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Designing for Serendipity, a Means or an End?

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Designing for serendipity: a means or an end?

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Abstract

Purpose – This article aims to gain a better understanding of the reasons why serendipity is designed for in different kinds of environments. Understanding these design intents sheds light on the value such designs bring to designers, in contrast to the users of the environment. In this way, the article seeks to contribute to the literature on cultivating serendipity from a designers' point of view.

Design/methodology/approach – An extensive review of the literature discussing designing for serendipity was conducted to elicit the different motivations to design for serendipity. Based on these findings and a thorough analysis, a typology of design intents for serendipity is presented.

Findings – The article puts forward four intents to design for serendipity: serendipity as an ideal, common good, mediator and feature. It also highlights that the current academic discourse puts a strong emphasis on two of them. It is argued that this academic abstraction could be problematic for how we deal with designs for serendipity, both in theory and practice.

Originality/value – The novelty of this article is that it addresses the question of why to design for serendipity from a designer's point of view. By introducing the notion of directionality it opens up the opportunity to discuss serendipity from multiple perspectives, which contributes to gaining a firmer understanding of serendipity. It allows to more explicitly formulate the different functions of a design for serendipity and thereby expands our knowledge on the value of designing for serendipity. At the same time, it sheds light on the potential threats to designing for serendipity.

Keywords Design, Directionality, Intent, Serendipity, Threats, Value

Paper type Conceptual paper

1. Introduction

Cities with streets whose width allows for eye-contact across the street. Streaming services that rely on machine learning techniques to recommend novel items. Offices with coffee machines accessible to employees from different divisions. While this may seem like a listing of unrelated environments, they all have characteristics that have been found to cultivate experiences of serendipity (Björneborn, 2017). In an era where environments seem primarily oriented toward efficiency and therefore often predictability, there is an ever-growing call for such designs for serendipity (André et al., 2009; Reviglio, 2019b). Instances of "serendipity by design" (Reviglio, 2017) or "artificial serendipity" (Melo and Carvalhais, 2018) have nevertheless been called an ultimate paradox: the idea that an unplanned experience, such as serendipity, could be designed and thus planned, would destroy its essential feature (Van Andel, 1994).

This viewpoint has, however, been contested (Björneborn, 2017; Makri et al., 2014; Melo, 2018). One of the arguments is that the presumed paradox mistakenly locates the experience of serendipity within the environment rather than the individual. Scholars have drawn an important distinction between the viewpoint of the "designer" of the environment, the one who "successfully asserts control over the environment" (Carr, 2015, p. 835) and that of the "serendipitist" (Van Andel, 1994, p. 645), the one who experiences serendipity. It is argued

that while it is (likely) impossible to "design serendipity" it is possible to "design *for* serendipity", meaning "create opportunities for users to have experiences they might (subjectively) perceive as serendipitous" (Makri *et al.*, 2014, p. 2181). Björneborn aptly formulates this as "serendipity may be intended by designers but must always be unplanned by users" (2017, p. 1068).

The distinction between designers and serendipitists continues in the literature on serendipity. The focal point of existing work could be broadly described by two questions: how is serendipity experienced by the serendipitist, and how could designers design for serendipity? I argue that there is an important aspect missing in this discourse: why would designers design for serendipity in the first place? While prior work has focused on the valuable outcomes to the serendipitist, such as knowledge creation or social encounters (McDonald *et al.*, 2008; Yaqub, 2018), little is known about what motivates designers to design for serendipity. What value is in it for them?

My argument builds on the rationale that products and services in practice emerge in multi-sided markets (Evans and Schmalensee, 2016). As a consequence, providers ("designers") and consumers (potential "serendipitists") often find themselves at other sides of the market with potential diverging or even conflicting objectives. Therefore, we cannot simply assume that if an individual values serendipity, designers also value such a design. My concern is that when we do not take into account this potential divergence, we might be missing out on some important consequences about how serendipity is designed for and ultimately experienced.

This article sets out a first understanding of the various ways designers could value a design for serendipity. This will not only fill a gap in current scholarly work but also contribute to our understanding of serendipity and the possible threats to designing for serendipity. As I will argue in the remainder of this article, different design intents exist, and it will be important to question the "directionality" of a design for serendipity: who wants what kind of serendipity for whom? What happens when serendipity is not primarily designed for the serendipitist but rather for the sake of the designer's objectives? In a discourse that encourages cultivating serendipity, it is important to address these questions on value and directionality, as they might indicate potential threats to designing for serendipity.

In other words, we should be able to answer the question with what purpose (or intent) serendipity is designed for – is serendipity designed for as a means or an end? To address this question, this paper is organized as follows. First, I briefly present how value is discussed in the literature on serendipity thus far. Next, I examine the literature that deals with designing for serendipity and contribute to the current discourse a typology of four ways in which this can be valued from a designer's perspective. More specifically, I distinguish serendipity as an ideal, serendipity as a common good, serendipity as a mediator and serendipity as a feature. Following this typology, I highlight three potential threats that come along with those categories. Finally, the implications for further research are addressed.

2. Background

Serendipity is known as a "vague word" as there is in fact no consensus on its exact definition (Merton and Barber, 2004; Reviglio, 2019b). Horace Walpole, who coined the term in already reluctant about providing a definition claiming that the word is better u "by the derivation than by the definition" (Walpole, 1754 in Merton and Barber, 2 He recounts the story of the Three Princes of Serendip who were "always making di by accidents and sagacity, of things which they were not in quest of" (Walpol Merton and Barber, 2004, p. 2). Up until this day, Walpole's account of serendipity s as the prime inspiration of many works echoing key aspects in their suggested d Such as Merton's (1968, p. ix) "discovery through chance by a prepared mind of new

that were not looked for" or Fine and Deegan who consider it as "the unique and contingent mix of insight coupled with chance" (1996, p. 346).

Research on serendipity spans across a wide variety of domains, such as philosophy of science, information behavior research, education sciences, managerial research or architecture, and each emphasizes a particular interpretation of the phenomenon. Since the goal of this article is not to better understand the phenomenon of serendipity as such, but rather aims to understand why designers design for serendipity, I follow Walpole's suggestion by not pinning down to one single definition. Similar to Makri and Blandford (2012b) who instead of providing a definition identified key elements of serendipitous encounters, I follow what Copeland (2015, p. 4) calls a "tripartite account of serendipity" consisting of accidents, sagacity and value.

2.1 A tripartite account of serendipity

Serendipity is often understood through the interplay of accidents (chance) and sagacity (wisdom) (Copeland, 2019; Melo and Carvalhais, 2016; Merton and Barber, 2004; Reviglio, 2019b). Although different weights have been given to each of the two factors, it has been emphasized that serendipity is not the result of merely one of them but rather their combination (Copeland, 2019; Melo and Carvalhais, 2016). This view has found its way into studies investigating the role of both external and internal factors in experiences of serendipity (Lutz et al., 2017; McCay-Peet and Toms, 2015; Smets et al., 2021). There is, however, a growing awareness of the importance of a third factor: value, and valuable outcomes in particular (Cunha et al., 2010; Makri et al., 2017; Makri and Blandford, 2012b; Napier and Vuong, 2013). As put by Copeland, being able to perceive this valuable outcome is what leads "an observer to attend to an unexpected observation rather than simply dismissing it" (2019, p. 2395). Value is indeed considered an essential part of serendipity, even to the extent that is seen as the distinguishing factor between serendipity and coincidence (Bogers and Björneborn, 2013). Boden was one of the first to explicitly mention value when defining serendipity as "the finding of something valuable without its being specifically sought" (2004, p. 234). The interplay of each of these factors in unfolding serendipity, what external factors influence it, and what types of serendipity can be distinguished, are all subject of a great deal of research and have led to various theoretical models of serendipity. In the light of this discussion, two strands of work can be distinguished: a phenomenological and a design-oriented approach to serendipity research.

2.2 Experiencing and cultivating serendipity

The phenomenological line of work focuses on developing a process model of a serendipitous experience to understand how it unfolds (Cunha, 2005; Foster and Ellis, 2014; Makri and Blandford, 2012b; McCay-Peet and Toms, 2015; Rubin et al., 2011). An overview by McCay-Peet and Toms (2015) highlights that these models all include an "outcome" as a necessary component, described as a "fortuitous" (Rubin et al., 2011) or "valuable outcome" (Makri and Blandford, 2012b), a "solution to a problem" (Cunha, 2005) or "having a positive impact in the short or long term" (Sun et al., 2011). Makri and Blandford's (2012a, b) process model of serendipity (Figure 1), for example, describes the iterative process of reflecting upon the value of a connection of insight and unexpected circumstances, that will eventually lead to a valuable, unanticipated outcome. Most of these works rely on qualitative data acquired through interviews or diary studies with those people whose serendipitous experiences are being investigated. As a consequence, value is studied from a highly user-centric perspective as it is the user who "subjectively determine[s] the value of encountered information" (Makri et al., 2017, p. 2). However, these process models not only apply to serendipity in a single individual's context. Cunha (2005) and McCay-Peet and Toms (2015), for example, consider serendipity in an organizational context.

Another line of work focuses on cultivating serendipity. This design-oriented research is related to the phenomenological strand in the sense that process models often mention facilitating and inhibiting factors that are external to the serendipitist and rather cover characteristics of the environment. For example, the physical proximity between co-workers is a well-known strategy used in office space design as in the case of Pixar, one of the most successful film studios worldwide (Cunha, 2005). To maximize accidental encounters, all employees' mailboxes were deliberately located in the central atrium of the office building (Busch, 2020). These kinds of design strategies are not limited to the mere spatial design of physical environments. As put by Björneborn (2017, p. 1054) both "physical and digital environments can be designed to facilitate serendipity". In his 2017 work, Björneborn presents an affordance framework conceptualizing how environments can be designed to afford serendipity.

This knowledge about what could facilitate serendipitous experiences has indeed found its way into the design of digital environments as well. Scholars in the field of interaction design have presented design heuristics highlighting the capacity of digital environments to cultivate serendipity (Melo, 2018; Race and Makri, 2016). Moreover, various works have emphasized how serendipity can be fostered through institutional routines or cultural practices (Busch, 2020). In organizations, for example, the degree to which "controlled sloppiness" is tolerated might impact the level of experienced serendipity (Napier and Vuong, 2013).

The surveyed literature (see below) showed that Melo and Carvalhais (2016) are one of the few to explicitly discuss the value of serendipity in digital interaction design. Unlike others discussing value as a rather abstract term (e.g. Makri and Blandford, 2012b; McCay-Peet and Toms, 2015), their work distinguishes five more specific manifestations of value through serendipitous experiences: the discovery of new information, a meaningful experience, a moment of unfamiliarity or unexpectedness and creativity. However, their discussion stems again from a highly user-centered perspective only considering how individual users could derive value from serendipity. The question thus remains why designers would want to design for serendipity. What is the value for them?

3. Intents to design for serendipity
The discussion in this article is based on a literature review of research dealing with cultivating serendipity (i.e. design-oriented) in a broad range of disciplines (e.g. library science, computer science, engineering, social sciences, art, ethics and philosophy). Relevant works were retrieved by querying for "serendipity" and "design" in the Web of Science database. Ultimately, 111 articles were retained in the sample based on their abstract. The majority of the articles that were excluded reported on *experienced* serendipity during a design process rather than the practice of designing for serendipity. I analyzed the articles by coding what they consider as the value of designing for serendipity: what benefit designers

Figure 1.
Makri and Blandford's (2012a, b) process-model of serendipity, as illustrated in Makri *et al.* (2014). Reproduced with permission
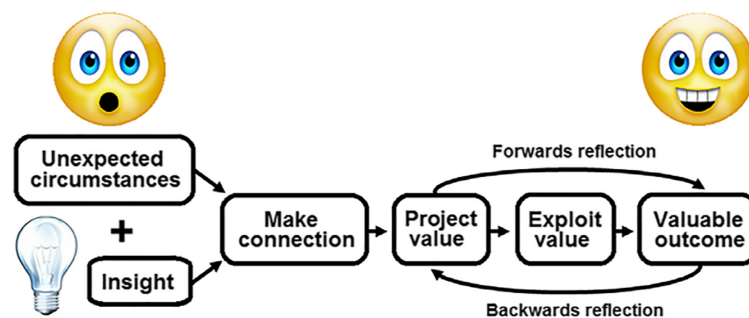
derive from designing for serendipity, or what contributes to their intent to design for serendipity. By emphasizing "design intent" I follow Björneborn (2017, p. 1068 emphasis added) who argued that "serendipity may thus be *intended* by designers".

The value I discuss is thus not necessarily associated with normative values that designers hold about design, although there might be an overlap. The interpretation of value in this article is broader as it represents the entirety of values that a design for serendipity might bring to designers, such as reaching their commercial objectives (see below).

This analysis resulted in four different intents to design for serendipity, which I call serendipity as an ideal, serendipity as a common good, serendipity as a mediator and serendipity as a feature. Each of these categories values a different (partial) component of the process of experiencing serendipity as represented in Figure 2. While this conceptual representation is inspired by phenomenological works (e.g. Makri *et al.*, 2014), it does not aim at representing an actual process model of serendipity and the order should not be taken literally. Rather, its building blocks stem from the different components that I identified as being valued by designers and will be discussed in more depth in the remainder of this section.

Broadly, Figure 2 should be understood as follows: a designer designs an environment, which is interacted with by the serendipitist. From this interaction, the serendipitist might notice a valuable outcome that eventually leads to a serendipitous experience. This experience could result in a consequence, such as the serendipitist being satisfied with the environment. For the remainder of this article, it is important to grasp the difference between the valuable outcome (i.e. what makes it a serendipitous experience, such as discovering a relevant book) and the consequence of this experience of serendipity (e.g. being satisfied with the bookstore). Additionally, I distinguish a societal impact, which represents the result of a large group of people experiencing serendipity. A more in-depth discussion of these components will follow below.

Central to my argument is the distinction between the various actors involved. I already mentioned "the serendipitist" who experiences serendipity, and "the designer" who designs the environment. This could be either a single person or more generally represent the organization that is maintaining and/or developing the environment. Throughout the remainder of this article, I will consistently use "the environment" to refer to any product, service or even practice that is designed by a designer and interacted with by a serendipitist. As discussed before, examples of such an environment could be a digital information system, an institutional policy, the spatial lay-out of an office and much more. Additionally, there may be other actors representing society at large (e.g. policymakers) or "item providers" such as authors whose books are being sold in a bookstore.

By making this distinction between the various actors involved, a crucial element is added to the discussion: **directionality**. Directionality refers to the direction of the design intent
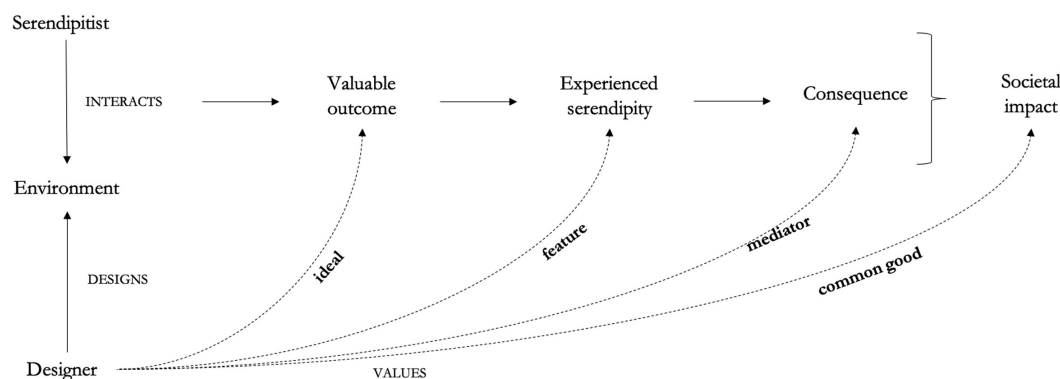

Figure 2.
Conceptual representation of what (partial) component of the process of experiencing serendipity is valued by the designer

and thus questions who wants what kind of serendipity for whom. This directionality reflects a characteristic of the relationship between the various actors involved.

3.1 Serendipity as an ideal

Serendipity as an ideal implies that designers intent to design for serendipity because they value the **valuable outcome** recognized by the serendipitist. This kind of design intent is most apparent in literature discussing information retrieval systems and knowledge discovery and emphasizes the expected value for the serendipitist, mostly in terms of generated creativity, knowledge or innovation. Most of these works describe novel algorithms or user interfaces to stimulate serendipitous discoveries in databases. The application domains of these systems are broad and include among others digital libraries (Fena, 2020; McKay *et al.*, 2017), educational purposes (Afridi, 2018) and navigation in urban places (Ge *et al.*, 2017; Tessem *et al.*, 2015). They could also be used to stimulate social interactions among people, such as connecting people at conferences (McDonald *et al.*, 2008) or help people find new friends (Manca *et al.*, 2018). In this line of work, frequent references are made to the "Bohemian Bookshelf", a landmark work by Thudt *et al.* (2012) describing visualization principles to support serendipitous discoveries in digital libraries. Other examples can be found in design research. In order to stimulate creativity, various works explore how design and ideation tools could be designed or implemented differently in order to stimulate serendipity (Ekströmer and Wever, 2019; Kourteva and Mc Meel, 2017; Lee-Smith, 2019). Overgoor and Funk (2018), for example, designed a social robot that does literally nothing but waiting. Their aim is to investigate how artifacts can be designed differently from most artifacts today that demand our attention. By doing so, they intend to make people "comfortably idle" and slow down their pace, which might spark serendipity (Björneborn, 2017).

None of these works explicitly addresses why the designer is motivated to design for serendipity, and in this sense, most strongly aligns with the dominant discourse in the literature on cultivating serendipity. They all emphasize the value for the serendipitist and do not make any distinction regarding the value for the designer. This tends to be a very altruistic interpretation of designing for serendipity, where the designer seems to only care about the needs and preferences of the users of the environment. In this case, the directionality is straightforward: the designer wants the serendipitist to obtain a valuable outcome (Figure 3a). Apart from those of the serendipitist, no other interests are ought to be served.

It is however questionable to what extent this altruistic nature of this design intent a realistic representation of designing for serendipity. In reality, it is very hard to think of cases in which the designer is indeed truly (and solely) aligned with the serendipitist. Although there might be some examples, in most application domains, it is questionable if this altruism provides true (or enough) value to the designers. One could argue that libraries are one of

Figure 3.
Directionality: (a) the designers design for serendipity for the individual serendipitist, (b) the design could be impacted by the result of an individual experiencing serendipity, or other actors that are affected by an individual experiencing serendipity
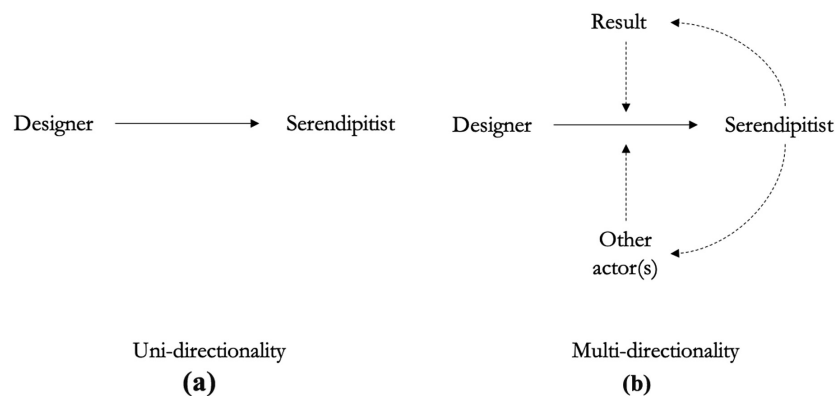
these exceptional cases. After all, libraries aim at connecting people and ideas, and serendipitous discoveries are at the heart of that. However, in Section 4, I will challenge this idea by demonstrating that even libraries are not resistant to factors that could restrain designs for serendipity.

3.2 Serendipity as a common good

Similar to serendipity as an ideal, serendipity as a common good is designed for by designers who are motivated by the value it brings to someone else. In this case, designers do not value the valuable outcome perceived by a single individual but rather the **societal impact** resulting of many individuals experiencing serendipity. In most cases, this societal impact contributes to a societal goal, such as social welfare (Sauer and Bonelli, 2020) or democratic values (Reviglio, 2019b). Consequently, it most explicitly surfaces in literature discussing application domains closely related to such public values. More specifically, this kind of design value was observed in literature discussing news media, urban planning and research and innovation. In news media, the topical democratic role of media pluralism encourages designing for serendipity to support reflection on viewpoint formation and fight filter bubbles and echo chambers (Maccatrozzo, 2012; McKay *et al.*, 2020; Reviglio, 2019b). This plea builds upon Sunstein's (2017) argument of "chance encounters and shared experiences" being crucial for a well-functioning democracy. A similar line of thought is expressed by urbanists who consider serendipity in urban environments as a crucial element of cities' social fabric and economic growth (Jacobs, 1961; Sennett and Sendra, 2020; Smets *et al.*, 2021). Others then argue for encouraging serendipity in responsible research and innovation as a means to enhance the societal impacts of research (Holbrook, 2019; Sauer and Bonelli, 2020).

As mentioned before, in contrast to serendipity as an ideal, the emphasis is put less on the value serendipity brings to the single individual but rather on the beneficial impact to society. In this sense, the directionality is multi-layered and dependent on one another (Figure 3b). On the one hand, it is directed toward the individual serendipitist (because the individually experienced serendipity is assumed to lead to the desired societal impact). On the other hand, this societal impact is primordial to the designer. As a consequence, the serendipity created for the individual might be influenced by the result that is envisioned for the greater good.

Here again, a similar reflection can be made in terms of the true design value. The contentious topic of serendipity in news recommenders serves as a good example to make this reflection. While media professionals endorse media pluralism and therefore value a design for serendipity (Reviglio, 2019b), the question is to what extent designing for serendipity will not conflict with other interests of the organization and how those interests will be traded-off, possibly at the expense of serendipity (Smets *et al.*, 2022). For example, subscription rates could be optimized by providing popular news items rather than serendipitous ones. This understanding implies that in order to safeguard a design for serendipity its value must outweigh any other concern.

Consequently, from a design point of view, both serendipity as an ideal and common good are fragile and potentially subject to other factors related to the context in which designers find themselves. These two design values are nevertheless dominant in the reviewed academic literature, probably because it mostly reports on scholarly work and applications that often make abstraction from actual implementations in practice. However, in some cases, other motivations are put forward in the literature when talking about designing for serendipity. This is particularly apparent when the designer and serendipitist are on different sides of the market.

3.3 Serendipity as a mediator

In the case of serendipity as a mediator, there are such examples of diverging objectives between designers and serendipitists. From the perspective of the designer, the valuable

outcome and experienced serendipity are of secondary importance. Rather, their primary concern is the eventual **consequence** of the serendipitist experiencing serendipity, which aligns with the designers' objectives such as an increase in user satisfaction (Chen *et al.*, 2019). This means that the widely held view on serendipity as "a subjective experience of a valuable outcome" (Makri *et al.*, 2014) is in fact irrelevant to the designers in this case – as long as the resulting consequence of this experience serves their objectives. This is an important consideration since it can have far-reaching consequences for the way serendipity is designed for and experienced, as I will discuss later.

Examples of this kind of design intent are mostly found in the literature that consider information systems within their business context. Here, serendipity is discussed primarily in relation to the valuable result it brings to the designer rather than the serendipitist. For example, recommender systems that are used by online retailers and implement serendipity as a driver of consumer satisfaction, engagement or as a means to address the long tail problem (Agarwal *et al.*, 2019; Chen *et al.*, 2021; Grange *et al.*, 2019; Yi *et al.*, 2017). Designing for serendipity is thus primarily motivated by the expected consequences and their value for designers, such as an increase in sales or user satisfaction. This does not necessarily mean that serendipity is not important to the designers, but rather that it will always be weighed in function of their main objectives, such as maintaining a viable business.

Similarly, research on business and innovation management reports on serendipity as a means to foster new business opportunities or business growth. Here again, the individual's subjective experience of serendipity is less important because what matters are the business opportunities that arise due to serendipitous encounters and "the extraordinary business value it can generate" (Cleverley and Burnett, 2015, p. 7). Or as put by Napier and Vuong (2013, p. 194 emphasis added): "The ability to recognize and evaluate unexpected information is not valuable in itself. To be a competitive advantage, the assessment must yield value and *action*". As discussed previously, the means to cultivate serendipity in this kind of contexts relate to fostering an organizational culture for serendipity (Busch, 2020) or making it a core aspect of an institutional routine (Napier and Vuong, 2013). At the same time, it could also manifest in the design of both physical and virtual work environments, such as Pixar's office design, as mentioned earlier.

In this category, the directionality of serendipity plays an important role and quickly becomes more complex compared to the previous ones. To illustrate this by means of an example, consider the Discover Weekly playlist from music streaming platform Spotify that aims at recommending unknown yet relevant songs to end-users. From the perspective of Spotify (i.e. the designer), designing for serendipity fulfills multiple objectives. First, it is designed for as a means to increase user satisfaction as users might be pleasantly surprised by getting to know new songs (Zhang *et al.*, 2012). Second, by introducing serendipity in its service, Spotify addresses the long tail that results in less-known artists getting attention or addressing issues like gender bias as songs by female artists are found to be in this long tail (Ferraro *et al.*, 2021). Third, as a result of the positive affect that is induced by users, designing for serendipity catalyzes a new product: the streaming service can now sell this positive affect to advertisers that want to benefit from it and play their ads while users are listening to this playlist. What this example shows, is first the distinct (but not necessarily conflicting) objectives between the designer and serendipitist. Further, it highlights the multi-directionality of the intent to design for serendipity: the fact that the serendipitist experiences serendipity is valued by multiple actors but in different ways. It is therefore important to consider the stakeholder configurations (i.e. which actors are involved and how) and the directionality of serendipity, as it might uncover various motivations to design for serendipity and their consequences in terms of how serendipity is designed for (as discussed in Section 4).

3.4 Serendipity as a feature

Finally, serendipity as a feature means that serendipity is designed for because **experiencing serendipity** is essential for the functioning of the environment. Most of the times, serendipity is introduced here as a means to realize an unexpected information provision. What stands out from the examples found in the literature is that most of them consist of a location-based service and/or are related to reminiscing (Bentley *et al.*, 2011; Helmes *et al.*, 2011; Jones *et al.*, 2019). For example, the "Serendipitous Family Stories" system allows families to share videos by relating them to real-world locations (Bentley *et al.*, 2011). When a family member approaches such a (to them unknown) location, they get notified and can watch the movie that was shared by their relative. Here, serendipity is considered "a cute little treat" and "an experience that will make you feel happy or bring a smile to your face" (Bentley *et al.*, 2011). Serendipity is thus mainly seen as a concept to indicate the unexpectedness of the information provision, and the positive affect that comes along with it.

Other examples of serendipity as a feature are again to be found in literature that describes serendipity in organizational contexts. Olma's (2012) work on Seats2meet.com (S2M), for example, illustrates how serendipity plays a crucial role in business models for a network society. S2M is a Dutch network of physical co-working spaces where individuals can work for free in return for being open to share their knowledge and networks. By providing an office space to all sorts of professionals looking for new connections, S2M has created a "serendipity machine" (Olma, 2012). What differentiates S2M from Pixar's office design, for example, is the fact that serendipitous encounters are the value proposition of S2M: people make use of S2M because they *want to* experience serendipity, and this is what they are willing to pay for (not in monetary but social capital, see Olma, 2012). This illustrates a key characteristic of serendipity as a feature: the intent to design for serendipity stems from the purpose of the environment and is consequently indispensable to its functioning.

4. Discussion

The previous section identified four design intents for serendipity starting from the relationship between the serendipitist and the designer (see Figure 2). In what follows, I discuss each of these intents from a designer's perspective by presenting a classification framework or a typology. This not only helps to more clearly distinguish the different design intents and understand them but also highlights a significant gap between how designing for serendipity is discussed in academic work and how it happens in practice. I will argue that as a consequence of this academic abstraction, scholarly work is not always aware of the threats that arise when designing for serendipity in practice, nor does it emphasize enough the value of designing for serendipity for designers.

4.1 Typology

The typology presented in Figure 4 is based on two key aspects from the designers' point of view. First, is a design for serendipity **essential** from the perspective of the designer? And second, does the designer value the potential **consequence** of the serendipitist experiencing serendipity?

The essentiality is represented on the horizontal axis of the framework. As outlined in the previous discussion, a design for serendipity is essential in two categories. In the case of *serendipity as a feature*, this follows from its definition that serendipity is considered necessary for the functioning of the environment. In a similar way, *serendipity as an ideal* rests upon the assumption that serendipity is a necessary precondition to achieve the valuable outcome for the serendipitist. On the contrary, in both cases of *mediator* and *common good* the functioning of the environment is not dependent on whether or not it is intentionally
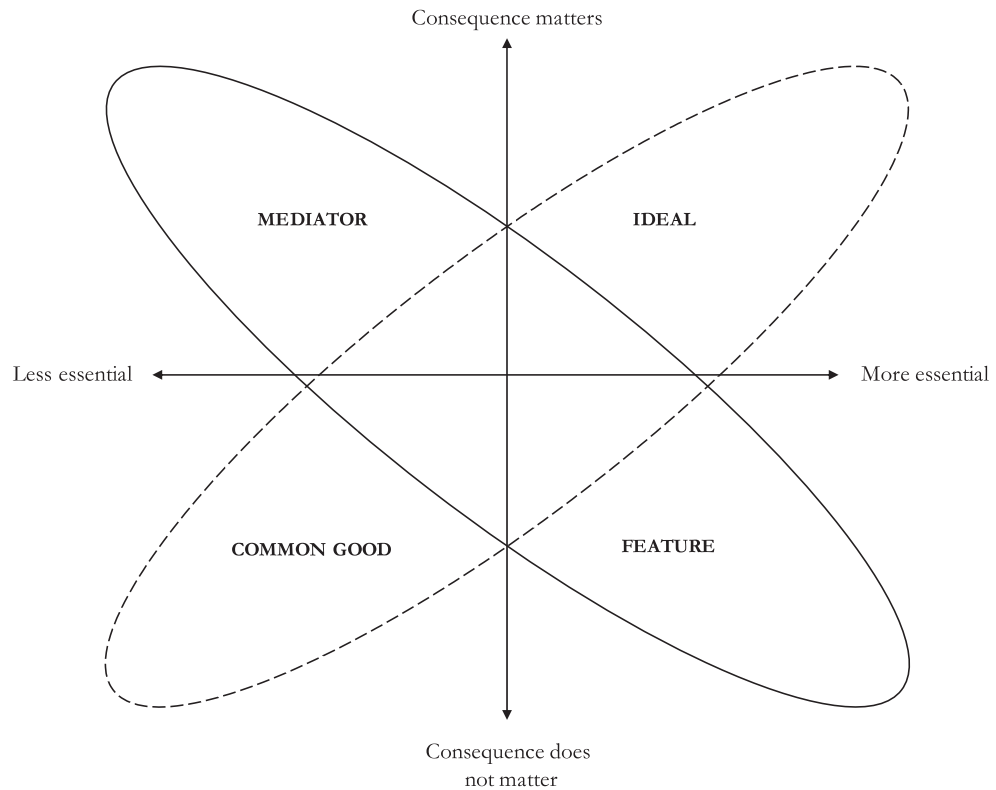
Figure 4.
Typology of different
intents to design for
serendipity, seen from
the perspective of the
designer

designed for serendipity. Since the primary goal for the designer is respectively the consequence (mediator) or societal impact (common good), it matters to a lesser extent whether or not this is achieved through an individual actually experiencing serendipity.

The second characteristic (vertical axis) indicates whether the potential consequence of the serendipitous experience has a significant value to the designer. In the case of *mediator*, designing for serendipity is seen as a means to generate a valuable consequence to the designer (e.g. increase in sales) that might be different from the objective of the serendipitist. On the other hand, in the case of *serendipity as an ideal*, these two valuable outcomes converge (or align). For the two remaining categories, a design for serendipity is not primarily motivated by a consequence that matters to the designer. Rather, there is a perceived benefit toward society (*common good*) or the design for serendipity is seen as a crucial factor for the functioning of the environment (*feature*), regardless of the consequence of an individual experiencing serendipity.

Following this typology, one could see a parallel with designer-centered environments (solid line in Figure 4) and user-oriented environments (dotted line in Figure 4). In the former, the design principles "are the interests, agendas and preferences of whoever successfully asserts control over the environment" (Carr, 2015, p. 835) whereas user-centered environments "are intended to address a broad community of users' needs rather than the designer's needs" (Carr, 2015, p. 836).

4.2 Academic abstraction
By positioning the cases from the literature in the proposed typology, it can be observed that the majority of the reviewed academic research discusses serendipity in ways that classify as an ideal or common good (dotted line in Figure 4). These works mainly emphasize the value to

the individual serendipitist or a greater societal good, and it is assumed that this is sufficiently valuable for designers to design for serendipity. Such as the works on serendipity for educational purposes (Afridi, 2018), or those arguing for serendipity to counter polarization through news algorithms (Reviglio, 2019b). Exceptions are, for example, the work by Stewart (1996) that discusses serendipity in electronic academic journals, not from the perspective of the valuable discoveries made by the readers, which is the dominant academic view on most of these applications but rather how serendipity increases the acceptance of the electronic journal (and thus considers serendipity as a mediator). This academic abstraction is, perhaps not surprisingly, less apparent in the literature dealing with business and innovation management that by its nature puts more emphasis on the multi-sided nature of many products and services.

As I have argued before, this rather altruistic perspective on designing for serendipity that is present in the academic literature, is questionable to be a realistic representation of real-world practices. While it is true that in some cases, designers are sufficiently motivated by the value for an individual or the greater good, we should not take this abstraction as the only way forward to advance our knowledge. Indeed, this could lead to a rather single-sided discussion and understanding of serendipity, whereas including the designer perspective brings along different challenges and questions such as the dynamics and interactions among various stakeholders, which also propagates to how serendipity is interpreted and implemented. In other words, this abstraction might result in a gap between academic research and real-world practices. In practice, it is most likely that designers are motivated by a different value and hence many of the examples from the literature that were classified as ideal or common good, might emerge from another design value when they are put in practice (i.e. mediator or feature, solid line in Figure 4). When we fail to account for this abstraction and simply extrapolate our academic frames of reference to real-world cases, we might miss out on some important threats to designing for serendipity.

4.3 Threats to designing for serendipity
This revisited understanding of designing for serendipity brings to the fore three threats to the design for serendipity: commodification, misalignment and missing incentives.

4.3.1 Commodification. Commodification means that serendipity may become part of the value proposition of the environment (i.e. product or service) toward its users (Appadurai, 2005). For example, Spotify's Discover Weekly is explicitly telling its users they will discover new music when using the service. One could argue that this will lead users to "expect the unexpected" (Makri *et al.*, 2014, p. 2181), which has been said to challenge the *accidental* nature of serendipity: when people are interacting with an environment *because of* serendipity, the unexpectedness of their serendipitous experience is compromised (Reviglio, 2019b). Many definitions of serendipity indeed use the term "unexpected" (e.g. Lawley and Tompkins, 2008; Makri and Blandford, 2012a; McCay-Peet and Toms, 2015). However, "unexpected events always are unplanned, but unplanned events are not always unexpected given the situation" (Björneborn, 2017, p. 1067). Indeed, a bookshop, designed to foster serendipity and also communicates this to its customers as such, has still been found to trigger experiences of serendipity (Makri *et al.*, 2019). As a result, experiences of serendipity may arise even when one expects it.

Therefore, I posit that the threat of the commodification is not that serendipity is expected but rather that these expectations are not consistently met: when the bookshop designed for serendipity does not trigger an experience of serendipity, or your Discover Weekly playlist that disappoints week after week. A similar discrepancy between "expectations" and "realizations" has been pointed out by Jakonen *et al.* (2017, p. 241) who studied co-working spaces (similar to Seats2meet.com) where "the potentiality of encounters is a special feature" and therefore "encounters are anticipated and expected". However, they found that

"even though these spaces are designed [...] to intentionally increase the number of serendipitous encounters, encounters do not necessarily take place" (Jakonen *et al.*, 2017, p. 241).

Such a discrepancy is not problematic in itself. However, when there is a commodification of serendipity and many providers (or designers) promise serendipity but do not fulfill these promises, serendipity risks losing its meaning and value. This is a frequent consequence of the commodification of immaterial concepts such as culture or sustainability (Shepherd, 2002). The main challenge in the case of serendipity, however, is that a design for serendipity can never guarantee the realization of experiences of serendipity. And as a result, any design for serendipity has an inherent risk of not leading to experiences of serendipity. Consequently, we should not simply call everything a design for serendipity, because when serendipity loses its meaning and value, this may further contribute to a loss of incentives to design for serendipity (see below).

4.3.2 Misalignment. By introducing the directionality of serendipity, I already hinted toward a concern of misalignment. Directionality considers the intent of the those trying to make serendipity happen. It helps to understand in what ways various interests (from different stakeholders) can influence how serendipity is designed for. I argue that misalignment could either result in a perverse use of serendipity or a disappearance of the design intent for serendipity.

The threat of a perverse use of serendipity due to issues of misalignment is most apparent when serendipity is designed for not with the main purpose of realizing a valuable outcome to the serendipitist but to someone else (see Figure 3b). In other words, in all cases except for serendipity as an ideal. However, paradoxically, misalignment could also occur in the case (see Figure 3a) when there is unidirectionality (i.e. serendipity as an ideal). Indeed, in an extreme (and most likely unpreferable scenario), such misalignment could even lead to turning serendipity into a negative experience for the serendipitist. For example, an online search engine that is providing answers to questions you are not trying to answer at that point in time. While this might help you finding answers to other questions, it could hamper the activity you want to perform: answering your current question. In that case, designing for serendipity leads to the opposite of what it is ought to do. This example of the difficult balance between searching and browsing behavior has indeed been observed in library studies (e.g. Carr, 2015) and referred to as a "seeking-encountering tension" (Waugh *et al.*, 2017). It is important to recognize these tensions such that design strategies to mitigate them can be investigated.

Next to such perverse effects, misalignment can also result in a disappearance of the design intent for serendipity. For example, when originally serendipity was designed for to increase user satisfaction, but there appears to be another feature that results in a higher increase in user satisfaction (and perhaps even a decline in serendipitous encounters) serendipity might be (un)intentionally *designed out* of the environment. In this case, the interests of the serendipitist and the designer are not aligned, which is a real threat in all cases except for serendipity as an ideal. Indeed, even when serendipity is a necessary precondition for the functioning of the environment (serendipity as a feature), the previous discussion illustrated that when this purpose changes, there is no more intent to design for serendipity.

Even in the case of libraries, the exemplary serendipitous environment, there have been cases of a disappearance of the design intent for serendipity. Previously, I challenged the idea that serendipity in libraries can be defined as serendipity as an ideal because of potential distorting factors. After all, facilitating serendipitous encounters is not the sole objective of a library, and one must be able to manage the library with the (sometimes limited) available resources. The automatic sorting of returned books, for example, is one of the many applications introduced to increase libraries' efficiency. This may lead to a lower likelihood of serendipity because there are no longer trolleys with unsorted books in the library, which

used to be a source of serendipitous encounters (Björneborn, 2017, p. 1068). A more extreme version is the Mansueto Library where books are stored by size in the basement and automatically fetched when users request a particular book through the digital library interface. This process no longer leaves room for serendipitous encounters as there are no open shelves for browsing, so users have to know what they are looking for in order to get it. Both examples show that a design for serendipity *in practice* is rarely serendipity as an ideal.

4.3.3 Missing incentives. The final and perhaps most significant concern that follows from this analysis is the threat of missing incentives to design for serendipity. I argue that this is mainly applicable in the case of serendipity as a common good where serendipity is neither essential for the functioning of the environment nor its consequence of considerable value to the designer (see Figure 4). In other words, the designer is in no way inherently motivated to design for serendipity in a sustainable way. This is concerning given the current call for serendipity in domains that particularly value this societal impact of experienced serendipity, such as news media.

This comes down to the observation that even though there is a clear societal need for designing for serendipity, it might be that no designer is inherently motivated to do so. In the current light of for example the numerous initiatives to counter disinformation or echo chambers, this might sound like a questionable claim. Are these initiatives not deliberately designing for serendipity? And hence, are their designers not motivated to design for serendipity because of this common good? I would like to challenge this assumption by hypothesizing that these initiatives are in practice either a case of serendipity as a mediator or feature. In the end, designers of these information environments will rarely derive sufficient value from the mere fact that there might be some benefits at a societal level. In reality, they are more likely to be motivated by actions within a corporate social responsibility framework that enhances their brand image (think of large platforms announcing disinformation initiatives after they have been in the news negatively) or they consider this as a feature that increases the overall functionality of their product. There might of course be exceptions, however, to the best of my knowledge, these have not been properly documented in the literature so far.

Framing these initiatives in this way illustrates that there might be a systemic problem that inhibits (or at least not motivates) designers to design for serendipity. Additionally, it helps to explore, from the designer's perspective, opportunities to counter this. This could mean further investigating and identifying the valuable outcomes to designers. My assumption is that by studying serendipity from a designers' perspective, we can learn more about what informs (current) intents to design for serendipity. This is also what is happening in the context of recommender systems, for example. In this field, research emerges on the added value of serendipity in these systems, and is mostly found in terms of increased user satisfaction and long-term engagement (e.g. Chen *et al.*, 2021). Understanding this added value and how it is the result of a design for serendipity, is important because at one point in time serendipity is likely to become subject to a trade-off. For example, when other mechanisms are found to (perhaps more significantly) increase user satisfaction. Another possibility could be to investigate the extent to which policy interventions may be required, such as directives or funding schemes. Especially when there is a societal value at stake, there might be a need to implement governance models that guarantee this societal good at all times. It is no coincidence that scholars have been advocating for public services taking up a responsibility to ensure serendipity in domains such as media (Reviglio, 2019a) or the internet (Fuchs, 2017).

4.4 Limitations
It is important to point out that the proposed typology is a theoretical one. My analysis draws upon academic work, and the question thus is whether the different intents all occur in practice, and if they can always be delineated in this way. Perhaps in reality it is often a mix of

different design intents. In that sense, this typology should be understood as a first proposal and an invitation to study the design for serendipity from a designer's point of view as well.

Another limitation of this article is its scope. I hold the view that serendipity can be deliberately designed for, which implies that there might be a situation where the designer has unintendedly designed for serendipity (see, e.g. Björneborn, 2017, p. 1070). As I focused on what motivates designers to deliberately design for serendipity, I did not include any of these cases of "unintended serendipity", which might be an avenue for future work to explore.

Finally, I refrained from defining serendipity, following other scholars who did not provide any definition. This choice can be challenged by arguing that without a definition it is very hard to know what one is talking about. However, the ambiguity resulting from different viewpoints is exactly the point I want to make by including the notion of directionality that questions whom serendipity is designed for. By taking the designer's perspective and asking what is in it for them, I hope to have shown that depending on the design intent, designing for serendipity might mean something different to various actors. The fact that the current research on serendipity does not take into account these different perspectives to this extent, might be one of the reasons why it is considered such "a vague word" (Merton and Barber, 2004, p. 289).

5. Conclusion
This article started from the observation that there is an increasing call for designs for serendipity, mainly echoing the various benefits such designs provide to individuals and society at large. The current discourse, however, lacks a thorough understanding of why designers would be motivated to design for serendipity in the first place. Following the assumption that designers and users of environments do not necessarily share the same objectives, this article therefore aimed to elicit why designers would intent to design for serendipity.

Drawing from an interdisciplinary body of work, I identified four different motivations to design for serendipity, or design intents: serendipity as an ideal, a common good, a mediator and a feature (see Figure 4). By means of examples from the literature, I illustrated how each of them values a different (partial) component of the process of experiencing serendipity (see Figure 2). Apart from delineating the different design intents, the discussion also sheds light on the importance of directionality. Directionality questions the direction of the design intent, and thus who wants what kind of serendipity for whom. Including directionality helps to understand that from a designers' point of view serendipity might be designed for different reasons than merely an individual experiencing serendipity. In that sense, the proposed typology allows to more explicitly formulate the different functions of a design for serendipity and thereby expand our knowledge on the value of designing for serendipity.

This leads to the finding that a design for serendipity is not always essential for the purpose of the environment and could therefore be omitted when conflicting objectives come up that lead to a trade-off. Such cases of "serendipity lost" are one of the consequences of a potential misalignment between the objectives of the designers and serendipitists. Another aspect that this discussion brought to the fore is a lack of incentives to design for serendipity. This is particularly concerning because it is most likely to be a threat to environments that could have a beneficial societal impact by a design for serendipity, such as news media. A final threat is the commodification of serendipity that might result in serendipity eventually losing its value.

Is serendipity then designed for as a means or an end? The discussion in this article showed that the academic discourse tends to consider designing for serendipity as an end; for the sake of an individual's or societal benefit. In practice, however, I argued that serendipity is more likely to be designed for as a means. It helps designers to reach their objectives or

contributes to the purpose of the environment. It is important to note that neither view is problematic in itself, but the finding that there is a discrepancy between theory and practice is concerning. In my analysis, I have pointed to the notion of directionality as being an essential concept to bridge this gap, and at the same time helping to understand potential threats to designing for serendipity as well as highlight the opportunities to design for serendipity by emphasizing its functions in design.

I am confident that deepening our understanding of serendipity from a designers' perspective is an important way forward to inform the design of all sorts of future environments. Further work could contribute to this by conducting empirical research to investigate designers' intent to design for serendipity in more depth, or what strategies exists to mitigate or reduce the potential threats. By doing so, it could also inform design policy and practice on how to design responsibly in the context of serendipity.

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