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## **Varieties and externalities of biosocial organizations in the Anthropocene, a boundary-work perspective**

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### **Abstract**

For many organizations, animals are indispensable resources and without their presence these organizations would be unable to fulfill their mission and achieve their objectives. Despite this importance, organizational theory and management research have largely rejected animals outside the boundaries of the discipline. Our research focuses on the central place of animals in certain organizations that we describe as biosocial. Based on the analytical developments of boundary-work, our article makes two contributions to the emerging theory of biosocial organizations. First of all, we highlight a variety of biosocial organizations that do not pursue the same objectives and grant different status to animals. We also highlight the many externalities associated with the functioning of biosocial organizations that strain the equilibriums of the earth system and are at the root of political tensions and ethical questions. In response to the scientific and industrial developments of biosocial organizations and their societal and environmental footprints, our research highlights the need to integrate these organizations as research objects within the theory of organizations and management research. We also bring original developments for boundary-work by showing the importance of taking an interest in the boundaries of living organisms that are challenged by biosocial organizations and which lead to questioning the very notion of the human species.

### **Key words**

Animals, Biosocial organizations, Externalities, Boundary-work, Anthropocene

**Varieties and ethical issues of biosocial organizations in the Anthropocene, a boundary-work perspective**

**Introduction**

Organization studies and management scholars have devoted most of their attention the analysis of how human beings succeed in developing and maintaining patterns of collective actions to reach objectives that no single individual could attain (Clegg, Hardy, & Nord, 2003). Recently, we have observed a material turn in organization studies and some researchers have shown that various devices and material elements constitute key components in the functioning of organizations. Human beings are not able to reach their collective objectives if they do not rely on material elements such as factories, assembly lines, computers, software, offices, warehouses, trucks... (Carlile, Nicolini, Langley, & Tsoukas, 2013). However, a quick glance on the functioning of organizations shows that in many cases, a third category of actors are involved and might even constitute key components: animals. Animals are critical resources for many organizations and without their presence, these organizations would not reach their goals or even lose their *raison d'être* (DeMello, 2012; Hamilton & Taylor, 2013; Labatut, Munro, & Desmond, 2016; Manning & Serpell, 2002). This is the case, for example, of research laboratories that rely each year on millions of animals to test new molecules and to develop intervention protocols that are likely to result in better care for humans. Without the animals they use on a daily basis, it would be difficult for these laboratories to function and medical progress would be considerably slowed down. (Donaldson & Kymlicka, 2011). This is also the case for zoos that capture and maintain thousands of wild animals in enclosures for human entertainment (Hosey, Melfi, & Pankhurst, 2013). Lastly, this is the case in the agriculture and food sector where billions of animals are

selected, fed and slaughtered every year in order to provide humans with the proteins they need (Weis, 2013, 2016). If the presence of animals is visible in many cases, organization studies and management scholars tend to largely neglect this category of actors (Hannah & Robertson, 2017; Sayers, 2016; Sayers, Hamilton, & Sang, 2019). This peculiar relationship is noticed by Lennerfors and Sköd who emphasize that “*if non-human animals were once a central component and object of analysis of the management domain, when the physiocrats obsessed over the productivity of horses and oxen, industrialization largely appears to have driven them out of this academic field, and fenced them off in isolated preserves like agronomics*” (Lennerfors & Sköld, 2018, p. 264). This absence of animals in the theories of organization and management is all the more paradoxical because the etymology of the term management refers to the Latin word *maneggiare*, which refers to the human activity of training and handling horses (O’Doherty, 2016).

Recently some organizational scholars have devoted specific investigations regarding organizations that need animals to reach their objectives. Based on the work of Foucauld (2003, 2008) and Rabinow (1996), Labatut and al. propose designating these organizations that have animals as key components as biosocial organizations (Labatut et al., 2016). In these organizations, animals are an essential dimension and their presence is vital to fulfil the mission and objectives. These organizations are also characterized by the development of knowledge and techniques that make it possible to maintain, develop, or even reconfigure the genetic, biological and behavioral characteristics of the animals they incorporate into their processes (Labatut et al., 2016; Labatut & Tesnière, 2018; Weis, 2016). This research shows that biosocial organizations are essential for the proper functioning of human societies. They are the source of our food and clothing habits, as well as our entertainment and leisure activities. They are at the heart of scientific research and medical progress (Donaldson & Kymlicka, 2011). This mobilization and sometimes overexploitation of animals in biosocial

organizations is also at the origin of many externalities borne by the animals themselves but also by humans and the natural environment (Derrida & Wills, 2002; Labatut et al., 2016; Weis, 2016). Some biosocial organizations play a decisive role in the deregulation of the Earth system because they are directly responsible for greenhouse gas emissions, the decline in biodiversity, soil degradation, and the release of many chemical residues (Bonneuil & Fressoz, 2016; Lymbery, 2014; Steffen, Grinevald, Crutzen, & McNeill, 2011). In addition, biosocial organizations that use animals to conduct scientific experiments are causing significant transformations in living organisms due to the development of biotechnologies that reconfigure the genetic and biological characteristics of animals and now question the very notion of the human species (Lemke, Casper, & Moore, 2011; Lemke & Ruppel, 2019; Rabinow & Rose, 2006). The activity of biosocial organizations goes far beyond their organizational boundaries and the externalities they produce generate major ethical issues that take a new turn in the Anthropocene era (Hoffman & Jennings, 2018). As Labatut et al point out, these organizations are by definition political objects par excellence subject to multiple criticisms and ethical demands (Donaldson & Kymlicka, 2011; Labatut et al., 2016; Pelluchon, 2019a; Rabinow & Rose, 2006). Biosocial organizations are actors and heralds of the Anthropocene era and of a post-human world where “*absolute boundaries between humans and nonhumans, nature and society have been broken down and all beings are connected together in a series of overlapping webs or networks of activity*” (Fox, 2006, p. 525). There is fear of the Anthropocene and despair over the negative impacts of biosocial organizations on the environment. There is also an anxiety triggered by advances and progress in biotechnologies that are developed, used and spread at a very large scale by biosocial organizations. Faced with the importance of biosocial organizations in human societies and their responsibilities in disrupting the earth system as well as transcending the boundaries of life, our objective in this research is to review the diversity of social organizations that can be

observed in order to better understand and clarify the nature of externalities and the ethical issues they engender.

To update the variety of biosocial organizations and the externalities that they generate, we mobilize the boundary-work theory. Boundary-work has its origins in Gieryn's research, which focuses on the discursive strategies of some scientists in order to establish clear and unquestionable boundaries between science and non-science (Gieryn, 1983, 1995). Increasingly mobilized in organizational theory (Oliver, 1993; Santos & Eisenhardt, 2005; Zietsma & Lawrence, 2010), it is defined by Langley as the "*purposeful individual and collective effort to influence the social, symbolic, material, or temporal boundaries, demarcations and distinctions affecting groups, occupations, and organizations*" (Langley et al., 2019, p. 5). As Hamilton and Taylor show, biosocial organizations are constantly doing important boundary-work to stabilize the nature of human-animal relationships, but also to stabilize their organizational boundaries and scope of responsibility (Hamilton & Taylor, 2013). The use of boundary-work will help us to better understand how biosocial organizations draw demarcations between humans and animals and stabilize a scope of responsibility that allows them to function and meet the demands they face. We highlight four types of biosocial organizations (instrumental, scientific, partnership and hybrid) that are characterized by a variety of objectives and animal ontologies. We also highlight four types of externalities that directly question the scope of responsibility of these organizations (interspecies, social, natural, and ontological). The use of boundary-work brings new developments to the emerging theory of biosocial organizations. Faced with the increase in research devoted to these organizations, it makes it possible to identify different types of biosocial organizations that have purposes and relationships with animals that are not homogeneous. Boundary-work helps us to identify an initial typology of biosocial organizations that can guide further research. The use of boundary-work also helps us to

identify the different forms of externalities that raise ethical issues and differentiated processing modalities. More generally, the use of boundary-work helps us to embed biosocial organizations in organizational theory and to open new research objects within this academic field which, despite its importance, has largely rejected these organizations (Lennerfors & Sköld, 2018). This article also leads to original contributions for research on boundary-work. We show that beyond the symbolic, social and material aspects that characterize the notion of boundary, biosocial organizations are also working to reconfigure and stabilize new biological boundaries between humans and animals. Biosocial organizations are directly at the origin of a reconfiguration of the boundaries of living organisms that question the very notion of the human species.

In the first part of the article, we discuss the notion of boundary-work in biosocial organizations. In particular, we consider the issue of animal ontology and the construction of demarcations between humans and animals in these organizations. We show that, depending on the objectives they pursue and the status they grant to animals, it is possible to identify four types of biosocial organizations: instrumental, hybrid, scientific and partnerships. Secondly, we discuss the types of externalities that these organizations are responsible for and that directly question their boundaries and scope of responsibilities. We identify four types of externalities that weaken the limits of the earth system and which raise thorny ethical questions. We conclude by discussing our findings for the theories of biosocial organizations and boundary-work. We identify avenues for future research to better understand the functioning and perimeters of responsibility of biosocial organizations in the Anthropocene era.

## **Animals at work and varieties of biosocial organizations**

Work on biosocial organizations highlights a significant number of situations in which animals are at the heart of organizational processes. These can range from the agricultural and food sectors, which mobilize billions of animals each year, to universities, which now increasingly include domestic animals on campuses to reduce student stress and facilitate social connections (Hamilton & Taylor, 2013; Labatut et al., 2016; Scanes & Toukhsati, 2018). Recent work on biosocial organizations shows that these organizations use animals to meet a variety of objectives that are not systematically economic, but focused on scientific research, well-being, or the treatment of social problems. While they highlight the diversity of objectives pursued by biosocial organizations, these studies also show that these organizations are involved in permanent boundary-work that will lead to the stabilization of more or less clear demarcations and forms of collaboration that are sometimes very different between humans and animals (Hamilton & Taylor, 2013; Sayers, 2016).

The notion of boundary-work came from research by Gieryn, who focuses on the discursive strategies of some scientists to distinguish between science and non-science (Gieryn, 1983, 1995). The author shows that the construction of this demarcation is not given once and for all, but that it requires social work that is characterized by dynamics of inclusion and exclusion of the work carried out within a scientific community. In a recent summary, Langley et al. define boundary-work as “*purposeful individual and collective effort to influence the social, symbolic, material, or temporal boundaries, demarcations and distinctions affecting groups, occupations, and organizations*” (Langley et al., 2019, p. 5). This definition leads to considering the boundaries of a collective as constructed, fluctuating elements whose tangibility requires continuous maintenance, creation and reconfiguration work (Hernes, 2004; Hernes & Paulsen, 2003). This definition also shows that a boundary or demarcation has social, symbolic, and material dimensions that can change over time (Oliver,



1993; Santos & Eisenhardt, 2005). The literature on biosocial organizations highlights two types of boundary-work that lead to giving very different statuses to animals and to considering forms of collaboration with humans that are also very different (Hamilton & McCabe, 2016; Hamilton & Taylor, 2013; Sayers et al., 2019).

In some biosocial organizations, boundary-work is competitive (Langley et al., 2019) and results in symbolic, social, and spatial boundaries between humans and animals that are clear and unlikely to be challenged. In this configuration, there is a strong human desire to define and maintain an impassable boundary with animals. Attempts to challenge these boundaries are systematically rejected in order to allow for the proper functioning of the biosocial organization that needs to maintain such demarcations between humans and animals in order to operate and carry out their missions. Animals are understood as resources that the biosocial organization will mobilize to achieve its objectives (Baran, Rogelberg, & Clausen, 2016; Hamilton & McCabe, 2016; Shukin, 2009; Stuart & Gunderson, 2019). Contacts and relationships with humans are deliberately limited and animals are considered and ontologically conceived as instruments in the service of the organization's objectives (Coppin, 2003; Sayers, 2016). In other biosocial organizations, the boundaries between humans and animals are much more indistinct and an ontological and organizational continuity between humans and animals can be observed (Mouret, Porcher, & Mainix, 2019; Porcher & Schmitt, 2012). These biosocial organizations are engaged in collaborative boundary-work (Langley et al., 2019). In this configuration, humans operate with open boundaries and interact in order to initiate collaboration with animals. The boundary between humans and animals is the subject of negotiation and constitutes the element around which collaboration is defined and established based on the differences and continuities that humans wish to establish with animals (DeAngelo, 2018). The actors go beyond ontological antagonisms to redefine the border/boundary and initiate collaboration with animals. Animals are thought of as partners of

the organization (Cunha, Rego, & Munro, 2019). They will contribute with humans because of their characteristics and skills to achieve the organization's objectives. There is an ontological continuity that structures human-animal collaborations (O'Doherty, 2016; Sayers et al., 2019; Smuts, 2001).

Biosocial organizations are engaged in different forms of boundary-work that lead them to conceptualize animals as resources that serve a production process (competitive work) or, on the contrary, as partners who will collaborate with humans to fulfil the organization's mission (collaborative work). From the economic or non-economic objectives pursued by the organizations and the type of boundary-work they develop to delimit the areas of collaboration between humans and animals, it is possible to identify a typology of four categories of biosocial organizations.

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Insert Table 1 about here

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#### *Instrumental biosocial organizations*

This first category of biosocial organizations includes organizations that pursue economic objectives and whose strategies are guided by the realization of profits. The animals they mobilize are considered as resources. They are at the heart of the production processes that these organizations seek to make ever more efficient. Animals are ontologically separated from humans and every effort is made to maintain an impassable social, symbolic and material boundary/border between two forms of living beings conceived as fundamentally different (Hamilton & McCabe, 2016). These resource animals, like the production processes in which they are embedded, are subject to constant attention and investments in order to improve their potential for economic efficiency and performance. These instrumental biosocial organizations are undoubtedly the ones that mobilize the most animals and are found in many agricultural and food sectors (Krawczyk & Barthold, 2018). In 2017, we counted 24

million dairy cows in Europe, 23 million in Brazil and 9.3 million in the USA. These cows belong to farm organizations and constitute key resources for a globalized dairy market and its derivatives. Every year, biosocial organizations entangled in food systems mobilize billions of animals in their production processes (beehives, buffaloes, chicken, ducks, goats, horses, pigs, rabbits...), animals who are carefully selected, fed, treated, and generally killed for the benefit of humans (Krawczyk & Barthold, 2018). One of the most advanced set of instrumental biosocial organizations is observable in the broiler industry. Chicken might be a category of animals that has been totally adapted to industrial processes and to the needs of customers (Boyd, 2001; Moore, 2015b, 2016). Nutrition, health, genetics, and just-in-time processes have led to the transformation of *"both the biological productivity of broilers and the organization and management of the industry. Through industrial farming practices the chicken has become ontologically closer to a substrate for protein production than a sentient being"* (Labatut et al., 2016, p. 318). Bees are another category of animals that are deeply entangled in instrumental biosocial organizations. They form the basis of a large industry which *"has suffered the consequences of unreflexive "scaling up"; where a backyard hobby based on a commensurate relationship for both humans and bees has morphed into an industry based on the derivation of commercial benefits for humans"*. Instrumental biosocial organizations deliberately transform animals into resources and commodities, and they adapt their biological characteristics and potentialities to meet economic needs (Birke & Hockenhull, 2012; Hillier & Byrne, 2016; Sage, Justesen, Dainty, Tryggstad, & Mouritsen, 2016; Wilkie, 2010) . The time required to produce a turkey was halved between 1970 and 2000. It now takes 20 weeks between the egg and a 16 kg turkey (Moore, 2015a, 2015b, 2016; Patel & Moore, 2017). This "performance" is the result of important transformations of genetic and biological characteristics that are achieved through the mobilization of multiple scientific and technical know-how. This considerably increases the productive potential of the

animal resources used by these biosocial organizations (Labatut & Tesnière, 2018). Animals are meticulously selected according to the yields they are likely to produce and are subject to sustained attention in terms of feeding, care, and treatment. They constitute animal capital that must be made ever more productive and efficient (Gunderson, 2013; Shukin, 2009; Stuart & Gunderson, 2019).

### *Hybrid biosocial organizations*

Hybrid biosocial organizations are engaged in economic activities and rely on animals to generate profits. But unlike instrumental biosocial organizations, they view animals not as productive resources but as partners who collaborate with humans to achieve the organization's objectives. Animals are actors and not resources. They are directly involved in the organization's processes, which they can also lead to transformation. This is the case, for example, in zoos where humans and animals are jointly involved in certain activities. In their studies of American zoos (there are more than 200 of them), Bunderson and Thompson show how close and collaborative the staff are to the animals they feed, care for and mobilize on a daily basis as part of the organization's activities (Bunderson & Thompson, 2009). In their book on zoo management, Hosey, Melfi & Pankhurst also discuss animal behavior in an environment that may not be familiar to them and that requires collaboration with humans (Hosey, Melfi, & Pankhurst, 2013). They also show how animals adapt to confrontation with the public and develop a whole range of skills and strategies, particularly to still human food that can be harmful to their health. The authors highlight the different forms of collaboration that are taking place between humans and animals and the initiatives that the latter can take (Hosey et al., 2013). In the dairy farming sector, Porcher shows all the forms of collaboration that can develop between a farmer and his dairy cows. Dairy cows are actors, making decisions and initiatives that facilitate or complicate the farmer's work (Mouret et al., 2019; Porcher & Schmitt, 2012). This form of collaboration between animals and humans is found

in non-industrial forms of animal husbandry, where organizational processes are adapted to the rhythms, morphologies and biological cycles of the animals. This animal-human collaboration is made possible through reduced economic pressure. Hybrid biosocial organizations are not immune to economic objectives, but they are also affected by other institutional logic (Battilana, Besharov, & Mitzinneck, 2017; Battilana, Sengul, Pache, & Model, 2015) which lead them to consider animals as partners who collaborate to achieve the organization's objectives. They are also hybrid because they establish continuities or even a form of community between animals and humans. These organizations were widely present in the past when it came to mobilizing animals not for food purposes, but for their labor force (DeMello, 2012; Haraway, 2003; C. Salter, 2018).

#### *Scientific biosocial organizations*

The main motivation of scientific biosocial organizations is not profit but the development of new knowledge by mobilizing animals. Animals are understood as resources that are not integrated into economic-industrial processes, but scientific ones (Howell, 2018). There is an ontological separation between animals and humans. This separation allows and legitimizes the manipulation of animals for the benefit of humans. Animals are used for scientific experiments that will benefit both humans and other animals in order to treat or prevent pathologies (Scanes, 2018a). In France, figures produced by the Ministry of Higher Education and Research show that about two million animals are used each year in university laboratories. In Europe, the figure is twelve million (Jougla, 2015). These animals will be used to test new molecules and therapeutic protocols that, once validated, can be applied to humans. Animals can also be resources for direct human care. This is the case, for example, for pigs that share certain genetic properties with humans and whose cells and tissues are used to repair human heart valves (Essig, 2015; Sayers, 2016). Animals are also the basis for new scientific discoveries about the genome and reproduction of living organisms. The cloning of

the sheep Dolly (5 July 1996 - 14 February 2003) by scientists from the University of Edinburgh is emblematic of a scientific discovery around mammalian cloning carried out by conducting experiments on animals. Other animals have subsequently been mobilized and used as resources to develop knowledge and skills in cloning living beings (Franklin, 2007). Twenty years after these first clones, these scientific discoveries have now entered the public domain and instrumental biosocial organizations are able to offer commercial services in the field of mammalian cloning. The Chinese biotechnology company Sinogen offers services to individuals who wish to have their deceased pets cloned. A cell from the deceased animal is removed and inserted into the nucleus of an unfertilized egg that is placed in the womb of a surrogate mother. Customers recover the genetic copy of their favorite pet. It is now possible to clone pets, racehorses, or animals whose biological properties can be mobilized in the food chain because of their characteristics. Scientific biosocial organizations use animals as resources to test new molecules and develop new knowledge in genetic engineering. Knowledge that will often be used to benefit instrumental biosocial organizations that will create and exploit new markets. Scientific biosocial organizations view animals as resources in order to carry out experiments and generate new knowledge. They actively participate in the emergence of new knowledge and new techniques which in turn will contribute to the emergence of new powers (Rabinow, 1992; Rabinow & Rose, 2006), and in particular new economic powers (Busch, 2010; Weis, 2007, 2013).

#### *Partnerial biosocial organizations*

A fourth category of biosocial organizations can be identified. The objectives they pursue are not economic and animals are considered as partners with whom continuity of action is established with humans. Darcie DeAngelo (2018) analyzes this category of biosocial organization and shows through an ethnographic account that animals can be organizational partners. She observes more specifically how rats are used for mine detection by the

Cambodian Mine Action Centre (DeAngelo, 2018). Rats have an unparalleled sense of smell that allows them to detect chemicals in small quantities and at great distances (Scanes, 2018b). These rats are trained to identify the smell of explosives such as TNT and are able to detect anti-personnel mines very quickly. The animals are so lightweight that it allows them to detect mines without risk of explosion. Rats become real partners and professionals in mine clearance because of their biological characteristics and the skills they develop as a result of training by humans. They transform social relations between organizational members but also with other actors involved in disarmament and mine detection processes. They are the source of a new insitutional logic in terms of demilitarizing processes that complements and undermines the militaristic habits and values that have traditionally marked this peace-keeping operation (DeAngelo, 2018). Charles and Wolkowitz have recently investigated the role played by animals inside US and UK universities. In response to increasing stress and work overloads among students, some universities have developed the placement of animals on campus and more specifically dogs to enhance the well-being of students. University dogs become partners and friends of students and exert calming effects, reduce loneliness and facilitate concentration (Charles & Wolkowitz, 2019). In other research devoted to the place of dogs in organizations, Cunha, Rego and Munro show all the symbolic and functional dimensions around which humans and animals can establish collaborations and relationships (Cunha et al., 2019). Similarly, Smuts (2001) establishes a scale of seven stages of cooperation and attachment with animals that humans are likely to develop (Sayers, 2016; Smuts, 2001). This ability of animals to become full members of an organization without any instrumental logic is also well documented by O'Doherty in his ethnographic research on the role of cat Olly in the Manchester Airport (O'Doherty, 2016). This cat, who lived at the airport's head office, has gradually established herself as a prominent member of the organization. She had a Facebook page, appeared regularly in the internal newspaper, and was

the subject of real attention from the staff. Olly the cat helped organizational members to establish a “*common work ethos*” and the development of a “*distinctive sense of common purpose and symbolic value*” (Hamilton & Taylor, 2013; O'Doherty, 2016, p. 414). Partnerial biosocial organizations do not prioritize the pursuit of profit and make animals true partners that complement human action and perform tasks that they are not able to do. This presence of animals in the organization structures certain constituent elements of collective action such as culture, organizational processes, and interactions between humans as well as between humans and animals. They are also at the heart of political issues that consist in giving them rights, prerogatives and status in the organization (Donaldson & Kymlicka, 2011; Pelluchon, 2019b).

### **Negative externalities and ethical issues**

While animals have historically been key elements in the functioning of many organizations (DeMello, 2012; Diamond, 2002, 2010; Hamilton & Taylor, 2013), it is only very recently that they have been the subject of work within organizational theory through the notion of biosocial organizations (Labatut et al., 2016; Lennerfors & Sköld, 2018; Sayers et al., 2019). The place occupied by biosocial organizations in the food, health, leisure, and clothing sectors gives these organizations a very particular importance. They are at the heart of the daily lives of billions of people who rely on them for food, health, relaxation, and clothing. They are also the source of important life transformations due to the development of biotechnologies, which are nowadays likely to upset the very notion of what it is to be human. The activity of biosocial organizations extends far beyond their organizational borders/boundaries and the externalities they produce have potentially tragic consequences on humans and the natural environment at a very large scale. As Labatut et al. point out, biosocial organizations are at the root of many externalities that make them political objects par excellence, subject to multiple criticisms and ethical issues (Donaldson & Kymlicka, 2011; Labatut et al., 2016;



Pelluchon, 2019a; Rabinow & Rose, 2006). These externalities lead biosocial organizations to reconsider their impact areas and scope of responsibility. They must also incorporate the expectations of the stakeholders who support these externalities because of pressure applied by public authorities or social movements, (Hobson-West, 2012; Stephens, 2013). Biosocial organizations are at the origin of four types of externalities (interspecies, moral, natural, and ontological) which are themselves at the root of a weakening of the Earth system and particularly complex ethical issues.

#### *Pandemic threats and interspecies externalities*

Some biosocial organizations are regularly placed at the heart of food and health scandals that remind us of the fragility of the coexistence of animals and humans (Keck, 2008). Some practices implemented on animals in biosocial organizations can impact and contaminate human or other animal species (Scanes, 2018c). This is the case, for example, of mad cow disease, the origins of which came from new sources of cattle feed via bone meal that have proved likely to generate diseases that can be transmitted to humans. The case of avian influenza is quite similar, but this time it affects domestic poultry and wild birds. The avian influenza virus (H5N1) can also be transmitted to humans and the risk of human mutation can have significant implications for human health. In his work on the avian influenza, Porter demonstrates how the interactions between infected chickens, poultry farmers, and risky environments contribute to the spread of the disease and generate interspecies interactions that transect and transcend environmental relationships (Porter, 2012, 2013). This study reveals that in some cases, biosocial organizations struggle to cure diseased animals and their pathologies may directly affect human beings and spread at a very large scale. We can also mention the case of the foot and mouth disease virus, which is another example of contamination between animal species. Viruses that develop in farm animals are likely to affect other animals and create pandemics. As with mad cow disease, these viruses have their

origins in an evolution and emergence of negligence in livestock feeding practices in some biosocial organizations engaged in processes to rationalize their production costs (Pina e Cunha, Cabral-Cardoso, & Clegg, 2008). Because they are built on cohabitation and collaboration between humans and animals, biosocial organizations are particularly sensitive to the issue of the transmission of diseases and pathologies between species. These risks are all the more significant because in some biosocial organizations, the concentration of animals is very high, which multiplies the contacts and potential contagions between animals but also between humans (Nading, 2013; Porter, 2012). Food crises and scandals in recent years have shown that the biological and epidemiological boundaries/borders between species are porous (Labatut et al., 2016). The practices and innovations of some biosocial organizations can have a negative reaction on animals and humans without it being possible to put up barriers that would limit the risks of contagions and pandemics (Law & Mol, 2008; Scanes, 2018c). The development of biotechnologies, the increasing industrialization of production processes, and the concentration of animals are all factors that put biosocial organizations at risk (Perrow, 2011) because they can generate massive interspecies externalities (Brown & Nading, 2019).

#### *Dirty work and social externalities*

While numerous studies show that the presence of animals can have positive aspects on social relations and the well-being of individuals within an organization (Charles & Wolkowitz, 2019; Cunha et al., 2019), other research shows that operating modes and production rhythms can have very negative repercussions on the health and psychological equilibriums of some workers. In their research on cultural issues in slaughterhouses, Ackroyd and Crowdy (1990) show that the modes and rhythms of production imposed on workers lead to pressure and behavioral abuses on new entrants who are victims of mockery and harassment practices (Ackroyd & Crowdy, 1990). The authors also show the dilemmas and moral ambiguity in which these workers are exposed: feeding humanity by savagely killing animals. These

workers fall into the category of dirty workers, i.e. workers who perform important or even essential tasks for society but who are socially stigmatized and rejected because of the practices they involve (Ashforth & Kreiner, 1999). This rejection and the pressure they face lead these workers to adopt cultures and practices that can be harmful to their own health (Ackroyd & Crowdy, 1990). On the basis of this work, other authors have investigated the health of workers in biosocial organizations subject to extreme production rhythms and whose activity is characterized by the death of animals. Workers in biosocial organizations do have feelings and emotions regarding animals and Baran et al., show that workers in slaughterhouses develop many psychological pathologies compared to other workers engaged in other forms of “dirty work” (Baran et al., 2016; Krawczyk & Barthold, 2018). Workplace culture, factory technologies, space design make compassion for animals difficult if not impossible to realize. Everything is done in organizational design to construct a clear division between humans and animals and to ensure that livestock are commodities for human use. But borders/boundaries between animal suffering and human beings are not hermetic and many workers face negative psychological impacts such as alcoholism, sleeplessness, and depression (Hamilton & McCabe, 2016; Lennerfors & Sköld, 2018). The production rhythms, the brutality of elimination processes, and the suffering of animals are not neutral on the psychological equilibriums of humans exposed to these practices. The externalities and social costs of these organizations are considerable and are generally totally absent from public policies which, as Pelluchon argues, could act to reform certain practices and restore a more positive identity to dirty workers in biosocial organizations (Donaldson & Kymlicka, 2011; Pelluchon, 2019a, 2019b). The exclusion of animals from certain ethical questions (respect, dignity in death, absence of suffering) is not neutral on the health of workers but also on the functioning of our society. Unnecessary suffering of animals and degraded working conditions for humans also mean renouncing human dignity, as Sayers points out, based on

Derrida's work (Derrida & Wills, 2002; Sayers, 2016; Sayers et al., 2019). Because they lock humans into dirty work, some biosocial organizations pose ethical and political challenges for society as a whole (Massumi, 2014). It can even be said that the more the living conditions and exploitation of animals in biosocial organizations deteriorate and become more widespread, the more human societies renounce some of their ethical and moral foundations (Bekoff, 2007; Shepard, 1997).

### *Planet boundaries and natural externalities*

While externalities are observed on animals and humans, biosocial organizations also have negative effects on the natural environment. Every year, billions of animals are killed to feed people and the trend to place meat at the heart of good nutrition is leading to an ever-increasing increase in animal consumption (Weis, 2016). The biosocial organizations that give birth, feed and breed these animals create important environmental externalities that are particularly complex to address (Patel & Moore, 2017; Vermeulen, Campbell, & Ingram, 2012; Weis, 2007). FAO (United Nations organization for food and agriculture) thus considers that these organizations grouped together constitute the second source of externalities released into the environment (Steinfeld et al., 2006). The authors identify five externalities: land degradation, air pollution, water shortage, water pollution, and loss of biodiversity. Biosocial organizations in the livestock sector occupy 26% of the planet's unglaciated surface, while animal feed production covers 33% of arable land. The demand for foodstuffs is leading to an ever-increasing increase in the area intended for livestock farming to the detriment of forests and other plant cover. The activities of these organizations also contribute to soil degradation through effluent discharge and the use of pesticides. As far as CO<sub>2</sub> emissions are concerned, FAO studies put the contribution of livestock at more than 18%, which is a higher contribution than the transport sector. These biosocial organizations are also responsible for 37% of methane emissions, 65% of nitrous oxide, and 64% of

ammonia (Steinfeld et al., 2006). These organizations consume a significant portion of the water in which antibiotics, hormones, chemicals, fertilizers and pesticides, and sediments from pasture erosion are found. Finally, these organizations are at the heart of biodiversity erosion issues because of the space they take up, which then leads to a reduction in the space needed for wildlife species, and in particular carnivorous species, to flourish (Ripple et al., 2014). Weis proposes the concept of "ecological hoofprint" to describe the breaking down of the biophysical barriers of biosocial organizations that, by no longer respecting nature's rhythms and absorption capacities, generate multiple externalities that are increasingly costly to manage and treat (Weis, 2013). These externalities, combined with each other, lead to reaching certain limits of the earth system and calling into question the equilibriums of life as we know it. Some specialists speak of a new geological era - the Anthropocene - characterized by a disruptive impact of human activity on the earth system (Moore, 2015a; Rockström et al., 2009). Biosocial organizations, as we have just seen, have a significant contribution to the disruptions of the earth system (Bonneuil & Fressoz, 2016).

#### *Species barriers and ontological externalities*

Biosocial organizations are characterized by the development of knowledge and techniques that maintain, develop, or even reconfigure the genetic and biological characteristics of the animals they incorporate into their process (Labatut et al., 2016; Rabinow & Rose, 2006). While the principle of animal selection and domestication to serve human needs is very old, this activity has historically been carried out with respect for the life cycles of animals and the absence of direct intervention on their genetic heritage (Labatut & Tesnière, 2018). For a very long time, humans have adopted a naturalistic perspective to retain certain animal species and bring out biological properties that are considered more in line with their needs. Advances in genetic engineering and biotechnology have significantly transformed animal selection practices by allowing direct intervention on the living organism, i.e. deliberately modifying

certain genetic characteristics to bring out biological properties (Holloway, Morris, Gilna, & Gibbs, 2009; Rabinow, 1992; Rabinow & Rose, 2006). Biosocial organizations manufacture intervention techniques on living organisms or directly supply animals perfectly calibrated to the specified needs. Recent advances in biotechnology are likely not only to bring out animals with exceptional biological characteristics, but also to clone them, i.e. to reproduce infinite copies of a single animal. In 2016, a polo competition held in Argentina was won by mobilizing six different horses (Cuartetera 01 to Cuartetera 06) which are six clones of the same mare (Lopez Frias & Torres, 2019). Biotechnology is helping to profoundly transform animal nature and recent advances are now pushing the boundaries between human and animal species. It is now possible to introduce human DNA sequences into animal cells in order to grow organs that can then be transplanted into human bodies. The technology is not yet developed and it will take a number of years before the transplantation of human organs developed in animals is possible, but the creation of human-animal chimeras is allowed in a number of countries (B. Salter & Harvey, 2014). Japan has just authorized the creation of hybrid human-mouse embryos that can be allowed to develop for fourteen days (Cyranoski, 2019). American research teams have created a man-sheep embryo that lived for twenty-eight days. While they are progressing cautiously, the objective of this research conducted in biosocial organizations is clear: to give life to hybrid animals that will serve as organ banks for human patients waiting for transplants. Biosocial organizations transform animal nature to meet certain needs of human societies. They have developed and generalized techniques for intervention on living organisms that are now likely to turn animals into real organ banks that will treat humans. These genetic manipulations on animals will break down the biological boundary/border between animals and humans. Is a sheep that integrates human genes and develops human organs still a sheep? The hybridization of genes and the creation of human-animal chimeras lead to the creation of sentient and intelligent beings that are ever closer to

human characteristics. Scientific advances by biosocial organizations and the creation of animals who are human organ donors will break down the species barrier and raise fundamental questions about the nature of our relationships with animals (Rabinow, 1992). While biosocial organizations have deliberately built impassable barriers between humans and animals to legitimize practices of intervention on living organisms, they are now overwhelmed by their own technologies (Rabinow & Rose, 2006). They have given rise to knowledge and intervention techniques on living organisms that hybridize human and animal communities (Holloway & Morris, 2017). They profoundly alter the genetic, biological and ethical boundaries between humans and animals (Meloni, Williams, & Martin, 2016). As Haraway points out, "*the certainty of what counts as nature—a source of insight and promise of innocence—is undermined, probably fatally.*" (Haraway, 1994, p. 81).

### **Discussion and avenues for future research**

Organizational and management theories have largely neglected the issue of animals, which are nevertheless essential components for many organizations. Recently, research has highlighted the importance of focusing on the role of animals in stabilizing the notion of biosocial organizations. These organizations need animals to fulfil their missions and achieve their objectives. They are characterized by the development of knowledge and techniques that make it possible to maintain, develop, or even reconfigure the genetic, biological and behavioral characteristics of the animals they incorporate into their process (Labatut et al., 2016; Labatut & Tesnière, 2018; Weis, 2016). Our research contributes several elements to the emerging theory of biosocial organizations. It also opens up new perspectives and questions for the theoretical framework of boundary-work.

*Contributions to biosocial organizations*

The theory of biosocial organizations is in an emerging phase that is marked by an increase of work and research that explores the functioning of these organizations. The authors focus on researching the varieties of situations in which animals are positioned at the core of organizational processes. This leads to a diversity of cases and situations where the issues and the place of animals are differentiated without it being possible to establish comparisons and continuities between these organizations who do not pursue the same objectives and do not grant animals a single status. Building on Hamilton's work that shows that biosocial organizations are engaged in boundary-work (Hamilton & McCabe, 2016; Hamilton & Taylor, 2013; Sayers et al., 2019) and drawing on recent analytical developments, we identify a variety of biosocial organizations. This typology of biosocial organizations highlights a diversity of objectives and relationships with animals. Biosocial organizations cannot only be reduced to economic organizations that rely on resource animals to achieve economic objectives. There are also biosocial organizations that establish real collaborations with animals and pursue non-economic objectives. Some biosocial organizations need clear and impassable borders/boundaries to function, while others need indistinct and negotiable boundaries to achieve their objectives. By placing the question of boundary-work at the heart of their operations, our research identifies and clarifies the variety of situations observed randomly in work on biosocial organizations. The typology we propose makes it possible to account for this diversity of situations that has not yet been analyzed in a systematic and reasoned way.

The identification of externalities and collateral damage associated with biosocial organizations is also the subject of real attention (Labatut et al., 2016; Rabinow, 1992; Weis, 2016). However, it is difficult to identify a typology of the externalities associated with these organizations. Our research makes it possible to identify different forms of externalities that



imply an extension of the scope of responsibilities and the impact zone of biosocial organizations. But not all biosocial organizations are affected by all the forms of externalities we have identified, as shown in the table below. Instrumental and scientific biosocial organizations are the main sources of externalities that extend far beyond society and the environment and impose highly complex ethical questions. These biosocial organizations are largely responsible for the shift to the Anthropocene era and have very significant political repercussions that are fracturing Western societies. Hybrid and partnership organizations, which are characterized by continuity between humans and animals, have much less significant impacts on society and the environment. Their ability to establish continuities between humans and animals and to include the latter in the scope of ethical issues and questions limits the sources of externalities (Pelluchon, 2019b).

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Insert table 2 about here

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While our research highlights a variety of biosocial organizations and the externalities associated with them, it also opens up new avenues for questioning that we place at two complementary levels. Demarcations established by humans within biosocial organizations transform animals into productive resources whose potential must be maximized or, on the contrary, turned into partners to be taken care of. In both cases, these demarcations between humans and animals are constructed and it seems important to us to better understand the symbolic, social and material elements that contribute to the stabilization of the various animal ontologies that lead to the exclusion or inclusion of animals in ethical questions. In this regard, it seems important to better document the forms of boundary-work carried out within biosocial organizations to maintain or reconfigure the status that humans grant to animals. A second complementary research axis consists in observing the ethical strategies

and modes of legitimization of social organizations that are the subject of challenges and criticism. Biosocial organizations are the target of many social movements that challenge animal exploitation and highlight the many externalities they release into the natural environment. They must be able to provide justifications and arguments that demonstrate their ability to provide valued resources. The work of Wainwright et al. shows how laboratories that manipulate embryonic cells develop a "*positive ethical space*" that signals the progressive and virtuous nature of the activities they conduct despite the associated risks and externalities (Wainwright, Williams, Michael, Farsides, & Cribb, 2006). The leaders affirm that the practices at work are both in accordance with the law and part of a regular scientific activity, the ethical standards and criteria of which they respect. They highlight the skills they master and the moral correctness of the procedures they follow in close collaboration with official authorities. Nor do they fail to show that the externalities associated with the activity of their companies are disproportionate to the benefits and progress they are likely to bring. Because of their externalities, biosocial organizations are forced to develop ethical strategies and defend their license to operate. Future work should make it possible to document and better understand the strategies and operating methods of these ethical strategies in a context where the impacts of biosocial organizations are increasingly significant, visible and contested (Lymbery, 2014; Moore, 2015a, 2016; Rabinow & Rose, 2006; Weis, 2016).

#### *Contributions to boundary-work*

Our research places boundary-work at the center of our understanding of biosocial organizations and the externalities they produce. It is likely to enrich and provide new research objects to this theoretical framework, which is becoming increasingly important within the theory of organizations (Langley et al., 2019; Santos & Eisenhardt, 2005; Zietsma & Lawrence, 2010). Research on boundary-work is no exception to other theoretical frameworks in management and, with the exception of the work of Wainwright et al, Hobson-

West and Stephens, the place of biosocial organizations is relatively limited given the importance of these organizations in the functioning of our contemporary economies and societies (Hobson-West, 2012; Stephens, 2013; Wainwright et al, 2006). Given their nature and challenges, a greater exposure of biosocial organizations within the analytical developments of boundary-work is likely to strengthen this theoretical framework and to better understand the processes of defining, stabilizing and reconfiguring borders/boundaries. More fundamentally, our research shows the importance of taking an interest in a new type of frontier within the theory of organizations: the limits of life. Boundary-work is defined as "*purposeful individual and collective effort to influence the social, symbolic, material, or temporal boundaries, demarcations and distinctions affecting groups, occupations, and organizations*" (Langley et al., 2019, p. 5). It highlights the symbolic, social, temporal and material dimensions of borders/boundaries. Our research on biosocial organizations shows how important it is to consider the issue of the boundaries of life. Indeed, some of these biosocial organizations have developed knowledge and intervention techniques that are likely to challenge the boundaries of life and the very notion of the human species. In this respect, it seems important to introduce a biological dimension into boundary-work and to study the strategies, methods and techniques of the biosocial organizations that are now pushing the boundaries of species. The integration of a biological boundary/border into the notion of boundary-work is likely to guide organizational theory and research in management towards technological issues and ethical questions that have a profound impact on the functioning of Western societies. This introduction at the core of the theory of organizations that touch on the issues for living organisms will allow us to go beyond a vision of organizations as entities intersected and impacted by social forces, but as entities composed of humans and non-humans embedded in the web of life (Moore, 2017)

## Conclusion

Our research starts from the observation that there is a lack of interest in animals in the theory of organizations and management research despite their place and importance in many organizations. These organizations that we call biosocial need animals to fulfill their mission and objectives (Labatut et al., 2016). They develop knowledge and techniques that make it possible to maintain, develop, or even reconfigure the genetic, biological and behavioral characteristics of the animals they incorporate into their process (Labatut et al., 2016; Labatut & Tesnière, 2018; Weis, 2016). Based on the analytical developments of boundary-work, our research highlights a variety of biosocial organizations that do not pursue the same objectives and do not give animals a unique status. We also highlight the many externalities of which biosocial organizations are the source, and that which expose them to many challenges and criticisms. Facing the scientific and industrial developments of biosocial organizations, our research underlines the importance of integrating them as research objects within the theory of organizations and management research. Biosocial organizations are actively involved in the emergence of new knowledge and techniques that contribute to the emergence of new powers (Rabinow, 1992; Rabinow & Rose, 2006) and in particular new economic powers that transform human societies and affect the earth system at an unprecedented scale and pace.

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## Annexe

	<b>Animals as resources (competitive boundary-work)</b>	<b>Animals as partners (collaborative boundary-work)</b>
<b>Economic objectives</b>	Instrumental biosocial organizations <i>Ex. Intensive factory farms</i>	Hybrid biosocial organizations <i>Ex. Zoo</i>
<b>Non-economic objectives</b>	Scientific biosocial organizations <i>Ex. Laboratories in Universities</i>	Partnership biosocial organizations <i>Ex. Rats for mine detection</i>

**Table 1:** Objectives, demarcations between humans and animals and varieties of biosocial organizations

	<b>Interspecies externalities</b>	<b>Social externalities</b>	<b>Environmental externalities</b>	<b>Ontological externalities</b>
<b>Instrumental biosocial organizations</b>	X	X	X	X
<b>Scientific biosocial organizations</b>	X			X
<b>Hybrid biosocial organizations</b>	x		x	
<b>Partnership biosocial organizations</b>	x			

**Table 2:** Varieties of externalities and biosocial organizations