

Unforeseen Challenges

Adopting Wearable Health Data Tracking Devices to Reduce Health Insurance Costs in Organizations

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Abstract. Wearable health-tracking devices are being adopted by American self-insured companies to combat rising health insurance costs. The key motivation is to discourage employees' unhealthy behavior through monitoring their data. While wearable health-tracking devices might improve users awareness about personal health, we argue that the introduction of such devices in organizational settings also risk introducing unforeseen challenges. In this paper we unpack the unforeseen challenges and argue that wearable health-tracking devices in organizational settings risk disciplining employees, by tempting or penalizing them financially. Further, health concerns are reduced to numbers through wearable health-tracking devices providing surveillance of bodies, impacting people's lives. We stress how important it is that designers and researchers find ways to address these challenges in order to avoid future abuse of personal health data collected from wearable health-data tracking devices.

Keywords: Wearable Health-Tracking devices · Health data · Health insurance · Differentiated pricing · Wellness programs · Personal healthcare records · Privacy · Surveillance · Disciplining · Health as numbers

1 Introduction

In this paper, we explore the unforeseen challenges, which the introduction of wearable health-tracking devices might cause. In particular, we investigate how the introduction of such devices in an organizational setting shapes the relationship between the employee, the organization, and health conditions in certain unforeseen ways. Self-insured companies in the USA have started to adopt wearable health-tracking devices into their organizational setting through corporate wellness programs [26, 30]. This was a response to part of the Patient Protection and Affordable Care Act (PPACA), which made it possible, under federal law, for employers to vary health insurance premiums by up to 30 % based on employee's health factors [31]. In 2011, the national US healthcare expenditures reached \$2,700 billion [10] and wearable health-tracking devices holds promises to decrease healthcare spending by differentiating insurance premiums and motivating people to get healthier. More than half of all Americans receive health insurance through their employers [10], thus the introduction of wearable

health-tracking devices in organizational settings have huge potential impact on the American society. However, the nature of the impact might take different forms. We found that the introduction of wearable health-tracking devices within organizations have created the risk of disciplining human behaviors; reducing health concerns in measurable numbers, thus neglecting important aspects of health; and finally bring health surveillance into the everyday lives of people jeopardizing privacy. We argue that there is a need to further investigate the intentions and effects derived from adopting wearable health-tracking devices to contend rising health insurance costs. The financial incentives to reduce costs or generate profits on health insurance seem to benefit the few and not the many who are dependent or left without health insurance. Thus, it seems important to pause and debate wearable health-tracking technology before it is fully embedded into organizational settings and societies.

The paper is structured as follows: First we present our method and data sources which is comprised of a variety of written sources on wearable health-tracking devices in the USA. We then move into the section *Data, Technologies and Personal Health Data* in which we present external literature on the subject of health data and personal healthcare records, for then to present the theoretical approach of our work. The result section has three subsections, each unpacking the challenges we have identified by pointing to the data we investigated. This is followed by discussions of *The Wearable Dream, Newborn Artifacts, and Unfit Cyborgs*, ending with final remarks.

2 Method

Healthcare is not universal in the USA, and the majority of Americans with healthcare insurance have it organized through their employer [10]. This alongside the PPACA has created an environment for adopting wearable health-tracking devices by self-insured companies. Thus, to study the possible unforeseen challenges that emerge when wearable health-tracking devices are introduced into organizations we decided to focus on the USA. To gain a comprehensive overview and insights into the possible challenges of wearable health-tracking devices we collected and analyzed data from several diverse sets of sources including academic papers, consultant reports, corporate web-sites, government reports, government web-sites, and other online articles. Analyzing our data, we took a grounded theory approach [16], and thus identified categories capturing the diverse set of challenges emerging in these documents. Our coding made us able to conceptualize and structure the identified actors as well as the unanticipated challenges. Our classification provided us the opportunity to compare data from several sources, thus, allowing us to identify key actors and challenges in relation to health data gathered by wearable health-tracking devices.

In total, we analyzed 28 different data sources identifying potential challenges, merging challenges across sources with similarities. This process made us question each challenge seeking further empirical confirmations. Our data began to reveal corresponding challenges, formed by a collective of abstractions and events throughout our material, such as; the context and manipulation of data; data ownership, security and anonymity; minimizing insurance risk by incentives to get healthy; dictating behavior;

differentiated pricing; and no opt out options toward using wearable health-tracking devices. Then, by studying the emerging groupings of data, we reframed the key challenges worth pursuing and abandoned the ones having diffused or random content. Hence, our categories lead us to three central challenges, namely; how wearable health-tracking devices risk being used to discipline; how health-tracking devices risk reducing health into numbers; and finally, how health-tracking devices risk surveil and compromise privacy.

3 Data, Technologies, and Personal Health Data

Designing technologies to collect data about health is not something new, but have been pursued in research on personal healthcare records and medical records [13]. Most research in this area has been done within hospital organizations and findings point to the challenges in terms of: standardization and reconfiguration across healthcare institutions [5]; that difficulties in adaptation and reconfiguration is part of design [29]; and that patchwork is extra work required to make the multiple healthcare systems within hospital work together [14]. Various myths exist concerning healthcare systems [3], and clearly it is difficult to design systems which support healthcare practices rather than constrain them. One of the major challenges in the design of healthcare systems is the issues concerning categories and classifications [1, 17]. How we develop the categorization, which becomes embedded within healthcare technologies, clearly impact the way in which healthcare personnel are able to do their work by surveillance of practices rather than supporting work [4]. However, while the above research have been critical in terms of driving research on health information systems forward, they do not pay attention to the situation where we move out of the hospital and into people's work and lives.

In this paper, our interest is not the professional setting of healthcare practitioners, but instead the practices by which technologies collecting health data move into the workplace or the homes of people [6]. We study how wearable health-tracking devices have been brought into an organizational setting of self-insured companies and the challenges that have emerged. We apply the socio-technical perspective as a lens to uncover the challenge of how wearable health-tracking devices risk being used to discipline. This perspective makes us pay attention to the design of the technology and how it enacts power to discriminate against certain groups and favor others [22, 33]. There are currently a large variety of wearable health-tracking devices available, and it is unclear if they follow the same standards and classifications, even though we know that such classification strictly impact peoples' practices [8]. Numbers has in healthcare been seen as the most reliable and objective way of presenting facts [11], thus we must investigate what it means when health is monitored and presented in terms of numbers. Classifying health is difficult and complex as it is more situated and subjective [8]. Individuals agreeing to use wearable health-tracking devices can be viewed as a form for participatory surveillance [7], where bodies are producing numbers. By initially agreeing to terms of agreements before using the technology, it can be argued that users begin to self-regulate their behavior toward becoming healthier, allowing other parties

to discipline and punish from afar [15]. The interconnection in between health-tracking devices and their users can be viewed as a form for cybernetic information system [2], in which individuals will not only be concerned about their physical health but also become self-conscious about their digital health and financial stature. In this merge, between human and technology, they become cyborgs [19]. To understand the incentives to implement wearable health-tracking technology there is a need to pry into the dynamics of capitalism, whose logic is somehow separate from the physical world we all live in [23].

4 Disciplining, Reducing Health to Numbers, Surveillance, and Privacy

In investigating how wearable health-tracking devices risk being used to discipline employees, we will dig into the possible challenges employees experiences when tracking devices are introduced in an organizational setting. We found different types of disciplining to emerge when wearable health-tracking devices are introduced. Several self-insured companies have started to use these tracking devices to financially tempt or penalize their employees through wellness programs. Employees at one of these companies are offered a chance to win \$10,000 if they walk more steps than the top executives, thus financially tempting them to use these devices [30]. Another company tempts employees financially to share their health data, but in this case by awarding them with a \$25 bi-weekly discount if they fill out a health questionnaire. However, in order to qualify for this \$25 reduction a health screening, showing acceptable levels regarding waistline, blood pressure, glucose, HDL and triglyceride, is required [18]. More wide reaching initiatives was found in wellness programs at other companies, namely that of penalizing through fines. A company requires employees to submit health data which included weight, body fat, glucose levels, and other vitals. Employees refusing to comply with this requirement receive a monthly fine of \$50, thus penalizing the employees through fines to share their health data [28]. A similar practice also existed at another company where an employee was charged \$40 extra a month for health insurance because of a refusal to provide health data with said company [28]. The challenge of how wearable health-tracking devices risk being used to discipline employees may have greater implications for certain types of individuals. Healthy individuals will have few drawbacks besides privacy concerns from sharing their health data, whereas individuals who are worse off health wise or are on a tight budget may face other challenges on top of that. People on a tight budget can potentially not afford to either pass on rewards for sharing health data or receive fines for refusing to do so, even if they so wished [18]. Hence, penniless employees risk ending up in a situation where they are disciplined into sharing their health data. Unhealthy individuals potentially end up being caught between a rock and a hard place as they have to choose whether or not to share their health data. By sharing health data they can collect rewards and avoid fines, but the health data could potentially lead to higher insurance premiums if the individual becomes classified as unhealthy. On the other hand by refusing to share health data they face fines and no rewards, meaning their financial

situation risk changing to a worse state than what has previously been the case [18]. A situation where unhealthy individuals are disciplined into paying more for health insurance, face fines, or lose out on financial rewards is at risk here.

The second major risk area concerns how wearable health-tracking devices reduce health into numbers and why it could turn out to be problematic. Wearable health-tracking devices contain sensors which measure a person's health data such as number of steps taken, glucose levels, blood pressure, amount of sleep [26, 30]. Based on these readings an individual's insurance premium could be differentiated, increasing or decreasing in price, depending on whether the data is classified as healthy or unhealthy. By reducing health to numbers individuals risk facing a number of consequences. The readings made by wearable health-tracking devices fail to factor in social, psychological, environmental and physical circumstances [32], which can all influence the readings and the state of a person's health. By reducing health to numbers there is a risk that blind spots are created within the data because the circumstances, which are not accounted for digitally, are lost and the context of how the data came to be is missing [12]. The actions of the individual are not enough to explain how or why insurance premiums are differentiated; the actions of the multitude are needed to understand the premise [12]. The health data of the multitude is within the organizational setting compared and assessed, which is accommodated by reducing health to numbers, and health insurance premiums can thus be differentiated in between individuals. However, wearable health-tracking devices on today's market lack common standards and practices as they have not gone through any validation process [9]. Thus, each device or sensor could potentially collect different data even when measuring the exact same situation [9]. Other medical devices used for research and professional use have to be meticulously tested before being approved by the U.S. Food and Drug Administration [9]. This is not the case with wearable health-tracking devices as they have not been validated, further they do not follow common standards [9] and it can thus be questioned whether or not they should be used for differentiating insurance premiums. When health data is analyzed there is a possibility for manipulation, and the algorithms used can potentially be modified by an organization wishing to change the analytical outcome [24]. This could particularly become a problem when there are financial incentives to manipulate the data, for instance if healthier looking data means lower health insurance cost [27]. Self-insured companies could save large amounts of money when bargaining with an insurance provider if their employee's health data is manipulated to look healthier. The employees could also have incentives to manipulate their own health data. For example, step count could be manipulated by attaching the wearable health-tracking device to an animal, co-worker or perhaps a machine thereby fooling the wearable health-tracking device to record fake steps [24]. Reducing health into numbers through the use of wearable health-tracking devices is followed by a number of consequences that could impact individuals and how the price of their health insurance premium is determined.

The third risk area is that of surveillance and privacy. In wellness programs health data is collected by wearable health-tracking devices, stored in personal health data sets, while being administered by a heterogeneous host of intermediaries [27]. Employees are being prompted to participate in wellness programs, driven by their employers wish

to keep health insurance costs low, which in turn invade the privacy of employees as the wearable health-tracking devices are being used as a form for surveillance tools [9]. As wearable health-tracking technologies evolve they begin to be able to track more sensitive data such as heart rates, glucose levels and body temperatures revealing a more intimate picture of a person's health [25]. Thus, in order to preserve the privacy of individuals from their insurance provider, neutral third parties are brought in to manage the data. In the slipstream of wearable health-tracking technology lays privacy concerns on how wearable health-tracking provider's access and use individual's health data. The privacy concern is embedded in how terms of use agreements are accepted before using wearable health-tracking technologies [20]. Terms of use agreements typically state that the organization providing the wearable health-tracking technology either fully owns or has full and complete rights to the health data, including rights to repackage and sell datasets to other parties as long as it has been anonymized [9]. Further, while some people are aware of these privacy issues, others are indifferent or oblivious, thus personal health data can be used for other purposes than what the users expected [9]. Subsequently, there is a risk that anonymized personal health data can become de-anonymized when two or more data sources are combined [9]. Finally, there is a security risk in guarding the stored personal health data as repositories of data are characteristically unstable. Data has a tendency to escape in unexpected ways, be it through errors, leaks or hacks [12]. Wearable health-tracking devices, operating as a form for surveillance tools, endanger individual's privacy. The collected health data may be used for other purposes than what was originally intended.

5 The Wearable Dream, Newborn Artifacts and Unfit Cyborgs

A new dream is forming in America - the wearable dream. As a result of the PPACA employers have been permitted to differentiate the prices of health insurance premiums with the help of wearable health-tracking devices. It is for example cheaper to eat unhealthy than healthy [21], but instead of trying to regulate the market to make it more financially attractive to eat healthy, the individual is disciplined in an attempt to make them healthier [18, 28, 30]. Whether or not that is the right choice, we still see that the responsibility of reducing the vast health related expenses in the USA is placed on the individual through wellness programs and not on the industries that lead people to unhealthy lifestyles. A vital actor in these wellness programs is wearable health-tracking technology which can be used to enhance the privilege of some over others [33]. Healthy individuals will potentially be able to benefit from sharing their health data beyond that of receiving rewards or avoid fines. By sharing their health data they can prove their healthiness, becoming less risky to insure and therefore be entitled to lower health insurance premiums. On the other side individuals unwilling to share their health data, possibly because they are unhealthy or have privacy concerns [9, 18], will not be able to prove their healthiness and could thus be deemed more risky to insure and face a higher health insurance premium. These wearable health-tracking devices are because of their prescriptions discriminating against people who are unhealthy or have privacy concerns, as it prevents them from getting

the same financial benefits as healthy persons [22, 33]. Whether or not the challenges health-tracking devices bring are intended or not by the designers are uncertain. Nevertheless, it is clear that tracking devices can be used to execute political power in certain ways, which benefit some on the cost of others [33].

The PPACA created by the US government has made it possible for the wearable health-tracking device to be used as a mean by which employers can reduce health insurance costs [31]. The tracking technology provides both the government and the employers a way to act at a distance [22], which gives them a certain power over the individuals who use these wearable health-tracking devices. The government exerts its power through the wearable health-tracking devices by making the individuals perform the action of becoming healthier and in a sense they have delegated the work to the wearable health-tracking device. However, the tracking device is not capable of transforming an unhealthy human to a healthy human on its own, it requires the humans to be motivated or forced into making the transformation. In the case of wellness programs the motivating or forcing driver is money exemplified by financial temptations and fines [18, 28, 30]. When health data collected from wearable health-tracking devices becomes part of the personal health data set it has the potential to structure the US society in a different way. If the healthy are getting cheaper health insurance and the unhealthy more expensive health insurance, then a situation possibly arise where the only ones able to afford health insurance are the ones who are healthy or wealthy and need it the least. What should also be considered problematic is that people with low incomes are more prone to being unhealthy [10] and as a result of being unhealthy they could risk facing higher health insurance premiums. In a potential scenario the health insurance premiums for unhealthy persons could rise to such high levels that low-income individuals cannot afford health insurance at all. However, if unhealthy people cannot afford health insurance and all the healthy people are getting cheaper health insurance, then it seems like some money is going to be missing if the insurance industry is to be profitable. If that is the case the insurance industry could again turn to the health data wearable health-tracking devices collect and re-categorize what is considered healthy and unhealthy. This would mean that people who were once considered healthy could suddenly become classified as less healthy without any changes in their health data. This could potentially have great implications on the US society as it could end up in a situation where only the most healthy or wealthy people can afford health insurance.

New artifacts have been born: wearable health-tracking technologies. Since their birth they have not undergone any official tests and do not have to comply with a specific rule set [9]. Companies providing wearable health-tracking technologies can, to some extent, make up their own rules in relation to how their specific device is measuring and collecting health data. Presently, there is a risk that the lack of standards for wearable health-tracking devices could mean that a person's health data set might vary depending on which tracking device is used to measure and collect it [9]. Individuals could very well face a situation where they have to seek out an employer at which their health data set is within a health range that would not present them with a large insurance bill, a seemingly impossible task for individuals with long term illnesses or other chronic diseases. By adopting wearable health-tracking technologies the determination of an individual's health status could, instead of visiting a doctor for a diagnosis, be based on

the numbers produced by the health-tracking devices. However, the collected health data could prove problematic since health is more situated and subjective [8]. The integrity and validity of the health data is compromised especially when considering how the tracking devices fail to factor in psychological, environmental and physical circumstances [32]. This should create concerns for employees whose insurance premiums might be unfairly changed based on their health data.

Companies are treating numbers from the wearable health-tracking devices as a representation of people's health which is justifiable since numbers for a long time have represented an objective way of presenting facts [11]. However, employees might quickly find themselves in a variety of situations, which could compromise this truth and objectivity. For example, a high pulse rate measurement might be due to an obese employee walking a lot of stairs but it could also be due to a normal weight person having an office romance. Wearable health-tracking devices cannot account for such external factors and contexts, they only collect the numbers, which could mean that a perfectly healthy employee find their health insurance priced unjustly. An intriguing point is that health could prove to be much more complex than the numbers wearable health-tracking devices reduce them to [9, 12, 32]. Self-insured companies are creating health profiles on their employees based on these numbers, which is concerning if it turns out that they are not valid or true in the first place, in fact it might be the opposite and provide a completely distorted picture of the state of a person's health.

Disturbingly, employees who are constantly being tracked and monitored might seek any means possible in order to create a healthy data set and not lose out financially for example by manipulating the data [24]. More desperate employees who cannot afford a more expensive health insurance could try to find ways to inflate their data to look healthier. A scenario made possible by the lack of control, since it, for example, is difficult to check if an employee gets a friend or coworker to wear their device for a period of time. However, for some employees inflating their data might become a necessity in order to keep their economy afloat. It is a scary thought but employees might in the future need to be concerned about how healthy they are, not out of common sense, but because health has become a currency with which they can bargain lower insurance premiums. Chronically ill individuals also risk having to bargain their insurance premiums and will thus most likely have to pay more regardless due to circumstances out of their control. In a sense it could be considered fair that obese individuals would have to pay a higher premium until they get healthier, but they have the possibility to change and improve whereas the chronically ill do not. The gap between healthy and unhealthy individuals will only get bigger as will the gap between rich and poor, which could be a consequence of a market where it is cheaper to eat unhealthy than healthy [21].

In the disciplining of fit as unfit individuals, different parties may have different incentives to collect personal health data through wearable health-tracking devices [28]. Further, these actors may also differ on how they use, store and manipulate the data [12, 24]. These predicaments are specified in terms of agreements usually written in large bodies of legal texts, in small fonts, and in a foreign language to most laymen. Very few people actually read these terms of agreements [20], by just clicking 'agree' whenever opted to make the choice. Thereby, blindly agreeing to an array of complex laws, interests, warnings and disclaims from a multitude of actors which may have

direct consequences on individual's daily lives [20]. In doing so, people adhere to a form for participatory surveillance [7], where administrators of the technology may manifest a desire to realize a system with only healthy people in it. What at first glance seemed like a harmless pulse rate tracker could soon come to dictate human behavior and insurance choices to an unforeseen extent. A panoptic grid may be realized by the multitude of worn wearable health-tracking technologies, serving different purposes, but collectively granting a productive increase of power to lessen costs on healthcare ever so subtly [15]. A cybernetic information system [2], where wearable health-tracking technologies work to replace human function, such as the ability to reason what is healthy. If a person is at risk of becoming obese a wearable artifact will cry out through the information system, calling for assistance to discipline the individual to behave healthy, and if not be penalized until showing a change of attitude [18, 28]. By clicking 'agree' people may enter this cybernetic realm of surveillance, often free of charge but with far reaching consequences into time and space. By agreeing to one's health data being collected by wearable health-tracking devices it may affect future insurance options and prices, even if annulled, because the data has already become part of the digital health sets immortal memory. Furthermore, the irony is not lost if a person by chance should not agree to participate, evidently he or she would still be penalized for showing lacking health data and thereby risky to insure [18, 28]. Wearable health-tracking technology's ability to read, process and communicate bodily signals enhance people to evaluate their health, and potential financial risk, thus becoming cybernetic creatures in the merge of human and machine. They become cyborgs [19] reborn with a hybrid consciousness surrounding their physical, financial and digital well-being, between physical heart rates, insurance premiums and personal health records.

Not so long ago in the 'Western World' it would be viewed as heresy to question religious belief, the divine was an unquestionable second nature to the first nature of man [23]. In modern times a new entity has taken residence in this second nature, namely capitalism [23]. Few laymen fully grasp the dynamics of capitalism and are reluctant to question its logic. In this second nature we find something other in the mind of the cyborg, an ambiguous player known as unregulated capitalism. Wearable health-tracking technologies tend to gamify their use and intent, inviting people to play a casual game with high stakes [18, 26, 30]. Thus, resistance is hopeless in the eye of the cyborg, you play along or you do not, either way we look at a possible soon-to-be scenario where both choices hold consequences. People may pay more or less for their insurance premiums by wearing or not wearing health-tracking devices [18, 28, 30]. The personal health data sets will either show plentiful or lacking data, consequently producing differentiated health risk profiles. While this is not a rant against capitalism, we argue that unregulated capitalism have found an abnormal shortcut, by the cyborg, in entering its logic directly into human flesh. The amount of money at stake when playing with healthcare is huge [10], and this bait big fish to enter its waters. Big fish usually eat smaller fish, and this logic also seems to follow through when differentiating individual health by using wearable health-tracking technology. Instead of regulating the healthcare market as a whole it seems to befall the individual [18, 31]. Unrestrained capitalism will always hunt for new prey yielding profits. Thus, if all cyborgs were to become fit, the

health boundaries defining what is natural could quickly be remade to be unnatural, thereby creating an everlasting and profitable herd of unfit cyborgs.

The purpose of the paper has not been to provide a solution on how to accommodate the emerging challenges from the use of wearable health-tracking technology. Instead, we strive to describe the challenges and possible consequences for society when adopting wearable health-tracking devices into organizational settings. If we are not careful the wearable dream could very well turn into a nightmare. Health insurance premiums of individuals are differentiated in price based on whether or not healthy looking data can be provided. This can create a situation where only the most healthy or wealthy can afford health insurance. A new artifact has been born alongside the wearable dream. Wearable health-tracking devices are constantly tracking, measuring and collecting personal health data. The health of individuals is reduced to numbers by the mercy of this newborn artifact. However, the integrity and validity of this health data can be compromised through the lack of standards, context and manipulation leading to wrongly determined insurance premiums. The wearable health-tracking technologies are invading the privacy of individuals by constantly monitoring and surveil them. By participating, willingly or unwillingly, in this endeavour individuals become something else, cyborgs. In this hybrid creature, an ongoing battle, in between unregulated capitalism and human behavior, is taking place. A far reaching point, perhaps, but we have to wake up from the wearable dream and face reality. We need to debate, research and rethink how wearable health-tracking technologies are embedded into societies in order to prevent the potential abuse of personal health data.

References

1. Balka, E., Bjørn, P., Wagner, I.: Steps towards a typology for health informatics. In: Computer Supported Cooperative Work (CSCW), pp. 515–524. ACM, San Diego (2008)
2. Balsamo, A.: Reading cyborgs writing feminism. In: Hovenden, F., Janes, L., Kirkup, G., Woodward, K. (eds.) *The Gendered Cyborg: A Reader*, pp. 148–158. Routledge, London (2000)
3. Berg, M.: Implementing information systems in healthcare organizations: myths and challenges. *Int. J. Med. Inform.* **64**, 143–156 (2001)
4. Bjørn, P., Balka, E.: Health care categories have politics too: unpacking the managerial agendas of electronic triage systems. In: *ECSCW 2007: Proceedings of the Tenth European Conference on Computer Supported Cooperative Work*, pp. 371–390. Springer, Limerick (2007)
5. Bjørn, P., Burgoyne, S., Crompton, V., MacDonald, T., Pickering, B., Munro, S.: Boundary factors and contextual contingencies: Configuring electronic templates for health care professionals. *Eur. J. Inf. Syst.* **18**, 428–441 (2009)
6. Bjørn, P., Markussen, R.: Cyborg heart: the affective apparatus of bodily production of ICD patients. *Sci. Technol. Stud.* **26**(2), 14–28 (2013)
7. Bloomfield, B.: In the right place at the right time: Electronic tagging and problems of social order/disorder. *Sociol. Rev.* **49**, 174–201 (2001)
8. Bowker, G.C., Star, L.S.: Introduction: to classify is human and some tricks of the trade in analyzing classification. In: *Sorting Things Out: Classification and Its Consequences*, pp. 1–51. MIT Press, Cambridge (2000)

9. California Institute for Telecommunications and Information Technology Personal data for the public good (2014). http://www.calit2.net/hdexplore/images/hdx_final_report.pdf. Accessed 11 November 2014
10. Centers for Disease Control and Prevention. Health, United States, 2013: With special feature on prescription drugs (2014). <http://www.cdc.gov/nchs/data/abus/hus13.pdf#112>. Accessed 11 November 2014
11. Cohen, P.C.: A calculating people: The spread of numeracy in early America, pp. 205–227. University of Chicago Press, Chicago (1982)
12. Crawford, K., Miltner, K., Gray, M.L.: Critiquing big data: politics, ethics, epistemology. *Int. J. Commun.* **8**, 1663–1672 (2014)
13. Ellingsen, G., Fitzpatrick, G.: A review of 25 years of cscw research in healthcare: contributions, challenges and future agendas. *Comput. Support. Coop. Work* **22**, 609–665 (2013)
14. Ellingsen, G., Monteiro, E.: A patchwork planet integration and cooperation in hospitals. *Comput. Support. Coop. Work (CSCW) Int. J.* **12**(1), 71–95 (2003)
15. Foucault, M.: Panopticism. In: *Discipline & Punish: The Birth of the Prison* (A. Sheridan, Trans., pp. 195–228). Vintage Books, New York (1975)
16. Glaser, B.G., Strauss, A.M.: The credibility of grounded theory. *The Discovery of Grounded Theory: Strategies for Qualitative Research*, pp. 228–233. Aldine Publishing Company, Chicago (1967)
17. Grisot, M., Vassilakopoulou, P.: Infrastructures in healthcare: the interplay between generativity and standardization. *Int. J. Med. Inform.* **82**, 170–179 (2013)
18. Goldberg, C.: Can my company's wellness program really ask me to do that? (2012). <http://commonhealth.wbur.org/2012/09/wellness-program-legal-limits>. Accessed 11 November 2014
19. Haraway, D.: A Cyborg Manifesto: Science, Technology, and Socialist-Feminism in the Late Twentieth Century. In: Haraway, D. (ed.) *Simians, Cyborgs and Women: The Reinvention of Nature*, pp. 149–181. Routledge, New York, US (1991)
20. Hoback, C.: Terms and conditions may apply [Motion Picture] (2013)
21. Houle, B.: How obesity relates to socioeconomic status (2013). <http://www.prb.org/Publications/Articles/2013/obesity-socioeconomic-status.aspx>. Accessed 11 November 2014
22. Latour, B.: Where are the missing masses: sociology of a few mundane artefacts. In: Bijker, W., Law, J. (eds.) *Shaping Technology/Building Society - Studies in Sociotechnical Change*, pp. 225–259. MIT Press, Cambridge (1992)
23. Latour, B.: On Some of the Affects of Capitalism. At The Royal Academy, Copenhagen, 26 February 2014
24. Lazer, D., Kennedy, R., King, G., Vespignani, A.: The parable of Google Flu: Traps in Big Data analysis (2014). <http://scholar.harvard.edu/files/gking/files/0314policyforumff.pdf>. Accessed 11 November 2014
25. Martin, J.A.: Pros and cons of using fitness trackers for employee wellness (2014). <http://www.cio.com/article/2377723/it-strategy/pros-and-cons-of-using-fitness-trackers-for-employee-wellness.html>. Accessed 11 November 2014
26. Olson, P.: Wearable tech is plugging into health insurance (2014). <http://www.forbes.com/sites/parmyolson/2014/06/19/wearable-tech-health-insurance/>. Accessed 11 November 2014
27. Olson, P., Tilley, A.: The quantified other: Nest and Fitbit chase a lucrative side business (2014). <http://www.forbes.com/sites/parmyolson/2014/04/17/the-quantified-other-nest-and-fitbit-chase-a-lucrative-side-business/>. Accessed 11 November 2014

28. Osunsami, S.: CVS Pharmacy wants workers' health information, or they'll pay a fine (2013). <http://abcnews.go.com/blogs/health/2013/03/20/cvs-pharmacy-wants-workers-health-information-or-theyll-pay-a-fine>. Accessed 11 November 2014
29. Park, S.Y., Chen, Y.: Adaptation as design: learning from an EMR deployment study. In: Computer Human Interaction, pp. 2097–2106. ACM, Austin (2012)
30. Satariano, A.: Wear this device so the boss knows you're losing weight (2014). <http://www.bloomberg.com/news/articles/2014-08-21/wear-this-device-so-the-boss-knows-you-re-losing-weight>. Accessed 11 November 2014
31. U.S. Department of Labor: The Affordable Care Act and wellness programs (n.d.). <http://www.dol.gov/ebsa/newsroom/fswellnessprogram.html>. Accessed 11 November 2014
32. WebMD: 5 heart rate myths debunked (2013). <http://www.webmd.com/heart-disease/features/5-heart-rate-myths-debunked>. Accessed 11 November 2014
33. Winner, L.: The Whale and the Reactor: A Search for Limits in an Age of High Technology. In: Winner, L. (ed.) Do Artifacts Have Politics, pp. 19–40. University of Chicago Press, Chicago (1986)