

Exploration of the Future of Co-Creative Systems Through Collaborative Speculative Design Practices

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Abstract

Technology strongly influences societal systems, and likewise societal perceptions influence the implementation of specific technologies as well as their future development. When it comes to co-creative systems, questions arise on how these systems will fit into human social systems. Therefore, a broad and pluralistic discourse about the future of co-creative systems and their societal impact should be aimed for. Our research collects crucial questions from the realm of co-creative literature and embeds them in a collaborative speculative design framework. Firstly, the framework aids collaboration between interdisciplinary speculators when imagining future scenarios about co-creative systems together. And second, it supports the generation of visual speculative products that can serve as a starting point for a broad external audience to discuss the developments and impacts of co-creative technology on possible futures in a pluralistic manner.

Introduction

Creativity is broadly perceived as one of the things that makes us human. Therefore, the possibility for an artificial intelligence (AI) driven system to be creative is considered as one of the frontiers of AI development, but also a feared threshold for its critics. (Colton and Wiggins 2012) The thought that computational systems are not able to, or should be excluded from, performing creative acts is reflected in an unconscious human bias found in the assessment of artefacts created by computational creative systems (Moffat and Kelly 2006). Furthermore, the seemingly general unease with AI systems within society only adds to this bias (Moffat and Kelly 2006). This unease could not only create skepticism towards the beneficial use of AI systems, but also limit positive future visions.

Because co-creative systems may have a great influence on the creativity of laymen and professionals (Kantosalo, Toivanen, Xiao, and Toivonen 2014), and potentially also lead to a transformation of creative industries as well as cultural norms and value systems, it could be valuable to have discussions on the future of co-creative systems; Discussions that include not only researchers from the field, but

also societal actors who will be equally affected. In this paper, we present a method to collectively reflect on and discuss about the status quo as well as the future of co-creative systems and generate visual discussion contributions.

We rely on the definition of creative systems by Karim, Maher, Davis and Grace (2019, p.17): “Creative systems are computational systems that either model human creativity in some manner or are designed to support and inspire creativity.” Within the field of creative systems, different approaches, namely creativity support tools, autonomous creative systems and co-creativity systems, can be differentiated (Karim et al. 2019). This paper specifically focusses on societal questions regarding the future of co-creative systems. Co-creative systems describe proactive (Liapis, Yannakakis, Alexopoulos and Lopes 2016) collaborations between computers and humans on a creative task in real time, whereby the creativity of both agents is mutually influenced and enriched (Davis, Hsiao, Popova, and Magerko 2015).

With the development of the research field of computational creativity and the increase in autonomy of computational systems, many societal and philosophical questions relevant to co-creative systems stem from the approach of autonomous creative systems, which can lie the basis for the computational counterpart in co-creative systems. Looking at a simplified co-creative environment, the human and the computational system form the co-creative unit. This unit is embedded in a social system (society) with its norms and values. The creator or the programmer has influence on the computational system. Societal questions arise at all possible interrelations of these entities. In the following section, we will first raise societal and philosophical questions before presenting our method for the exploration of the future of co-creative systems.

Societal and Philosophical Questions

A crucial factor when it comes to the assessment of creativity of computational systems is the question of **creative autonomy**. In order for this concept to be enabled, it is essential to integrate a certain amount of self-awareness and, therefore, the ability to “observe and assess its own

performance” (Ackerman, Goel, Johnson, Jordanous, Leon, Perez y Perez, Toivonen, and Ventura 2017, p.5) into the computational system. This allows the system to evaluate its predefined or learned system standard in order to assess and compare its actions and outputs accordingly. Furthermore, the ability to adapt this standard, if necessary, needs to be integrated into the computational system in order for it to gain autonomy. (Ackerman et al. 2017) This raises the question on whether the ability of autonomous systems to change without direct human interference is equal to the idea of autonomy (Jennings 2010) and whether it is accepted as such by the human collaborator in the co-creative system.

In addition, the assessment of its current system standards by a computational system is directly linked to the **social setting** of the environment, where the system is embedded. This is not only because the initial system standards originate from a human creator, but because they must be aligned with societal norms and values beyond the programmer-system relationship (Jennings 2010). This is extended further when it comes to co-creative systems, where the user and the computational system potentially influence the perception of each other constantly (Cunha et al. 2019) and thereby also the evaluation standard.

Related to the change of its standards by the computational system, is the potential **realignment of norms** within a society if an algorithm’s performance is envied by the collaborator or an observer. The comparison of the system’s abilities to one’s own or to what is broadly perceived as good practice, may lead human beings to challenge their performance. Eventually, this arises normative discussions about the quality or creativeness of a human work (Petee, Shimmin, Duhaime, and Vidrin 2019). This constellation raises questions on the influence of **societal standards and value systems** on the relationship of co-creative system collaborators and vice versa the influence of the relationship on societal norms and values. Furthermore, also questions of **equality of actors** within the co-creative system relationship referring to the influential power or importance of one collaborating actor are touched.

The latter topic has also been mentioned in the context of creative computational systems outside the co-creative realm. For instance, the pioneer Harold Cohen (1988) stated that the creation of art works of his computational system AARON is bound to language and representational determinations made by himself. While AARON generated art works autonomously, the creative computational system was not “an artist on its own right” (Cohen, P. 2016, p.65). Cohen perceived himself as the real artist and retained control by limiting AARON’s level of autonomy (Cohen, P. 2016). Even if the creators of computational systems for co-creative settings decide to grant unlimited autonomy to the machine, the question of **authorship** of the resulting co-creative work remains. While the latter refers to authorship rights between an autonomous computational agent and its creator, in co-creative systems the question of authorship should also be referred to the human-machine collaborators. Whereas shared creative responsibility over the generated

artifact was observed in co-creative systems (Kantosalo, Toivanen, Xiao, and Toivonen 2014), different scales of interaction (Maher 2012) and different roles, such as control over task, speaker or outcome (Novick and Sutton 1997), of the co-creators can be identified.

Finally, it has been discussed by Colton, Pease and Saunders (2018) that a computational system’s lack of **authenticity** regarding authorial intention and the meaning of a creative artifact will limit its creative potential. When it comes to societal reception of the creations of co-creative systems, the question arises whether the human influence balances the computational system’s lack of authenticity or whether the computational system’s lack of authenticity diminishes the authenticity of the final creative outcome regardless of the human influence.

Collaborative Speculative Design Practices

The following section presents our own speculative design approach and provides a framework to conduct 1.5-day workshops. Speculative design supports the exploration of uncertain technological futures and uses the reasoning about such futures as a medium for speculation: e.g. to think about the future of co-creative systems and their prospective societal impact. Due to the uncertainty of future developments, information gaps emerge. These gaps are closed by making assumptions that facilitate the conception of future scenarios. (Dunne and Raby 2013; Malpass 2017) The process of speculation decouples the imagination of future scenarios from specialized knowledge bases and allows an interdisciplinary group to generate ideas collectively, speculate on a more even level of knowledge and, thereby, integrates diverse perspectives into the ideation phase of the scenario. The result of the presented approach is the generation of a visualized product that transports the discussed and conceptualized future scenario.

Speculative design practices provide ample opportunity for exploring the future of co-creative systems. Indeed, speculative design aims to have an effect beyond the actual design of visual speculative artifacts, to initiate discussions about possible future scenarios (Dunne and Raby 2013; Malpass 2017). This can be achieved by using in-depth discussion settings, such as a workshop format, as well as by presenting the results to a broader audience. For the latter purpose the visualized products may serve as a starting point for subsequent discussions with a broad audience.

Our framework covers the collaborative speculative design process from ideation to conception of a future scenario for the visualization of a representative speculative product, through an in-depth discussion styled workshop format. Because the visualization of conceived products is a crucial part of the approach, at least one designer per workshop group should take part. The workshop can be conducted either in an offline or online setting. The framework is provided under the CC license on www.perfectfuturedesign.com and was validated by conducting two workshops on the topic of the future of the digital public sphere (results accessible at aforementioned website). The framework

applied to the context of co-creative systems contains the following three phases:

In the first phase, the participants learn about the co-creative systems and the applied speculative design method. In the second phase, the participants brainstorm individually on a shared board about given topics. This brainstorming task introduces the participants to speculation and prepares them to free their thoughts from everyday life constraints. The questions to ideate on are: *Which co-creativity-based technologies will be broadly established in 10 years?*, *How will established co-creativity-based technologies influence social norms and value systems (e.g. authorship, authenticity, autonomy, quality) in 10 years?* and, *What are the main challenges to be overcome to establish co-creative systems within the next 10 years?* The resulting collection of thoughts serves as an idea pool from which working groups can subsequently choose a co-creativity-related topic of interest for the speculation of a future scenario. The speculation and conception of this scenario is carried out in three steps. First, the topic of interest is analyzed with regards to the societal or human factor and the influencing factor. While the first refers to the relation of the chosen topic to societal systems or the role of human individuals in relation to the chosen topic, the latter questions the factors that enable or hinder the development of the chosen topic or issue with regards to co-creative systems. Second, from a perspective of a future in ten years, it is speculated how the topic of interest and/or the corresponding factors have evolved over the past years. In particular, a product or a service that has a major influence on the co-creative future scenario or results from the scenario is to be conceived. Third, effects of the conceived scenario and product on the future environment are to be speculated about. Finally, in the third phase, the group visualizes the conceived product or service as a product webpage optionally using a provided webpage-template. The webpage includes information about the future scenario, about the product or service and about how it can affect the life of their users.

Discussion and Conclusion

The presented framework provides a guideline for speculating about the future of co-creative systems. It was conceived to aid collaboration between inter-disciplinary speculators when imagining future scenarios together. Furthermore, the framework aims at supporting the generation of visual speculative products. These products can serve as a starting point for a broad external audience to discuss about developments and impacts of co-creative technology on possible futures in a pluralistic manner.

The questions addressed within the framework stem from the societal and philosophical questions posed in the computational creativity literature. Regarding the list of themes selected, no claim to completeness is made and the section on the societal and philosophical questions above is limited to raise all issues. Nevertheless, we hope the collection of themes and our framework provide a starting point for conversations on where the future of co-creative systems may lie and what to keep an eye on when heading there.

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