Routledge
Taylor & Francis Group

CRC Press
Taylor & Francis Group

SAVE
£24.00

Routledge Advances in Management and Business Studies

COLLABORATIVE SPACES AT WORK

INNOVATION, CREATIVITY AND RELATIONS

Edited by
Fabrizio Montanari, Elisa Mattarelli
and Anna Chiara Scapolan

1st Edition

Collaborative Spaces at Work
Innovation, Creativity and Relations

Edited By Fabrizio Montanari, Elisa Mattarelli, Anna Chiara Scapolan

Copyright Year 2021

ISBN 9780367350451

December 29, 2020   Forthcoming   by Routledge

248 Pages 27 B/W Illustrations

Book Description

Collaborative spaces are more than physical locations of work and production. They present strong identities centered on collaboration, exchange, sense of community, and co-creation, which are expected to create a physical and social atmosphere that facilitates positive social interaction, knowledge sharing, and information exchange. This book explores the complex experiences and social dynamics that emerge within and between collaborative spaces and how they impact, sometimes unexpectedly, on creativity and innovation.

Collaborative Spaces at Work is timely and relevant: it will address the gap in critical understandings of the role and outcomes of collaborative spaces. Advancing the debate beyond regional development rhetoric, the book will investigate, through various empirical studies, if and how collaborative spaces do actually support innovation and the generation of new ideas, products, and processes.

The book is intended as a primary reference in creativity and innovation, workspaces, knowledge and creative workers, and urban studies. Given its short chapters and strong empirical orientation, it will also appeal to policy makers interested in urban regeneration, sustaining innovation, and social and economic development, and to managers of both collaborative spaces and companies who want to foster creativity within larger organizations. It can also serve as a textbook in master's degrees and PhD courses on innovation and creativity, public management, urban studies, management of work, and labor relations.

Table of Contents

INTRODUCTION

PART I – How collaborative spaces work: Goals, internal dynamics and (un)expected results in context

DICHIARAZIONE SOSTITUTIVA DELL'ATTO DI NOTORIETA'
(Art.47 D.P.R. 28 dicembre 2000, n.445)

Oggetto: dichiarazione di attribuzione analitica di pubblicazione

Gentili Colleghi,

con la presente dichiariamo che, nonostante la seguente pubblicazione sia il frutto di un lavoro congiunto svolto dai firmatari, le singole parti possono essere attribuite come segue:

- Il paragrafo "Introduction" è attribuibile a Damiano Razzoli, Matteo Rinaldini, Federico Montanari;

- Il paragrafo "Sociomateriality, space and time at play in workspace" è attribuibile a Damiano Razzoli e Stefano Rodighiero;

- Il paragrafo "Setting and methodology" è attribuibile a Stefano Rodighiero;

- Il paragrafo "Findings" è attribuibile congiuntamente a Matteo Rinaldini e Damiano Razzoli;

- Il paragrafo "Conclusions" è attribuibile congiuntamente ai quattro autori.

Rinaldini, M.., Razzoli, D., Rodighiero, S., & Montanari, F.(2021). "Collaborative spaces in the material world: Towards a typology of space-time regulation artifacts", in Montanari, F., Mattarelli, E., & Scapolan A., *Collaborative Spaces at Work: Innovation, Creativity and Relations,* London: Routledge, ISBN: 9780367350451 (forecoming)

Cordiali saluti,

Matteo Rinaldini

RINALDINI
MATTEO
10.11.2020
00:35:29 UTC

Damiano Razzoli

Stefano Rodighiero

Federico Montanari

Collaborative spaces in the material world: Towards a typology of space-time regulation artifacts

Collaborative spaces in the material world: Towards a typology of space-time regulation artifacts

Matteo Rinaldini
University of Modena e Reggio Emilia, Department of Communication and Economics
Damiano Razzoli
University of Modena e Reggio Emilia, Department of Communication and Economics
Stefano Rodighiero
University of Bologna, Department of Management
Federico Montanari
University of Modena e Reggio Emilia, Department of Communication and Economics

Abstract
Collaborative spaces (CSs) have emerged as settings conceivable as spatial and temporal re-organization devices. The aim of this chapter is to highlight the relationship between the space-time dimension and the material assemblages unfolding within collaborative spaces. Through direct observations and semi-structured interviews conducted in three CSs in Northern Italy, we explore how material artifacts allow CSs' users to organize their working space and time. Indeed, CS's users process, shape and use material artifacts according to their space-time needs. Specifically, we draw a typology of space-time regulation artifacts that comprises three different categories of material artifacts that contribute to the enactment of space-time coordination practices by those who attend CSs.

Keywords: collaborative spaces, sociomateriality, space, time, artifacts, coworking

Collaborative spaces in the material world: Towards a typology of space-time regulation artifacts

Introduction

In the last decades, globalization and digitalization have coincided with (and enhanced) changes in the labor market that have impacted on the spaces and times in which work activities are carried out – i.e., the *where* and *when* of people's work. These changes have resulted in an increasingly project-based and independent workforce, short-term contracts, and high levels of mobility (Boltanski & Chiapello, 2005; Cappelli & Keller, 2013). In these new working conditions, the disconnection between work activities and traditional work environments has contributed to changing the spatial distribution of work towards a distributed mode of production, in which work tasks can be performed from different settings and with a flexible temporality (e.g., Merkel, 2019).

Within this framework, collaborative spaces (CSs) have been referred to as so-called "third places" (e.g., Brown, 2017) that combine a flexible organization working spaces and times with services and infrastructures of traditional workplaces. In doing so, CSs foster opportunities for serendipitous encounters, knowledge exchange and cross-fertilization among otherwise dispersed professionals, thus potentially favoring a collaborative emergence of creative and innovative outcomes (Capdevila, 2019; Oksanen and Ståhle, 2013). Moreover, studies concerning the managing of CSs – in terms of their physical, socio-organizational, or relational design – have also focused on the emergence of spontaneous practices thanks to the co-localization and proximity of heterogeneous actors (e.g., Parrino, 2015). Accordingly, the ever-growing importance accorded to CSs by both practitioners and scholars has led to the investigation of how their physical and material features, as well as their aesthetic dimension, can sustain professionals in better organizing their workflows (Blagoev, Costas, & Kärreman, 2019; Cnossen & Bencherki, 2019). These contributions have suggested the importance of a sociomaterial perspective in order to understand how professionals interact with space and

Collaborative spaces in the material world: Towards a typology of space-time regulation artifacts

materiality (e.g., Dale & Burrell, 2008), despite the common interpretation of work within the gig and platform economy as being dematerialized.

Moreover, the mostly part-time and temporary attendance of CSs by different professionals and the co-localization of different physical spaces and artifacts suggest interesting research avenues, as their intertwining might shape professionals' practices in different ways. The present chapter attempts to provide a first exploration of such avenues by defining a typology of material artifacts that allow for professionals' space-time coordination practices within CSs by exerting a regulatory function on the actions, interactions and collaborations that they carry out and take part to while performing their work activities. Specifically, space-time coordination pertains to all those constraints that are created in a CSs thanks to the use of material objects, technologies, and relationships between actors, with the function of maintaining a sense of coherence and identity in these spaces (see also Schwanen & Kwan, 2007). We deem CSs as a particularly interesting setting for exploring the enactment of space-time coordination practices, as such spaces entail both physical and organizational settings that enable professionals to address their need for managing (and organizing) increasingly flexible and mobile work activities. Moreover, we acknowledge approaches that highlight the reciprocal influence of space, material artifacts and social interactions, under both sociological (e.g., Fuller & Löw 2017) and organizational lenses (e.g., Boxenbaum, Jones, Meyer, & Svejenova, 2018). We also attempt to integrate sociomateriality within "individuals' interdependent work patterns and the larger social and temporal context" (Perlow, 1999, p. 57). Coherently, our exploratory work underlines three different categories of material artifacts that contribute to the enactment of space-time coordination practices by the different individuals attending CSs: i.e., "immanent artifacts of space-time regulation", "infrastructural artifacts of space-time regulation", "practical artifacts of space-time regulation".

Collaborative spaces in the material world: Towards a typology of space-time regulation artifacts

Sociomateriality, space and time at play in workspaces

Since the seminal works on situated and distributed cognition (e.g., Hutchins, 1995; Suchman, 2007), which underlined the relevance of physical, social, and cultural contexts in defining what is knowledge, the role of material artifacts has been scrutinized by different studies, ranging from technology-related ones to those relating to actor network theory. Within this framework, a relevant focus is drawn on the fact that human practices can be conceived not only as constellations of intersubjectivity but also as constellations of interobjectivity (Latour, 1996), contributing to the so-called "objectualization" of the social (Knorr-Cetina, 1997, p. 1). Such a focus has stressed the dependence of human beings on objects as "relationship partners and embedding environments" (Knorr-Cetina, 1997, p. 1), providing an important stepping stone for the renewed attention on the role of workplaces for those who attend them (e.g., Luff, Hindmarsh, & Heath, 2000).

In this vein, an increasing number of scholars from sociology, organizational studies, and management have raised the attention on both the spatial and material elements of workspaces and their impact in organizations and organizing (e.g., Boxenbaum et al. 2018; van Marrewijk & Yanow 2010). This growing interest on object-centered environments that situate selves – and set their reciprocal links with artifacts – has led to a new attention on the role of space in providing a material (physical) and immaterial (e.g., value- or identity-based) arrangement where the "things" facilitate the diverse activities, relationships, and outcomes of professionals (Carlile, Nicolini, & Langley, 2013; Leonardi, Nardi, & Kalinikos, 2012).

Indeed, based on the idea that space is the product of multiple interrelations always under construction (Massey, 2005) and that "social relations [...] have no real existence save in and through space" (Lefebvre, 1991, p. 404), studies on workplaces and organizations conceptualized space as a sociomaterial performative process. To illustrate, the conceptualization of sociomateriality encompasses considerations about the relationship

4

Collaborative spaces in the material world: Towards a typology of space-time regulation artifacts

between the "social" and the "material": on the one side, the term sociomateriality underlines how all materiality is created through social processes and how it is interpreted, enacted, and more generally used in social contexts; on the other side, the term showcases how all social actions are possible because of some materiality (Leonardi, 2013). Hence, the sociomaterial perspective considers worth to be explored not only the "objective" characteristics of workspaces or the associated social processes, but also the way in which individuals relate to artifacts in a mutual constitutive process (e.g., Orlikowski & Scott, 2008). Materiality shapes processes through its tight connection to the social realm, whereas space constitutes the physical setting where objects and subjects relate. At this regard, scholars define this bond as a *constitutive entanglement*: "The social and the material are considered to be inextricably related – there is no social that is not also material, and no material that is not also social" (Orlikowski, 2007, p. 1437). Accordingly, some scholars refer to workplaces as *generative* rather than "passive container" for actions that influence organizations' capacities (Kornberger & Clegg, 2004), whereas others refer to the trope of *affiliation object* to describe the role of objects to establish fraught relational associations (Suchman, 2005).

In this line, the interrelation between human and non-human actors has been studied by focusing on performative and mutual constitution processes relating to the organizational space and work practices (e.g., Beyes & Steyaert, 2011). Studies have focused on organizations' and workers' use of sociomaterial features of work environments as tools for achieving different goals – i.e., tools for narrating and shaping their own image and identity (Quattrone, Puyou, McLean, & Thrift, 2012); tools for defining meaning and boundaries of novel managerial ideas (Höllerer, Jancsary, Meyer, & Vettori, 2013); tools for occupational legitimacy (Rafaeli & Pratt, 2006); tools for fostering interaction, information exchange, and collaboration in work practices (Nicolini, Mengis, & Swan, 2012). Moreover, studies embracing this perspective have pointed out the multiple sets of artifacts found to be essential for processes of organizing:

Collaborative spaces in the material world: Towards a typology of space-time regulation artifacts

forms, images, visualizations and assemblages (Bell, Warren, & Schroeder, 2014), buildings and architectural features (Gieryn, 2002), infrastructures for daily work activities (Orlikowski 2007), and the design of internal physical layouts (Kingma, 2019; Kornberger & Clegg, 2004). In this vein, artifacts are acknowledged as critical elements that shape the organizational experiences of individuals: on the one side, they regulate the way individuals relate with the physical setting where they enact their everyday working practices; on the other side, they can favor – as boundary objects – collective action, coordination and collaboration among different professionals, due to their "capacity to serve as bridges between intersecting social and cultural worlds" (Nicolini et al., 2012: 614).

Within this framework, the social and the material domains are mutually constitutive and, thus, they should be investigated jointly. In this direction, we believe that the attention on this entanglement between the social and the material should put under scrutiny also the role played by artifacts in regulating and shaping not only the workplace, but also the work time (e.g., Orlikowski & Yates, 2002; Perlow, 1999). Indeed, extant literature on time in organizations has mainly focused on individuals' use of time, identifying the existence of common patterns in the ways people use their time alone and in coordination with others (e.g., Perlow 1999 for a review). In this context, some studies have already underlined how human and non-human artifacts like calendars, clocks, or event-based cycles are involved in the social construction of temporal rhythms (Clark, 1985; Zerubavel, 1981). Hence, as temporality is produced in situated practices (Orlikowski & Yates, 2002), and practices are enacted also in a spatial environment, it would be useful to delve deeper into this interrelation. Accordingly, studying how spatiality and materiality influence work patterns would allow to better understand "how work actually gets done and what effects the work process has on individuals' work, their team's work" (Perlow, 1999, p. 79).

Collaborative spaces in the material world: Towards a typology of space-time regulation artifacts

CSs represent an increasingly important empirical setting for this purpose. CSs refer to settings that aim to gather together people from different sectors and contexts "who do not necessarily work for the same company or on the same project, [… but who work] alongside each other, sharing the same working space and resources" (DeGuzman & Tang, 2011, p. 22). One of the core objectives of CSs is to provide a physical and social atmosphere able to support face-to-face interactions, an overall ethos of exchange, and a sense of community, which in turn can sustain cross-fertilization processes and collaborations that are potentially conducive to outcomes such as innovation and entrepreneurship (e.g., Garrett, Spreitzer, & Bacevice, 2017; Schmidt & Brinks, 2017). The importance of CSs as an empirical setting is further amplified by current transformations of work, which entail the erosion of traditional organizational, spatial, and temporal boundaries. Within this framework, CSs are conceived as providing professionals with new forms of support and coordination (Krause, 2019).

Indeed, CSs have been often intertwined with distributed modes of production favored by technological improvements and based on individuals' autonomy, mobility, and flexibility in organizing their own tasks. In this direction, they seem to be fraught of relevant implications on how sociomaterial aspects underlying them might impact on the way people relate and organize their workspace and work time. Extant literature has overlooked such aspects. However, some interesting contributions are emerging linking sociomateriality to CSs. For instance, sociomateriality can be linked to the provision of behavioral and relational slacks that help CSs' users pursue novel entrepreneurial ideas (Aslam & Goermar, 2018). Moreover, CSs' spatial setting is conceived as a material assemblage that enable practices and is shaped by practices simultaneously, thus contributing to the constitution and the endurance of organizations (Cnossen & Bencherki, 2019). Space, artifacts, and their aesthetics are also considered central to collective processes that favor the emergence of a shared meaning in terms of personal and professional identities and attachment to a job, an environment, or a

Collaborative spaces in the material world: Towards a typology of space-time regulation artifacts

community (van Dijk, 2019). The spatial and material organization of CSs has also been found to enable temporal patterns such as *rituals*, which provide templates for making sense of social reality, and *routines*, which do "not pattern the 'what' or 'how', but rather the 'where' and 'when' of work" (Blagoev et al., 2019, p. 14). Accordingly, our study aims at offering a contribution to this debate.

Setting and methodology

Consistently with our exploratory aim, we adopted a multiple case study approach (Yin, 2009). We investigated three CSs located in Northern Italy: i.e., BASE (Milan); Impact Hub (Reggio Emilia); Kilowatt (Bologna). First, the three CSs host a wide array of knowledge workers and so-called IPROs (Rapelli, 2012) – from now on, we will call them coworkers – from different realms (ICT, social innovation, creative industries, etc.), who mostly work as freelancers and smart workers, or either within start-ups or established companies. Second, whereas BASE and Impact Hub are situated in former industrial buildings, Kilowatt is in a historical one. Third, all three CSs offer a wide array of services (shared desks, private offices, networking and acceleration programs, events, workshops, lunch areas, etc.). All three aspects result in different spatial settings and material artifacts encompassed within all three CSs, further differentiating space-time coordination practices of coworkers.

We conducted fieldwork from March 2018 to April 2019 and gathered data from multiple sources: direct observations, semi-structured interviews, and archival sources. Direct observations represented the primary source: this is consistent with an interpretative approach within studies adopting a sociomaterial perspective that aims to "engage the meanings … [physical] spaces and other objects hold for those passing through and/or using them" (van Marrewijk & Yanow, 2010, p. 7). We distributed observations uniformly throughout opening hours and on various days of the week. We took field notes and pictures. Field notes reported

both facts and researchers' impressions, including physical sensations, thoughts, and questions emerging from observations and interactions (Emerson, Fretz, & Shaw, 2011). We then transcribed them into files that were analyzed by all four authors. We paralleled direct observations with 68 semi-structured interviews with coworkers and hosts of the three CSs. Interviews ranged from 30 to 50 minutes and were recorded and transcribed. Questions focused on: background information about CSs and informants; design of physical spaces and artifacts and informants' behaviors, attitudes, uses, and meanings relating to them (as well as perceptions of those of other users); informants' organization of work and non-work time; interactions and collaborations developed within the CSs, and emerging outcomes.

Finally, we collected data from the following archival sources: official websites of CSs, documents produced by CSs, and floorplans. The use of multiple sources allowed us to triangulate data, thus supporting us in substantiating the emerging categories of artifacts (Eisenhardt, 1989). Each author read the collected data independently in order to develop personal impressions, which we then shared and discussed until we reached a common interpretation. Moreover, throughout the data collection process, we used an inductive approach and went back and forth between data and literature. This allowed us to uncover three different categories of artifacts that support the emergence of space-time coordination practices of coworkers. This was a recursive rather than a linear process: we moved iteratively between our data and the emerging patterns, while also looking for relevant "breakdowns" that could challenge our interpretations of what was occurring on the field (Alvesson & Kärremann, 2011). We stopped when adequate categories emerged for our typology of space-time regulation artifacts.

Findings

Collaborative spaces in the material world: Towards a typology of space-time regulation artifacts

Material artifacts can contribute to the construction and enactment of space-time coordination practices by individuals. Given CSs' respective features, goals, and missions, this consideration opens relevant questions concerning such settings. Drawing on our qualitative analysis, we try to address these questions by exploring which artifacts perform a space-time regulation function within CSs and how they perform it. Within this framework, artifacts placed within CSs define both constraints and opportunities for coworkers while they carry out their own work tasks or interact with others, thus potentially affecting modes of working, design and use of workspaces, and worktimes. Through their material and symbolic dimensions, these artifacts can support the segmentation of internal areas, as well as attributing identities and functions, regulating modes of uses, rules of access, and ways of interactions. In doing so, artifacts can influence space-time coordination. Accordingly, we can label them as "space-time regulation artifacts". The triangulation of multiple sources allowed us to explore both the inter-subjective and inter-objective relational dimensions unfolding within our case studies, thus enabling the emergence of those specific artifacts that regulate space-time coordination. We identified three different categories of "space-time regulation artifacts": i.e., "immanent artifacts of space-time regulation"; "infrastructural artifacts of space-time regulation"; "practical artifacts of space-time regulation". These three categories of artifacts (and their functions) are summarized in Table 4.1 along with some examples. Photos of material artifacts within the three CSs for each identified category are provided in the Appendix (Figures A1–A4).

<TABLE 4.1 HERE>

Immanent artifacts of space-time regulation

The first category includes artifacts such as: calendars, agendas, and boards illustrating the activities planned for the various internal spaces; ICT platforms supporting the scheduling of

Collaborative spaces in the material world: Towards a typology of space-time regulation artifacts

workshops and events; badges at the entrance of the various internal spaces outlining their functions; notations relating to opening and closing hours of CSs. All these artifacts are designed and used entailing an immanent space-time regulation function: coherently, artifacts illustrating planned activities cannot be separated from the act of planning itself, whereas artifacts supporting the scheduling of workshops and events cannot be separated from the act of scheduling itself. CSs can rely on immanent artifacts to both set formal functions for specific areas and set those areas apart from other "un-functionalized" ones. Moreover, immanent artifacts can help outline intended functions of distinctive areas. Within Impact Hub, a plastic badge labelling a previously un-functionalized room as "Meeting Room" formalized its functionalization as a room for private work meetings, with coworkers relying on that single artifact in reinforcing such a function over time. As a result, coworkers have increasingly arranged private work meetings based on the room's availability (which, in turn, is signaled by the above-mentioned badge), while arranging (and sometimes rearranging) other activities such as training courses, pitches, and events in other areas. For instance, one interviewee who helps manage the CS reports as follows: "We decided to give a clear function to a small room as coworkers needed a meeting room. However, no one reserved it until we placed a plastic badge to label its new function. Now, people organize their work tasks and daily timelines according to its availability."

Moreover, we observed that Impact Hub relied on a calendar to outline its main planned activities (e.g., workshops, talks, events). Hosts purposefully located the calendar within an open-plan area at the very entrance of the CS, thus making it potentially visible to all coworkers. In turn, coworkers used the calendar to get a first glance at the upcoming activities within the CS, and then engaged in conversations with other coworkers to coordinate their own activities with those reported on the calendar. At this regard, one interviewee said: "Hosts set up a chalkboard for us to write down what we need and when. In doing so, we do not only book

the meeting room or the open space, but we also share and socialize our schedules with other coworkers."

We also observed that BASE largely relied on immanent artifacts, in most cases similarly to Impact Hub. One example relates to a badge labelling a room as "Burò" (which recalls the French word *bureau* – i.e., "private office"). The badge outlined (and contributed to) the functionalization of that room as one with strict access rules, being accessible to hosts and few authorized coworkers only. As a result, this artifact encapsulated different space-time regulation functions for those who could access the room and those who were not granted access, thus affecting their space-time coordination practices differently. For instance, one coworker who could access the "Burò" said: "I come to work here at any time of the day, week and year; my badge allows me to be part of the community of the second floor and this helps me routinize my work and, at the same time, be more flexible when I'm closer to projects' deadlines". By contrast, one interviewee who mostly works from BASE's café said: "Most people like the café more than other areas because of its free access and sociality, as it is easier to meet people either at public events or while working. However, I always need to fit my agenda to the café's daily time flows: for instance, it gets too noisy at lunch times, thus I have to change work environment in order to stay focused."

Infrastructural artifacts of space-time regulation

Not all artifacts contributing to regulating space and time entail an immanent regulatory function, thus still managing to define constraints and opportunities for coworkers. Our second category of artifacts – i.e., "infrastructural artifacts of space-time regulation" – well exemplifies these considerations. These artifacts comprise doors, windows, walls, partitions, and other infrastructural components of CSs. Their mere presence and assemblage can suggest premises, functions, and access rules of internal areas. However, the setting of these artifacts

Collaborative spaces in the material world: Towards a typology of space-time regulation artifacts

is not enough, as their own physical characteristics affect how their regulatory action unfolds, in turn contributing to defining different constraints: i.e., a permanent brick wall encapsulates very different space-time constraints compared to a wooden partition that can be easily moved and reassembled. For instance, our case studies widely relied on movable wooden partitions to allow coworkers to shape their workspaces in order to meet their own needs for either privacy or socialization alternating across different times of the day. To illustrate, one interviewee working at Impact Hub said: "This CS adopts modular structures and dividers that can be moved to adapt to the different needs of those who work here. The environment has changed many times since I've got a desk here." Another interviewee said: "Flexibility is Impact Hub's strength; hosts accommodate our demands easily. Whenever a room no longer serves its function, it becomes something else."

Moreover, transparent and soundproof glass doors and partitions are widely used by CSs to both set spatial divisions and segment different areas whilst preserving visual continuity across these segmented areas. Indeed, these artifacts can enable a filtering of the many, sometimes conflicting, stimuli linked to shared workplaces. They can expose coworkers to visual stimuli coming from other internal and external areas of a CS whilst reducing auditory ones to a minimum, thus aiming to support both a sense of community (and sometimes collaboration) and a need for privacy and focusing. In this sense, one example stems from the segmentation of employees of a small ICT company located within Impact Hub. The company engaged in negotiations with Impact Hub's hosts in order to balance two potentially conflicting needs it was facing: a need for spatial proximity of its employees, on the one side, and a need for spatial division between those performing programming tasks and those delivering phone consultancy, on the other side. Thus, all employees were located within one single area of the CS (in turn, also resulting in a functionalization of a previously un-functionalized area), with a glass partition segmenting that area in two further ones (and two further functions): one sub-area for

programmers and another one for consultants. By being soundproof, the partition enabled programmers to keep focusing on their own tasks whilst their colleagues delivered phone consultancy. Simultaneously, the partition's transparency allowed consultants to engage in real-time, non-verbal interactions and coordinate with programmers while still taking calls and performing their own tasks. Thus, the physical characteristics of such an artifact enhanced the productivity of both groups of employees, while also partially nurturing the collaborative benefits of spatial proximity. They allowed one single (segmented) area to encompass both the synchronous development of potentially conflicting work activities and continuous real-time, non-verbal interactions between the two groups of employees, thus fostering different forms of space-time coordination. As a result, the two groups are segmented by the glass partition, but do not end up being secluded. To illustrate, one interviewee said: "At first, we all had temporary shared desks. However, the company grew and expressed the need to move in a separate environment because of a growing fragmentation into different project teams. We started working ever-more separately, with distinct tasks and schedules depending on each project."

Another example of an infrastructural artifact relates to a small area fully bordered by glass walls located at the center of a larger open-plan area in BASE. This glass-bordered area (informally labelled by coworkers as "Aquarium") was both transparent and partially soundproof, while also being usable by booking it for short times only. These characteristics supported the creation of an "enclaved" workspace with its own functions and stricter – yet, on a temporary basis – access rules that still maintained some relevant links with the outside world. As a result, the setting of such an artifact enabled to address coworkers' temporary needs for privacy and isolation either for private work meetings or for individual work, while also keeping them embedded within the broader context of the CS. The artifact's physical characteristics allowed both the leveraging of some of the benefits of spatial proximity and the synchronous development of potentially conflicting work activities similarly to the example of

Collaborative spaces in the material world: Towards a typology of space-time regulation artifacts

Impact Hub. However, differently from Impact Hub, both these aspects were further reinforced by the location of such an area within an open-plan one with more flexible access rules (e.g., all coworkers can access the open-plan area at any time) and modes of use (e.g., a mix both formal and informal modes of use). This was also compounded by the informal labelling ("Aquarium") performed by coworkers. Such a labelling symbolically reinforced the emergence of a different "space-time dimension" within the boundaries of the enclaved area that still traced links, and triggered coworkers' coordination, with the other dimensions unfolding in the bordering open-plan area. To illustrate, one interviewee said: "I always see lots of people in that glass room. It's interesting to sneaky peek and see what they're doing; they're like fish in a bowl, that is why we call it 'Aquarium'. Apart from being useful, these rooms make me think of the boundary between interaction and isolation that underlies coworking, making me more eager to get to know other coworkers."

Practical artifacts of space-time regulation

Finally, our qualitative analysis allowed us to uncover a third category of artifacts exerting a space-time regulation role: i.e., "practical artifacts of space-time regulation". This category includes tables, desks, chairs, wardrobes, cupboards, cabinets, shelves, and other furnishings. Physical characteristics, arrangements, and locations of such furnishings can play an important role in defining identities, functions, and access rules of CSs' areas. For instance, Kilowatt's hosts relied on tables and desks of different sizes and shapes in segmenting the internal areas of the CS and suggesting their distinct functions and access rules to coworkers. One coworker referred that "the way desks, cabinets and shelves are placed enable people to be aware of others. Personally, I feel that their arrangement supports a sense of co-presence." Hosts furnished an internal area as an open-plan one dotted with small desks: this prompted coworkers to focus work tasks to be carried out individually mostly in that area and organize

Collaborative spaces in the material world: Towards a typology of space-time regulation artifacts

their workflows accordingly. Another internal area was furnished with large desks and round tables, thus prompting coworkers to use it for brainstorming sessions, group work, and meetings. Thus, coworkers both selected and changed areas depending on their work activities, while also regulating their own work times depending on the availability of such areas. Moreover, these artifacts contributed to defining specific access rules for both areas to be followed by coworkers, despite both being flexibly accessible from a formal point of view. These considerations underline how the physical characteristics of practical artifacts can contribute to their regulatory action, in turn affecting space-time coordination practices. Coherently, one interviewee said: "I needed a small open space to work in, where I could see people working with bulimic patterns like me, while also feeling the comfort of being in a CS with a wide array of settings: I can reach the café whenever I need a break; I can arrange business meetings in one of the private rooms or, more informally, in the garden. […] The way this CS is furnished and partitioned makes me feel free".

Practical artifacts also include all those tools and devices contributing to defining functions and access rules of CSs' areas. Some examples relate to coffee machines, refrigerators, and microwaves, which usually functionalize relax or lunch areas within CSs. For instance, within Impact Hub, the placing of a coffee machine and a microwave within a previously un-functionalized area hinted to coworkers the possibility to carry out leisure activities, engage in informal conversations, and perform more informal work meetings. Such a functionalization occurred despite no immanent artifact was put in place (e.g., no badges or notations defined the functions of that area). Moreover, coworkers accessed that area more loosely and flexibly than all other internal areas of the CS: they accessed it at any time of the day, with no much coordination needed with other coworkers. One interviewee referred that "[…] the furnishing of an area with a coffee machine, tables, and a microwave in the basement helped us manage breaks or lunch times more efficiently, with no need to exit the CS. Sometimes, when we need

Collaborative spaces in the material world: Towards a typology of space-time regulation artifacts

it, the hosts help us set a projector in that area: in this way, we can set up meetings during coffee breaks".

Another example relates to a piano located at the center of an open-plan area within BASE. Coworkers could use the piano at any time of the day: thus, both its central location and its loose mode of use set great constraints in the use of the open-plan area in which it is located. In fact, despite some desks being scattered around the area, the use of the piano discouraged many coworkers from using it for work activities for most of the day, in turn using it for leisure ones. For example, one interviewee said: "I started going to work earlier in the morning as soon as I found out that there were very few people at that time of the day and that those people were used to play the piano before starting working. […] It has become a routine of mine, and other people have started coming earlier and enjoying it as well". Therefore, potential space-time coordination conflicts among coworkers were limited by the informal functionalization of that area mostly as one for "playful" activities rather than work-related ones. Moreover, some coworkers also limited potential conflicts by using the piano either earlier in the morning or later in the evening. This also allowed extending coworkers' presence in BASE outside traditional worktimes, thus contributing to reinforcing the space-time regulation function of the piano.

Conclusions

The categories emerging from the present study allowed us to uncover the space-time regulation functions of the different artifacts included within CSs under a sociomaterial perspective. Moreover, such categories of artifacts can help set the basis for better understanding both their features and contributions, as well as informing both socio-organizational and physical design interventions within CSs. All three categories contribute to coworkers' space-time coordination differently. One notable difference relates to the

Collaborative spaces in the material world: Towards a typology of space-time regulation artifacts

"immanent" nature of all those artifacts pertaining to the first category. By entailing a regulatory function, these artifacts contribute to coworkers' space-time coordination more explicitly than those of the other two categories. Immanent artifacts explicitly convey such a function, whereas the regulatory function of both infrastructural and practical artifacts is mediated by a shared interpretation to be developed among coworkers. In turn, it takes time to foster such a shared interpretation related to infrastructural and practical artifacts, as well as requiring an active role of both coworkers and hosts in both shaping and sharing meanings and uses of those artifacts.

Our exploratory work traces some important connections with existing empirical and theoretical contributions pertaining to Science and Technology Studies, Actor Network Theory, and the anthropology of techniques and objects (e.g., Knorr-Cetina, 1997; Latour, 1996). These complex and varied areas of research draw a greater focus on relationships and tensions rather than on individual elements and objects, on reticulations of actors (both human and non-human actors, such as artifacts and technologies) rather than on individual subjects. Drawing on these contributions, we can argue that space-time relationships are not given as *a priori*, but they are produced dynamically within a sociomaterial network. Moreover, material artifacts are not merely *there* within a work environment to be just taken for granted, but they are the *conditio sine qua non* for coordinating work activities and fostering collaboration. Coherently, we offer an explorative contribution to the literature on objects and sociomateriality (e.g., Carlile et al., 2013; Nicolini et al., 2012; Orlikowski, 2007; Orlikowski & Yates, 2002), highlighting the malleable and emergent nature of material artifacts. Whenever they perform a space-time regulation function, material artifacts are neither "black-boxed" nor characterized by completeness, but they are mediated by and transformed in reciprocal relationships with humans.

Collaborative spaces in the material world: Towards a typology of space-time regulation artifacts

These considerations suggest how different artifacts can encompass different degrees of explicitness in exerting their regulatory function, thus hinting potentially interesting avenues for future research. For instance, it could be relevant to analyze how space-time regulation artifacts influence collaborative practices (see Caccamo, 2020 for a recent contribution on CSs and collaboration). Accordingly, a deeper investigation might compare our typology of space-time regulation artifacts with objects affecting cross-disciplinary collaboration (e.g., with "material infrastructures" or "boundary", "epistemic", and "activity objects" as categorized by Nicolini and colleagues - Nicolini et al., 2012, pp. 624–625). Indeed, besides the basic "mundane" infrastructural support to collaboration (*material infrastructures*), space-time regulation artifacts can be conceived as features of the organizational and sociomaterial base that can lead, on the one side, to the activation of objects that "facilitate work across different types of boundaries" (*boundary objects*) and, on the other side, to the activation of objects that trigger/sustain/motivate cross-disciplinary collaboration (*epistemic and activity objects*).

Moreover, the development of a shared interpretation might be more difficult to achieve in CSs with a high degree of turnover of coworkers, thus making it more likely for coworkers to rely on immanent artifacts in shaping their space-time coordination practices. Thus, these differences call for cross-sectional comparisons on the potential roles of different artifacts within CSs with different degrees of turnover. Longitudinal comparisons could also provide compelling results. Coherently, scholars could explore how the preponderance of one category of artifacts over the others might change over time, while also investigating whether both infrastructural and practical artifacts could exert different types of regulatory functions depending on different stages of development of coworkers' shared interpretations. Future research could also scrutinize how artifacts enable space-time coordination practices that lead to different outcomes in terms of emotions, individual and team behaviors, and interactions at play within CSs.

Collaborative spaces in the material world: Towards a typology of space-time regulation artifacts

We should also note that the greater degree of explicitness embodied by immanent artifacts does not inherently underpin a stronger regulatory function as compared to the other two categories of artifacts. Our direct observations uncovered how both infrastructural and practical artifacts are usually more pervasive than immanent ones. For instance, whereas coffee machines might set strong constraints to coworkers' modes of encounter, interaction, and coordination with one another, calendars could be avoided by coworkers more easily (both intentionally and unintentionally). Immanent artifacts might set constraints that are more susceptible to coworkers' own dispositions and daily moments of "inattention": thus, explicitness might be important, but it should rely on triggers at the individual level in order to express itself fully. This underlines the constitutive relationship between individuals (e.g., coworkers, hosts) and artifacts, in which two types of agents (human and non-human, respectively) both influence and leverage on the actions of one another. Coherently, future research could uncover the effects of this relationship at different levels: e.g., at a micro- (i.e., that of individuals) and meso-level (i.e., that of CSs as organizational and physical settings).

At a micro-level, the present study could set the basis for a more thorough focus on the space-time coordination practices of coworkers, as well as calling for a deeper understanding of the potential strategies performed by coworkers with respect to the different categories of artifacts. In this chapter, we have centered our attention on the side of artifacts, while also delivering results that are still at an exploratory stage. Thus, further attention is needed on the side of coworkers: in this sense, it could be relevant to intertwine the regulatory functions of immanent, infrastructural, and practical artifacts with the strategies that coworkers might perform when relying on such functions when trying to reach specific outcomes. In this sense, it could be relevant to integrate our typology of artifacts with potential boundary management strategies of coworkers when juggling across increasingly eroded temporal and/or spatial boundaries between work and non-work domains. At a meso level, it could be relevant to

explore how the intertwining of the actions of both artifacts and coworkers helps establish CSs as organizational entities with their own rules, meanings, interdependencies, and roles, and not only as mere repositories of disconnected forms of organizing times and spaces performed by coworkers at a strictly individual level (see also Blagoev et al., 2019). However, this focus calls for a more thorough longitudinal effort.

References

Alvesson, M., & Kärreman, D. (2011). *Qualitative research and theory development: Mystery as method.* London, UK: SAGE.

Aslam, M., & Goermar, L. (2018). Sociomateriality and entrepreneurship in coworking-spaces. *Academy of Management Proceedings*.

Bell, E., Warren, S., & Schroeder, J. (2014). *The Routledge Companion to Visual Organization.* New York, NY: Routledge.

Beyes, T., & Steyaert, C. (2012). Spacing organization: non-representational theory and performing organizational space. *Organization, 19*(1), 45–61.

Blagoev, B., Costas, J., & Kärreman, D. (2019). 'We are all herd animals': Community and organizationality in coworking spaces. *Organization*, *26*(6), 894–916

Boltanski, L., & Chiapello E. (2005). The new spirit of capitalism. *International Journal of Politics, Culture, and Society, 18*(3–4), 161–188.

Boxenbaum, E., Jones, C., Meyer, R., & Svejenova, S. (2018). Towards an articulation of the material and visual turn in organization studies. *Organization Studies, 39*(5–6), 597–616.

Brown, J. (2017). Curating the 'Third Place'? Co-working and the mediation of creativity. *Geoforum*, *82*, 112–126.

Caccamo, M. (2020). Leveraging innovation spaces to foster collaborative innovation. *Creativity and Innovation Management, 29*(1), 178–191.

Collaborative spaces in the material world: Towards a typology of space-time regulation artifacts

Capdevila, I. (2019). Joining a collaborative space: Is it really a better place to work? *Journal of Business Strategy, 40*(2), 14–21.

Cappelli, P., & Keller, J.R. (2013). Classifying work in the new economy. *Academy of Management Review, 38*, 575–596.

Carlile, P. R., Nicolini, D., Langley, A., & Tsoukas, H. (2013). *How matter matters: Objects, artifacts and materiality in organization studies*. Oxford, UK: Oxford University Press.

Clark, P. (1985). *A review of the theories of time and structure for organizational sociology.* Birmingham, UK: Work Organization Research Centre, University of Aston.

Cnossen, B., & Bencherki, N. (2019). The role of space in the emergence and endurance of organizing: How independent workers and material assemblages constitute organizations. *Human Relations*, *72*(6), 1057–1080.

Dale, K., Durrell, G. (2008). *The space of organisation and the organisation of space*. Basingstoke, UK: Palgrave.

DeGuzman, G. V., & Tang, A. I. (2011). *Working in the unoffice: A guide to coworking for indie workers, small businesses, and nonprofits*. San Francisco, CA: NightOwlsPress.

Eisenhardt, K. M. (1989). Building theories from case study research. *Academy of Management Review, 14*(4), 532–550.

Emerson, R. M., Fretz, R. I., & Shaw, L. L. (2011). *Writing ethnographic fieldnotes*. Chicago, IL: University of Chicago Press.

Fuller, M. G., & Löw, M. (2017). Introduction: An invitation to spatial sociology. *Current Sociology*, *65*(4), 469–491

Garrett, L. E., Spreitzer, G. M., & Bacevice, P. A. (2017). Co-constructing a sense of community at work: The emergence of community in coworking spaces. *Organization Studies, 38*(6), 821–842.

Gieryn, T. F. (2002). What buildings do. *Theory and Society*, *31*, 35–74.

Collaborative spaces in the material world: Towards a typology of space-time regulation artifacts

Höllerer, M., Jancsary, D., Meyer, R., & Vettori, O. (2013). Imageries of corporate social responsibility: Visual recontextualization and field-level meaning. In M. Lounsbury, & E. Boxenbaum (Eds.), *Institutional Logics in Action, Part B* (pp. 139–174). Bingley, UK: Emerald Publishing Limited.

Hutchins, E. (1995). *Cognition in the Wild*. Cambridge, MA: MIT Press.

Kingma, S. (2019) New ways of working (NWW): work space and cultural change in virtualizing organizations, *Culture and Organization, 25*(5), 383–406.

Knorr-Cetina, K. (1997). Sociality with objects: Social relations in postsocial knowledge. *Theory Culture Society, 14*(1), 1–30

Kornberger, M., & Clegg, S. R. (2004). Bringing space back in: Organizing the generative building. *Organization Studies, 25*(7), 1095–1114.

Krause, I. (2019). Coworking spaces: Windows to the future of work? Changes in the organizational model of work and the attitude of the younger generation. *Foresight and STI Governance, 13*(2), 52–60.

Latour, B. (1996). On interobjectivity. *Mind, Culture, Activity, 3*(4), 228–245.

Lefebvre, H. (1991). *The production of space*. Oxford, UK: Blackwell.

Leonardi, P. M. (2013). Theoretical foundations for the study of sociomateriality. *Information and Organization, 23*(2), 59–76.

Leonardi, P. M., Nardi, B. A., & Kalinikos, J. (2012). *Materiality and organizing: Social interaction in a technological world*. Oxford, UK: Oxford University Press.

Luff, P., Hindmarsh, J., & Heath, C. (2000). *Workplace studies: Recovering work practice and informing system design*. Cambridge, UK: Cambridge University Press.

Merkel, J. (2019). 'Freelance isn't free.' Co-working as a critical urban practice to cope with informality in creative labour markets. *Urban Studies, 56*(3), 526–547.

Collaborative spaces in the material world: Towards a typology of space-time regulation artifacts

Nicolini, D. Mengis, J., & Swan, J. (2012). Understanding the role of objects in cross-disciplinary collaboration. *Organization Science, 23*(3), 612–629

Oksanen, K., & Ståhle, P. (2013). Physical environment as a source for innovation: investigating the attributes of innovative space. *Journal of Knowledge Management, 17*(6), 815–827.

Orlikowski, W. J. (2007). Sociomaterial practices: Exploring technology at work. *Organization Studies, 28*(9), 1435–1448.

Orlikowski, W. J., & Scott, S.V. (2008). Sociomateriality: challenging the separation of technology, work and organization. *Academy of Management Annals, 2*(1), 433–474.

Orlikowski, W. J., & Yates, J. (2002). It's About Time: Temporal Structuring in Organizations. *Organization Science, 13*(6), 684–700.

Parrino, L. (2015). Coworking: assessing the role of proximity in knowledge exchange. *Knowledge Management Research & Practice*, *13*(3), 261–271.

Perlow, L. A. (1999). The Time Famine: Toward a Sociology of Work Time. *Administrative Science Quarterly, 44*(1), 57–81.

Quattrone, P., Puyou, F. R., McLean, C., & Thrift, N. (2012). Imagining organizations: An introduction. In F. R. Puyou, P. Quattrone, C. McLean, & N. Thrift (Eds.), *Imagining Organizations: Performative Imagery in Business and Beyond*. New York, NY: Routledge.

Rafaeli, A., & Pratt, M. G. (Eds.). (2006). *Artifacts and Organizations*. Mahwah, NJ: Lawrence Erlbaum.

Rapelli, S. (2012). *European IPros: A Study*. London, UK: PCG.

Schmidt, S., & Brinks, V. (2017). Open creative labs: Spatial settings at the intersection of communities and organizations. *Creativity and Innovation Management, 26*(3), 291–299.

Suchman, L. (2005). Affiliative Objects. *Organization*, *12*(3), 379–399.

Collaborative spaces in the material world: Towards a typology of space-time regulation artifacts

Suchman, L. (2007). *Human-machine reconfigurations. Plans and situated actions.* Cambridge, MA: Cambridge University Press.

Schwanen, T., & Kwan, M. (2008), The Internet, mobile phone and space-time constraints, *Geoforum*, *39*, 1362–1377.

van Dijk, S. (2019). At home in the workplace: The value of materiality for immaterial labor in Amsterdam. *European Journal of Cultural Studies, 22*(4), 468-483.

van Marrewijk, A., & Yanow, D. (eds.). (2010). *Organizational spaces: Rematerializing the workaday world*. Cheltenham, UK: Edward Elgar Publishing.

Yin, R. K. (2009). *Case study research: Design and methods*. Thousand Oaks, CA: SAGE.

Zerubaval, E. (1981). *Hidden rhythms*. Chicago, IL: University of Chicago Press.

Collaborative spaces in the material world: Towards a typology of space-time regulation artifacts

Appendix 1

Example of immanent artifact of space-time regulation

Impact Hub, chalkboard on the door of the meeting room

Example of infrastructural artifact of space-time regulation

BASE, open-plan area vs the "Acquarium"

Collaborative spaces in the material world: Towards a typology of space-time regulation artifacts

Examples of practical artifacts of space-time regulation

Impact Hub, practical artifacts in the relax room

BASE, piano and armchairs at the entrance of the CS