Zeitschrift: Trans : Publikationsreihe des Fachvereins der Studierenden am Departement Architektur der ETH Zürich

Herausgeber: Departement Architektur der ETH Zürich

Band: - (2009)

Heft: 15

Artikel: Wal-Martians : Wal-Mart's servo-organism

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DOI: https://doi.org/10.5169/seals-918928

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Wal-Martians

Wal-Mart's Servo-Organism

Fig. 1, *Universal Product Code (UPS) symbol*, in: http://www-static.cc.gatech.edu/classes/AY2006/cs13211_fall/HW/hw4-upc.jpg, state 2007.

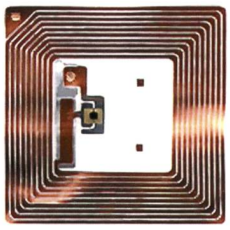

Fig. 2, *Radio-Frequency Identification (RFID) tag*, in: http://rfid-informationen.de/info/rfid-tag.jpg, state 2007.

"Logistics is the art of defining and extending the possible."[1]

500'000'000 megabytes or five hundred terabytes: Wal-Mart Stores, Inc. has the largest private database in the world and records 20 million customer transactions a day.[2] Wal-Mart maintains such a vast store of information because hyper-efficient inventory management is the only way a company so large and with such razor-thin margins can maintain profitability. The term 'logistics' includes the managing and transport of this enormous inventory and is central to the company's daily operations. In fact, Wal-Mart is obsessed with logistics and this obsession is instrumental in the formation of its typical building forms: the so-called 'Big Box' retail stores and the distribution centers that supply them with their goods. While the goods in transit through these buildings are inherently material and must be physically moved, Wal-Mart manages them as if they were immaterial – as if they were pure information. Correspondingly, the distribution centers function like gigantic computers whose inhabitants straddle both the concrete realm of things and the abstract realm of information. By using the writings of Marshall McLuhan and J. C. R. Licklider to examine these conditions, it will be argued that hybrid and seemingly contradictory spatial states result, summarized here with the new term 'servo-organism.' McLuhan argues in *Understanding Media* that humans act as direct extensions of their technology, as 'servo-mechanisms,' while Licklider, in his essay "Man-Computer Symbiosis," sees the relationship as a mutual interface in which both sides benefit equally from each other's presence. 'Servo-organism,' on the other hand, is neither a state of extension (McLuhan) nor symbiosis (Licklider) but a combination that results in new forms of incorporation and allows us to link previously incompatible spatial conditions and open new directions in urban discourse.[3]

Goods as Information, Information is Good

Wal-Mart Stores, Inc. is one of the largest companies in the world and its success has been largely determined by its sophisticated logistics systems, its efficiency and its invention of 'just-in-time' delivery. Wal-Mart was one of the first companies to use the Universal Product Code (UPC) symbol (fig. 1) to track its goods and is now pioneering the use of Radio Frequency Identification (RFID) tags (fig. 2). The UPC symbol consists of a binary code that can be quickly scanned and entered into a database. This scanning occurs at nodes along a product's journey: for example, a product might be scanned when it leaves the factory floor for the shipping container; when it arrives at its dis-

1 James Huston, *The Sinews of War. Army Logistics 1775–1953*, Honolulu: University Press of the Pacific 2004, p. 53.
In this case, Huston is using the sinew, the tissue that connects muscles to bones, as a metaphor for the role of logistics in the creation of a robust military machine.

2 Misha Petrovic / Gary G. Hamilton, "Making Global Markets. Wal-Mart and Its Suppliers," in: Nelson Lichtenstein (ed.), *Wal-Mart. The Face of Twenty-First Century Capitalism*, New York: The New Press 2006, p. 133.

3 It should be noted that extensive work has been done to better understand the evolving relationships between humans and machines, cyborgs, post-humans, etc.
For more information see: Donna Haraway, *The Cyborg Handbook*, Chris Gram (ed.), London: Routledge 1995.
Donna Haraway, *The Haraway Reader*, London: Routledge 2004.
Nancy Katherine Hayles, *How We Became Posthuman. Virtual Bodies in Cybernetics. Literature and Informatics*, Chicago/Ill.: The University of Chicago Press 1999.

4 Wal-Mart is currently attempting system-wide RFID implementation within the next few years. The RFID impact could be profound. For example, if every product had an RFID tag, then customers would no longer need cashiers

Fig. 6, *Wal-Mart distribution center*, Ridge Manor / Florida, aerial view, in: http://www.sblom.com/ridgemanorflorida/wmt.jpg, state 2007.

tribution center; when it reaches its retail destination; and finally when it has been purchased. The UPC can also be used to access information about the product, its provenance, price, etc. The RFID tag, on the other hand, provides a constant link to the item in question and allows Wal-Mart to monitor shipments in 'real-time.' Wal-Mart is attempting to convince most of its suppliers to switch to RFIDs in the next few years.[4] By increasing their reliance on this technological coding, the relationship with the specific goods has changed. Rather than receiving a box of goods, opening it, inspecting its contents and understanding the physicality of the items, the goods become reduced to their UPC symbol or RFID signal.

Because the goal of the market-driven corporation is always profit, the specifics of the items for sale are important only insofar as they can be strategically distributed to maximize that profit – commodities are abstracted in the pursuit of capital. In order to make decisions about where these products can be best used, Wal-Mart analysts work with a massive database in order to anticipate needs and market opportunities. Though physical in the sense that they occupy quantifiable space and need to be transported, functionally these goods are perceived merely as data. Marshall McLuhan in *Understanding Media* acknowledged this transition when he wrote: "In the new electric Age of Information and programmed production, commodities themselves assume more and more the character of information."[5] However, even though this merchandise is conceptualized as data, its materiality is undeniable and, in spite of sophisticated data networks, it still must be transported using traditional means.[6] This conflict between high-speed digital networks and relatively slow terrestrial networks gives rise to the conditions in which Wal-Mart distribution center employees find themselves placed – somewhere between the concreteness of physical space and the abstractness of digital space.

The challenge of transporting and distributing merchandise is largely responsible for the spatial manifestations of Wal-Mart. The need to handle it efficiently dictates the location of distribution centers, the location of retail outlets, the traffic patterns in the parking lot, the interior layout, the aisle widths, etc. But this manifestation of physical parameters is coupled with a manifestation of less tangible factors, like the control of information. According to McLuhan, with technological advances: "All solid goods can be summoned to appear as solid commodities by means of information circuits set up in the organic patterns that we call 'automation' and information retrieval. Under electric technology the entire business of man becomes learning and knowing. In terms of what we still consider an 'economy,' this means that all forms of employment become 'paid learning,' and all forms of wealth result from the movement of information."[7]

to check out, they could simply pass their cart full of items through an electric gate and have their account automatically debited (similar to EZ-Pass systems that many cities have adopted to alleviate congestion).
Or, according to Kazys Varnelis, "There's no reason why RFIDs couldn't already be the subject of incredibly sophisticated, long-term forms of tracking – or why, if you enter Wal-Mart already wearing clothes tagged with RFIDs, you couldn't be greeted with highly specific and individualized forms of product information. Let's say Geoff walks in, and he's already bought two t-shirts and a pair of pants: from the RFIDs still embedded in his clothing, the store will know exactly who he is, even what he might be shopping for." From an interview with Geoff Manaugh, August 12, 2006. See: http://www.worldchanging.com/archives/004801.html, state December 2006. For further information, see the video: "Wal-Mart's RFID program" at http://www.walmart.feedroom.com, state December 2006.

5 Marshall McLuhan, *Understanding Media. The Extensions of Man*, Cambridge: MIT Press, 1966, p. 37.
This transformation of the character of commercial goods is also acknowledged later by Keller Easterling: "Obdurate physical material ideally behaves more like information, sorting itself and thus further enticing the distribution addict to his obsession." Keller Easterling, *Enduring Innocence. Global Architecture and Its Political Masquerades*, Cambridge: MIT Press 2005, p. 102.

6 This is acknowledged by J. C. R. Licklider in an interview: "The printing press was the great step into sharing information but the printing press didn't handle the problem of distributing it, it handled the problem of copying it. And we have needed for a long time some better way to distribute information than to carry it about. The print on paper form is embarrassing because in order to distribute it you've got to move the paper around and lots of paper gets to be bulky and heavy and expensive to move about."
Though he is referring to the distribution of information, the same issues apply to the transit of physical goods. In: Steven King, *Computer Networks. The Heralds of Resource Sharing*, shortfilm, Cambridge: 1972.

Fig. 3, David Lynch (director), *Space Guild Navigator*, film still from *Dune*, Universal Pictures, 1984, based on the novel by Frank Herbert.

Fig. 4, *Sam Walton*, founder of Wal-Mart, dancing the Hula on Wall Street, 1984, in: http://graphics.samsclub.com/wmimages/wmstores/samhula.jpg, state 2007.

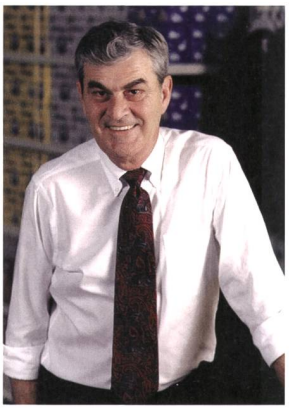

Fig. 5, *David Glass*, former Wal-Mart CEO, 1988, in: http://graphics.samsclub.com/wmimages/wmstores/david_glass.jpg, state 2007.

McLuhan recognized that acquiring information would be more important than accumulating physical things. Historically, it was often the case that if one had possession of a great number of desirable products, then capital accumulation would follow naturally. According to McLuhan, the key to generating capital is the acquisition of information, something at which Wal-Mart excels. In fact, like a dragon sitting atop its hoard of gold, it is their massive consumer information database that they guard most closely. Commodities, once a producer of wealth, now produce information that, when translated into knowledge, becomes the real source of money and power.

An example from science fiction offers a glimpse of the possibilities of this information accumulation: in Frank Herbert's *Dune*, the most powerful characters are the god-like Space Guild Navigators (fig. 3) who rely on a rare substance to grant them both omniscience and omnipresence. This substance, a spice, is the source of all struggles in the novel: those who have it will do anything to maintain control and those who lack it will do anything to acquire it. The desire for spice parallels today's battle for information access and helps us to better understand the shift from the transit of material goods to the transit of immaterial information-goods. Likewise, it is the executives of companies like Wal-Mart, with a data vault second only to the U.S. Department of Defense, who become increasingly able to exert themselves across time and space while also being able to 'see' throughout their entire network. Though Sam Walton, (fig. 4) the company's founder, helmed the company largely before the advent of digital communications, he was nonetheless in the office at 5:00 a.m. every Saturday to review the all profit and loss information from the previous week. His successor, David Glass (fig. 5) recognized the promise of information networks and was responsible for initiating Wal-Mart's aggressive information acquisition strategy. According to Glass, "Our distribution facilities are one of the keys to our success. If we do anything better than other folks, that's it."[8] Information management is not simply a business approach of a company; it is an obsession for its leaders and a way of life for its employees.

Distribution Centers (very large computers)

The distribution centers (DCs) that handle these goods and information are a case of architecture reduced to a purely diagrammatic state (fig. 6). Their form and position are the results of a direct translation of efficiency protocols into a three-dimensional space. They are typically removed from an urban context and surrounded by parking lots and loading docks. Characteristically flat and very large – the DC near the Wal-Mart Headquarters is over 1.2 million square feet – the exterior is undifferentiated, save for perhaps some words of inspiration (fig. 7). These buildings have a much different set of parameters, few of which are traditionally 'architectural' but instead are a "problem of programming [...]. It's all about queuing and flow control, the same kind of problems that chip designers have to deal with. And, of course, if you see the big box from above, it's just a giant microchip."[9] Inside, the distribution centers are a tangle of rollers and conveyors and an endless procession of boxes and pallets (fig. 8). Most of these goods are delivered by trucks, unloaded by the DC workers, placed on a belt to be removed and loaded to another truck for shipment. Much of the allocation of the goods is done automatically but the picking and packing requires human workers.

By accepting that the goods Wal-Mart handles can be understood as both information and material, then the distribution center functions more as a process-

ing device than as a storehouse or a place of inhabitation. J. C. R. Licklider, in his influential essay 'Man-Computer Symbiosis' uses the term 'computer' to describe "a wide class of calculating, data processing, and information-storage-and-retrieval machines."[10] Given this definition and given the ultimately abstract nature of the merchandise that Wal-Mart distributes, it can be instructive to view these distribution centers not just as very large buildings but also as very large computers. In light of Licklider's definition, the typical automated warehouse, in which "The Warehouse Control System can itself have 'intelligence' to process dispatch-order patterns, to rearrange stock to suit the order demand, and to optimize equipment cycles and picking operations,"[11] could also be easily understood as a computer. This categorization is useful because it allows a reconsideration of the actual humans who inhabit these mega-computers and their relationship to architecture and space.

Fig. 7, *Wal-Mart distribution center*, Bentonville/AR, exterior view, unknown photographer, unknown year, in: http://www.walmartfacts.com/PhotoGallery/default.aspx?id=8, state 2007.

McLuhan and Licklider: Extension, Symbiosis and Servo-organism

In a typical distribution center, the workers experience direct and sustained contact with both machines and information. Because the projects of both McLuhan and Licklider were directly concerned with the state of humans in such environments, an examination of some of their early writings will illuminate aspects of this condition. One of the central theses of McLuhan's *Understanding Media* is that media function as extensions of human thinking and feeling and he sees this as a defense mechanism of sorts in order to cope with the increasing hostility and intensity of a world characterized by media saturation. He explains this further by writing: "Any invention or technology is an extension or self-amputation of our physical bodies, and such extension also demands new ratios or new equilibriums among the other organs and extensions of the body [...]. To behold, use or perceive any extension of ourselves in technological form is necessarily to embrace it. To listen to radio or to read the printed page is to accept these extensions of ourselves into our personal system and to undergo the 'closure' of displacement that follows automatically. It is this continuous embrace of our own technology in daily use that puts us in the Narcissus role of subliminal awareness and numbness in relation to these images of ourselves. By continuously embracing technologies, we relate ourselves to them as servomechanisms [...]. An Indian is the servomechanism of his canoe, as the cowboy of his horse, or the executive of his clock."[12]

Fig. 8, *Wal-Mart distribution center*, Bentonville/AR, interior view, unknown photographer, unknown year, in: http://www.walmartfacts.com/PhotoGallery/default.aspx?id=8, state 2007.

McLuhan's idea of servomechanism is unconventional because he asserts that the relationship between media and humans is reciprocal. If a servomechanism is typically defined as "a powered mechanism producing motion or forces at a higher level of energy than the input level"[13] then it is puzzling to label the human responsible for the input as the servomechanism. In the more straightforward reading of the situation, the vehicle would be seen as the servomechanism because it intensifies and extends the human's small effort of depressing the accelerator. However, McLuhan is claiming that we are so heavily influenced by the technology that surrounds us that we are the ones receiving the input, in effect becoming technology's 'servo.'[14] McLuhan argues that humans are not immune to the effects of the technology they created but that there is a developing relationship between the two that is continuously transforming both.

Though writing a decade earlier, the work of J. C. R. Licklider complements McLuhan's because it also addresses the interconnectedness of humans and media, specifically computers. Licklider wrote 'Man-Computer Symbiosis' in 1954 and its influence was widespread because it crystallized several ideas about

7 Marshall McLuhan, p. 58.
8 David Glass, quoted in display in Wal-Mart Visitor's Center, Bentonville/Arkansas/USA.
9 Kazys Varnelis, Interview with Geoff Manaugh. See: http://www.worldchanging.com/archives/004801.html, August 12, 2006. (Kazys Varnelis is the Director of The Network Architecture Lab at Columbia University).
10 J. C. R. Licklider, "Man-Computer Symbiosis," in: *IRE Transactions on Human Factors in Electronics* (1960), vol. 1/March, p. 4–11, see also: http://www.groups.csail.mit.edu/medg/people/psz/Licklider.html, state 2007.
11 Joylon Drury / Peter Falconer, *Building and Planning for Industrial Storage and Distribution*, Oxford: Architectural Press, 2003, p. 201.
12 McLuhan, p. 45–46.
13 http://www.dictionary.com, state August 2006.
14 Elaborating on this notion, McLuhan writes: "The effects of technology do not occur at the level of opinions or concepts, but alter sense ratios or patterns of perception steadily and without any resistance [...] we become what we behold." In: McLuhan, p. 18.

Fig. 10, *Symbol, wearable scanner*, unknown photographer, unknown year, in: ftp://symstore.longisland.com/Symstore/productlibrary/PDT8100/PDT8100wGrip.jpg, state 2007.

Fig. 9, *Phaser, cordless scanner*, unknown photographer, unknown year, in: http://www.symbol.com/news/reporters_only/ph_lib_barcode_srs1rs.html, state 2007.

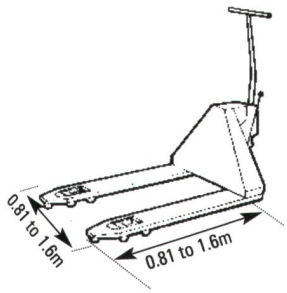

Fig. 11, *pallet-truck / pallet-jack*, in: Joylon Drury / Peter Falconer, *Building and Planning for Industrial Storage and Distribution*, Oxford: Architectural Press 2003, p. 145.

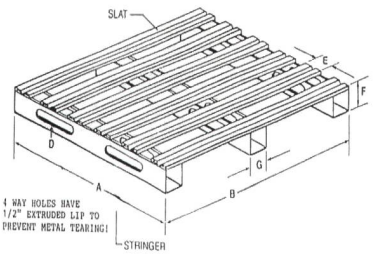

Fig. 12, *typical shipping pallet*, in: http://www.metalpallet.com/images/pallet.jpg, state 2007.

the future of computing and offered a new understanding of the potential of interactive computing. Licklider's essay "rapidly achieved the kind of status as a unifying reference point in computer science [...] It became the universally cited founding articulation of the movement to establish a time-sharing, interactive computing regime."[15] Licklider makes a case for the needs and benefits of a closely linked relationship between humans and their computers where the two operate as a single entity with a seamlessly integrated interface that allows for faster and more effective decision-making. He saw these possibilities as a result of the perceived complementary nature of humans and machines. Licklider's starting point for his argument is based on efficiency. He argues that large organizations and companies were spending too much time doing labor-intensive calculations and preparations in order to be properly equipped to make a decision. He proposes that "Computing machines will do the routinizable work that must be done to prepare the way for insights and decisions in technical and scientific thinking."[16] Because computers were especially well-equipped to process large amounts of information, they could accelerate the decision making process by freeing humans to do the 'thinking' and to make decisions based on the data sorted and presented by the computer.

For Licklider, the optimal human–computer interaction would be one in which the computer would do the labor and the human would do the 'thinking.' Though this is often the case, the distribution centers of retail logistics offer another version of this relationship. In the case of Wal-Mart, whose daily operation is characterized by an enormous amount of information management, the computer is actually performing many of the labor-intensive calculating processes in addition to many of the decision-making duties. Because Wal-Mart's supplies are so carefully calculated, the decision about where to route different goods can be made based on pre-existing inventory formulae. What the computer cannot do is manage the physicality of the merchandise. That is, it can locate the goods and it can determine where they should go but it cannot execute the repetitive and labor-intensive task of selecting them and transporting them to the desired location. It needs humans for this. Humans have the flexibility, agility, and economy that currently, and for the foreseeable future, will far outdo those of computers.[17] This reliance on humans by the computer to do the routinizable tasks that it is incapable of doing itself constitutes a reversal of the roles assigned by Licklider. Instead of the computer serving as the laboring 'body' for the thinking human 'head,' the opposite is true. The mainframe becomes dependent on its organic counterparts to ensure that operations run smoothly. Combining McLuhan's version of 'extension' and Licklider's 'szymbiosis' presents another understanding of the inhabitants of these large distribution centers not as workers, not as decision-makers, and not as 'mechanically-extended' subjects, but as a collective 'servo-organism.' If in a servomechanism the machinic output is disproportionately larger than the organic input, then in the case of the distribution center, the machinic input is relatively small while the human labor that it prompts is extensive. In this space between the physical and the virtual, these inhabitants become cyborgs because they are entities that are "both their own agents and subject to the

power of other agencies."[18] Furthermore, "each cyborg implies a new spatial configuration or territory – a habitat"[19] – in this case the distribution center.

Servo-Organism in Action

Three examples of human–machine interface in a typical distribution center support the notion of the 'servo-organism': human/scanner, human/pallet-jack, and human/crane. In order for Wal-Mart to maintain its mechanical and hyper-efficient routine of monitoring and distribution, the workers 'on the front-lines' must be directly linked to the information network and must be able to quickly and nimbly move large quantities of goods or reconfigure the retail and warehouse floor. In order to access Wal-Mart's large store of data, employees are equipped with wireless scanners (fig. 9) that are with them at all times. The scanners are primarily a means of communicating with the central computer database and act as the 'eyes' of the mainframe in Bentonville. In this sense, the computer is depending on the humans for information but there is none of the collaboration that Licklider imagines in his ideal symbiotic relationship. Instead, the workers function as mobile conduits and as tools necessary for a completion of a job. The portable scanner could be seen as a mechanical extension, or servomechanism, for an individual. However, because the function of the device is not directed to the worker but beyond them, the worker–scanner combination functions more as an extension of the central computer in Arkansas and places the human in the servant role – mechanically autonomous but bound to the demands of the computer.

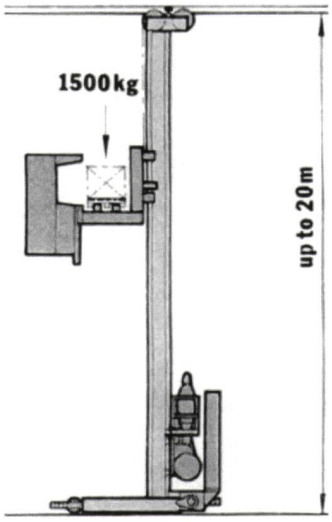

Fig. 13, order picker diagram for a typical automated distribution center, in: Joylon Drury / Peter Falconer, *Building and Planning for Industrial Storage and Distribution*, Oxford: Architectural Press, 2003, p. 211.

A further development in this human–scanner relationship is apparent in the 'wearable scanner' (fig. 10) provided by Symbol, Wal-Mart's primary supplier of the hardware and software and the company that allows Wal-Mart's employees to remain in constant contact with the central information hub in Bentonville. This system "allows workers to move freely through inventory aisles and still be able to scan, access information, and perform data entry."[20] This technology is the latest step in the development of scanning devices from heavy and fixed scanners to the smaller handheld scanners mentioned above which allow employees more freedom but still maintain a clear distinction between body and tool, human and machine. Workers must decide to use handheld scanners but the wearable scanner eliminates any decision-making because the workers are always using it. The removal of agency is an example of the cyborg condition described above where the entity "is both its own agent and subject to the power of other agencies." That is, the workers still have control over all of their cognitive and motor abilities but now have to contend with the weight of the 'largest civilian database in the world' that is now strapped to their forearms and wrapped around their fingers. Not only is there an erosion of the boundary between the human and computer but also there is internal sensory erosion within the user. Their hands are feeling, lifting and moving as usual but now they are also 'seeing' for the central mainframe and are able to distinguish between an array of objects quite often hidden from them in a shipping container, pallet, or cardboard box.

15 Paul Edwards, *The Closed World. Computers and the Politics of Discourse in Cold War America*, Cambridge: MIT Press 1996, p. 266.
16 Licklider, p. 59.
17 According to distribution expert Joylon Drury, "the final picking of discrete articles generally has to be done manually." Drury / Falconner, p. 204.
18 Jennifer Gonzalez, "Envisioning Cyborg Bodies. Notes from Current Research," in: Chris Gray (ed.), *The Cyborg Handbook*, London: Routledge 1995, p. 268.
19 Ibid., p. 272.
20 http://www.symbol.com/products/mobile_computers/mobile_computers.html, state August 2006.

Fig. 14, A typical distribution center, interior view, showing a picker-crane and its driver, in: Joylon Drury / Peter Falconer, *Building and Planning for Industrial Storage and Distribution*, Oxford: Architectural Press, 2003, p. 171.

Fig. 15, Publicity image from Symbol showing an employee using his wearable scanner, in: http://www.symbol.com/news/reporters_only/reporters_only_photo_library_b2.html, state 2007.

Workers use a device known as a 'pallet-jack' (fig. 11) to aid them in moving and placing large quantities of goods that would be otherwise impossible for one person to lift or carry. The standard format by which most goods arrive in the store is on a pallet, (fig. 12) usually a wafer-like construction with three spacers connected perpendicularly with planks on either side. The pallet-jack has a significant influence on the layout of stores and warehouses because its turning radius is one of the primary determinants of dimensions. The pallet-jack also allows its driver to do much more than humanly possible. Though more advanced than the typical pallet-jack, the power-loader exo-suit from James Cameron's film *Aliens* suggests the logical continuation of this kind of technology. In *Aliens*, the power-loader is 'worn' and used to assist in material handling, salvage operations, alien battles, etc. It is also an example of a servomechanism in the sense that its 'wearer' controls the mechanical elements in order to increase his or her strength and ability. The difference in the typical distribution center condition is that even though the workers' strength and ability are augmented by mechanical extension, their actions are still dictated by Wal-Mart Headquarters in Bentonville.

In automated warehouses and distribution centers with extra-high inventory storage, the human workers must physically move to the location of the goods ordered, remove them from storage and prepare them to be loaded onto some form of transit. In order to do this, they use a device called a 'picker crane' which is basically a forklift on a track that can move horizontally and vertically (fig. 13) and "combines pallet storage with order picking, useful for medium throughput operations or where the majority of withdrawals are full pallet loads."[21] The humans who use these picker cranes become almost completely absorbed by their environment. (fig. 14) In some cases, they become so much a part of the mechanism that it becomes difficult to even identify them. In the case of the picker-crane, the augmentations of the scanner (knowledge) and the pallet-jack (strength) are combined with that of mobility. Now they have access to huge amounts of data, can lift tremendous weight, and virtually fly through space in three axes. In spite of these newfound abilities, the workers are still bound to the commands of Wal-Mart's central computer. Zooming out to the scale of the 'building,' a publicity photograph from Symbol offers a view of the 'habitat' of these warehouse employees. Dominant in the image are the shelves upon shelves of mute boxes covered with the ciphers that will allow the specially outfitted warehouse servo-organisms to interpret their contents, provenance, and destination. Equally prominent is the internalization of the warehouse world – this habitat is an insular terrain protected and independent from its surroundings.

Spatial Contradictions, Blurred Boundaries

When viewed parallel to the notion of servo-organism, two pieces from the artist Rebecca Horn, from 1972 titled *Fingergloves* (fig. 16) and *Pencil Mask* (fig. 17), provide a helpful filter. The sculpture/performance *Fingergloves* witnesses the struggle of manipulating objects at a distance by using tools that are the literal and linear extension of the artist's digits. The fingers and hands are one of the primary thresholds through which we inhabit our physical world. They are functional and agile and also sources of pleasure as they act as primary touch receptors. The monstrous extension of Horn's fingers promises enhanced abilities to interface with her surroundings at a distance but at the same time

denies their physicality because the wearer can no longer feel them. The promise of connection distances her even more from her surroundings. Likewise, because of their inflexibility, they preclude an interaction with objects within a certain radius. Most significantly, they prevent the wearer from touching herself save for in the most attenuated poses. In an effort to recognize objects at a distance, the wearer sacrifices the ability to recognize herself.

The project *Pencil Mask* consists of a web of straps worn about the head from which protrude eighteen pencils. During the performance, the artist uses her head and the mask to cover a wall with a dense web of lines. In the same way that the wearable scanner breaks down certain internal divisions between touch and sight (the hands, in effect, 'see'), the *Pencil Mask* both upsets and enables new sensory functions. One writes by moving, by seeing, or simply by thinking. Furthermore, even though movement and seeing are conflated with communication, the author/wearer still has an impact on the outcome because the pencils follow the profile of her face and as a result, certain zones on the wall are darker than others because they receive more pressure. This suggests that even if mechanical extension of humans precludes certain forms of control or expression, there is still some reciprocal influence on the outcome. If in *Fingergloves*, sustained interaction with the surroundings serves to erode the integrity of the subject, in *Pencil Mask*, continued interaction creates more traces and increases the presence of the wearer.

Fig. 16, Rebecca Horn, *Fingergloves*, performance/sculpture, 1972, in: http://www.holzwarth-publications.de/pages_specialeditions/horn.html, state 2007.

In Horn's pieces there is an analog to the concept of servo-organism and the tensions that it embodies. The workers are at once present and removed, strong and weak, fixed and mobile, connected and isolated. This suggests that the continued interaction with augmenting technology poses significant dilemmas in terms of how we might constitute bodies in space, and by extension, buildings. The benefit of such augmentation promises certain kinds of physical emancipation, whether through profound ontological transformations or more prosaic things like spatial mobility. Furthermore, the blurring of human boundaries in the servo-organism could also blur conditions at the scale of buildings and cities. We can witness such a process with the development of the 'wearable' scanner. Not only does the border between body and space dissolve but also do so some of the internal borders within the wearer. The condition of these networked warehouses is one in which humans are both discrete entities but also 'incorporated' into the larger body of the machine–information organism of Wal-Mart such that the boundaries of both are in a constant state of negotiation. This kind of tension also suggests another way of understanding architectural scale not as an incremental reduction in size but instead as a continuous exchange across all scales in a very physical way such that "the city and body will interface with the computer, forming part of an information machine in which the body's limbs and organs will become interchangeable parts with the computer and with the technologization of production."[22] These conditions suggest, through their erosion of boundaries, the possibilities of moving beyond conventional urban binaries (urban/rural, center/edge, virtual/physical, abstract/concrete, etc.) in order to straddle both. Doing so opens up categories of seemingly contradictory urban states that can exploit the potentials offered by logistically driven operations like those of Wal-Mart.

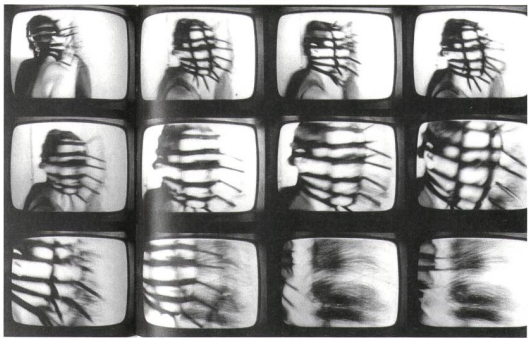

Fig. 17, Rebecca Horn, *Pencilmask*, performance/sculpture, 1972, in: Rebecca Horn, *Bodylandscapes*, Düsseldorf: Hatje Cantz Verlag 2005, plate 12.

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21 Drury / Falconner, p. 93.
22 Elizabeth Grosz, "Bodies-Cities," in: Gary Bridge / Sophie Watson (eds.), *The Blackwell City Reader*, Oxford: Blackwell Publishers 2002, p. 303.