Sustainability Indicators of Corporate Communications – Translated into Public Procurement and the Implications of their Digitalization

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Abstract

Sustainability Indicators (SIs) are rising. They reach importance in all communications and decisions towards sustainability (Baue, 2019; Hák et al., 2016; Lyytimäki, 2019; UN DESA, 2019; UNRISD, 2019), especially in corporate communications and corporate reporting (GRI, 2019; Knebel & Seele, 2015). With the revised General Procurement Agreement (GPA) from the World Trade Organization (WTO) also Public Procurement starts to rely on SIs in order to fulfill upcoming legal requirements (Arrowsmith & Anderson, 2011b; European Union, 2014; WTO, 2015). The rise of SIs coincides with a digital revolution (Greengard, 2015; Helbing, 2015b) potentially also revolutionizing SIs, in their consistence, the way they support decision making, as well as their potential in measuring and communicating sustainability performance in corporate communications. The thesis follows two research streams, whereby one stream delves into the realms of SIs and sustainable public procurement (SPP) and the other into the realms of SIs and Digitalization. The first stream looks into possibilities to translate and operationalize SIs in SPP considering previously identified issues to implement sustainability in public procurement. The second stream looks into SIs, their digitalization and its impact on corporate communications.

The findings and results encompass the development of a flexible and a framing approach for public procurements' way towards sustainability. Thereby, the findings include an analysis of status quo in SPP and called for definitions for SPP's common understanding. Thereby, the conceptualization and development of a "SIs selector" based on a SIs typology allows professionals to select and construct SIs for each individual procured good and service. A framing approach complements these results by providing a small SIs set tailored to SPP requirements which aims to reduce complexity, to overcome implementation inertia and to provide common ground in a field that craves for harmony and a common understanding of SPP.

Findings from the second stream encompass the conceptualization of a digital corporate nervous net, which enables the further conceptualization of preporting. The conceptualization of a corporate nervous net reveals ways for corporate communications

to adopt to the digital revolution. Preporting builds on such a corporate nervous net and conceptualizes how digitalized and AI augmented SIs complement existing reporting practices in corporate communications.

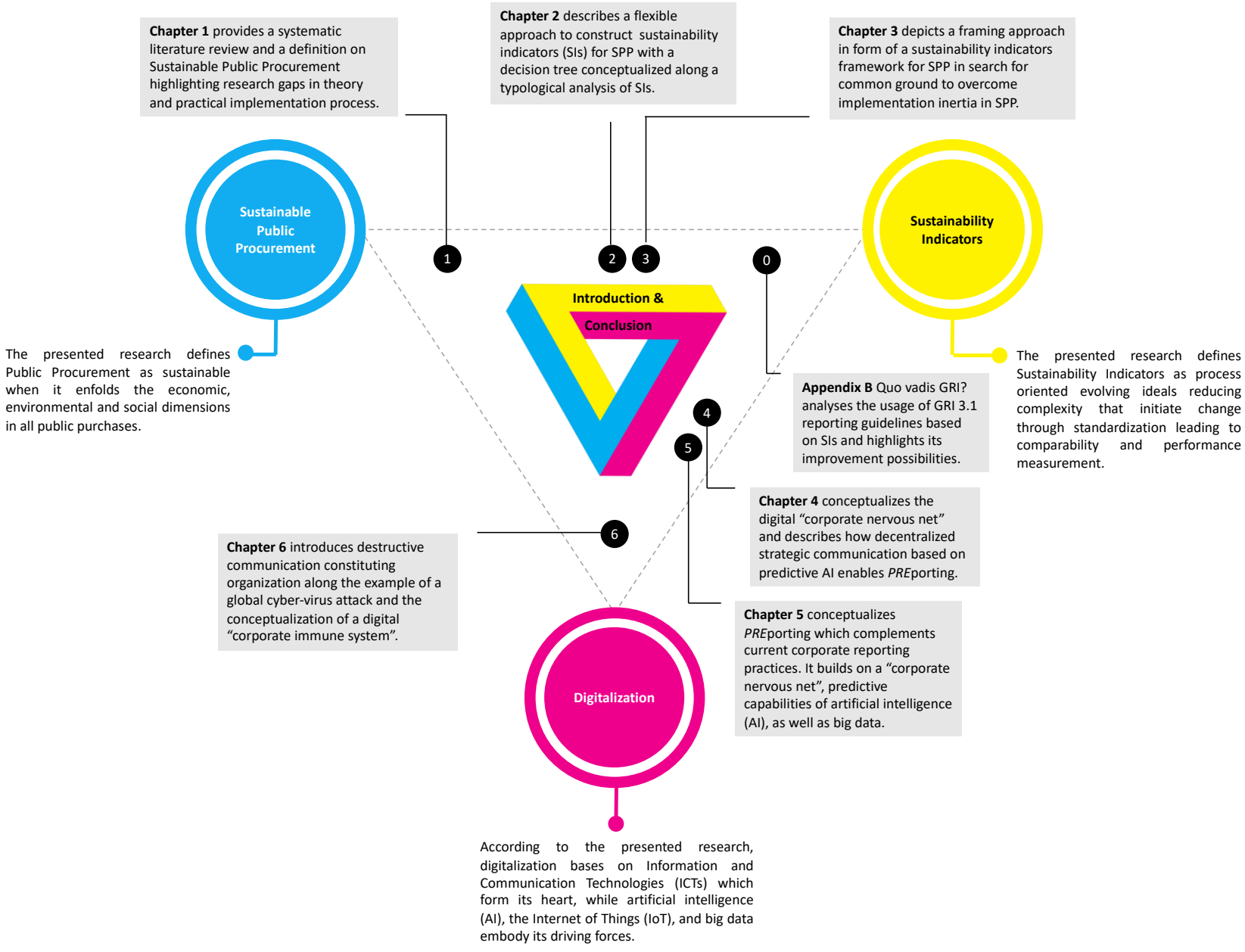
While SIs rather represent constructive communication aiming to order potential disorder by reducing complexities, the thesis introduces in the end destructive communication in form of cyberattacks as opposing force. Interestingly, the findings reveal not only how SIs destruct organization if used unproperly or when they oversimplify, but also how destructive communication constitutes organization in the sense of CCO without being contradictorily. Thus, the thesis outlines this duality of communication along SIs and cyberattacks in its interplay and their switching roles between construction and destruction in changing organization.

Hence, the thesis in its six plus one chapters provides theoretical advancements and practical implications into the digitalization of corporate communications along SIs and cyberattacks and the opportunities to overcome inertia in SPP implementation using SIs.

Keywords

Corporate Communications, Corporate Reporting, Sustainability Indicators (SIs), Sustainable Public Procurement (SPP), Corporate Social Responsibility (CSR), Communication Constituting Organization (CCO), Digitalization, Cyberattacks, Organizational Communications, AI, big data, IoT, Digital Immune System, Digital Nervous Net

Graphical Abstract



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Introduction

1. Research Dimensions and Purpose of the Research

The following lines introduce comprehensively the three dimensions this thesis interrelates, namely, SIs, Sustainable Public Procurement (SPP), and Digitalization. The thesis looks at these research dimensions always through the lenses of communications sciences, especially the ones of corporate communications. The articles presented in the course of the thesis delve on one hand into the realms of SIs and SPP and on the other hand into the realms of SIs and Digitalization. Hence, the following introduction covers the specific topics covered in the various articles presented in this thesis as well as a discussion of the relevant literature.

Sustainability Indicators

The recently introduced Sustainable Development Goals (SDGs) triggered the production of numerous SIs in order to guide and monitor the global process towards sustainability (Bain et al., 2019; Baue, 2019; Lyytimäki, 2019; UN DESA, 2019; UN Sustainable Development Goals, 2017).

In general, indicators main task relies in the creation of sanity in highly complex environments. Thus, the word indicator stems from the Latin word "indicare" which means to point out or direct to knowledge. Currently, the Gross Domestic Product (GDP) represents the most prominent example of an indicator (Bell & Morse, 2011). Bell and Morse explain indicator and indices as "simplifying tools designed to capture complexity and help convey information to specialists and non-specialists alike" (Bell & Morse, 2018b, p. 2). That way, indicators aim to simplify complexity and aim to initiate change. They do so by reducing complexity into single values, numbers and synopses. Meanwhile complexity advances, through globalization, digitalization and the connection of everything with everything in interconnected analogue and digital network systems, as well as through rapid and unpredicted change (Accard, 2018; Bernik, 2014; Greengard, 2015; Helbing, 2015b; Lavorgna, 2020). In order to manage complexity, decision-makers draw on indicators (Simcic Brønn, 2001). Communications professionals also draw on

indicators because the indicators provide them with easily digestible and communicable pieces of information. Interestingly, no commonly agreed terminology exists for indicators. Therefore, indicator developers use the term parameter for lower levels of abstraction, followed by criterion for higher levels of abstraction while quality builds the top of the ranking and data the bottom. Within this field of possibilities scholars use the term indicator for the whole spectrum between data on the bottom of the pyramid and quality at its top (Turnhout et al., 2007). Due to the lack of a commonly agreed definition, Chapter 2 introduces an own definition of indicators:

> *Indicators are process oriented evolving ideals reducing complexity that initiate change through standardization leading to comparability and performance measurement.*

Since the 90's also Corporate Social Responsibility (CSR) communication relies on sustainability performance measurement based on indicators, whereby societal values determine the development of sustainability indicators (SIs) measuring sustainability performance (Whelan & Adams, 2009).

Sustainability itself in its modern meaning rose in the 70's as response to industrial growth and mass consumption as well as the acknowledgment of their impacts on the environment and societies worldwide (Dragos & Neamtu, 2014; Helbing, 2013; Knebel & Seele, 2015). The further course of this thesis in its different articles relies on the definition of sustainability from the Brundtland Report of the 80's. It defines sustainability as development which "meets the needs of the present without compromising the ability of future generations to meet their own needs" (World commission on environment and development, 1987, p. 16). Sustainability relies on indicators because it also describes complexities and interrelations of social and environmental systems.

Studies reveal a lack of tailored sustainability information to stakeholders in organizational and CSR communications, as well as the need for detailed indicators to do so (Dawkins, 2005; Lyytimäki, 2019). The need for tailored SIs as well as the need of public procurement to communicate sustainability performance led to the articles of

chapter 1, 2 and 3 of this thesis. They contain results from the SNF project Sustainable Public Procurement from the NRP 73 "Sustainable Economy" in which I researched as PhD student (Project Number 407340_172351). My fit for this project resulted from my master thesis about the global reporting initiative (GRI) and the quality of SIs usage by corporations. This master thesis led to a publication also presented in this thesis as Annex B titled "Quo vadis GRI?".

The articles presented in chapters 1-3 describe the challenges to measure sustainability and outline the debates between scholars. For example, scholars highlight the challenge and motivations for true transparency through SIs in CSR reporting and find that corporations and responsible stakeholders rather build a pseudo-panopticon than using SIs for sustainable development, criticizing the usage of SIs (Coombs & Holladay, 2013; Knebel & Seele, 2015) while others debate about the consistence, respectively the methods, SIs build on. Thereby, scholars criticize the overreliance on quantitative measures as well as the complexity of contextual measures (Macnamara, 2015; Morse, 2004). This debate between quants and poets produced calls for the development of mix-methods which combine quantitative and qualitative methods (Crane et al., 2018; Molina-Azorin, 2012) while others warn about the power given to numbers through aggregations in SIs they do not deserve (Jesinghaus, 2018). Picking up on this debate, chapter 2 outlines the impacts of this discussion for the translation of SIs into the realm of public procurement and provides practical solutions and findings.

The evolution of SIs reflects societal ideals (Morse, 2004). The current debate between "contextualists" and "incrementalists" covered in chapter 3 display its current status. In this discussion incrementalists argue for incremental sustainable development while contextualists counter with transformative sustainable development considering contexts of a broader understanding of sustainability in form of thresholds and overall limits (Baue, 2019; Bell & Morse, 2018b; McElroy, 2019; Salathé-Beaulieu et al., 2019; UNRISD, 2019). In order to anticipate these ongoing debates in the evolution of SIs, the research presented in chapters 1-3 elaborates possibilities of translation from SIs into the requirements of public procurement.

Sustainability entering public procurement complexifies an already complex area as the next introductory section outlines.

Sustainable Public Procurement

Changing mindsets in a climate changing, as well as a globalized world connected by Information and Communication Technologies (ICTs), enabling global supply chains, which heavily impact the environment, societies and human rights, led, next to the Paris Agreement and the SDGs in 2015, the WTO to revise its Government Procurement Agreement (GPA). The WTO aims with this announcement to transform public procurers globally into leading examples of responsible actors in a global society (WTO, 1994, 2015). Public procurement accounts for an average of 12% of a countries GDP (OECD, 2015) and represents therewith the largest business sector in the world (OECD, 2015; The World Bank, 2016). The announcement causes upcoming public procurement legislations in the GPA member countries including the EU and Switzerland. The proposed legislations include sustainability performance measurements and provide latitudes towards sustainability for professionals (Dragos & Neamtu, 2014; European Union, 2014; WTO, 2015). Chapter 1 and 3 outline how these latitudes challenge professionals and politicians alike in the implementation of sustainability in public procurement. The vast and increasing availability of SIs and the uncertainties about their consistence and proper usage cause inertia in the implementation (Meehan & Bryde, 2011; UNEP, 2012a, 2013, 2016a). Chapter 2 and 3 acknowledge these challenges and aim to contribute to successful sustainable public procurement processes. So far, scholars attribute the theoretical body of SPP rising interests in academic literature, but assess its current status as expandable (Brammer & Walker, 2011; Gelderman et al., 2015; Preuss, 2009). The systematic literature presented in chapter 1 adds and agrees to these previous assessments. The main focus of current literature lies on the identification of drivers and barriers in specific countries respectively industry sectors. Thus, the most common identified drivers and barriers in SPP theory describe the perceived costs of SPP, stakeholder conflicts, organizational fragmentation of SPP approaches, the knowledge transfer and

communication of SPP, risk aversion, complexity, organizational strategies and goal setting, policies, personal commitment, leadership, SMEs and inertia (see chapter 1 and 3).

Reasons for the continuous rise of interest in SPP lie in the appearing major scandals of public procurement (K. Thai, 2001; Khi V Thai, 2008), as also outlined in chapter 3 with current examples from Switzerland. Also new laws like the 2014 Directive by the EU (European Union, 2014) and laws triggered by the WTO announcement cause a rising interest, whereby some academics bravely proclaim an already commenced paradigm shift in public procurement in which sustainability redefines its consistency (Arrowsmith & Anderson, 2011a; Dragos & Neamtu, 2014). Traditionally, public procurements culture resides in economic efficiency, until today (Preuss, 2009). Although, the idea to use public procurement as tool for sustainability related matters stems from the last century as outlined in more detail in chapter 3 (McCrudden, 2004). Further, scholars acknowledged the governmental usage of public procurement as foreign policy tool to achieve national objectives like economic stabilization and development, as well as the protection of local firms from firms of other countries (K. Thai, 2001). The hopes for public procurement as key component towards sustainability derive from its purchasing force of trillions of dollars as well as on cascading global supply chain effects (Smith & Terman, 2016; The World Bank, 2016).

Public Procurers lack a clear understanding of sustainable procurement (ARE, 2018; BAFU, 2018; Snell, 2006). Moreover, no commonly agreed definition of SPP appears in theoretical literature, as chapter 1 outlines. Additionally, other dominant phenomena like "Green Public Procurement (GPP)" next to many other names and definitions, dilute a clear understanding of SPP. GPP for example refers merely to one of three sustainability dimensions, namely the environmental, and leaves out the economic and social dimension (Brammer & Walker, 2011; Bratt et al., 2013; European Commission, 2017a; Grandia, 2015; Preuss, 2009). Even public procurement itself received so far varying and muddled definitions (Prier, 2009; Prier et al., 2016). So the development of the research presented in this thesis follows the definition of public procurement which defines it as acquisition of goods and services by government of public sector organizations (Uyarra & Flanagan,

2010). At the same time it acknowledges the different facets in the theoretical field (Brammer & Walker, 2011; Gelderman et al., 2015; Preuss, 2009) and understands within this definition public procurement as a broad field, involving more than the procurement process, but also its potential as a policy tool, its importance for government efficiency, its impacts on innovation and development, as well as the strategic implications it brings along (Flynn & Davis, 2014; Koala & Steinfeld, 2018; Patrucco et al., 2017; Khi V Thai, 2008). In order to deal with the uncertainties in the definition of SPP, chapter 1 introduces an own definition for the sustainability in public procurement:

> *Sustainable Public Procurement enfolds the economic, environmental and social dimensions in all public purchases.*

With this definition the thesis aims to find common ground in a still fragmented research field and aims to reduce complexity barriers by scholars and professionals. Thus, the thesis does not aim to trivialize the phenomenon. Instead, by using this definition as smallest common denominator the thesis acknowledges and includes previous research and definitions of SPP like the one from the Marrakesh Taskforce defining SPP as "a process whereby organizations meet their needs for goods, services, works and utilities in a way that achieves value for money on a whole life basis in terms of generating benefits not only to the organization, but also to society and the economy, whilst minimizing damage to the environment." (UNEP, 2012b, p. 7)

Midst in the research presented in chapter 1-3, which bases on the mentioned SNF project, the ISO released its sustainable procurement standard ISO 20400 (ISO, 2017). Chapter 2 and 3 pick up on the impacts of this publication on the presented research. Fortunately, they enriched and supported the research, contrary to first fears of replacing it. The ISO standard focuses on the implementation of sustainability into procurement functions and relates closely to existing sustainability strategies, practices and frameworks. In doing so it concentrates on the alignment of sustainability in procurement with existing ongoing strategies and reporting practices. Hence, it focuses on strategy alignment and

implementation procedures, leaving out the provision of clear definitions or SIs to do so. Acknowledging this gap, chapter 2 and 3 aim to close it.

Furthermore, due to these developments, chapter 2 and 3 present two complementary approaches towards the implementation and usage of SIs in public procurement. The rich experiences of organizational communications with SIs in corporate reporting call for synergies and the transfer of learned lessons. In order to do so, the two articles summarize a framing and a flexible approach towards SPP. Thus, as the conclusion outlines further, the two given ways complement each other in their dealing with vast opportunities, complexities and communalities in search for a common and harmonized ground for SPP. From the current possibilities of SI usage, the next introductory section introduces the digital revolution from an organizational communications perspective and points at conceptualizations of future usage and possibilities with SIs.

Digitalization

The digitalization revolutionizes society and organization. Already today more than 95 % of all data exists digitally. At the same time, all contents collected in history of humankind until the year 2003 amount to approximately five billion gigabytes which equals the amount of data volume produced now every day (Helbing, 2015b). Unsurprisingly experts compare the masses of data with the oil of the information age that fuels the digital revolution (Arthur, 2013). Information and Communication Technologies (ICTs) like smartphones, computer, cameras, machines, cars, sensors among many more generate and store these masses of data in all areas of life, called big data. Masses of data cause artificial intelligence (AI) to evolve. AI facilitates the processing and analytics of big data. In doing so AI describes any technique enabling computers to mimic human intelligence and encompasses any device sensitive to its environment and able to act in a way that maximizes its chances of successfully achieving its goals (Russell & Norvig, 2016). Chapter 4 and 5 conceptualize the impact of the digitalization on SIs. Thus, they base on a subset of AI defined as deep learning composed of algorithms. Deep learning permits software to train itself to perform tasks. For the learning, a predictive algorithm rifles

constantly through the gathered data to find patterns where the human eye cannot find them. The patterns result in in big data-based prediction models, which find application in a variety of areas (Malek, 2008). For example the police (Greengard, 2012; Lapowski, 2018; C McCue, 2006), intelligence agencies (Appelbaum et al., 2015) seismographs and meteorologists (G.-Y. Chen et al., 2015; Garzon et al., 2018), politicians (Dahlhaus et al., 2017), as well as sales (Fan et al., 2017) and marketing (Allenby, 2017) departments use AI producing big data prediction models on a daily basis. Meanwhile, recent studies prove the efficiency of predictive algorithms and assess their efficiency superior to human prediction (Greengard, 2012; Hopkins et al., 2011; Kennedy et al., 2011).

Next to big data and AI, the internet of things (IoT) drives the digital revolution. The IoT describes the connectedness of everything, a globally digital connected world (Greengard, 2015). Thus, the IoT builds the backbone of the digital revolution. It consists of sensor networks, global communication between electronic devices, globally accessible websites and social communication networks. In other words, the IoT connects the infrastructure of an information society. This infrastructure even includes objects previously not considered ICTs like TVs, fridges, cameras, vehicles, machines, conveyor, product parts, smart wearables, and sensors amongst more. As a result the digital revolution builds a parallel digital universe which influences the analogue world (Bernik, 2014; Helbing, 2015b; Lavorgna, 2020).

The industry 4.0 exemplifies how the digital revolution changes an industry sector. Hence, it implies how the digital revolution potentially changes many other areas as well. In this example, industry 4.0 stands for the marriage between mechanization and communication. The marriage enables machines to directly communicate with each other needing only a few production workers. This way industry 4.0 describes an evolutionary process that started with the steam engine and industry 1.0, followed by the conveyor belt called industry 2.0 and the introduction of robots in the production lines, industry 3.0. This process or waves of automation lead in industry 4.0 to self-organizing production systems. Next to industry 4.0 also the economy 4.0 emerges which stands for a digital sector driven by information and knowledge production (Brynjolfsson & McAfee, 2014; Helbing, 2015b; Rifkin, 2009, 2011, 2014). The examples show how the wave of automation

transforms continuously industry and economy, sector by sector with different speeds. So the ongoing changes imply the potential for other areas, like corporate communications. Articles presented in chapters 4 to 6 conceptualize how the digitalization impacts corporate communications and organizational communications, especially in their usage of SIs.

The articles presented in the chapters of this thesis refer to the digital revolution with the following description:

> *Digitalization bases on Information and Communication Technologies (ICTs) which form its heart, while artificial intelligence (AI), the Internet of Things (IoT), and big data embody its driving forces.*

The digital revolution sits at the core of corporate communications. Firstly, it creates masses of data usable for organizational communications. On the other hand, organizational communications need to manage this flood of information. Secondly, it provides a new vast variety of opportunities to access information and to communicate them. Thirdly, it enables automations of communications (Helbing, 2015b; Werder et al., 2018). Chapter 4 conceptualizes a digital corporate nervous net and analyses how organizational communication can adopt to this changing environment.

The presented articles refer to either corporate communications or organizational communications. With organizational communications the thesis refers to all communications that are substantial for the perpetuation of organization. The presented research refers to organization as processual entities, as ongoing and interconnected communicative processes in the sense of communication constituting organization (CCO) as outlined in chapter 6, which refers to the Montreal School that defines organizing by communication (Ashcraft et al., 2009; François Cooren & Fairhurst, 2009; Putnam & McPhee, 2009; Schoeneborn et al., 2014; Taylor & Van Every, 2000). Chapters one to five refer to corporate communications. In doing so the thesis refers to the concept of corporate communications analogue to public relations, communication management, and strategic communication. The thesis acknowledges the different traditions and schools that

exist (like organizational communications), but does not aim to discuss their differences (J. Cornelissen, 2017; Ihlen & May, 2011).

The effects on the core of corporate and organizational communications create challenges. The digital revolution destabilizes the economy and society because they cannot control it (Helbing, 2015b; Rifkin, 2011, 2014). The rapid growth of data creates information overloads and complexities. Simultaneously, the high connectivity of everything, as well as the interconnectivity of network systems combined with high interaction strengths causes system breakdowns and failures. In this view, chapters 4 to 5 questions the ambition to run organizations like perfect clockworks, especially in a digital revolution. Instead the chapters aim for adaptation possibilities of corporate communications to the digital revolution. In doing so chapter 4 and 5 analyze how organizations can use the forces of the digital revolution in combination with SIs in their favor instead of fighting against them. Chapter 6 introduces destructive communication constituting organization as opposing force to the evolving ideals of SIs which aim to stabilize through standardization. After the introduction of the research dimensions and implied purpose of the research, the next lines provide an overview of the thesis structure and research objectives of the presented manuscripts.

2. Structure of the Thesis and Research Objectives

The research presented in this thesis follows two main research streams. The first research stream aims to identify SIs usable for public procurement and how to translate them into public procurement. The second stream conceptualizes future digitalized SIs for organizational survival. The first three chapters describe the first stream, while chapters 4 to 6 describe the second stream. Hence, the thesis consists of six manuscripts, partially published and partially submitted to major academic journals.

Both streams emanate from SIs and my master thesis about the GRI reporting framework. Appendix B presents the relating improved, reworked, and published manuscript which analyses improvement possibilities of the usage and disclosure of SIs within the GRI reporting framework.

The first three chapters derive from the SNF project "Sustainable Public Procurement" which aims to identify criteria and indicators targeted specifically for public procurement tenders in Switzerland and elsewhere. The motivation and ambition of the funded project stem from WTO's announcement along the revised GPA (WTO, 1994, 2015) to foster sustainability in public procurement. This announcement triggers legislation adaptations for public procurement in all governments that signed the agreement. The legislation in Switzerland plans to implement legally backed sustainability in public procurement functions by directive of the federal council and by administrative and judicial decisions. However, the question of how to implement and use criteria and indicators in public procurement tenders remains unanswered, even after the publication of the ISO 20400 standard. The SNF research project and the derived insights displayed in the first three manuscripts aim to close this research gap.

The second three chapters delve into the digital revolution and their impact on SIs. Thereby, the individual objectives of the presented manuscripts look through the lens of corporate communications and at its usage of SIs in the digitalized process of organization. In doing so, the resulting conceptualizations capture and aim to answer questions about corporate reporting functions, their usage of SIs and how big data, the IoT and predictive AIs influence them. In other words, especially chapters 4 and 5 look at conceptualizations into future digitalized sustainability performance measurements, while chapter 6 looks at destructive communication in form of cyberattacks. This leads to the following summary of the introduced research streams:

> *Research Stream (I) – identification and translation of SIs for sustainable public procurement implementation (Chapter I-III)*
> *Research Stream (II) – conceptualizing future digitalized SIs for organizational survival and the role of destructive communication (Chapter IV-VI)*

The following lines provide a more detailed description of the individual objectives of each chapter.

Objective Chapter I

The first chapter describes a systematic literature review with the objective to generate a status quo of academic literature in sustainable public procurement. It aims to generate a common understanding of SPP, as well as current research directions. With the knowledge of WTO's GPA announcement chapter 1 aims to understand challenges and potentials of strengthened SPP from a theoretical perspective. Additionally, the literature review of SPP intends to provide an overview of research gaps, as well as the current status of SPP implementations globally. Furthermore, the review aims also to look into the advancements of linking sustainability with public procurement.

Objective Chapter II

The second chapter's objective lies in a typology development of existing SIs in order to understand the possibilities of their usage and translation into SPP. In doing so it aims to introduce public procurement tenders as a part of corporate communications. With this understanding it intends to use existing knowledge about SIs from CSR reporting as well as knowledge about commonly used SIs, to communicate sustainability performance in tenders. Furthermore, the article intends to provide procurement professionals and communications specialist alike with a pragmatic approach and means to use SIs in public procurement tenders, especially with a focus on the need of flexibility for each individual procured good or service.

Objective Chapter III

Chapter III aims to translate and operationalize knowledge about sustainability performance measurement into sustainable public procurement. This includes the intention to provide means to overcome current barriers and inertia in the SPP

implementation process, building on the case of Switzerland. The research presented in the chapter wants to find out how and which existing sustainability standards or guidelines offer orientation for sustainability communication in public procurement tenders. After the development of a framing set of SIs for SPP the research aims to analyze their acceptance by public procurement experts. The framing set and its acceptance intend to contribute to the search for common ground in SPP.

Objective Chapter IV

With chapter IV the presented research in this thesis switches the research dimensions from SIs and SPP to SIs and Digitalization. Its research objective focuses on the conceptualization of a corporate nervous net and a predictive SIs module. Their conceptualization aims to provide corporate communications with a way to adopt to the digital revolution with its possibilities of real-time data and predictive SIs, as well as the vulnerabilities of high connectivity in interconnected network systems. The presented manuscript asks how corporate communications in form of strategic communication can adopt to the digital revolution. In doing so the chapter aims to conceptualize a corporate nervous net and a predictive indicator module orientated on the automation of existing SIs through big data and predictive AI.

Objective Chapter V

Chapter V builds on the results and findings of chapter IV. Thus, it aims to elaborate and introduce *Pre*porting. Once the digital revolution transformed organization and enabled a corporate nervous net, this article aims to understand the implications for corporate reporting, especially CSR reporting. It asks how artificial intelligence (AI) building on predictive algorithms transforms and complements current corporate reporting practices. The presented research aims further to analyze the potential of the digital revolution and its driving forces big data, AI and IoT to prosper shared values in corporate communications. So, it aims to acknowledge the double-edged sword of the digitalization

and its possibilities between digital automated mass opinion manipulation and digital automated and augmented decision-making.

Objective Chapter VI

Chapter VI approaches sense-making in organization from the opposing side of SIs. SIs aim to order and standardize organization for comparability as evolving ideals for change initiation through standardization. Chapter VI intends to introduce destructive communication constituting organization (CCO). Instead of looking at communication that orders and standardizes, like SIs to constitute organization, this chapter aims to analyze destructive communication along the global cyberattack WannaCry which based on a crypto-virus. The presented manuscript in Chapter VI asks how destructive communication in form of a cyberattack, constitutes organization, as well as how this relates to the conceptualization of a digital "corporate immune system". Chapter 4 and 5 aim to conceptualize an "corporate nervous net" building on SIs while chapter VI aims to complement these thoughts with an "corporate immune system" building on destructive communication that triggers change and sense-making.

The conclusion synthesizes and integrates the obtained results in form of a short summary of the chapters, a discussion of the findings, theoretical and managerial implications, as well as limitations and a research outlook.
The graphical abstract in the beginning of the thesis summarizes the introduced research dimensions, features the individual articles presented in chapter I to VI with the Appendix B, and provides definitions which frame the thesis development. Additionally, the graphical abstract provides the research dimensions in a triangular in which each chapter finds its theoretical positioning within those research dimensions.

Chapter I

I. 9.5 trillion US Dollar for Sustainability - A literature review on Sustainable Public Procurement

Manuscript Published as Working Paper

Knebel, S., Stürmer, M., De Rossa Gisimundo, F., Hirsiger, E., & Seele, P. (2019). 9.5 trillion USD for Sustainability: A Literature Review on Sustainable Public Procurement. *Research Gate*. https://doi.org/10.13140/RG.2.2.36358.22089

Abstract

Currently 9,5 trillion USD are spent globally on public procurement p.a. The World Trade Organization (WTO) issued the Government Procurement Agreement (GPA) as a guideline for governments to refine public procurement policies also toward sustainability. In other words, if applied rigorously 9,5, trillion USD would incorporate criteria and indicators for public procurement tenders respecting and promoting sustainability. The literature review takes up this potential mapping and clustering the existing literature on sustainable public procurement (SPP). We do so by a systematic literature review that is clustered into six topics to understand the challenges and the potential of SPP: 1. Definition, 2. Scope, 3. Geographic, 4. Regulation, 5. Management and Innovation and 6. Measurement and Indicators. Based on the literature review we identify a set of research gaps and we provide a simplified definition: "Sustainable Public Procurement enfolds the economic, environmental and social dimensions in all public purchases".

Keywords: sustainable public procurement SPP, sustainability, supply chain, government, regulation, governance

1. Walk the Walk - 9.5 trillion USD market for sustainable public procurement

Although sustainability is a buzz word in environmental literature for the last decades (Dragos & Neamtu, 2014) strong or true sustainability has not been achieved (Shevchenko et al., 2016). The three dimensions of sustainability economic, environmental and social are well-known as triple bottom line. But there is a growing divide between lip services and pragmatic action (Seele, 2016b). Science and everyday experiences leave little doubt that a transformation towards more sustainable ways of living is essential. Moreover, there is evidence that transnational agreements, guidelines, and sustainable theory are on a rise. Though, at the same time the hunger for resources, the contamination of the environment and excessive lifestyles are still increasing. This paradox is called "sustainability gap" in literature (Esty & Lubin, 2014). Alarmingly this gap seems to increase, the louder the call for a sustainable global society becomes. The gap can be seen as wake-up call and challenge to understand and evolve complex mechanisms between global, social and human interaction systems. In this paper, we follow this call putting sustainable public procurement (SPP) at the center and with it 9.5 trillion USD financial power of public procurement (plus expected spill-over effects from the public to the private sector). Should this global budget indeed follow criteria for sustainability we would reach a great step forward from talk the walk to credible and tangible walk the walk: On average government procurement accounts for 12% of a countries GDP (OECD, 2015). Government purchasing of goods, services and construction work "is valued at 9.5 trillion US dollar annually" (The World Bank, 2016). In several industry-sectors public authorities are principle buyers which makes public procurement a "key economic activity of governments" (OECD, 2015).

In the past years, Sustainable Public Procurement (SPP) has become a term of art (Caranta, 2010), combining the disciplines of sustainability, procurement, law and business. The idea of Sustainable Public Procurement could become a practical solution to the sustainable development challenge as called for by Kauffman (Kauffman & Arico, 2014). SPP could shift these vast capital flows towards sustainable goods and services. Thereby SPP and SPP research enhances governmental institutions to navigate socio-technical

systems towards more sustainable ways. It can evolve into a societal facilitator in the transition to sustainability (T. Miller et al., 2014). Public procurement has underlying rules. These rules apply to tenders when the monetary value exceeds the thresholds agreed within the Government Procurement Agreement (GPA) of the WTO (European Commission, 2017b; WTO, 2017). Introducing sustainability into these procurement practices creates various possibilities. The WTO predicts that SPP is becoming a central pillar of the multilateral trading system (Arrowsmith & Anderson, 2011a). The possibilities of SPP lie within the chain reactions of governments purchasing powers. They can be used to develop markets for more sustainable products that otherwise might not emerge (Preuss, 2009). Also, SPP stimulates competition and enhances stakeholder dialogues (UNEP 2012). SPP can be used to face the complexity of globalized supply chains by implementing social, environmental and economic objectives (Preuss, 2009). Further, the implementation of SPP is performed by policies. The policy instrument of SPP has the potential to steer procurers' and producers' decisions in a sustainable direction (Bratt et al., 2013). Public procurement becomes a policy tool to reach desired outcomes in society (Grandia, 2015). The principle behind SPP is to shift the focus of public procurement on value instead of price, using rather value performance than cost performance (Grandia, 2015). This vision and institutional change is in line with the core of sustainability science which is transformative change (Kauffman & Arico, 2014).

Traditionally public procurement had to be economical efficient with purely economic objectives. Despite the sustainability gap, governments drifted into a position to "lead by example" in recent times. They are expected to use their purchasing power in a sustainable way. In 2007 the Marrakech Task Force identified over 300 SPP tools like guidelines, handbooks, databases, and software (Perera et al., 2007). In the beginnings of SPP there was a trend to implement environmental criteria into the tenders as a first step towards a more sustainable public procurement. Also, it was feasible to enrich the technical specifications in tenders with environmental data requests. They can be measured in a straight forward way. Recently the trend is to integrate also social criteria into the tenders (Steiner, 2017). Due to the close ties of legislation and public procurement it does not seem surprising that each country is developing its own SPP approach (Perera et al., 2007).

Nevertheless, the supply chains of a globalized world demand for a global SPP approach in order to be effective. That is why trans-national organizations like the WTO, UN, OECD and EU are fostering SPP.

The WTO enables SPP with the Government Procurement Agreement (GPA). The agreement is based on the concept of transparency, open markets, accountability and value for money in public procurement (Arrowsmith & Anderson, 2011b). The revised GPA is one of the plurilateral agreements of the WTO. Regarding SPP the revised GPA depicts in Article XXII (8) (WTO, 2012a) that SPP shall be further facilitated through a particular work program. Thus, Annex E of the GPA 2012 states among others that national and sub-national procurement policies shall integrate the concept of SPP (WTO, 1994, 2012b), even though the revised text does not contain any direct reference to social, labor or employment related considerations.

The revised EU Public Procurement Directive (European Union, 2014) pushes as well for SPP. According to the directive the procurer has to give the contract to the economically most advantageous tender, that means the tender with the most value for money. This opens the door for the incorporation of sustainability criteria in all dimensions, economic, social and environmental. This incorporation of sustainability criteria in public procurement tenders embodies SPP (Brammer & Walker, 2011).

The United Nation Environment Program (UNEP) is providing guidebooks and implementation manuals of SPP for governments also pushing for SPP (UNEP, 2012b). Finally, the OECD Recommendation on Public Procurement ensures the strategic and holistic use of public procurement and evoke the need to develop appropriate and balanced strategies for the integration of secondary policy objectives in public procurement systems (OECD, 2015).

The last literature review by Walker and Brummer in 2012 was performed to analyze the impact of E-procurement (Walker & Brammer, 2012). In this paper, we perform a dedicated and focused literature review on SPP. It is the aim of this paper to get researchers interested in this research field, to enable further research on SPP, to provide a tailored definition of SPP and to identify research gaps to see how far research in this field has

advanced in linking sustainability to the solution orientated approach of SPP (T. Miller et al., 2014).

2. Systematic Review Method

There are many possibilities to systematically review academic literature. Noblit and Hare distinguish between two systematic literature review procedures (Noblit & Hare, 1988). They state that literature reviews are either integrative or interpretive. Integrative reviews are most likely used when there are many similarities concerning the type of study and collection of data. Usually integrative reviews summarize large numbers of literature that tend to use quantitative methods of meta-analysis. Interpretive reviews are inductive and are appropriate when the literature varies in its research approaches. Usually they are being performed when there is less similarity between the studies and when there is a mixture of qualitative and quantitative research approaches. Therefore, an interpretive approach for the systematic literature review of SPP is useful.

We focused on SPP only knowing that there are other definitions around. The most commonly used is green public procurement (GPP). GPP is used to emphasize the incorporation of environmental specifications into public tenders pointing out the early approaches implementing sustainable information into tenders. Considering current developments to include as well economic and social criteria in public procurement (Steiner, 2017) this paper focuses on all three dimensions of sustainability reflected in the wider definition of sustainability in public procurement, namely SPP.

We systematically reviewed the literature on SPP by using a three-step model. First, we ran a keyword search for “Sustainable Public Procurement”. For that we used the Google Scholar Advanced Search and ran the search in titles only function. The papers in the resulting list were then reviewed and eliminated if SPP was not the core variable or construct of the research. Afterwards we supplemented the list with book chapters, books and related articles that did not appear in the general search but are well-recognized and cited in the scientific field of SPP. The final dataset from July 2017 included 115 articles.

In the second step, we read and coded the articles individually. Two authors independently

created research clusters based on that coding. All articles were allocated to the clusters. The result of step two were two sets of clusters from two authors. The two sets of clusters were individually created to increase the reliability of the study. Also, all articles were individually allocated into the clusters. Finally, in a third step, the two cluster sets were merged in a consensus session by the authors. Similar cluster topics were merged and led to five final research clusters: Definition, Scope, Geographic, Regulation, Management/Innovation and Measurement/Indicators. The articles were then allocated accordingly and analyzed in detail to generate cluster-based review chapters and their synthesis. The results are described in the following sections.

3. Clustering Literature

3.1. Definition of Sustainable Public Procurement

There are various approaches and definitions of sustainable public procurement (SPP). Also, it is named differently, depending on the researchers and the historical development of SPP. First, we give an overview of definitions of procurement, then we dive into the definition of SPP and how current literature is using it. Afterwards we come up with a definition of SPP and how we interpret it as a first contribution of this paper to the science of SPP.

Procurement is the process by which organizations purchase goods and services. More precisely it is the process by which organizations try to arrange supplier contracts for the purchase of goods and services (Perera et al., 2007). Public Procurement (PP) narrows the scope down to purchasing processes of governments and public-sector organizations. There is no global harmonized methodology of procurement thus PP differs from country to country. The only common principles of procurement processes are “value for money”, “transparency”, and “anti-corruption” (Bratt et al., 2013; Perera et al., 2007; Uyarra et al., 2014). Most public procurement is carried out by tender processes to which all suppliers may submit a tender (Perera et al., 2007). It is one of the key economic activities of a government (Brammer & Walker, 2011). Sustainable Procurement (SP) considers broader concerns about sustainable development in procurement processes. Most commonly used

is the definition of the UK Sustainable Procurement Task Force in 2006, which states "sustainable procurement is the process whereby organizations meet their needs for goods, services, works and utilities in a way that achieves value for money on a whole life basis. It results in benefits not only to the organization, but also to society and the economy, whilst minimizing damage to the environment" (DEFRA, 2006; Perera et al., 2007; Preuss, 2009). Sustainable Public Procurement (SPP) does not have a consensus definition among researchers. The EU defines SPP as "a process by which public authorities seek to achieve the appropriate balance between the three pillars of sustainable development - economic, social and environmental - when procuring goods, services or works at all stages of the project" (European Commission, 2017a). Other names like green public procurement (GPP), Environmental preferable Procurement (EPP), Social Responsible Procurement (SRP), Sustainable Acquisition (SA), Responsible Procurement (RP), CSR Procurement and Ethical Procurement are also being used but mean the same as SPP. GPP and EPP try to emphasize the environmental aspect over social and economic ones but don't exclude them (UNEP, 2013). Defined by the EU "Green Public Procurement (GPP) means that public authorities seek to purchase goods, services and works with a reduced environmental impact throughout their life-cycle compared to goods, services and works with the same primary function which would otherwise be procured" (European Commission, 2017a). Seeing all the definitions pointing on one or more aspect of sustainability in public procurement it makes sense to use the all-inclusive expression of SPP following the lead of the WTO and the UNEP (UNEP, 2013; Yaker, 2017).

There is critique to the definition of SPP due to the lack of clear definitions of sustainability objective (Bratt et al., 2013). This critique is widely discussed in all research fields embracing sustainability. There is no clear definition of sustainability (Knebel & Seele, 2015). In the beginnings, public procurement had to be economically efficient and to combat corruption (Arrowsmith & Anderson, 2011b). The interests of public procurement were the opening of markets to increase competition for best pricing and to support anti-corruption measures through transparency. This is still the case today. However, in the last years with the development of sustainable concepts and corporate social responsibility (CSR) governments have been put in the position to "lead by

example" (Dragos & Neamtu, 2014). That led to the introduction of SPP and the introduction of policies and guidelines. When discussing SPP researches and the UNEP tend to use the DEFRA definition mentioned above. We propose the following definition for SPP leaning on all pre-existing definitions of sustainability in public procurement. Especially considered are the widely used definition by the DEFRA and the definition of GPP by the EU. Also anticipated are the current discussions about SPP (Steiner, 2017) and the inclusion of all sustainability dimensions in SPP:

> *Sustainable Public Procurement enfolds the economic, environmental and social dimensions in all public purchases.*

This definition aims to find a common and all-inclusive understanding of sustainability in public procurement. Current understandings of SPP rather focus on one sustainability dimensions, predominantly the environmental dimension. Furthermore, this definition aims to reduce complexity barriers to approach and implement SPP but acknowledges more detailed definitions like the one form the Marrakesh Taskforce (UNEP, 2012b).

3.2. Scope

There is a trend in the SPP research to examine case studies in a specific industry sector. All papers following this trend were assorted in the scope cluster. Usually the analyzed sector lies within a legally harmonized frame, in a particular country. Most analyzed industry sectors with an SPP perspective are the construction industry (Keaveney & Butler, 2014; Uttam, 2014), the healthcare industry (Asare, 2017) and Universities (Omwoha, 2015; Pacheco-Blanco & Bastante-Ceca, 2016). Other analyzed sectors are food, waste, water, and recycling.

Within these cases the implementation of SPP is analyzed and its impact in the concerning industry sector. Asare (2017) for example analyzed the implementation of SPP in the health care sector of Ghana. He explored that the lack of a sufficient SPP policy in Ghana is resulting in misleading tender procedures with the result of negative impacts due to SPP (Asare, 2017). The case studies are to a majority based on surveys of experts. These

experts are public procurers and the corresponding suppliers in the sector. Therefore, in this cluster the studies focus on drivers and barriers in the communication between the two corresponding parties. The main overarching result is a barrier to SPP identified in a lack of knowledge about SPP and a lack of training in SPP on both sides, procurers and suppliers (Keaveney & Butler, 2014; Omwoha, 2015; Uttam, 2014).

All researchers in this cluster conclude with detected barriers and improvement possibilities. Next to the already mentioned lack of knowledge and training, other barriers and complementing drivers or improvement possibilities are identified. These are the lack of policies and legal frame works, a lack of collaboration of lawmakers and practitioners and the problems of comparison and measurement.

Furthermore, the researches state that due to the variation of SPP policies and implementation practices the case studies are single cases without any comparisons. This leaves the validity of the research in this cluster within the local scope of the analyzed industry sector and legal frame.

These findings are consistent with the findings of Brammer and Walker. They spotted a typical SPP research approach in single case studies with a sectoral perspective investigating how sustainability can be encouraged when public procurers buy from suppliers in specific industries (Brammer & Walker, 2011).

3.3. Geographic Approach

Most studies within the whole sample have a geographic frame. This cluster contains those papers that generated a general overview of SPP practices within a certain country. For example, Kaya analyses current SPP practices in Turkey finding that the current legal framework is not sufficient to promote SPP in Turkey (Kaya, 2014). Another example is taken from Prier and McCue who analyzed public sector organizations in the US with the result that the current state of SPP in the US created a random experimentation with little systematic pattern to SPP adoption (Prier et al., 2016).

Also, in this cluster, there are just a few international comparison case studies. Steurer et al. (2007) analyzed SPP adoption characteristics within European countries examining the state of development of national action plans regarding green or sustainable public

procurement in the EU (Steurer et al., 2007). Their analysis showed that only one third of the 27 EU member states had implemented SPP action plans in that time. They also found that the emphasis of taken actions is environmental rather than social in character (Steurer et al., 2007). McCrudden did a global comparative analysis of SPP developments. He elaborated that the SPP developments in the US are non-discriminatory driven. According to McCrudden the EU focuses on value for money and competition while Japan passed a law mandating all public organizations to implement SPP in their processes (McCrudden, 2004).

These examples highlight the difficulties to compare SPP approaches internationally. The differences between countries in their approaches also due to cultural reasons play a strong part in the SPP implementation. That complements the findings of Uyarra (2014), who found that SPP initiatives vary strongly in their rationale and implementation mode and reflect national differences in culture, structure and governance of PP practices. That results in different objectives associated with different policies and the complexity of procurement processes in general (Uyarra et al., 2014).

The UNEP and PricewaterhouseCoopers (PwC) tried each to rank countries in their SPP activities. PwC used expert opinions, while the UNEP used a content analysis of countries cited in SPP literature to come up with a ranking (PwC, 2008; UNEP, 2013). Both rankings differ in their result and leave room for interpretation. The UNEP's top five is Sweden, UK, Germany, Denmark and Switzerland. PwC identified the frontrunners in Japan, USA, and Canada followed by the European "Green-7" countries Austria, Denmark, Finland, Germany, the Netherlands, Sweden and the UK, as well as Belgium, Italy and Spain (UNEP, 2013).

3.4. Regulation

Legal literature about SPP concerns the conditions under which sustainability criteria might be introduced in the public procurement regulation and how the subjects in charge could implement them. One major element that links the different papers is the awareness that SPP has gained prominence mainly in Europe and that its implementation in procurement practice has become a crucial priority (Corvaglia, 2016; Sjåfjell &

Wiesbrock, 2016). In this context, the regulation cluster considers those papers that deal essentially with two major issues. On the one side, the literature tries to find the conditions under which States can apply the requirements of SPP as a policy tool to foster the sustainable development. On the other side, a part of the contemporary doctrine mainly focuses on the potential, the chance and the legitimacy to utilize certificates and labels within the legal framework.

Related to the first issue, a central element is that the integration of environmental and social criteria is considered as a secondary policy in respect of the primary economic objectives of the public procurement regulation (such as fair and open competition; efficient allocation of public funds; transparency and non-discrimination); thus, for what it concerns the terminology, some authors suggest to use the label "horizontal" (instead of "secondary") in order to ensure that the objectives of these policies gain the same status as the primary ones (Arrowsmith & Kunzlik, 2009). From a dogmatic point of view, a considerable segment of the scholarship looks at how to integrate and balance in the legal system these secondary objectives to the primary ones without denaturalize or ignore them (Arrowsmith & Kunzlik, 2009; Palmujoki et al., 2010; Steiner, 2017; Wiesbrock & Sjåfjell, 2016). In this context, some authors consider that the economic, environmental and social objectives in the public procurement regulation are not necessarily contradictory, may be pursued simultaneously and therefore they are not necessarily a derogation from the fundamental economic objectives that has to be justified (Wiesbrock & Sjåfjell, 2016), but they may represent another common manifestation of market behavior in the public and private sectors (Arrowsmith & Kunzlik, 2009). Furthermore, some authors analyze the amount of the discretion and the flexibility that States have in the implementation of sustainability rules under the GPA Agreement (Semple, 2017; Steiner, 2017) and under the EU law (Andrecka, 2017; Arrowsmith & Kunzlik, 2009; Sjåfjell & Wiesbrock, 2016; Wiesbrock & Sjåfjell, 2016), through a systematic analysis (Comba, 2010) of the legal framework, of the awarding entities 'praxis and of the jurisprudence of the Courts, both on the international and on the national level. In this context, within the scholarship, a rather general unexplored topic is the necessity of a mandatory approach because the effectiveness of the secondary policies is undermined by

the large amount of discretion left in the hands of Member States and contracting authorities (Arrowsmith & Kunzlik, 2009; Wiesbrock, 2016). However, this possible solution is perceived (especially by stakeholders) as an excessive burden for the contracting authorities because it limits their flexibility and it requires a disproportionate amount of resources and know-how (Wiesbrock, 2016). Besides, the doctrine concentrates on how to prevent the likelihood that sustainable criteria may be introduced with the final aim to favor hidden protectionist practices conflicting with the European free movement principle, which prohibits unjustified discriminatory measures in public procurement and imposes transparency in awarding public contract (Arrowsmith, 2009; Caranta, 2010). In light of this, a part of the literature highlights that environmental and social considerations do not have the same weight in the juridical framework: indeed, environmental criteria are more suitable to be considered in the application of the "best value for money" principle because of their easily quantifiable character and their linkage to the procurement's object. Compared to the environmental considerations, the social ones (as working conditions) are more linked to the producer and to its internal organization and their improvement is frequently problematic in the light of non-discrimination principle (Comba, 2010; Wiesbrock, 2016). Furthermore, from a practical point of view, the scholarship tries to individuate the most suitable collocation (or classification) of the secondary considerations within the different stages of the tender process and it points out the margin that the Member States have to implement horizontal policies within every single stage. For instance, there is a vivid debate on how far certain social and environmental requirements can be classified as relating to technical or professional ability within the selection criteria, also considering that their absence could turn into a possible reason of exclusion from the procedure. Moreover, the literature investigates in a punctual way to which extent the contracting entities have the faculty to integrate these considerations when defining the subject-matter of the contract through the drafting of the technical specifications; the same question arises around the award criteria, and specifically it concerns their weighting in the definition of the most advantageous tender (Schebesta, 2014). Besides, Comba (2010) examines whether the most relevant opportunity for environmental or social public procurement could be given by the integration in the

contract performance clauses, which relate to the execution phase (Comba, 2010). Lastly, Semple (2016) highlights the necessity of granting the link between social and environmental criteria and the subject-matter in every single stage of the tender process (Semple, 2017). In this context, the author emphasizes how the strict requirement of the "link to the subject-matter" may represent one of the major limiting principles for sustainability considerations under the EU legal framework and he suggests therefore a looser approach to this condition.

Concerning the second issue of the literature, the use of transnational private regulations (TPRs), such as standards, labelling (in particular eco-label) and certifications, has increased within the award process, since it is considered as a direct instrument of verification for environmental and social criteria. In this context, the literature analyses the possibilities for implementing the TPRs under the GPA legal framework (Corvaglia, 2016) and the new EU Directive of 2014 (Caranta, 2016; Schebesta, 2014; Wilsher, 2009) and it focuses on the advantage of using these labels (namely the monitoring and the certification of labor and environmental conditions of the production processes). In particular, Corvaglia (2016) stresses that the integration of TPRs contributes to reduce the management costs of the supply chain and to exchange information between the various actors in the procurement process (Corvaglia, 2016). Moreover, Wilsher (2009) tries to find the best solution for enacting eco-labels in the tender process, for instance by proposing to integrate them in the award criteria rather than in technical specifications, due to the complexity of the latter (Wilsher, 2009). However, an undeniable disadvantage is that TPRs have both the potential to distort international competition and to undermine the best use of taxpayers' money; in addition, there is a danger of misuse, such as discriminatory practices (Corvaglia, 2016). Therefore, the literature argues that, in order to avoid a distortion of the competition, TPRs must be based on objectively verifiable and non-discriminatory criteria and that they must be transparent and accessible to all economic operators (Martinez Romera & Caranta, 2017). Eventually, Schneider (2016) points out that the contracting authorities must not utilize the labels as a tool to identify ex ante a specific product, but rather as an instrument for establishing the qualities of the

needed product; notably the labels must be clear and they must accept equivalent proofs of the required characteristics.

3.5. Management and Innovation

SPP literature that does not have a regulative, country specific or sector specific approach is likely to be driven by business science in the private sector. That means that the chosen perspective of analysis is from private business looking at SPP. Several papers analyze the relationships between buyers and suppliers, as well as the relationships between governments and businesses (Witjes & Lozano, 2016). Frameworks and innovations are introduced with the aim to improve the supply chain. Also, lessons learned from sustainability in supply chain management (SCM) are transferred to SPP and analyzed in their possibilities for SPP (Brammer & Walker, 2011; Preuss, 2009; Walker, 2010; Witjes & Lozano, 2016). Results highlight the positive potentials of SPP on business and describe the impacts of SPP on economic activity (Brammer & Walker, 2011).

Researchers agree that a competition over price alone is not stimulating innovation. At the same time, it is stated that SPP needs to provide incentives for business to embrace it (Steiner, 2017; Witjes & Lozano, 2016). According to Witjes and Lozano and Preuss the incentives are given in the SPP process as to be seen in sustainable SCM. Collaboration of procurers and suppliers lead to reductions in raw material utilization and waste generation and promote the development of new, more sustainable, business models (Preuss, 2009; Witjes & Lozano, 2016). Another approach to visualize incentives of SPP is life cycle costing (LCC). LCC is a tool which evaluates the costs of an asset throughout its life-cycle. Dragos and Neamtu identify LCC as an important element to make SPP attractive by shifting the focus beyond the solely purchase price of a good or service (Dragos & Neamtu, 2014).

Lessons from sustainable SCM are concerned with the supporting factors transparency, strategy, culture and risk management that could be taken also one to one as important supporting factors for SPP (Preuss, 2009).

An innovative proposal to SPP is the concept of circular economy (CE). The idea is to close life cycle loops of products and goods through recycling, levels of recovery and the

longest possible usage. The focus is on a circular value chain, similar to cradle to cradle technologies (Witjes & Lozano, 2016).

Grandia chose a psychological behavioral approach and found out that the behavior of the procurer is a mediator between the organizational factors and the degree of sustainable public procurement that is implemented. He indicates that the lack of knowledge that is identified as a mayor barrier to SPP across literature is not directly responsible for the diminishing implementation of SPP. Rather does this lack of knowledge influence the behavior of the procurer who then in turn is implementing less SPP (Grandia, 2015).

Walker and Brammer analyzed that the flow of innovation does not need to start top down from SPP practices. They explain that a change in policy forces business to improve the sustainability of operations across the supply chain. But research and practice in SCM can as well influence policy by presenting alternatives in sustainable SCM (Alhola et al., 2017; Brammer & Walker, 2011).

Research about SPP from the business perspective have similar results than other SPP studies concerning barriers and drivers of SPP. Communication, collaboration, knowledge, price, training and relational factors between procurers and business are identified as areas of problems and potential for SPP.

3.6. Measurement and Indicators

The literature on measurement of SPP is scarce. In a few reviewed papers, researchers touched the topic of indicator implementation or tender criteria improvement. Vatalis et al identified performance indicators for construction procurement processes in Greece (Vatalis et al., 2012). Based on two rounds of Delphi questionnaires most practical indicators for project management were identified by which one indicator is connected to SPP which is waste reduction. Vos made suggestions to improve the sustainability criteria of public procurement in the Netherlands (Vos, 2010). The suggestions are tailored to current PP practices in the Netherlands. One suggestion is the summary of all technical specifications that concern sustainability. They could then be put into one sustainability category that is weighted accordingly (Vos, 2010). Prenen (2008) analyzed 120 tender documents in the Netherlands in their usage of SPP criteria (Prenen, 2008). The results

show the possibility to implement sustainability prominent in PP practices but at the same time it is not being done often. Mansi analyzed disclosure practices of central public-sector enterprises in the field of SPP in India which underperform in the SPP dimensions (Mansi, 2015).

Walker and Brammer used the purchasing social responsibility scale items developed by Carter and Jennings (Carter & Jennings, 2004) in a survey to find out if and how SPP was implemented. They tested the impact relations of communication and e-procurement. The result is that e-procurement seems to hinder SMEs to participate in tenders and that communication is positively related to SPP.

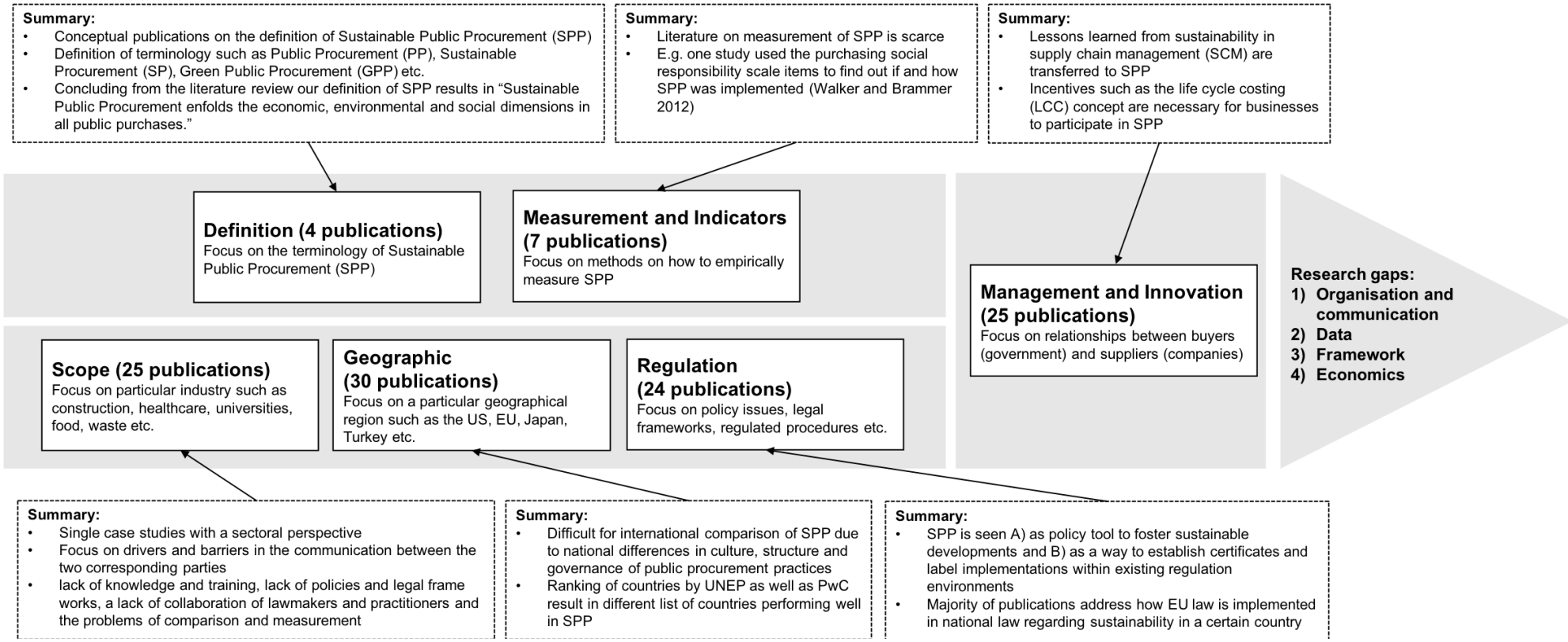

Figure I-1: Cluster Summary and Identified Research Gaps

4. Identified Research Gaps

To sum up the described clusters in the previous chapters including the research gaps the key findings are illustrated in Figure 2. The scientific SPP literature reveals research gaps. All published SPP papers include in their discussion drivers and barriers for SPP. Some researchers point into directions for further research. The identified research gaps of SPP evolve the one hand from that formulated literature in form of drivers, barriers and needed future research. On the other hand, they evolve from their lack of existence in current literature. For a better understanding, the research gaps have been categorized in four sections and are being described in the following: organization and communication, data, framework, economics.

The first research gap category is summarizing organizational and communicational research gaps. Organization and communication categorize as research gap all identified relational and informational gaps. Most identified barrier to SPP in the reviewed literature is knowledge dissemination of SPP (Grandia, 2015; Preuss, 2009; Uyarra et al., 2014). Most proposed solution and driver to encounter the barrier of knowledge dissemination is SPP training (Couto & Ribeiro, 2016; Omwoha, 2015). Current literature does not answer how SPP training should look alike. Also, literature has not yet analyzed the impact and effectiveness of SPP trainings. Aragão and Jabbour (2017) identified this lack in literature and found out in their study that training is void (Aragão & Jabbour, 2017). Another identified driver for SPP by SPP literature is intensified relationships between policymakers and practitioners (Aragão & Jabbour, 2017; Walker & Brammer, 2012) respectively procurers and suppliers (Brammer & Walker, 2011; Uyarra et al., 2014). It is not yet analyzed how these relationships could be established and framed. Moreover, the possibly involved risks of close relationships are not discussed. Risks of close relationships are for example corruption, patronage, barriers to market extension and barriers for innovation.

The second research gap is categorized as data. Data stands in this section for the comparability problems of SPP as well as the lack of SPP monitoring. Without SPP data collection it is difficult to measure, monitor and improve any SPP processes. The

importance of transparency, comparability and audit mechanisms is mentioned in literature (Dragos & Neamtu, 2014; Preuss, 2009; UNEP, 2016a; Wiesbrock, 2016). However, only a few researchers started to analyze SPP criteria development in tenders (Vos, 2010) and possibilities of how SPP could be implemented effectively into tender procedures (Witjes & Lozano, 2016). There is a lack of research about SPP indicators and measurement as to be seen in the cluster development of this paper. In addition, there is a lack about how SPP indicators could be effectively implemented into tender procedures in full compliance with all the relevant provisions at a national and an international level. Walker and Uyarra (Uyarra et al., 2014; Walker & Brammer, 2009) emphasize the importance of SPP data collection for SPP research.

The third identified research gap category describes gaps concerning the overall scientific SPP framework. Framework is supposed to describe here the general scientific approach to SPP and its improvement possibilities. Bratt identified a lack of common global definitions which makes a discussion about SPP difficult (Bratt et al., 2013). Also, the general lack of a common agreed on definition of sustainability enters the discussion about SPP. This lack hinders the elaboration of objectives, goals and strategies. Amongst others Walker and Brammer, Perera et al., and the UNEP identify the need for a global theory development. Research and implementation of SPP takes place in regional and local policy and industry specific areas. Concurrently the research focusses on local tailored, industry and policy specific single case studies with little global validity (Perera et al., 2007; UNEP, 2016b; Walker & Brammer, 2012). The current SPP implementation process of governments is explorative and based on best practice examples (UNEP, 2012b). A scientific policy development testing respectively implementation testing is missing (Dragos & Neamtu, 2014; Grandia, 2015; McCrudden, 2004; Walker & Brammer, 2012).

The fourth research gap is named economics. It stands for research gaps concerning the economic factors of SPP. The tender process has been and still is strongly based on the lowest price or overall cost (European Union, 2014; Steiner, 2013; Witjes & Lozano, 2016). A UNEP study concludes that SPP is perceived as more expensive. Simultaneously this fact is seen as biggest obstacle for a successful SPP development. SPP literature tackles this problematic partially by claiming that due to waste reduction and quality SPP

provides financial incentives. Drogos and Neamtu introduced life cycle costing as solution to proof economic efficiency of SPP (Dragos & Neamtu, 2014). Further research in the economical field of SPP can help to understand or dispel the perceived barrier of financial constraints.

5. Conclusion and Limitations

The aim of this study was to give a review of literature about SPP. Hopefully the developed clusters, the proposed definition of SPP and the identified research gaps will be useful for researchers who intend to work in this powerful and interesting field of sustainability and public procurement. The proposed definition of SPP stating that 'Sustainable Public Procurement enfolds the economic, environmental and social dimensions in all public purchases' could be used as fruitful starting point for interested researchers.

There is consensus that SPP can be implemented as policy to drive sustainability. It is a pragmatic hands-on approach towards more sustainable practices. Due to the vast amounts of money that are being channeled by public procurement the impact could be high. The scientific approach to SPP is in its youth and needs to fill several research gaps before qualified decisions about the proper global implementation of SPP can be made. It is clear that the cost of the goods and services continue to remain the most important and applicable criterion for procurers. The big research question in SPP therefore is how to mould social, environmental and long-term economic criteria into the purchase decisions, and this within a legal framework that is still keen to consider horizontal (social and environmental) policies in public procurement as secondary, or even antonymous, objectives to the others (as competition, free movement and value for money) (Arrowsmith & Kunzlik, 2009; Steiner, 2013, 2017). One possibility given in the analysis of this study is the construction of measurement infrastructure as fundament for a strong argument for SPP. In order to refine the science of SPP also critical analysis of the SPP approach as such is useful (Hettne, 2013). Also, scrutinizing the proposed drivers of SPP is helpful for the development of SPP (Preuss, 2009). It is still unclear for example if training has a positive impact on SPP (Aragão & Jabbour, 2017). Also unclear is how SPP can become

indeed a powerful source of innovation at supplier side (Uyarra et al., 2014). An interesting field of research and important for SPP is the necessary form in which the proposed close relationships and interactions between procurer, supplier and policymaker should be fostered. And there are already considerable risks mentioned by scholars who see the foundational principles of public procurement endangered by SPP (Walker & Brammer, 2012). These principles are transparency, anti-corruption and enlarged market access through the non-discrimination principle. Morse is warning about the creation of sustainability indicators and indices without assessing their usefulness, as it is currently being done in many cases. That could trigger evolutionary processes in the development of sustainability indicators and shift the development away from technical concerns towards the users' needs (Morse, 2015). Barnett points at the double-edged characteristic of sustainability indicators and indices. On the one hand, they help to reduce complexity on the other hand they might provide hazardous simplifications (Barnett et al., 2008). And last but not to forget are the vast experiences in sustainability driven transformational changes SPP research could learn from. As for example in the coffee industry with passive revolutions in value regimes (D. Levy et al., 2016). The science of SPP has the ability to develop the necessary theoretical framework to address and include its critics.

Chapter II

II. Introducing Public Procurement Tenders as Part of Corporate Communications - A typological analysis based on CSR reporting indicators

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Abstract

Purpose – Corporations have to include increasingly CSR communication by responding to public procurement tenders because of the recent WTO's Government Procurement Agreement. We argue that procurement tenders are to be seen as part of corporate communications, particularly when aligned with CSR reporting and performance indicators of CSR reporting as proposed by the Global Reporting Initiative. The recent ISO 20400 on sustainable procurement emphasizes the alignment of procurement with organizational goals and existing reporting practices. This paper aims to support scholars and professionals alike with a sustainability indicators typology and indicator selector to align CSR communication in tender processes with organizational goals.

Design/methodology/approach – We performed a typological analysis of sustainability indicators, which led to the creation of a sustainability indicators typology and the development of a sustainable public procurement indicator selector.

Findings – The typology reveals three indicator types. The first indicator type bases on purely quantitative methods, the second on purely qualitative methods, and the third type combines qualitative and quantitative methods and can be applied with a sustainable public procurement indicator selector.

Research limitations/implications – The limitations of the study lie within the legal and country specific contextuality of public procurement tender processes, as well as in the current uncertainty of how governments introduce the WTO's Government Procurement Agreement into existing laws.

Originality/value – To our best knowledge this is the first contribution to introduce procurement tenders as part of corporate communications. In addition, the derived typology contributes to the debate between quants and poets a new approach of combining qualitative and quantitative methods as called for by scholars. It provides professionals with a way to flexibly adopt CSR communication for the usage in different areas of the organization.

Keywords**:** CSR, SIs, Public Procurement, Corporate Communications

1. Introduction

We introduce public procurement tenders as corporate communications and base this line of argumentation on recent developments of using corporate social responsibility (CSR) communication within public procurement tender communications.

Next to the intensified climate debate sensitizing the field of public procurement for sustainability, the World Trade Organization (WTO) announced to foster sustainability in public procurement with the revised Government Procurement Agreement (GPA), entered into force on 6 April 2014 (WTO, 2015). Therewith the WTO aims to channel the global governmental expenditures in public procurement valued at 9.5 trillion US dollar annually (The World Bank, 2016) into sustainable ways. This way, public procurement (PP) tenders will increasingly require social and environmental performance information from participating corporations. Additionally, the International Organization for Standardization (ISO) released the ISO 20400, an international standard on sustainable procurement, emphasizing the alignment of procurement with organizational objectives and goals, as well as with existing sustainability reporting practices (ISO, 2017).

The need of CSR communication and its sustainability indicators (SIs) to participate in public tender, challenges professionals to tailor existent CSR communication and SIs to procurement processes. Further, this knowledge transfer requires a readjusted alignment of overall organizational communications. This paper aims to support scholars and professionals alike in this challenge with a derived typology and an indicator selector to craft CSR communication to public procurement tender processes.

The field of SIs describes a minefield between quants and poets along their favoured methodological approaches. We outline the debate and use it as lead in the performed typological analysis. The results consist of a typology of SIs which enables the conceptualization of a sustainable public procurement (SPP) indicator selector based on algorithm like decision trees. The conceptualized selector allows for self-responsible, relevant, adaptable and pragmatic CSR communication in public procurement tenders. The vast variety of procured services and goods, the purpose and environment of the procurement, as well as the differences in their sustainability impacts, legal environments

and peculiarities create complexities. These complexities demand flexible and adoptable solutions of CSR communication and sustainability performance measurement. With this paper we aim to provide the means to communicate flexibly within the complexity.

The derived typology reveals three indicator types. The first indicator type bases on purely quantitative methods, the second on purely qualitative methods, and the third type combines qualitative and quantitative methods in a hybrid type. The elaborated SPP indicator selector enables professionals to produce all SI types depending on the situational needs.

The derived typology contributes to the debate between quants and poets a new approach of combining qualitative and quantitative methods as called for by scholars (Macnamara, 2015; Morse, 2004). The typology and the indicator selector provide professionals with a way to standardize and prepare CSR communication for usage in different areas of the organization. In its design the indicator selector also anticipates the possibility of digitalization processes within corporate communications.

2. Introducing Public Procurement Tenders as Corporate Communications

2.1. Sustainability in public procurement

Scholars commonly agree that explaining the value of communication remains the most important and fundamental challenge for professionals and scholars in corporate communication (Buhmann et al., 2017; Falkheimer et al., 2017; Macnamara, 2015; Zerfass & Viertmann, 2017). Others point out that advanced visions of corporate communications have not reached the boardrooms (Zerfass & Sherzada, 2015) and that practitioners do not have a consistent understanding of corporate communications' value because their explanations to CEOs vary too much due to its cross-functional scope (Penning & Bain, 2018; Zerfass & Viertmann, 2017). At the same time practitioners and scholars alike call for more visibility of communication management's contribution to organizational success if the profession does not want to dissolve within other management functions (Falkheimer et al., 2017; Zerfass & Viertmann, 2017). The key problem of proving communications management's value unfolds in the difficulty to describe this contribution in economic terms since the communicative contributions to success emerge in qualitative values (Falkheimer et al., 2016). With the increased usage of CSR communication in public procurement tender processes, a so far purely sales driven task, corporate communications approximate another economical value generating area with the chance to increase its own value. We aim to support corporate communications professionals in this opportunity.

In this paper we use the concept of corporate communications analogue to public relations, communication management and strategic communication. We are aware of the different traditions and schools (and other concepts such as organizational communication) that exist, but our aim in this paper is not to discuss their differences (Falkheimer & Gregory, 2016). We base this paper on the definition of corporate communications by Long and Hazelton Jr (1987) as a way to understand how to manage an organization concerning its communication (Long & Hazelton Jr, 1987). We see communication management in the manner of van Ruler and Verčič (2005), as helping "organizations by counseling the

deliberations on legitimacy, by coaching its members in the development of their communicative competencies, by conceptualizing communication plans, and by executing communication means, using informational, persuasive, relational, and discursive interventions" (Van Ruler & Verčič, 2005, p. 265).

CSR communication in public procurement processes describes a new link between sales and organizational goals consisting of CSR communication. The need of this link for market access in public procurement tenders presents a new means to proof the value of corporate communications. Especially the need to coach organizational members in CSR communication, in this case sales personnel, rises. We aim to support this knowledge transfer from corporate communications departments to sales departments with a typology of sustainability indicators and a tool to adopt the relevant indicators for each individual public procurement tender communication.

A few businesses and public entities have introduced sustainability to their own procurement practices on a voluntary basis. That way in the past years, Sustainable Procurement (SP) became a term of art (Caranta, 2010), combining the disciplines of sustainability, procurement, law and business. Public Procurement refers to processes by which governments and public-sector organizations purchase goods and services from suppliers. The process starts with a bid that specifies criteria for the selection of the supplier, such as required quality. When the bid is published, suppliers can make their offers, and are evaluated by the public organization in order to select the best according to the set criteria (Dragos & Neamtu, 2014). Sustainability entering public procurement led to the following definition: "Sustainable Public Procurement enfolds the economic, environmental and social dimensions in all public purchases" (Knebel et al., 2019, p. 7). Thereby, SPP shifts the focus in public procurement on value instead of price, using rather value performance than cost performance taking into account entire lifecycles (Grandia, 2015). The biggest challenge of the implementation of CSR communication into public procurement emerges with the vast variety of procured products, as well as the individual needs and occurrences of sustainability matters in each purchased good or service. Practitioners need on one side clear comparable sustainability measurements and on the

other side the flexibility to tailor CSR communication and sustainability performance measurement to their needs in order to achieve relevance (ARE, 2018; BAFU, 2018).

Recently the WTO announced to foster sustainability in public procurement with the revised GPA. With this announcement the WTO wants to make public procurers leading examples of responsible actors in a global society (Knebel et al., 2019; WTO, 1994, 2012a). As a result, the WTO leverages sustainability with the aim of a global supply chain effect (WTO, 1994, 2012a). On average government procurement accounts for 12% or more of a countries GDP (OECD, 2015). That means corporations increasingly need sustainability performance measures and the knowledge of CSR communications for their market access in form of public tender participation. The idea to implement sustainability measures in public procurement stems from the last century but receives increasingly attention due to the GPA, the ongoing climate debate and the development of new laws for public procurement (UNEP, 2012b).

Also, recently the ISO released the ISO 20400, a standard focusing on the implementation of sustainability into procurement, aiming to harmonize the unclear and confusing field of SPP. The standard orientates closely on existing sustainability strategies and practices. Therefore, it emphasizes an implementation aligned with organizations strategy and ongoing reporting practices (ISO, 2017). Meanwhile supply chain control, monitoring sustainability matters, becomes state of the art and give rise to profit orientated organizations like EcoVadis (EcoVadis, 2017). Thereby, all developments around sustainability measurement include the creation of SIs.

CSR relies due to its nature of stakeholder relationship and reputation management on communicative capabilities (J. Cornelissen, 2017). Hence, communication professionals need to develop the necessary means in order to achieve and align the overall communication strategy with the strategic CSR agenda. This agenda needs to include now also SPP and its alignment with overall organizational goals, as also required by the ISO 20400 (Benn et al., 2010; ISO, 2017). That way communication professionals aim to achieve consistency in all corporate messages communicated through integrated channels inside and outside of the organization aligned with organizational goals (Craig & Allen, 2013). Dawkins (2005) emphasizes the challenge to communicate CSR information in

general. The challenge lies within a clear strategy as well as in the tailoring of CSR messages to different stakeholder groups (Dawkins, 2005). The same study reveals a lack of tailored CSR messages to individual stakeholder groups and the need of detailed indicators. Additionally, Coombs and Holladay (2013) highlight the challenge and motivations for true transparency through SIs in CSR reporting since corporations and responsible stakeholder rather build a pseudo-panopticon than using SIs for sustainable development (Coombs & Holladay, 2013). Current reporting standards like the Global Reporting Initiative (GRI) provide SIs and guide their ideal usage but face at the same time critique, related to the mentioned pseudo-panopticon, stating that the GRI provides corporations with the means to hide their doings behind SIs and CSR reporting rather than disclosing them (Coombs & Holladay, 2013; Knebel & Seele, 2015). Meanwhile the recently introduced Sustainable Development Goals (SDGs) triggered the production of numerous SIs in order to guide and monitor the global process towards sustainability (Bain et al., 2019; Hák et al., 2016; Lyytimäki, 2019; UN DESA, 2019; UN Sustainable Development Goals, 2017).

The vast amounts of SIs and their varieties complexify an already complex area of public procurement. We aim in this paper to provide a pragmatic approach in the hands of communication professionals to meet the needs of the current changing corporate environment. Thereby corporate communications departments need to coach sales forces involved in public procurement tenders in CSR communication. Although, some communication professionals utter the importance of consistency and control which would be undermined by the enabling of others to communicate (Zerfass & Franke, 2013). We argue, along with other researchers, that enabling others to communicate increases the perceived value of communication. Further we argue that the provision of preconditions for effective communication becomes increasingly important for organizational success (Heide & Simonsson, 2011; Zerfass & Franke, 2013).

The mentioned challenge in tailoring CSR communication to certain stakeholders, as well as the need to do so with SIs, leads to the next chapter.

2.2. Indicators on the rise challenge quants and poets

In corporate communications the fight between quants and poets has several dimensions. While quants favor and promote quantitative methods, poets favor and promote qualitative methods in, from time to time, heavy turf battels. We present two dimensions of the fight, in order to get to the core of the debate. The first-dimension concerns measurement and evaluation of communication. The second concerns the measurement and evaluation of corporate sustainability with indicators.

In the first dimension Macnamara (2015) identifies obstacles that prevent the value demonstration of corporate communications. One of these obstacles consists of the over-reliance on quantitative measures (Macnamara, 2015). The language of quantitative research and quantitative methodology derives from mathematics and consists of numbers, counts, percentages, degrees, weights etc. Social science follows in its methodology in search for credibility and legitimacy natural science. But in its pursuit of scientific and social scientific knowledge scholars tend to forget the third approach, the humanistic perspective (Littlejohn & Foss, 2010). The advantage for scholars and professionals by following quants resides in its inherent logic and rigor, but as Einstein put it "Not everything that can be counted counts, and not everything that counts can be counted." (Gioia et al., 2013, p. 16).

Objectivity in detachment and numbers limits the possibilities to analyze and understand emotion and subjectivity in human communication. And, as cited in the first chapter, corporate communications struggles to proof its value in economic quantitative turns because its contribution to organizational success resides in qualitative values. Additionally, as Macnamara (2015) puts it, "value is a perception" (Macnamara, 2015, p. 380).

The second discussed dimension in the debate between quants and poets in corporate management concerns the measurement and evaluation of corporate sustainability performance with SIs.

Managers of the dominant coalition increasingly rely on indicators to make decisions. Their main task consists in the creation of sanity in highly complex environments and make decisions with severe organizational impact. The complexity advances through rapid

and unpredictable change (Falkheimer et al., 2016; Simcic Brønn, 2001). In order to manage complexity decision-makers draw on indicators. The gross domestic product (GDP) represents the most prominent example of an indicator (Bell & Morse, 2011). Since the 90's also CSR communication has relied on sustainability performance measurement based on indicators (Whelan & Adams, 2009). Professionals aim with indicators to simplify complexity and to initiate change. Sustainability in public procurement tenders creates the need to tailor SIs to SPP processes. Instead of inventing new indicators for public procurement, corporations can rely on synergies of existing expertise in the field. In the further course of the paper we analyze a sample of 665 sustainability indicators used partially already today in public procurement already today. With this analysis we aim to elaborate a way to generate out of this vast field of SIs specialized sustainable public procurement indicators.

Indicators aim to simplify complexity into single values, numbers and synopses. Thereby they provide communicators with easily digestible and communicable pieces of information. The word indicator stems from the Latin word "indicare" which means to point out or direct to knowledge. Bell and Morse explain indicator and indices as "simplifying tools designed to capture complexity and help convey information to specialists and non-specialists alike" (Bell & Morse, 2018b, p. 2).

However, no commonly agreed terminology exists for indicators. Some indicator developers use the term parameter for lower levels of abstraction, followed by criterion for higher levels of abstraction, while quality builds the top of the ranking and data the bottom. Scholars use the term indicator for the whole spectrum between data on the bottom of the pyramid and quality at its top (Turnhout et al., 2007). In doing so, scholars use indicators and the definition of indicators in many varying ways, perspectives and contexts without an agreed common understanding or core definition. Due to the resulting uncertainties we propose the following definition of an indicator for this paper: *Indicators are process oriented evolving ideals reducing complexity that initiate change through standardization leading to comparability and performance measurement*. With this definition we aim to provide a common base for the development of SPP indicators in the further course of this paper.

Sustainability performance measurements and comparisons in corporations look at a longer tradition in corporate management, namely in corporate reporting. CSR or sustainability reporting uses indicator-based guidelines and frameworks to measure sustainability (Brown et al., 2009; Crane et al., 2018; GRI, 2014; Knebel & Seele, 2015). Scholars and professionals debate about the methods behind SIs. Jesinghaus (2018) criticizes the aggregation behind SIs and the way these aggregations give powers to numbers that do not deserve it (Jesinghaus, 2018). At the same time Crane (2018) points out the risk of dominant quantitative measures overrunning the field of sustainability measures as they have done before in business and society research (Crane et al., 2018). Also Cornelisson (2017) sees a trend in management theory in general towards higher perceived robustness of quantitative studies which led to qualitative studies in top journals being styled in the image of quantitative research (J. P. Cornelissen, 2017). Poets criticize quants based on studies from Carroll et al. (2016) and Chen & Delmas (2011) which reveal problems of aggregated pure quantitative SIs from Bloomberg, MSCI, and Thomson Reuters in their accuracy to predict social and environmental performance (Carroll et al., 2016; C. Chen & Delmas, 2011). As a result, and to overcome the fight in the debate scholars call for the development of mix-methods which mix or combine quantitative and qualitative methods (Crane et al., 2018; Molina-Azorin, 2012). With our research we aim to follow this thought.

In the next paragraphs we outline how professionals can use SIs in public procurement tenders considering their need to fit them to each procured good or service in a tender communication. In doing so we keep in mind the need for flexibility regarding method and cause. These thoughts lead to the research objective.

Research Objective

Developing a SI typology for standardized corporate sustainability communication in public procurement between quants and poets, as well as the means to tailor them to the vast variety of public procurement tender processes. The following chapter describes the used method and results.

3. Three Types to design the formal communication process of SPP tenders

3.1. Method and Results

We aim to understand SIs in their consistence to find out how they can serve public procurement. In order to extract the existing knowledge about SIs for public procurement we chose as method a typological analysis. We chose this method because it allows to inductively analyze raw data, in our case SIs, to understand their composition and to create types. Scholars in many qualitative studies construct types to comprehend and understand complex social realities. A few approaches in social qualitative research explain the process of typology construction in detail. One of these approaches is called typological analysis (Kluge, 2000). Typological analysis aims to condense raw textual data into a brief summarizing format to link them to research objectives. This process results in the development of a typology of the underlying structure of experiences or processes of the raw data.

The primary technique of analysis is the construction of types from raw data (D. R. Thomas, 2006). Given (2008) explains the research process in four steps. In a first step the researcher conceptualizes an organizing framework. In the second step the researcher identifies possible sources of communality and variation in the raw data. In a third step the researcher looks within those sources of commonality and variation for patterns. In the final step the researcher reconstructs the patterns into ideal types (Given, 2008). The systemization of a typological analysis in steps varies between the different authors but contains a common ground in working inductively from the raw data in different coding, grouping and restructuring steps to reveal and summaries underlying patterns in types (Given, 2008; Kluge, 2000; Suziedelis & Lorr, 1973; D. R. Thomas, 2006).

Using this methodological background, we collected 665 (n=665) sustainability indicators from several common sustainability reporting guidelines, sustainability frameworks and established SIs as raw data, in a convenience sample. Professionals use certain indicators of the sample for sustainable public procurement already today. Table 1 depicts the used indicator frameworks as well as the number of indicators retrieved from each source. The

indicators stem from the Global Reporting Initiative (GRI) (GRI, 2019), Global Compact (GC) (UN Global Compact, 2019), MONET 2030, the Suisse national SDG monitoring framework (BFS, 2018), the Sustainable Development Goals (SDGs) (UN Sustainable Development Goals, 2017), the UN department of economic and societal data (DESA) sustainability indicators, who monitor the process of the SDGs globally, also called the global indicator framework (UN DESA, 2019), the ISO 26000 Indicators on sustainability (ISO, 2010), the ISO 20400 indicators on sustainable public procurement (ISO, 2017), as well as the sustainability indicators from EcoVadis the leading supply chain rating organization (EcoVadis, 2017), and the UNEP sustainable consumption pattern (SCP) indicators (UNEP, 2017).

Sustainability Indicators Sources	**Number of Indicators**
Global Reporting Initiative (GRI)	149
Global Compact (GC)	10
MONET 2030	106
Sustainable Development Goals (SDGs)	17
UN DESA SDG Target Indicators	244
ISO 26000	35
ISO 20400	66
EcoVadis	21
UN SCP Indicators	17
Total	**665**

Table II-1: Sustainability Indicators' sources and number of indicators in the sample.

In a first step, as organizing framework, we collected and listed schematically all sustainability indicators in one data pool. In order to do so we gave each indicator an ID and a source tag. Further we reused the given identification number if existent and copied, translated or summarized an indicator definition. As a result, we ended up with an excel sheet containing 665 sustainability indicators.

The structures of the different frameworks and guidelines used as sources of SIs comprise similarities but remain different in their defined sustainability areas and level of sustainability measurement. Therefore, in a second step we identified possible sources of communality and variation. We found them in the three dimensions of sustainability, the social, economic and environmental dimension. All analyzed SIs could be grouped within the three sustainability dimensions, only 5% of the indicators point at general reporting or measurement information. Table 2 describes the results of step 2.

Sustainability Dimension	**Count**	**Percentage**
General	34	5%
Environmental	177	27%
Economical	66	10%
Social	388	58%
Total	**665**	**100%**

Table II-2: Sustainability dimensions and their appearance in the sample

Following the debate between quants and poets we looked in a third step for communality and variation concerning methods and parameters the sampled SIs consist of. Thereby, we found a way to categorize each indicator either to a qualitative approach or a quantitative approach. In order to do so, we analyzed the definitions to elaborate if the indicator uses qualitative or quantitative rudiments. Most indicators provide a clear definition of used methods and use a wording like, “percentage of…”, “total number of…”, “proportion of…” for quantitative approaches and wording like, “provide a list of…”, “report the measures taken…”, “benefits provided…” for qualitative approaches.

Aligned with the described debate between quants and poets, also the SIs of our sample followed either methodological direction. The performed grouping worked for 78% of the sample. For 22% we could not get access to the information of used method or the indicators do not specify any method. Especially the ISO 20400 indicators for procurement

leave it to the procurers to define the method and parameters of measurement for the given indicators.

Along the qualitative method used for our study, we performed in a fourth and final step of the typological analysis a typology for SIs according to our research objective.

Table 3 summarizes the derived sustainability indicator types and their amount of appearance in the sample. Further the table shows the percentage of each type appearing within the three sustainability dimensions. As a result, 61% of all social indicators (n=388) consist of quantitative methods, while 76% of all environmental indicators (n=177) do so. In total 69% of the sample use quantitative methods. These results underline poets' critique in the current evolution of SIs by proving the predominance of quantitative SIs.

Indicator Type	**Amount**	**% Sample**	**% Social**	**% Envmnt**	**%Econ**
Type 1: Quants	459	69 %	61 %	76 %	74 %
Type 2: Poets	84	13 %	13 %	7 %	11 %
Type 3: Hybrids	0	0 %	0 %	0 %	0 %
N/A	122	18 %	26 %	18 %	15 %
Total	**665**	**100 %**	**100 %**	**100 %**	**100 %**

Table II-3: Sustainability Indicators types, amount of each type in the sample, their percentages of the entire sample and the percentage of each type within the sustainability dimension

The following paragraphs describe the sustainability indicators types in detail. The typology includes a hybrid type, we could not find in the sample, but which builds the ground for our research objective of tailoring CSR communication to a vast variety of tendered goods and services overcoming the methodological deadlock between quants and poets. Further the typology leads to the development of the SPP indicator selector to create type 3 indicators for CSR communication in public procurement tender processes.

3.2. Type 1: Quantitative SIs

Most indicators in our sample build on quantitative scientific grounds (69%). These type 1 indicators use solely quantitative measures and consist of quantitative language. Their quantitative approach results in clean clear-cut numbers. They produce numerical and comparable results. Numbers work perfectly as control mechanisms and facilitate goal settings. In the referred sustainability frameworks and guidelines of the study in this paper pure quantitative indicators were prominent in environmental measures like emissions and waste, but were also used in the economic (74%) and social dimension (61%) e.g. total hours of employee training on human rights policies. Figure 1 exemplifies a pure type 1 quantitative indicator. To exemplify this type, we used the visualization of a typical indicator called "Measures Against Corruption". For illustration purposes, the chosen parameters of this indicator rely on numbers, percentages and economic values as existing in various forms in the sample. In this case, the chosen parameters consist of number of training hours, percentage of assessed operations, and amount of political contributions. The biggest advantage lies in the straight forward comparability. The biggest disadvantage lies in context oblivion. For example, the indicator cannot communicate the quality of training or the depth of the assessments.

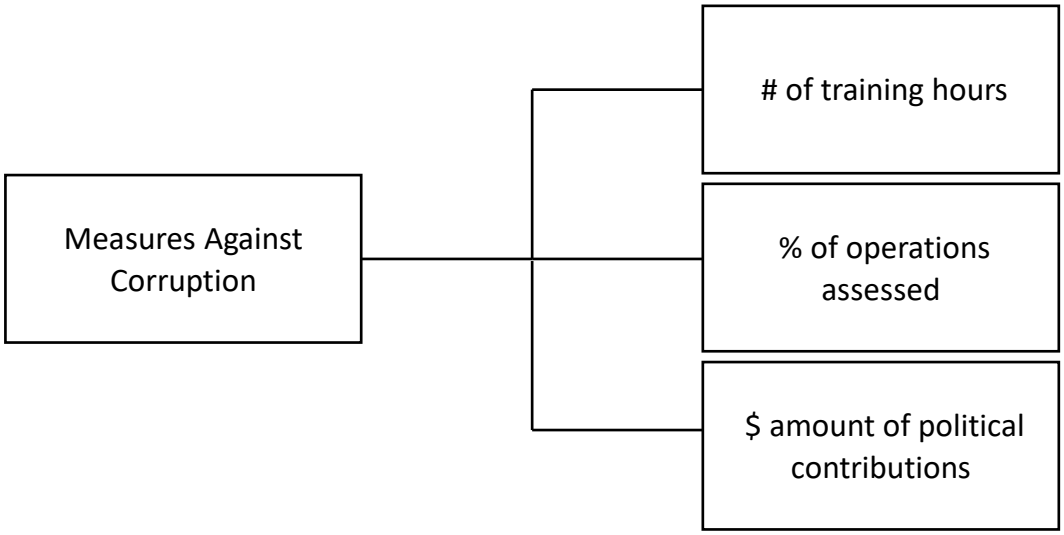

Figure II-1: Exemplified type 1 indicator using quantitative methods

3.3. Type 2: Qualitative SIs

Type 2 indicators use solely qualitative measures and consist of contextual explications. The sample contained a few of these type 2 indicators (13%). Their qualitative approach results in summaries, synopses, descriptions or references in form of text. The qualitative type provides a contextual image of sustainability performance. Figure 2 visually exemplifies such a type 2 indicators. For the illustration purposes we use the same indicator we used before to exemplify a pure qualitative indicator in its variation to a quantitative indicator as described above. Here, qualitative parameters measure the "Measures Against Corruption". The exemplified indicator uses as parameters, a description of the training program if existent, the display of integrity standards, and asks for a list of identified significant risks of corruption within corporate operations. The biggest advantage lies in the flexible contextuality. The biggest disadvantage lies within the hardship of comparability. In the sample of analysed SIs, the measurement or reporting of initiatives and actions taken consist prominently of pure qualitative indicators. Also, SIs used for the description of structural phenomena like the integration of sustainability

management in the organization base on qualitative methods. Further examples of qualitative indicator usage concern the variety of interactions with stakeholders.

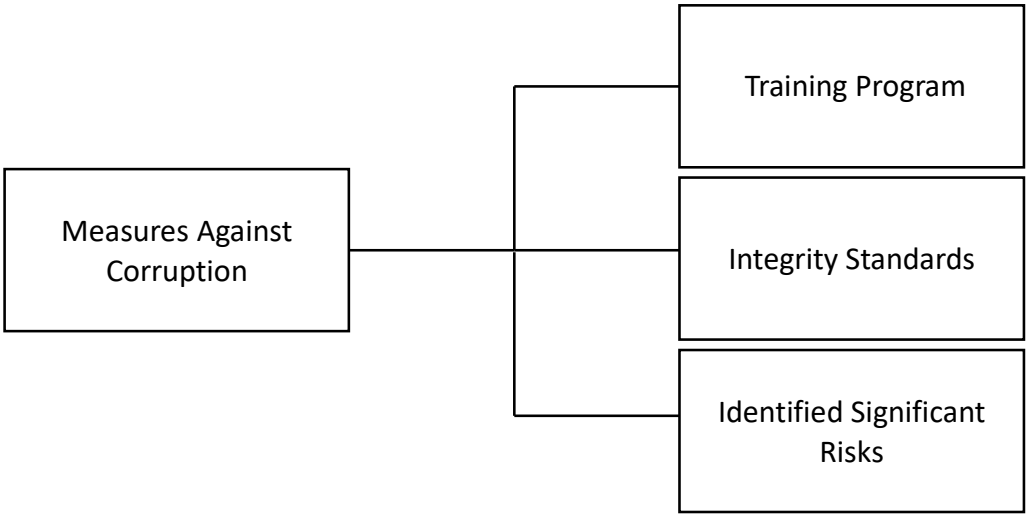

Figure II-2: Exemplified type 2 indicator using qualitative methods

3.4. Type 3: Hybrid SIs

We could not find any type 3 indicators in the sample. Type 3 indicators use qualitative and quantitative measures complementary. The logical integration of the debate between quants and poets as well as the call for mixed methods led to the development of type 3 indicator. They open up the deadlock between quants and poets. Thereby, they enable the usage of all available methods. Figure 3 illustrates a type 3 indicator. In order to do so, the exemplified indicator concerns, like the previously given examples in Figure 1 and 2, measures against corruption but uses mixed methods with a training program description, a list of integrity standards and the amount of training hours.

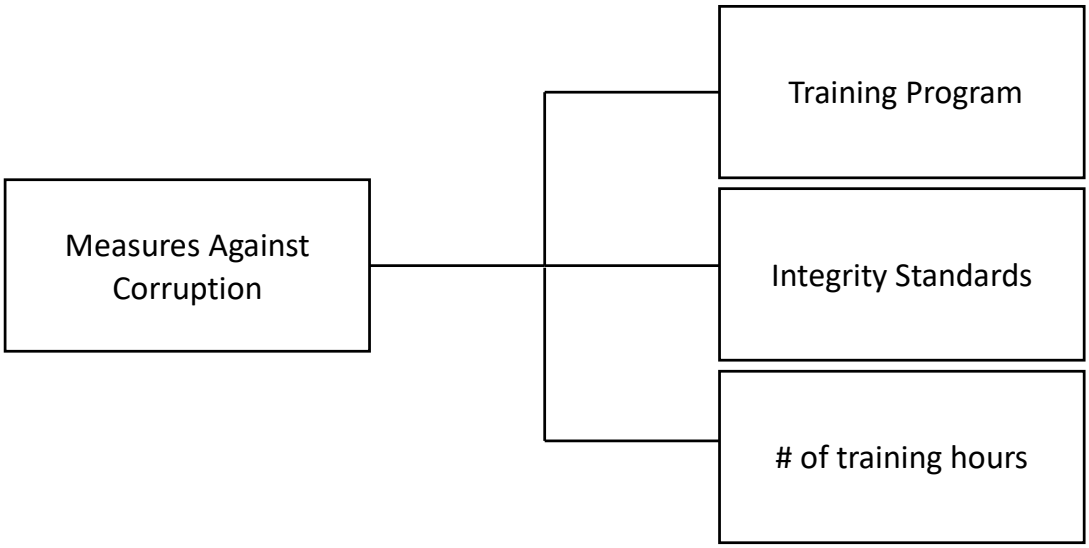

Figure II-3: Exemplified type 3 indicator using a mix of qualitative and quantitative methods

Using the derived SI types as knowledge base, the next chapter describes the development of an SPPI selector who enables practitioners to create type 3 indicator tailored to specialized needs in public procurement tendering communication.

3.5. Sustainable Public Procurement Indicator Selector (SPPI selector)

Type 3 indicator contain the potential to provide procurers with the needed flexibility to combine methods to compare and weigh sustainability performance. However, each procured product and service varies in its impact area concerning sustainability. Moreover, it varies in its specific procurement requirements. This complexity challenges overarching and all including sustainability measurement frameworks for public procurement. This complexity potentially provides one of the reasons why the ISO 20400 standard for public procurement does not specify precise methods for their proposed indicators. With the following introduction of a SPPI selector we aim to fill this gap.

For the conceptualization of the selector we use a decision tree initially developed for the GRI framework to set boundaries of sustainability impacts (Global Reporting Initiative,

2011, p. 18). The decision tree consists of a basic algorithm to guide practitioners to the decision if and how they can implement a SI in a corporate sustainability report. We translated this algorithm into the realm of public procurement and propose a two-step process in its application.

Figure 4 visualizes the decision tree. In a first step, the professional has to decide whether the corporation has control over the entity the indicator points to and further if it has significant influence and impacts. Depending on each decision led by the tree, procurers either exclude or include a SI in the tender communication. In a second step, the procurer uses the decision tree again for the selection of the parameter and its method. As a result, the selector, in form of a decision tree used in two steps for indicator selection and parameter selection, produces all three types of SIs, depending on the requirements of each procurement.

Depending on the situation and the informational demands, the decision tree allows always the inclusion of a whole indicator and individual parameters in a narrative form. In doing so the professional selecting a SI and its parameters can give important additional information or explain why a parameter or whole indicator was not comprehensively and completely included. Figure 5 exemplifies a type 3 indicator constructed with a SPPI selector. We used again the indicator "Measure Against Corruption" with the previous exemplified quantitative and qualitative parameters. On the left, the arrows present the possible proceedings after the procurer applied the decision tree. For example, if the professional determines that the corporation has control over "Measures Against Corruption" and in a second step that it also has significant impacts, the indicator becomes part of the tender communication. Afterwards the professional determines guided by the decision tree which parameters and methods to include or exclude from the tender communication.

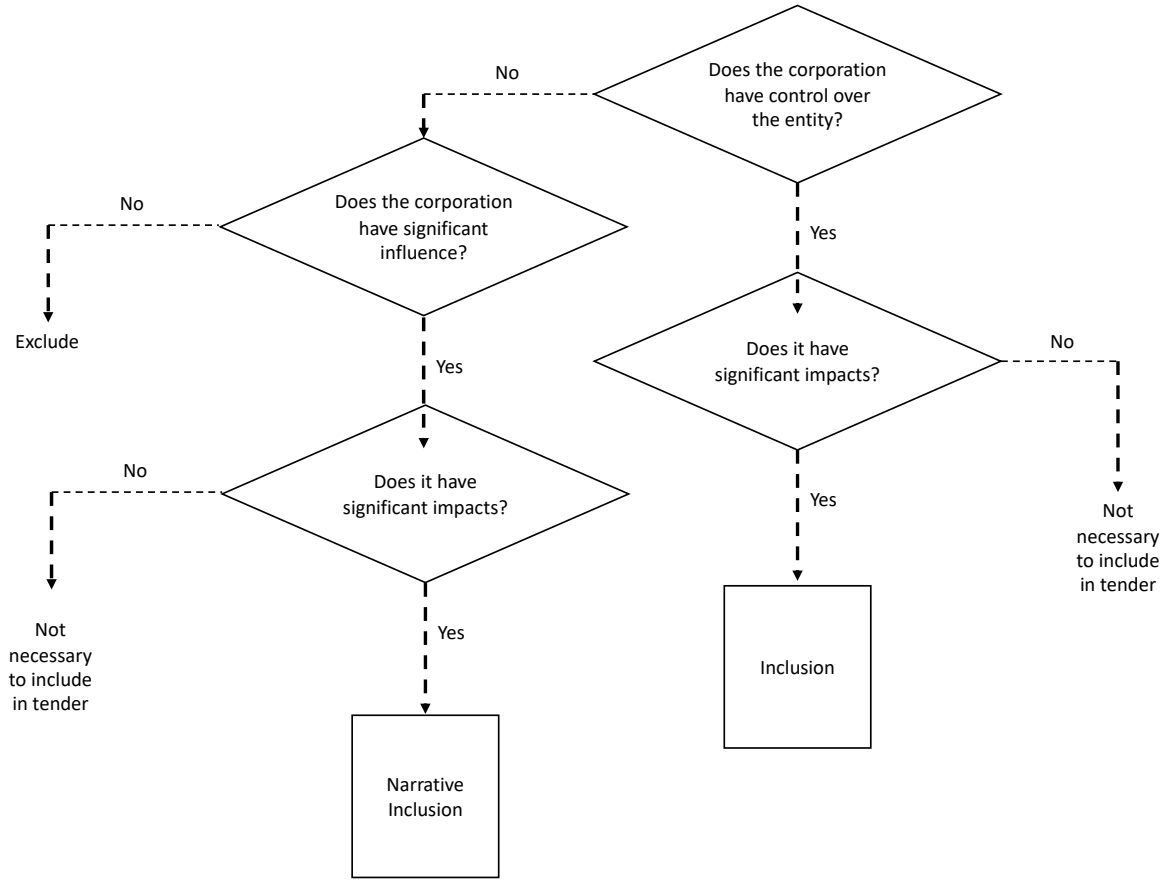

Figure II-4: Decision tree for public procurement SI generation

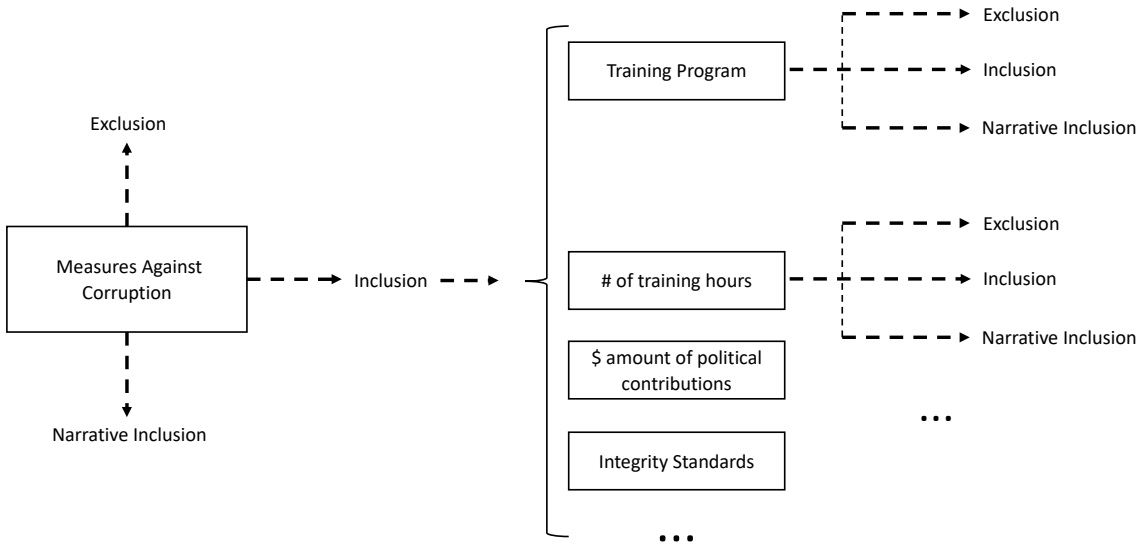

Figure II-5: Example of a hybrid type public procurement indicator generation

The biggest advantage of type 3 indicators lies in its flexibility and situational adaptation while enabling comparison, as well as contextuality. Its biggest disadvantage lies within the involved efforts and needed specialized capabilities of professionals. This thought leads to the following discussion which summarizes results as well as key findings and reflects theoretically on them, to come up with the contribution and subsequent thoughts.

4. Discussion, Contribution and Practical Implications

CSR communication enters public procurement tender processes. Therefore, we introduce SPP tender processes as corporate communications. In doing so, corporate communications managers need to connect public procurement tender communication with overall corporate goals and objectives. The challenge rises with the complexity and variety of procured goods and services. Even the recently published ISO 20400 standard for SPP avoids specific methodological frames for their SIs. We introduce a SPPI selector conceptualized on top of a SI typology to approach this gap.

The described vast variety of procured goods and services in combination with the complexity of public procurement demands a flexible and adoptable usage of sustainability performance measurement while remaining relevant concerning the core sustainability impacts of each procured good and service. With the proposition of type 3 indicator and a SPPI selector to produce type 3 indicators we aim to give professionals the tool at hand they need in order to perform the needed task. Type 1 SIs allure because of their numerical precision and comparability but they proof to be numb to contextuality and depth. Tender processes aim for comparison of corporations and their offers. This fact increases the temptation to rely solely on mathematical language but thereby the indicators run the risk of overvaluation. Type 2 SIs provide a contextual image of the actual sustainability performance but they leave room for buzzwords and greenwashing. Additionally, they increase the needed efforts for comparison. Type 3 SIs produced with a SPPI selector allow an adaptive and flexible approach beyond factional thinking of quants and poets. They provide a hybrid combination of precision and adaptation with the option to use simultaneously numerical precision and flexible contextuality. Public procurement tenders vary heavily depending on the procuring entity and the procured goods and services. Therefore, on one side type 3 SIs set sustainability boundaries and give procurers the possibility to tailor and adopt the CSR communication to the situational need of each individual public procurement tender process. On the other side, this tailoring freedom comes along with additional efforts and requires additional capabilities of involved professionals, which calls for the counselling and coaching role of corporate communications managers. The advantage of the SPPI selector lies within the usage of the decision tree in two steps. This proposed process guides procurers to relevant sustainability performance comparison in a flexible way. The implementation of such a selector requires additional resources and knowledgeable personnel. Knowledge bearer of CSR communication and measurement sit currently in corporate communications or CSR departments. Thus, the upcoming need of CSR communication in tenders increases the value proposition of corporate communications.

In order to implement and actually use a SPPI selector professionals require a pool of indicators and their methods, similar to the one used for this study. Experience and

evolution of the used indicators then lead to a more focused set of reusable SPPIs. We emphasize and urge professionals to exhaust the methodological realm to avoid the distinction of type 2 indicator which make only 13% of the sample and to experiment with type 3 indicator to overcome methodological deadlocks.

The derived typology contributes to the debate between quants and poets a new approach of combining qualitative and quantitative methods as called for by scholars (Macnamara, 2015; Morse, 2004). It provides professionals with a way to standardize and prepare CSR communication for usage in different areas of the organization. Additionally, it might serve as a blue print for all sorts of standardized CSR communication that needs translation and transfer into all kinds of corporate processes. Finally, the case as such and the typology hopefully help scholars to launch further research to overcome methodological deadlocks and prove the value of corporate communications.

5. Limitations and Future Research

Future research in the field of standardized communication with adaptation possibilities including decision trees could also be pursued further in the direction of datafication and digital driven communication management with automations. The digital revolution has already automated communication processes. With the introduced SPPI selector based on a basic algorithm future research can use the concept and elaborate automations simplifying the process for procurers and communication professionals.

The limitations of the study lie within the legal and country specific contextuality of public procurement tender processes. Furthermore, the law-making bodies of governments start slowly to follow the GPA agreement, which leaves uncertainty of how sustainability enters public procurement and how the final requirements will look like. The value of the proposed concept lies in its flexibility and adaptation also in this uncertain environment.

Chapter III

III. Searching Common Ground in Sustainable Public Procurement to Overcome Implementation Inertia – The Case of Switzerland

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Abstract

Purpose – Current approaches towards sustainable public procurement face barriers and implementation inertia. With the translation and operationalization of knowledge about sustainability performance measurement into sustainable public procurement we aim to provide means to overcome current barriers and inertia building on the case of Switzerland.

Design/methodology/approach – In our research design we follow three recommended steps to neutralize inertia in the implementation processes of sustainability into public procurement. First, by collecting existing knowledge about sustainability performance measurement in form of sustainability indicators. Second, by performing a typological analysis of those sustainability indicators to extract the essence of sustainability measurement. Third, we test feasibility and usability of the derived indicator set by an acceptability survey with public procurement experts in Switzerland.

Findings – We develop a framing set of ten sustainability indicators for public procurement and propose ways for their application. Additionally, public procurement experts from Switzerland evaluate the indicator set for public procurement positively in its usefulness and feasibility for the Swiss context.

Research limitations/implications – A limitation of the study lies in the legal and country specific contextuality of public procurement tender processes. Future studies may advance how the produced indicator set for public procurement complies with upcoming public procurement laws for individual governmental contexts.

Originality/value – The developed indicator framework serves academics and professionals alike as common starting ground to delve further into the field of sustainable public procurement. Thereby, it comprises the essence and knowledge of existing sustainability performance measurement realms.

Keywords – Sustainable Public Procurement, CSR, SIs, SDGs, Reporting, Corporate Communication

1. Introduction

So far, the price for a given product specification rules public procurement. With the implementation of sustainability in public procurement, non-financial values enter the scene. In this paper we analyze and propose how to overcome barriers of sustainable public procurement (SPP) implementation within the case of Switzerland's SPP approach. Thereby, we aim to instill values beyond price into the regulated and standardized communication processes of public procurement tendering in the sense of sustainable public procurement, as also proposed by the World Trade Organization (WTO, 2015).

In times of climate change, financial crises and human rights violations the challenges to achieve sustainability aggravate and demand immediate actions, but the ambitions to find perfect concepts and practices to measure and revolutionize impacts in the three sustainability dimensions blast the available time horizons. The alternative lies within the acceptance of "approximately rights" and "now" preferred to "later" and "precisely wrongs" (M. P. Thomas & McElroy, 2016). This field of tension leads to the current debate about sustainable public procurement of academics and professionals alike. The debate focusses mainly on drivers and barriers of sustainable public procurement (Brammer & Walker, 2011; Gelderman et al., 2015; Prier et al., 2016). And at the same time, scholars commonly acknowledge the existence of inertia in the implementation process of sustainable public procurement (Meehan & Bryde, 2011).

With our research we aim to overcome barriers and inertia in SPP implementation. In order to do so, we filter out the essence of sustainability performance measurement to operationalize it within public procurement. Thereby, we follow Meehan and Bryde's recommendations, first by taking successful experiences from other areas, second by developing a small and clear set of sustainability indicators (SIs) for public procurement using typological analysis, and third, by focusing and emphasizing on triggers to overcome barriers of SPP (Meehan & Bryde, 2011). Therefore, we test the derived SIs' acceptance by public procurement experts for the Swiss context. The set of indicators serves as common ground and common frame for the ongoing debate about price and values in SPP. Thereby, this paper contributes to the theory of sustainable public procurement condensed

knowledge from other areas working towards sustainability, like corporate reporting, corporate communication, supply chain control and monitoring, as well as sustainability management, and sustainability performance measurement. Additionally, the research provides a pragmatic approach with the elaboration of concrete SIs. Thereby, the proposed framework complements other initiatives and approaches like the ISO 20400 which currently lacks a clear set of concrete and operational SIs for performance comparisons in tenders. Finally, we aim to contribute a common ground for further action and research in sustainable public procurement.

To outline the state of the art in current SPP research, we describe in the following the previous investigated barriers and triggers of SPP along the case of Switzerland. Before, for understanding purposes, we provide definitions for clarity in the further course of the paper. The second part provides a detailed description of the realized typological analysis and the acceptance survey with their results and findings. A discussion and orientation of the presented research, within its theoretical environment, complemented by limitations and potential future research, conclude the paper.

2. The way towards Sustainable Public Procurement and the Swiss Context

2.1. Linking sustainability and public procurement

Professionals purchasers still lack a clear understanding and application know-how of "sustainable procurement". In a survey in the US, professionals complain about a lot of jargon and a lack of commonality in sustainable procurement throughout the entire profession (Snell, 2006). Also recent studies in Switzerland gain similar insights (ARE, 2018; BAFU, 2018). The expression "sustainability" itself remains heavily debated. Because of its broadness and abstractness, it creates confusion and cynicism but also environmental, social, and economic change (Dragos & Neamtu, 2014). The concept of sustainability in its modern meaning rose in the 70's as response to the massive industrial growth and mass consumption, as well as rising complexities and dependencies within a globalization process causing severe impacts on the environment and societies worldwide (Dragos & Neamtu, 2014; Helbing, 2013; Knebel & Seele, 2015). Despite many approaches to define sustainability, for the purpose of this paper we follow the most known fundamental definition from the Brundtland Report which defines sustainability as development which meets the needs of the present without compromising the ability of future generations to meet their own needs (World commission on environment and development, 1987). With this definition of sustainability, we continue by outlining public procurement before we synthesize the two realms in one definition for sustainable public procurement.

Academics assess the theoretical body of public procurement and sustainable public procurement as expandable but accredit it a rising interest in research (Brammer & Walker, 2011; Gelderman et al., 2015; Preuss, 2009). Researchers pin this development on the continuously appearing major scandals in public procurement (K. Thai, 2001; Khi V Thai, 2008), as well as on the cognizance of public procurement as key component towards sustainability. The attribute "key component towards sustainability" derives from the possibility of cascading supply chain effects globally and bases on the purchasing force of trillions of dollars flowing through the mechanisms of publicly procured goods and

services worldwide per year with great impact on the economy (Knebel et al., 2019; Smith & Terman, 2016; The World Bank, 2016). The idea to use the forceful function of public procurement as tool to achieve economic, social and other objectives, reaches back centuries (McCrudden, 2004; Smith & Terman, 2016; K. Thai, 2001). At the same time, governments use public procurement as foreign policy tool to achieve objectives like national economic stabilization and development, also by preferring national and local firms over firms from other countries in a protectionist way (K. Thai, 2001).

Over the years, public procurement received many varying definitions, and occasionally muddled definitions (Prier, 2009; Prier et al., 2016). For the further course of this paper we refer to public procurement as acquisition of goods and services by government of public sector organizations (Uyarra & Flanagan, 2010). At the same time we acknowledge the different factettes in the theoretical field (Brammer & Walker, 2011; Gelderman et al., 2015; Preuss, 2009) and understand within this definition public procurement as a broad field, involving more than the procurement process, but also its potential as a policy tool, its importance for government efficiency, its impacts on innovation and development, as well as the strategic implications it brings along (Flynn & Davis, 2014; Koala & Steinfeld, 2018; Patrucco et al., 2017; Khi V Thai, 2008).

Adding sustainability to public procurement, we understand public procurement as sustainable when it enfolds the economic, environmental and social dimensions in all public purchases (Brammer & Walker, 2011; Knebel et al., 2019). Several definitions of sustainable public procurement use wordings like “minimizing damage on the environment”, “reducing impacts” or “ensuring least environmental and social impacts” (Grandia, 2015; Meehan & Bryde, 2011; Preuss, 2009). Those wordings derive from a major discussion in sustainability performance measurement between “incrementalists” and “contextualists” (McElroy & Baue, 2013; M. P. Thomas & McElroy, 2016; UNRISD, 2019). Incrementalists argue for incremental sustainable development leading to the mentioned wordings above and rather marginal improvements. Contextualists on the other side argue for transformative sustainable development considering contexts of a broader understanding of sustainability in form of thresholds and limits for example of overall available resources or percentages of pollution in relation to overall pollution in a region

(McElroy & Baue, 2013). The next chapter of this paper describes the state of the art of sustainability indicator development and picks up further on this debate between incrementalists and contextualists.

Traditionally public procurement based predominantly on economic efficiency, despite the mentioned attempts to use it as policy tool to reach social objectives. With recent developments like the revised GPA from the WTO (WTO, 2015) or the new 2014 Directives by the EU (European Union, 2014) academics proclaim a paradigm shift in public procurement, whereby sustainability potentially even takes over, respectively redefines, the realm of public procurement (Arrowsmith & Anderson, 2011a; Dragos & Neamtu, 2014). Upcoming public procurement legislations in the EU and Switzerland include sustainability and provide latitudes towards sustainability for professionals (Dragos & Neamtu, 2014; European Union, 2014; WTO, 2015). These latitudes for professionals of public procurement to implement sustainability in their purchases depend on a general cultural shift within the profession for significant change, also visible in Switzerland (Steiner, 2020). Respectively, as Grandia (2016) puts it, a culture of willingness beats any sustainability performance measurement, framework, law or policy (Gelderman et al., 2015; Grandia, 2015, 2016). These insights preview how societal values determine the development of sustainability indicators measuring sustainability performance are described in the next chapter.

Other related phenomenon to SPP like "Green Public Procurement", next to many other names and definitions in the public and private sector, deal only with the environmental sustainability dimension (Brammer & Walker, 2011; Bratt et al., 2013; European Commission, 2017a; Grandia, 2015; Preuss, 2009).

The definitions and various approaches of sustainability entering public procurement call for a common ground and harmonization to further advance SPP theory and implementation (Meehan & Bryde, 2011; Prier et al., 2016). The fact that the public procurement market represents the largest business sector in the world emphasizes the importance and possibilities of the call for communality (OECD, 2015; The World Bank, 2016).

Although we aim to emphasize and focus on the overcoming of barriers we display them in the following along the case of Switzerland to illustrate what we are dealing with. In doing so, we also summarize the status of current SPP research, which so far focused mainly on drivers and barriers (Brammer & Walker, 2011; Gelderman et al., 2015; Preuss, 2009; Prier et al., 2016; Khi V Thai, 2008).

2.2. Searching for triggers to overcome barriers of Sustainable Public Procurement

Identified drivers and barriers in the theoretical body of knowledge in SPP describe the following major aspects: the perceived costs of SPP, stakeholder conflicts, organizational fragmentation of SPP approaches, the knowledge transfer and communication of SPP, risk aversion, complexity, organizational strategies and goal setting, policies, personal commitment, leadership, SMEs and inertia. These found-out drivers and barriers also come into play in Switzerland.

The roots of sustainability in public procurement in Switzerland reach far back into the 90's of the last century. The Swiss law for public procurement, federal act of public procurement (FAPP), enfolded the possibility to include criteria concerning the environment, gender equality and working conditions in 1996 (FAPP Art. 8, Art. 21) (ARE, 2018). A further strong root reaches back and into the Federal Office for the Environment of Switzerland (FOEN) as part of the league of ecological procurement (IGÖB).

The available guides, indicators and platforms for sustainable public procurement internationally and nationally in Switzerland spring like mushrooms in many different places (BAFU, 2018). At one side, the spring of guides and tools proves an upswing of sustainability matters and sustainability sensitization in public procurement, on the other hand it proves its current dilemma by lacking a harmonization and clarity for comparability and easy access (BAFU, 2018).

The diversification of available tools and guides serves as innovation pool but also reveals barriers towards SPP. Stakeholder conflicts describe one of these barriers. Hereby, stakeholder conflicts stand for the various and interacting pressures on the public

procurement system. These pressures result in trade-offs between sustainability forces, and other potentially conflicting stakeholder goals like market structure, industry development, national protectionism, and the protection of national jobs (Gelderman et al., 2015; K. Thai, 2001). This phenomenon also describes a major difference to sustainable procurement in the private sector that, despite several efforts, remains heavily profit driven to please most of all shareholder interests. Sustainable Public Procurement on the other side sits in a mediating position between politicians, the public, citizens, taxpayers, unions, and the bureaucratic body (Gelderman et al., 2015; Cliff McCue & Prier, 2008; Khi V Thai, 2008). In this complex situation research revealed that professionals tend to make the resulting trade-offs between various stakeholder goals in favor of their department managers (Gelderman et al., 2015). Divided loyalties, multiple masters, conflicting interests and goals describe public procurers' role which they aim to balance pressures and secure their own jobs in (Grandia, 2015; Cliff McCue & Prier, 2008). Additionally, various stakeholder pressures provoke various SPP approaches. This proves to be true also in the Swiss context as to be seen in the two most used guides one used predominantly in the French speaking part, the other in the German speaking part. Also, the various involved federal departments in the development of the guides exemplify this barrier in the Swiss context (BAFU, 2018).

Stakeholder conflicts potentially cause fragmentation. Hence, scholars identified fragmentation and variation of SPP approaches as barrier on an international level (Arrowsmith & Anderson, 2011b; Brammer & Walker, 2011), on a national level (Prier et al., 2016), within public procuring organs (Grandia, 2016) and even between procurement projects of the same procuring department (Grandia, 2015). Thereby, researchers recognize the need for decentralization in public procurement to meet individual requirements of each product and service. However, at the same time, their findings show a high degree of fragmentation and silo approaches caused by this decentralization (K. Thai, 2001). In addition, decentralized procurement functions focus on different, varying and changing aspects of sustainability (Brammer & Walker, 2011; Walker & Brammer, 2009). The fragmentation and decentralization causes rather cautious and experimental approaches to SPP without overall strategies or goals (Prier et al., 2016). The Swiss case

exemplifies these fragmentations in the legislative dimension, the organizational dimension and strategic dimension with its consequences (figure 1).

Switzerland's federal structure fragments public procurement legislation into all levels and bodies of law. The World Trade Organization's Agreement on Government Procurement (GPA), the bilateral agreement between Switzerland and the European Union (EU) and the European Free Trade Association agreement (EFTA), frame Switzerland's obligations internationally. Nationally several bodies of law frame public procurement in Switzerland, complicated through differing federal and cantonal legislation (Steiner, 2020), accompanied by legal acts all over the legislative dimension containing traces of law for sustainability in public procurement (ARE, 2018). Similar to the fragmentation of public procurement law, the political organization of public procurement locates in several federal departments and organs.

Figure 1 visualizes the organization of public procurement on a federal level. It shows the leading function within the Federal Department of Finance (FDF) in form of the Federal office for buildings and logistics (FOBL) and public procurement controlling. Further two main organs develop the strategic direction of public procurement in Switzerland. On the one hand the Swiss Federal Procurement Conference (FPC) and on the other hand the coordination conference of construction and buildings (KBOB). The FPC defines their area of competence in services and goods, the KBOB defines their area of competences in construction and buildings. While the FDF holds all leading public procurement functions and organs, the Federal Department of the Environment, Transport, Energy and Communications (DETEK) leads the most of involved departments and offices.

Consistent with the division in two competence areas in public procurement, two units develop strategies towards SPP. Under the lead of the FPC the unit sustainability (Fachgruppe Nachhaltigkeit) works towards SPP in goods and services. And on the other side under the lead of the KBOB the unit sustainable construction (Fachgruppe Nachhaltiges Bauen) works towards SPP in construction and buildings. The biggest and financially most powerful organizations related to public procurement, the Swiss Railway (SBB) and the Swiss Post (Schweizerische Post), both property of the community, sit as observers in one of the groups. Both groups meet four times per year with overlapping but

not the same members. Armasuisse, the federal office for defense procurement, sits as only department in all groups and organs.

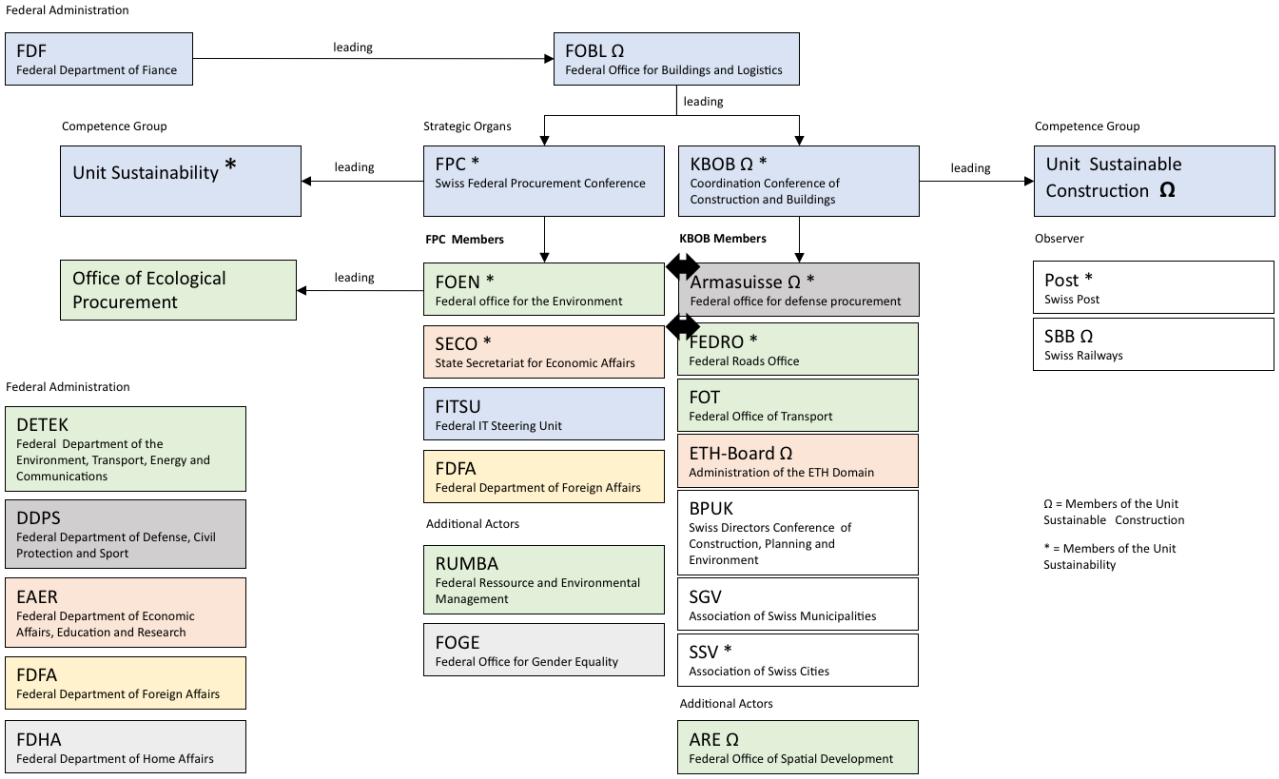

Figure III-1: Organizational fragmentation of Switzerland's Sustainable Public Procurement approach

The SPP implementation guide from 2012 from the Marrakesh task force led by Switzerland never reached general attention, whereby silo approaches from individual political organs reinvented their own approaches. This exemplifies another identified barrier, namely knowledge transfer, knowledge dissemination and communication of SPP (Brammer & Walker, 2011; Schwerin & Prier, 2013; Snell, 2006). At that, SPP requires training, education, communication tools and platforms, cooperation, skills, harmonization and communality, general knowledge and information about sustainability, and established criteria for professionals to implement SPP successfully (Schwerin et al., 2016).

The barriers of fragmentation, various stakeholder interests, and problems of knowledge transfer, lead to other barriers, figure 1 also illustrates, namely the importance of personal psychological motives. Scholars name these barriers perceived complexity, leadership, personal commitment, and risk aversion. At that, promoting change in public procurement requires a degree of entrepreneurism and risk-taking (Prier et al., 2016). Thus, department leaders and their form of leadership take a crucial role in implementing SPP (Brammer & Walker, 2011; Walker & Brammer, 2009). Thereby, researchers uncovered an asymmetric structure to bureaucratic change considering public reactions to SPP. Thus, as long as procurers do well, the public remains silent, but as soon as something goes wrong, a public firestorm of criticism and scrutiny targets procurers (Prier et al., 2016). Therefore, change towards SPP provides neither first mover advantages nor incentives for professionals. Meanwhile an anti-entrepreneurial bureaucratic environment incentivizes a reductionist approach to social comparisons and free riders. As a result, governments tend to stay away from binding or explicit SPP efforts and commit - at most - partially to SPP (Meehan & Bryde, 2011; Prier et al., 2016).

Further, sustainability complexifies the already existent complexity of public procurement (K. Thai, 2001; Khi V Thai, 2008). The existent complexity derives from the multiple stakeholders with conflicting goals. Additional complexity stems from a vast amount of existing concepts and indicators to measure sustainability which overwhelm and confuse politicians and procurers alike as the next chapter outlines (Hák et al., 2015; Cliff McCue & Prier, 2008; Prier et al., 2016). The complexity especially affects SMEs. Thereby, the already existing hurdles for SMEs to participate in public procurement tender processes increase with the expansion of sustainability requirements. The encompassed hurdles reach from bureaucratic complexities and needed resources to unfitting and large sustainability frameworks. SMEs play a major role because they represent the biggest part of the economic and social landscape comprising 95% of all businesses worldwide (L. J. Spence, 2014).

In Switzerland and internationally perceived costs depict the most discussed and most often identified barrier in the implementation of sustainability in public procurement. Researchers mainly use the wording “perceived” costs of SPP, because the actual costs

usually remain unknown. The tendered price cannot usually reflect the overall costs, called life-cycle costs (LCC). Its calculation remains challenging because of varying used methods (Dragos & Neamtu, 2014).

All above outlined drivers and barriers synthesize to a recognized inertia in SPP implementation, not only in Switzerland. Scholars define organizational inertia as the inability of an organization to act and adopt when facing a changing organizational environment (D. Miller & Friesen, 1980). The inertia stems from the stability and permanence organizations produce for long-term success. But this institutionalization generates inertia and resistance to change (Meehan & Bryde, 2011). Therefore, we follow Scholars in their call to emphasize and focus on the overcoming of barriers to get into action (Meehan & Bryde, 2011).

After setting the stage of sustainable public procurement and its illustration in the case of Switzerland, we proceed to the technical aspect of sustainable public procurement. In doing so, we provide in the following an overview of Sustainability Indicators and their role in measuring sustainability performance, as well as the possibilities of their inclusion in tender processes.

2.3. How to use relevant sustainability indicators for public procurement

Public procurement tender processes perform heavily standardized communications to compare goods and services in competitive markets. Thereby, award criteria, contract requirements and technical specifications as well as the price allow firms to combat for public awards of contracts. Each public procured good and service requires its own tendering process with individual requirements. Bids for big projects, for example the construction of railway tunnels in the Alps, get easily 500 pages long (Dragos & Neamtu, 2014; Grandia, 2015; Swiss State Secretariat for Economic Affairs, 2019).

So far, sustainability has found its way into SPP in form of sustainability indicators. In the course of this, public procurers included SIs within the technical specifications of tenders. Until today procurers generally prefer environmental SIs that gave rise to green public procurement and green supply chain management, which lack the social and economic dimension of sustainability (Grandia, 2015). The reason for this lies in the overlap of the

environmental sustainability dimension and natural sciences. Thus, the underlying methods to generate environmental SIs produce easily comparable numbers and percentages based on natural sciences. However, not all aspects of sustainability translate into easy comparable numbers (Bell & Morse, 2018a). This connects to and leads to a general scientific debate about methods between quants and poets, which exceeds the scope of this paper but explains this inclination by procurers (Morse, 2004).

Indicators aim to simplify complexity and convey information (Bell & Morse, 2018a, 2018b). Sustainability indicators constitute translation tools to foster achievements of sustainable development (Bell & Morse, 2003). In doing so, they simplify complexity to provide guidance for all stakeholders, including procurers and politicians (Turnhout et al., 2007). Certainly, scholars debate about SIs. One side sees SIs as indispensable tools, while the other side sees more problems than usage in aggregating something as complex as sustainability in simple metrics (Hinkel, 2011). They agree on the convenience indicators provide for communication processes but differ in their perception of the risk by oversimplification of complexities (Barnett et al., 2008; Morse, 2015). The simplification process of SIs results in trade-offs (Bell & Morse, 2018b). Thereby, ironically, the reduction of complexity into digestible and communicable pieces, the biggest strength of SIs, comprises its biggest risk (Bell & Morse, 2018a). Some scholars even argue that aggregation is evil as soon as it provides power to numbers that do not deserve it (Jesinghaus, 2018). Researchers agree that SIs cannot be perfect by design, because they do not contain laws of nature. At that, professionals build them with all their biases, worldviews and intentions (Bell & Morse, 2018b). The produced risks of SIs stem from hidden key decisions over included and excluded aggregated contents, which influence results. In a next step, these influenced results determine decisions and strategies (Bell & Morse, 2018a). Thus, any indicator contains arbitrary choices, not only from the scientific realm but also from the political realm (Bravo, 2014). Therefore, academics point out and warn all stakeholders using SIs to stay aware of their limitations (Bell & Morse, 2018b). This in turn also implies that SIs evolve, rise and vanish, depending on how they provide usefulness to indicate knowledge about sustainability performance and depending on the societal accepted values they carry along. No common terminology exists for

sustainability indicators. So, for the purpose of this paper and the described field of research we use our own definition which derived from several existing ones (Turnhout et al., 2007) and the insights provided above: *Indicators are process oriented evolving ideals reducing complexity that initiate change through standardization leading to comparability and performance measurement*.

The perspective on SIs as evolving phenomenon in combination with the noticed organizational inertia of SPP implementation leads to the conclusion that "now", "approximately rights", and "walking the talk" contain the potential to produce the wished-for results. Sari et al. (2018) summarize this insights aptly by stating that "the role of criteria and indicator processes in these complex and contested situations is perhaps more to allow a structuring of the debate than to provide a set of boxes to be ticked" (Sari et al., 2018, p. 423). The previously mentioned discussion between incrementalists and contextualists underlines this aspect. Thereby, the debate illustrates different paths on the evolutionary front of SIs. Respectively it shows how future SIs look different and provide different angels on sustainability. On the one hand, the incrementalists' focus on step by step improvement in conformity of an ever-growing industry without limits. On the other hand, the contextualists look at sustainability from another angle emphasizing limits and thresholds questioning the design and necessity of ever growing (Global Reporting Initiative, 2011; McElroy & Baue, 2013; McElroy & Thomas, 2015; M. P. Thomas & McElroy, 2016; UNRISD, 2019).

For the further course of the paper our takeaways regarding SIs compose of SIs ability for decision making, SIs strength to reduce complexity for communication and comparison purposes, and SIs feature to point to knowledge rather than to contain knowledge. In doing so SIs remain evolving pointers to changing societal values and ideals.

With these insights about SIs and their involvement in the implementation process of sustainability in public procurement, the next lines depict our research question.

Research Question

By using the Swiss case as illustrative example for driver, barriers and inertia in the implementation of sustainability in public procurement with SIs, we ask the following

research question: How to find common ground in Sustainable Public Procurement to overcome barriers and implementation inertia? In order to approach this question, the next paragraphs explain the used methods, results and findings, summarized in Figure 2.

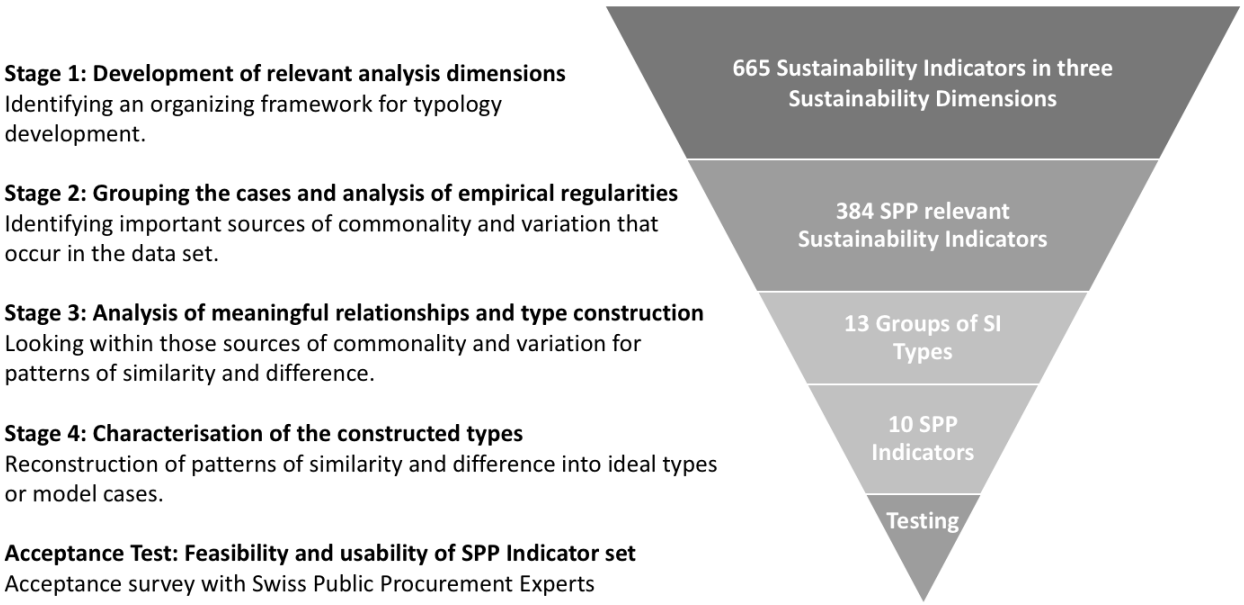

Figure III-2: Typological Analysis, filtering out the essence of sustainability indicators and testing

3. Method

3.1. Typological Analysis

In this study we aim to understand and use previous experiences of sustainability measurement for public procurement. In doing so, we aim to extract the essence of sustainability measurement from raw data in form of SIs. Hence, we choose the inductive approach of a typological analysis to generate a small set of SIs for public procurement.
A typological analysis condenses raw data into brief summarizing formats linking them to research objectives. Researchers in many qualitative studies use the construction of types to gain insights into complex social realities. A few method books describe the

construction of types in detail (Given, 2008; Kluge, 2000; Suziedelis & Lorr, 1973; D. R. Thomas, 2006). A typological analysis guides the process towards a typology development. Thereby, the derived typology bases on the underlying structure of the experiences or processes, the raw data contains (Kluge, 2000).

Thus, the primary technique of analysis consists in the construction of types from raw data (D. R. Thomas, 2006). Both, Kluge (2000) and Given (2008) describe the research process of typological analyses in four stages (Given, 2008; Kluge, 2000). Stage one, describes the development of relevant analysis dimensions (Kluge, 2000). At that, the investigator identifies an organizing framework for the typology development (Given, 2008). Stage two, instructs the researcher to grouping the cases and analysis of empirical regularities (Kluge, 2000). Hereby, once the raw data collection completes, the researcher identifies important sources of commonality and variation that occur within the structured raw data set (Given, 2008). At stage three, the investigator analyses meaningful relationships and constructs types (Kluge, 2000). Thereby, the investigator hunts within the identified sources of communality and variation for patterns of similarity and difference (Given, 2008). Finally, at stage four, the researcher characterizes the constructed types of stage three (Kluge, 2000). In doing so, stage four guides the researcher to reconstruct the discovered patterns into ideal types and type characterizations (Given, 2008). The finalized characterized types translate into a small set of ten SIs for public procurement.

3.2. Expert acceptance survey of SPPIs

After the finalization of the typological analysis we tested the resulting set of SIs for public procurement with experts. Thereby, we asked experts how they estimate the usability and feasibility of each indicator. We asked the experts using an online survey. For the survey we leaned on online remote closed card sorting methods from the field of psychology which finds interest in user experience designs, especially the development of information architecture (Basri et al., 2016; Chowdhury, 2015; Mahmood et al., 2018; Schmettow & Sommer, 2016; Zimmerman & Akerelrea, 2002). At that, we used a common sorting technique asking experts to rank each indicator in order of their perceived importance within the field of public procurement. Beforehand, we explained the SIs in detail.

Afterwards we asked the experts to sort each indicator either into the category “usable” or “not usable”, respectively “feasible” or “not feasible”.
After explaining the used method, the next sections outline the results and findings.

4. Results and Findings

4.1. Typological Analysis

For the raw data, we gathered all proven SIs from different areas of application. These areas encompassed sustainability performance measurement from corporate reporting (GRI, 2019), supply chain rating and monitoring from frameworks like Ecovadis and the ISO 20400 (EcoVadis, 2017; ISO, 2017), target indicators from the UN to monitor the SDGs globally, also called the global indicator framework (UN DESA, 2019), further frameworks like the Global Compact (GC) (UN Global Compact, 2019), MONET 2030, the Suisse national SDG monitoring framework (BFS, 2018), the ISO 26000 Indicators on sustainability (ISO, 2010), and the UNEP sustainable consumption pattern (SCP) indicators (UNEP, 2017).
At stage one, we gathered all indicators in one data pool (N=665) and used the three sustainability dimensions, environmental, social and economic as organizing framework and initial analysis dimension. Additionally, we transcribed the given definitions of the SIs and provided them with source tags as well as with IDs. Table 1 visualizes the first stage. Interestingly, the social dimension attracts the most SIs, against our expectations deriving from the higher usage of environmental SIs in practice.

Sustainability Indicators Sources	**Number of Indicators**
Global Reporting Initiative (GRI)	149
Global Compact (GC)	10
MONET 2030	106
Sustainable Development Goals (SDGs)	17
UN DESA SDG Target Indicators	244

ISO 26000	35
ISO 20400	66
EcoVadis	21
UN SCP Indicators	17
Total	**665**

Sustainability Dimension	**Count**	**Percentage**
General	34	5%
Environmental	177	27%
Economical	66	10%
Social	388	58%
Total	**665**	**100%**

Table III-1: Collected sustainability indicators' sources, numbers, and sustainability dimensions

At stage two we identified patterns and started to group SIs accordingly. In doing so, we excluded all SIs irrelevant for public procurement. Thereby, most indicators provide a clear understanding what they indicate. We excluded for example indicators for general reporting practices like "message from the CEO" or "reporting period", as well as indicators concerning agriculture on a national level like "consumption of vegetables and fruits" or "risky alcohol consumption", as well as indicators with further topics outside the realm of public procurement like "maternal mortality ratio" or "malaria incidents per year". After the data cleaning, we went on with SIs relevant for public procurement (N=384, 58% of the sample) and started searching for patterns. Later we grouped the indicators accordingly. As a result, we ended up with thirteen groups of which "labor rights" (55 indicators), "human rights" (45 indicators) and "waste" (43 indicators) combine the most indicators (36% of the sample).

At the next stage, we looked for meaningful relationships and merged groups with overlaps. In doing so we continued to revise and refine the grouping. First, we defined these groups and described them. Afterwards we started to construct types from them. In our case those types resulted in group headlines. Further, in a final stage, we characterized those types and translated them into public procurement. With this translation we transformed the types into public procurement SIs. Thereby, we worked out explanations for each SI and provide insights into their operationalization. Table 2 summarizes stage three and four and presents the small and clear set of SIs operational for public procurement.

Type and Characterization	**Translation into SPPI**
Human Rights	This indicator asks potential contractors to prove their measures to enforce human rights and societal issues. It includes measures against child labor and other forced labor and measures for decent work conditions, as well as bargaining powers of employees and unions.
Supply Chain Control	This indicator asks potential contractors to proof if and how the supply chain is being controlled concerning labor conditions, human rights and child labor as well as environmental standards through certificates and own measures.
Environmental and Social Risks	This indicator asks potential contractors to provide an overview of positive and negative environmental and social incidents the organization encountered.
Gender Pay Gap	This indicator asks potential contractors to proof their efforts to reduce income inequality between men and women.

Sustainability Management Certification	This indicator asks potential contractors to show if their sustainability management is certified and how it is integrated in the organization.
Measures against Corruption	This indicator asks potential contractors to proof their efforts against corruption.
Greenhouse Gas Emissions	This indicator asks potential contractors to disclose their GHG emissions of the organization as well as measures and programs with actions taken to reduce the emissions.
Energy Consumption	This indicator asks potential contractors to disclose the energy consumption of the organization as well as measures and programs with actions taken to reduce the consumption.
Investments in Sustainability	This indicator asks potential contractors if and how they invested into sustainability.
Stakeholder Description	This indicator asks potential contractors for a description of their stakeholders, as well as how the stakeholders are affecting the organization and how the organization is affecting the stakeholders.

Table III-2: Idealization of types into Sustainable Public Procurement Indicators

After the finalization of the typological analysis transforming and condensing common SIs into fresh crafted public procurement SIs, we tested their acceptance by public procurement experts from Switzerland as the following outlines.

4.2. Expert acceptance survey of Sustainable Public Procurement Indicators (SPPIs)

In testing the acceptability of the crafted SPPIs we approached 21 experts from the advisory board of the project from which this research derives. Their answers (N=10) led to the results and findings visualized in figure 3. The results show the relative importance of human rights and supply chain control within the realm of public procurement in Switzerland compared to the other developed SPPIs. Figure 3 embodies the ranking results with the perceived most important indicator on top until the least perceived important indicator of the set on the bottom. When asked about the feasibility and usability of the SPPIs, the experts rated them interestingly predominantly as both feasible and usable. The experts reached total agreement for the usability of the SIs "Human Rights", "Supply Chain Control", and "Green House Gas Emissions". Regarding feasibility, the experts agreed uniformly on the SIs "Sustainability Management Certification", "Greenhouse Gas Emissions", and "Energy Consumption" as feasible. Highlighting that, the experts also evaluated all the other SPPIs by a majority as usable and feasible as figure 3 illustrates.

Table III-3: Perceived usability and feasibility of developed Sustainable Public Procurement Indicators by Swiss PP experts

The results and findings conclude with a concise and clear set of indicators for public procurement and the acceptance by public procurement experts in Switzerland participating in the online survey. The next chapter discusses these results and their contribution to the body of knowledge on public procurement, their meaning within the Swiss context, and the necessities of how to proceed for their successful application.

4. Discussion and Contribution

With our research we aim to support public procurement on its quest to overcome barriers and inertia on its way towards sustainability. Time is ticking and makes perfect solutions and perfect concepts inadequate, especially against the backdrop of SIs need for evolution and continuous process in learning by doing. The path forward requires nothing less than a paradigm shift in public procurement as well as a shift of cultural values influencing the procurement profession. Particularly the insights into the professions' own perceived status towards SPP calls for immediate action to achieve communality, harmonization and a professional wide understanding of sustainability. Even though a culture of willingness beats any sustainability guideline or sustainability framework, we argue for mutual triggering effects. In order to do so, we followed the three-step recommendation by Meehan and Bryde (2011), to neutralize inertia throughout the implementation of sustainability into public procurement (Meehan & Bryde, 2011). We gathered the knowledge of all successful proven sustainability performance measurement frameworks in form of SIs, filtered their essence in a typological analysis and translates them into a small and clear set of SPPIs. Additionally, we tested the acceptance of the developed SIs by experts to facilitate their application.

With this approach we aim to avoid another silo approach driven by various stakeholder pressures and conflicts throughout the profession of public procurement. With the usage of proven knowledge from all realms of sustainability performance measurement we anticipated the problems of knowledge dissemination and fragmentation illustrated by the Swiss case. With a clear and easy communicable basis of ten indicators we aim to reduce not only perceived complexity and a facilitated knowledge dissemination of SPP but also the risk aversion of procurers and their leadership. Additionally, we accredit the derived framing for SPP a trigger effect for policy implementation and national goal settings. With the conscious decision to stay on a macro level with the indicator set we aim to include also SMEs in further thoughts and innovations through the inherent flexibility of application. Of course, the proposed approach contains certain risks.

Therefore, we recommend to all applicants of the given SPP frame of SIs to keep in mind their limitations by aggregating complexity into digestible pieces and urge to cautiousness from oversimplification and greenwashing. Also, we urge users and applicants of the indicator set not to hide behind or misuse the inherent latitudes and flexibilities but to use them as a chance to tailor the SIs to individual procurement needs in order to improve them on the long run. The recent "Monte-Ceneri" case about a railway tunnel project in the Alps, out of the legal public procurement realm from Switzerland, underlines latter and highlights also the importance to transparently choose fitting methodologies for relevant SIs (Swiss Constitutional Court, 2018). Within the case, the public procurer used non-transparent and non-fitting methods to compare qualitative criteria. This paper's section about limitations and future research picks up on this issue.

The present research contributes to the theoretical body of public procurement first of all a knowledge transfer from other sustainability relevant research areas like corporate reporting, corporate communication, supply chain control and monitoring as well as sustainability management, and sustainability performance measurement. Further, with the concrete elaboration of SIs, the proposed approach complements other initiatives like the ISO 20400 which lacks a neat set of clear and operational SIs. In doing so, the research provides an overarching sustainability frame for all public purchases without losing itself in individual and detailed requirements of publicly procured goods and services in tender processes.

Regarding the case of Switzerland where communality and harmonization of the SPP approach remains one of the main challenges, the elaborated SPPIs framework serves as a common ground and a common language as well as a further step to profoundly implemented sustainability in public procurement on all organizational levels. Besides, we aim with this research to provide the necessary flexibility and space for evolution and adaptation in each individual procurement towards sustainability. Also, the framework allows and encourages professionals to engage, experiment and improve it in order to serve its evolution. We hope to help with this research professionals and academics to overcome inertia in SPP implementation and see its elaboration as a trigger to do so.

5. Limitations and Future Research

The presented research provides a starting point and common ground for further investigations and requires continuous refinements essential in the work implementing SIs in SPP processes. A limitation of the study lies in the legal and country specific contextuality of public procurement tender processes. Future studies may elaborate how the produced SIs comply with upcoming public procurement laws, as well as how to maintain the need of flexibility for the unique requirements concerning sustainability in each tender process. Hereby, the challenge resides in the choosing of "fitting" and "sustainability relevant" SIs with their underlying methods. Future research may look into how to select the best suiting SIs and methods out of the derived frame in this paper as well as the means to do so for each procured good and service.

Chapter IV

IV. Conceptualizing the "Corporate Nervous Net": Decentralized Strategic Communication Based on a Digital Reporting Indicator Framework

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Abstract

The digital revolution challenges strategic communication. Artificial Intelligence (AI), Big Data, and the Internet of Things (IoT) create a rapidly changing environment for organizations as well as system complexities. To fulfill its task in ensuring the long-lasting success of organizations strategic communication needs to continuously adopt to this revolution. This article approaches the question of how strategic communication can adopt to the digitalization. In order to do so the article conceptualizes the corporate nervous net and a predictive reporting indicator module with real-time feedback loops. As a result, the article contributes digital assisted, decentralized strategic communication to the theoretical body of strategic communication. Decentralized strategic communication proposes a self-organizing, bottom-up approach of strategic communication under the principle of subsidiarity. It keeps complexity at a manageable level and enables the usage of local knowledge and quick adaptation to rapid changes. The proposed resilient approach to strategic communication uses the driving forces of the digital revolution of big data, AI and IoT in its favor instead of trying to control them.

Keywords: Decentralized Strategic Communication, Complex Systems, Digital Revolution, Corporate Nervous Net, Indicator, AI, Big Data, Internet of Things, Planetary Nervous System

1. Introduction

Digitalization revolutionizes society and corporations globally. Today, more than 95 % of all data exists digital (Helbing, 2015b). Masses of data, also pictured as the oil of the information age and called big data (Arthur, 2013; Helbing, 2015b), fuel the digital revolution. ICTs like smartphones, computer, cameras, machines, cars, sensors among many more generate and store masses of data in all areas of life. All the contents collected in the history of humankind until the year 2003 are estimated to amount to five billion gigabytes. The same amount of data volume that is now produced approximately every day (Helbing, 2015b). As a consequence, the generation and storage processes create a parallel digital universe that influences heavily the 'real' world (Bernik, 2014). Along with the digitalization come technological tools available to many people and corporations (Bernik, 2014; Greengard, 2015).

The digital revolution destabilizes the economy, society and corporations because of the inability to control it (Helbing, 2015b; Rifkin, 2011, 2014). The rapid growth of data volumes creates information overloads and complexity. The high connectivity between system components combined with high interaction strength can cause increasingly system breakdowns through cascade effects similar to chain reactions in atomic bombs as soon as they reach a critical mass (Buldyrev et al., 2010; Helbing & Lämmer, 2005). We argue in line with other scholars that attempts to run corporations like perfect clockworks in a digital revolution are doomed to fail including pure centralized top-down content controlling strategic communication approaches (Buldyrev et al., 2010; Dörner & Kimber, 1996; Greengard, 2015; Haldane & May, 2011; Helbing, 2013).

Based on big data, AI and the creation of the IoT the digital revolution triggers a wave of automation leading to a "second machine age". These developments, also described as the third economic revolution, cause the emergence of the economy 4.0, a digital sector driven by information and knowledge production (Brynjolfsson & McAfee, 2014; Rifkin, 2011, 2014). This revolution results in increasing communication and information fueling the core of strategic communication and creating complexities as well as critical vulnerabilities (Buldyrev et al., 2010; Haldane & May, 2011; Peters et al., 2008). Vast

information production in continuous evolving and increasingly powerful communication systems calls for strategic communication to manage and to adopt to them. Strategic communication links organizational communication and the public sphere as main task and builds fine-tuned sensors into the organizational environment. In doing so communicators must link the organization with its stakeholders, its strategy and decision-making in multi-agent settings (Holtzhausen & Zerfass, 2015). At this stage the conversion of raw data into useful knowledge is increasingly challenging strategic communication. Moreover, the management of the increased amount of crucial communication for the survival of a corporation challenges professionals. The digital revolution has not yet fully reached the field of strategic communication even though it might change the profession to its roots through automation and big data analytics (Hopkins et al., 2011; Wiesenberg et al., 2017).

Industry 4.0 exemplifies the digital revolution in corporate production processes and stands for the marriage between mechanization and communication, enabling machines to directly communicate with each other needing only a few production workers. Examples range from the VeChain-technology to the Radio Frequency Identification technology (RFID). VeChain is a cloud product management solution working with block chain technology, enabling stakeholders to verify product information in an unchangeable database (Meraviglia, 2018). RFID technology uses electromagnetic fields to automatically identify and track tags attached to objects. Supply chain management uses RFID technology for its production and logistics control (Zhong et al., 2015).

After the steam engine, the conveyor belt for mass production and the introduction of robots in production lines, forming industry 1.0 to 3.0, industry 4.0 describes the next step of automation potentially leading to self-organizing production systems. The Internet of Things drives this development and builds its communicative backbone by using data generating networked sensors enabling production management in real-time (Armbruster et al., 2005; Greengard, 2015; Seidel et al., 2008).

In this article we aim to conceptualize the impacts of the digital revolution on strategic communication and ask the question of how strategic communication can position itself for the upcoming storm. Theory and practice in the field of strategic communication

undergo constant reinvention in the enduring search for universality and solid grounds (Nothhaft et al., 2018). Meanwhile corporations find themselves in an increasingly sceptic and hostile communicative environment interspersed by fake news, cyberattacks, manipulation and sensationalism with increasingly informed stakeholder (Appelbaum et al., 2015; Edwards, 2010; Kramer et al., 2014; Paletta et al., 2015; Schneier, 2015). In this fluid and dynamic environment corporations need discursive and dialectic processes in order to reach a state of authenticity as enabler of trust, the basis of any stakeholder relationship and communicative interaction (Edwards, 2010; Heath, 2001; Lock et al., 2016).

We base this article on the definition of strategic communication by Zerfass et al. (2018), which encompasses all communication that is substantial for the survival and sustained success of an entity (Zerfass et al., 2018). We also refer to van Ruler's (2018) deliberations on strategic communication defining it as the management of a communication processes amalgam in the context of strategy making. Thereby, strategic communication describes a continuous reflective learning loop of both, the presentation of strategy and its rebuilding (van Ruler, 2018). Additionally, we follow Nothhaft et al. and Zerfass et al. who define the conditions under which strategic communication operates as complex, uncertain, and with limited resources, as seen against a horizon of predictability (Nothhaft et al., 2018; Zerfass et al., 2018). Whereby ideally, strategic communication prepares a corporation for an uncertain future (Zerfass & Huck, 2007). Within these defining parameters of strategic communication, we see in line with van Ruler (2018) communication as omnidirectional and diachronic (van Ruler, 2018). And as other scholars in the field, we follow modern strategy development theory and see strategy as an emergent and continuous development process also called emergent strategy (Moore, 2011; van Ruler, 2018). Thereby the ongoing process of strategy building bases on the reflection of itself to enable adaptation to internal and external emergent changes. In doing so the involved actors can check constantly if they are still doing the right things in the right way (Moore, 2011). Following this framing, strategic communication requires continuous monitoring through the gathering of data and the sense making of the gathered data. Continuous monitoring enables needed adjustments of strategic assumptions accordingly to the gained insights

about changes in the internal and external environment (van Ruler, 2018). Further we follow scholars in the field calling for interdisciplinary research to develop and innovate strategic communication, by including insights from other research areas like information technology and corporate social responsibility (CSR) (Falkheimer & Gregory, 2016; Werder et al., 2018). We also orientate on scholars who ask for additional understanding for the management of communication in organizations (Werder et al., 2018) as well as for instruments that can be refined, replicated and reviewed by other scholars until they reach a robustness strengthening the field of strategic communication (Nothhaft et al., 2018). Thereby, we aim to support advancements for more open, dynamic and expanded approaches of strategic communication (Macnamara & Gregory, 2018). In doing so we see like others the need to expand the focus of strategic communication towards a holistic understanding of organizational complexity, but not only to co-workers, as suggested by Heide et al. (2018) but to all communicators, human and non-human (François Cooren & Fairhurst, 2009; Heide et al., 2018; Heide & Simonsson, 2011; Sandhu, 2009). In order to conceptualize the corporate nervous net with a predictive indicator module as possible answer to the digital transformation in strategic communication, we build on the definition of communication as process of meaning creation. In doing so we focus on how the meaning creation process works (Littlejohn & Foss, 2010; Rosengren, 2000; van Ruler, 2018). Besides, we build on the basic principles of communication constitutes organization (CCO) and a constitutive role of communication. CCO emphasizes the emergent organization from the bottom-up rather than from top-down, which implies that an organization and its strategy emerge from a continuous loop of sense making (Schoeneborn et al., 2014; Taylor, 2009). We chose this approach because it aligns with recent theories studying digitalization in complex dynamic systems. These studies question current hierarchical, top-down, controlling, and surveilling structures in complex dynamical systems, because of their inefficiencies and vulnerabilities in rapid changing interconnected environments (Buldyrev et al., 2010; Carvalho et al., 2014; Haldane & May, 2011; Seidel et al., 2008). Building on CCO in addition to the previous described definition of strategic communication results in a stronger focus on the actual processes and practices of strategic communication in accordance with other scholars (Heide et al.,

2018; Liedtka, 2000; van Ruler, 2018). To conceptualize the corporate nervous net we build on communication as the continuous and simultaneous interaction of a large number of variables that move, affect, change each other in the sense of Berlo (Berlo, 1977). In doing so we refer also to interaction defined by Watzlawick et al. (1967) as a necessity for relationships to emerge with many kinds of interaction rules that govern communicative behavior (Watzlawick et al., 1967). By obeying to the set rules, the communicators approve the defined relationship. As a basis for all purposeful behavior we refer to feedback as introduced by Wiener (1965) concerned with the purposeful levels of behavior within systems. All purposeful behavior requires feedback in order to be adjustable and remain purposefully (Wiener, 1965). These feedbacks enable reflexivity as introduced by Mead (1934), whereby the turning back of experience upon the communicator "enables the individual to take the attitude of the other toward himself, that the individual is able consciously to adjust himself to that process, and to modify the resultant process in any given social act in terms of his adjustment to it" (Mead, 1934, p. 134).

A recent study revealed the unpreparedness of communication professionals for the upcoming automation and digitalization in the corporate environment, not only in a lack of competencies and ethical reflection but also in a limited use of opportunities (Wiesenberg et al., 2017). As a result, the digital revolution poses an unknown effect on the strategic communication profession and theoretical realm with the potential to severely change communication jobs and strategic communication science (Frey & Osborne, 2017; Rifkin, 2011; Wiesenberg et al., 2017).

This article aims to approach the mentioned unpreparedness in the field with the question of how strategic communication can adopt to the digital revolution. In order to do so, we conceptualize the corporate nervous net adopted from the established concept of a digital planetary nervous system (Helbing 2015). As a result, we introduce decentralized strategic communication with a distributed bottom-up approach including self-organization under the principle of subsidiarity. We structure the article in three parts, whereby the first part depicts strategic communication in the light of the digital revolution. The second part illustrates the conceptualization while the third part enfolds a discussion. The second part containing the conceptualization of digital assisted, self-organized and decentralized

strategic communication consists of four elements. Firstly, we develop an indicator module explaining the data processing. Secondly, we conceptualize the corporate nervous net. Thirdly, we embed decentralized strategic communication into the corporate nervous net. The three graphs support the understanding of the conceptualization followed by managerial implications.

After setting the stage and defining strategic communication for the conceptualization of a corporate nervous net, we describe strategic communication in the light of the digital revolution.

2. Strategic communication in the light of the digital revolution

2.1. The forces behind the digitalization and their effects on strategic communication

Digitalization changes the environment of strategic communication in three ways and challenges it to adopt to these changes (Holtzhausen & Zerfass, 2015). First of all, it creates masses of data useable for strategic communication and to be managed by strategic communication, concerning the listening of communication. Secondly, it provides new opportunities making the data accessible and a substantial part of goal-orientated conversations, concerning the messaging of communication. Thirdly, it enables data-based automations of communication (Helbing, 2015b; Werder et al., 2018). Meanwhile the audiences become increasingly sophisticated in their assessment of intent and quality of information along with an increased skepticism in how far communicating entities can be trusted (Edwards, 2010).

The environmental change of strategic communication consists of three major developments, big data, artificial intelligence and the internet of things.

Every organizations and corporations gather and store vast amounts of data but don't know how to use them properly, which becomes a problem also for strategic communication as we will also lay out further in this article (Hopkins et al., 2011). These vast amounts of data build big data, which exceed the capacities of traditional data analysis tools. Big data can help to generate better knowledge faster, more effective, with more insights. But the

increasing collected amounts of data turn the extremes from not enough data in the past to too much data to process, at this stage. The collected data by eBay, Walmart or Facebook must be measured in petabytes – 1 million gigabytes, a hundred times more than the largest physical library in the world stores (Helbing, 2015b). Evolving technology exacerbates this phenomenon, against all intuitive thinking because the complexity and data volumes mount faster than the available computerized processing power. As a result, the relative lack of computational power will increase while the relative amount of processable data decreases (Helbing, 2015b; Lazer et al., 2014) Strategic communication's task to keep a well-balanced overview of all communication that is substantial for the survival and the sustained success of an entity becomes therefore progressively more difficult (Helbing, 2014b, 2015b; Tench et al., 2017; Volk & Zerfass, 2018; Zerfass et al., 2018).

Along with big data comes AI which facilitates the processing and analytics of big data. AI describes any technique enabling computers to mimic human intelligence and encompasses any device sensitive to its environment and able to act in a way that maximizes its chances of successfully achieving its goals (Russell & Norvig, 2016). A subset of AI defined as deep learning composed of algorithms permits software to train itself to perform tasks. Thereby, a predictive algorithm rifles constantly through the gathered data to find patterns where the human eye cannot find them. In doing so they produce big data-based prediction models. (Malek, 2008). Several studies prove the efficiency of predictive algorithms and their superiority to human prediction (Greengard, 2012; Hopkins et al., 2011; Kennedy et al., 2011). From the perspective of strategic communication that operates in the light of predictability the question rises how AI can support strategic communication? We aim in the course of this article with the conceptualization of a predictive reporting indicator module in a corporate nervous net to approach this question.

The IoT describes the third driver of the digital revolution and builds the basis for the development of this article. It consists of sensor networks, global communication between electronic devices, globally accessible websites and social communication networks. In short, it connects the infrastructure of an information society. ICTs produce data and communicate to each other producing even more data. Further, previously offline devices

like TVs, fridges, cameras, vehicles, machines, conveyor, product parts, smart wearables, and sensors connected to the internet create the IoT also called Internet of Everything (IoE) which stands for a connected world. As a result, the IoT will enable the real-time measurement of everything by using sensor networks that communicate with each other wireless (Greengard, 2015). These developments led to the conceptualization of the "Planetary Nervous System" an intelligent information platform proposed by the FuturICT project, also called the "Nervousnet" (Helbing, 2014a, 2015b; Helbing et al., 2012). The Nervousnet aims to use the sensor networks behind the IoT including smart phones to measure the world in an open source project, forming a decentralized digital nervous system (Helbing et al., 2012). Thereby, the Nervousnet contains the potential to enable real-time measurements of the world, the warning of side effects of certain actions like the amount of CO2 emissions produced, the revelation of hidden forces behind socio-economic changes, and the enabling of self-organizing systems with real-time feedbacks (Helbing, 2015b; Seidel et al., 2008). The real-time feedbacks from the measurement of externalities in combination with AI and its predictive capabilities potentially help to avoid unforeseen damage (Helbing, 2015b). The conceptualized Nervousnet serves as blue print for the corporate nervous net with a predictive indicator module in this article.

After the description of the forces behind the digital revolution in relation to strategic communication and the planetary nervous system, the following paragraphs outline possibilities in dealing with complexity.

2.2. Adopting to complexity in strategic communication and complex systems

Digitalization produces complexity. The intuitive answer to the increasing complexity lies in simplification, but simplification by standardization and homogenization undermine innovation needed for adaptation in rapid changing environments. In the following we describe examples of simplification without neglecting the need for innovative adaptation. Firstly, we describe opportunities for action in the context of dynamical complex systems and then in the context of current strategic communication.

The complexity in dynamic systems challenges top-down structures because they cannot adopt timely to changes and fail if only one node in the chain of command disrupts or

becomes dysfunctional. Flexible and timely adaptation occurs on the bottom with local knowledge and manageable complexities (Helbing, 2013). Control theory reveals that delayed adaptation destabilizes systems (Helbing, 2015b). Attempts to control complex dynamical systems in a top-down way undermine normal functionalities of the system. The greatest improvement in airplane flight safety exemplifies the effect because not technical control mechanisms achieved them but the introduction of a non-hierarchical culture of collaboration in the cockpit encouraging co-pilots to question decisions and actions of the pilot (Helbing, 2015b). The digital revolution produces unavoidable and unpredictable accidents. The answer to these accidents lies within resilience because control and surveillance cannot avoid accidents from happening. Therefore, also complex communication networks and corporate strategic communication requires resilient structures to survive. Resilience stands for the ability of a system to absorb shocks and to recover from them (Carvalho et al., 2014; Chewning et al., 2012; Weick & Sutcliffe, 2011). Resilient network designs consist of flexible governance systems with quick adaptation capabilities, achieved through decentralization, self-organization, control elements and the principle of subsidiarity. Such system designs empower staff to find innovatively solutions for themselves (Helbing, 2015b).

Decentralization means to break down systems into substructures with lower levels of connectivity and interaction compared to connectivity and interaction within the substructures. These substructures reduce complexity, decrease interaction effects between them and consist of a manageable size (Helbing & Lämmer, 2005).

Self-organization builds on individual self-determination and subsidiarity stands for as little top-down control as possible. The resulting system combines centralized top-down control and distributed bottom-up organization whereby self-organization enables distributed organization (Helbing, 2015b).

Digital assisted self-organization modifies the interaction rules of system components where necessary. Following this approach, a resilient complex dynamic system requires real-time information, feedback, whereby incoming information must determine how the interaction needs to be adjusted. The feedback loops of the system inform about external effects, called externalities, as for example reputation, emissions, waste or other impacts

on the organizational environment (Carvalho et al., 2014; Helbing et al., 2003; Seidel et al., 2008).

After describing how scholars suggest to reduce systematic organizational complexities we refer in the following to measures reducing complexities in current strategic communicational practices like corporate performance measurement used for corporate reporting.

Indicators in corporate reports simplify complexity into numbers and synopses with the aim to provide digestible and communicational pieces of information. The word indicator stems from the Latin word "indicare" and stands for the pointing or directing to knowledge. Scholars define indicator as "simplifying tools designed to capture complexity and help convey information to specialists and non-specialists alike" (Bell & Morse, 2018b, p. 2).

Corporate reporting of financial and non-financial information relies on reporting indicators. Guidelines and laws structure the measurement approach behind. In the last years many corporations commenced the production of integrated reports <IR>. They show how sustainability performance and the financial performance mutually depend on each other (Churet & Eccles, 2014; Robert G Eccles & Armbrester, 2011; Robert G Eccles & Krzus, 2010, 2015). Integrated reporting defines a merger of sustainability reporting and financial reporting into a single "narrative" (Churet & Eccles, 2014). For this purpose, integrated reports integrate and combine financial and non-financial data in one document to show all stakeholders how the corporation performed in the past year. In doing so they add social and environmental matters to the economical ones as well as their interdependences (Robert G Eccles et al., 2015; Seele, 2016a, 2017). Further, scholars introduced the conceptualization of AI to reduce complexity in a reporting indicator based setting with predictive capabilities (Seele, 2017).

The academic theory provides many more and other ways how to deal with complexity but we focused on the described ones in order to set the stage for this article.

We described strategic communication in the light of the digital revolution as well as means to deal with complexity in strategic communication and complex dynamical systems, which leads to the research objective of this article.

2.3. Research Objective

The research objective focuses on the conceptualization of a corporate nervous net and a predictive indicator module to approach the questions of how strategic communication can adopt to the digital revolution.

3. Conceptualizing the Corporate Nervous Net with a predictive reporting-indicators

The following three chapters describe the conceptualization of the corporate nervous net and the predictive indicator module in three steps. They base on the introduced theory of strategic communication and complex digitalized systems. First of all, we describe the concept of the predictive indicator module. Then we outline the emerging corporate nervous net in a digitalized corporation and how a predictive indicator module assists strategic communication within it. In a third step we introduce decentralized strategic communication enabled by a predictive indicator module within a corporate nervous net as a way for strategic communication to adopt to the digital revolution. Thereby, we combine the knowledge of strategic communication and complexity research within the context of the digital revolution. In order to do so, we base the conceptualization on a constitutive and emerging understanding of strategic communication in an ethnographic allegory.

3.1. Linking AI and reporting indicator to create a predictive indicator module

Corporations gather and store vast amounts of data but do not know how to use them properly. These data amounts will increase in the further course of the digital revolution due to the increasing number of ICTs producing increasing amounts of data and their resulting increased communication with each other. Strategic communication needs to convert raw data into useful data in order to link the organization with its stakeholders, its strategy and decision-making in multi-agent settings. The following description of a predictive indicator module aims to enable strategic communication in a digitalized

corporation and converts raw data into useful knowledge. Thus, current reporting guidelines for financial and non-financial information guide the collection of smart-data. Smart-data refers to the tailored measurement of temporal data for specific use. The smart data flows into a data repository that allows for real-time transparency of the measurements. After the automated preparation of the smart data, AI in form of learning predictive algorithms continuously scans the data repository for patterns humans cannot see. In result a display panel shows predictive indications based on real-time measurements. Thus, systemized indicators in the form of a traffic light system indicate predictive signals for actionable insights. Figure 1 depicts the predictive indicator module and its data flow. The predictive indicator module assists and enables strategic communication in a digitalized corporation using the technical advancements of the digital revolution in a structured way circumventing the pitfall of information overload through smart data and the use of predictive algorithms.

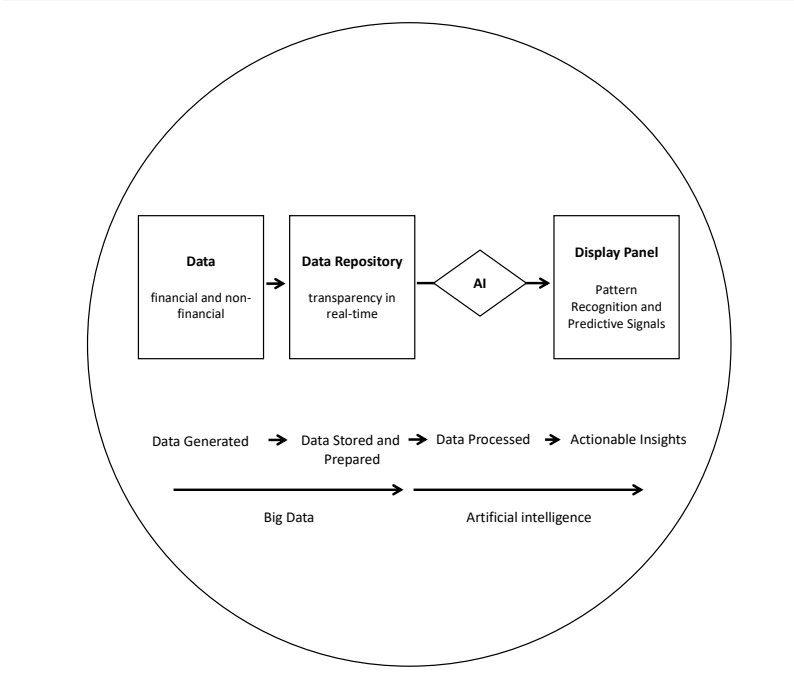

Figure IV-1: The predictive indicator module and data flow

3.2. Putting the pieces together: Predictive indicators within a corporate nervous net

The corporate nervous net consists of a sensor network similar to the previously described planetary nervous system. Thus, the sensors anywhere in the corporation measure corporate performance in real-time. Just like nerve cells in the human nervous system they send their measurements in form of data to the brain. The brain in the presented concept stands for a data repository where the data gets filtered, prepared and processed. Digitalization in corporations connects everything with everything building a nervous net with signals in form of communicated data. The human nervous system serves as warning system for the brain. Similar in a digitalized corporate context the corporate nervous net has the potential to deliver risk indications as well as impact measurements of externalities. The corporate nervous net as real-time measurement of corporate interaction combined with a predictive indicator module as brain function and sense-making operator enables strategic communication to link stakeholders with strategy and decision-making in a multi agent setting. At the same time it serves as feedback loop for strategic communication and enables the basic requirement for purposeful communication, namely to be adjustable and remain purposeful. Moreover, the feedback loops with real-time measurement enable reflexivity which enables strategic communication not only to take the attitude of a stakeholder toward himself but the ability to consciously adjust to that process and modify the resultant process in any other interaction. This way strategic communication adopts to the digital revolution by using the forces at play conceptualized as a corporate nervous system to make sense of information and adjust to rapid changing environments.

Depicting organs as organizational functions extends the allegory of the corporate nervous net. The organs interact with each other and connect through the corporate nervous net. Thus, their communication and information in form of data flows towards the brain where strategic communication locates with a predictive indicator module to convert raw data into useful knowledge. At the same time the predictive indicator module provides an automated feedback possibility. Figure 2 depicts the corporate nervous net including strategic communication assisted by a predictive indicator module.

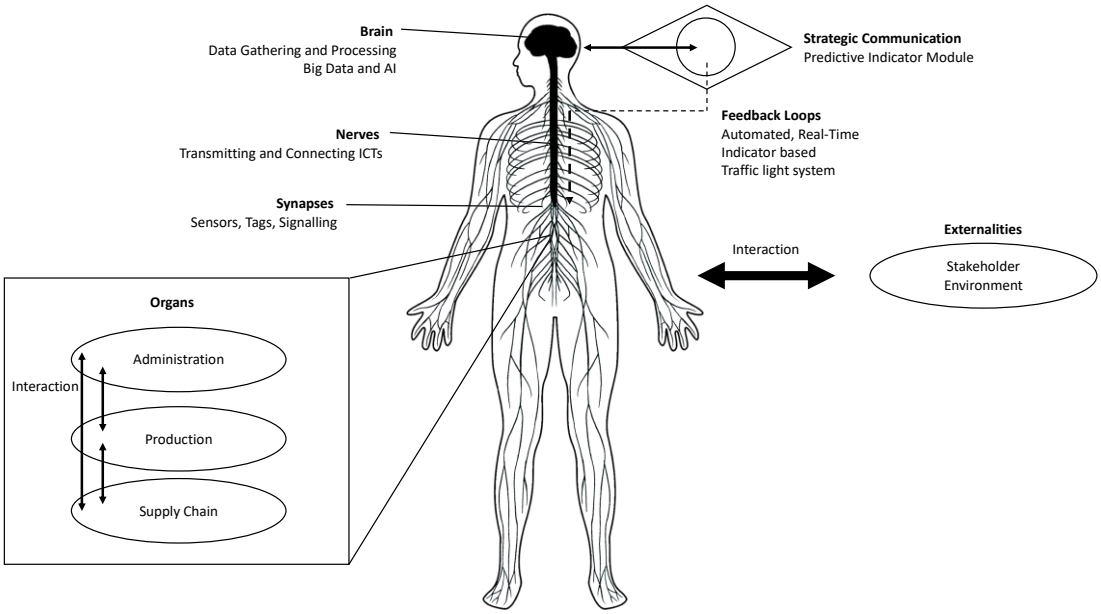

Figure IV-2: The corporate nervous net and strategic communication

The conceptualization of the corporate nervous net and the predictive indicator module provide strategic communication with the means to enable emerging strategic communication as well as its foundational need of feedback. However, by themselves they do not solve the complexity issues of complex dynamic network systems, which leads to the third step and the decentralization of strategic communication in a corporate nervous net.

3.3. Digital assisted, self-organized and decentralized strategic communication

Traditionally hierarchical structures experience their limits in the digital revolution. The disruption of one node in the structure breaks the system, delays adoption from top-down, threatens the survival of the system and cascade effects in strongly interconnected

networks endanger corporations and their communication networks in the digital revolution.

The scientists of complexity studies suggest a resilient organizational design based on self-organization and decentralization under the principle of subsidiarity. In the following we integrate these organizational design principles into strategic communication assisted by the predictive indicator module within a corporate nervous net to elucidate how strategic communication can adopt to the digital revolution.

First, we apply the organizational design of decentralization. Instead of just one brain, meaning one strategic communication function for the entire corporate nervous net, the function splits up into substructures "units". These units dock on reasonable corporate functions schematic depicted as organs. Similar to the human nervous system they enable organs to interact purposefully on their own with each other or externalities. Thus, they can rely on predictive feedback loops enabled through the predictive indicator module and interaction frames. These interaction frames consist of two parts and remain similar or adjust simultaneously. One part describes the reporting indicator frame and with it the kind of gathered local smart data. The other part outlines the displayed reporting indicator structure in real-time feedback loops with risk predictions.

Secondly, we apply the principle of self-organization. Instead of a pure top-down hierarchical organization for strategic communication, strategic communication emerges within the previously described set frame. The strategic communication "units" remain as independent as possible to adopt as fast as possible to environmental change and to stay as loose as possible in its connection to the corporate nervous net. This design provides resilience to cascade effects and unmanageable complexities. However, in order to maintain consistency and a degree of alignment strategic communication sets and modifies the interaction rules of system components where necessary, whereby the predictive indicator module assists to align goal formulation and the overall alignment with it. Thus, the principle self-organization follows subsidiarity that stands for as little top-down control as possible but emphasizes the combination and complementation of both top-down control and distributed bottom-up strategic communication.

Decentralized strategic communication focuses on interaction rules of the system rather than on content control enabling the emergence of strategic communication. Thus, digital assisted self-organization supports strategic communication in the setting of the interaction rules. Each unit possesses its own predictive indicator module, smart data collection and AI with individual results. Interaction rules and the indicator framework build the universal components of strategic communication that remain the same or simultaneously gets adjusted in each unit. As a result, strategic communication within the corporate nervous net consists of digital assisted decentralized units providing real-time measurement and AI supported predictive actionable insights fed by their local collected smart data similar to different human organs that communicate through the nervous system with each other, perform reflexes or problem solving to a certain degree. Corporate functions with strategic communication units can communicate strategically independently within a certain frame and with interaction rules given by the overall strategic communication. Only in severe crisis or in cases of emergency the central brain function is getting activated through an emergency signal to adjust the frame or interaction rules. In a case of a shock or an overall system failure the units remain operational. Figure 3 visualizes in a schematic model the organization of decentralized strategic communication. The next chapter outlines how decentralized strategic communication works in a digitalized corporate environment.

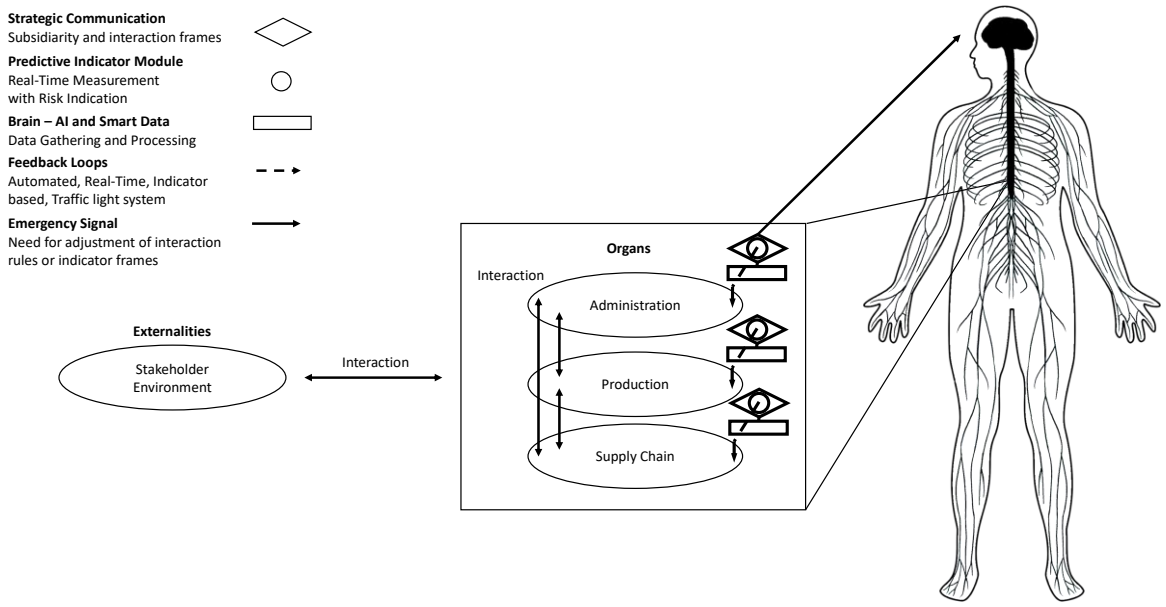

Figure IV-3: Digital assisted, self-organized and decentralized strategic communication

3.4. Managerial implications: How to use a modular predictive indicator module for decentralized strategic communication

In the following we exemplify how decentralized strategic communication works for the production function of a corporation producing textiles. The sensor network behind the ICT infra-structure of the corporate production produces big data. The data flows into an own data repository which allows for real-time transparency of the measurements. After the automated preparation of the smart data, AI in form of learning predictive algorithms continuously scans the data repository for patterns. In result a display panel shows predictive indications based on real-time measurements. The systemized indicators display a form of traffic light system for each indicator. It shows for example the greenhouse gas emissions in real-time with a green traffic light if the manager's actions lie within his goals also in the near future. Thus, the actionable insight enables the manager to engage into strategic communication. The real-time measurement allows for continuously adaptation and adjustments in the units' strategic communication. If for

example the AI within the predictive indicator module finds the pattern for the high risk of a system failure due to the breakdown of a production sight and the set interaction rules and frames mandate in such a situation an emergency signal to top-management in such a situation, the responsible manager can do so.

Decentralized strategic communication within a corporate nervous net enables decision-makers on all levels to find solutions to their actions and to engage into strategic communication coordinated by interaction rules.

After the pragmatic implications of decentralized strategic communication, the next chapter discusses how this concept contributes to the theory of strategic communication, as well as how it provides strategic communication with answers to deal with the digital revolution.

4. Discussion

Strategic communication in the light of the digital revolution reveals the challenges of the field to adopt to the expected grave changes. At the same time professionals lack capabilities to deal with the situation. With this paper we aim to approach this gap.

Decentralized strategic communication contributes to the theoretical body of strategic communication a distributed bottom-up approach of strategic communication including self-organization under the principle of subsidiarity. We argue based on the principle of trust and the proven instabilities of rigid top-down controlling and surveilling system approaches we argue for the long-lasting success of an organization with quick adjustment at the bottom and a resilient communication system design based on decentralization and self-organization.

Decentralized strategic communication keeps complexity to a manageable level, it enables the usage of local knowledge and quick adaptation through self-organization. Thus, interaction rules and an indicator frame keep the body from losing itself into single parts. Moreover, each subunit can send emergency signals if interaction rules or the indicator module need adjustment as well as when risks occur endangering the entire corporation. If accidents occur, maybe even caused by the digitalization in form of network failures,

cyberattacks or unmanageable information complexities, strategic communication maintains operational thanks to the decentralized design and the self-organization. The design enables rapid adjustments on a local level on the bottom. Thus, it contains diversity to a certain degree that leaves room for innovation and solutions. It reduces top-down control to needed modifications in interaction rules and the indicator preset of systemized indicator. At the same time, decentralized strategic communication supports a constitutive and emerging approach of strategic communication that holds also for self-organizing intelligent systems of non-human actors.

The digital revolution creates possibilities like the introduced concept but challenges ethical behavior. The technology itself cannot be good or bad but the usage determines its impacts. Considering the introduced digital possibilities of tools and instruments with many more to come to surveil, manipulate and influence, strategic communication approaches a crossroad and has to decide how to position itself. Scholars have already developed several alternatives to the evident usage of digitalization as means of top-down surveillance and manipulation and introduced digital concept for digital assisted, self-organized strategic communication does not protect from misuse. Though, the decentralized design with a bottom-up focus and self-organization reduces the magnitude of harmful behavior. With the development of decentralized strategic communication, we emphasize the usage of digitals tools for sustainability and shared strategic communication. In addition to do that the planetary nervous system as blue print for this concept builds on a participative platform with the aim to solve global socio-economic problems. Further developments of decentralized strategic communication in a corporate nervous net potentially contribute to these traditions.

As implied we propose the usage of proven indicators, especially proven corporate reporting indicator from established guidelines like the GRI etc., within the predictive reporting indicator module to measure and compare financial and non-financial performance. Proven financial and non-financial indicators potentially guide the gathering of temporal smart data and their visualization of knowledgeable insights. As pointed out, the indicators for this conceptualization should contain the ability to change due to their process orientation towards evolving ideals to reduce complexity. We propose the usage

of these reporting indicator frameworks because they present the state of the art of corporate performance measurement in socio-economic realms. At the same time, the indicators need to remain open for adjustments as well as for insights from the self-learning AI.

Once decentralized strategic communication proves its promises it can serve as door opener for further thoughts. For example, it supports the theory of shared strategic communication by aligning organizational and corporate interests. It also enables the anonymous sharing of information and data with the global society and the planetary nervous system, whereby global insights always produce insights for corporations as well. Digitally assisted decentralized strategic communication potentially allows all stakeholders to participate in the emerging of strategic communication. Besides, it builds the infrastructure for further means of strategic communication like "preports" whereby a corporation discloses not only corporate performance based on past data but on real-time data with predictive insights.

5. Limitations and Future Research

This article is a conceptual starting point. The concept needs further research for its refinement, operationalization and technical application. Future research can use this article as starting point to explore ways of shared data ontologies and global open access data. With this article we hope to support research into a planetary nervous system as well as possible ways to solve global problems in dynamic socio-economic systems.

Chapter V

V. From Reporting to Preporting? - Predictive algorithms, artificial intelligence and their contribution for shared values in future oriented corporate communications

Manuscript in Preparation for Submission

Knebel, S., & Seele, P. From Reporting to Preporting? - Predictive algorithms, artificial intelligence and their contribution for shared values in future oriented corporate communications.

Abstract

In times where disruption is the new normal we conceptualize how the digital transformation affects corporations and their dealing with possible and likely futures. Thus, we conceptualize how artificial intelligence (AI) building on predictive algorithms transforms current corporate reporting practices. In line with AI pragmatics, we conceptualize preporting as augmentation of corporations' decision-making abilities. *Pre*porting introduces automated standardized *pre*ports on all available corporate data in real-time. *Pre*porting bases on *present* data using technological advancements with *predictive* capabilities exceeding and advancing currently used forward-looking disclosures. Instead of using digital advancements for power seizure, control or warfare we present with preporting an alternative to use the forces at play as driver for sustainability and shared values. At that a preport provides future risk indications to any present stakeholder with the aim to avoid corporate crisis escalations and calamities. It results in a tool to approach complex interconnected problems like climate change and human rights violations in supply chains that currently divides societies' and corporations' interests. In this article we frame preporting with the four laws of futures studies leading at our main contribution: the time ontological perspectives of how AI impacts on corporate communications' futures.

Keywords: Digitalization, Reporting, AI, Corporate Communications, Foresight

1. Introduction

Reports as used in financial or sustainability reporting of corporations are disclosed information based on past data. This is what the Latin root of ‘Re’ (meaning back’ and ‘porting’ (meaning carrying, bringing) indicates. We argue that with the same standardized data sets for reporting, - making use of predictive algorithms – a new category of foresight instrument may be created, which we propose to call ‘Preporting’ (Latin ‘pre’ meaning before’).

We elaborate preporting within the concept of shared strategic communication and at the center of tension between corporations’ and societal interests. We particularly focus on the tensions in times of an amplifying digital revolution. Thus, we try to explore how predictive algorithms effect corporate reporting.

The digital revolution affects all aspects of our lives. Information and Communication Technologies (ICTs) form the heart of the revolution, artificial intelligence (AI), the Internet of Things (IoT), and big data embody its driving forces. With preporting we introduce a concept aiming to use the forces at play to solve complex global problems instead of trying to control them for manipulation and oppression. Therefore, we elaborate preporting within shared strategic communication (SSC) (Author et al., 2016). SSC focuses on the alignment of social and organizational aspirations instead of treating them as opposites.

*Pre*porting introduces automated standardized *pre*ports on all available corporate data in real-time. It bases on *present* data using technological advancements with *predictive* capabilities exceeding and advancing currently used forward-looking disclosures. The technology enables standardization and automation of preports in real-time or as concise forecast reports, here labelled as *Pre*ports.

We argue that the concept of preporting can be seen in line with the two dimensions of shared strategic communication. In the first dimension preporting contributes to corporate-oriented communications through its abilities to create transparency, accuracy and the prevention of calamities increasing credibility and trust. Hence, preporting simultaneously contributes to the second dimension consisting of societal values essential for

organizations to be successful in the short and long run. The focus lies on the common interest of corporations and society instead of corporations' privileged interest against common interest. The perspective interprets corporations as societies' organs that perform major tasks for their mutual sustainable long lasting.

In line with futures studies we elaborate preporting as means to display alternative futures to corporations' stakeholders along the four laws of futures studies (Sardar, 2010). So we focus on the impact of preports on the present as tool to approach complex interconnected problems like, for example, climate change, global warming and human rights violations in supply chains. Further, preporting contributes to futures studies by exemplarily showing how the past stays always present while the past and the present combined create a future. Hence, automated real-time data based preports illustrate how alternative futures impact the present and why and how predictions remain futureless. In doing so data embodies time by forming time-ontological directions. Reports from past data, real-time data from the present and future data through predictive algorithms depict this embodiment.

2. Reporting at the crossroads and the potential of digital technology

2.1. The two-edged sword of digitalization and big data

Future studies aim to gather knowledge about futures along with its consequences for society and culture (Sardar, 2010). Nowadays, the digital revolution and its driving forces, AI, big data and the IoT, impact our knowledge about the future twofold. In the first place the revolution provides new means to generate knowledge about futures. In the second place and simultaneously the digital revolution impacts alternative futures as a key element. Especially one force, AI, occupies the minds of futurists while some of them argue that AI poses an existential threat to humanity by intellectually surpassing it or oppressing it. Others believe AI turns out to be the solution for complex global problems like the climate change. Next to the many negativists and the few optimists some pragmatists see in AI the potential to augment our own decision making abilities (Makridakis, 2017).

Meanwhile current accidents and developments inform us about the two-edged sword of the digitalization and AI. At least so far, our "usage" of AI signified its biggest dangers but not "yet" AI itself. Recent outbreaks of an ongoing information and cyberwar prove the offensive and violent usage of big data, the IoT and AI. The Cambridge Analytica Facebook cataclysm revealed how governments and their military develop information propaganda weapons in war regions like Afghanistan or Iraq based on AI that then find their way into democratic elections in the US and the UK. Such they undermine societal cohesion, democracy and obstruct a free or even peaceful AI evolution (Cadwalladr, 2019; Cadwalladr & Graham-Harrison, 2018). Further AI projects like the US army intelligence system built by Palantir (Cadwalladr, 2019; Cadwalladr & Graham-Harrison, 2018) or the military project, called "maven", based on Google's AI, prove military driven objectives in the evolution of AI (Wakabayashi & Shane, 2019). We argue that the military driven development of AI favors AI negativists' position. At the same time, we argue that the intrinsically danger with AI originates in ourselves and how we use the forces of the digital revolution but not in AI itself along the pragmatist view in the AI debate.

Therefore, with the conceptualization of preporting, we aim at a pragmatic AI usage that supports our decision-making abilities. The possibilities of using AI peacefully and to solve complex interconnected global societal and environmental problems turn out to be at least as vast as their usage to seizure power and make war. Digital democracy and E-democracy exemplify how transparency, accuracy and accountability can become normative foundations. Consequently, AI, big data and the IoT augment informed deliberate and public debate (Gastil & Richards, 2017; Helbing & Pournaras, 2015). Hence, we develop preporting in the canvas of shared strategic communication. SSC defines communication of organizations as stakeholder dialogue, in the public sphere that contributes to both the corporation and society. At that, credibility and trust underpin the corporate-oriented communication contributing to societal values essential for corporate success in the short and long run (Lock et al., 2016). Creating shared value implies benefits in economic terms for the corporation and in social terms for the society. So, preporting locates in corporate communication's reporting practices as the next paragraphs outlines.

2.2. Reporting, its digital transformation and the difficulties to measure futures

The digital revolution has not yet fully reached corporate reporting but potentially transforms it totally. Corporate reporting as a subfield of corporate communications involves the creation of a publicized annually corporate report. Such a report bases on data of the passed reporting period, usually covering the last year. While initially focusing merely on financial data, nowadays corporations disclose increasingly non-financial information in their reports. Growing responsibilities, globalization, digitalization, laws, regulation, scandals, public pressure, new theories, increased public interest and stakeholder expectations caused the rise of non-financial reporting (Robert G Eccles & Armbrester, 2011). Non-financial information includes business information in social, economic and environmental dimensions.

As a result, the essence of any form of reporting consists of data gathering, data connection and data processing in digestible pieces to communicate to any stakeholder. Tasks like the mentioned lie in the center of the digital transformation. AI and its abilities to gather, connect and process data automatically and autonomously increases the speed of processing, the amount of processed data as well as the depth of data insight. These abilities can augment corporate reporting's aim to maintain relationships to all stakeholders. This maintenance requires trust-building measures through transparency and disclosure of sustainability performance. Robust stakeholder relationships help to avoid escalations in crises situations and prevent crisis situations from happening (Shevchenko et al., 2016; Uysal, 2014). The forces of the digital revolution transform these core processes. While the digital transformation changes the data work of reporting it also augments and enriches knowledge about futures in reports.

In the current practices, if corporate reports communicate any risks, they include the communication of forward-looking statements (FLS), forward-looking narratives or forward-looking performance statements (FLPDs) as well as earnings forecasts. These statements allow investors to understand corporate managements' estimation in respect of the future financial performance (Athanasakou & Hussainey, 2014). However, no rules dictate how and which forward-looking information a company must provide (Bozanic et al., 2018). So they rely mainly on managements' hopes and feelings for the next year.

Meanwhile several studies prove the efficiency of predictive algorithms and their superiority to human prediction (Greengard, 2012; Hopkins et al., 2011; Kennedy et al., 2011).

Therefore, we argue for the potential AI can have in communications about the futures. Future studies reject the idea of one future that can be known. That is why in the conceptualization of preporting we consider the four laws of futures' studies to consider the latter aspect.

In doing so, we anticipate the interconnected, complex, and uncertain environment of corporate preporting. The complexity accrues through corporate communications' task to connect an organization as organ to its surrounding society while a vast number of variables influence their mutual developments.

Moreover, we anticipate the second law by developing preporting within shared strategic communication to involve all actors affected by the consequences of preporting. Preporting aims at connecting a corporation to its stakeholders through the communication of possible futures and their impacts on both the corporation and society.

Further, we anticipate the third law and do not interpret preporting as the only truth but a tool to augment decision making abilities as any current report about the past builds on past data preporting aims with its communication about possible futures to augment and complement decision-making. At the same time, like reports also preports cannot replace decision-making. Like reporting also preporting bases on risk indications, so it considers always the multiplicity of possible futures.

At last, we elaborate preporting in its impact on the present in alignment with the fourth law of future studies. Hence, we analyze preporting in its impact on the present by aiming at the knowledge creation of possible futures for the immediate allocation of resources in the present to prevent calamities and crises.

Recent crises caused by the SCL group (strategic communication laboratories) prove the close interconnection of strategic communication, futures studies and the digital revolution. The SCL group, Cambridge Analytica's parent company, developed information propaganda weapons for the wars in Iraq and Afghanistan as contractor of the US military. So the usage of sophisticated AI in combination with social media networks

like Facebook or Twitter enabled the targeted manipulation of individuals with the intention to shift mass opinion towards the favored direction. Within the last years these weapons found their way through Cambridge Analytica's subsidiary company into democratic elections campaigns in the US and the UK as well as into other strategic communication campaigns worldwide (Cadwalladr, 2019; Cadwalladr & Graham-Harrison, 2018). These practices use AI with predictive capabilities in a digitally transformed environment to force a certain future to happen. In doing so they disrespect the essence of futures studies and the preservation of futures multiplicities.

With this example we argue that the digital revolution potentially transforms corporate reporting to its roots due to the current antiquated form of communicating reports. Current corporate reports exist in written pieces of paper or in pdf format respectively as websites. The eXtended Business Reporting Language (XBRL) marks a first step into digitalization of this traditional communication form. XBRL weaves standardized tags of data points into reporting information empowering machines to read the reports (Author, 2016). Advancing this first step of digitalizing reporting we aim to envision how AI affects corporate reporting and which possibilities it contains. The integration and connecting of data play a major role in the process. Data seen as reflection of the interconnected complex and uncertain environment of a corporation enters further the realm of futures studies through AI and predictive algorithms which process this data.

Integrated reporting as a form of corporate reporting defines a merger of sustainability reporting and financial reporting into a single "narrative" (Churet & Eccles, 2014; Robert G Eccles et al., 2015). The connectivity of information composes the essence of integrated reporting (Robert G Eccles et al., 2015). The 10-k form mandated by the SEC and the GRI guidelines among many others enable guide and frame the process (Global Reporting Initiative, 2018; Security and Exchange Commission, 2014). Ideally, corporate reports contain also negative incidents and the measures taken to avoid them in the future. Thereby, corporations intend to prove all stakeholders including shareholders that they have taken all possible means for the long-lasting and legitimization of the corporation (Cheng et al., 2014). Thus, corporate communications provide the means to link and position an entity within society to prepare for uncertain futures (Zerfass & Huck, 2007).

With preporting we build on the current intentions to avoid making the same mistakes again and complement this approach with digital advancements to ideally prevent the mistakes with grave consequences in the first place.

Some scholars criticize corporate reporting in its current form of communicating to stakeholders. Part of the critique contains the antiquatedness of reports in times of a digital revolution shaking the foundations of the profession. Critics also state that corporate reporting cannot reach the audiences practitioners aim to reach because of its format (Crowther, 2016). Others state that especially the reporting of non-financial information serves mainly as a mean for greenwashing (Gerdien et al., 2013). Whereby greenwashing stands for pretending to perform better than one does. With the mentioned possibilities through AI and the witnessed mass opinion manipulation in the case of Cambridge Analytica the current issues of greenwashing reach new dimensions.

Another reason for these critiques lies within the difficulties to measure and communicate sustainability performance and existential risks in general. The overreliance on quantitative measures as well as the complexity of contextual measures explain the difficulties and challenges in the evolution of sustainability indicators (Macnamara, 2015). Practitioners rely mainly on those indicators to measure sustainability performance. Therefore, they debate heavily about the methods these indicators base on (Morse, 2004). Numbers contain ambiguity and quantitative probabilities cannot represent all aspects of the involved risks. At the same time, qualitative contextual methods lose themselves in incomparability. Thus, scientists aim to develop standardized and easy understandable instruments to communicate dangers and risks like the Torino scale of asteroid danger. The scale conveys a color coded scale based on the severity and the probability intervals of the risks (Turchin & Denkenberger, 2018).

The potentials of AI for reporting and the guiding principles of futures studies lead to the following research agenda.

Research Agenda:

We aim to analyze how predictive AI effects corporate reporting in its potential to prosper shared values in corporate communications. In order to do we conceptualize preporting

within ‘shared strategic communication’ considering the double-edged sword of the digitalization.

3. Developing Preporting within Corporate Communications

3.1. What we know about AI and linking it to corporate reporting data

Governments and their military, corporations and institutions have already deeply weaved AI into their functionalities. The police (Greengard, 2012; Lapowski, 2018; C McCue, 2006), intelligence agencies (Appelbaum et al., 2015) seismographs and meteorologists (G.-Y. Chen et al., 2015; Garzon et al., 2018), politicians (Dahlhaus et al., 2017) as well as sales (Fan et al., 2017) and marketing (Allenby, 2017) departments use AI on a daily basis.

Cambridge Analytica as part of the SCL group (strategic communication laboratories) and their work using AI for information warfare and manipulation to shift mass opinion showed impressively one side of using AI. Once these technologies prove their efficiency they find their ways into all sorts of applications, they can also influence the way corporations communicate to their stakeholders. With AI based strategic communication campaigns in social networks they can shift mass opinion in their intended direction. This way of digital transformation in a corporate reporting context would result in the opposite we aim for with the conceptualization of preporting. Instead of manipulation strategies based on AI endangering or cutting stakeholder relationships we aim for transparency, accuracy and accountability strategies including alternative futures fostering stakeholder relationships. Preporting in an SSC context contemplates the usage of AI with predictive algorithms to augment decision-making abilities through data-based knowledge about alternative futures.

From a scientific and technical perspective machine learning, pattern recognition, data mining and computer technology underpin predictive algorithms. Instead of using AI and predictive algorithms in warfare scientist have already analyzed the possibilities to use them for sustainability (Gijzen, 2013; Helbing, 2012). Predictive sustainability control, for example, explains how to translate the concept of predictive policing into the realm of

corporate sustainability management. Predictive sustainability control uses AI to improve corporate social responsibility (CSR). Within predictive sustainability control the used predictive algorithm provides risk probabilities and improvement possibilities in real-time (Author, 2017). The introduced concept of preporting builds on the outlined concept of predictive sustainability control.

Besides the militaristic application of AI with predictive capabilities, also its civil usage contains risks (Ridgeway, 2013). Experts who interpret output data and know how their AI works, interpret the results based on their knowledge, diminishing the quality of the prediction model. High expectations and convenience of predictions lead practitioners into another risk, if they presume the predictions as perfect. Predictions provide probabilities and estimations but no guarantied certainties even when performed by a machine. A further risk occurs when strategists fail to consider unintended consequences of predictions. Statements about the future that did not happen so far suffice for present changes for the good or bad (Ridgeway, 2013). Due to the varied possible applications of AI in all areas using big data, data mining, and prediction models the step to use it in corporate reporting remains small. Reporting presents nothing but the data processing of past data into digestible pieces displaying the corporate performance of the last year for strategic decisions in the present. AI automates the process and enables the usage of real-time data next to past data for preporting. The next paragraph explains this transition.

3.2. Prototyping: From Re-Porting to Pre-Porting

While current reporting practices rely on the tedious manual collection of all data from all areas of the organization preporting bases on the instant automated collection of all corporate data in one data repository. The data repository contains all the data the corporation produces. All communication between machines, all communication between humans and all communication between humans and machines as well as software produced meta data about all communication as well as all financial and non-financial data already collected for the existing reporting processes flow into the data repository. Advanced technologies also envisioned in Ambient Intelligence (AmI) (Wright, 2008) like sensors, actuators, VeChain, radio frequency identification (RFID) tags, amongst others

to come, increasingly produce the data flows usable for preporting. The infrastructure of preporting automatically collects data and consolidates all produced data of a corporation in real-time. A predictive algorithm trained for preporting scans permanently the growing data pool. The algorithm searches for patterns that pose a risk to the corporation and in doing so improves by learning. The computing clusters and summarizes the data considering location, time, and distribution in a periodically preport indicating risk potentials and their intervals. The customization of a preport depends on the target audience and the corporate needs. Preporting obtains its predictive capabilities from a predictive algorithm.

*Pre*porting introduces automated standardized *pre*ports on all available corporate data in real-time. *Pre*porting is based on *present* data using technological advancements with *predictive* capabilities exceeding and complementing currently used forward-looking statements in reports by the following five advancements. Firstly, in contrast to current future performance, disclosures preports base on big data and predictive algorithms. Thus, preporting complements and advances currently used managements' narrative opinions, beliefs and earnings forecasts with big data-based prediction models. Secondly, preporting encompasses all three sustainability dimensions societal, economic, and environmental additionally to the currently mainly financially focused forward-looking statements like quantitative earnings forecasts. Thirdly, preporting includes and connects automatically data-points in all available corporate data. Fourthly, preporting introduces a standardized and automated preport that allows for comparison, auditing, and transparency for all forward-looking information. At last preporting indicates risk potentials in a traffic light system, like the Toronto scale, using a framework similar to the 10-k form and the GRI indicator overview improving clarity and intelligibility. In highlighting the risks in such a structured and digestible way preporting enables the prevention of crisis escalation and calamities by triggering purposeful use of communications to engage in conversations with stakeholders before calamities happen. The next paragraph visualizes the process model of preporting.

3.3. Process-Model of Preporting expanding corporation's data-driven reporting

The concept of preporting is visualized as process-model in figure 1. It shows the data generation and its collection in a data repository. The data repository builds the data base for all corporate reporting and preporting processes. The automated collection process of the data enables real-time access. The data consists of sensorial data from technologies like VeChain and RFID next to already used financial and non-financial data and can be complemented by additional social media data supply chain data and production floor data. The real-time data enables the creation of either classical reports or the here introduced preports. For preporting a self-learning predictive algorithm steadily scans the data repository calculating the relative risk levels and produces continuously adopting prediction models. As a result, corporate reporting obtains next to integrated and XBRL interconnected reports preports that flag, in a traffic light system, corporate areas with risk potential. The traffic light system leans on the previously described Torino scale of asteroid danger to communicate the relative risk in a standardized and understandable way. The categorization of risk areas follows the framing of GRI and 10k formats. Based on the continuous data flow, preporting uses past and real-time (present) data.

The data repository in combination with a predictive algorithm multiplies the connection possibilities of information that scholars define as the essence of reporting. Additionally, the connectivity with the predictive algorithm reveals patterns invisible to any human eye. The preports in their intended form augment decision-making abilities. That being so, preporting aims at the prevention of calamities in the sense of shared strategic communication aligning corporate interests with societal interests for their mutual sustainable long-lasting. Preporting supports risk management, reputation protection and stakeholder relation functions. In addition, it enables stakeholders to engage into a constructive discourse not only in the aftermath of a crisis but beforehand. So it allows for additional transparency and accuracy through automatized real-time data based on communicable preports to any stakeholder. Any stakeholder provided with the preport can use it as basis for discussion and as support for arguments.

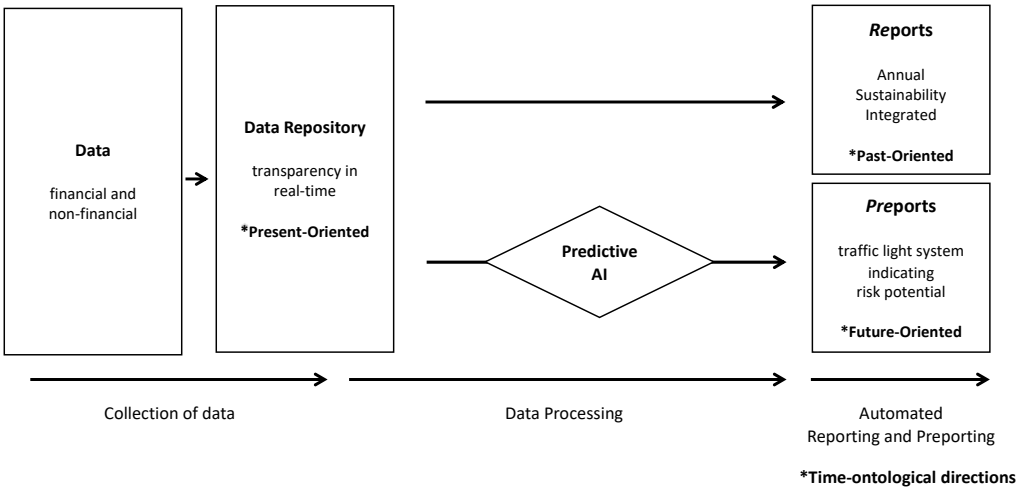

Figure V-1: The Concept of Preporting

As a result, preporting complements the time-ontology of corporate reporting. The data repository allows for real-time data access providing data for everyday communication. While reports provide data-based insights into past developments, preports complete the time-ontology with data-based, future-orientated corporate performance information. The next chapter elaborates the time-ontological perspective of preporting as its contribution to futures studies.

3.4. Time-ontological directions of preporting and their contribution for shared values in corporate communications

Future studies aim to gather knowledge about futures considering its consequences for society and culture. Preporting exemplifies how knowledge about futures creates shared value within a habitual tensed field between society and its corporations. Consequently, it aims at harmonizing interests between corporations and society through the disclosure of futures data to engage in dialogues to prevent calamities. Hence, it aims at fulfilling corporates main purpose by serving society's needs. Preporting aligns corporate and societal interests through its usage of advanced technology identifying future risk

potentials, which concern mutually corporations and societies. Through the inclusion of all available data preporting intrinsically considerers stakeholders in the creation process of each preport. With the aim to avoid harm preports provide a basis for the engagement in stakeholder communication. It sits within corporate communications and directly in the junction of an entities' and societies' interests.

Preporting crystalizes shared values between corporations and society not only through the inclusion of all available data but also by completing the data-based time-ontology of corporate reporting. Figure 3 illustrates preporting in from time-ontological perspective. At the center data and mediums are located. Data embodies the moving time represented by the dashed time bar. The black point on the dashed time bar represents the present "now". Below the time bar time membranes divide the data in past, present and future. While current reporting practices base on past data brought into the present through the communication of reports, the digital revolution allows for the gathering of real-time data. Real-time data stands for actual ongoing communication, as well as ongoing data gathering and processing. Therefore, real-time data embodies the present. Past data together with real-time data form data about the futures with the help of AI. Based on predictive algorithms AI processes past as well as present data to create knowledge about futures. This knowledge impacts the present through its communication by preports. Any preport augments the decision-making capabilities in the present. The arrows on the time bar visualize the embodiment of time through data and their combined impact on the present through both communication mediums, reports and preports.

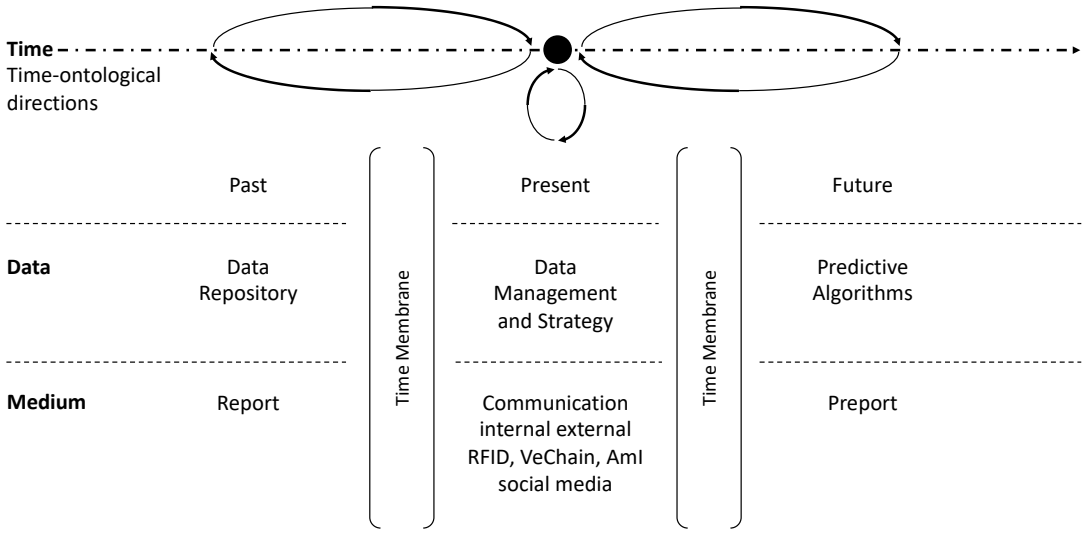

Figure V-2: Time-ontological directions of Preporting in Corporate Communications

After outlying the contribution of preporting to corporate communications, shared strategic communication and futures studies illustrated by figure 3, the next paragraph provides practical implications of preporting.

3.5. Practical implications: How to communicate pre-porting data

As soon as a preport indicates a risk, the decision maker can adjust the available resources to reduce the risk potential. Decision-makers can also use preports to target any stakeholder within the corporation or outside. Thus, preports underpin and augment strategy building and lead to strengthened, plausible and deliberate arguments in discourses within the public sphere. Further, corporations can disclose whole preports next to reports or even 'time-ontological integrated reports' by releasing one document including all described time horizons with all sustainability dimensions and the colored future risk indications. In the course of this, a corporation increases trust as well as

reliability through increased transparency and accuracy. Additionally, corporations receive with preporting further possibilities to engage in stakeholder dialogues.

The following examples illustrate the possible operationalization of preporting in corporations. For example, a preport communicates to decision makers the risk of greenhouse gas emissions exceeding the target frame as "likely to happen". Then the decision-maker can allocate resources to prevent it from happening. The corporation communication department can even disclose the risk and the allocated resources set to prevent the rise of emissions. Such a disclosure increases trust in the communicated information and enables stakeholders to engage in discursive communication strengthening the stakeholder relationships. The next example shows the possibilities within preporting to increase the quality of communication. Further it provides insides of how the disclosure of preports can lead to the prevention of calamities. The chosen example sits in the supply chain and its labor conditions. When a preport indicates a probable factory incident within the supply chain of a corporation in a defined country, the disclosure of such information to locally involved parties can trigger investigations into the danger with a hope to prevent it from happening.

The range of possible usage exceeds by far the mentioned two examples. The outlined examples lead to the discussion and summary of the conceptualization of preporting and its contribution to futures studies.

4. Discussion and Conclusion

Preporting cannot evade the double-edged sword of the digitalization. Any organization implementing preporting can use the set-up for misconduct in various forms but since the digital revolution enters all realms, also corporate communications, the described concept of preporting provides a possible alternative to use the forces at play. Opposed to the usage of AI approached by the Strategic Communication Laboratory, the intentions behind preporting favor the usage of AI with predictive capabilities for transparency, accuracy and accountability. Thus, preporting aims at preparing societies and their corporations for the things to come and their mutual long lasting. Thereby preporting sits at the center and

point of tension between society and its organs, which includes the here described corporations. In doing so preporting complements current attempts to improve and strengthen stakeholder relationships. Hence, it aims at harmonizing interests between corporations and society through the disclosure of information about alternative futures. AI planted in corporate data generates this knowledge about futures. In doing so it enables the engagement in dialogues in the present and ideally prevents calamities in the sense of SSC. So preporting uses AI in a way to preserve the multiplicity of possible futures. In doing so this approach opposes the usage of AI exemplified in the Cambridge Analytica case in which strategic communication actions based on AI with predictive capabilities intend to enforce one certain future by oppressing alternative futures.

The concept of preporting aligns with AI pragmatics that evaluate AI as augmenting function for decision-making. With preporting we develop a further argument of how AI fulfills augmenting functions without eradicating human decision-making. However, at the same time, we highlight the risks of overreliance on created knowledge about futures as well as the misinterpretation of preports. Thus, the concept contributes to the theory of futures studies with the following insights. It depicts how the digitalization transforms corporate communications' futures. Further, it elaborates how the knowledge about corporate futures affects corporate reporting and its stakeholders. Additionally, it illustrates futures studies in the embodiment of time through corporate data processed by AI with predictive algorithms and its impact on the present.

So far, we described the positive aspects of preporting but next to the described avoidable risks for decision-makers like overreliance and misinterpretation of preports, another not yet mentioned risk exists. This risk concerns the time-ontological reflections or feedbacks that help the corporation to self-correct and stabilize itself but might also backfire with unintended consequences. For example, a disclosed preport could destroy a corporation causing a lot more harm than it prevented. The risk stems from the psychological research field of self-fulfilling prophecies. That being so, a preport could cause something to happen by its disclosure that otherwise would not have happened. Hence, preports could intensify and increase panicky measures that do not lead to balance or self-correction but

self-destruction. However, we argue that as long as the healthy skepticism about and within futures studies remains, decision-makers augmented by AI can circumvent this risk. Looking at current developments, we argue that the biggest risks of AI originate in its creators. Therefore, the system behind preporting certainly allures for misconduct. The means to do so remain vast as the Cambridge Analytica case reveals. For example, practitioners can misuse the system with its intelligence to intensify subtle, insidious, and non-transparent persuasion tactics and they can likewise misuse it for coercion and propaganda. Moreover, experts can easily tweak the system looking down the data stream and use it as an overarching surveillance machinery as the creations of Palantir demonstrate but corporations can choose the manner handling the concept of preporting. Their choice, their feeling for responsibility and their interest in the long lasting of the society they operate in, decides if preporting becomes a tool to tackle challenges of digitalization and align corporate and societal interests or if preporting becomes a tool that amplifies distrust and manipulation.

5. Limitations and Future Research

The described concept of preporting forms a prototype and basis for further research. It needs further elaborations before reaching a sufficient level ready for implementation. Further research has to overcome technical hurdles for the variety of data flows. Laws and regulation have to grow with the demands of preporting concerning data security, misconduct, obligations and responsibilities. In addition, the ignoring of indicated risks in preports demands a clear legal statement. Though, the fast progress of the digital revolution and technological possibilities indicate the high probability of its arrival in corporate communication. Future research can elaborate how to transfer and implement preporting in different forms of organization like governments, municipalities or NGOs – or alternatively different levels and departments within organizations making use of preporting.

Chapter VI

VI. Organization under Siege - Advancing CCO theory by Agamben's 'State of Exception' exemplified by cyberattacks and ransomware

Manuscript revised and resubmitted

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Abstract

This article outlines how destructive communication along the example of the cyberattack WannaCry devastates the process of organization, causes a "state of exception" – and thus constitutes organization. In order to do so, we rely on Agamben's state of exception and translate it into the theory of Communication Constituting Organization (CCO). As a significant increase of cyberattacks impacting businesses in recent times lays organization under siege, we expand thoughts about a digital "corporate immune system" to question current offensive cyber strategies of deterrence and promote cyber strategies towards resilience. Our theory advancement supports arguments to overcome the ordering bias in CCO theory by contributing 'a liminal state of indifference neither inside nor outside the process of organization'. In addition, the article explains where disruptions like cyberattacks may trigger sensemaking and change – and thus preserve stability. Finally, a novel definition of 'destructive CCO' is provided.

Keywords: Cybercrimes, CCO, State of Exception, WannaCry, Disruption, Backhacking

1. Introduction

"Communication is as much about the destruction and transformation of meanings as it is about their construction" (Cooren et al., 2011, p. 1160). Following this line, we aim to introduce a destructive and disruptive force into communication constituting organization (CCO) theory by analyzing cyberattacks and their impacts on corporations. In doing so, we pick up Bisel's (2009) question if talk can also disorganize when it can organize (Bisel, 2009) and aim to answer it by one of the greatest possible forms of disorganizing: cyberattacks. In doing so, we follow the properties of communication that can disconnect and connect, disassemble and assemble whereby the differentiation of what constitutes order or disorder blurs (Putnam & Nicotera, 2009b, p. 3). We locate our conceptualization right at that junction of seemingly incommensurate perspectives by asking the following research question: *How does destructive communication, like the ransomware computer virus WannaCry, constitute organization?*

CCO defines communication as the process of organizing (Boivin et al., 2017; Brummans et al., 2014; Putnam & McPhee, 2009; Schoeneborn et al., 2014) and we aim to show how that includes destructive communication using the WannaCry cyberattack as illustrative example. In doing so we follow the insights of Weick et al. (2005) who define interruptions in the process of organization as emotional triggers for sense-making (Weick et al., 2005).Cyberattacks globally rise to the number one risk of enterprises and corporations, disrupting business activities (dpa, 2020; Kaspersky, 2018a; Lavorgna, 2020; Obama, 2013). Today IT security experts ask themselves not anymore *if* a cyberattack hits their systems but *when* (Lavorgna, 2020).

We contribute to CCO theory the inclusion of destructive communication constituting organization relying on Agamben's theory of a "state of exception" (Agamben, 2005) to explain the state when order and disorder, constructive and destructive communication blurs. With this approach we aim to contribute to the closing of a knowledge gap in CCO theory. With the inclusion of destructive communication that constitutes into existing theory we aim to help overcoming the ordering bias, as well as issues caused by the duality of constructive and destructive communication. In order to do so, we depict, along the

ransomware cyberattack WannaCry, how destructive and constructive communication blur in a state of exception once a cyberattack hits a corporation. Further, we explain how the resulting *permanent* state of exception, translated into the realm of cybercrimes, illustrates how destructive and constructive communication constitute mutually organization. Our insights lead to managerial implications in which we question currently favorized offensive cybersecurity strategies of deterrence and deliver supporting arguments for cybersecurity strategies of resilience and adaptation. In our conceptualization we build on existing thoughts about digital "corporate immune systems". We chose the global, pandemic like, WannaCry cyberattack as illustrative example due to the secrecy of the matter and unavailability of key players like criminal hackers, secret services and (most) corporations affected. The involvement of corporate cyber vulnerabilities potentially resulting in reputation damages and the global governmental arms race in cyberspace of secret agencies and military operations cause the secrecy of the matter.

The paper is structured in two parts. The first part depicts how cyberattacks like WannaCry destruct and disrupt the process of organization and explains Agamben's state of exception. The second part introduces destructive communication constituting organization as theoretical contribution, concluding in a discussion, limitations and potential future research.

2. Cyberattacks destruct organization through communication

2.1. How WannaCry destroyed organization from a CCO perspective

The WannaCry ransomware attack affected more than 230'000 computers in 150 countries. Cyber experts estimate the total number of victims in the millions and the accrued damage in the billions of dollar (Frenkel, 2017; Greenberg, 2018; Kaspersky, 2018b; Lavorgna, 2020). In our times of the digital revolution everything connects to everything forming a connected world of objects, devices and people. The resulting concept of an Internet of Things (IoT) facilitates the communication between people and the objects themselves where all types of devices and objects can talk to each other,

exchange data and stay continuously connected to the internet (Appelbaum et al., 2015; Lavorgna, 2020). This way, the digitalization builds a parallel mirrored universe based on data called cyberspace, which influences heavily the analogue world (Bernik, 2014). The increased global connectivity and interconnectivity of systems results in a critical dependency on information and communication technology (ICT) infrastructure (Bernik, 2014; Embar-Seddon, 2002). The underlying connected global networks produce critical interdependent and uncontrollable systems (Helbing, 2015b). These systems expose vulnerabilities to failure and cybercrimes (Helbing, 2015b; Lavorgna, 2020).

When the WannaCry cyberattack spread globally through all digital interconnected systems it spread like a biological virus in a global epidemic affecting thousands of machines operating with certain Windows versions (Frenkel, 2017). As example, once the virus hit the Spanish electricity utility firm Iberdola, their IT experts tried unsuccessfully to disconnect their systems from the internet as precautionary measure (Ghosh & Ashok, 2017) because even experts cannot control or oversee all possible interconnections. Another example also proves these difficulties. When WannaCry affected Brazil's social security systems, it forced them to shut down and disconnect all computers resulting in the cancelling of public access to the agency disrupting their business (Ghosh & Ashok, 2017).

In order to approach the WannaCry attack from the theoretical background we chose CCO theory and more specifically, the Montreal School. CCO theory increasingly establishes itself in organizational communication and management communication (Boivin et al., 2017). The Montreal School presents one of three major CCO schools. Its siblings present the four flows (McPhee, 2015; McPhee & Iverson, 2009; McPhee & Zaug, 2000, 2010) and the Luhmannian perspective (Schoeneborn, 2011). Organization thought of as the verb "organizing" unites the different schools and factettes of CCO (Bisel, 2009; Blaschke et al., 2012; Putnam et al., 2016). And therefore, CCO describes organization as processual entities, as ongoing and interconnected communicative processes (Kuhn & Schoeneborn, 2015; Schoeneborn et al., 2018). CCO delivers rather a central grounding question concerning the role of communication in the ontology of an organization than a clear answer to it (Putnam & Nicotera, 2009a, 2009b). The Montreal School theorizes

organizing by communication in two dimensions, text and conversation (Ashcraft et al., 2009; François Cooren & Fairhurst, 2009; Putnam & McPhee, 2009; Schoeneborn et al., 2014; Taylor & Van Every, 2000). The textual dimension bears constant communication forming the recurring coherent "surface" of organization, like earth crust. The conversational dimension stands for the dynamic "site" which constantly generates and regenerates organization like a fluid nucleus. In doing so, conversation and text form a self-organizing loop (Ashcraft et al., 2009; Cooren et al., 2011; Schoeneborn, 2011; Taylor & Van Every, 2000). We use the term organization throughout the paper as a perpetual state of change or becoming focusing on the organizing process (Putnam & Nicotera, 2009b). In using the extreme case of a global cryptoviral cyberattack we follow the tradition of using extreme phenomena to exemplify how organizing perpetuates (Kuhn & Schoeneborn, 2015; Schoeneborn & Sandhu, 2013; Schoeneborn & Scherer, 2012).

Cyberattacks depict communication that potentially disrupts communication. Experts in the field call cyber-attackers "malware authors" who write "text", written to code, in "machine readable languages" using hardware, firmware and software to attack organization (Hutchins et al., 2011; Primiero et al., 2019). For this paper we follow the definition of malware as software compromising digital systems (Kim et al., 2011).

The question of how disruptive and destructive communication in form of a cyberattack constitutes organization, considering CCO theory, describes a knowledge gap we aim to approach in this paper. The currently predominant academic tendency in the theoretical body of CCO defines the process of organization in communication as the creation of order out of potential disorder, resulting in a recognized ordering bias and a superiority of order over disorder (Bisel, 2009, 2010; Cooren et al., 2011; Vásquez et al., 2015). Bisel (2010) suggests to test the boundaries of communication's constitutive force in order to bring the theory further (Bisel, 2010). Others explain the relevance of looking at extreme examples to understand how organization perpetuates against all odds, as well as to understand how organization makes sure of the next communicative event perpetuating organization (Schoeneborn & Sandhu, 2013).

In the realm of cyberattacks and cryptovirology, a crypto-ransomware like WannaCry targets businesses and governmental institutions globally, installing itself on connected

machines. Analysts classified WannaCry as a ransomware crypto-worm because it encrypts all data on infected systems and spreads once launched through all interconnected systems autonomously. The piece of code, "text", representing WannaCry, reproduced and installed itself searching continuously for connected systems to spread, respectively copy paste itself. So for example at Renault, the French automobile giant, the code created chaos and forced the halt of all production lines in France and Slovenia in an attempt to stop the virus from spreading further within their systems (Ghosh & Ashok, 2017). In a recent cyberattack based on ransomware, the Spanish security firm Prosegure had to send home all employees once the virus hit the corporate systems (Westernhagen, 2019) with unknown consequences disrupting their process of organization.

Ransomware describes a form of malware; its history reaches back to the 80's. When ransomware infects a system, the situation shows similarities to taking a hostage. By threatening not to release the hostage the blackmailer extorts money in form of untraceable cryptocurrency. Data presents the hostage in the case of ransomware. Encrypting ransomware prevents the victim to access data. Cybercrime experts observe the rise of ransomware becoming the biggest cybercrime problem (Kaspersky, 2018b; Lavorgna, 2020). The news coined the expression ransomware. Experts initially called such a form of malware "cryptoviral extortion attack" (Young & Yung, 2017). For this paper we use the better-known expression *ransomware*.

The significant dark number of ransomware attacks thwart the assessments of costs, impacts and damages. Many companies prefer to investigate incidents themselves and tend to underreport and keep quiet in fear of reputational damages or further attacks on their exposed vulnerabilities. Non-transparency and secrecy of the topic led to our decision to use WannaCry as illustrative case relying on accessible information mainly from news articles and investigative journalism. Further, only big cases like WannaCry reach the news but experts see the biggest damages in small and medium-sized businesses and governmental infra-structure like hospitals, universities and cities that cannot keep up with the fast advancing technologies and security standards. Most ransomware attacks remain unknown and cannot reach the news. At the same time, Young and Young (2017) identify the news about big cases like WannaCry as accelerator for ransomware attacks by

reporting on their 'success' stories (Young & Yung, 2017). Underreporting and cybersecurity firms' interest to exaggerate, challenge further the studies and the assessments of ransomware impacts. Still, experts agree on a steady increase of ransomware attacks (Bernik, 2014; Choo, 2011; Dewar, 2014; Lavorgna, 2020; Tsegaye & Flowerday, 2014). Recent estimates, to be treated carefully, range at damages at 470 billion dollars annually, which equals 0.8 % of the global GDP (CSIS & McAfee, 2018; Lavorgna, 2020). Also, the assessment of actual impacts remains challenging because they consist of many variables like data loss, system downtime, security solutions, emotional and physical costs. WannaCry, for example, affected heavily the British National Health System which suffered a massive outage and caused the delay of surgeries and X-rays, as well as the loss of patients' data with unknown consequences (Ghosh & Ashok, 2017; Haddad, 2017).

Luhmann (2000) holds that without communication organization seizes to exist (Luhmann, 2000). Weick (1995) agrees that "the communication activity is the organization" (Weick, 1995, p. 75). Taylor adds to it by stating that the presence of communication produces organization (Taylor, 2009). So, CCO focuses on communicative processes and elements that produce the process of organization (Putnam & Nicotera, 2009b). In the further course of this paper we aim to show how machine communication in written code of WannaCry caused the interruptions of communications in businesses and created states of emergencies. And we aim to show how, in that moment, organization seizes to exist but potentially revives whereby the destructive communication of a cyberattack constitutes organization without contradicting current CCO theory. In order to do so, we apply Agamben's state of exception, introduced in the next chapter, to CCO theory. Hence, we also deliver arguments for the materiality debate, in which Cooren (2018) suggests to understand existence and constitution as a matter of degree (François Cooren, 2018), countering Reed who criticizes the whole theoretical body of CCO for minimizing the importance of material constraint in organizing (Reed, 2009). Moreover, we will get back to Bisel who argues that organization needs communication but communication is not sufficient for the emergence of communication (Bisel, 2010).

Not all businesses survive a cyberattack, as recently happened in Switzerland, where a business called Swisswindows had to close down after a ransomware attack and dismiss its 170 workers. The ransomware infected all machines and caused delivery delays, financial penalties and the cancelling of big orders by customers, which made a recovery financially impossible even though the blackmailers set the ransom low (Latzer, 2020). Organization as constantly progressing construct needs continuous establishment and re-establishment in communicative events (Schoeneborn et al., 2014). Its perpetuation remains constantly at risk and requires communication to survive (Blaschke et al., 2012; Schoeneborn et al., 2018). Following this stream of theory reveals the volatile character of organization and depicts organization as interlocking network of communication processes (Accard, 2018; Blaschke et al., 2012; François Cooren & Fairhurst, 2009; Weick & Sutcliffe, 2011). A cyberattack interrupts the process of organization and does not destroy organization in most cases but changes it. We argue that cyberattacks contain the ability to stabilize organization on the long run through its triggering of change. Thus, we follow existing research which proves how change preserves stability (Accard, 2018; François Cooren & Fairhurst, 2009; Farjoun, 2010; Hussenot & Missonier, 2015). The CCO perspective underlines this research since ever-changing communication processes constitute organization (Ford & Ford, 1995; Taylor & Van Every, 2000). Further, Tsoukas and Chia (2002) define organization as ongoing process of change (Tsoukas & Chia, 2002). Similar to the deep involvement of change in stability, whereby change and stability build the two sides of the same coin, we aim to show that destructive and constructive communication build the two sides of the same coin in the constitution of organization (Tsoukas & Dooley, 2011).

A bulk of cybersecurity research focused on the prevention of cybercrime, similar to the strong focus on crisis prevention in crisis management (Lin et al., 2006; Weick & Sutcliffe, 2011). Current security strategies and governmental attempts to control cybercrimes follow these streams aiming to prevent cybercrimes but fail. Deterrence presents the main strategy of choice whereby the increased perceived costs and consequences for attackers should prevent cyberattacks. Although recent studies agree that deterrence does not work in cyberspace because of the high financial rewards of cybercrime and the possibilities to

just copy paste the most devastating cyberweapons. Any amateur can use severe weapons as ransomware and the WannaCry attack illustrate. The deterrence strategies result in an arms race, producing increasing forceful weapons. Insiders can steal easily these weapons so they spread easily around the globe within seconds due to the connectedness of everything. So cyber weapons contain contrary features than nuclear weapons in the analogue world (Appelbaum et al., 2015; Eilstrup-Sangiovanni, 2018; Libicki, 2009; Paletta et al., 2015). Therefore, unsurprisingly, cybersecurity experts recognize a weaponization in cyberspace making prevention strategies increasingly impossible, especially for SMEs and underfinanced governmental infra-structure (Kaspersky, 2018a; Lavorgna, 2020). Law enforcement reveals difficulties to deal with cybercrimes. The reasons lie in the resistance to change and inertia, as well as in a lack of resources to handle cybercrimes. Additionally, overwhelmed police forces get into the "minimis trap" as Wall (2007) coined it, whereby many cybercrimes lead to low-impact victimizations, which cause large aggregated global losses because police strategies do not prioritize them (Lavorgna, 2020; Wall & Williams, 2007). These shortcomings meet the enormous financial benefits of cybercrime, the difficulties to attribute them and the possibility to attack everything from everywhere (Bernik, 2014).

These developments result in an inability of security to keep pace with the growth of connectivity (Embar-Seddon, 2002; Kruse et al., 2017; Lavorgna, 2020). Consequently, recent studies concerning stability in organization, cybersecurity and resilience choose a different approach (Boin et al., 2010; Dewar, 2014; Weick & Sutcliffe, 2011; Zobel & Khansa, 2012). They focus on how to survive sudden shocks (Boin et al., 2010), how to prepare for the unexpected (Weick & Sutcliffe, 2011), interpret organization as in permanent on-the-edge-of-chaos situations (Accard, 2018) and promote a tolerance to mistakes (Helbing, 2015b). Cyberattacks produce disorder and chaotic situations as a ransomware attack on the US city of Baltimore exemplifies. The ransomware attack laid the city under siege. The virus infected all 10'000 computers of the public administration as well as the phone and email systems. The ransomware disrupted the communication of the public administration entirely. Tax data, bills, the real estate business, social security information remained inaccessible. The site and surface of the process of organization

seized to exist in Baltimore's public administration. Emergency measures enabled the recovery of the most important emergency phone lines but the city stayed in a permanent state of exception (Beuth, 2019; Perlroth & Shane, 2019).

In connection to the promotion of resilience as reaction to the steady increase of cyberattacks researchers come up with innovative concepts to approach the situation. The similarities of the IoT, crypto-viruses and a heavily connected global digital sphere to human biological bodies led to the conceptualization of a digital "corporate immune system" (Harmer et al., 2002; Helbing, 2015a). Even though our biological immune systems defend against a bombardment of attacks from viruses, bacteria, and other harmful agents daily, they remain successful most of the time and keep the body alive. Translated into cyberspace a digital immune system of a corporation consists of a decentralized structure which keeps the process of organization ongoing even though parts suffer disruptions. Further, such systems learn with any attack or virus for further attacks and create abilities to minimize their damaging impacts. In doing so they adopt to their environment, trigger and shape change, and consequently create stability within a rhythm of order and disorder depending on the severity of attacks. Such a system incorporates resilience strategies which supposedly base on learning, information sharing, fast communication, and adaptation (Weick & Sutcliffe, 2011; Wilding, 2016). In a culture of resilience "failure" emerges from a malfunction to the result of adaptations necessary to cope with complexities and changing environments (Hollnagel et al., 2006). As Vasquez et al. (2015) put it, an organization's continuity and survival necessitate order and disorder alike. When the process of organization becomes too ordered it dies and when the process of organization becomes too chaotic it collapses (Vásquez et al., 2015). Therefore, we argue that cyberattacks potentially strengthen corporations on the long run and prevention strategies disable learning opportunities for digital corporate immune systems.

2.2. Organization in Agamben's état de siège through cyberattacks

A computer virus, such as a ransomware cyberattack, has similarities with historical events regarding impact: In the French revolution a decree from 1789 distinguishes a "state of peace" from a "state of siege". In such a state of siege, generally proclaimed when an army besieged a city, all functions for maintaining order, usually in the hands of the civilian authorities, passed to the military commander. Agamben (2005) built his theory about a state of exception on this historical phenomenon (Agamben, 2005; Humphreys, 2006) also discussing the controversial work of Carl Schmitt and his 'political theology' (Schmitt, 2005, original 1922). In the following, we depict the similarities between the state of siege in the French revolution and the situation in cities hit by crypto-ransomware attacks today. Cities as victim of ransomware attacks hit the news frequently, famous examples present the cities of Atlanta, Baltimore, Riviera Beach, New Bedford, Lake City or Neustadt in Germany (Beuth, 2019; Newman, 2018; Perlroth & Shane, 2019; Robles, 2019; Spencer, 2019; Wiegand, 2019; Wölbert, 2020). Cities provide an easy target because they possess old and underfinanced ICT infrastructures and rely on outdated computer systems. Further, they generate tax money as constant income and possess a lot of valuable data of public interest. So many ransomware attacks focus on cities' public administration. The FBI next to all other law enforcement authorities strongly advice victims not to pay the ransom in order to reduce potential financial benefits for cyberattackers. Atlanta followed the advice but paid a high price for doing so. In order to handle the emergency situation the city paid 2.6 million dollars. The ransomware attackers demanded barely a ransom of 50,000 dollar worth of bitcoin, a cryptocurrency. The 2.6 million dollars represent the accrued costs of emergency measures for IT consultants, digital forensics, and emergency systems. The rebuilt of the needed new ICT infra structure costs even more. Therefore, experts estimate high dark numbers of cases in which the victims pay the ransom because of the high recovery costs and because the attackers price their ransom at an affordable level (Newman, 2018). In the German city Neustadt, after an employee clicked a link on a phishing email, a ransomware encrypted all data including book keeping data of taxes, marriages, birth certificates, real estate, and addresses of debtors. At the same time, the attack disabled the billing system, and encrypted some parts of the backups. As immediate reaction, the mayor and his IT head asked all employees to shut down their computers and

to go home, froze all bank accounts and warned via external phone lines contract partners not to open any emails stemming from the city's administration. After contacting the German authorities responsible for such cases (BSI), the mayor and his IT head shut down all their systems to enable a guaranteed virus free buildup of a new ICT infra structure. The IT head gathered 30 IT experts to rebuild all systems on new servers and networks. Also, they set up the 300 computers from all offices. After one week, the administration resumed slowly their process of organization. The IT experts could recover some of the lost data from backups and partners, employees created some data new, like the plans for a development area, some data remained lost. The rebuilt included new policies, procedures and other security measures including regular system stress tests as well as weekly backup drives in a bank vault (Wölbert, 2020).

"Are we under siege?" asked Embar-Seddon referring to cyberattacks already in 2002 (Embar-Seddon, 2002). The examples of German and US cities' administration underline this impression. Ransomware creates states of exception. In Agamben's theory a state of exception describes the power to suspend the law. The power to suspend the law comes from the same source that produces it, because only law could declare the state of siege (Agamben, 2005). Further, in a state of siege all the functions entrusted to the civil authority to maintain order pass to the military commander. Therefore, it describes a delegation of legislative power to the executive (Agamben, 2005; Reinach, 1885). In doing so, the state of exception creates a threshold neither intern nor extern to the juridical order, a zone of indifference, where inside and outside do not exclude each other but blur with one another (Agamben, 2005; Humphreys, 2006). Hence, the state of exception describes an anomie within the juridical order without being contradictorily.

Following Agamben's theory a state of exception usually cannot appear and afterwards entirely disappear but proceeds into a *permanent* state of exception. The permanence describes a mechanism of how rule and exception, law and anomy intertwine and mutually constitute (Agamben, 2005; Huber & Scheytt, 2013). So Agamben warns of emergency regimes rising out of state of exceptions through their evolving permanence, including powershifts. Further, he sees the danger of permanent states of exceptions undermining democracy and uses examples of permanent states of exceptions from the Nazi regime to

the Bush administration and the active *permanent* state of exception, the US government still works on, which followed the 9/11 attacks (Agamben, 2005). We advance CCO theory in the next chapter using a permanent state of exception to understand how destructive and constructive communication constitute organization.

More than 29 countries possess military or intelligence units specifically dedicated to offensive cyber operations, and more than 60 countries are developing cyber-weapons flooding cyberspace (Paletta et al., 2015). The core of the malware used in the WannaCry attack originated in the NSA. The core describes a zero-exploit in Windows called eternal blue. The NSA used it in their operations for more than five years, until a group, called shadow-brokers, stole it and made it available for anyone to download in the internet (Beuth, 2019; Lavorgna, 2020; Perlroth & Shane, 2019). Further, new business models like ransomware as a service (RaaS) occur, opening the doors of serious cybercrimes to offenders with little technical capabilities (Lavorgna, 2020). The global arms-race together with the financial benefits of cyberattacks by criminals led experts to the prediction of a massive rising number of cyberattacks in the near future and similar cases like WannaCry putting organization under siege (Bernik, 2014; Choo, 2011; Dewar, 2014; Kaspersky, 2018a; Lavorgna, 2020; Tsegaye & Flowerday, 2014). We use the example of the cyberattack WannaCry as destructive communication and ask the following research question.

Research Question: *How does destructive communication, like the ransomware computer virus WannaCry, constitute organization?*

3. Theorizing Cyberattacks as Communication Constituting Organization

3.1. Destructive communication constituting organization in 'state of exceptions'

CCO theory describes organization as process and aims to understand the role of communication in the ontology of an organization. In the following, we contribute to CCO theory destructive communication constituting organization to advance CCO theory by including all forms of communication, destructive and constructive alike. Figure 1 summarizes this theoretical advancement of CCO theory outlined in this chapter.

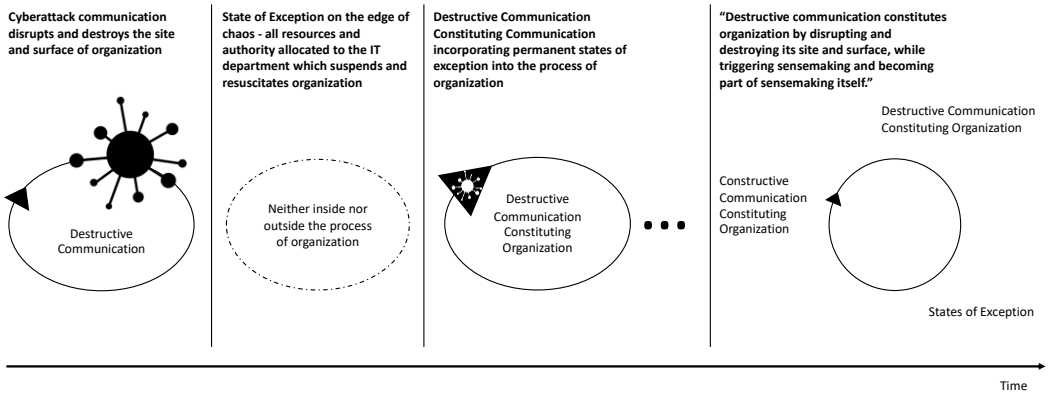

Figure VI-1: Ransomware cyberattacks as disruptive, destructive and disordering communication constituting organization in the sense of CCO

Cyberattack communication disrupts, destroys, destabilizes and changes the "site" and "surface" of organization. From a CCO perspective and the Montreal School, the written code from a malware author of a cyberattack destroys text and disrupts conversation. Text as the coherent "surface" of organization stores mostly on ICT-infrastructure, which cyberattacks destroy or encrypt. And cyberattacks disrupt conversation the "site" of

organization performed mostly through ICT-infrastructure. Text stabilizes organization, though the destruction and encryption of text destabilizes organization.

This first disruptive shock caused by a crypto-virus leads to a state of exception of the process of organization and reveals the fragility and vulnerability of organization. Organization needs continuous establishment and re-establishment in communicative events. However, cyberattacks respectively destructive communication breaks the perpetuation. Thus, in the case of WannaCry, a crypto-virus disables the backbone of the process of organization in form of the ICT-infrastructure. Even if the infrastructure survives the first attack the following security measures to isolate and analyze the virus cause a halt of the perpetuation. So far, CCO theory struggles to explain how in such an extreme situation, without communication, organization still exists, as well as how the destructive form of communication in a cyberattack constitutes organization.

Explained with Agamben's state of exception: Similar to a state of siege where all power shifts to the military commander, all communication constituting organization passes to the IT head after the first shock of a cyberattack. By that, in order to isolate the attack, the IT head halts the process of organization, as the example from Neustadt in Germany illustrates, where he sent all employees home and asked them not to use any ICTs (Wölbert, 2020). A 'state of exception' occurs. As Agamben defines the state of exception, the power to suspend the law, comes from the same source that produces it. In the presented example of Neustadt, organizing under the extreme influence of the cyberattack halts itself in order to survive respectively to get rid of the virus. In other words, in the realms of cyberattacks and CCO theory, a state of exception describes the power to suspend the process of organization, which similarly sources in organization itself.

Within a state of exception communicative events seize to exist and the process of organization halts, but does not die. Using Agamben's theory and translating it into CCO, the state of exception builds a liminal zone of indifference neither inside nor outside the process of organization.

The state of exception describes the state when the process of organization halts because of cyberattack communication and IT heads who shut down the ICT infrastructure and

send all employees home. In this phase forensics analyze the attack, freeze organization to prevent the further spreading of the virus and try to find ways to get rid of it.

Under those circumstances the state describes an anomie within CCO theory without being contradictory. It underlines the acknowledged ambivalence of communication and its potential to order and disorder alike. It answers the question if communication can simultaneously disorganize and organize as we will outline in the following.

A state of exception after the first shock of a cyberattack like WannaCry underlines and crystalizes the continuous on-edge-of-chaos situation the process of organization builds on. The state of exception describes neither constructive ordering communication nor destructive disordering communication but originates in organization. It describes a zone of indifference where order and disorder, respectively construction and destruction blur with one another. The state of exception does not describe a special kind of organization. Rather, it describes a suspension of the organization itself, it defines organizations threshold or limit concept, its boundaries, where Bisel (2009) pointed at to look for verifications (Bisel, 2009).

Any 'state of exception' changes the process of organization permanently. As WannaCry illustrates, most organizations in form of businesses and critical infra structure survived the attack. After IT departments reanimated and allowed for the continuum of communicative events the process or organization continues. Even though, it cannot return to the preexisting because of the destruction of its surface, respectively text. As soon as conversation picks up and produces text the attack pattern of the virus becomes a part of it. Organization learns from the attack and adapts to it in order to prevent it from happening again. Also, the rebuild of the ICT infrastructure incorporates lessons learned and changes in order to strengthen the systems. Further, powershifts do not re-shift into the exact same states compared to before the attack.

Agamben's theory of a *permanent* state of exception allows to understand how a state of exception impacts and changes organization permanently. By that, constructive and destructive communication constitute organization in the same way rule and exception, law and anomy mutually constitute. Thereby, the constituted *permanence* describes the constitutive part of destructive communication.

A state of exception in the process of organization allows ordering and disordering communication to intertwine which results in adaptation and change derived from their mutual constituting character. Explained along a cyberattack, the attack disrupts communication and triggers sensemaking in the sense of Weick. Though, additionally, the malware code, "text", constitutes a *permanent* state of exception as part of communication constituting organization. The malware code becomes a part of communication constituting organization.

Using the introduced concept of a digital corporate immune system, the immune system incorporates the crypto-virus which in turn becomes a part of it, and thereby a part of the process of organization. The virus and the experiences through its attack become part of the immune system and the process of communication constituting organization, similar to a biological virus building a biological immune system.

Organization constituted by destructive communication ensures the impossibility or mitigation of the same attack pattern. Hence, organization surviving and incorporating a digital crypto-virus shows similarities to a vaccination or the survival of a biological virus attacking a human immune system. After the attack, the digital, similar to the biological immune system, knows how to react efficiently, in order to mitigate the impact once exposed to the same virus again. This way, organization produces resilience and stability on the long run, whereby destructive communication triggers sensemaking and enables organization to adopt to changing environments. Through the permanence of the constituted state of exception destructive communication constitutes organization. In doing so, destructive communication balances too ordered processes incapable to adopt and at the same time relies on constructive communication not to end in chaos and organizational collapse.

Due to the expected increase of major cyberattacks a rhythm or breathing of constructive and destructive communication occurs. This interplay results in constantly stabilizing organization on the long run, unless the created chaos leads to the collapse of organization or too ordered processes, which prevent adaptation and cause the death of organization. A cyberattack hitting organization exemplifies destructive communication. Agamben's theory of a 'state of exception' and further a *permanent* 'state of exception' enables us to

highlight the mutual constitution of organization by destructive and constructive communication. As a result, our approach supports arguments of existing theory like change preserving stability and resilience. In order to highlight the contribution of this paper to CCO theory, we introduce the following definition of destructive communication in the sense of CCO:

> *"Destructive CCO by disrupting and destroying its site and surface, while triggering sensemaking and becoming part of sensemaking itself."*

After explaining the theoretical contribution of this conceptual paper, the next chapter implies how these theoretical insights impact managerial and organizational and management communication.

3.2. Managerial Implications

The practice relevant insights for professionals in organizational and management communication lie in the choice of cyber strategy as well as in the perspective on destructive communication.

The WannaCry case illustrates how fast cyberattacks spread globally, infecting any digital system of any type of organization, similar to a pandemic in the biological sphere without physical boundaries or borders. Describing along the example of WannaCry how cyberattacks stabilize organization on the long run supports the argumentation of experts favoring resilience cyber strategies rather than fortification and armament cyber strategies. Especially if deterrence in cyberspace does not show the same effects as deterrence in nuclear armament in the analogue world. Additionally, the costs rise for armament and fortification within the current arms race are skyrocketing. The introduction of disruptive and disordering communication into CCO theory supports an adaptable cybersecurity approach. The approach complements the perspective on cyberattacks with a chance to stabilize and strengthen organization through these increasing unavoidable attacks. In doing so we align this argument with the theory of stability through change as well as of

resilience. Further, we build on the conceptualization of digital "corporate immune systems" which, in their similarity to biological immune systems, allow for decentralized cyber security standards and the "designing out" (Lavorgna, 2020) of potential attack patterns. Further thoughts in this direction involve how cybersecurity stress testing, as lesson learned from the example of Neustadt, digital virus vaccination and information sharing can lead to herd immunity of global interconnected networks. Similar to the human immune system a corporation gets stronger the more cyberattacks it recovers from or gets vaccinated with. For this reason, the virus and the experiences through its attack, become part of its immune system constituting organization. Currently, corporations and governments choose and prefer offensive and fortification strategies aiming to prevent viruses from entering their systems over resilience strategies. News about an example from a web developer firm confirm these approaches. In Germany a web developer firm announced to have successfully hacked back a ransomware attacker. Even though the German legislation forbids "backhacking", corporations build up their IT security departments and arm them with tools and weapons which they oppose in cyberspace (Scherschel, 2019). By doing this they follow the example of the biggest high tech corporations like Microsoft who operate their own cyberspace army of IT experts fighting cybercrime on their own, sometimes in alliance with governmental agencies like the NSA, sometimes on their own with the claim to protect their assets (Dwoskin & Timberg, 2018; Wait, 2013). Since the avoidance of viruses entering systems has become impossible we implicate to enlarge the focus on communication constituting organization with destructive communication and its constituting force.

With the expanding thoughts about a digital "corporate immune system", we question not only current cybersecurity strategies but also corporations centralized processes which show high vulnerabilities in an all connected globalized cyberspace. Small independent units organized under the principle of subsidiarity show higher resilience to cyberattacks and can continue to communicate even if other parts lay under siege (Knebel & Seele, 2019). Also, these thoughts question the need of the "ever growing or dying bias" since high connectivity and complexity have caused high vulnerabilities to cyberattacks and

cascading effects of interconnected networks in the digital as well as in the analogue world (Helbing, 2015a).

We deliver arguments how destructive communication potentially strengthens organization and creates resilience. Meanwhile deterrence, fortification and armament prevent digital immune systems from learning and result in a fueled arms race flooding cyberspace with more and more weapons. By allowing destructive communication to happen organizational and managerial communication opens for innovative and adapted strategies, as well as the establishment of digital "corporate immune systems".

With these thoughts about how destructive communication impacts managerial decisions, we continue with a discussion about the findings and the contribution.

4. Discussion and Conclusion

Without communication the organization seizes to exist (Luhmann, 2000) or, as introduced in this paper, experiences a shock followed by a state of exception caused by a cyberattack, which ends in a permanent state of exception. The permanent state of exception described along a digital "corporate immune system" illustrates how destructive communication constitutes organization. All forms of communication, destructive and constructive, ordering and disordering, constitute organization as the illustrative example of the WannaCry cyberattack reveals. So far, CCO theory rather acknowledged the existence of destructive communication than look at or explain its constitutive character; building on Agamben's permanent states of exceptions we pioneered how such approaches can look alike. As contribution to CCO theory we introduce destructive communication constituting organization without contradicting existing CCO theory but contributing to it.

Two centuries ago researchers found already the presence of the simultaneous process of organizing and disorganizing (Bisel, 2009). Entropy and negative entropy in thermodynamics and organization science base on simultaneous organizing processes of decay and renewal in planetary, biological, and social systems (Clausius, 1887). With destructive and constructive communication constituting organization we describe

similarities of dynamic social systems, organization, to living organisms, which constantly decompose and regenerate (Bisel, 2009). So we agree with Bisel's (2010) argumentation that communication can produce decay but we disagree with his assumption that this suffices as proof for something else constituting organization than communication. We cannot disagree with the argument about need and sufficiency of communication for the emergence of organization but we argue that destructive communication cannot prove that position because it constitutes as well (Bisel, 2010). We underline this argument along the example of a digital "corporate immune system".

The process of organization necessitates both destructive and constructive communication in order to survive and adapt. However, of course, the argument's limits base on the needed balance of destructive and constructive communication. When a cyberattack forces organization too far over the edge of chaos it collapses (Vásquez et al., 2015). The example of Swisswindows illustrates such a case of how a ransomware attack kills the process of organization entirely (Latzer, 2020). Within a state of exception caused by a cyberattack organization does not seize to exist even though communication halts. One could take this fact in favor of CCO critiques like Reed (Reed, 2009) by stating an organization survives without communication. But we insist that destructive communication not only triggers sense-making but also becomes part of it while the source of the state of exception and the halt of organizing can only stem from the process of organization itself. Hence, we go along with Agamben's theory that a state of exception describes the boundaries of the concept of organization and pioneer these boundaries as suggested by Bisel to strengthen the existing body of CCO knowledge.

With the introduced conceptualization of destructive communication we acknowledge the ambivalence of communication but prove how to align this fact with existing CCO theory. The state of exception as well as the analysis of the digital sphere from a CCO perspective supports Cooren's (François Cooren, 2018) proposed relational ontology of materiality. In a state of exception organization exists without communication. Of course, one could argue that communication still exists through the forensic work of IT experts analyzing the ICT-infrastructure. Even though critique from the other extreme stands in favor of Reeds general CCO critique, stating that a state of exception proves that an organization

can exist without communication respectively cannot be reduced to it. However, we prefer to stay with Cooren's arguments, whereby the described state of exception shows similarities to his introduced semiotic mode of existence (François Cooren, 2018).
The paper underlines through an excursion to cyberspace, how communication is as much about the destruction and transformation of meaning as it is about their construction (Cooren et al., 2011, p. 1160).

5. Limitations and Future Research

Non-transparency and secrecy of the topic pose a limitation in this paper. The involvement of secret agencies and the tendency of businesses to underreport on cybercrimes keeps research in the field difficult. Also, hackers designing ransomware are not available for research projects. The fear of reputation losses and the fear of disclosing vulnerabilities by businesses intensify the secrecy. In order to research in this field anyway, we depend on whistleblower or investigative journalism along examples and illustrative cases.
Further research could delve into the importance of digital immune systems for corporate resilience. We also hope to motivate researchers to delve further into the destructive forces constituting organization. With the comparison to biological viruses and immune systems we hope to further connect communicational, digital and biological research in a way that they mutually enrich each other; especially in times where biological viruses like the corona virus show similarities to ransomware attacks like WannaCry in their aggression, speed of spreading and pandemic scope in even more connected globalized dimensions of networks in network systems.

Conclusion

The conclusion aims to synthesize and to integrate the different obtained results. In line with the thesis structure and the two presented research lines, the conclusion presents the following summary of the chapters, discussions of the findings, theoretical implications, managerial implications, limitations and research outlook.
The summary of the chapters consists of two parts. Part one covers results in the dimensions of SIs and SPP from chapters 1 to 3, the second part covers and integrates results from chapters 4 to 6.

1. Summary of the Chapters

The systematic literature review presented in chapter I underlines the need of the translation and operationalization of sustainability indicators in sustainable public procurement. The mapping and clustering of the existing academic literature of SPP revealed six main topics the research delves into. These main topics approach SPP theoretically as follows: 1. Definition of SPP; 2. Scope, referring to sector specific research; 3. Geographic, referring to country specific analyses; 4. Regulation, referring to theoretical advancements in law and legal issues; 5. Management and Innovation; referring to a private business perspective on SPP; and 6. Measurement and Indicators, referring to the research of comparability and indicator usage. Most research locates in scope and geographic, almost none in measurement. As chapters I and II outline the focus of current research in SPP remains on the identification of drivers and barriers. Hence, the most common identified drivers and barriers in SPP theory describe the perceived costs of SPP, stakeholder conflicts, organizational fragmentation of SPP approaches, the knowledge transfer and communication of SPP, risk aversion, complexity, organizational strategies and goal setting, policies, personal commitment, leadership, SMEs and inertia. Chapter II and III use the literature review as starting point to delve further into SPP. Afterwards, the two presented approaches towards sustainability in public procurement, described in the chapters, tackle the drivers and barriers of SPPs' organizational fragmentation, knowledge transfer, complexity and implementation inertia. They do so in chapter II with a flexible approach and in chapter III with a framing approach. The flexible

approach results from a qualitative typological analysis of an indicator set of 665 commonly used SIs, which reveals a predominant quantitative SI type and a less common qualitative SI type. The quantitative indicator type bases on purely quantitative methods, the qualitative type on purely qualitative methods. The set reveals a lack of hybrid SIs which represent the derived third SI type. The third type enables the flexible and combined usage of needed methods to reach best comparability in each individual procured good or service.

The interaction with procurers along the SNF project along recent studies revealed the critical challenge to find common ground in SPP due to the individual requirements regarding sustainability in each procurement tender. The lack of common ground also causes barriers like fragmentation, complexity, low degree of knowledge dissemination, and inertia. Combining these requirements with the call of scholars for hybrid methods in SIs for sustainability performance measurements led to the conceptualization of a SIs selector for SPP. The SIs selector empowers public procurers to flexibly build their own measurement tool out of existing and proven successful SIs. The selector enables the development of any of the derived SI types and fills the latitudes of uncertainty, procurers face with vague first SPP legislations, as the case of Switzerland reveals.

Chapter III delivers a complementary approach in the search for common ground in SPP. Ergo, it complements the rather flexible approach of chapter II with a sustainability frame tailored to SPP along the example of Switzerland. With the help of a typological analysis the chapter results in the concrete translation and operationalization of the core of currently performed sustainability performance measurement. In doing so it provides a set of ten SIs aimed at providing a starting common ground for their further evolution. In order to validate their suitedness for SPP in Switzerland, the chapter provides an acceptance test with public procurement experts who supervised the SNF project, the presented research stems from. The experts assessed the provided set as positive in its usability, as well as in its feasibility.

Synthesized, the results of the first research stream within the research dimensions of SIs and SPP provide a comprehensive overview of the current status of SPP. Secondly, they provide professional procurers and scholars alike with pragmatic solutions to work with

previously identified drivers and barriers. In doing so they give into public procurers hands a tool in form of a SIs selector to select and build their necessary means to procure each individual procured good and service in the sustainability dimensions. Additionally, they provide a SPP frame, as called for by scholars and professionals, for a common ground to proceed in the implementation of SPP. Thirdly, the presented means support SPP to overcome its acknowledged implementation inertia through derived definitions of SPP and SIs, through a flexible approach to use SIs, and with a framing set of SPP tailored SIs. Fourthly, the chapters contribute to the theoretical body of corporate communications and CSR communications the introduction of a new research field by defining public procurement tenders as part of corporate communications. Further, they contribute to theory possible ways to disseminate, translate and operationalize standardized pieces of sustainability information in form of SIs in all areas of organization. Fifthly, they complement recently published guidelines like the ISO 20400 for sustainable procurement with a clear operationalizable set of SIs along adaptation possibilities.

Since the resulting pragmatic tools and means perform a standardization of corporate communications they also present an evolutionary step towards automation of communications. The second part of this chapter summary delves more deeply into the possibilities and dangers of automated SIs through the digital revolution. The SIs selector uses a decision tree for the selection and construction of SIs. By that, it resembles a basic algorithm. Furthermore, the usage of SIs bases on organizational data, which the digitalization produces in masses. In other words, SIs in the context of corporate communications produce a standardization of communications, which in turn facilitates its automation as the following summary section of chapter 4 to 6 indicate.

Chapter four results contain the conceptualization of a digital corporate nervous net. Looking at examples of the industry 4.0, such corporate nervous nets have already been established in form of ICTs augmenting all production and communication activities. Sensor networks, social communication platforms, augmented by technologies like RFID and VeChain combined with the storage of big data have already built the infra-structure

of a digital nervous net today. Chapter four acknowledges these developments and conceptualizes how AI's predictive capabilities in combination with SIs and the availability of real-time big data impact and augment corporate communications and decision-making. In doing so it highlights this potential countering the challenges of the digital revolution in form of complexities, interdependencies of systems and networks, as well as resulting cascading effects and system failures. Hence, chapter four introduces decentralized corporate communication augmented with a predictive SIs module capable of discovering risk patterns in the organizational data, warning decision makers from calamities before they happen. Such a digital nervous net provides, similar to a biological nervous net, signals of the internal and external environments. It enables immediate reactions and adaptations in form of reflexes or indicates via pain or other sensorial signals how the organism needs to adapt in order to survive. Through the forces of the digital revolution in decentralized corporate communication units equipped with predictive SIs modules that not only provide real-time feedback loops but also predictive risk indications, corporate communications can adopt to the digital revolution and augment decision-making. Under the principle of subsidiarity each unit remains operational even if system failures occur for example through cyberattacks.

Chapter V builds on the digital nervous net of chapter IV and results in the conceptualization of preporting. Preporting complements current reporting practices with a future orientated time-ontological direction. In doing so, it provides a SIs based future orientated preport. Such a preport indicates and communicates automatically, AI supported, developments of possible organizational futures.

Both conceptualizations of chapter 4 and 5 indicate as a result always the double-edged sword of the digital revolution. Thus, they outline how the presented conceptualizations either augment decision-making and serve as driver for sustainability and shared values or tempts users to manipulate, control or attack. The chapters emphasize the usage of the corporate nervous net and preporting for transparent and trustworthy relationships to all stakeholders and the prevention of calamities. In doing so the results outline how these tools can approach complex interconnected problems like climate change and human rights violations in supply chains. Chapter 4 and 5 produce results about the future usage

of SIs with AI, big data and the IoT to reduce complexity and produce order out of potential disorder.

Chapter 6, on the contrary, switches to communication that first of all produces disorder. Interestingly, as a result, the introduced destructive communication in form of cyberattacks not only produces disorder triggering sensemaking and change but also constitutes simultaneously organization in the sense of CCO. It contributes a liminal state of indifference neither inside nor outside the process of organization to CCO theory. By doing this, it shows where disruptions like cyberattacks trigger sensemaking and change to preserve stability on the long run. Furthermore, the chapter produces as result a derived definition of destructive CCO. In doing so it expands thoughts about a digital corporate immune system consisting of digital viruses like the crypto-virus in the illustrated case of WannaCry.

Synthesized, provide the results of the second research stream within the research dimensions of SIs and Digitalization, conceptualizations which combine SIs with the forces of the digital revolution. Secondly, they imply the responsibility of the user of these developments for the impact they have on society and organization. Thirdly, they contribute to theory how corporate communications can adopt to the digital revolution, how preporting complements the time ontological directions of corporate reporting, as well as how destructive communication constitutes organization. Fourthly, they help in the understanding of the interplay of ordering communication in form SIs and disordering communication in form of cyberattacks. Fifthly, they describe impacts of the digital revolution on organizational and corporate communications.

The summary and synthesis of the results and findings in two research streams leads to the following discussion, which aims to spot the main arguments on a macro level throughout the presented articles.

2. Discussion of the Findings

Communication in form of SIs in public procurement as well as in the digital revolution reveals a duality. This duality reveals itself in several facets. SIs, on one hand, reduce complexity, on the other hand their aggregation simplifies and risks over simplification. The driving forces of the digital revolution combined with SIs, at the core of communication science, enable on one hand innovative means to deal with complex interconnected problems like climate change and human rights violations in supply chains, on other hand they enable manipulation and misconduct. Thus, SIs represent on one hand constructive communication through standardization and the reduction of complexity, on the other hand they oversimplify and by doing so can cause destruction. Cyberattacks, as example of highly destructive communication, endanger the perpetuation of organization and create chaos and disorder. However, while destructing, also cyberattacks constitute organization. In other words, the thesis looks at special forms of communication, which reveal similarities to other forces of nature. These similarities recall notions of the ancient Chinese philosophy of Ying and Yang☯ (Cua, 2013). Due to this, destructive communication and constructive communication which look like opposite forces of ordering and disordering communication show features of each other and bring each other into being. Results of chapter 6 show how the process of organization necessitates both destructive and constructive communication in order to survive and adapt, as well as how both sides contain characteristics of their opposite. Scholars introduced the idea of communication as force of nature before (Bisel, 2010), whereby the comparison of organizational communications with, for example, thermodynamics shows how destructive and constructive communications shows similar characteristics than entropy and negative entropy. Furthermore, presented biological analogies of results in chapter 4 and 6 with a digital corporate nervous net and a digital corporate immune system imply how the digital revolution evolves the process of organization in its similarities to natural living organisms. These insights lead to the following discursive thoughts.

The presented research implies and proposes, due to this duality, that the responsibility of SIs usage, especially in their digitalization, remains with the user. Technology itself cannot

be good or bad but the usage determines its impacts. Additionally, the impact of SIs depends on its usage. The risk of hiding behind technology or indicators shoving away responsibility always presents on side of this duality as findings from the manuscript in the appendix show.

Thus, the presented conceptualizations and frames try to equip the user respectively the bottom with the necessary means to communicate and adopt. The implementation of sustainability into public procurement in form of SIs, the SIs selector and the frame of ten SIs tailored to SPP aim to empower each procurer to use existing knowledge and adopt it to each required sustainability communication in public procurement tenders for any procured good or service. In doing so the responsibility and means to adopt sit with the individual who directly communicates with stakeholders. The thesis argues why the long-lasting survival of organization relies on such approaches. Chapter 4 highlights why in complex networked systems the principle of subsidiarity in combination with decentralized functions enables the perpetuation of organization especially in the digital revolution. Moreover, it highlights how such approaches produce resilient communication systems in the contrary to momentarily favored top-down controlling and surveilling systems which expose vulnerabilities to system failures. Chapter 6 adds why the myth of stability in hierarchical clockwork thinking ends in too ordered organization unable to change and adopt, causing its death. Certainly this implies, when the process of organization becomes too chaotic it collapses (Vásquez et al., 2015). This understanding of organizing underlines the results of chapter 2 and 3, which present standardizing forms of communication flexible enough to adopt and framed within an indicator set for SPP.

Of course, these approaches contain the need of public procurers to train and learn. Furthermore, the conceptualizations require pioneers and risk takers exploiting the latitudes towards sustainability upcoming legislation provides, which remains challenging looking at findings in which procurers tend to decide in favor of their department heads before all other stakeholders (Brammer & Walker, 2011; Prier et al., 2016). The mentioned requirements challenge the proposed conceptualizations of the thesis because even with the provided means responsible public procurers still face the barriers of stakeholder conflicts and the efforts change and adaptation require. Though, the thesis argues in favor

of its proposed approaches because alternatives face the even bigger challenges, namely to provide public procurers with detailed criteria and standard procedures for each possible procured good and service. These oversized frameworks contain adaptation problems to evolving societal ideals. Thus, in the tradition of SIs development and their need for evolution, the thesis proposes SPP ideals, incorporating current values, with the flexibility to evolve. This flexibility enables quick adaptation in the capillaries of organization in the hands of each procurer, as well as flexibility regarding the evolution of the provided SIs with the SIs selector over time. It enables self-organization, the inclusion of local knowledge under the principle of subsidiarity and a decentralized approach adopted to the requirements of each procurer.

Unfortunately, such flexibility tempts for misconduct and silo approaches. In order to avoid such developments, the thesis conceptualizes frames as chapter 3, 4, and 5 illustrate and aims to find common ground and harmonization for the evolution of SIs in SPP. The emergence of misconduct, the thesis argues, occurs in any setting, hierarchical top-down surveillance and controlling as well as in flexible decentralized bottom-up approaches, especially in high interconnected complexities. In other words, even a strict and detailed clear-cut criteria catalogue, as introduced by the EU for GPP, cannot prevent misconduct due to the complexity of the matter. Also, such approaches reveal problems of adaptation and vulnerabilities to system failures.

Chapters 3, 4 and 6 emphasize the requirement of a culture shift. This requirement challenges SPP and the proposed approaches. Hence, the concerning chapters imply that a culture of willingness builds an integral part for the proposed approaches. In order to argue for the proposals of the thesis, the climate change debates, as well as the upcoming legal changes, imply the possible beginning of such needed culture shifts and change of thought. In other words, the acknowledgement of destructive communication that destructs and constitutes, as well as preports for the harmonization of stakeholder interests between organizations and society through transparency, accuracy and accountability under the principle of trust, require continuous change of thought and change of organization.

Organizational and corporate communications in the digital revolution not only face issues of duality but also issues of complexity. This complexity stems from new fields entering the realm of sustainability, like SPP. Corporate communications need to align these new fields with overall strategies and goals. At the same time, big data, the IoT and AIs start to impact organizational communications in its core with endless ICTs to communicate, producing masses of information resulting in big data and the possibility to automate communication. The presented results in form of a SIs selector, the introduction of destructive communication constituting organization, the conceptualization of preports, as well as the conceptualization of decentralized self-organized AI augmented communication units, anticipate the issues of complexity and present solutions. These solutions use the forces of the digital revolution in favor of organizational perpetuation instead of currently favored attempts to defend, fortify, control, manipulate against change the digital revolution enforces. The results favor information sharing, promote resilience and contain solutions of how to tailor SIs based communication to stakeholder needs in tender processes, how to standardize sustainability performance measurement, how to translate and operationalize it into new fields, as well as how AI augmented SIs keeping complexity to a manageable level.

Even though the digital revolution barely started to transform corporate communications, the example of industry 4.0 implies its potential for the near future. With the conceptualization of preporting in chapter 5 the thesis illustrates how such a transformation can look alike, especially regarding automated communication, the expansion of time-ontological directions based on big data, as well as the use of ICTs to warn of and prevent calamities, as well as the sharing of information in mutual interest. Moreover, decentralized, self-organized, AI augmented, communication units under the principle of subsidiarity, through SIs frameworks, in chapter 4, illustrate the transformation possibilities. Countering theories which proclaim the upcoming full automation of everything including organizational communications (chapter 5), the thesis, in chapter 5, refers to AI pragmatics who see the upcoming impact of AI mainly in the augmentation of decision-making.

The thesis implies why the complexity for SPP to implement SIs sits not only in the nature of sustainability and SIs but also in the vast variety of procurable goods and services. The results of chapters 1-3 anticipate this issue and try, in contrary to present SPP theory, to focus on the overcoming of status quo instead of validating existing drivers and barriers of the status quo. In order to do so, the flexible and framing results emphasize the need of complexity reduction as well as adoptable tailored but still standardized sustainability performance measurement communication. The thesis counters arguments against such an approach like the impossibility to change the currently predominant hierarchical paradigm of top-down controlled organizing, with the insights from chapter 4 to 6, which imply the fragility and vulnerability of such systems, even more visible in the just starting digital revolution. Chapter 6 illustrates how destructive communication constitutes organization and highlights the importance of destructive communication in its capabilities to trigger sensemaking and enabling change. The acknowledged inertia in the implementation of sustainability in public procurement in the case of Switzerland illustrates resistance to change. Using the insights from chapter 6 for the issues of SPP leads to the conclusion that the present inertia risks the long-lasting survival of such organization. The risk occurs because of the missing change for stability.

Closing the discussion throughout the findings and results of this thesis, the next section outlines theoretical implications the thesis provides.

3. Theoretical Implications

In light of these discussed findings, several contributions to theory emerge. This section outlines explicitly the theoretical implications each presented manuscript provides in an abbreviated and digestible way.

Chapter I contributes a literature review of SPP and depicts the status quo of sustainability implementation in public procurement. By doing this, it provides a definition of SPP aiming at the harmonization in SPP theory as well as clarification in a muddled research field (Brammer & Walker, 2011; Bratt et al., 2013; Dragos & Neamtu, 2014; Preuss, 2009; Prier, 2009). Further, the first chapter identifies theoretical research gaps in four identified areas: gaps concerning the overall scientific SPP framework for common grounds and definitions, the role of economics in SPP besides high perceived costs of SPP, the organization and communication of SPP information tackling issues of knowledge dissemination and fragmentation, and data, which encompasses all issues related to sustainability performance measurement, comparability, and monitoring.

Chapter II provides a methodological overview of SIs in a typological analysis. It contributes to SPP theory an understanding of available methods of SIs and their working. Furthermore, it critically analyses the methodological barriers and deadlocks in SI development for their usage in SPP (Bell & Morse, 2018a, 2018b; Jesinghaus, 2018; Macnamara, 2015; Morse, 2004, 2015). Furthermore, it acknowledges the identified gaps of chapter I and contributes to theory a clear definition of SIs usable and understandable in the theory of SPP. Besides, it contributes the introduction of public procurement tenders in the theory of corporate communications (van Ruler, 2018; Van Ruler & Verčič, 2005; Zerfass & Viertmann, 2017). The conceptualization of a flexible way to adopt and translate CSR communication into the procurement function of organization contributes also to CSR theory in the sense of Sheehy's self-responsible private regulation towards sustainability (Sheehy, 2014).

Chapter III contributes a tested proposal of common ground in SPP aiming at closing the identified framework gap in SPP theory (chapter I). Subsequently, it contributes to SPP

theory and CSR theory the translation of SIs core, tailored to SPP. It complements other theoretical approaches with a clear framing set of ten SPP indicators for their further theoretical and practical evolution. Additionally, it contributes to theory an approach to overcome implementation inertia in contrary to the main focus of existing theory focusing on the status quo in its drivers and barriers (Brammer & Walker, 2011; Gelderman et al., 2015; Meehan & Bryde, 2011; Prier, 2009; M. P. Thomas & McElroy, 2016).

Chapter IV contributes to the theory how strategic communications (Holtzhausen & Zerfass, 2015; Nothhaft et al., 2018; Werder et al., 2018) can adopt to the digital revolution with the help of ICTs and SIs. Hence, it contributes to the conceptualization of digital assisted, decentralized, SIs and AI augmented, communication units. The concept proposes a self-organizing, bottom-up approach of strategic communication under the principle of subsidiarity translating findings from complexity research in digitalized interconnected systems to corporate communications (Buldyrev et al., 2010; Helbing, 2013, 2015b; Rifkin, 2011).

Chapter V contributes to CSR theory and the theory of shared values (Lock et al., 2016; Porter & Kramer, 2011; Shanahan & Seele, 2017) the conceptualization of preporting. Preporting crystalizes shared values between corporations and society not only through the inclusion of all available data but also by completing the data-based time-ontology of corporate reporting. It contributes the concept of how disclosed knowledge about futures in preports created by predictive AI helps to prevent corporate crisis escalations and calamities in dialogue with stakeholders. Preporting crystalizes shared values between corporations and society not only through the inclusion of all available data but also by completing the data-based time-ontology of CSR reporting (Robert G Eccles et al., 2015; Knebel & Seele, 2015; Shevchenko et al., 2016).

Chapter VI contributes to the theory of CCO destructive communication along the extreme illustrative case of a cyberattack. On that account, the thesis contributes to destructive communication in CCO theory not by questioning its theoretical frame as done so far (Bisel, 2010; Reed, 2009) but by explaining how destructive communication also constitutes. By it, Chapter VI complements CCO theory without being contradictory. In order to do so the contribution to CCO involves Agamben's (2005) theory of a permanent

state of exception and transfers it into the CCO body of research (Agamben, 2005; Ashcraft et al., 2009; François Cooren & Fairhurst, 2009; Putnam & McPhee, 2009; Schoeneborn et al., 2014).

After the summarized theoretical implications of each chapter, the next section outlines the managerial implications in an abbreviated and digestible manner.

4. Managerial Implications

This section presents an overview of managerial implications in two parts. Part one covers the implications of chapters 1 to 3, while part two covers the implications of chapters 4 to 6. The concerning chapters of the thesis contain detailed managerial implications.

The professionals in public procurement lack a common understanding of SPP as well as a frame to operate in. The thesis provides an overview of these issues in chapter 1 and builds on it. With the conceptualization of a tool to use several available methods in the creation of SIs the thesis empowers public procurers to adopt sustainability to their needs in an individual, self-responsible way. Certainly, such a concept requests effort, resources, and risk-taking on behalf of the profession. The delivered arguments throughout the thesis underline why such an approach delivers a resilient approach towards SPP as well as an approach adjusted to the requirements within a digital revolution. Furthermore, the alternative in building a huge top-down controlling framework of predefined criteria for each procured good and service contradicts current complexity research and research about organizational change (Helbing, 2015b; Meehan & Bryde, 2011). In order not to lose SPP in silo approaches, the thesis provides a mutual complementing flexible and framing approach for SPP. The SIs selector provides procurers with a tool to select SIs and the referring needed methods out of the whole spectrum of qualitative, quantitative and hybrid methods. The SPP tailored frame out of ten SIs describes a framing approach as well as a starting point for SPP. Swiss public procurement experts assessed the framework as useful and feasible. Hopefully, the two conceptualizations together provide the needed common ground, frame and means for a speeded up SPP implementation in Switzerland and elsewhere.

While the first three chapters describe a needed adaptation of public procurement organization to a change of societal values, the second three chapters describe ways of adaptation for corporate communications to change caused by the digital revolution.

Chapter 4 provides professionals with the strategic possibilities to adopt corporate communication functions to the digital revolution. It provides managers and decision

makers with an alternative perspective of how to structure communication processes using the forces of the digital revolution in order to survive it. It shifts the managerial focus away from top-down surveillance and control towards self-organized decentralized communication units. Using the results of chapters 1 to 3, a SIs based frame standardizes and frames the communication of each unit, which operates with an algorithm providing real-time feedback on all real-time data. Furthermore, it equips decision-makers with the concept of a digital corporate nervous net, which aids their vision of future organization and innovative possibilities. Chapter V provides one of those possibilities introducing preporting. The disclosure of preports complementing existing reports enables decision-makers to align corporate with societal interests. In doing so they can strengthen stakeholder relationships through additional disclosures of AI augmented prediction patterns along existing SIs and their indications in possible organizational futures. The traffic light indication of the digitalized and AI augmented SIs helps professionals to spot problems before they result in crises and calamities. The thesis suggests using the opportunity to disclose aggregated data and to share information with stakeholders. The sharing of information comes also into play in regarding destructive communication of cyberattacks. So shared information about cyberattacks works like a vaccination for a digital "corporate immune system". In order to build up such a system chapter 6 recommends professionals to change existing cyber strategies of fortification, armament and attack into strategies of resilience, flexible adaptation, decentralization, subsidiarity, self-organization and bottom up approaches to use local knowledge and enable immediate actions without risking organization to die.

With these practical managerial insights, the next section points at the limitations.

5. Limitations

Each chapter describes its own limitations in its end. This section aims to provide a general overview on them.

General limitations in the first part of the thesis lie within the legal and country specific contextuality of SPP. Further, the thesis analyses the phenomenon from the perspective of communication sciences respectively corporate communication sciences. Future research can explore and complement this view for example from a regulative and legal perspective. Existing literature focuses predominantly on country or sector specifics of SPP. The deductive approach of the thesis to find common ground and definitions throughout SPP in all its sustainability dimensions reduced the possibilities to provide detailed inductive legal specifics and individual requirements of each procured good and service. Fortunately, through the provision of a frame allowing for flexible adaptations researcher and professionals can counter this limitation with the means to select and construct SIs for tender processes along their requirements. Furthermore, the latitudes and flexibility, not only in upcoming legislations but also in this thesis, might lead to misuse of SIs, by hiding behind them in grey areas, as discussed examples from Switzerland illustrate.

Another limitation describes the needed refinements and evolutionary work to bring the proposed SPP tailored SIs and tools into life. Only their daily usage and constant adaptation shapes them into evolving ideals portraying societal values. The thesis understands the proposed concepts as starting points for further research in the tradition of conceptual research.

Limitations in the second part of the thesis, especially in the last chapter, lie in the non-transparency and secrecy of the topic. Innovations and future developments involving ICTs, as well as the involvement of secret agencies and the tendency of businesses to underreport on their own research and failures cause such difficulties to reach information. So the thesis in the second part relies on the combination of previous research, whistle-blowers and investigative journalism as well as illustrative examples.

6. Research Outlook

The thesis provides various points to delve into further research. The different conceptualizations provide starting points and aim to interest researchers in the fields of public procurement, SIs development and the digitalization of organizational and corporate communications. A field of interest, the thesis lays ground for, presents the combination of the research dimensions SPP and digitalization. Research in that direction can support the outlined way to overcome implementation inertia in SPP, as well as possibilities to digitalize the proposed tools and frames. The conceptualization and extended thoughts about a digital corporate immune system and a digital corporate nervous net hopefully trigger the interests of researchers to delve further in the each other enriching biological and digital worlds to advance communication science, particularly in corporate and organizational communications.

Further research can also explore how the provided concepts can be adjusted and refined for example with qualitative interviews and the inclusion of scholars of law and regulation. The evolution of SIs speeds up and continuously changes and mutates, the latest working paper show how contextualists gain momentum and ask *sustainable compared to what?* (Baue, 2019; McElroy, 2019; Salathé-Beaulieu et al., 2019) and aim to implement thresholds, limits and contextual shares to SIs. This rises the further research question of how these developments of SIs potentially impact SPP in the digital revolution.

Final Remarks - Learning Experience

Already at this moment, just finishing my three years as a PhD student, I realize the incredible richness of this adventure. The richness expands through my personal and professional life, I learned a lot.

My research adventure trips in front of my computer, brought me to the discovery of many to me unknown worlds. For sure, this adventure trips into theories and research realms as well as experiences in their environment, challenged me and helped me to build knowledge, skills and competencies, valuable for a lifetime.

My supervisors stimulating and challenging questions allowed me to broaden my horizon of thoughts and enabled me to learn looking at phenomena from many different perspectives instead of working from one first belief defending it as long as possible.

During my PhD adventure I learned how to research, analyze and write in a comprehensive way allowing thoughts and arguments of all perspectives to produce full images of phenomena and acknowledge dualities in all kinds of forces in the science of organizational and corporate communications.

On my trip, I found especially enriching the moments in which I could exchange thoughts with likeminded researchers, appreciated their inputs and was more than happy to give thoughts to peers mutually enriching our work and finding community over distances and time.

I appreciate everything I learned, which includes the great opportunity to co-teach a course for several years and passing on knowledge of sustainability. Furthermore, I appreciate the developed understanding of criticism in peer review processes and at conferences as not too personal and as constituting force, which increased my frustration tolerance and helped me to refine my professional attitude.

Thanks to the many research adventures I developed and refined also my skills to present and organize large amounts of information in a clear and concise manner, I learned to analyze and process complex data, as well as huge amounts of information, I learned to form them into digestible pieces, concepts and conclusions, and to communicate them to

a range of audiences in a range of formats, I learned to organize myself, deliver to agreed timelines and to work initiatively as well as self-reliant.

Appendix A - List of Publications

Knebel, S., & Seele, P. (2019). Conceptualizing the "Corporate Nervous Net" Decentralized strategic communication based on a digital reporting indicator framework. *International Journal of Strategic Communication*, *13*(5), 418–432. https://doi.org/10.1080/1553118X.2019.1637878

Knebel, S. and Seele, P. (2020), Introducing Public Procurement Tenders as Part of Corporate Communications - A typological analysis based on CSR reporting indicators, *Corporate Communications: An International Journal*, https://doi.org/10.1108/CCIJ-01-2020-0029.

Knebel, S., & Seele, P. (2015). Quo vadis GRI? A (critical) assessment of GRI 3.1 A+ non-financial reports and implications for credibility and standardization. *Corporate Communications: An International Journal*, *20*(2), 196–212. https://doi.org/10.1108/CCIJ-11-2013-0101

Knebel, S., Stürmer, M., De Rossa Gisimundo, F., Hirsiger, E., & Seele, P. (2019). 9.5 trillion USD for Sustainability: A Literature Review on Sustainable Public Procurement. *Working Paper at Research Gate*. https://doi.org/10.13140/RG.2.2.36358.22089

Scherrer, C., Langhammer, R.J., Matthes, J., Pies, I., Seele, P. and Knebel, S. (2013), "Inhumane Arbeitsbedingungen auf dem globalen Markt—Wer kann, wer soll handeln?", *Wirtschaftsdienst, Vol. 93 No. 4, pp. 215–232.* https://doi.org/10.1007/s10273-013-1513-5

Appendix B - Quo vadis GRI? A (critical) assessment of GRI 3.1 A+ non-financial reports and implications for credibility and standardization

This published manuscript bases on results of my master thesis. For the publication, the paper received significant rewriting and a considerable redraft. The topic of the manuscript led, in an important and determining way, to the PhD theme.

Manuscript Published:

Knebel, S., & Seele, P. (2015). Quo vadis GRI? A (critical) assessment of GRI 3.1 A+ non-financial reports and implications for credibility and standardization. *Corporate Communications: An International Journal*, *20*(2), 196–212. https://doi.org/10.1108/CCIJ-11-2013-0101

Abstract

Purpose – The purpose of this paper is to examine the status of non-financial reporting according to the Global Reporting Initiative (GRI) 3.1 A+ standard. By examining the comprehensiveness of the GRI performance in corporate non-financial reports classified as A+ the authors challenge the external assurance system imposed by GRI 3.1 A+ and discuss future directions for the application of GRI 4.0. Design/methodology/approach – The authors applied a three-step-research design based on four literature-derived hypothesis and examined all 177 GRI 3.1

Findings – The results indicate a lack of completeness of GRI's 3.1 key performance indicators in A+ assured reports that is made possible due to the reporting flexibility and voluntariness of the guideline. The authors find that the average of disclosed core indicators is 77.66 percent. Single A+ reports disclose even fewer GRI core indicators that B+ reports, which challenges the validity of the assurance system of GRI 3.1.

Research limitations/implications – In this study the (core) indicators were taken as given by GRI 3.1; the quality of the indicators was not measured or weighted.

Practical implications – Implications may emerge for redesigning non-financial reporting guidelines. Social implications – By critically indicating possible weaknesses of the GRI 3.1 guidelines the authors aim to contribute to a more transparent and effective non-financial reporting. Originality/value – As an increasing number of contributions criticize the credibility of non-financial reporting and also GRI's role, for the first time the research provides empirical evidence of the shortcomings of CSR and sustainability reporting regarding comprehensiveness, accessibility, and comparability.

Keywords Social responsibility, Corporate social responsibility, Reports, Non-financial reporting, External assurance system, Shortcomings of CSR

Introduction: Reporting, Credibility, and the Role of GRI

Although non-financial reporting is more and more prevalent (Raar, 2002) as part of corporate communication and corporations professionalize their communication towards social and environmental topics, non-financial reports are not perceived as credible and trustworthy: This phenomenon is known in the scholarly literature as "credibility gap" (Dando & Swift, 2003) and seen as one of the major challenges of non-financial reporting. The notion of the "CSR communication paradox" goes even further stating that with more and more reports skepticism and scrutiny among stakeholders increase (Waddock & Googins, 2011). Recently in a CSR corporate communication, paper non-financial reports have been typologized as instrumental communication strategy, unlike social media or corporate webblogs typologized as deliberative (Seele & Lock, 2015). Thus, the contribution of non-financial reports to corporate communication is considered a strong communication tool, although its strategic goal is considered non-deliberative. The "CSR communication paradox" is even more puzzling as corporations undertake measures to create transparency and trustworthiness by applying social disclosure rating systems (Sutantoputra, 2009), third party independent assurance and increased standardization of non-financial reporting. However, the steps towards standardization remain on a voluntary level (C. Adams & Zutshi, 2004), which leaves room for adjustments and more favorable ways of presenting one's non-financial performance. State regulation to support non-financial reporting, or laws to make it mandatory, might not be enough for global operating companies. At the same time, discussions are occurring as to how far self-regulation can be incentivized to have a governance structure that works (Johansen & Nielsen, 2011) to maintain the license to operate (Corvellec, 2007).

Relating these trends to the *CSR communication paradox* or the claim for the credibility gap opens the wider discussion on credibility and trust that are grouped into two topics regarding non-financial reporting. The first concerns audit, verification, and assurance; the second is about self-regulation, state regulation, and market regulation (C. Adams & Zutshi, 2004; R.G. Eccles et al., 2012; Ferreira et al., 2010; Ioannou & Serafeim, 2010; D. L. Levy et al., 2009; Maguire, 2012; Marrewijk, 2003; Whelan & Adams, 2009).

Here, GRI as an NGO is perceived as a professional answer to provide guidance on economic, social, and environmental issues, as it provides guidance and performance indicators for companies on what to report. At the same time, we find indications that a small NGO does not have enough power, and that consulting and accounting firms influence the GRI in order to attract business (D. L. Levy et al., 2009; Vogel, 2005). In the literature, guidelines like the GRI 3.1 are being criticized for not guiding corporations sufficiently in this matter (D. L. Levy et al., 2009; Roca & Searcy, 2012) or up to a level that could also be implemented. Others indicate that the GRI could be an answer to the lack of consistency within CSR communication (Nielsen & Thomsen, 2007).

The GRI is an international multi-stakeholder organization founded in 1997, based in Amsterdam since 2002. The GRI guidelines have become the most common global framework for voluntary sustainability reporting. The guidelines focus the context of corporate sustainability reports, the vision of the company concerning sustainability, their objectives in sustainability and their sustainable performances (Roca & Searcy, 2012). The first official guideline was released in 2000, an updated version in 2002 (G2 guidelines), the G3 guidelines in 2006 (D. L. Levy et al., 2009) and the G3.1 in 2011. The G3.1 guideline was the peak of an evolutionary process of revisions and updates since the year 2000. New elements have been introduced like application levels, a technical protocol, indicator protocol sets as well as revisions und updates of performance indicators (GRI, 2002, 2011).

In the paper we analyze the reporting patterns of GRI A+ certified reports with regard to the guidelines as proposed by GRI and ask in how far GRI advances the transparency and standardization of non-financial reporting. To do so we build on previous research on GRI (Aktas et al., 2013; Guthrie & Farneti, 2008; Roca & Searcy, 2012) to advance our knowledge about this NGO's role in the maturation of non-financial reporting. As a consequence, this research aims at closing the empirical gap of quantitatively testing rigor of GRI application in the highest assurance level A+, which has not been done previously in the scholarly literature. Based on the collected and analyzed data of all GRI 3.1 A+ reports, we begin with a discussion of GRI's future development and where to go from here. This discussion also incorporates technologically driven changes in the

implementation of data standardization, e.g., by the XBRL standard (eXtensible Business Reporting Language is an XML based reporting language standard for exchanging business information) known from mandatory financial reporting as required by the U.S. Securities and Exchange Commission (SEC) since 2009 (Debreceny & Gray, 2001; Zhu & Wu, 2014).

We therefore critically analyze a dataset of all companies awarded GRI 3.1 A+ in 2012, which is the highest classification to communicate commitment to rigorous GRI reporting. The data allows us to present on solid empirical ground a state-of-the-art analysis of GRI, of GRI A+ assured companies, and of the assurers involved in the A+ certification process.

Literature Review and Hypothesis Development

For more than 35 years, research has been conducted on the role of corporations in society, their social responsibilities and more recently on the role of corporations to contribute to sustainable development and non-financial reporting. Non-financial information plays an important role in the field of CSR. The definition and role of reporting in the field of non-financial information is discussed controversially in academic literature (Aktas et al., 2013; GRI, 2011; Ioannou & Serafeim, 2010; Roca & Searcy, 2012) and also the trends in non-financial reporting show that different concepts such as sustainability reporting, CSR reporting, or just responsibility reporting are applied (Gatti & Seele, 2014). Since analyzing GRI influenced reports we derive the aspect to develop our hypotheses from the literature on GRI reports and GRI itself. The most relevant topics in this regard therefore are accuracy, completeness, clarity and transparency:

Accuracy, Sincerity, and Completeness

Critics argue that the process of sustainable reports is defective in the sense that there is a lack of confidence in the content of the report. Its main challenges are accuracy, sincerity, and completeness (Doane, 2000) or that non-financial reports consist of mere “images” (Bowers, 2010). Some academics state that CSR is defective due to lack of transparency.

They define CSR as a belief system that provides only an impression of full disclosure that works against the process of transparency (Coombs & Holladay, 2013). Independent third-party auditors assure that financial reports are the archetypes for sustainable reports. It is claimed that this should be also done for sustainable reports. In financial reporting, independent third parties state the level of assurance based on evidence they have examined in a regulated and standardized way. But even in experienced financial reporting practices there are limits, as the Enron case reveals (Simms, 2002). Therefore standards and frameworks to promote corporate social responsibility and foster sustainability have been developed such as the GRI guidelines for reporting, labor codes (SA8000), environmental management (ISO 14001), and the CSR standard ISO 26000, among others (Dando & Swift, 2003; Maguire, 2012). Also, assurance standards have been developed such as AccountAbility AA1000 Assurance Standard (AA1000 AS), which delivers guidelines for assurance-related services (Aras & Crowther, 2008). These guidelines are voluntary and do not resolve the incompleteness problem. In addition, they are not regulated and worked out to a degree close to the financial standards (Ihlen, 2008). And even if they were worked out, there would still be the limitations of reporting in general, following the opinion of the critics. NGOs do not trust external assurance by commercial auditors and are reducing their support in development of sustainable reports (D. L. Levy et al., 2009). Critics see the danger that non-financial reporting standards provide organizations with tools to legitimate poor performance and let them get away with poor performance not covered in the guidelines (C. A. Adams & Kuasirikun, 2000). Deriving from the research of Adams & Zutshi, the most concerning issue of non-financial reporting today is the lack of completeness (C. Adams & Zutshi, 2004). A lack of full disclosure, a lack of completeness, and the little coverage of negative impacts are also the results of recent studies about sustainability reports. Studies about performance indicators in sustainable reports reveal that sustainable reports meet minimum requirements, and the disclosure of performance indicators varies significantly, even among the same application level firms (Aktas et al., 2013; Whelan & Adams, 2009). These results are supported by Guthrie & Farneti, who found there is a trend of cherry-picking of indicators, and not all indicators are provided in sustainability reports (Guthrie & Farneti, 2008).

That leads to the first hypothesis of this study. The general aim is to test if the highest rated GRI reports display the mentioned criticisms, and if there are patterns in the disclosure of performance indicators that feed the current debate about non-financial reporting with additional empirical evidence.

> **H1**: Due to the reporting flexibility and voluntariness of the GRI reporting guidelines, only a limited number of companies are expected to report comprehensively.

Clarity, Transparency, and Disclosure Overview

The pragmatic approach to non-financial reporting focuses on the paradigm of accounting. The combination of financial and cost accounting was designed to meet the informational needs of managers by generating relevant data for decision making based on clarity and transparency. The aim of non-financial reporting is defined as the gathering of data to help understand target oriented decision-making by fulfilling the informational needs of all stakeholders (R.L. Burritt et al., 2002; Roger L. Burritt & Schaltegger, 2010; Fleischman & Tyson, 1998; Schaltegger & Burritt, 2005; Wells, 1978). The focus of non-financial reporting is on sustainability information, particularly on social and environmental topics, the designing of information processes, empirically understanding where the data in practice comes from, and how it can be used (C. Spence et al., 2010). Here non-financial reports take different shapes. With regard to GRI DuPont could be mentioned. DuPont published in 2010 a "Sustainability Progress Report" of twelve pages and additionally a "Global Reporting Initiative Report" consisting of 63 pages providing in a transparent and comprehensive way what the company has done to address its social responsibilities and contribute to sustainable development. This variety of reports can be looked at with a theoretical lens as well: Buritt and Schaltegger group non-financial reporting theories take three directional approaches: the Inside-out Approach (helping managers contribute to sustainable development), the Outside-in Approach (stakeholder driven contribution of the corporation to sustainable development), and the Twin-track Approach (combination of the two) (Roger L. Burritt & Schaltegger, 2010).

However, aside from motivation, today's challenge is that different processes are used to produce sustainable reports. It is not clear if the internal usability of sustainable information, as the pragmatics say, is strong enough to outweigh the critical demand for strong and independent external audits and assurance, and contribute to standardization and trust-based credibility. Assurance can only create trust when it is independent (Dando & Swift, 2003). An audit is an inspection of standards with which an organization must comply. Usually the standard defines a minimal norm an organization must fulfill to maintain its certification level (Kok et al., 2001). Adams points out that an external audit does not guarantee that a sustainable report will not be used to legitimize corporate action. In his opinion, an audit can only generate trust if it is conducted by qualified people who understand the data generating process. Following his argument, an audit process needs generally accepted auditing guidelines that are compatible with generally accepted reporting guidelines of the companies (Whelan & Adams, 2009).

Financial reporting auditing can be conducted only by regulated organizations that have been certified and given the right to audit under specified auditing standards (Ioannou & Serafeim, 2010). So far, there has been no mandatory regulation for non-financial reporting as there is for financial reporting. For this reason, several interest groups have promoted the introduction of regulations, standards, and guidelines to translate sustainable performance into numbers. The aim is to enable comparison and assurance. The performance indicators introduced by entities like the GRI show this trend. The AA1000 Assurance Standard (AA1000 AS) is a standard by AccountAbility, a non-profit consultancy that offers assurance-related services. Their focus is on the process of reporting and auditing. The GRI is a non-profit organization that offers guidelines for non-financial reporting. Their focus is on the management of sustainability efforts (C. Adams & Zutshi, 2004). The GRI approach is described in detail in the next part of this review. Biggest for-profit competitors in the market segment of audits and assurance are PwC, KPMG, Ernst & Young, DNV, and Deloitte. Momentarily, their focus is only on the verification of reports. They do not attempt to assess sustainability performance. AccountAbility provides a broader range of services including the improvement, measurement, and assessment of sustainable performance (D. L. Levy et al., 2009). The

assessment of performance is a review of the strengths and weaknesses of an organization. The aim is to find opportunities for improvement (Kok et al., 2001).

Despite the existing guidelines and their improvements, there are still fields of concern. The problem is not only the earlier mentioned lack of completeness, but also the way of disclosing sustainability reports. There is an increase in the disclosure of sustainable reports on the Internet that gives companies the possibility to change their disclosures frequently. That leaves doubts about their reliability. Procedures like that would not be tolerated in financial reporting. That gives reason to call for mandatory requirements and governance structures. McDermott forms the idea of a worldwide association for sustainability issues (McDermott, 2009). Even if audits by third parties are included, transparency is lost if data is disclosed only on the Internet, given the fluidity of web data (Whelan & Adams, 2009). Guidelines like the one from the GRI call for sustainable reports that facilitate comparisons between companies. A crucial aspect for comparisons of this kind is reports that span several time periods and past performance. This availability of data is unquestioned for financial reporting, which is the role model for non-financial reporting (Willis, 2003). Maguire writes that even if reporting is voluntary, it is also expected, and therefore treated as a way of benchmarking financial performance. In the opinion of Ioannou, Serafeim, and Eccles, non-financial reporting does enable benchmarking and leads to a connection of sustainable performance and economic value (R.G. Eccles et al., 2012; Ioannou & Serafeim, 2012). The quality principles of the GRI guidelines state that a report should include clarity in communicating CSR (Birth et al., 2008). Clarity is defined as "information should be made available in a manner that is understandable and accessible to stakeholders using the report" (GRI, 2011). This definition however also can be criticized for connecting understandability to information being made available. This is particularly noteworthy as the completeness of the core performance indicators even on level A do not require 100 % completeness – a problem that in the later 4.0 version was addressed in removing all completeness by the buzzword of 'materiality'. Other principles that define the quality of a sustainable report, like timeliness, balance, accuracy, comparability, and reliability, can only be fulfilled if the report includes most of the performance indicators and if the report is accessible to all

stakeholders (GRI, 2011; Whelan & Adams, 2009). This study tries to find out to what extent the best-rated GRI A+ reports fulfill these quality standards. That leads to the second and third hypotheses.

> **H2** The role model of non-financial reporting is financial reporting, and one of the core principles of sustainable reporting is clarity. Therefore, it is assumed that there is full accessibility to current GRI reports via the GRI or online.

> **H3** Benchmarking possibilities of sustainability is a key feature in the evolution of non-financial reporting. Taking the principles and the mission of the GRI into account, it is expected that they provide a disclosure overview of companies and their indicator disclosures.

Disclosure of GRI 3.1 Performance Indicators

A GRI report is divided in three parts. The first part contains the firm profile, the second part consists of a management approach and the third part are performance indicators. Performance indicators are tools to generate non-financial information for sustainability reports (Stefania & Teresa, 2013).

The 84 GRI 3.1 performance indicators are either a "core indicator" (56), or an "additional indicator" (28). They are categorized into three areas: economic (7 core and 2 additional), environmental (18 core and 12 additional), and social (31 core and 14 additional). The social indicators are divided into four subcategories: human rights, labor, product responsibility, and society.

There are several application levels of GRI reporting: A, B, and C. They can be plus (+) if external assurance was utilized for the report. To meet minimum requirements, a level C report must disclose 24 indicators of part I (Profile), none of part II (Management Approach), and at least 10 indicators of part III (Performance Indicators). A level B report must disclose all indicators of part I and part II, and at least 20 core indicators of part III.

Level A reports must disclose all indicators of part I and part II, and at least 55 indicators of part III (GRI, 2011).

The focus of the GRI is on completeness—one of the core principles of the GRI reporting guidelines. On their website and in the guidelines, it is required for reports approaching an A+ level to report to the fullest extent on all core indicators (GRI, 2011; www.globalreporting.org, 2013). As mentioned above, the most concerning issue of non-financial reporting is the lack of completeness (C. Adams & Zutshi, 2004), particularly with regard to industry requirements (Lock & Seele, 2015). The aim of the GRI is to improve, through their guidelines, poor reporting performances, standardize reports, and make them comparable. The introduction of report levels and certifications for voluntary reporting, and the aim of the GRI to provide more transparency, arose from expectations that there is full disclosure on the required core indicators by companies with A+ reports. This is underlined by the fact that the report level and number of disclosed indicators is free of choice (GRI, 2011; www.globalreporting.org, 2013). That leads to the fourth hypothesis of this paper.

> **H4** Given the highest application level with external assurance (A+), it is expected that there is a high disclosure of mandatory core indicators.

This hypothesis could be considered a contradiction to the first hypothesis, but the reason for this hypothesis lies within the GRI guidelines and the certification system of the GRI. The first hypothesis is aimed at all possible indicators and the general willingness to disclose indicators; this hypothesis focuses only on the mandatory core indicators that are required in order to get an A+ certification. As stated on the GRI website, an A+ report is a report that "reports to the fullest extent...against the required standard disclosures" (www.globalreporting.org, 2013). Reporting level A allows the omission of mandatory core indicators if there is a justification in the report, including materiality, applicability, availability, or proprietary. That means an indicator can be omitted if it is proprietary; if "local laws forbid monitoring/disclosure of information OR when reporting on this Performance Indicator or disclosure management approach aspect would be seen as

business confidential." Not reporting because of "availability" means that a company can omit an indicator if it is able to "Explain why the data cannot currently be presented and commit to future reporting by indicating a specific year when this data will be reported." Materiality means a company must "explain the immateriality in relation to the organization's particular business process and/or explain why your organization's activities do not result in significant impacts in this particular area." Not Applicable means to "explain why the aspect or Performance Indicator as prescribed by the GRI Guidelines is not applicable to your specific business."

Method, Research Design, and Sample

The Sample and Data Collection Process

The sample of this study consists of all officially labelled GRI G3.1 A+ reports published in 2012 (N=177). The sample was finalized in March 2013. The 2012 reports were chosen because these are the most current reports available and the publication period is exceeded for that year. That means the sample is complete in its time frame. The G3.1 is the most updated version of the GRI guidelines applied, includes all recent improvements and changes, and is the on-going version until May 2013, when the new guidelines G4 were published. A-level reports have the highest requirements, and the plus means that an independent third party has assured these reports.

The data collection had to be modified due to difficulties in communication with GRI and the data was gathered manually from the website and the disclosure database. The Excel sheet provided by the GRI only enabled us to identify the companies labelled G3.1 A+ from 2012 and served as list for the sample identification. The manually gathering of the 84 performance indicators disclosures for each firm was possible only for 98 firms of the sample, because only these firms disclosed these data voluntarily in the disclosure database. Therefore, consist the results of hypothesis one and four on these 98 firms. For the other hypotheses the whole sample was evaluated.

Subsample Overview

Hypothesis	**Subsample Size**
Hypothesis 1: *Due to the reporting flexibility and voluntariness of the GRI reporting guidelines, only a limited number of companies are expected to report comprehensively.*	98
Hypothesis 2: The role model of non-financial reporting is financial reporting, and one of the core principles of sustainable reporting is clarity. Therefore, it is assumed that there is full accessibility to current GRI reports via the GRI or online.	177
Hypothesis 3: Benchmarking possibilities of sustainability is a key feature in the evolution of non-financial reporting. Taking the principles and the mission of the GRI into account, it is expected that they provide a disclosure overview of companies and their indicator disclosures.	177
Hypothesis 4: Given the highest application level with external assurance (A+), it is expected that there is a high disclosure of mandatory core indicators.	98

Coding Process

To apply quantitative content analysis, we analyzed the content of the GRI A+ reports by a codebook to generate data in order to test the hypothesis. The coding contains 41 descriptive variables on the report and the reporting company plus the 84 performance indicators of GRI 3.1. The codebook with the 41 variables is subdivided into three sections: a. formal categories and organizational data, b. accessibility of report and indicators, and c. performance indicator categories as presented by GRI 3.1.

Once the data was manually obtained and fed in the Excel sheet, the coding was done in two phases. Phase one was the manual gathering of the disclosure data from the disclosure database of the GRI into the code sheet. The second phase was the gathering of the data of part two of the categorization in the codebook, which are the categories about accessibility. That means that all 177 company web pages and online portals were checked manually for the availability of the report, as well as through all links provided by the GRI. All reports were tested in their accessibility, ability to download, their reuse and achievability, and the possibility to compare them to older reports. The coding sheet than was transferred to SPSS providing the codes for all 177 GRI A+ reports.

Quantitative Content Analysis

The method used for this study is quantitative content analysis. There are several definitions of content analysis. The definition from Berelson points out the quantitative consistency of a content analysis: "Content Analysis is a research technique for the objective, systematic, and quantitative description of the manifest content of communication" (Berelson, 1952, p. 18). Holsti includes in his definition the identification of characteristics. He says that "Content Analysis is any technique for making inferences by objectively and systematically identifying specified characteristics of messages" (Holsti, 1969, p. 14). Krippendorf complements the previous definitions with the notion of inference to the context of the data. "Content analysis is a research technique for making replicative and valid inferences from data to their context" (Krippendorff, 1980, p. 21). These definitions have in common that content analysis is a technique to systematically analyze specified characteristics of communication content. Given the public availability of the data from the GRI database we also point to the possibility of replication of our research.

We followed the tradition of previous works concentrating on performance indicators (Aktas et al., 2013; Guthrie & Farneti, 2008; Roca & Searcy, 2012) and used an explorative approach in order to generate frequencies of disclosure in order to generate comparable results. The challenge lies within the gathering and coding of this data.

The research process can be explained by the following three-step figure:

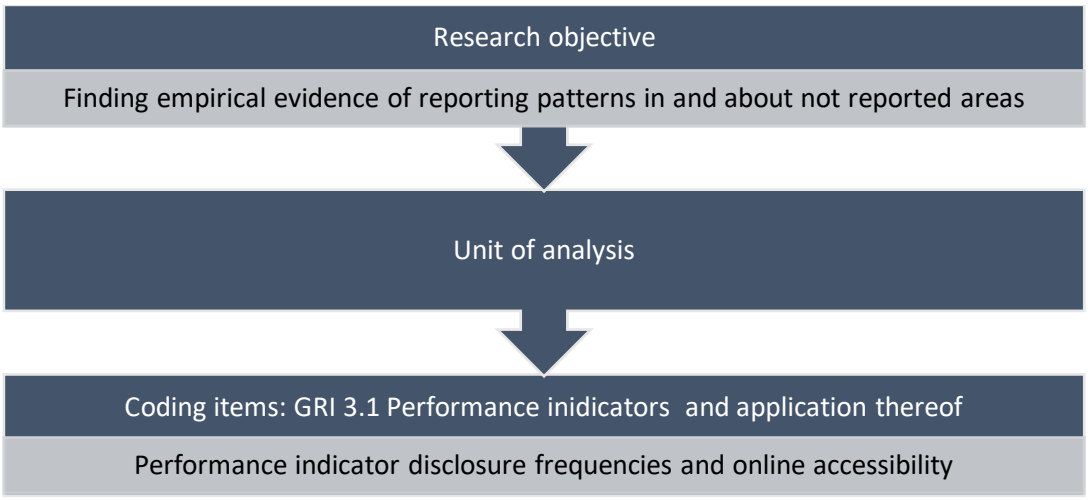

Figure B-1: Process of research

Results and Discussion

The analysis was done with Excel and SPSS. The data was analyzed with descriptive statistics to produce frequency tables of performance indicator disclosures, as well as for accessibility and availability of the GRI reports. To produce results in order to test the hypotheses, averages of disclosure frequencies within industry sectors, indicator categories, and accessibility categories were compared. The results about the consistency of the sample were achieved through descriptive statistics in frequency tables. We also applied statistical testing in order to find significant patterns within the variables, but however there were not which is why we remain on the level of mapping the field in an explorative and descriptive way.

Comprehensiveness of GRI-Reporting (Hypothesis 1)

The first hypothesis (H1) states that due to the reporting flexibility and voluntariness of the GRI reporting guidelines, only a limited number of companies are expected to report comprehensively.

The percentage of companies that have disclosed comprehensively on all mandatory indicators of a GRI A+ level report is 2.04% (subsample size N=98). That means two companies out of 98 disclosed all profile indicators, all management approach indicators, and all performance indicators (132 indicators). This finding *confirms* the hypothesis and verifies previous results that there is a lack of completeness in the analyzed GRI reports.

The only unexpected aspect of this finding is the extremely low number of companies disclosing on all indicators in this specific sample of the presumably best reports following the GRI guidelines. The specific sample of A+ reports, meaning externally assured best level reports, does not indicate a trend towards comprehensiveness, which could increase credibility in non-financial reporting following the argument of its promoters. The possibilities and reasons to omit indicators are broad. This is caused by the voluntariness of reporting and other reasons, like the inability of the generalization of indicators for all companies in all industries worldwide, as well as by the difficulties to measure sustainability. The creation of general standardized indicators remains the main challenge for the GRI and every other organization that is aiming to generate a sustainability-reporting frame that creates trust and directs companies towards a sustainable development. This finding can be taken as argument for hard laws regulating and mandating the disclosure of non-financial information as a way to create credibility in the reports through mandatory comprehensiveness.

Accessibility of GRI-Reports (Hypothesis 2)

Hypothesis H2 says that the role model of non-financial reporting is financial reporting, and one of the core principles of sustainable reporting is clarity. Therefore, it is assumed that there is full accessibility to current GRI reports via the GRI or online directly from the company.

Table 1 shows results of all accessibility categories. Findings indicate that 83.05% (subsample size N=177) of the GRI G3.1 A+ reports published in 2012 are actually available online. That means that there is not full accessibility to current GRI reports. We therefore *reject* H2.

There is still a gap concerning the accessibility of reports between financial reporting and non-financial reporting. It needs to be mentioned that the GRI guidelines are not making disclosure of the A+ report a must. If the GRI would make it mandatory to disclose GRI reports in a standardized way, it can be assumed that they could lose companies following the guidelines. This result seems to support the opinion of critics about current non-financial reporting practices. Companies get into the position to report on an A+ level without necessarily disclosing the underlying report. The reporting is voluntary as well as the disclosure. That displays the dilemma of voluntary sustainability reports and the rather weak position of NGOs like the GRI.

Accessibility of GRI Reports	**%**
Report online accessible	83,05
PDF of report downloadable	81,92
No password required to open PDF of report	98,62*
Report available in English	93,79*
Older PDF reports online available	46,33*
* % of downloadable reports	

Table B-1: Public accessibility of GRI reports

Information Dissemination by the GRI (Hypothesis 3)

The third hypothesis (H3) says that benchmarking possibilities of sustainability is a key feature in the evolution of non-financial reporting. Taking the principles and the mission of the GRI into account, it is expected that they provide a disclosure overview of companies and their indicator disclosures. Findings show that 55% (subsample size

N=177) of all indicator disclosure data is accessible directly through the online database provided by GRI in collaboration with KPMG.

As mentioned in the data collection chapter, there has been a change in the data gathering for this study. The GRI was not able or did not want to provide the disclosure frequencies of performance indicators from individual companies. The tool provided for benchmarking on the web page (http://database.global-reporting.org/benchmark) does not allow benchmarking of individual companies or by report level, but gives general frequencies of disclosed indicators, with possible filters for industry sector and region. Companies are responsible for maintaining indicator disclosures directly on the webpage, not the GRI.

This finding reveals the challenges of enabling benchmarking on non-financial reporting. One difficulty is measuring sustainability performance; another difficulty is the form, collection, and clarity of the sustainability data. The GRI has its origins in non-profit organizations that gathered, systemized, and disseminated information about companies' social performance. They used this information to generate public pressure on corporations. The GRI cannot provide clear and individualized data for stakeholders for benchmarking purposes on a meta-level. Critics of the GRI can use this finding because of the GRI's collaboration with KPMG concerning data collection and data disposability. This is particularly true as KPMG is the company, as the coding reveals, with the most assurance approvals of all 177 A+ reports. At the same time, they are the main cooperation partner of the GRI in providing the disclosure database. The GRI is collecting the data but was not able to provide the data for this study. Maintaining the disclosure information on the web page is the responsibility of the reporting company. This finding can be interpreted differently but as we do not have a robust data situation, we will not engage in speculating about this situation.

Certification of Non-financial reporting (Hypothesis 4)

Hypothesis four (H4) states that given the highest application level with external assurance (A+), it is expected that there is a high disclosure of mandatory core indicators. Table 2

shows the findings of the disclosure frequencies of performance indicators within their main categories. We find that the average of disclosed core indicators is 77.66% (subsample size N=98).

Indicator Category	**% of Disclosure**
Average Reported Core Indicators	77,66
Average Reported Additional Indicators	65,52
Average Reported Economic Indicators	79,59
Average Reported Environmental Indicators	68,64
Average Reported Social Indicators	76,33

Table B-2: The frequency of disclosed performance in average percentages

Hence, the hypothesis that A+ reports disclose fully or high on the mandatory core indicators has to be *rejected*. The findings show that some A+ reports disclose less mandatory core indicators than are required for B level reports. That means an A+ report can disclose all 56 core indicators, which is a comprehensive reporting of all indicators. But the findings also reveal that some A+ reports, although assured as A+ report less than 20 indicators which – by the number of suggested reported indicators – is less than what is recommended for a B+ report. Given that it is not GRI's declared aim to define, certify, or audit performance, but to provide a universal reporting framework for non-financial reporting this finding challenges the way the ABC classification scheme as proposed in the 3. 1 guideline (and as abolished in the subsequent 4.0 guideline).

The results show that the certification levels of the GRI do not reflect disclosure frequencies of mandatory core performance indicators. Critics can argue that non-financial reporting is part of the problem rather than a way out of it. Also, scholars that criticize sustainable reporting as self-laudatory advice can take these results as a basis for argument. Reports may fluctuate, and the reason for these fluctuations might lie in the generalization of the indicators as mentioned in the discussion of the first hypothesis, or in the self-laudatory attempt of companies to cushion their reputation. Either way, the

results show the challenges the GRI in particular, and non-financial reporting in general face.

Conclusions

This research provides findings that nourish the current academic discussion about non-financial reporting and the question of where to go from here, particularly for the NGO GRI. Non-financial reporting is in the process of development. Results of this study show and complement the literature that the main challenges of non-financial reporting lie within credibility and standardization. The variance of indicator disclosure frequencies, as demonstrated empirically here, and the various ways of publishing sustainability reports, indicate these challenges. The findings imply that non-financial reporting is not on a same level with financial reporting. That can be seen by the accessibility of sustainability reports and the variance of indicator disclosure frequencies.

GRI reporting shows the same disclosure patterns as other sustainability reports concerning the degree of comprehensiveness. The study explains general reporting problems like completeness, quality by disclosure frequency, and accessibility of the data that suggest critical remarks towards GRI and the lack of provision of transparency, even with the best-in-class reports externally assured as GRI 3.1 A+.

Variance and variety in this standardized way of reporting sustainability by the GRI can be concluded as a need for mandatory disclosure processes like the ones for financial reporting backed by governmental laws. However, the quality of the indicators and the knowledge about the ability to generalize them can be concluded as a need for patience before the reporting process is evolved enough to become a hard law. More information about reporting practices and the reasons behind the non-disclosure of performance indicators can be interesting topics of further studies.

Therefore, the findings enable the identification of potential areas where non-financial reporting can be improved concerning accessibility and benchmarking possibilities. The overall challenge, therefore, is to adopt financial accounting standards to generalize performance indicators and thus reach comparability, standardization and thus

transparency. We can say, based on our findings, that GRI 3.1 is not capable of achieving this step. On the contrary, by providing external assurance standards that have the shortcomings mentioned above, GRI 3.1 appears to be standardized and transparent but when looking closely, it is not. Mastering this challenge, however, seems to be on the agenda of GRI, as the new 4.0 was published in May 2013. The external assurance level of ABC, with and without "+", is removed by GRI. What seems to be less assurance by third party entities is based on the result of the assurance application as a step towards more credibility of GRI, as the assurance standard and application is questionable even on the A+ level. A second advancement of GRI 4.0 is the healing of shortcomings found in this research and the translation of GRI 4.0 into corporate reporting language XBRL. XBRL is widely used (Zhu & Wu, 2014) and already mandatory in the U.S. by the Securities and Exchange Commission, which allows for large scale, software-based data-set standardization and thus higher levels of comparability and semantically richer reports (Debreceny & Gray, 2001). However, it needs to be said that again the XBRL taxonomy is developed with corporate support, here Deloitte NL. XBRL being a mandatory standard for financial reporting in the U.S. already could allow healing some of the shortcomings addressed in this research on GRI 3.1. and contribute to more transparency, credibility, and comparability of non-financial disclosure within corporate communication, stakeholders, and regulator perception.

Limitations and Future Research

One limitation concerns the study design itself by referencing disclosing frequencies to non-financial reporting performance. A sustainability report is not necessarily mirroring the creation process of itself, so all possible conclusions are interpreted probabilities drawn from a report. A future research design to study the creation process and the data generation and monitoring mechanisms within the firm would allow precise measurements of the disclosure quality. With such a research design, one could also draw conclusions not only about disclosure quality but sustainability performance itself, contrary to the

measurement of disclosure frequencies of performance indicators that allow only one-dimensional conclusions to the disclosure quality by frequency and not by content.

The next limitation relates to the performance indicator. In this study the indicators were taken as given; the quality of the indicators was not measured or weighted. But this limitation also applies to GRI, except for the fact that GRI distinguishes between additional indicators and core indicators.

Another limitation relates to the categorization of accessibility. As mentioned in the discussion, accessibility does not mean the same thing in all cases. Some companies made it difficult to access the report, while others made it easy. In the coding for this study, a degree of accessibility has not been measured. It falls also under this category that – as mentioned in the results section – in the GRI database the availability was not always given. Out of the 177 A+ reports only 98 disclosed their performance indicators in the GRI database.

Based on these limitations, future research should first address a systematic comparison of the 3.1 and 4.0 guidelines and the changes mentioned here to both advance non-financial reporting and stop the decreasing number of corporations incorporating guidance by the Global Reporting Initiative. Furthermore, the introduction of XBRL as the corporate reporting language for CSR and sustainability content allows for more rigorous, standardized quantitative research, if social and environmental issues are reported and published in a standardized reporting language, making use of comparable data points as already used in XBRL-based financial reporting.

Finally, the new principle of "materiality" of the GRI needs to be examined. Materiality being a widely accepted concept for corporations to decide what to report, also opens opportunities for 'window dressing' as it leaves it to the company to decide what to report and what not to report (and thus it may contribute in some cases to window dressing, placing those that report all indicators (irrespective of favorable or non-favorable outcomes) at disadvantage to those who in the name of materiality report only numbers making the company look good. This misleading application of materiality could be seen as a potential loophole for corporations to escape more rigor, and standardized non-financial reporting in order to potentially mislead the public by reporting favorable

performance indicators and leave aside bad-looking performances excused by the specific "materiality" of the industry or single corporation. Therefore, more research on the pros and cons of the concept of materiality is needed, also in order to advance non-financial reporting in general to arrive at a level-playing field.

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