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Responsible Innovation Between Virtue and Governance

Revisiting Arendt's Notion of Work as Action

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Abstract

Recent developments in responsible innovation have focused on the governance of innovation processes. The dimension of virtue in innovation processes has thereby been largely overlooked, and more significantly the constitutive relation between virtue and governance that enables responsible innovation. To understand responsible innovation in terms of this relation, this paper turns to Hannah Arendt's ontology of the Vita Activa. First, it problematises responsible innovation in Arendt's work, but then points at a hitherto undiscussed possibility of responsible innovation as 'work in the mode of action'. Second, it explores this possibility as it arises out of nine modes for human activity in Arendt's work, arguing that it constitutes a hybrid activity between world and plurality, durability and fragility, and the firm and the public sphere. Third, it explains how the 'web of stories' links virtuous action and governance, which points at a novel understanding of the role of narrative for responsible innovation.

Keywords: Arendt, responsible innovation, virtue, governance, narrative

1. Introduction

The unceasing process of technological innovation across the globe seems to harbour a conundrum. On the one hand, it is aimed at delivering greater prosperity and well-being: it has made a great number of people healthier, more comfortable and more secure than ever before in history. On the other hand, it feeds into complex, global problems that result from the entanglement between technological innovation, societal developments, and earth processes. The most prominent example would be climate change (Zwier & Blok, 2017), which results from the increasing exploitation of the earth's materials and processes for the purpose of growing prosperity and well-being, to a great extent driven by technological innovation. Another timely example is the development of artificial intelligence, which optimised business-to-business processes as well as consumer experiences, but has also raised concerns of massive violations of privacy and a loss of human autonomy (Frischmann & Selinger, 2018). The negative impacts of technological innovations have led to a worldwide call to responsibility. This call has resulted in a proliferation of new practices for stakeholder engagement, value sensitive design, professional codes and ethical principles, and many other initiatives to make innovation processes more responsible.

Studies and practical initiatives of responsible innovation have mostly focused on governance, and on institutional aspects of responsibly dealing with the impacts of technological innovation. One could for instance consider the EU's efforts to implement frameworks for environmental assessment[1] or to create a framework with ethical guidelines for trustworthy AI (AI HLEG, 2019). Similarly, responsible innovation scholars propose structures to anticipate impacts of technological innovation, reflect on those impacts, include stakeholders to shape impacts and propose structures to deliberate about impacts (Owen et al., 2013; Reijers et al., 2017). This general focus on *governance* of the impacts of innovation has led to a neglect of the attitude, or *virtue* of responsibility in innovation activities[2]. It is one thing to design better institutional structure for the responsible management of innovation processes, it is yet another to work on a culture of responsible innovation that turns people into responsible agents. Some recent studies address this issue (cf. Blok, Gremmen, & Wesselink, 2016), investigating the role of individual virtue in fostering responsible innovation, and also asking whether individual virtue even has a place in innovation processes (Blok, 2019).

We cannot, however, uncritically assume that either institutional arrangements or individual virtues by themselves are sufficient to address the potential negative impacts of technological innovation, to foster *responsible innovation*. Rather, these two aspects are inter-related (cf. Pandza & Ellwood, 2013). Political theorists have long been aware of this dynamic in the context of 'responsible' governance: a political community needs to be well organised to support responsible institutional practices (e.g., support

1 See: https://ec.europa.eu/environment/eia/index_en.htm

2 For notable examples, see Coeckelbergh's book *Environmental Skill* (2015) and Vallor's book *Technology and the Virtues* (2016). However, these books are not situated within the discourse on responsible innovation.

procedural arrangements to support distributive justice), but at the same time it requires its citizens to possess some minimal qualities, called civic virtues (e.g., vigilance to engage in political participation). Political governance and individual virtue, so to say, stand in a constitutive relation to one-another. In the present context, there is a need to understand this *relation* between innovation as a human activity and the virtues of innovation practitioners. In the responsible innovation literature, this relation has been thematised by Grinbaum and Groves (2013), who argue for the importance of virtue and suggest ways to cultivate it through moral education. To better understand the relation between virtue and governance, this paper departs from Hannah Arendt's work *The Human Condition* (1958). It does so for two reasons. First, Arendt is uniquely positioned as a theorist of both technologically mediated human organisation and the problematics of human virtue. Second, she is one of the few scholars who theorised the *relation* between these two aspects, by relating an ontology of organised human activity (*Vita Activa*) to an understanding of the human condition, which crucially involves an understanding of virtue (Arendt, 1958, 191) and human freedom.

This paper contributes to the literature on responsible innovation and scholarly work on Arendt's legacy (cf., Groves, 2015). It offers an understanding of responsible innovation that involves a constitutive relation between governance and virtue, as well as an interpretation of Arendt that puts her ontology of human activity in a new light. The paper does not aim to provide a new, authoritative critique of Arendt's work, but instead to open up hitherto unexplored possibilities concerning its application to the problematic of responsible innovation. The first section argues that innovation as a *responsible* human activity is initially problematic in light of Arendt's work, but would also be possible as 'work in the mode of action'; a mode of human activity that has remained underdeveloped by Arendt. The second section revisits Arendt's concept of work or fabrication as a solitary activity that finds its only place in the market. It argues for the possibility of work in the mode of action that enables workers to act and speak in concert, in the context of a transformed version of the firm as the site of responsible innovation. The third section develops this notion of work in the mode of action, elaborating on the idea that narrative mediates between virtue and governance. Responsible innovation means taking the role of narrative structures seriously.

2. The Problem of the Responsible Innovator

This section problematises responsible innovation. Although Arendt does not use the concept of responsibility often in *The Human Condition*, it becomes clear that she wields it foremost as a *political* concept, connected to human action (cf. Arendt, 1958, 233). Her later work on collective responsibility confirms this, stating that in taking political action, we take responsibility 'for things we have not done' (Arendt, 1987, 50), for instance for mitigating climate change. A political understanding of responsible innovation resonates with some recent voices in the literature, who argue that responsible innovation is too much concerned with ethics and too little with politics (cf. Himmelreich, 2020; Wong, 2019). Politics and power in innovation practices are

insufficiently theorised, which makes us blind for the ways in which deliberation is organised, political standpoints influence deliberation processes, and deliberation outcomes are enforced (Oudheusden, 2014). In other words, we too often disregard that responsible innovation is an activity of acting and speaking in concert.

However, in Arendt's work the idea of a responsible worker, and therefore of the responsible 'innovator', initially seems to be problematic because (1) work is done in isolation (Arendt, 1958, 161) while responsible action would imply acting and speaking together (e.g., stakeholder and citizen engagement) and (2) work involves the categories of means and ends while political action knows no end because it is entirely *unexpected*. This means that responsible innovation, as responsible work in the context of Arendt's ontology of the Vita Activa, could seem to be a contradiction in terms. Arendt can therefore be considered as an inevitable critic of technological innovation, for as a human activity it can never aspire to the ideal of responsibility. One might object that we cannot uncritically apply Arendt's understanding of innovation to our current time, for it was not yet embedded in a reflection of 21st century innovation practices that are thoroughly mediated by the Internet and digital technologies; innovations that were not yet in place in a ubiquitous manner when Arendt wrote *The Human Condition*. Yet, even though Arendt's ontology of human activity is historical, we have not yet entered a post-human era. That is, the central ontological tendencies that Arendt wrote about, of the domination of process under global capitalism and the cybernetic mode of human organisation that foreshadowed the impacts of the digital revolution (cf., Simbirski, 2016), are still at play today; which makes her ontology all the more relevant.

A critical view of responsible innovation from an Arendtian perspective resonates with recent critiques of responsible innovation in the current, capitalist mode of innovation, which operates in an economic paradigm (Blok & Lemmens, 2015). Such a negative view of 'responsible' innovation seems to have currency when we consider the status quo of innovation practices in the 21st century. In this context, innovators cannot act responsibly because they are bound to an economic understanding or logic of innovation, which leaves no room for meaningful virtue to develop or to be exercised. If we follow Arendt's critique of the modern economy, we observe that innovation as an exclusively economic phenomenon obstructs political action because it leads to increasing worldlessness (Arendt, 1958, 118). This has two reasons: (1) economic innovation operates as a process, which moves in a cyclical mode of production and consumption and (2) its products are not durable but essentially perishable, they are produced for conspicuous consumption. For instance, social media content as a product of capitalist innovation is produced to perish; to serve the economy for a limited time before being made obsolescent. Similarly, an iPhone's functionality diminishes through time, even if it is not used; its firmware, battery, and so forth, are not durable. Information and communication technologies even challenge the notion of 'world' and worldliness as such, for they give rise to digital objects that are fully relational (Hui, 2016).

In our age of surveillance capitalism, use objects have become consumer goods, and have come to dominate our understanding of the world (Arendt, 1958, 309). In order to counter the current, economic paradigm of innovation in a capitalist system

and open up a space for political action, innovation activities should address the related issue of worldliness. This means that *if* responsible innovation is a possibility, it should be organised in such a way that it fosters the construction and maintenance of a durable, common world. Arendt might leave us little hope, however, because as we saw her notion of work seems to exclude the possibility of working towards a durable world in a responsible way (i.e., as political action). Yet, we argue for a different interpretation of Arendt's discussion of work[3], which does *not* automatically lead to the conclusion that responsible innovation is a contradiction in terms.

Let us first problematise the concept of work, by pointing at some ambiguities it contains. Many critics of Arendt insert ambiguity by questioning the adequacy of her historical account of Ancient Greece (c.f., Tsao, 2002; Canovan, 1978). Such historical ambiguity is telling, because it points at potential inconsistencies between Arendt's ontology and its applicability to particular spaces and events. Yet, Arendt's main engagement was with the philosophical (mostly Aristotelian) understanding of the Vita Activa. This means that we need to establish ambiguity *both* at the historical and at the ontological level.

From a historical perspective, work reveals its ambiguity both in the direction of labour and of action. On the one hand, the concept of *administration* that Arendt exclusively assigns to the household and the private sphere (Arendt, 1958, 28), cannot uncritically be assimilated to the activity of labour. For Arendt, administration happens in the mode of labour because it has been derived from the way in which an individual (the pater familias) runs the household, and thereby sustains life (Arendt, 1958, 33). Yet, the historical concept of administration is ambiguous, because (1) the administrators of the ancient household were not the masters but the servants (e.g., women) of the oikos; (2) the 'necessities' provided by household administration were not merely necessities for life (Zoë) but also for the 'good life', which indicates that it includes the provision of durable use objects and therefore constituted 'world' in addition to 'life' (Leshem, 2016, 229); and (3) household administration operated within the categories of means and ends (*techne*), which relates it to work rather than to labour. Given these nuances, the activity of administration could also be placed within the category of work[4].

On the other hand, the activity of work might engender political action, which suggests that the workplace is not merely an a-political place. When Arendt discusses the guilds, she emphasises their a-political nature by arguing that they were organised according to the model of the family household (Arendt, 1958, 35). Yet, the activity of

[3] The only 'true' isolated craftsman for Arendt seems to be the artist (the poet, the painter), but the artist, while bridging the categories of work and action does not produce the worldliness that is necessary for political action to be sustained, to counter frailty of human action.

[4] Moreover, Arendt does not talk about the *location* for work in *The Human Condition*, even though she does discuss the locations for labour and action. This might be due to the scarcity of ancient sources that give clarity on the location of where the crafts were performed. However, it seems clear that work both took place within and without the household; from workshops managed by families to studios of masters with apprentices probably traveling from their homes to the workshops (Elini, 2013). The very least we could argue is that insofar the ancient workshop differed from the oikos, the medieval workshop of the guild, the modern factory and the modern workshop cannot simply be assimilated to the extended household.

work in the guilds is historically ambiguous, because (1) craftsmen often had to travel from their households to their working place, which throws doubt on the understanding of the guild as the extended household; (2) the guilds performed important political functions and were not solely structured according to the master-servant or master-apprentice relation, as for instance merchants – apart from the master artisans – co-governed the guilds (Soly, 2008); and (3) the guilds were at times the birthplace of republican political ideals, such as was the case with 'guild republicanism' in 14th century Florence (Najemy, 1979). These historical nuances do not invalidate Arendt's perspective, but rather open up spaces of conceptual ambiguity that invites for a reinterpratation of the notion of work. This leads us to the more significant *ontological* ambiguity in the notion of work.

From an ontological perspective, we might question the notion of work by reconsidering Arendt's appropriation of Aristotle's ontology, as it was reinterpreted by Heidegger. With Aristotle, Arendt put *poeisis,* or production, in opposition to *praxis,* or political action. Yet, the distinction between labour and work is 'unusual', even to Arendt's own admission (Villa, 1996, 26), and does not directly derive from Aristotle. Work for Arendt is as a solitary activity, in which the worker is alone with his idea (eidos) in 'splendid isolation' (Arendt, 1958, 161). In drawing work into the Vita Activa, Arendt made a move similar to Heidegger in his famous essay *Question Concerning Technology* (1977). Heidegger considered modern technology as a mode of revealing of *enframing*, which is a challenging-forth into ordering of the world (Heidegger, 1977, 25). This means that modern technology sets human beings on a way of revealing that is restricted to the 'in order to' relation, and never reaches the 'for the sake of which' relation; the *telos* of work for Dasein. A very similar remark we find in Arendt, who argues that Homo Faber is faced with the 'incapacity to understand the distinction between utility and meaningfulness, which we express linguistically by distinguishing between in order to and for the sake of' (Arendt, 1958, 154). In other words, work in Arendt resonates strongly with what Heidegger designated as modern technology.

Yet, modern technology, for Heidegger, is not the proper mode of the crafts. Work, as *techne*, revolves around the dialectic of the 'ready-at-hand' and the 'present-at-hand'. It consists of a focused activity in which the tool becomes transparent, but also of the possible breaking down of the tool, which reveals a 'manifoldness of concerns' (Heidegger, 2009, 49). This manifoldness of concerns, which Heidegger derives from Aristotle, negates the solitary nature of work, and instead situates work in a totality of relevance through which the 'in order to' refers to that 'for the sake of which' the work exists in living together in a political community (Heidegger, 2009, 50). Taking this perspective, we can argue that Arendt's notion of work proper is similar to modern technology, in which the engineer indeed finds himself alone with his idea. This leaves us room to rehabilitate work as *techne*. In other words, when engaged in work as crafts, Homo Faber is not alone with his idea, but rather finds himself in the midst of a totality of relevance of living together in a political community. Even though work might appear solitary in that it somehow comes to an 'end' (telos) in the use object, at the same time it points beyond ('refers') to a manifoldness of concerns or a 'use context'

(cf. Ihde, 1979) in which others are involved. Taken together, we have opened up the notion of work by demonstrating both its historical and ontological ambiguity.

The problem of setting work clearly apart from labour and action derives from its essentially mediating character. Work is never 'pure' but is instead always caught up in the realms of labour (by providing for necessary use objects) and action (by referring through a use context to a mode of being-with-others). The same counts for innovation. For instance, innovation in the context of sustainable energy production involves the ceaseless process of production and consumption of electricity, which belongs to labour, while it is also caught up in a use context of political deliberation concerning 'green' innovation. This 'impurity' and ambiguity of work leads to an opening for the possibility of responsible innovation, namely for the possibility of 'work in the mode of action'. Work in the mode of action entails that activities appearing as work, in producing durable use objects that constitute worldliness, are performed in a mode of speaking and acting in the workplace or the firm. The workplace, as distinct from both oikos and polis, thereby performs a mediating role between the work to be realised and the political action that guides it.

3. Work in the Mode of Action

Instead of the initial conflict between Arendt's understanding of responsibility and the human activity of (economic) innovation, we see another possibility in her work, namely that responsible innovation can be understood as 'work in the mode of action' that brings about a durable, common world. The activity of innovation 'proper' is mainly understood as an instance of work, operating within the categories of means and ends. Yet, responsible innovation requires a *political* attitude or state of character, insofar innovators (makers, engineers) ought to have the freedom to act responsibly and be able to act and speak with others in order to coordinate their activities with the political activities of their fellow citizens. Responsible innovation therefore ought to happen in the mode of *praxis*, or political action. How would such an activity be possible?

Following Arendt, our theoretical framework comprises an ontology of human activity (Vita Activa). According to this ontology, we can distinguish *nine* modes of human activity in *The Human Condition*[5]. Each mode gathers three interpretations of human activity. First, a mode denotes how an activity appears, namely as life (labour), as world (work), and as plurality (action). For instance, we encounter 'a work' when an ancient Greek temple appears, because it discloses a distinct world. Second, a mode

[5] We encounter work in the mode of labour and action in the mode of work at numerous places in *The Human Condition.* For instance, Arendt argues: 'what dominates the labour process and all work processes which are performed in the mode of labouring is neither man's purposeful effort nor the product he may desire, but the motion of the process itself and the rhythm it imposes upon the labourers' (Arendt, 1958, 146); and 'how persistent and successful the transformation of action into a mode of making has been is easily attested by the whole terminology of political theory and political thought, which indeed makes it almost impossible to discuss these matters without using the category of means and ends and thinking in terms of instrumentality' (Arendt, 1958, 229).

denotes the interpretation of its appearance in terms of temporality: (1) life, as *process*, has the temporal character of futility; (2) world, as *a collection of use objects*, has the temporal character of duration; and (3) fragility, as *the unexpected*, has the temporal character of fragility. Third, a mode denotes the historical site or place in which the organisation of the activity happened, namely in the household (labour), the market (work), and the public sphere (action). For example, we encounter political action in the parliament (ideally, that is), insofar members of parliament act and speak in concert. In what follows, we will substitute the workplace or the firm for the market, for we argue that it is the site of work 'proper', rather than the market.

Notably, a certain human activity can *be* in the mode of another, which means that its mode of temporality changes even though its appearance does not. For instance, in the industrial revolution 'work' became organised in the 'mode of labour'. Artisans were sent to the textile factories in which their activity of work that focused on the production of a finished, durable product, was transformed into a futile process without end, leading to alienation. The 'work' that was encountered (e.g., a tapestry) might have appeared similar as before, but the activity producing it had been transformed into labour. Eventually its appearance also follows the activity's temporal transformation, in that use objects have been increasingly transformed into consumer goods.

Remarkably, Arendt seems to discuss only six out of the nine possible modes of human activity in *The Human Condition*. First, she discusses labour, work, and action *proper*, meaning that the respective mode of being in terms of its temporality corresponds with its mode of appearance (e.g., labour as a mode of being appears *as* labour when we consider tasks like cooking and cleaning in the household). Second, she discusses how both work and action are performed in the mode of labour. Work in the mode of labour corresponds with Marx's critique of labour in the industrial revolution and means that the worker becomes 'instrumental in the production of objects of whose ultimate shape he has not the slightest notion' (Arendt, 1958, 141). In the context of contemporary innovation, this activity is for instance facilitated by Amazon's 'Mechanical Turk', which crowdsources tasks that computers are still unable to perform (e.g., to provide human annotated data for machine learning processes). Arendt then discusses action in the mode of work, which has impregnated political activity with the categories of means and ends (Arendt, 1958, 229). This resonates with the idea of 'public management', which considers politics to be simply about aligning different means, such as infrastructure, public education, and social welfare, as efficiently as possible with pre-given ends. An example would be the performance of the 'new public management' paradigm in higher education institutions, which includes the strengthening of executive functions and implementation of evaluation metrics, including publication output metrics like the H-Index. Finally, Arendt discusses the most serious development in modern times, the coming to be of action in the mode of labour. This implies that the entire lifeworld, including the public sphere, is dominated by *process*, the relentless cycle of production and consumption. Such a mode of human activity envisions 'political communities in the image of a family whose everyday affairs have to be taken care of by a gigantic, nation-wide administration of housekeeping' (Arendt, 1958, 28). A telling example in this context is the emerging

Chinese Social Credit System, which aims to subsume public life under a logic of continuous interference based on constant surveillance and evaluation of behaviour (Orgad & Reijers, 2019).

Three other modes of action have remained undiscussed in Arendt's work, one of them being work in the mode of action, which is the crucial type of activity to consider in the context of responsible innovation. It is unclear why Arendt left these three modes aside, and it would be beyond the scope of this paper to investigate the motivation for her to do so. Nevertheless, these modes are relevant to consider because they harbour distinct emancipatory possibilities. How do these three previously concealed types of human activity arise out of Arendt's ontology?

First, labour in the mode of work and work proper are two distinct activities, though Arendt discusses them together. For Arendt, work is the activity of a craftsman, for instance a shoemaker, who works in a solitary manner; in isolation. However, she designated the marketplace as the proper place for the craftsman, even though the crafts existed long before human beings invented the market in the context of specialisation. Does this mean that work only arose with the emergence of the market, or that it rather had a different mode of appearance before? In the foregoing discussion, it already became clear that work is ambiguous, both from a historical and an ontological perspective. Accordingly, we distinguish two different types of human activity. Labour in the mode of work corresponds with the solitary craftsman and was historically mostly performed in the household. This work was still a-political, and only performed in service of the oikos; perhaps finding its most striking illustration in the building of a house, the activity of the mason. Work 'proper' only arose in the context of specialisation and the surge of the market. An example would be Aristotle's saddle maker, who would build saddles for war waged by the city state he belonged to (Heidegger, 2009, 50). Work proper is *not* a solitary activity but instead is a communal activity that takes place in the confines of the workplace or firm, which is its primary historical site. In the modern world, the paradigmatic site of work proper might be the *start-up*, which sets up a small communal group of skilled workers who together work towards a durable end product, the 'proto-type'. Even though teamwork, which was denounced by Arendt as being destructive of skill (Arendt, 1958, 161), might belong to work in the mode of labour, work proper opens up the possibility of co-design. Consider for instance open source communities in which workers together contribute to the same code, working without any division of tasks.

Second, there is labour in the mode of action, which designates the possibility of politics in the context of labour in the household. As such, the household is not merely a site of domination, but also of emancipation and political struggle. This realisation has been a point of frustration of feminist critics of Arendt, who saw in her work the failure to recognise political action for the masses of slaves and women who were oppressed in ancient Greece (Benhabib, 1993). The idea that political action is a possibility within the confines of the household resonates with recent work on non-capitalist, political modes of production (see e.g., Gibson-Graham, 1996). In a similar vein, feminist social theorists like Zelizer argue that the use of money in the household has had political consequences (Zelizer, 2000). While not being the focus of this paper,

the possibility of labour in the mode of action provides a fruitful starting point for investigations into the possibility of political action in household contexts.

Third, and foremost, *The Human Condition* allows for the possibility of work in the mode of action. This, we argue, is the paradigmatic type of human activity that enables 'responsible' innovation, and therefore a distinctly political and ethical activity in which those engaging in the activity can become virtuous. Work in the mode of action implies that what appears as the activity of work in the context of the modern *site* of work, which is predominantly the workplace or firm[6], at the same time signals a transformation of this activity into action. Instead of innovation becoming a hybrid between work and labour, as both Arendt and Marx rightly feared in the context of a prolongation of the industrial revolution, it could become a hybrid between work and political action. Even though this form of innovation will be rare in a context of global capitalist production and difficult to realise at a large scale in our current time, Arendt's ontology gives us a sense both of what it might mean and where to look for it. Accordingly, responsible innovation would encompass three aspects:

1. In terms of work's *appearance*, responsible innovation is a hybrid between a durable world and plurality. This can be illustrated by what Stam et al. (2020) call the idea of open script, the appearance of a product of innovation as something that is both specific (the 'closedness' of a world), but also open to appropriation (the plurality of 'use', beyond use in the economic sense). An architectural structure, for instance, can constrain its users by aligning them strictly with the means-end logic of work, but can also invite them to appropriate a space according to their own political agency, thereby distilling an active sense of responsibility; the capacity to initiate.
2. In terms of work's *temporality*, responsible innovation is a hybrid between durability and fragility. This implies that the activity will establish durability of a common world, but not necessarily in terms of durable objects but rather in terms of durable *relations* between the things that make up our world and the human capacity to act and speak in concert. As Arendt explains, political action consists in having power in common (Arendt, 1958, 204), and human institutions give durability to this power in common. As such, responsible innovation is concerned with arranging the durable world in such a way that it is conducive to the sustenance of human institutions that enable power in common. For instance, certain responsible forms of 'sustainable finance' are not primarily about creating durable use objects, but rather about establishing a durable relation between the 'things' that make up the financial world (e.g., investments, loans) and the capacity of people to exert power in common over the way in which these things are arranged.

[6] "The firm" connects with Arendt's concept of work as a human activity that established durability, for its etymology derives from the strength and steadiness of object, as well as the permanent and enduring nature of promises and agreements.

3. In terms of the historical *site* of innovation, work in the mode of action gives rise to a transformed version of the workplace or the firm. This site does not facilitate work as an isolated activity but is rather primarily a space in which people act and speak in concert, resembling the public sphere. To illustrate: it can be a space in which workers meet to debate the way in which their activity contributes to a 'better' world (cf., Gibson-Graham, 2003). This space can also be in cyberspace. For instance, consider the Github repository (see: https://github.com/home-assistant/core) of 'Home Assistant' (an application to automate 'smart home' appliances), one of the largest open source projects in the world to which thousands of innovators from different countries contribute. This space combines the working on the code with deliberation about its purpose, values, and further development.

Hence, we have established a possible meaning of 'responsible innovation' in light of Arendt's ontology of human activity. As such, we have shown that Arendt is *not* an inevitable critic of responsible innovation as it might initially appear but offers valuable resources to rethink responsible innovation in light of the limitations of an approach that only focuses on governance or on individual virtue. That said, we have not yet explored how the activity of responsible innovation is made possible by a constitutive relation between governance and virtue. In the next section, we turn to investigating this relation.

4. Narrative and Responsible Innovation

Here, we return to our initial concern: the constitutive relation between governance and virtue. What gives rise to this constitutive relation, and as such makes possible the activity of responsible innovation? The answer to this question lies in Arendt's account of what binds people who act and speak with one-another to their institutional reality: namely, an intangible 'web of human relationships' that gains reality through a 'web of stories', which can be encountered in entities such as documents and monuments (Arendt, 1958, 184). In other words, responsible human activities are made possible by *narrative structures*.

The role of narrative in responsible innovation has been extensively discussed. In approaching the 'hermeneutic side of responsible innovation', Grunwald examines how narrative 'visions' shape our reinterpretations of nature, thereby making different 'techno-futures' understandable (Grunwald, 2014, 288). Methodologically, this approach connects with methods such as 'vision assessment', which implies the investigation of narratives that shape public discourse (e.g., media analysis, expert interviews) (Karafyllis, 2009). The significance of narrative in responsible innovation has also been discussed in relation to virtue. In this respect, Dupuy argues that a lay ethics concerned with innovation resonates with virtue ethics, and the stories told in the thick of everyday life. Virtue ethics, in turn, is 'inseparable from a reflection on the narrative structures of human life' (Dupuy, 2010, 154). Responsible innovation can be

understood in line with 'master narratives' that shape our collective consciousness, such as the one expressed in the Greek myth of *Pandora's box*. In a similar light, Sand (2018) argues that science fiction stories like Mary Shelley's *Frankenstein* shape our understanding of the virtues and vices of innovators. Grinbaum and Groves (2013) have developed this perspective the furthest. They argue that innovators need certain capacities, which resonate with the idea of virtues, that they relate to Arendt's notion of collective responsibility. To cultivate the virtues that constitute a sense of collective responsibility, they propose to learn from stories and myths (also invoking the Frankenstein narrative). As such, a form of moral education is envisioned, one that mobilises narratives to develop 'reflective skills' that enable the 'virtue of responsibility' (Grinbaum and Groves, 2013, 139).

Even though narrative has been thoroughly thematised, existing literature falls short of fully addressing the constitutive relation between virtue and governance - in three ways. First, emphasis is placed on the notion of responsibility as a virtue, but innovation as a human activity is not thematised. As such, it remains unclear how innovation practices – as made intelligible through narrative – set themselves apart from other practices, such as taking a walk or nurturing a child. Second, perhaps in line with contemporary work by virtue ethicists such as MacIntyre (2007), narrative is mostly discussed in relation to individual human capacities, as a way to shape moral education. The way in which narrative mediates structures of governance and human institutions, as also explored by organisation scholars like Czarniasma (1998) is largely left aside. Third, the existing literature fails to discuss the ontological role of narrative, namely, the way in which it endows human action with a sense of temporality. In a way, this neglect becomes apparent through the way in which narrative is almost exclusively understood in a narrow way as an actual 'story', such as a Greek myth or a Victorian novel. It is argued that narratives shape our understanding of innovation trajectories, an insight taken from philosophical hermeneutics, but how exactly this happens is largely left undiscussed. In what follows, we investigate how our approach to narrative, arising from our engagement with Arendt's Vita Activa, addresses these shortcomings.

For Arendt, the web of stories gives rise to the public sphere: the space in which humans act and speak in concert. As we saw, the temporality of political action is that of fragility: action disappears as soon as humans seize to act and speak in concert. This aspect of action makes it difficult to endow political, responsible action with the same durability as we assign to the products of work. As Arendt explains, political action has the problematic aspect of being boundless (it knows no 'end') and being inherently unpredictable (it knows no 'before' and thus no predictable 'after'). The power in common[7] that emerges from action cannot be 'stored up' like raw materials and always retains its character as a potentiality (Arendt, 1958, 200). In order for it to be sustained, it needs to be taken up into the common world, and this happens through narrative. Narrative thereby enables the *remembrance* of action, providing it with a sense of temporal duration. For Arendt, narrative is a living story that establishes the web of relationships between newly born humans and those that are already in the world. As

[7] Notably, Arendt equates 'power in common' with 'organisation' (Arendt, 1958, 201).

such, it enables a history in which political action, as undertaken by *disclosed* agents, takes place. After all, it is in the mode of action that people distinguish themselves from all others in the public sphere (i.e., exercise virtue). Disclosure of the acting agent thereby opens up the possibility for taking responsibility, for the essence of the concept of responsibility lies in the ascription of an action to an agent, a 'who' (Ricoeur, 2000, 20). While the act of 'making' a use object could be anyone's act (the anonymous worker), an act of virtue belongs to someone, to a unique individual who *responds* to a call of imputation.

Arendt stresses that a living story in the web of human relations is not 'made' or fabricated: it is not itself written down in a book or inscribed in a monument. Moreover, the acting human being is the agent of the story, but not its author. Instead, a story arises retrospectively, as the outcome of both acting (what the agent does) and suffering (what is done to the agent). Only the historian has a full understanding of action (Arendt, 1958, 192). Thus, Arendt argues that the reification (in the broad sense of giving a definite content and form to a thing) of a story turns it into a work, and thereby removes it from the realm of action. In other words, once a narrative is 'captured' by a material medium, such as a written text or a mp3 media file, it is not an integral part of the living web of stories. This makes it questionable whether from Arendt's perspective literary works like *Frankenstein* can in fact give rise to responsibility, as suggested by authors like Sand, Grinbaum and Groves (in fact, Arendt is suspicious of fiction[8]). Is such a story really 'alive' in the sense Arendt assigned to it?

The tension between stories and their reification arises from Arendt's wager of modelling political judgments on the notion of aesthetic judgment (the judgment of taste, of what is beautiful) in Kant's *Third Critique* (cf., Ricoeur, 2000). As Arendt herself argues, action is concerned with 'the life devoted to the matters of the polis, in which excellence [virtue] produces *beautiful* deeds' (Arendt, 1958, 13 – emphasis added). Aesthetic judgment, for Kant, is universally communicable but nonetheless has no concept, and therefore knows no end (i.e., no telos). As such, it generates a 'sensus communis' based on plurality (i.e., aesthetic judgment is both eminently intimate and universally communicable) and on the exemplarity of the particular, leading to the possibility of distinction (Ricoeur, 2000, 104). By considering political judgment as aesthetical judgment, Arendt is critical of the reification of action in the Aristotelian *mimesis*, the imitation of action in theatre (Arendt, 1958, 187). Already at the point where a story in a more immediate, aesthetic sense gets transformed into remembrance and memorisation by the poet, Arendt considers it to become tainted by the activity of 'making' (work) that puts itself in between immediate thought and action (Arendt, 1958, 169).

Arendt's insistence on the aesthetic nature of the web of stories seems to pose a problem for responsible innovation, which, because of its position 'in between' the teleological character of fabrication and the aesthetic character of action, can never become more than a quasi-aesthetic activity. For Arendt, narrative is only backward

[8] Arendt argues: Through it, [the invoking of an invisible actor] the story resulting from action is misconstrued as a fictional story, where indeed an author pulls the strings and directs the play.

looking, while responsible innovation is an activity oriented towards the future. As such, narrative loses its *anticipatory* role in Arendt. Moreover, and related to this, narrative is confined to the idea of remembrance and history, which leaves little room for fiction and its role in providing innovators with notions of *visions* concerning techno-futures that we encountered before. Notably, Arendt's notion of narrative takes its cue from Kant's notion of the productive imagination, which exclusively belongs to the human agent. As such, it provides little room for thinking about the way in which the products of responsible innovation might *externalise* the productive imagination (cf., Romele, 2019), and as such consider the activity of responsible innovation as a practice that mediates between humans and technologies.

To address this difficulty, we are helped by Paul Ricoeur's reinterpretation of Arendt's ontology. Ricoeur is critical of Arendt's wager, because he argues that politics both requires backward looking aesthetic judgment and forward-looking teleological judgment (Ricoeur, 2000, 106). He embraces Arendt's idea that narrative mediates between virtue and governance but denies that narrative has a 'pure' or immediate aesthetic reality. Rather, like the activity of work, narrative itself is always situated 'in between'; namely in between the 'objective' description of the world, and the subjective 'unity of life' that enables each person to be a unique individual capable of acting and suffering (Ricoeur, 1992). When considering a durable, common world as the aim of responsible innovation, we are therefore confronting the possibility of a durable web of narrative structures, which can be embedded in external things like technologies (e.g., video games). Narratives structure the phenomenon of 'living together', and therefore of the institution (Ricoeur, 1992, 194). From this perspective, a life's story through which an actor distinguishes himself in the public realm has not only an 'actor' and 'sufferer' (Arendt, 1958, 184), but is also 'coauthored' by the actor in conjunction with others, and with the world of things. As Ricoeur explains: 'by narrating a life of which I am not the author as to existence [because we cannot recount our own birth and death], I make myself its coauthor as to its meaning' (Ricoeur, 1992, 162). This allows Ricoeur to argue that 'real', reified stories, such as written works of fiction, historical documents, and preambles of constitutions, *can* mediate meaningful action, including political action in Arendt's terms.

This perspective opens up the possibility that reified narrative structures can mediate the hybrid activity of work in the mode of action. Narrative enters the stage at three levels. First, at the level of narratives *about* technologies (both historical and fictional), responsible innovation implies facilitating a forum, a public sphere, in which collective deliberation about innovation pathways can take place. Such deliberation aims at fostering 'sociotechnical imaginaries', which are 'collectively imagined forms of social life and social order reflected in the design and fulfilment of nation-specific scientific and/or technological projects' (Jasanoff & Kim, 2013, 190). Fostering the emergence of such imaginaries does neither imply that the media should advocate for one future pathway rather than another, nor that a narrative concerning one product of innovation (e.g., wind energy) versus another (e.g., combustion engines) should be set up. Rather, fostering sociotechnical imaginaries implies constructing a public sphere in which the *relation* between the products of innovation (the 'things' in question) and the

capacity of people to act and speak in concert is put into focus; to collectively imagine the common world in which the products of innovation appear.

Second, narrative structures arise through interaction with cultural objects, through a process of technological mediation. This idea resonates with recent work in hermeneutics of technology, which argues that narrative structures are not only produced by books, movies, and theatre plays, but also by actual technologies (cf. Coeckelbergh & Reijers, 2016; Gransche, 2017; Romele, 2017). Technologies can configure certain narrative structures, altering the temporal character of the human-technology interaction or by instantiating proximation or distance between the interaction and the world of action (Reijers & Coeckelbergh, 2018). As we saw earlier, at the level of technology design, responsible innovation implies balancing the 'specificity' of design (design being specific to a certain range of uses) with 'openness' in design. Accordingly, responsibility in design is related to the capacity of users to engage in 'imaginative variations', which implies being able to use a technology in unexpected ways (Reijers & Coeckelbergh, 2018, 116). As such, technological design can enable the unexpected aspect of political action, the capacity of a user to distinguish herself from others.

Third, narrative structures arise from institutional structures that shape the historical site of innovation, which in our current world is predominantly the modern firm. In the contemporary firm, there is a tension between official institutional rules and documents, which often resist narration and are unintelligible to citizens and stakeholders, and responsible innovation. Consider for instance the terms of service of online platforms, or even codes of conduct that are meant to steer the professional ethics of innovators, both of which are rarely if ever read by those who should be concerned with them. Yet, this does not mean that laws, statutes, and other institutional structures do not generate meaning. On the contrary, Ricoeur acknowledges that they do, for instance when he discusses how constitutions can give rise to the collective virtue of justice (Ricoeur, 1992, 257) or how the Golden Rule gives rise to a shared, critical understanding of solicitude (Ricoeur, 1992, 219). As Mootz (2008) argues, a legal text can convey meaning and generate narrative structures, because the rules it expresses resonate with the lived experience of judges. Even institutional structures like 'double entry bookkeeping' can generate narrative structures that endow innovation practices with a normative meaning, for instance of trustworthiness (cf. Poovey, 1998). To be conducive to a web of narratives, institutional structures need to be both narratable and accessible, not only intelligible to lawyers and experts, but also to citizens and lay stakeholders. Responsibility in this context would mean establishing institutional structures that generate narratives that invite actors (innovators, stakeholders) to act and speak in concert in determining the purpose of innovation products.

To sum up, let us review where our discussion has brought us regarding the role of narrative in responsible innovation. First, we have established the ontological role of narrative in the activity of responsible innovation. In order to stabilise the fleeting character of political action, narrative endows it with the temporal resilience of remembrance and anticipation. Second, we have established narrative as that which gives rise to the constitutive relation between virtue and governance. On the one hand,

it enables an innovator to distinguish himself, and therefore to exercise virtue. On the other hand, narrative gives rise to governance of responsible innovation as power in common. Third, we have coupled the role of narrative to a specific understanding of responsible innovation as a human activity; namely as an activity that appears through a world in between openness and specificity, that mediates between durability and fragility, and that reimagines the firm as a space in which innovators can act and speak in concert. Hence, the constitutive relation between virtue and governance can be transformed – made more responsible – by telling 'better' stories about technological innovation, but *also* by changing technological designs and reforming policies.

5. Concluding Remarks

This paper has given a novel meaning to the concept of 'responsible innovation'; one that derives from Hannah Arendt's ontology of the Vita Activa and conceptualises this human activity as 'work in the mode of action'. This new conception of responsible innovation addresses the little discussed constitutive relation between virtue and governance. It showed that responsible innovation means three things: (1) that in terms of appearance, the works of responsible innovation balance specificity and openness; (2) that in terms of temporality, the activity of responsible innovation, a durable relation between the products of innovation and the capacity of people to act and speak in concert is at stake; and (3) that in terms of the historical site of innovation, responsible innovation calls for a transformation of the firm, such that it enables innovators to act and speak in concert. The paper showed that the constitutive relation between virtue and governance in the activity of responsible innovation is mediated by narrative; which gives rise to what Arendt calls a web of stories.

Responsible innovation encompasses a broad range of activities: from actions by public media and activist groups to generate new sociotechnical imaginaries about innovation, via activities by engineers to balance specificity and openness in their designs, to activities by policy makers to recreate the modern firm in a way that gives rise to a space in which conflicts can be addressed through debate and reflection. For these activities, the role of narrative is crucial. If we would wield a naïve conception of narrative, we might be struck by the absurd idea that the only thing we would need is to tell 'better' stories about innovation practices; through for instance new types of science fiction. Despite this getting us actually part of the way (cf. Dourish & Bell, 2014), we should not be tempted into thinking that the site of innovation should be turned into something like a theatre. Rather, we need to broaden our understanding of what narrative is and consider how it is interwoven in our lifeworld. There is no single road to the realisation of responsible innovation, but rather a 'map' that is laid out through the engagement with Arendt's work. Taking this into account, what could the activity of responsible innovation look like in practice? To conclude, we offer some initial thoughts, which point at future directions of research.

First, future research could examine ways for cultivating sociotechnical imaginaries would imply constructing a public sphere in which the *relation* between

the products of innovation (the 'things' in question) and the capacity of people to act and speak in concert is at stake. An example of such an imaginary, one that instantiates a contrast with the current, capitalist mode of innovation, concerns the idea of 'degrowth' (Strand et al., 2018, 3), which articulates alternative pathways of innovation that reduce our ecological footprint. Second, a fruitful direction for research would be the investigation of responsibility, as work in the mode of action, 'through' technology design. An example would be different driving styles enabled by the design of a car, and the way in which these progressively disappear once cars become more and more 'automated', culminating in the phenomenon of self-driving cars. This development indicates a shift away from the traffic as a semi-public sphere in which people act and speak in concert to one of solitary drivers[9]. Future research could explore how this and similar trends in design either foster or block work in the mode of action. Third, future research could focus on governance of a novel instantiation of the firm, in which responsible innovation is practiced. An interesting historical case of a firm that organised itself in a way that resembled the characterisation of responsible innovation is The Mondragon Cooperative Corporation (MCC). As Gibson-Graham explain, the MCC, a worker-cooperative in Spain that emerged from a social movement in the 1940's, shows a 'commitment to constant debate and re-evaluation of how a particular set of ethical principles will guide their economic choices and resultant paths of action' (Gibson-Graham, 2003, 139). Future research could explore how such historical modes of organising innovation give rise to work in the mode of action.

Finally, future research could look into the dynamic between technological change and possible transformations of Arendt's theory and concepts. In this paper, we have mostly applied our reinterpretation of Arendt's Vita Activa to understand the phenomenon of responsible innovation. Yet, we have not done the reverse: namely, investigating how fundamental changes in innovation practices through the emergence of automation processes, artificial intelligence, cyberspace, and so forth, leads to a transformation of the meaning of labour, work, and action. Philosophy has always proved sensitive to changes in science and technology. We therefore need to come to understand the fundamental impact of the force of innovation processes on our philosophical understanding of the world.

Arendt, for good reasons, considered 'hybrids' like our modern society (as a hybrid between labour and action) to be problematic (Arendt, 1958, 35). Yet, this made her disregard the potentially emancipatory promises of hybrid activities, such as the activity of responsible innovation. This activity will necessarily be caught up 'in between', in between work and action, in between sedimentation and openness. Perhaps the problem of our time is that current innovation practices are radically 'open' in their economic form, always searching for new modes of marketisation, but radically closed in their

[9] This is not to say that the traffic is similar to the parliament, but rather that it necessitates people to communicate in the mode of 'acting and speaking in concert' that Arendt spoke of. Beyond following traffic rules, the technical practice of driving implies taking initiative and doing the unexpected, for good and for worse. It is for this reason, perhaps, that despite the current negative role of cars in contributing to the problem of climate change, driving has been and probably is still considered as an act of freedom; which would likely disappear with the progressive disappearance of responsibility.

technological form, being dictated by the logic of the economic process. The current paradigm of innovation binds technological innovation to the imperatives of the capitalist economy. Breaking this bond will enable the activity of responsible innovation, starting a collective search for new sociotechnical imaginaries, reintroducing openness and therefore responsibility in design, and building a new workplace that brings the ancient logic of the Agora to the everyday work of innovators.

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[to be added]

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