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WIKIMEDIA COMMONS/AMAL GRAAFSTRA

The hand of microchip implant hobbyist Amal Graafstra, just after an operation to insert an RFID tag. The yellow coloration comes from iodine used to disinfect the hand for surgery.

# Giving Meaning to RFID and Cochlear Implants

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*Because it is now inside my body and I use it just as naturally as I use my fingers or hands or anything that is part of my body, it could be considered part of me, and my capabilities of human being.* (Randall, RFID)

*Those are my ears. Those are my ears and I cannot take them off... well I can take them off, but it's not convenient.* (Edith, CI)

**B**oth Randall and Edith have implants. Randall has two Radio Frequency Identification (RFID) tags implanted, one in each hand. He is a Do-It-Yourself (DIY) chipper who uses the implant to access his laptop, phone, home, car, and other digital devices. Edith has two cochlear implants (CIs) for hearing improvement, one in each ear. Such a CI is an array of electrodes that is surgically implanted in the cochlea. After several weeks of healing, an external processor is connected to the chip. Typically, people cannot immediately identify what they are hearing but need several months of rehabilitation to recognize different sounds and to understand speech. RFID implants are passive chips, identifiable by a reader from short distances, without the ability to send out signals. RFID implants can serve diverse purposes. For instance, in the healthcare industry implanted RFID tags can be linked to medical records and RFID implants can be used for access control. Randall and Edith are two completely different people, and they use their implants for different purposes, but they also have something in common. They both have made a modification to their body to improve their everyday life, and both have come to consider these implants as part of their body, as being part of them.

In this article, we focus on people such as Randall and Edith;

people who have either a cochlear implant for hearing improvement or a RFID implant. Both types of implants have caused controversy. The main opposition to CIs comes from the deaf community itself, which with the capital D signifies this minority culture. Deaf people consider themselves a socio-linguistic minority culture with sign language as their language [1]. They argue that CI undervalues the identity of being deaf: there is nothing wrong with being deaf, they are not disabled, and they do not need to be fixed.

Controversies about RFID implants are more diverse and come from different groups: they include medical issues [2], [3], worries about physical assault [4], issues with privacy and the security of the collected data [3]–[7], a fear for dehumanization [3], and worries from Christians who consider the tag to be the “Mark of the Beast” as described in the book of Revelation [8].

In the aforementioned controversies, the claims about implants are often rather general and pertain to all kinds of body chips; in addition, the voices of the implantees themselves are seldom heard (but for exceptions, see our literature review below). In this research we will therefore com-

“domestication” of implants, i.e., how they become part of everyday life and the experience of selfhood.

## Implants and Domestication

Implants can have diverse functions, ranging from containing medical records to being used to make transactions, to identifying someone or increasing national security. Research has shown that people are more willing to use medical implants or implants for personal security than implants used by the authorities to combat terrorism [7], [9]. Such outcomes suggest that implants are not problematic in themselves; the issue is their purpose [10]. With respect to RFID implants that can be used for access control or identification and authentication, the few relevant studies suggest people’s willingness to use them differs according to age (with younger generations being more accepting than older generations [10]) and nationality (e.g., people from India are more likely than people from the U.K., United States, or Australia to perceive an implant as a secure technology for employee identification [11]). Individual accounts from DIY chippers suggest they have their implants for utilitarian reasons, as it assists them

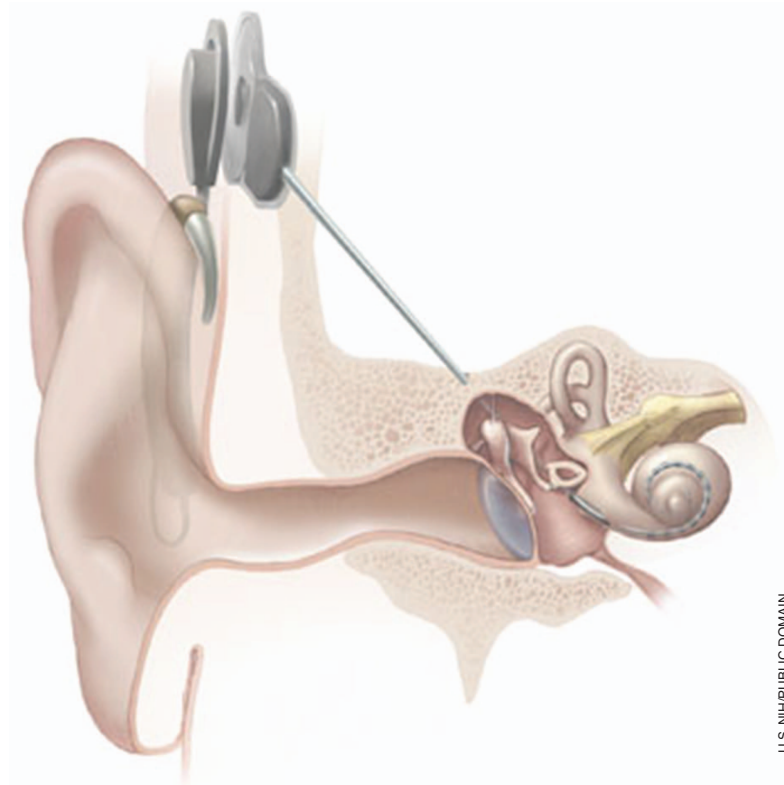
Implants have diverse functions, from containing medical records to being used to make transactions, to identifying someone or increasing national security.

pare the experiences of two different groups of implantees, DIY chippers and CI users. Examining their experiences will lead to a better understanding of the acceptance or rejection of implants in particular contexts by particular people, and what these implants mean to them. We use a social shaping approach to theorize the relation between users and technology, focusing in particular on the

in daily tasks such as unlocking doors, or because they consider an implant “cool” and part of a wider process of “body modding” [12]. In response to the various kinds of criticism towards RFID implants, Do-It-Yourself chippers maintain that they are more efficient and secure than other forms of identification, and that they can fit particular (but not all) lifestyles [11], [12].

Research on cochlear implants has not only examined how the CI improves people’s ability to hear speech, but also how a CI makes a difference to social life, for instance by increasing social participation [13] and reducing anxiety [14]. Additionally, scholars have paid attention to the concerns, mentioned earlier, about Deaf people losing their Deaf identity [1]. Rarely has research focused on what a CI means to individuals, i.e., how they understand it and feel about it, and how the technology is incorporated into one’s everyday life. Wheeler, Archbold, Gregory, and Skipp are an exception to this, examining how young individuals experience their CI [15]. The young CI users perceived their implant as essential, but they were not acquainted with the technological details of the CIs. They recognized their internal deafness, as without CI they would not be able to hear, but were not affiliated with Deaf culture [15]. While the RFID and CI studies differ widely, and range from surveys to  $N=1$  case studies, they are, by and large, descriptive (e.g., [7], [9]). These studies also ignore how implantees make their chips meaningful as part of their body, and how the implants become part of their everyday life and their identity. This latter element of integrating technology into one’s daily routines and rituals has been described in science and technology studies as the “domestication of technology.” It is a useful approach for our study of implants because it has the capacity to show how the same piece of technology (an implant) can acquire different meanings, depending on individual and social contexts.

The domestication approach assumes that technological artifacts are more than simple objects, and that they are also “texts” that evoke interpretations rooted in institutional, cultural, economical, and political factors [16]. Through an ongoing process of



Cochlear implant.

U.S. NIH/PUBLIC DOMAIN

giving meaning to a technological artefact, users incorporate their implant into their lives and in this sense “domesticate” it. This notion of the domestication of technology literally refers to the “taming” of a “wild” technology into the home.

The domestication approach uncovers the process of becoming familiar with an object and leads to an understanding of what happens when someone takes a technology “home” [17], [18]. It focuses on different stages and settings of meaning making (appropriation, objectification, incorporation, and conversion). The approach looks at skills and practices that are learned and adopted, at the compatibility of these technologies with existing habits and rituals, and at contestations that may emerge in the process. Finally, the approach examines whether and how domesticated technologies become part of the performance of self and, more profoundly, of an identity for the individual [19], [20]. Thus, this approach goes beyond motivations

or “use” alone. It focuses on context and on generated meanings – on “what people are trying to ‘do’ with their technology” [21, p. 314].

Rather than a linear, finite process or a one-off event, meaning-making is an ongoing process. People continually reshape their relationship with the technology and their sense of what it means [22].

### Method

In domestication research, it is important to understand data within its generated context [23]. Qualitative data provides in-depth and situated knowledge. Therefore we chose to conduct semi-structured interviews with implantees ( $N=21$ ) We found RFID implantees through the network of Amal Graafstra, who is a leading DIY chipper, and by contacting people who indicated somewhere online that they have a RFID implant (e.g., YouTube) ( $N=8$ ). By placing a call on a forum for CI users, we found people with a CI implant who were willing to share their experiences with us ( $N=13$ ).

All CI-users were Dutch, while the RFID implantees came from a variety of countries: Australia (1), Sweden (1), the U.S. (5), and the U.K (1). The interviews with RFID implantees were conducted in English and the interviews with CI-users were conducted in Dutch. The data was analyzed in its original language but the first author translated the quotes used in this article from Dutch. All respondents with an RFID tag were male.

As other researchers have advocated [25], [26], we let participants choose the form of the interview (e.g., face-to-face, Skype, email) in order to empower them and make them feel as comfortable as possible. In some cases, it was impossible to have face-to-face interviews due to the distances involved; some CI users are unable to have phone or Skype conversations. In total

“So, for me being able to just put my hand up there, and have it scanned reliably every time, is key.”

one phone interview, three Skype interviews, seven email interviews, one synchronous text-based interview, and nine face-to-face interviews were conducted.

Rather than considering one type of interview to be superior to another, the different types have their own merits. The asynchronous email interview increased reflexivity for both the respondents and the interviewer [27]. On the other hand, synchronous communication gives rise to more spontaneous answers. Similar to James and Busher [27] we conducted the email interviews over a longer period, with each email consisting of several questions; asking supplementary questions after receiving the answers created an ongoing dialogue.

Based on the domestication literature and the literature focusing on

concerns with RFID implants, the following topics were discussed: getting familiar with implants; reasons, advantages, and disadvantages; daily life; the body; surroundings; and identity. The topic of human enhancements was not originally included in the topic list, but came out spontaneously in the first interviews with RFID implantees and one CI user. We therefore included this topic in all interviews.

After conducting and transcribing the interviews, the answers were placed in a data matrix. Relevant codes were assigned in the transcript. The grouping of these codes formed the basis of a thematic analysis. We constantly compared the answers within their group and across the different groups. The observed themes for RFID users were: combatting common

misunderstandings, convenience, being upgraded/having a special skill, and the body as modifiable. For CI users, the themes included belonging to society, technology as a tool, and a focus on its use rather than the technological details of the implant. These themes came up in specific combinations that we analyzed as interpretative repertoires giving meaning to otherwise discontinuous experiences. Those are: the repertoire of technology as a tool to facilitate everyday chores and help with practical problems; the repertoire of the normal self in which technology is seen as means to become a person like anyone else; and the repertoire of the enhanced self in which technology is used, in contrast, to become someone special. In addition, we will show how these repertoires are

connected to the everyday contexts of implantees by providing a mini biography of a RFID implantee.

### Technology as a Tool

Both CI and RFID users talk about their implants as being merely a helpful tool. Before implantation, the CI users were either deaf or had severe problems with hearing. Respondents chose a CI because hearing aids were not sufficient anymore; the CI was their last chance to hear again. They perceive the CI as an aid, similar to hearing aids, but technically more advanced, although they don't know in detail how the technology works. Some respondents were anxious about having a chip inserted inside their head because of the risks of having surgery. One respondent thought it to have something in the body that does not belong there, although she was not thinking about this any longer. The implant makes life, and hearing in particular, less exhausting for our respondents. After implantation, all of the CI implantees could discern sounds, but some still depend on lip reading, while others rely completely on their CIs.

Nevertheless, CIs do not work as well as “normal ears,” and all but one of our users continue to identify themselves as hard of hearing. The respondents emphasize that their CI is an aid that helps them overcome difficulty hearing. Edith says, for instance:

*I don't see it myself as something strange or something. It's an aid what you...just like you need shoes to walk on, and a coat against the cold, and this is to hear.*  
(Edith, CI)

The RFID respondents also talked about the implant in their hand as a tool that made life easier, especially in terms of accessing devices and spaces, including opening doors and opening and starting cars. In contrast to the CI users, the



RFID implantees were well versed in technology, had experimented with the tag before the implantation, and continued to tinker with the tag after the implantation. Implantees explained the convenience of their tag in terms of always having their keys with them without the possibility to lose or forget them. Some of them even aspire to replace all keys with RFID technology.

*So, for me being able to just put my hand up there, and have it scanned, you know, reliably every time, very quickly and not a lot of inconvenience uh— that's that's key. So, that's what I've been enjoying about the technology uh since the first day.* (Randall, RFID)

Randall and other implantees did not give much thought to the fact that this tool was in their body. Although the tag was operating in an unusual environment, it remains similar to holding a RFID card in one's hands.

*I really see ... what I've done as simply moving the uh— you know the RFID access card from your pants pocket to your skin pocket.* (Randall, RFID)

The CI users had equivalent thoughts about crossing the skin boundary. Because the tool is placed inside of the body, both RFID and CI users considered the implant to be a part of themselves in a way similar to other body parts; their specific functions are part of someone. All respondents regarded the implant as a tool that makes life easier and they were in the end indifferent to the location in the body. Yet, the implant did have different outcomes for the sense of self of the respondents, as we will see in the two following sections.

For the CI users, the implant is a means of becoming “normal.” Most of the respondents' hearing

had diminished over time, which increasingly caused communication problems.

Consequently, these hearing-impaired people increasingly felt detached from everyday society. With a CI, the world of the respondents grew larger again. Not only can CI users hear better, but their social skills also improve because of their improved ability to communicate.

*I didn't really talk with people I didn't know well. The CI changed this considerably. I can remember the amazement of [name of husband] when, on the first holiday after the connection, I started to talk to a fellow camper about the weather. I never would have done that before.* (Ingrid, CI)

However, the CI is not a magical solution; it is not the tool itself but how CI users apply the tool that connects them with society. One of the respondents, who had been born deaf, still struggled with integrating within hearing society. She felt rejected by many people, perhaps largely because she spoke slowly and still had difficulty communicating. The ability to hear gives respondents the opportunity to integrate in society, but people still have to come out of their isolation themselves and have to be accepted as well.

The respondents clearly indicated that they are dependent on their CIs, wearing them most of the time - though many turned it off at times when they wanted to have some peace and quiet. They indicated that if the technology suddenly stopped working, they would be in more trouble than before their implantation - since their CI is constantly used, the CI users struggle to live without it, and the CI becomes part of their identity.

*You really get used to it. It's just a part of me* (Frans, CI)

All respondents got their implants at an adult age and none of them had a clear affinity with deaf culture. Most respondents were hearing impaired or turned deaf in their later years. One respondent who was born deaf went to a deaf school, but she believed there was more to life than deaf culture. She believed that everyone, including hearing people, should mingle with all kinds of people, including hearing, hearing-impaired, those with disabilities, and so on. Another respondent, who suddenly turned deaf in childhood, felt she did not belong to any kind of group, either hearing or deaf. When confronted with the cultural concerns on CI of deaf people who see themselves as a linguistic minority, some respondents understood the concern but disagreed with it, while others did not understand why someone would refuse a CI. The responses of the CI users illuminate their choice for a CI: it enables them to function within a society in which the majority is hearing. Without CI, the respondents indicated that they would likely be caught between two worlds, rather than become part of deaf culture.

While most respondents expressed a desire to belong to broader society, one woman indicated that she did not need the CI in order to do so. Evy believed she could communicate well despite her inability to hear. When she just had had her CI, she felt uncomfortable when people commented on how easy it now was to communicate with her; it gave her the feeling that she was not a full person while being deaf. Furthermore, Evy feels society becomes less and less capable of dealing with difference. A sense of entitlement pervades society, according to Evy, and if something does not work well, or somebody has a disability, it has become imperative to repair that:

*I think that is a very scary idea and a really dangerous development.* (Evy, CI)

Her problem with enhancement technologies, including CIs, is that they contribute to the idea that in contemporary society everyone should be perfect, including having a “normal” body. However, despite these objections, she still chose to have a CI and become more “normal” because of the usefulness of having a CI. Evy recognizes her contradictions, and struggles with her position.

Most CI implantees in our study are critical about technologies that go beyond “repairing” bodies and try to enhance the human body above its normal functioning. For a few others, it depends on the context in which the enhancement technology is used: a neurosurgeon, for instance, may benefit from a bionic eye. In general, however, CI users were reserved about the idea of enhancing the body. This was contrary to the RFID respondents, for whom enhancing the body was part of what the RFID tag enabled.

### An Enhanced Self

While some RFID users got their implants for convenience reasons, it would be too simple to assume

*I have always been interested in things like transhumanism, cyborgs, augmentation, and integration of computers and humans so when I heard people were doing implants that let them communicate directly with the computers it seemed natural that I would do it too.* (Gale, RFID)

For some implantees who saw themselves as upgraded, the implant was not only part of their body and thus part of their self; respondents articulated love for the tag beyond its functionality. Steven expressed this affection when he talked about the moment he took out his implant.

*When I first took it [the implant] out, I missed it immensely actually, I missed having it... even in and of itself. If that makes any—even outside of its functionality, I still felt that I was taking a part of myself away. Uh that I was somehow... less able, afterwards.* (Steven, RFID)

*A mindset of “Hey, I can play with and hack my body, just like anything else!” and suddenly it [the body, SW] doesn’t quite seem so sacred and impermeable.* (John, RFID)

Besides the RFID implant that they already have, respondents talk about possible future implants they would like to have. All respondents with a RFID tag are favorable towards human enhancements, but those who perceive themselves as being upgraded talk about integrating these enhancements in their own bodies.

In fact, these respondents are looking forward to these new developments, and say, for instance, that they would like to be a cyborg in the future. “Cyborg” is short for cybernetic organism, which means that cybernetic parts and organic parts interact with each other. A RFID implant is not interacting with but hosted in the body; some implantees do not consider themselves cyborgs, while others see themselves as extremely basic cyborgs. They do not usually consider themselves to be full cyborgs. Respondents did, however, express interest in the possibility of technology and the body integrating further. The tag was a small step towards this. To get a fuller understanding of the the “enhanced self,” we look at the story of Jeff in some more detail.

Some implantees do not consider themselves cyborgs, while others see themselves as extremely basic cyborgs.

this is the only reason. Some respondents, for instance, thought the precise functionalities of the tag were less important than having the tag. For them, the RFID tag first and foremost represents an upgrade of the self. Some respondents do not even mention the uses of the tag when explaining their motivation. Instead they focus on the novelty of RFID implants, or explain that they want to merge with technology. By getting an implant, one upgrades one’s body and thereby gains a (hidden) skill that others do not have.

Moreover, within this repertoire of the enhanced self, using the tag remained exciting beyond the novelty of its first uses. The respondents believed that the implant gave them a sense of uniqueness.

These respondents have a strong sense of individual ownership and responsibility over their bodies: they can thus customize it to their wishes. Some respondents show interest in transhumanism, but even implantees who did not mention this specific term talk about how they see their body as something that can be modified.

### Jeff: Expanding the Horizon of Human Capability

Jeff is a 31-year-old atheist living in the rural south of the United States. With many religious people in his surroundings, Jeff is the odd one out. Before implanting the tag in 2009/2010, Jeff researched and tested how RFID tags work. When he first got the implant, Jeff was mostly experimenting with writing codes on his computer and testing whether the implant would react to it. According to him, the RFID implant fits with his identity and his geeky lifestyle:

*A lot of the people that are close to me, that know me, were not surprised that I would do something like that.*

The reason Jeff got the implant was to have access control over, among other things, his household server, on which files are stored. However, his responses also show that Jeff, in contrast to some other implantees, perceives the implant as more than simply access control. Having something that most others do not gives Jeff an increased sense of individuality. Even though Jeff uses his implant every day and he forgets most of the time it is there, he is still excited about it.

*I still think it's [the RFID implant, SW] really cool ((laughs))*

Jeff is also looking forward to other technologies that can be implanted in his body. When we asked him whether he wanted to get other body modifications, he answered positively and enthusiastically, and elaborated on this by talking about specific enhancement technologies such as an internal flash drive and a brain implant. That these enhancements alter his body is not a problem for Jeff. He sees the tag as a body enhancer and expresses the desire to improve his body.

*My friends know me as the guy who is kinda like I don't really care what it's meant to do I care what it can do, talking about all of my tools or computer, everything is great, but it can be modified to be better. Cars, computers, I really don't care, it can always be modified to be better. Same thing with the human body. The human body is, you know, a stock part. It's (I see it) this way, it can be enhanced. It can be better.*

Jeff also sees the implant as a part of who he is. Because it is now in the body and it cannot be

put down like other devices, the implant has become part of Jeff's identity. Just as most of us do not consciously think about using our hands, Jeff forgets that the implant is there most of the time and uses it naturally. However, having a RFID implant remains special. Overall, for Jeff the implant is a tool that not only helps him to secure his files, but that also enhances him as a human being. The function of the implant is important for Jeff, but more so is the fact that he alters his body and makes it in to something better than the original.

### Examining Meaning

In this article, we examined the meaning people give to their technological implant, contrasting RFID chippers to CI implantees. Our study demonstrates that for both types of implantees, the “domestication” of the implants was relatively easy, although not entirely similar. For the RFID

Nevertheless, RFID chippers and CI users articulate the technology in different ways with their identity as human beings. The CI users see the CI as a tool, like any other aid, that helps them in their everyday life. It remains an aid, implanted by doctors, aimed to make people “normal.” Some RFID-tagged persons, however, mention that CI users are (basic) cyborgs, because cybernetic parts are interacting with the human organism. Most CI respondents in our study do not understand why anyone would consider them to be a cyborg, since they consider the CI to be a natural and not a technical part of themselves.

CI users tend not to use the exact definition of “cyborg,” thinking instead of cyborgs as people with electronically enhanced bodies – bodies that have functions normal bodies do not have. The cochlear implant, by contrast, is about normalizing the human body.

## Implantees quickly adapt to their implant because it fits with existing habits.

implantees the tags fit within their techie lifestyles; they are interested in technology and know what they are doing. As acknowledged in the domestication theory, implantees quickly adapt to their implant because it fits with existing habits. Despite becoming a habit, though, some RFID implantees indicate that having the tag remains exciting.

CI users undergo a longer domestication process in which they learn to use their new skills, yet they too begin to experience the CI as a natural way of hearing and reach a sense that they cannot live without their CI. Both RFID chippers and CI users perceive their implant to be part of their selves, simply because it is located in the body and they use it as naturally as their other body parts.

Unlike RFID implantees, CI users do not pay much attention to the fact that technology and humans are blending. On the contrary, they feel their implants are part of their bodies just as organs are. That the tool is electronic and is implanted is of minor importance. It is the fact that the tool helps them to be like other people that matters to them. It is not strange, therefore, that the CI users who were from the Netherlands were generally more reserved about enhancement technologies, having views similar to the general population in Dutch society [28].

RFID users in this study are more immersed in enhancement technologies, and look forward to having them. The literature suggested that chipping people leads



to dehumanization, because people are turned into numbers as technology and humans blend [3]. While our respondents may agree that technology is turning people into numbers, they say that RFID tags are not the only technologies to do this, and are certainly not the first. They also don't consider implanted identification tags to differ significantly from external devices with similar functions.

For those who see the RFID as an upgrade to their body, the implant makes them feel special. The RFID implantees in our study perceive the blending of technology with the human body as expanding the range of human capacity, rather than diminishing humanity, as the critics would have it. The research illustrates that a simple RFID implant is not solely about adding convenience to one's life, but also about upgrading the self. From this we might garner insight in to the significance that may be acquired by future human enhancement.

While the functionality of an enhancement is obviously important, enhancement technologies can also be appreciated for the mere fact of being an enhancement. The debate around human enhancement technology should not only be about what the technology can do, but also what the enhancement means to the individual.

This work has shown that the different outcomes of the domestication of a technology – normalization vs. enhancement – are essential in explaining the meaning of implants for its users. Technology, in that sense, is no different from any other “text.” It acquires meaning through its usage and interpretation, both of which are situated in particular individual and cultural circumstances.

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