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Politecnico di Torino

IoT & Circular Economy: Perspectives on Rights as a Standard in Balancing Interests from a Survey of Business Models

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Working paper nr 3/2017

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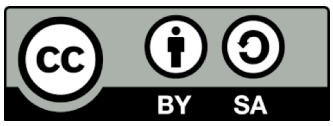

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IoT & Circular Economy: Perspectives on Rights as a Standard in Balancing Interests from a Survey of Business Models

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1 INTRODUCTION

The paper at hand is part of a research project about the Internet of Things (IoT) and its role in supporting the development of a Circular Economy (CE). The IoT may have mixed impacts on environmental sustainability – e.g., in traditional economic settings, it may adversely impact the environment, increasing the technological obsolescence of durable goods. At the same time, some IoT (and/or cloud robotics or otherwise connected) components are a prerequisite of a full-fledged circular economy, where reuse, repair, remanufacture and recycling become part of the products themselves and/or of the business models used to deliver services to the end-users. This is the case – as this paper will discuss in describing CE business models – because the collection of an increasing amount of information and the existence of durable links between manufacturers and their products is an enabler of the predictive maintenance and reverse logistics (e.g., take-back management, incentivized return and reuse, collection of used products) enabling the Circular Economy.

The research question on which we focus is not whether the IoT may have a positive environmental impact. This would amount to asking whether a CE may actually be implemented (and, for the sake of discussion, we assume that this is the case). The question is, instead, whether it is possible that this happens in such a way that simultaneously meets the interests of society, citizens and companies.

The overall research was kick-started within the conceptual framework of Distressed versus Effective Systems. In an Effective System, most issues are resolved through reconciling interests, some through determining who is right and the fewest through determining who is more powerful.

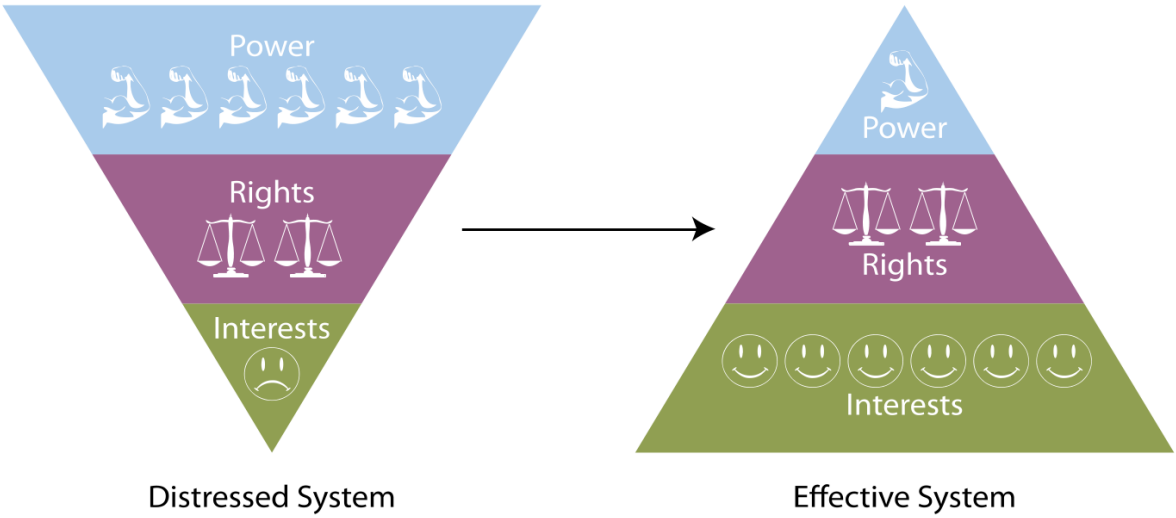

Figure 1. Source: Ury et Al. (1988)

According to Ury et Al. (1988), an effective system is a system in which – in order to manage a dispute or negotiation – the parties tend to frame the problem in terms of interests or needs to be balanced,[1] much more often than in terms of rights or powers to be confronted. Notice that, according to this understanding of an effective system, a system may be effective even if power is very unevenly distributed through the system itself. Even in this situation, the cost of resorting to the use of power may be higher than the cost of negotiation (under a more or less implicit threat of using power directly). In other words, an effective system is defined as a system in which there is actually a limited use of power as a dispute resolution tool, not as a system in which there is a small potential for the use of power to coerce other parties.

In terms of availability of tools to resolve conflicts, an effective system may very well be structured as in the following figure:

1 I leave to Maiese (2004) the discussion concerning the differences between interests and needs balancing.

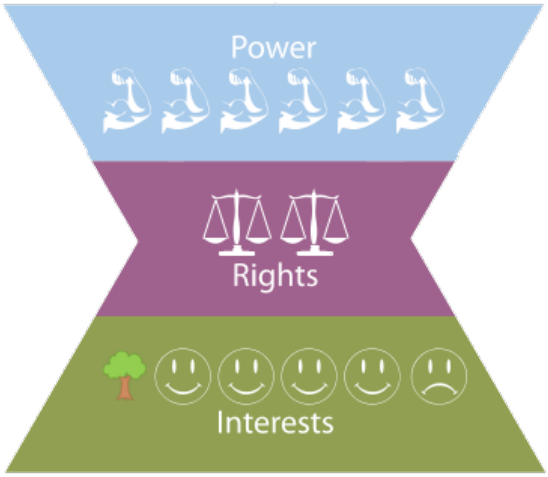

Figure 2. Personal elaboration based on Figure 1 (Ury et Al., 1988).

In this system, there may be a high concentration of power, e.g., in the hands of a small set of companies controlling some key pieces of information, which could possibly be used to resolve some conflicts. However, these powerful entities may refrain from abusing of their power. This may happen because of the complex dynamics of multi-sided platforms (as discussed, e.g., by Evans 2016). Or it may happen because these companies are better off (e.g., in terms of risk of being regulated), if they simply decide to "do the right thing".

One may believe or not that Circular Economy business models will be implemented in the short to medium run. In case such business models are implemented according to the current expectations of scholars, they may lead to an apparently effective system, in which most conflicts are resolved in the best interest of most of the parties involved. This may include a desirable environmental impact. However, this may also be accompanied by a situation in which a minority of conflicts, which may be relevant just to a small percentage of citizens, are resolved resorting to the power of a small number of entities controlling an impressively growing amount of information.

In other words, based on an analysis of CE business models, this paper submits that a Circular Economy may look like a more or less enlightened infomocracy, in which most of the interests of society (or, at least, the short/medium term interests of the majority of citizens) are reconciled in an efficient way, but where there is also a growing concentration of power – in particular in the form of information about citizens – in the hands of a relatively small number of companies.

This focus on information and rights may lead to a discussion of data protection or privacy issues. This may be a natural expansion of the paper at hand, as I will recommend in the conclusion. The paper itself just provides the first building block in that direction, demonstrating that – on the basis of an analysis of the literature concerning the CE from a business model perspective – the collection of a growing amount of information is a precondition for the implementation of a Circular Economy.

2 Survey of Circular Economy Business Models and the Centrality of Information

A point that seems to clearly emerge from the analysis of the literature on CE business models is the centrality of the "products as a service" model. As Antikainen and Valkokari (2016) put it, "*one of the major changes in a circular economy will concern consuming and the role of consumers. The relationships between consumers and products and services will change significantly as the concept of owning will be replaced with buying access and performance.*"

Along the same line, the following is a graphical representation summarizing the Circular Economy Toolkit from the University of Cambridge:[2]

2 Circular Economy Toolkit, University of Cambridge, Institute for Manufacturing, 2013 (http://circulareconomytoolkit.org/. (Last visited May 15, 2017.)

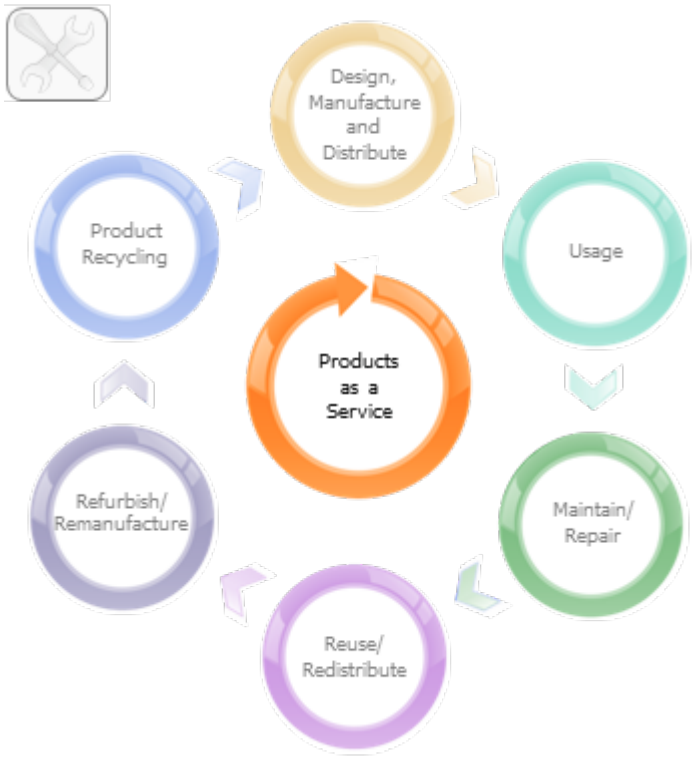

Figure 3. Source: University of Cambridge, Circular Economy Toolkit: http://circulareconomytoolkit.org/.

When the product is offered as a service, the provider "*typically has ownership of the product throughout the entire lifecycle and can manage the product through design, usage, maintenance, reuse, remanufacture and recycling*" (Tukker, 2004). Variations of this family of business models may include short rents or longer term leases, pay per use (or service unit), various forms of sharing or product pooling.

Jensen and Remmen (2017) describe this approach in term of *product stewardship*, which is interlinked with the concept of *extended producer responsibility*. And new enterprise information systems are an almost indispensable tools to support an efficient implementation of product stewardship: "*Digitalization and end-to-end optimization opens new possibilities – from automation of many work steps to decision support in*

situations like reuse and recycling. It calls for new data streams to be managed and central tools to handle information."

Some variations of the "product as a service" approach are actually at the core of CE business models also from the theoretical point of view. And the focus on information is likely not accidental. In fact, it is related with "*[the] probable foundations of sustainabilism*", as shown by Russ in a theoretical paper, discussing information, energy and an entropy based definition of capital (Russ 2016). The author submits that *"financial and economic data are at best a weak indicator of the present, and even worse predictor of the future state of an organization and of the economy."* In particular, this set of indicators is "*the best that we presently have, but it is probably not good enough. [...] Should information be used as a unifying measure in place of, or complementing, money as the basic unit of economic reality?"* Indeed, the role of money in economic theory is precisely to vehicle information about the scarcity and optimal allocation of resources. But the author argues that money communicates only *"the constraint of present economic resource scarcity, not future scarcity, with no social and environmental constraints"*.

This short paper is not an appropriate venue to discuss Russ' (2016) arguments, however it seems clear that the collection of many more pieces of information is one of "*the building block for the new sustainabilistic economy.*"

Coming back to a more empirical level, in its survey of Circular Economy business models, Planing (2015) exemplifies 4 business model categories, based on the customer perspective, as shown in the following table:

Business model category	**Short explanation**	**Example**
Ownership-based business models	Customer purchases a product and owns it right away	Purchasing a washing machine
Access- or Usage-based business models	Customer purchases a certain usage period or access period to a certain good	Leasing a washing machine for 12 Months
Performance-based business models	Customer purchases a defined performance, normally not bound to a defined product	Leasing a washing machine for 1000 washing cycles
Result-based business models	Customer purchases a defined end result	Providing a pick-up and delivery washing service

Source: Planing (2015)

Although this is not stressed by Planing, different business model categories also require a different amount of information.

Information is definitely minimum in the traditional, ownership-based business models, where parties are essentially concerned about payments (in some markets a registry of ownership may be considered efficient – e.g., for houses or cars – but the registered information is typically just the identity of the seller and buyer and the date of the purchase).

Access- or usage-based business models also require some kind of monitoring of the access or usage period. This usually requires the tracking of additional pieces of information.

Performance-based models require more fine-grained information about usage: it is not enough to identify the user and to keep track of time; also some metrics about

performance need to be monitored and associated with an individual user (or a token that he or she controls).

Result-based models may or not require more information. If they have to be cheaper and more convenient than plain ownership or performance-based approaches, a significant amount of information is usually needed. In fact, in access-, usage-, performance-, or result-based models, another distinctive feature is the efficiency of access, usage, etc. In particular, the waiting time to be granted access/usage or to receive the delivery of the final performance/result is a key element of customer satisfaction. And additional information is needed to make such waiting time tend to zero. It's not by chance that car sharing models started to be widely adopted just after the widespread adoption of smartphones (and GPS, and wireless Internet connectivity in general): performance/result-based models typically require granular information about the position and current status of the goods and of the customers.

To be sure, it is possible to vary the amount of customer-related information in each model in several ways, e.g., by anonymizing certain pieces of information, or discharging them after use. However, while the obvious and cheapest implementation of an ownership-based model requires almost no information, apart from the one related to the flow of money, the most basic implementation of a result-based model also requires information about the moment and place in which every customer needs a certain result to be delivered. Making such model more anonymous requires sophisticated add-ons.

The aforementioned business models only describe "the inner circle of a circular economy". To complete the outer circle, one has to adopt a broader perspective, along the entire product life. And this requires additional pieces of information, e.g., "*the development of reverse networks for resources only has become efficient when materials are traced via RFID or other identification technologies.*" (Planing, 2015)

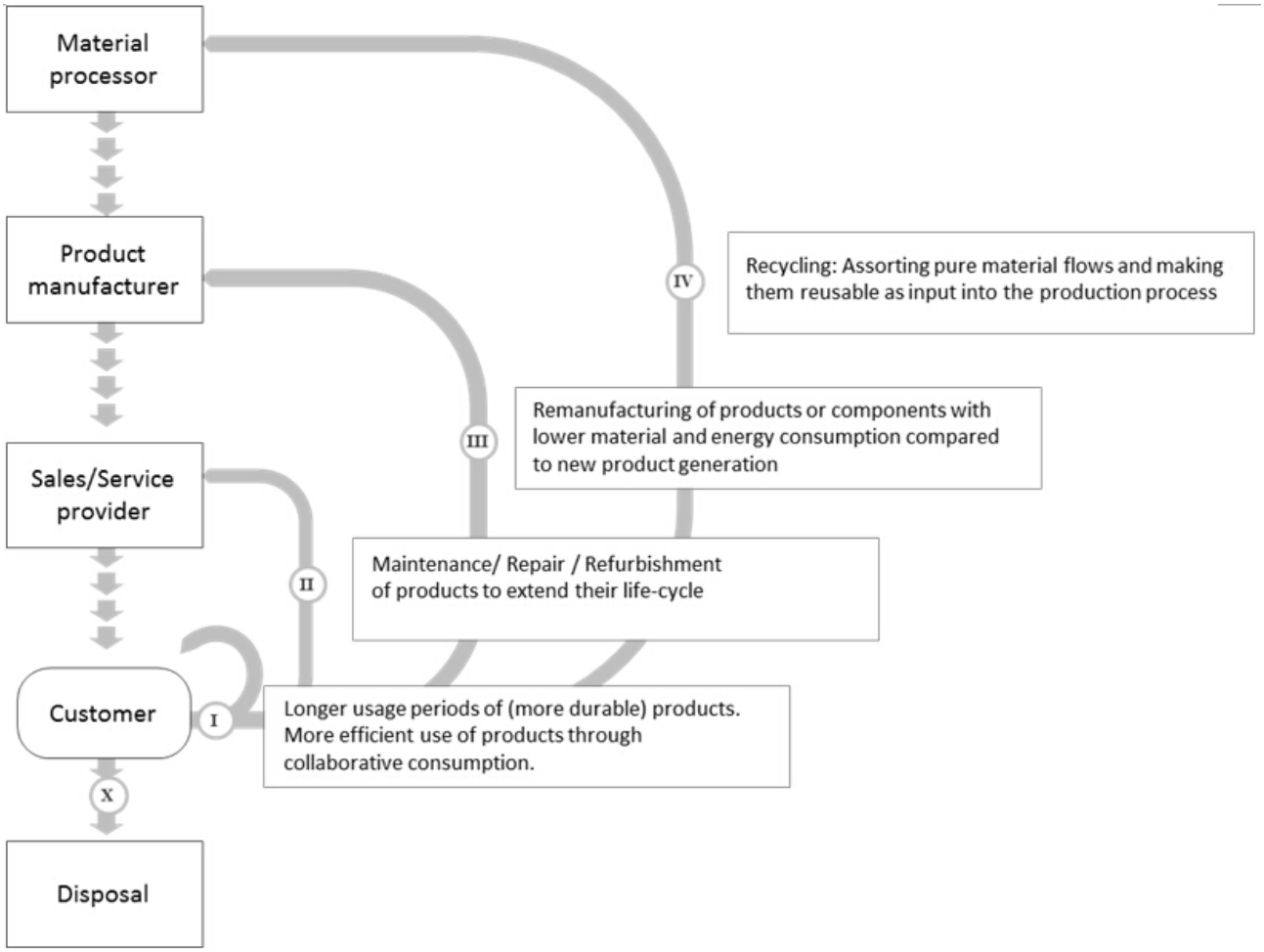

Figure 4. Source: Planing (2015), based on Ellen McArthur Foundation, 2014. Originally developed by Stahel and Reday-Mulvey, 1981.

In general, moving from I to II in Figure 4 requires additional pieces of information from the customer, which is usually "conveniently" acquired through monitoring activities performed by IoT components, instead of explicit interactions between the customer and the manufacturer. Actually, this is the innovation: at virtually no cost for the end-user – apart from paying for the services they deliver – IoT-enabled Circular Economy products are taking care of themselves. Similarly, most successful implementations of III and IV require additional exchanges of information amongst manufacturers, and a high likelihood that the product neatly comes back under the control

of the manufacturer, which is much more likely if ownership-based models have been substituted with usage-based (or otherwise temporary) ones. If the product is continuously monitored and if its return to the manufacturer is incentivized, the latter may efficiently refurbish, remanufacture or recycle it. Otherwise, a significant effort on the part of the consumer is typically required.

In another survey of CE business models, Lewandowski (2016) clusters such models along the following dimensions: Regenerate, Share, Optimise, Loop, Virtualize, Exchange. Once again, and in particular with respect to the examples related with sharing, optimizing, looping and virtualizing, the "product as a service" approach and the need of collecting increasing amounts of information are commonplace.

The centrality of services – i.e., the servitization of everything – that characterizes Circular Economy business models is actually part of a broader trend. With their seminal paper "Evolving to a New Dominant Logic for Marketing", Vargo and Lusch (2004) introduced a meta-theoretical framework for explaining value creation as service-for-service exchange. Within this framework, the traditional logics of exchange is substituted by the following axioms (Vargo and Lusch 2017):

- service is the fundamental basis of exchange;
- value is cocreated by multiple actors, always including the beneficiary;
- all social and economic actors are resource integrators;
- value is always uniquely and phenomenologically determined by the beneficiary;
- value cocreation is coordinated through actor-generated institutions and institutional arrangements.

The IoT and related technologies (from smartphones to cloud robotics) clearly expand the potential for applying similar models. And, in a CE context, some of the axioms are even more central, from co-creation and resource integration, to the emergence of actor-generated institutions and institutional arrangements.

So, although it is hardly possible to predict the likelihood that CE business models will become successful or even prevalent,[3] several commentators are convinced that it is likely that one of their precondition – i.e., the evolution toward a service-dominant logic – will progressively take place in many sectors of the economy (Vargo and Lusch, 2017).

3 POLICY

Within a service-dominant logic, where value co-creation is commonplace, there is a high likelihood of generating value through the reconciliation of interests – as Ury et Al. (1988) put it and as we discussed in the introduction. But there is also a higher potential for exchanging the (personal) data of end-users in ways that they do not full understand and/or a stronger need for coordination amongst companies. It is therefore interesting to analyse how antitrust or other competition policy tools are addressing the domains characterized by the collection of significant amounts or data (which may or not be considered as Big Data), thanks to the IoT.

On the one hand, IoT ecosystems may also represent paradigmatic multi-sided platforms. In this case, the possibility of exercising market power on end-users is constrained by the risk of losing users on the other sides, e.g., in terms of connected devices, application developers, etc. The complexity of market power assessment in multi-sided platforms is increasingly recognized by courts, as discussed by Evans (2016). In particular, market shares should be used cautiously, and dynamic competition may result in feature competition, so that also prices are a poor proxy of value extraction on each side of the market. Therefore, most antitrust lawyers may be quite reluctant to apply traditional antitrust tests in this domain and/or may systematically find that a direct intervention is premature. This is discussed in Ricolfi (2017), concluding that we may have to rejig antitrust, coming back to its origins and taking into account the dimension of "power" (power in broad sense, and not just "market power" within a "relevant market" as defined by a pre-defined SSNIP or similar test).

3 Amongst the many policy levers that I cannot fully discuss here, one is especially worth mentioning when discussing the likelihood that CE business models actually become widespread. As discussed by Witjesa and Lozanoa (2016), it consists in using public procurement to incentivize the adoption of Circular Economy approaches.

On the other hand, Lundqvist (2016) discusses some sector-specific regulations, which may provide interesting hints toward this rejigging of antitrust. The author suggests that a new form of antitrust harm (or "new non-discrimination theory") may be emerging, whereby "*a dominant firm cannot 'self-preference' it[s] 'own operations over those of competitors' in a discriminatory way.*" Such an approach is not actually emerging in the form of a new antitrust doctrine. Instead, as the author put it, "*[s]ector specific regulations seem to be the tool to be used to access competitors Data in the 21 st Century.*"

The first example mentioned by Lundqvist (2016) is the eCall Regulation (Regulation EU 2015/758), concerning type-approval requirements for the deployment of the eCall in-vehicle system based on the 112 service. According to Recital 16 of the Regulation, "*[i]n order to ensure open choice for customers and fair competition, as well as encourage innovation and boost the competitiveness of the Union's information technology industry on the global market, the eCall in-vehicle systems should be based on an interoperable, standardised, secure and open-access platform for possible future in-vehicle applications or services. As this requires technical and legal back-up, the Commission should assess without delay, on the basis of consultations with all stakeholders involved, including vehicle manufacturers and independent operators, all options for promoting and ensuring such an open-access platform and, if appropriate, put forward a legislative initiative to that effect. Furthermore, the 112-based eCall in-vehicle system should be accessible for a reasonable fee not exceeding a nominal amount and without discrimination to all independent operators for repair and maintenance purposes [...].*"

The second example is represented by the Directive on Payment Services 2 (Directive EU 2015/2366), in particular in the part concerning third party payment service providers. The two most relevant articles are Article 66, on "Rules on access to payment account in the case of payment initiation services", and Article 67, on "Rules on access to

and use of payment account information in the case of account information services".

As discussed by Reijers (2016), Payment Account Access Services (PAAS) are about accessing to bank (and similar) accounts, through the use of third parties, either for acquiring payment information or for payment initiation. In this context, Account Information Service Providers, or "*AISP's will allow a customer to have a holistic user-friendly overview of payments for a single or for multiple accounts supported by downloaded payment data from banks. This results in a complete overview on the customers financial position.*"

Finally, and possibly more importantly, the "Right to data portability," as expressed in Article 20 of the General Data Protection Regulation, represents a tool that may indirectly foster competition, in case its implementation progressively becomes automatable.

The eCall Regulation, the Directive on Payment Services 2, and the Right to data portability are described by Lundqvist (2016) as parts of a broader trend toward boosting "*competition by granting access to competitors Data, while circumventing general competition law*" – as the author critically puts it – or – if you prefer – without recurring to the complex and case by case analysis that competition law would require to achieve similar results.

It may be disputed whether such an approach is necessarily pro-competitive. On the one hand, those who are sceptical of such forms of mandated access may argue, as Lundqvist (2016), that "[t]his may act as a deterrent for the brick-and-mortar industry firms to become full-fledged competitors *in the Data industry. Indeed, the incentive of becoming members of the data industry may be low if a brinck-and-mort[a]r firm knows that it is obliged to share the input Data, i.e. its raw material.*"

On the other hand, these regulations may be described as a new tendency, which could possibly represent the sector-specific forefront of the rejigging of antitrust (or, in this case, competition law) that Ricolfi (2017) recommended.

4 CONCLUSION

I would like to conclude coming back to the focus on distressed versus effective systems (Ury et Al. 1988) that characterized the introduction of the paper at hand and of the overall research in which it is framed. Such theoretical contribution is a landmark of the literature on negotiation. As discussed by Ury (2007), in negotiating, rights may have a relevant role as standards even in cases in which the conflict resolution mechanism is the balancing of interests. In particular, rights may provide a standard that the parties refer to in building their expectations and creating scenarios.

To use a euphemism, today, attention to privacy and data protection issues is not part of the standard worries of those who think about the (hopefully forthcoming) Circular Economy. In fact, if one searches for "privacy", or "data protection", or even "fundamental rights" on the Circular Economy Toolkit website of the University of Cambridge, no results are returned.[4]

The modest contribution of the paper at hand is to highlight that Circular Economy business models are characterized by a common focus on collecting growing amounts of (personal) information. Collecting this information and acting on the basis of the information collected is actually the reason why the IoT is one of the preconditions of a Circular Economy. Therefore, privacy and data protection should be part, by design and by default, of Circular Economy business models. Or, at least, as citizens we may demand that this is the case and act as if this was a standard reference in building an effective system.

4 Own search on http://circulareconomytoolkit.org/ on May 15, 2017.

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