefining so much of our own building environment.

Factories, terminals, greenhouses and of course data centres. Which are unknown in the landscape of [automation] To talk about a post human architecture its evident we are moving in that direction and data centres the presence of human habitation is occasional and residual maintenance. When you look at a data centre brief it is obviously more concerned with machines and systems than humans. Little in the brief of a data centre is dedicated to human space.

But in those few spaces for human it is a form of condensation. But again, even when we look at those spaces inside those centres designed for machines we shouldn't really be completely out of the picture. The dimensions of the spaces where the servers are sat are based on our own modern dimensions, so that few residual engineers are able to keep the space running. Architecture for machines modelled on human dimensions.

Progressively virtualisation and the [unclear] of the centres are becoming a reality. They are turning into more complex machines, not just buildings for machines but machines on their own. We are dealing with a new landscape of machine to machines interaction. AI control and manage environments. Man is progressively scrapped out of the picture.

An emerging regime that might mark the end of grotesque images like this one [context] the security here is staged for marketing reasons in many commercial centres consider somehow superfluous. Threats are digital and no longer physical [cybercrime stats] As architects it is an opportunity to redefine the architecture of the centres – their role, presence accessibility, can we start thinking of an architecture for men that is reduced to an occasional visitor in the dark and hot machine environment. The debate of the role of the architect in this context is open. Being machines for machines It is not clear if architects are needed or not.

When we start asking what the role of the architect is in this context (8 steps of design process for data centres) it is reduced to the design of the floor plan and the shelves – pretty sad. In our experience we have tried to address the human machine relationship in different ways. Humanising the data centres, introducing natural light, open to both humans and machines. Or decoupling the two altogether and turning it into an autonomous unit. Able to be deployed everywhere and assembled into other programmes.

Unfortunately, the transformations in the industry are faster than any architect could cope with. From Uber using their driver's phones as back up data centres, we live in a world where data centres are in fact the remote devices we carry. We could ruminate about a global shift towards a fully decentralised backup system where data centres are replaced by one single facility. Serving the whole planet and connected devices. But then the question would be who would govern this? What institution would be able to mediate between different domains. Different ways to approach privacy, etc. Back to more concrete things, we know that data comes at huge cost which is doomed to increase over time. More specifically DC are largely responsible for the ICT global energy consumption. Few years ago we tried to make a diagram from data centres in 2015, if data centres were a country they would be the 11th most energy consuming nation in the world – a statistic doomed to increase. Cooling requires a lot of energy.

In the Netherlands, a country with a flourishing data industry, the Dutch government applied for special zoning plans where the DC is part of a network system and is able to exchange with other programmes. Climate becomes an asset for the in the use of data when mobilisation of cold water, air or geothermal energy contributes to lower financial and energy costs. This is not as straightforward as it seems, climate is an asset, on one side it might help mitigate the energy implications associated to the infrastructure of data, it might also translate to more data, and higher energy consumption. Climate change the accelerated loss of sea ice have opened the possibility of northern cable sea routes. This is a new order as the majority fibre optic cables follow the old telegraphic route. This is how high frequency trading (HTF)

looks like: massive amounts of financial transactions are organised in a fraction of a second through trading platforms known as HTF.

The use of complex networks markets can optimise the transactions in real time, this is the contemporary digital landscape. A landscape that [unclear] our environment through the spatial forms of digital mapping.

An MIT study recently mapped out the optimum intermediate trading routes. Locations for possible data centres are in the middle of the ocean at intermediate points between stock exchanges, London and NYC, to reduce [latency] and optimise the speed between one point and the other. But it is about the representation of entanglement between geographies, natural resources, data, data centres, economy and natural landscapes.

In the meantime Microsoft just launched its [project submarine] using cold water as a cooling resource. It is maybe a first step into a further colonisation of the sea bed by data into the implication of the previous MIT model.

To understand contemporary media culture we must look for those realities and material realities to see media itself. Geological formations, minerals and energy. One which media itself depends on. Keeping this perspective in mind we can say that a new geography is emerging; one that keeps together the infrastructural networks, the fibre optic cables at the centres in accommodating ways and the extraction of resources for minerals. Data mining goes hand in hand with mineral mining to keep the system running.

[Unclear audio] to make an iPhone we need an entire spectrum of the periodic table. A conglomerate of materials that needs to be sources across four continents. The all American iPhone is an impossible dream from a geological perspective.

Similar observations can be made for [unclear], the components of servers in data centres and in this case the selection of materials is vast but more limited than iPhone in any case it implies a global supply train based on a historically attractive relationship between western countries and the rest of the world. When the peripheries of our modern society are willing to pay the social and economic price of the extraction minerals in order to maintain the balance so that the landscape of data and its industry can maintain its size of extractions such as these. India, Chile, China. This implies bigger and bigger environmental and economic challenges.



New deposits have been traces and found at the bottom of the ocean. A new race for extraction whose environmental implications are risky and unknown. Ironically these new deposits are mapped by a species of octopus that lays its eggs on the stumps of sponges attached to polymetallic prongs on the sea bed.

*Mariana:*

Focusing on data centres, but we know as well that one of the roles of the data centres in order to create this space and [unclear] to have the infrastructures to build these data centres that need to have accessibility, speed of communications good tax benefits ect. In the case of the Netherlands, it provides a very important location to many of the cable laying boards and each one of them is being recorded by [person] an artist who has been recording all these cable landing boards in the Netherlands.

So you can see how these landscapes grow across scales, from these pieces of architecture that seem totally banal to this other places where there are data servers. [unclear section due to audio] I'm going to look at one of the places where automation is taking over, this an image of the [west/waste]land a space where there are many greenhouse facilities that allows for the Netherlands to be one of the larger [unclear]. These spaces are bigger and bigger containers where almost no human is present and we have also a bad implication for the environment and the people who live around it who have to suffer light pollution but also because of the transformation of the entire territory. You can see what was before a farm , inhabited by a small family perhaps is now a large infrastructure that is run by a big corporation because the only way this automation technology could be afforded therefore it is a complete [retracting] of the society and territories.

Inside those grey houses you will these beautiful sublime landscapes of vegetables and flowers that otherwise wouldn't be able to grow in normal conditions yet they grow inside regardless of the climate conditions that are outside and also regardless of the human presence.

SO the Netherlands is one of the largest and highest importers of flowers in the world, and is also cultivating certain vegetables like tomatoes. You can see how this spaces are managed by different technologies and robots which allow for a particular conditions of humidity and light and moisture and all the needs that are necessary for the plants to grow. This is a research taken by OMA and their research teams – a container – isolated in space as not anymore coming to sea but is now a container [unclear due to audio] this is the [unclear] interior with the beautiful flowers and the robot that take care of them. What is

interesting is that they are growing tomatoes [but also going to Canada]. But it is not only the greenhouses in the Netherlands but if we are talking about architecture for non-humans here I would say, for more than humans, if in the greenhouses we see a collaboration between machines and plants and architecture, then we see across the Netherlands different types of aggregations, for instance this is the part of the Netherlands, one of the automated spaces that is one of the biggest in the world and is highly automated as well.

Inside there are almost no humans present and all these machines that you see are entirely autonomous. You can see the organisation of the cranes and how the technologies have been evolving in the last years in order to implement these innovations. For instance, most of the humans are replaced by machines so therefore most of the spaces are not made for humans and those few who enter have to be subjected to surveillance or recommendation by certain machines. You have to use fingerprints and all types of surveillance and control technology to enter the space. As there is a [unclear] populated by workers that actually are the main actors in the labour markets in the Nth, Rotterdam in particular, Rotterdam is a city that provides most of the labour force [rustling in audio] and now after the labour market is changing therefore the infrastructure and the city itself are completely transformed to adapt to other types of labour and markets.

So basically what happens in the tracks arrive the driver has to identify themselves to enter and the humans are only located in this architecture in one room and it is being transformed for this worker for workers who are more office workers who are now controlling all the operations on the screens in a control room. So these are the architectures that are being entered as the operations are entering those spaces. So we have seen humans and machines, plants and machines and now we also have animals and machines because the Nth is one of the places where farms are also being automated.

So you can see how this technology is used to feed and push the food towards the animals, clean spaces, and milk the cows. This is the [milker]bot it was invented by a [company] What happens is that the cows go on their own to be milked because as they get milked they also are able to eat very tasty food, so they have to control that cows don't go too often to be milked. [laughing in audio – unclear section] if you look at this image you can see colour they have because actually that is a very important component of the architecture of the farm, the colour that the cows are tagged, control the organisation of these cows but also what they are eating what time, and if it has been milked or not and other controls that go together with these forms of control, if the cow is ill, so actually the farmer, with tools provided by the company that provides the robots Have applications for medication that can be controlled through iPad or iPhone or

computer, so you can see the data of the cows. So the cows do not necessarily need to be identified as a cow itself but just to be identified as data.

Again here we can see spaces that are for cows and robots but not for humans, and in many cases they are working with specialist consultants and [unclear] to make the most of these dairy farms what is interesting is that the cows can walk freely through the space, actually they are encouraged to walk freely as you can see there is no delineation between inside and the outside, so they can go outside but they prefer being inside because they are closer to the tasty food and the robots that are cleaning. But what is interesting about this model is that in this [unclear] that a farm has for cows is this exploration between animals and machines in an environment that has flexible architecture. And it made us think about this beautiful poem All watched over things of long [embrace] and there is this ideal cybernetic way. I'd like to think of a cybernetic model where [unclear] and computers live together in mutually programming harmony like pure water touching your [scalp/skin] so it is interesting how in the countryside of the Netherlands there is these materials

Also in these spaces there is automation in relation to architecture and machines allow for different configurations of the space and different types of society. Like New Babylon which was the architecture for this idea society [elaborated] From the [unclear] of labour. [Unclear audio] so society is devoted to pleasure, only because this architecture that was suspended from the ground actually had the base where all the machines bodies were actually doing the work. [Visual context needed here along with unclear audio for most of section]

So it is always at the expense of the other where this flexibility is possible. And it is [unclear] that for us it is so interesting. So this is the landscape of new Babylon automated and landscape architecture but also an architecture that creates conflict because the [unclear] of this technology and the [limitations] of living in this type of society even if we feel very [unclear] by labour nevertheless will be of mutual violence. Although we don't know yet if the bodies that are contested here are humans or machines [there is pencil scribbling here, sorry it is very hard to make out] we can see a scene of violence here, what seem to be a female body but if we look closer it is also [unclear] so that we don't know if it's a [human or human body] And we can never separate. [Unclear audio and visual context needed].

We go today to the port of Rotterdam where there are protests by the workers in the harbour, who had to reinvent themselves in order to work in these types of spaces, so there were some protests, meanwhile the facility is being portrayed as the poster side of innovation, most of the human bodies entering the facilities here are entering the space as tourists through different doors.

[Noise in audio] from the beginning of the century and the industrialisation processed especially for certain bodies, so we think about these other bodies that are always subjected to accommodation in order to drive for more efficiency there are other bodies that are the centre of innovation, when we think about technology we always believe that technology, innovation or automation will serve to [unclear] for local government but actually it is not necessary the case, for instance in the nth was the first automated kitchen developed from 65-70 and what was interesting is that it was revolved around the woman as a house wife, but no longer does the woman has to go to the appliances but that they go to the woman. And one of our students has [unclear] the history of recent development between [unclear] bodies and computers, and how the computer and these female bodies/voice would operate these big machinery and how the human body of the female has always commodified how to operate in relation to technology for instance how a computer might be female voiced like Alexa or Siri, with voices that are the serving machine. This is some of the work of the student we have this year, but we are trying to connect this idea of high core data with other question related to race, gender and many other stuff. I just want to end somehow with some reflections, because obviously when we talk about automation and non-humans at the end the automation focuses on the human body, they are pertinent to the [unclear] of the female body and also particular tasks so allows for the identification of the female body and sex with the female body and particular the way that would be to [unclear] unethical relationships with these genders, so in a way the way in which we relate the use of technology even if its not between humans, we are always defining the space and the relations that are beneficial for society. So we can talk about machines or animals or plants, but in this case in the studio we always try to manage how these bodies are related to each other and how technology does [unclear] outside but also encourages these [relations].

In fact many of the factories that are automated are developed through paradigms and ideas of human body, average human body, what a human is or what a male or a female is a for very specific bodies. I am going to try and explain; so many factories use software's that use data bases for training or use different algorithms to develop spaces for factories but that means that data bases sometimes come from the us military or very narrow data bases obviously don't recognise every single body. Therefore spaces, the architecture is often being designed according to a very narrow standards and ideas about human body. Around certain areas of [percentage] are uncertain notions of bodies that you can find in different geographies. So we have also ways of [unclear] in the data to be aware that some of the cases in the Netherlands focus only on the European context and not on other places, [outside are the most] important places for production and factory production and is being automated slowly and steadily in the last few years. Research on the factories, this is a factory in Shenzhen what is interesting here is that in the difference between what we see in the European context or the US, is this way they see human bodies with robots,

here there is more interaction between them, what we see in China for instance is that humans and machines interact, not only machines and AI, but also the human that are being automated by the applications that tell them about their productivity and how they are reaching their targets of the production, and they are constantly reminded of the time and the output, the times they have to do, and if they don't then they are sacked. So actually there is not that much there is not much that one goes and [unclear] but their relationship to the manager, everything is articulated through artificial intelligence and machines.

This is another rubber factory in Shenzhen here what happens is that senior collaborations between humans and machines in the same space, and the reason why they haven't introduced complete automation is because actually is not that functional in terms of productivity because the investment in technology is very high and smaller changes the machines become obsolete the goal is to use machine and automation only for very heavy tasks and difficult tasks and the humans for flexible and sophisticated tasks that maybe changes as the production changes.

So this is how the organisation of the space and how different bodies interact. Many other factories they are completely separated. And hear they work side by side, humans and machines. And just a final example this is a building in [unclear] factory and here is a completely different architecture so you have automation on one hand and humans on the other and both of them are separated. So in this case automation takes over the space and leaves completely different forms of utilisation of the space [scribbling] corridors so that the human bodies can pass through and certain conditions of light where relations are necessary for the designing of human spaces. In that case these two walls are completely functioning in that [environment].

So this is more and more operation between one or the other and that comes to question the relation between what we call human body and forms of exploitation, forms of production and efficiency are happening many years and many times in history in particular with bodies that were not considered bodies and therefore were considered disposable or use for production. Necessary to reflect how these developments have started in society and how society was built. [Unclear audio due to noise]  
In a way we have to think about what happens in these close spaces where bodies are routinely functioning for efficiency and being exploited for maximum capacity to create products we all consume and we see this models and how they are [unclear] a thing that allows for further reflection and that is [unclear] that allows me to bring here today.

Questions:

Q1:

I want to be slightly inspired by the landscapes and also both what you think the implications of the sensibilities of these spaces are, what we are talking about metaphorical sensibilities or whether it is changing [Noise in audio]

M:

[Unclear start to audio] I think capitalism is associating with the processes and there are reasons [Very unclear audio] are much more material, and these are happening in the court yard of our cities and opening people to learn about them especially architects that are generally not interested in these building and yet are spaces that are completely transforming the ways cities are developing and also the view of [unclear] societies and how they are operating,

One of our main concerns is giving visibility to these spaces in many different ways by bringing the discussion to the schools of architecture to introduce these questions to the curriculums of the schools and are also inviting architects to visit those spaces so many of data farms, data centres, were toured and organised, so we introduced them to these spaces that are next to you that you pass by in the highway or the train, so we take care of breaking people in and answer all these questions of this development in order to create certain awareness and invite people to reflect on them and by seeing that this is [unclear] and how these technologies are taking over and is not the fact that we have certain access to certain technologies doesn't involve or imply that we have to accept them as data especially in the way they are transforming the space and the territory, is encourages a certain sustainability and [intelligibility] of the space itself. Most of the development of the spaces that we see here of big corporation and big companies taking over the territories of these invisible spaces are coming out of anecdotal projection between companies over [unclear] is this opportunities, and there is no master mind this is happening so now with different universities and like Delft and other places we are trying to imagine what would be the ways in which technologies would be on the one hand going in a directions to serve as many [unclear] users as possible and at the same time how they can interact with other architecture and other systems and the way which we [design or criticise] generally so energy of data centres cooling server rooms and support housing and many other questions that are also technical also structural and we have to integrate those rules that see to be completely different. Although they serve each other.

I:

Netherlands is actually a country that is quite [unclear], there is not a lot of land but it is actually a very unique case, if you cross the border and go to Belgium [unclear audio], two lines for me that are very interesting that are one is presentation these spaces lack representation and representation is the first way

to understand what is going on, people are being moved physically but also metaphorically in a sense that the fact there are [unclear] on spaces is because we do not know, there is not a formal representation that fully describes [very unclear section of audio]

In that there is accessibility so people when we talk about projects in the RCA about a book – one of the first projects that are discussing why big factories with assembly have this interface [unclear] all infrastructures run [very unclear audio] they are infrastructures for all of [time].

Maybe one of the reasons why we can talk about these places is because we have the [language] You addressed it in your presentation as well about data mining is quite a [unique] language in terms of data but when you look at the architecture of all of these spaces you described today, we don't really have the language to address the elements of these buildings, have you thought about the shorthand we could adopt is there [unclear] that could help us along to communicate the matter [unclear]

What is interesting is that we were discussing about those [times] also with one of our students, and the idea of language, and what is interesting in a way that with these spaces there is always [unclear] to, all technologies all forms of large [unclear], so you talk about data mining, data harvesting so, somehow we still haven't developed these other form of complexity, forms of productions that are very far from data farming or mining that we have, yet we are somehow normalising those sources, to make a procession that is a continuation between activities that are happening, where it is completely different, you think about the labour of a farm, before they had to take care of climate conditions and particular timing around the seasons to cut the crops and manage the different... and most of the times it is down to an algorithm or a software, so the same data farm or data centre might store... in a way it's a end to make us feel comfortable in this huge transformation that are altering the way which we work, but language separates a little, apparently nothing has changed, so [I want to ask you] to come up with another type of letters in order to able to intervene in those spaces.

How to actualise them and on the other hand be clear enough so we can convey more people to be able to transform [unclear] But because of the Netherlands we have a sense of [unclear], we have tried to come up with an architectural language, ho do you actually represent those spaces and how do you actually talk about them, cause the aesthetics of the spaces are so [unclear] that you can't just forget about the rest by looking at the language of cables and artificial light, so you have to [unclear] and realise that language and aesthetics of representation.....

M:

The aesthetics and transformations in the industry are so weak and the transitions are so fast, that we might end up in a future where we are trying to study [unclear] that might disappear I think we are open discussing where we stand on architecture is not relevant anymore, how do you access these spaces, where

do you [transcend, descend] From the ceiling and how quickly can is this type of architecture actually evaluating individually each [device] That's a question I think, we are not able to answer, we are really desperately trying to get information from people representing the industry, and artists and journalists and any one who can actually provide some sort of further insight in the mapping speed of these transformations.

Q2:

Can you talk about systems, and the system running if we are to survive the next generation system change is inevitable and that is [unclear] that will happen in the next few years and this is work for any business alive before they become monuments to change, a lot of generation that use recourses in a different way, the data that is held within these centres is [unclear] that is a [box] of how it got there, I wondered if you could talk a bit more of this idea of like the end of human architecture, you talked a lot about non-human architecture but could you talk about the ecologies, [unclear] about centres as a big consumer of natural recourses and if you could just touch on the planetary [unclear] of this etc.

I:

I don't clearly have an answer to that question and I think my presentation [unclear]... despite all the efforts and despite all the marketing in fact and all the efforts for greener data infrastructures, heat exchange, and any point we made about data centres or any type of automated infrastructure changing the houses and cities and so on when you look at the total carbon footprint of the supply chain, the future is black, really black, I mean we have to recognise that, and by expanding we have to develop a [chain] that basically, as much as possible with our students, a critical point, that is actually able to look through all these layers to understand that whenever you are thinking about data you also have to think bout the actual natural recourses that that data needs in order to actually happen,

I don't have an answer but I am sure, going back to this issue of accessibility, making things visible and more understandable through mapping out all these supply chains and transformations at least we can place ourselves in a more critical position towards this. The [unclear] is a really bad example and a bad way to close the circle, poor octopuses deploying its eggs in circle where rare earth sources are found, its nothing stopping them, as there is nothing stopping the new cables which are planned through the arctic, that is [unclear] that we need to recognise, and knowing it we can take position and I think that is...

M:



I would say that, what is interesting about this displacement is with imagining architecture for humans and imagining architecture for non-humans, is that we are not negating [anyone] But we are imagining that there other species as important as humans and I think [unclear] that has not been addressed enough by architects and many other professions so perhaps I would like to be positive, so if we start designing not only for humans, and taking into account other species and coexistence between them, what it means to create an architecture for different types of life, perhaps we will think about questions differently because you will always have to compromise, right now inn the nth in the centres to serve the needs of the humans, when you start thinking about the octopus, or the cows or many other bodies, and the planetary body. Then the parameters are not that clear, maybe there supply changes the possibilities to access tomatoes or strawberries all the yearlong, aren't necessary anymore, and that will shift, so to me that is [unclear] that is perhaps an option... tails off

Q3:

You showed us many examples of [rustling] architecture for animals [very unclear audio]  
While there is a type of new landscape that or architecture for non-humans it is also generating a new kind of landscape for architecture for humans, you showed us images of factories where humans are still present , on the landscape where minerals and metals are extracted there are still many humans working... [speaker tails off]

I:

We live comfortably in our houses with our devices connecting devices, IT and everything, with everything trying to be more efficient and more greener, at least that is what we are told, but again what we were saying it is a consolidation of the different of the world and our cities that allow all these comforts so part of the problem is that there is really not enough information between the tow, of course we are always connecting, always connected to the global network of communications, but, there is a an old [unclear] between the way in which .... [unclear] what is interesting in the issue of connectivity is that there are places in the [70s] in which there is coexistence between human and machines are actually being made, made for labour, but maybe in the case of the cows there is not just labour there is perhaps [unclear] else, there are signs which might let us understand or approach where data is occurring

M:

As it happens there is [unclear] this high frequency radio so the possibility of having this infrastructural data, and regulation of wealth materialises in certain architectures. So you have the high rises that are built in London or NYC and we see this closed architecture for humans ... bad audio

Similarly the fact that the port of Rotterdam is being automated, many of the neighbourhoods, that are working neighbourhoods are being transformed, gentrified, [cleaned] And all this populations that are very connected to the harbour are being displaced from the city to other places, that's also a form of architecture of course, what was the factory of the [unclear], now tries to transform it into a [smart/Data] centre which is a paradigm of spaces, well now you don't need so many work in the factory because you have machines, and that means many people were annoyed and don't have access to work in [Shenzhen] so obviously it is inevitable that there these [links] between these non-human architectures and very traditional forms of architecture, but which is useful to see and understand

I:

These artificial spaces tend to look at [unclear] which is more authentic in a very artificial way, a few years ago there was this article, which became popular about airspace [very unclear audio]. Hold onto an extremely old model and as a designer when you are constantly confronted with this, and clients ask you [unclear audio] can you actually make it more [unclear] or can you actually make it more authentic so [unclear] in a way like that project[unclear] is going back to a very very human dimension which is literally not looking at what this is

Q3:

Which is maybe why that image you showed of that centre in new jersey looks so, cause in a way it is almost reassuring of that types of architecture...

I:

Yep, yep [tails off....]

Q4:

One of the things that goes through my mind as you were speaking was that you were speaking about infrastructural outcomes of engineering projects really, capitalistic enterprise, I kept thinking, what do architects do, because you said [unclear] about architects being slow, but it is also a slight problem of architects being impotent in the face of these kinds of forces that all of these questions refer to, so I was a bit disappointed in the question of representation it sounds as if you are addressing these thing [laughter, unclear audio] I was thinking about these kinds of historical things of industrialisation, also had no public

interface – factories were [in]visible and the difference between those factories and the kinds of places you are describing is that the people did go to these factories and used to work around them, but the factory itself was a kind of outcome of functionalism and had a meticulous intent, I wonder if the question therefore is not what should the data centre look like , but what is the structure sitting in the land of automated communisms, isn't the biggest question what the structure of society might be and how that might manifest itself in urban space, bigger question than representation....

M:

A clarification on what representation is – it is not necessarily talking about such... political representations.... That affects who is inside those spaces and who is allowed to access, how does it work, for whom does it work etc.

[they talk over each other]

I:

I think the question for me is that bigger but what I think we are not able in this so far to cope with is that this is an architecture that is not meant for people to go to. It stays in the context of just as a system, that is connected to other systems, and there are so far only four architectural interventions in these buildings, how do you clad this box, and you can do it with various ways such as the switch point we were showing here before, or you can in various futuristic ways but, I think there is something interesting that is emerging right now, maybe this large box data centre architecture is finally disappearing, starting transition into [unclear] smaller scale which could be much more integrated somehow into the urban context with existing consolidated urban functions. And that is something which we are also doing in this studio, difficult of course because we miss a lot of information, there is a transition that basically takes into account that scale I no longer a factor and if scale is not a factor, and we think to deurbanise or recontextualise and renegotiate the presence of the structures because they simply can fit you know in our cities, then the ways this will be made is a whole new question, how will this be integrated into housing and other existing factories....

M:

I have to say as the position] Of the architect, as an architect I might not actually agree with you because I have an understanding of the practice of architecture, wider and broader, so not just to be designing buildings so that [unclear] which we are interested in understanding for instance, centralisation of the data centres how they are able to coexist with spaces of the city, and are also analysing this supply changes and maybe thinking about the level of materials, what type of materials are we using in the

construction industry and also in the technology and how they affect... and there are many people working on these questions right now, I'm not [unclear] to say that greenhouses are necessarily bad but how these forms of intensive exploitation of resources might have a consequence regardless but I believe that people who say that greenhouses and this type of automated greenhouses that spread all over the territory allow for using very little quantities of water, in fact to me are the most sustainable so many people who try to now find a way of using those resources in relationship to housing spaces and to use to how to combine production, and living spaces etc. which is something that is not viewed but at the same time thinking that together with before the implementation of the technology happened and rather being the [finders] of the development of the technology itself which means that architects can no longer operate on the real level of development, we don't have in the schools the skills or the knowledge that is necessary to enter in those conversations and that's a problem. In order to understand how the digital architecture is operating and manifesting, and I am not meaning that we have to do virtual architecture, no, I mean how the digital is constructed, how architects intervene as maybe not the first or most important leaders of the conversation but at least agents in the conversation right now, we don't have the language we don't have the skills and the technology being developed is already going to be implemented. SO I think that is what happens and that means possible the transformation of the role of the architect as we know now and that might be many painful for many, many people. But could be very helpful for the planet so.... [speaker tails off]

I:

Maybe the question wants to see if these things are planned, maybe it's not a question of designing, we are almost not really interested in that question in the RCA but understanding what are the tools that we as architects can use to make our own contribution to those things, planning these infrastructures, discuss the way we interact in this environment, the way we address the existence between humans and machines and other species, so it might sound very bad or too ambitious but it is also about transgressing our discipline a little bit to really develop tools so that we can sit at those table where architects are normally not allowed, because they are tables for engineers only, or maybe for investors only.

Q5:

[Unclear] so there are older form of infrastructure, for example which I feel are challenged to be less centralised, for example, encouraging people to harvest their own energy, and you can say the same for the financial network, bitcoin and block chains, can you see a similar trend of data which is obviously ... people storing their own data ....

I:

You mean [taking] them from corporations? – yes – there is a part of the talk that we did not address which is about networks where situations in which [unclear audio] access to [facilities] You have to go along further than Detroit to find situations like that, now there are bottom up organisations which are creating and managing their own network, basically doing it independently from corporations and taking ownership of their own privacy, the value of their data and so on,... the problem is that this is not scale or expense, so far at least, because in order to be scalable they need to be financially sustainable and profitable, but they exist and they are really everywhere, especially those context where we are seeing [unclear] in the world of our students in which accessibility to the network is very difficult or even impossible.

M:

We are having interesting questions on whether censorship for instance with data, surveillance... how actually you can develop an alternative networks for [consolidating] data, even taking as a reference tax payments, how they operate in order to cut data [unclear], and obviously that is quite interesting, as on the one hand you allow for certain type of political action, but also other banker and other forms of practice , but we are looking into the centralised alternative forms of data circulation and storage, but in one of the conversations we are having with some of the experts that are allowing us to enter in the conversations that person said that it is more likely that data centres will grow in size than they will get smaller and distributed, disseminated and fragmented, which for us was a surprise, so the development of the fibre cables and technology will allow actually to have a centralised facilities located in the most perfect places in term of climate and political space etc. Which creates a very unbalances form of government and really interesting and maybe not that positive, but big data bodies [need] maybe a big planetary body a bug governance body that will actually take care of data connected to data distribution and circulation [unclear] like a UN model for data.

I:

We have choices as people, we can travel by train and not by plane if we want to have a lesser impact on the environment, we have a choice to buy certain foods, we have the choice to run through independent networks that actually can protect you privacy and protect your data and there many, so the point is that is might be difficult to address the questions from a large scale perspective sometimes we can be political in a very intimate was and I think both through data and certain choices we are able to do it with the independent networks we are looking at, at the scales of people who are promoting freedom of communication and press in certain areas of the world, we are not really talking about a large scale operation but rather a few people coming together and turning around the situation it is maybe a question of

[representation] When you are looking to design the planetary mesh of infrastructure and its way of interacting, but there a decisions which can take and the effect of our choices at a very intimate level, it is a way to live in this political context... [speech tails off]

MC:

Thank you etc.

I think with that question that we live interesting times and while we make sure what kind of agency architects will have in shaping this present and future we know that they will have agency and is already a positive thing to close on...

END OF TRANSCRIPT.