

Citation for published version

Sánchez Criado, T., Rodríguez Giralt, I. & Mencaroni, A. (2016). Care in the (critical) making. Open prototyping, or the radicalisation of independent-living politics. ALTER. European Journal of Disability Research, 10(1), 24-39.

DOI

<https://doi.org/10.1016/j.alter.2015.07.002>

Document Version

This is the Submitted Manuscript version.
The version in the Universitat Oberta de Catalunya institutional repository, O2 may differ from the final published version.

Copyright and Reuse

This manuscript version is made available under the terms of the Creative Commons Attribution Non Commercial No Derivatives licence (CC-BY-NC-ND) <http://creativecommons.org/licenses/by-nc-nd/3.0/es/>, which permits others to download it and share it with others as long as they credit you, but they can't change it in any way or use them commercially.

Enquiries

If you believe this document infringes copyright, please contact the Research Team at: repositori@uoc.edu



Care in the (critical) making

Open prototyping, or the radicalisation of independent-living politics

Abstract

In this paper we reflect empirically on some collective attempts at intervening the ways in which care for and by disabled people is being devised and carried out in Spain in austerity times. We highlight the novelties and challenges of the way in which these projects seek to tackle the current crisis of care through different forms of self-fabrication of 'open' and 'low cost' technical aids. We analyse them as forms of 'critical making' expanding the repertoire of independent-living and disabled people's rights politics to the experimentation with technological production. Through the deployment of an empirical example of the prototyping process by the Barcelona-based activist design collective *En torno a la silla* we show how open prototyping constitutes a major challenge for the radicalisation of the independent-living movement's precepts of control and choice, displaying the matter of care arrangements and making available its transformation.

Keywords

Care; arrangements; independent living; critical making; prototypes

Le *care* dans le faire (critique)

Prototypage ouverte : la radicalisation des politiques de la vie indépendante

Résumé

Dans cet article nous réfléchissons empiriquement sur certaines tentatives collectives d'intervention dans le *care* pour et par les personnes handicapées en temps d'austérité en Espagne. Nous mettons en évidence les nouveautés et les défis de la manière dont ces projets visent à confronter la crise du *care* grâce à l'auto-fabrication d'aides techniques «ouvertes» et «low cost». Nous les analysons comme des formes de « fabrication critique » élargissant le répertoire des politiques de la vie indépendante et des droits des handicapés à travers l'expérimentation de la production technologique. En montrant l'exemple d'un processus de prototypage du collectif *En torno a la silla* à Barcelone, nous essayons de décrire comment le prototypage ouvert constitue un défi majeur pour la radicalisation des préceptes du mouvement de la vie indépendante –le contrôle et le choix–, en déployant la matérialité des arrangements du care et permettant sa transformation.

Mots-clés

Care; arrangements; vie indépendante; fabrication critique; prototypes

1. Introduction: Developing independent-living advocacy in Spain

The independent-living movement developed recently in Spain. In 2001 a lively small group of activists created a mailing list to promote the right of disabled people to independent living in the country. Their challenge was to intervene an institutional and political context dominated by Christian charity and the medical-individual model of care, organised around huge sectorial disability associations managed on the most by relatives or professionals (Maraña & Lobato, 2003). Contrary to that, the Independent Living Forum (*Foro de Vida Independiente*) as it was originally named, sought to create a virtual community organised around the values of direct participation, self-management, experience-based knowledge, as well as the promotion of disabled people's rights through practices of empowerment and the fight against discrimination. Translating the motto and the philosophy of 'nothing about us without us', this small but hugely influential group was responsible for the creation of the first Independent-Living Offices in Spain (2006) –the notion of 'centre' in Spanish resonates with residential homes and was thus avoided–. They also succeeded in claiming the right to personal assistance in the debates surrounding the *Law 39/2006 for the Promotion of Autonomy and the Assistance of Dependent People*, a legal enactment they fiercely countered because of its 'ableist' groundings. And, more importantly, they managed to create a new conceptual framework around what they call the 'diversity model' (Palacios & Romañach, 2006; Palacios et al., 2012; Romañach, 2009).

In contrast to the social model of disability (Oliver, 2013), the *diversity model*¹ does not revolve around 'dis/ability' but stresses the dignity of all human diversity (Rodríguez Picavea, 2013). This shift is underpinned by the concept of *diversidad funcional* (functional diversity), coined in 2005 as a substitute to other more patronising and pejorative terms traditionally used to define disability–*deficiencia* (deficiency or lack), *minusvalía* (handicap), *personas discapacitadas* (disabled people), *personas con discapacidad* (people with disabilities), *dependientes* (dependents)–. With this term it is the diversity in bodily functioning that is highlighted as a common feature of humankind, not the distinction of dis/abledness. This explicitly anti-'identity politics' stance has granted its expansion and everyday use in many other critical social movements in the country: no particular traits of a collective or group are being claimed and defended, their target being to fight the historical discrimination against particular forms of functional diversity.

Since then, the notion of functional diversity has been central to empower people with functional diversity in Spain, giving them a political voice and allowing them to weave strategic alliances within the academic world and activism (Pié, 2012), mostly within feminist debates around the transformation of care arrangements². However, despite this creativity in conceptual and organisational explorations, the independent-living movement experienced in 2010 a relative decline. The progressive incorporation of independent living claims into mainstream political agendas has had the paradoxical effect of reinforcing a dependency model, favouring residential services and professional charities. This situation has worsened

¹ This model has been developed by Spanish activists as a result of online debates about the experience of disability, and has entailed the production of a vernacular form of *Disability Studies* in the country. According to Javier Romañach (2010), one of its most prominent independent-living authors and activists, the *diversity model* is an extension or evolution of the social model of disability (Oliver, 1981). Drawing on a humanist approach, the model of diversity poses 'functional diversity' as another form of 'human diversity' and, hence, its advocates defend that all diverse human lives should be treated according to the same legal, moral and bioethical values (Lafaye & Romañach, 2010).

² Most of the debates transcribed in the *Cojos y precarios haciendo vidas que importan* [Cripples and precarious making lives that matter] book (FVI & AAPTZ, 2012) addressed the role of personal assistance, and brought to the fore diverging ideas of care ethics and interdependence very much along the same lines described by Shakespeare (2006).

by the effects of the austerity measures implemented by Spanish Government to tackle public deficit. All of which has had profound implications for the Independent Living Forum, including a relative discouragement of protest and new memberships.

This tendency began to change during the 15M uprisings in May 2011. As it is well known, this refers to a series of demonstrations organised by different groups demanding ‘Real Democracy Now’ simultaneously in several cities. These protests demanded a radical change in Spanish politics, denouncing among other issues political corruption, unemployment, welfare cuts, the support received by banks and the democratic deficit of Spanish institutions. After several clashes and under the motto *No nos representan* (They do not represent us), millions of Spanish citizens occupied the squares to demand –and experiment with– a more participatory and direct politics. As it has been reported, the 15M uprisings have significantly changed the Spanish politics’ landscape since 2011, having also inspired similar developments around the world (Postill, 2014). This was also a very fertile moment for the transformation of the independent-living movement. Under the general atmosphere of experimenting with participatory, direct and inclusive forms of democracy, several new political alliances were formed.

In this paper we would like to reflect ethnographically on the experience of one of them, the Barcelona-based activist design collective *En torno a la silla* (ETS), exploring different open prototypes and collaborative design processes, seeking to experiment on and intervene in disability-oriented product design and services. To contextualize, in the following section we introduce the notion of ‘critical making’ (Ratto, 2011), a descriptive trope of collaborative and making practices critically exploring the matter and infrastructures of everyday life, and we will connect it to the rise of projects in Spain, such as ETS, where the ideals of open design, co-production and experimentation inspired a critical exploration of material arrangements grounding on functional diversity ideas. Later, we narrate through three ethnographic vignettes the open prototyping process of a portable wheelchair ramp developed by ETS, paying special attention to how ‘conception’, ‘testing’, and ‘licensing’ processes are opened up. Building from here, we discuss how in opening up the knowledge, design and division of labour implied in existing care arrangements, this project weaves together critical making or open prototyping practices and independent-living politics. To conclude, we engage in a short reflection on the role of open prototyping to re-democratise the independent-living project.

2. The ‘critical making’ of independent-living

‘Critical making’ was coined by Matt Ratto (2011) as an umbrella term signalling a research programme promoted by social science and humanities scholars and activists working on design in order to explore a new vernacular register for the critical engagement in technoscientific matters, such as the design of care technologies, beyond the traditional social scientific or activist genres and outputs (theories, ideas or concepts circulated in papers or pamphlets and presentations). In order to do so they have been analysing and developing what Ratto, Wylie & Jalbert call ‘materialist interventionist methods’ seeking to “counteract the ineffectual linguistic bias of traditional critiques of technoscience” (2014: 86). In a nutshell, abandoning external forms of debunking matter-of-factly in order to engage in forms of interference that proceed vernacularly through design practices—e.g. prototyping workshops or DIY production—. Their aim is to explore, materialise and intervene in ‘the politics of design’ (DiSalvo, 2014) through critical design practices. That is, critically and passionately engaging in exploratory practices of relevant issues whereby participants “[...] together perform a practice-based engagement with pragmatic and theoretical issues” (Ratto, 2011: p.253) through joint discussion of concepts and ideas in collective and experimental iterative

processes of prototyping, so as “to extend knowledge and skills in relevant technical areas as well as to provide the means for conceptual exploration [...] exploring the various configurations and alternative possibilities [of the prototypes], and using them to express, critique, and extend relevant concepts, theories, and models” (Ratto, 2011: p.253).

In doing so, they point at the “need to conceptualise making practices in ways that serve to reinforce, maintain, or trouble current structures in society, their relations to technoscience, and what kinds of knowledge work they incite” (Ratto *et al.*, 2014: 89). Despite its similarities with other recent changes in design culture³ its distinct features reside in its “broader focus on the lived experience of making and the role this plays in deepening our understanding of the socio-technical environment” (Hertz, 2012: 4). Indeed, beyond stressing ‘collaborative work’ or ‘inclusion,’ critical making should rather be understood as a practice of joint learning or joint exploration of the matter and infrastructures of our everyday life.

We believe in the enormous interest of using the trope of ‘critical making’ to reflect on the very relevant series of displacements operated by the independent-living movement in Spain in the advent of both ‘crisis of care’ and ‘post-austerity measures,’ departing from what might be called *conceptual and organisational explorations* (forging, as we saw in the previous section, a self-definition and care arrangement prototypes to counter institutionalised forms of disability care) to more recent *material explorations* (engaging collectively in the fabrication of open technical aids prototypes (De Couvreur *et al.*, 2013) beyond privately-designed technical aids subsidised and delivered by the public administrations).

The displacements giving rise to these open material explorations have to be connected to the 15M uprisings, despite there have been some other projects exploring some of these matters before. For instance, since 2006 the *Recursos de Bajo Coste* (Low cost resources) platform –developed by the CRMF Albacete, under the umbrella of the state’s CEAPAT⁴–, holds a yearly workshop with prizes to make visible and document different sorts of caring ‘little arrangements’ (López, 2015): that is, low cost innovations (not necessarily meaning free, cheap or costless, but using available materials and skills) done by users, relatives or friends in a collaborative fashion (Zamarro, 2011)⁵. These workshops have also helped to establish interesting relations with similar projects in Latin America. However, until very recently they have been oriented to a social and health services public, mostly composed of professionals rather the users themselves. With the creation of 15M *functional diversity commissions* in at least Madrid and Barcelona (Arenas & Pie, 2014) many worries regarding the democratisation and the need for a more developed citizen control of self-care

³ In the past decades there have appeared different schools and programs seeking to reflexively problematise or politicise different aspects of design practice (see DiSalvo, 2012): searching to produce social change through the deconstruction of the position of authority of creators, hence involving the users as co-designers in the conceptualisation, fabrication and testing (e.g. *participatory/collaborative design*); engaging in design projects seeking to craft artefacts and devices to provoke critical awareness of the cultural-symbolic values and practical aspects of design culture, ranging from material extraction to the division of labour or the commoditisation of its products (e.g. *critical and speculative design*); but also promoting counter-hegemonic and ironic forms of using, conceiving, fabricating and consuming materials to do so (*adversarial design*).

⁴ CRMF standing for *Centro de Recuperación de Personas con Discapacidad Física* (Rehabilitation Centre for People with Physical Disabilities). CEAPAT standing for *Centre for Personal Autonomy and Technical Aids* (<http://www.ceapat.es>).

⁵ The main core of *Bajo Coste*’s mission, a project with a very reduced budget developed and run by professionals (occupational therapists, mostly) engaged with independent-living politics and practices, is to maintain a digital repository (<http://www.crmfalbacete.org/recursosbajocoste/default.asp>) to publicize manuals, conferences’ lectures (providing insights on similar projects in the country and abroad), design workshops and projects. It has become an important resource in the country for those professionals and relatives interested in the production of DIY and low cost prostheses, technical aids and little caring arrangements.

technologies and urban accessibility arrangements came out and reached a broader public. This also happened to other collectives and some have highlighted this as a result of the particular practices there taking place (summarized as *hacer plaza*⁶).

Some social scientists describing what there happened have adopted some vernacular concepts and narratives, mostly from free culture activist, hacker ethic and copyleft practices, to describe the 15M uprisings as an experimental ‘method’ and temporary ‘hardware’ assembling different ideas and people in plazas’ assemblies in order to invite anyone interested in the collective, open and networked reconstruction of democracy (Corsín & Estalella, 2013; Moreno-Caballud, 2015): its fully-documented, freely shared (i.e. using open access forms of licensing) and remixed assemblies’ methods and logs being a sort of political, urban, affective and technological ‘prototype’. Despite this might be a very specific account of such a multiple, nuanced and variegated set of events taking place in many locales it has become impossible to deny the effect of the practices and logics of free digital culture and hacker ethics in the happening and the becoming of the very 15M uprisings and the occupation of public space (Postill, 2014).

15M’s functional diversity commissions in Madrid and Barcelona⁷ forged new alliances between independent-living advocates, engaged professionals and manifold activists or people. Indeed, these commissions created the conditions to engage in discussions with other collectives and groups similar on problems related to situations of democracy deficit (such as the democratic deficit of care institutions, services and products), and also took in charge of conveying to the general assembly the worries they had regarding the potential environmental and normative barriers blocking access of diverse publics to the empowering dynamics there happening (such as the use of language, the design of assembly spaces, etc.). Their efforts were aimed at creating a space for the joint reflection of how functional diversity’s discrimination affected us all and fostered debates and talks seeking to publicise their experience and the many specific problems they were suffering because of the charity, biomedical-rehabilitative and ‘assistentialist’ grounds of the policies and institutions addressing them.

The effects of these threads became also clear in several design projects that saw the light after these 2011-2012 political efforts, such as ETS. As we will show, displaying the open prototyping and testing process of one of ETS’s products (its portable wheelchair ramp), these different material explorations produce ‘infrastructural inversions’ in the independent-living politics, politicising present epistemic and market forms of ‘care arrangements,’ hence: (1) highlighting the knowledge and work implied in materialising particular care arrangements and forms of dis/ablement (López, 2015; Sánchez Criado *et al.*, 2014; Schillmeier, 2007); and (2) allowing for the experimentation with different materialisations of care for and by ‘functionally diverse’ people, recursively opening up their knowledge, design and division of labour in an ongoing exploration of more self-managed arrangements.

⁶ An expression referring to the ecosystem of values, spaces and assembly methods created by the long-lasting occupation of the squares, turning the main squares of Spanish cities into spaces for the encounter of very diverse people—most of them unknown to each other, with a low exposure to maintained activism, and not accustomed to these uses of public space—. As Fernández-Savater (2014) reminds, the term *hacer plaza* has no elegant translation in English. It literally means to ‘make square’. ‘Square’ in this context being the site of public assembly and occupation that proliferated after 15-M, and ‘making’ referring to the entire range of democratic practices unfolding in these sites.

⁷As can be seen in the record documented in their exhaustive open blogs to share assembly logs and to provoke debate on functional diversity issues (Madrid’s *Diversidad Funcional #Acampadasol*: <http://madrid.tomalaplaza.net/author/diversidadfuncional/>; Barcelona’s *Diversitat funcional BCN 15M*: <https://diversitatfuncional15m.wordpress.com/>).

3. *En torno a la silla* and its wheelchair ramp project

To be more specific, in this paper we would like to reflect ethnographically on the experience of one of these projects, the Barcelona-based collective *En torno a la silla*⁸, that emerged in May 2012 out of the friendship developed during the 15M uprisings of an independent-living advocate and different craftspeople interested in rethinking public space and care arrangements. Despite the collective has been changing, the project's core team would be composed of: the founders (Alida Díaz, architect, and Rai Vilatovà, anthropologist working as a craftsman –both have taken part in many activist collectives in the city–; and Antonio Centeno, renown independent-living advocate), the documentators (Tomás Sánchez Criado joined in November 2012, acting in the roles of resident ethnographer and in charge of curating the blog's digital documentation; Arianna Mencaroni joined in June 2013, acting as documentary filmmaker in charge of realizing the webdocumentary project, currently under development, and the video documentation of the collective), and recent incorporations (throughout 2014 several other leading independent-living advocates and makers with whom they had shared Barcelona's 15M 'functional diversity commission' became more explicitly involved: Marga Alonso, Nùria Gómez and Xavi Duacastilla).

Since October 2012, ETS has been exploring in a unique fashion in the country different open prototypes and collaborative design processes, weaving the redistributed innovation and amateur ethos of hacker culture, care ethics' reflections on interdependence and the self-care and full-access philosophy of the independent-living movement, very much along the same line as other similar projects that have been taking place in other countries building on the prospects of 3D printing⁹, such as: Waag Society's 'low cost prosthesis'¹⁰, Sozialhelden's plastic ramps¹¹, e-nable community's prosthetic hands for children¹², or the WikiWheelchair project seeking to build an open-source wheelchair¹³. The most relevant activities of ETS in their first year revolved around the prototyping process of a portable DIY wheelchair ramp, which became the main object discussed and reflected upon as part of their involvement in the *Funcionamientos* workshop in Madrid's Medialab-Prado.

ETS was one of the six projects submitted and accepted for its participation in Medialab-Prado Madrid's¹⁴ *Funcionamientos* ('Functionings') workshops, whose call for projects sought to host groups, collectives and projects articulating, co-producing or experimenting on the 'open design'¹⁵ of objects affected by the philosophy of functional diversity. Two sessions in November 2012 and January 2013 were programmed, consisting of three-day co-creation workshops. These workshops happened after several seminars and lectures hosted at Medialab-Prado between 2011's Winter and 2012's Spring on what they

⁸ The collective's name is a wordplay in Spanish pointing at the importance of focusing 'on' (*en torno*) the wheelchair's (*silla*) environment (*entorno*), as a means and object of relevant design interventions. See the website: <https://entornoalasilla.wordpress.com>

⁹ D. Rose (31/1/2014, BBC News Ouch) 'Could 3D printing provide new solutions for disabled people?,' <http://www.bbc.co.uk/news/blogs-ouch-25947021>

¹⁰ See <http://www.lowcostprosthesis.org/>

¹¹ R. Krauthausen (31/12/2013, raul.de) 'Printing a mini-wheelchair ramp yourself with a 3D-printer,' <http://raul.de/inspiring/printing-a-mini-wheelchair-ramp-yourself-with-a-3d-printer/?lang=en>

¹² See <http://enablingthefuture.org>

¹³ See their Google+ community: <https://plus.google.com/communities/105344423917493990493>

¹⁴ Medialab-Prado Madrid (<http://medialab-prado.es/>) is part of Madrid City Council's Area of Arts, Sports and Tourism. It is conceived as a citizen laboratory of arts, culture and technology for the production, research, learning and public experimentation of commons-based design and cultural prototypes.

¹⁵ Open design (van Abel et al., 2011) has been termed a practice of 'design by everyone,' that is a community-based exploration, part of the 'maker culture,' involved in the transformation of material culture boosted by the opening up of the knowledge production and the source-code of the design process and outcomes through use of free licenses for their distribution and dissemination.

called ‘technologies of diversity,’ reflecting on how the philosophy of functional diversity might affect or be affected by open design practices, as well as how to rethink accessible environments and technical aids from the perspective of open access standards.

The project submitted and approved by ETS had the scope to design in these workshops three small objects that might become a freely licensed ‘wheelchair kit’ to activate other possible relations with its technical and affective environments, that is acting, reflecting and intervening on them so as to habilitate not only its user but also his or her alliances¹⁶. The kit was originally composed of three ideas: a portable wheelchair ramp, a folding table and a briefcase-armrest. These workshops took place in the gigantic art and culture hub called Matadero (where many neighbours attend to take part in many leisure activities), and they were open to the public (literally to anyone passing by), where the projects had the assistance of several mentors who helped in the production of the prototypes.

The ethnographic description of the following vignettes of the ramp’s prototyping process will be based on Tomás’s personal fieldnotes, as well as on the materials that he, together with Arianna and the other members of the collective, have produced for the visual documentation of their activities, involving: taking pictures of prototyping and fabrication situations or gathering pictures donated by others, gathering sketches, shooting videos, and archiving them using publicly accessible digital platforms, such as the collective’s blog and different social networks¹⁷.

3. 1. Opening up the ramp’s conception in Medialab-Prado’s workshops

“January 18th 2013. In the past months many efforts have been put so as to think the ramp’s shape and materials. In the first *Funcionamientos* workshop (in November) there was a discussion on the first metal and wood model that had been produced by Alida and Rai in Pepe’s workshop (another friend from the 15M commission who is a handy man and former technician) to show a very simple draft as a starting point of the prototyping process. This was done in Barcelona after measuring Antonio’s wheelchair and under the supervision of Antonio with whom they discuss every development. In this first model, conceived by Alida and Rai, each track had two detachable pieces so as to enhance its portability, united when being used by a very rustic U-shaped tube helping tracks to fit into each other, and impeding detachment when being trod over by the wheelchair. It ended up chalk-painted in a collective exploration with the project’s mentors drafting out loud alternative junction methods to solve the main problem highlighted in the meeting (see IMAGE 1): ‘the U-shaped tubes stand out of the bag when transporting them and they are a bit too dangerous for safe manipulation’, said one of them. Antonio’s personal assistant, also present in the workshop had also highlighted that they were a bit complicated to manipulate and to place because there was no handle. Despite the recollection of complaints and alternatives gathered in November’s meeting, Rai and Alida wanted to test the material that was to be used in the final prototype (as discussed with the mentors) for the January session, but also the width of the metal plates affecting the ramp tracks’

¹⁶ See <https://entornoalasilla.wordpress.com/el-proyecto-original/>.

¹⁷ According to Pink (2007) the visual documentation here shown is comprised of both ‘research images:’ those pictures taken to produce a documentary record for the researchers only, that sometimes were also shared with the rest of the collective to reflect on prototyping endeavours, and sometimes being published with a collective authorship in the blog, hence also turning into ‘expository images.’ In all different situations, special care has been put to register the specific context of production of those images, something crucial for the documentary record of both of our ethnographic research and for the open discussion of the practices of the collective.

weight. So, before attending the second *Funcionamientos* workshop in January a similar version has been commissioned to an ironsmith, with Medialab's funding, in 3mm thick anti-slippery extruded aluminium. The ironsmith, however, had a creative day and eliminated one of the two tube junctions ('it will be stable enough like this'), something that caused a bitter argument between him and Rai. This version also incorporates a new trick thought by Rai: a side fold in each metal plate so as to avoid the wheels to exit the track.

INSERT IMAGE 1 HERE

IMAGE 1. Model discussed at the first *Funcionamientos* workshop (December 2012¹⁸).

Anyway, today we have brought it to Madrid for an open discussion in Matadero's open space. It's a Sunday morning and many regular people come and go. At the appointed time, a collective discussion with several of the mentors starts. Rai begins by placing the ramp on a step to test it, Antonio starts climbing up and down to understand if it can stand the wheelchair's weight, and I record the whole situation with my cell¹⁹. The mentors (Carlos Tomás –engineer–; Mario Toboso –physicist–, Antoni Abad –sculptor and digital artist–, and Alma Orozco –artist and convenor of the workshop–) start debating again about the problems of the junction and the whole conversation slowly centres on how to design a folding method allowing the two parts of the track to be united. Rai together with Carlos debate on the possibility of using a mechanism similar to a hinge. All of a sudden, a man we don't know starts to hang around, listening to our quarrels: 'maybe it would bend in the middle... 'cos the tube acts as a reinforcement to prevent the plate from bending when wheelchair treads over... if it bends that would be dangerous', says Rai. Carlos answers that maybe the tube would still be needed. Out of the blue the unknown man intervenes in the conversation, smoothly but vehemently (like he was a knowledgeable technician), grabs the ramp track's two parts from Rai's hands and arguments in favour of a folding method using a circular joint: 'I'm not saying that you keep the bar, no, no, you place a knee-like joint here [in the middle], and that's it... This [pointing at the ramp] can hold an elephant... This plate can support 120kg without a problem, and in case not you just can use a wider one that supports more weight'. This starts a very technical conversation, lasting around 6 minutes with Rai and Carlos (with the rest of us present) on how to conceive the folding joint and how it could be welded into the plate so as to create a joint distributing the weight's pressure among the plate. Besides my cell video, the concept for the junction was captured in the form of a sketch by Mario Toboso²⁰. After an hour, the mentors have to meet another project's team and we hang around this space, thinking aloud on what just happened. We will go back to Barcelona with 10 draft ideas of a possible ramp that Alida has been gathering in each bar conversation and chat in the past days (everyone has an idea for a ramp), but we need to follow the thread of a single idea. Medialab has given us a slight amount of

¹⁸ Picture taken by Tomás whilst the collective debated with the mentors different folding and extraction methods than the one displayed by the first wood and metal 1:1 model (using a piece of chalk to draw over it). Later published in ETS's blog: <http://entornoalasilla.wordpress.com/2013/01/13/pruebas-del-prototipo-de-la-rampa-en-medialab-prado-16-12-2012>. (used with permission).

¹⁹ See <https://entornoalasilla.wordpress.com/2013/01/25/segundas-pruebas-del-prototipo-de-la-rampa-en-medialab-prado-18-1-2013/>

²⁰ See <https://entornoalasilla.wordpress.com/2013/01/29/como-mejorar-el-segundo-prototipo-de-la-rampa-en-medialab-prado-18-1-2013/>

money to develop the last prototype from here...” (Reconstruction from Tomás’s fieldnotes).

3. 2. Testing in the open, entering Bar Mundial

Having gathered those sketches and ideas, when returning to Barcelona we also return to our everyday lives. After some months conceiving the precise junction for the folding method creating wood models that are shown to Tomás and Antonio, Alida and Rai reached the conclusion that they had found the perfect match—or at least a good new improvement of the folding method—. The new method allows the parts of the detachable track to turn together when folding, creating a slight new problem for storage and transportation, but making the ramp much safer and usable. The problem is that with the previous method, the U-shaped aluminium bars prevented the sheet serving as walkway from folding too much, and hence avoiding breakage or unexpected bounces that could cause the wheelchair to overturn. The collective needed to test it, so the last bits of Medialab’s funding were used to commission what was hoped to be the last prototype of the ramp to the ironsmith.

“It is a cold evening in May 2013, and here we have the definitive, or so we think, prototype in our hands: a two-tracked 3mm-thick aluminium portable ramp for an electric wheelchair (each track weighting 5 kg). Alida, Rai and I picked it up from the smith workshop a few days ago and we made a blog entry about it²¹. So here we are, ready to test it ‘in the wild’ with Antonio, at last! The new method would allow the parts of the detachable track to turn together when folding, making the ramp much safer and usable. We still did not know if the ramp would bend too much in the middle because of the heaviness of the wheelchair. ‘Will the ramp work?’ is a question that all of us four ask in many different ways when we see each other. We are almost sure it will, because we have tested previous models, be it the first raw prototype made in wood and iron or a previous aluminium model with very similar features, but one never knows. We still don’t know if the ramp will bend too much in the middle because of the heaviness of the wheelchair, weighting around 250 kg (125 in each track). In our calculations Rai and Alida have estimated a maximum weight of around 150 kg in each track for it to be safe. And we are still unsure if the ramp might need improvements in the parts serving as junctures to the sidewalk and the step to be climbed, or *entregas* as Rai and Alida call them: a very beautiful technical term, having the joint connotations of a ‘consignment’ or a ‘shipment’ and the ‘commitment’ and dedication of one person with a given cause. We believe that aluminium might be too slippery in its *entrega* with clay, and have thought of recycling used bike tires so as to create a rubber band system in each track enhancing the ramp’s grip.

We are anxious and start searching for possible inaccessible spaces around the ancient Gòtic district where we usually meet. Many bars have access ramps or street-level floors, which might not be very well finished, but they will not allow us to show the potential of our prototype! We need to find a step where we might put the ramp to work, where we might understand if it works or not and why. Then we find out the Bar Mundial, an elegant tapas bar with a bizarre boxing decoration. It has a huge step in its entrance of around 24 cm high. At first we are doubtful, for our ramp has been designed for 20 cm steps on the max. Alida says: ‘No, it won’t work, it’s too high, it might be dangerous!’ But Antonio is confident to give it a try and climb the step with his wheelchair, but only if he gets a little help by someone holding him fast so as to

²¹ Pictures taken from the blog: <http://entornoalasilla.wordpress.com/2013/05/07/ya-tenemos-el-prototipo-de-la-rampa-en-nuestras-manos-mayo-2013> (used with permission).

avoid ‘ending up upside-down,’ he jokes. Alida gets into the bar and asks the owner if we could open the entrance’s door standing leaf. Once this is done, Rai and Alida take the ramp out of the bag. Rai places the two tracks next to each other, checking the height (see IMAGE 2).

INSERT IMAGE 2 HERE

IMAGE 2. Displaying the ramp tracks to ‘assault’ Bar Mundial. May 2013²².

‘It’s too tall,’ he warns Antonio, but the latter wants to give it a go. Rai places in the rear of the wheelchair so as to hold Antonio’s chair while he carefully moves his joystick. Meanwhile I take pictures of the whole process with my cell as best as I can—it all goes so fast... and try to make rough notes so as to document what is going on and later post it on our blog. And then, all of a sudden we made it! Antonio is up and safe, the ramp has resisted unaffected. It is working! Happy as we are we are immediately received by the owner, trying to hide his guilt of not complying to the accessibility norms with over-infatuated friendly manners. After eating and drinking something we leave. It works again!’ (Reconstruction from Tomás’s fieldnotes).

3. 3. Free distribution and open discussion: ‘The ramp is not the solution’ blog post

The following summer was also a very intense one, in which the ramps were used by the Barcelona Independent-Living Office as part of a summer trip²³, as well as in other actions – such as breaking in pubs and bars in doing what the collective have come to call jokingly ‘assaults’²⁴—that were reported in the blog—. All of these actions using the ramp led to many discussions over the political potential of the ramp. Some involved veiled accusations by other disabled advocates of ‘collaborationism’ with inaccessible places that were against the current accessibility law and should be prosecuted, as well as disputing the visual and text language used in the blog, dimmed poetical or metaphoric. These affairs lead the collective to publish several blog posts as a matter of clarification. One of them, mainly written by Alida—the architect of the group—and receiving the input of the rest of the collective, read as follows²⁵:

“We have received some friendly comments pointing at the fact that the portable ramp is a ‘false solution’ to the problem of accessibility. For some it is too personal a solution, given that it only solves the problem of access for one person or a few people and to a given place. For others its use is extremely dependent on the possibilities granted by the situations in which we might want to use them, that is: the will of others to help us, obstacles that prove to be not more problematic than they might seem, etc.

In almost all of these comments a reference is made to the fact that as we use it, the ramp entails some sort of sell-out to the always-pressing need to vindicate a city, public equipment, and an urban life that might be accessible and for all. From this stance the right thing to do would be to make evident and to report the fault and not to take care of it. The debate got extremely interesting in some personal posts on the

²² Taken by Tomás, later published in ETS’s blog: <http://entornoalasilla.wordpress.com/2013/05/18/poniendoen-uso-la-rampa-mayo-2013> (used with permission).

²³ See <https://entornoalasilla.wordpress.com/2013/09/29/las-rampas-son-para-el-verano-verano-2013/>

²⁴ See <https://entornoalasilla.wordpress.com/2013/10/02/cualquier-sistema-octubre-2013/>

²⁵ Foucault’s original quote was from the Spanish version of the text. We have included here the English one. The original could be seen here: <https://entornoalasilla.wordpress.com/2013/11/10/la-rampa-no-es-la-solucion-noviembre-2013/>

social networks but, just like almost everything happening on Facebook, it was quickly discontinued.

We've been thinking for some time what the ramp might mean. Together with the technical issues (weight, costs, materials, measurements, the ways of handling and deploying it), other more conceptual issues have been unfolded (is the ramp an assault machine, an infrastructure, a technique of the self, a strategy?). Sometimes, these terms being entangled, we might be using the ramp as a tool for intervention, as a form of engagement or commitment, as a way to build bridges with others...

With it we do not claim to be solving the problem of universal accessibility. Neither we search for a definitive solution. We seek instead to activate some possible relations with the environment. The ramp displaces the problem to the person responsible for a given urban setting. The problem is transferred to this place, that shop, that space... and from here we might create a possible link, with all the difficulties to solve thereon. The ramp doesn't solve anything. On the contrary, it displays the problem, making it evident, tangible, and attainable. We believe that it is in the practice of liberty to access a place that the ramp's use acquires its true meaning.

The fight for laws having accessibility as its main concern could be as liberating as 'giving' ourselves the effective and untimely access to a place by our own means. It is not the object in itself that liberates, but the exercise of liberty, and it is not the laws by themselves—as the experience has taught us—that guarantee rights and sanctions, but their actual exercise.

By the way, we love this answer Michel Foucault gives in an interview, talking about architecture:

'Q. Do you see any particular architectural projects, either in the past or the present, as forces of liberation or resistance?

M.F. [...] I do not think that there is anything that is functionally—by its very nature—absolutely liberating. Liberty is a practice. So there may, in fact, always be a certain number of projects whose aim is to modify some constraints, to loosen, or even to break them, but none of these projects can, simply by its nature, assure that people will have liberty automatically, that it will be established by the project itself. The liberty of men is never assured by the institutions and laws that are intended to guarantee them. This is why almost all of these laws and institutions are quite capable of being turned around. Not because they are ambiguous, but simply because 'liberty' is what must be exercised.

[...] it can never be inherent in the structure of things to guarantee the exercise of freedom. The guarantee of freedom is freedom' (Foucault, 1984: p.245)" (Our translation).

In a way, we could say that this paper is no more than a large commentary to this post, translating it and putting it in context for an academic audience interested in contemporary transformations of care arrangements and independent-living politics.

4. Open prototyping as displaying or opening up the matter of care arrangements

Using examples very similar to ETS's portable wheelchair ramp and the sorts of workshops in which it gradually came to see the light, Carl DiSalvo describes prototyping practices as dialogic design processes "in that its structure is one of exchange and its purpose is the discovery and elucidation of the conditions or factors of a design. As a dialogic endeavour,

the participants are engaged in a kind of conversation with and through the materials of design and the qualities of those materials” (DiSalvo, 2014: 100), not an isolated conversation but “a conversation with other people” (DiSalvo, 2014: 101) in which the “object functions in a manner analogous to a boundary object [...] by providing a focal point for drawing out and focusing the issues of any design activity” (DiSalvo, 2014: 100), being “[...] a means to an end, and achieve value through the act of shared construction, joint conversation, and reflection” (Ratto, 2011: p.253). Indeed, in ETS’s blog post the prototyping or exploration of a portable wheelchair ramp was described as a form of open display: of the problem of inaccessibility that the collective seeks to attain, of the solutions devised and the knowledge there produced.

Unpacking our argument from here, we contend that ETS’s portable wheelchair ramp project as described above could indeed be characterised as being the deployment or the display of an open prototyping process. And we would like to consider it as a particular form of epistemic/political experiment (Corsín, 2014) to tackle what Ratto calls ‘wicked problems’ through “a shared process of making as a common space for experimentation [that] encourages the development of a collective frame while allowing disciplinary and epistemic differences to be both highlighted and hopefully overcome” (Ratto, 2011: p.253).

In this vein, Corsín characterises open source prototypes not only as a new form of peer production (Powell, 2012), but also a different way of crafting knowledge, opening up or inscribing in themselves the very documentation used in their construction, hence “prefiguring a knowledge-based economy, which thrives on the circulation of images rather than objects” (Küchler, quoted in Corsín, 2014: 4). That is where documents, pictures, technical specifications and all attached media both describing and performing the existence of the very prototype circulate allowing for other objects to be likewise prototyped in a recursive manner.

This is what leads Corsín to call prototypes ‘inscriptive’ and ‘recursive’ yet ‘porous’ or ‘perpetually unfinished’ (perpetually in beta) objects part of an epistemic culture allowing relationships and objects to be ‘more than many and less than one’ in Corsín’s terms, that is cultural forms: “always on the move and proliferating into affinal objects, yet never quite accomplishing its own closure” (Corsín, 2014: 5). This perpetual state of non-closure and recursion signal their importance in a redistributed epistemic culture of experimentation beyond the regular actors performing it, beyond the sites where scientific knowledge is being made and validated, and beyond the conventional depiction of experimentation as the control of variables in the natural sciences closed laboratory (Gross & Krohn, 2005). Indeed, following Dickel et al. in the spaces where these open-source prototypes are being created nowadays—fablabs, medialabs, co-creation and peer production workshops—there is an expansion of the meaning of experimentation “to designate systematic learning practices by means of specific [...] installations” (Dickel et al., 2014), such as the ones taking place in peer production workshops in which ETS’s project was born.

In the wheelchair ramp project described above the different open conversations, raw sketches circulated online and offline, and casual use tests were addressed at collaboratively understanding the adequacy of its design, in order to identify its flaws and problems. But in this independent-living version of something resembling Galileo’s ‘inclined plane’ experimental device (Stengers, 2006) it is not the principles of the physics of the falling bodies that are primarily at stake. As we see it, ETS’s open tests could rather be considered part of a collaborative exploration—sometimes looser in open workshops, sometimes tighter and restricted to the very ETS members—on how alternative care arrangements could be devised. Such tests are important because they serve as part of a process of small and precarious experiments of different kinds to elucidate its potential as a future low-cost product

and not an eternal beta-product, since the ramp has to be useful to meet the needs of a very vulnerable target collective, living in conditions of semi-poverty (Braithwaite & Mont, 2009): for instance, the easy availability of cheap-yet-resistant materials used, the search for an easy-to-build solution, the clarity of the information provided to others to start their own DIY process through drawings, tutorials, and an open access and easily available documentation of the design process are under permanent test, having become sources of anxiety and of exploration throughout the project.

In fact, it is not only the very design that was being tested in ‘assaults’ like the one performed in the Bar Mundial. What is being tested submitting accessibility politics to the ‘inclined plane’ of ETS’s portable wheelchair ramp project is also the collective capability to affect the places the ramp is helping to intervene, because this prototype is not thought of as a mere ready-made piece of portable urban furniture so as to allow wheelchair access. Given the activist aspirations of the collective building it, the ramp is deployed as an exemplar of a ‘material culture of protest’—characterised by precariousness, scarcity of means and failure but also richness in ends (to say it with Flood & Grindon, 2014: 12)—: a symbol of ad hoc and visible interventions, seeking to make access issues a matter of public concern. In this vein, such a critical making project materialises the politics of design in a process leading ‘to an elucidation of the politicised factors of practice expressed in prototype product form’ (DiSalvo, 2014: 104).

This is why ETS might be thought of as a particular experimental device akin to Dickel et al.’s description of ‘real-life laboratories,’ a concept they use “to describe semi-protected spaces that are established for experiments between knowledge generation and knowledge application” (Dickel et al., 2014). That is, semi-open spatial spaces “for experimental innovation practices in contexts of peer production,” given that “[...] peer production itself is a real-life-experiment in societal transformation” (Dickel et al., 2014). Indeed, this open display of knowledge and political experimentation operates a particular displacement or, in Star & Lampland’s (2009: 14) terms, an ‘infrastructural inversion’ opening up the usually back-staged matter of personal and urban care arrangements: the division of labour and the asymmetries it usually implies (between experts and lay people, between innovators and end users) in contemporary arrangements involving particular forms of market provision and commodification of these technical aids in public and private markets. An infrastructural inversion allowing a conceptual and political displacement of care and disability debates: from a focus on the ways in which there is a need to *tinker with* standardised technologies in order to ‘adjust to them’ and personalise them (Ott, 2002), despite full adaptation is commonly not possible and a good compromise has to be reached, to an interest in understanding the *prototyping of* new material care arrangements for independent-living. Despite *tinkering* might be seen as a caring practice (Winance, 2010) when these technologies cannot be changed, it might also be taken as a conservative strategy that does not challenge the pre-inscribed knowledge and configurations of orthopaedic design. These attempts at prototyping, however precarious, do not merely take the objects’ design for granted but question and put under examination their very configurations, making available ways of learning how to create other alternatives.

And finally, what is also being tested and experienced is the very vulnerability, precariousness and fragility of the collective building it: indeed, their personal and collective aspirations and hopes are being tested every time; but also the necessary alliances between craftspeople and independent-living collectives to make the project a bit more stable, and their strength to work with a no-budget horizon in a project in which they are learning a lot, but which takes a lot of time. Yes, it might become part of the way in which they might make a living in the future, but none of this might happen if the low-cost ramp (now a single and

nearly worn-out prototype) does not become a market product, allowing them to earn some money to either continue freeing objects or acting as paid technical aid ‘hackers.’ All of these bundled outputs of ETS’s particular ‘inclined plane’ might only be recognised and worked out in tests such as the one depicted before, needing of subsequent collective situations to articulate in words what there happened (such as the conversations when preparing blog posts).

In sum, this form of opening up or displaying the prototyping process is indeed interesting in a particular form of politicising the matter of current care arrangements: that is, articulating open alternatives that would recursively open up or revert the knowledge, political and organisational aspects of these arrangements allowing to go beyond the mere personalisation of technical aids or the sheer defence of urban accessibility infrastructures as ‘solutions by design’ to the problem of independent-living, recursively re-structuring what independent-living means. Or, to say it otherwise, making visible how care arrangements for the functionally diverse might be rethought by the functionally diverse in order to expand the political repertoire of the independent-living movement on care matters, paying attention to the matter of care. Something that expands the classic advocacy of the Disability Rights Movement for more controlled and user-led services enhancing the choice over one’s life (Beresford & Carr, 2012; Barnes & Mercer, 2006; Morris, 2004) to the joint prototyping of independent-living with others.

5. Conclusion: A radicalisation in independent-living politics?

ETS’s wheelchair ramp prototyping processes, as well as several other projects that we have been analysing in the past three years, point at the emergence of new sociomaterial forms of exploring independent-living and care arrangements for the functionally diverse beyond struggles for personal assistance. This statement might seem risky, given that many of these design worries and aspirations were also explored at the very beginning of the independent-living movement in the US (Lifchez & Winslow, 1979), also very keen on developing co-creative self-care prototypes—emphasising the importance of experimenting on the personalization of services and products (Pullin, 2009),—be it through strategies of empowering the functionally diverse as consumers against technology developers through direct payments from the Welfare State (Ratzka, 2002, 2003) or ensuring universal accessibility ‘by design’ (Imrie, 2012) in countries where independent-living rights have been secured.

As we have tried to show in this paper the most interesting and crucial aspect of ETS’s practices in austerity times lie on the fact that their critical making activities, such as the portable wheelchair ramp, entail another turn, resonating with the creativity devised to produce handmade solutions, or more or less temporary arrangements using materials at hand in places where the structural conditions of inaccessibility and discrimination are even harsher, such as in the Global South (Charlton, 1998: 87-88, 104-105; Hotchkiss, 1985; Schaub *et al.*, 2011; Srinivasan, 2002; Werner, 1998). The whole point of these prototyping processes is not only speaking for one’s self or defending an already existing legal framework guaranteeing rights and equal opportunities, but also taking part in the definition of the technical and material aspects defining independent-living. They also involve something more than participation. Taking part in the production of these open prototypes also entails redistributing the expertise and knowledge to produce this self-care machinery. However, the most important aspect is that the little infrastructural inversions they allow provide occasions for the recursive transformation of independent-living, radicalising and *forking* (to use hackers’ wording to refer to the versions produced by variations in code) the practical meaning of the motto ‘nothing about us without us.’

To be more concrete, these practices of ‘open source prototyping’ might be opening up a new form of political experimentation for independent-living revolving around the possibility of granting the right to shape one’s life supports (Winner, 2007). This *fork* would allow the functionally diverse to go beyond becoming a powerful consumer lobby of technical aids or defending the self-management of personal assistance: open prototyping means experimenting collectively with solutions and co-producing more or less precarious or complex arrangements for personal and urban care; making visible the utmost political importance of the very task of materially infrastructuring one’s self-care; but also guaranteeing the sociomaterial conditions of interdependence allowing the self-management of personal care, where these rights are something conquered or created and not only granted by others (Biehl & Petryna, 2011).

In sum, if democracy has always relied on ‘prosthetic devices’ to allow for the politically-disabled to participate, as some STS scholars have pointed out (Callon, 2008; Latour, 2005: 21), these open prototyping projects would entail a democratising intervention in the expert-driven, ableist and commoditised bodily arrangements that ‘prosthetic’ and ‘assistive’ devices have fostered under the medical model, reinforcing “outmoded categories of dependency and victimhood for those who use them [...] [tracking] the technologies into professional and consumer groups where few people will find out about or benefit from them” (Ott, 2002: 21). Hence, opening up the design processes in such prototyping strategies, indeed could be considered a radicalising democratic gesture that might help to radicalise the independent-living project. That is, both ‘repoliticising’ the movement and ‘going to the root’ of its particular sociomaterial arrangements to experiment with viable alternatives.

References

- Arenas, M., & Pie, A. (2014). Las comisiones de diversidad funcional en el 15M español: Poner el cuerpo en el espacio público. *Política y Sociedad*, 51(1), 227–245.
- Barnes, C., & Mercer, G. (2006). *Independent Futures: Creating User-Led Disability Services in a Disabling Society*. Bristol: The Policy Press.
- Beresford, P., & Carr, S. (Eds.). (2012). *Social Care, Service Users and User Involvement*. London: Jessica Kingsley Publishers.
- Biehl, J., & Petryna, A. (2011). Bodies of rights and therapeutic markets. *Social Research: An International Quarterly*, 78(2), 359–386.
- Braithwaite, J., & Mont, D. (2009). Disability and poverty: a survey of World Bank poverty assessments and implications. *ALTER-European Journal of Disability Research/Revue Européenne de Recherche sur le Handicap*, 3(3), 219-232.
- Callon, M. (2008). Economic Markets and the Rise of Interactive Agencements: From Prosthetic Agencies to Habilitated Agencies. In T. Pinch & R. Swedberg (Eds.), *Living in a Material World: Economic Sociology meets Science and Technology Studies* (pp. 29–56). Cambridge, MA: MIT Press.
- Charlton, J. I. (1998). *Nothing about Us Without Us: Disability Oppression and Empowerment*. Berkeley, CA: Univ of California Press.
- Corsín Jiménez, A. (2014). Introduction. The prototype: more than many and less than one. *Journal of Cultural Economy*, 7(4), 381–398.
- Corsín, A., & Estalella, A. (2013). Assembling Neighbours: The City as Hardware, Method, and ‘a Very Messy Kind of Archive.’ *Common Knowledge*, 20(1), 150–171.
- De Couvreur, L., Dejonghe, W., Detand, J., & Goossens, R. (2013). The Role of Subjective Well-Being in Co-Designing Open-Design Assistive Devices. *International Journal of Design*, 7(3), 57–70.
- Dickel, S., Ferdinand, J.-P., & Petschow, U. (2014). Shared Machine Shops as Real-life Laboratories. *Journal of Peer Production*, 5. Retrieved from

<http://peerproduction.net/issues/issue-5-shared-machine-shops/peer-reviewed-articles/shared-machine-shops-as-real-life-laboratories/>

- DiSalvio, C. (2012). *Adversarial Design*. Cambridge, MA: MIT Press.
- DiSalvo, C. (2014). Critical Making as Materializing the Politics of Design. *The Information Society*, 30(2), 96–105.
- Fernández Savater, A. (2014). Notes for a Non-Statocentric Politics. Retrieved from <http://criticallegalthinking.com/2014/04/21/notes-non-statocentric-politics/>
- Foro de Vida Independiente y Divertad & Agencia de Asuntos Precarios Todas a Zien (2011). *Cojos y precarias haciendo vidas que importan. Cuaderno sobre una alianza imprescindible*. Madrid: Traficantes de sueños.
- Flood, C., & Grindon, G. (2014). *Disobedient Objects*. London: V&A Publishing.
- Foucault, M. (1984). Space, Knowledge, Power. In P. Rabinow (Ed.), *The Foucault Reader* (pp. 239–256). New York: Pantheon Books.
- Gross, M., & Khron, W. (2005). Society as experiment: Sociological foundations for a self-experimental society. *History of the Human Sciences*, 18(2), 63–86.
- Hertz, G. (2012). Interview with Matt Ratto. *Critical Making*. Retrieved from <http://conceptlab.com/criticalmaking/>
- Hotchkiss, R. (1985). *Independence through Mobility: A Guide Through the Manufacture of the ATI-Hotchkiss Wheelchair*. (L. Ramsden, Ed.). Washington, DC: Appropriate Technology International.
- Imrie, R. (2012). Universalism, universal design and equitable access to the built environment. *Disability and Rehabilitation*, 34(10), 873–882.
- Lafaye, C. G., & Romañach, J. (2010). Diversity ethics. An alternative to Peter Singer's ethics. *Dilemata*, (3), 1–23.
- Latour, B. (2005). From Realpolitik to Dingpolitik or How to Make Things Public. In B. Latour & P. Weibel (Eds.), *Making Things Public. Atmospheres of Democracy* (pp. 14–41). Karlsruhe / Cambridge, MA: ZKM / MIT Press.
- Lifchez, R., & Winslow, B. (1979). *Design for Independent Living: The Environment and Physically Disabled People*. New York: Whitney Library of Design.
- López, D. (2015). Little arrangements that matter. Rethinking autonomy-enabling innovations for later life. *Technological Forecasting and Social Change*, 93, 91–101.
- Maraña, J. J. y Lobato, M. (2003). El movimiento de vida independiente en España. In J.V. García Alonso. (Ed.), *El movimiento de Vida Independiente. Experiencias internacionales*. (pp. 259-278). Madrid: Fundación Luis Vives.
- Morris, J. (2004). Independent living and community care: a disempowering framework. *Disability & Society*, 19(5), 427–442.
- Moreno-Caballud, L. (2015). *Cultures of Anyone: Studies on Cultural Democratization in the Spanish Neoliberal Crisis*. Liverpool: Liverpool University Press.
- Oliver, M. (1981). A New Model in the Social Work Role in Relation to Disability. In J. Campling (Ed.) *The Handicapped Person: A New Perspective for Social Workers* (pp. 19-32). London: RADAR.
- Oliver, M. (2013). The social model of disability: thirty years on. *Disability & Society*, 28(7), 1024–1026.
- Ott, K. (2002). The Sum of Its Parts: An Introduction to Modern Histories of Prosthetics. In K. Ott, D. Serlin, & S. Mihm (Eds.), *Artificial Parts, Practical Lives. Modern Histories of Prosthetics* (pp. 1–42). New York: New York University Press.
- Palacios, A., & Romañach, J. (2006). *El modelo de la diversidad la Bioética y los Derechos Humanos como herramientas para alcanzar la plena dignidad en la diversidad funcional*. Santiago de Compostela: Ediciones Diversitas-AIES.

- Palacios, A.; Romañach, J.; Ferreira, M. A., Ferrante, C. (2012). Functional Diversity, Bioethics and Sociological Theory: a New Approach to Disability. *Intersticios: Revista sociológica de pensamiento crítico*, 6(1), 115-130
- Pie, A. (Ed.). (2012). *Deconstruyendo la dependencia: Propuestas para una vida independiente*. Barcelona: UOC.
- Pink, S. (2007). *Doing Visual Ethnography. Images, Media and Representation in Research* (2nd Ed.). London: Sage
- Postill, J. (2014). Democracy in an age of viral reality: A media epidemiography of Spain's indignados movement. *Ethnography*, 15(1), 51-69
- Powell, A. (2012). Democratizing production through open source knowledge: from open software to open hardware. *Media, Culture & Society*, 34(6), 691-708.
- Pullin, G. (2009). *Design meets disability*. Cambridge, MA: MIT Press.
- Ratzka, A. (2002). User control over services as a precondition for self-determination. *Independent Living Institute*. Retrieved from <http://www.independentliving.org/docs4/ar200210.html>
- Ratzka, A. (2003). From patient to customer: Direct payments for assistive technology for disabled people's self-determination. *Independent Living Institute*. Retrieved from <http://www.independentliving.org/docs6/ratzka200308b.html>
- Rodríguez-Picavea, A. (2013). Divertad: libertad y dignidad en la diversidad. *Revista Latinoamericana de Educación Inclusiva*, 7(1): 39-58.
- Ratto, M. (2011). Critical Making: Conceptual and Material Studies in Technology and Social Life. *The Information Society*, 27(4), 252-260.
- Ratto, M., Wylie, S. A., & Jalbert, K. (2014). Introduction to the Special Forum on Critical Making as Research Program. *The Information Society*, 30(2), 85-95.
- Romañach, J. (2009). *Bioética al otro lado del espejo*. Santiago de Compostela: Diversitas Ediciones.
- Sánchez-Criado, T., López, D., Roberts, C., & Domenech, M. (2014). Installing Telecare, Installing Users: Felicity Conditions for the Instauration of Usership. *Science, Technology & Human Values*, 39(5), 694-719.
- Schaub, A., Herst, D., Surya, T., & Agrivina, I. (2011). Fifty Dollar Leg Prosthesis: Intercontinental Collaboration on Prosthetic Design. In B. van Abel, L. Evers, R. Klaassen, & P. Troxler (Eds.), *Open Design Now: Why Design Cannot Remain Exclusive* (pp. 218-219). Amsterdam: BIS Publishers.
- Schillmeier, M. (2007). Dis/abling practices: Rethinking Disability. *Human Affairs*, 17, 195-208.
- Shakespeare, T. (2006). Care, support and assistance. In *Disability Rights and Wrongs* (pp. 135-152). London: Routledge.
- Star, S. L., & Lampland, M. (2009). Reckoning with Standards. In M. Lampland & S. L. Star (Eds.), *Standards and Their Stories: How Quantifying, Classifying, and Formalizing Practices Shape Everyday Life* (pp. 3-34). Ithaca, NY: Cornell University Press.
- Stengers, I. (2006). *La Vierge et le neutrino : Les scientifiques dans la tourmente*. Paris: Les Empêcheurs de Penser en Rond.
- Srinivasan, R. (2002). Technology Sits Cross-Legged. Developing the Jaipur Foot Prosthesis. In K. Ott, D. Serlin, & S. Mihm (Eds.), *Artificial Parts, Practical Lives: Modern Histories of Prosthetics* (pp. 327-347). New York: New York University Press.
- Van Abel, B., Evers, L., Klaassen, R., & Troxler, P. (Eds.). (2011). *Open Design Now: Why Design Cannot Remain Exclusive*. Amsterdam: BIS Publishers.
- Werner, D. (Ed.). (1998). *Nothing About Us Without Us: Developing Innovative Technologies For, By, and With Disabled Persons*. Palo Alto, CA: Health Wrights.

- Winance, M. (2010). Care and disability. Practices of experimenting, tinkering with, and arranging people and technical aids. In A. Mol, I. Moser, & J. Pols (Eds.), *Care in Practice. On Tinkering in Clinics, Homes and Farms* (pp. 93–117). Bielefeld: Transcript.
- Winner, L. (2007). Is there a right to shape technology? *Argumentos de Razón Técnica*, 10, 199–213.
- Zamarro, J. (2011). Los productos de apoyo también pueden ser baratos. *Revista de Autonomía Personal*, 4, 20–23.