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BRIDGING THE RELATIONAL GAP: SYSTEMIC DESIGN AND AI, SPARC-ING SUSTAINABLE EDUCATION IN UNIVERSITIES

Haizea PÉREZ MACHIN[1,2] **and Alex TAYLOR** [1,2]
[1]Oslo Metropolitan University, Norway
[2]Arbeidsforskningsinstituttet – AFI, Norway

ABSTRACT
This paper gives perspectives on the use of systemic and product design methodology combined with AI as a tool to facilitate an inward examination of university organisational structures. The paper attempts to provide a deeper understanding of the existing challenges and the necessary adaptations to contribute to the development of a sustainable society within the university system. This research is derived from SPARC, 'Sustainable Partnerships and Research Collaborations', a student-led research pilot owned by Arbeidsforskningsinstituttet (AFI - Work Research Institute) and Oslo Metropolitan University. SPARC was created and led by three product design students collaborating with research assistants and research professors at AFI. The research seeks to design innovative approaches that address the complex interplay of elements within the stakeholders at fragmented organisational structures in the university. In the pursuit of this objective, the students shape AI using qualitative data gathered through explorative workshops involving various stakeholders at the university, which is at the core of the research. The article speculates and suggests the potential of design students to shape existing systems by utilising this approach in their product design education. This initiative is allocated to the following Sustainability Development Goals of the United Nations; 17. Partnership for the Goal and 4. Quality Education. Design approaches, along with advancing AI, provide a holistic examination of sustainable solutions by cultivating awareness and capabilities for action, developing partnerships, and improving educational quality within the university ecosystem.

Keywords: Systemic design, product design, AI, partnership, stakeholders, systemic change, sustainability, universities, research, interdisciplinarity, social innovation

1 INTRODUCTION
In a contemporary context, the university has evolved into a dynamic living system, providing a habitat for a multitude of institutional entities and stakeholders. This includes students, faculty, researchers, as well as a varied array of academic and administrative departments. Universities have tried to adapt and respond to the evolving needs of a developing society whilst the academic community helps apply focus on what should be taught and researched. However, in their outward gaze, universities sometimes neglect to examine their internal dynamics, leading to a potentially static and hierarchical organisational structure in a rapidly evolving society.
The triple Helix presents a model which relies on industry, governments and universities, as the entities with the power to create innovation based on their interactions [1], with universities being the main actors for knowledge production and delivery. Moreover, Elias G. Carayannis and David F.J. Campbell (2010), develop the Triple Helix into the Quadruple Helix [2], by adding the societal sphere, media-based and culture-based public, and further, the Quintuple Helix [3] including the dimension of natural environment, acknowledging socioecological interactions [4].
While recognising government, universities, society and environment interactions as the driving core for innovation, analysing this system through a magnifying lens is crucial for their understanding. Micro-relationships are the ones making the system operate, and their value is being increasingly perceived [5], after all, micro-relationships between individuals are the ones making the systems function.
This paper puts the scope on the micro-relationships of universities, believing in universities as innovation houses of "knowledge intermediaries, knowledge gatekeepers, knowledge providers, and

knowledge evaluators" [6]. Showcasing SPARC's activity, Sustainable Partnerships and Research Collaborations, the research explores system-oriented methodologies, as a groundwork to study universities own practice, and is designed to empower micro-relationships between multi-stakeholders; trusting, that a change at the university level can impact the quintuple helix interaction. Hence SPARC recognises sustainable values as essential for an operative interaction system, aligning with the 17th of the Sustainable Development Goals of the United Nations, Partnership for the goals: Strengthen the means of implementation and revitalise the Global Partnership for Sustainable Development. In addition, SPARC, a student-led research project, aims for the change for the 4th SDG, Quality Education, which is incorporated not only in the aim but also in the research methodology.

2 LITERATURE BACKBONE: SYSTEMIC DESIGN AND AI

Tame problems are stable problems which are defined to have a single aim to be solved and which can be objectively evaluated [7], however, when trying to look deep into gaps and barriers within the systems, we find the 'Wicked' problems [8]. Wicked problems are those ambiguous issues whose root is tangled in different systems, for example, in cultural, political and economic systems. Hence, clear definitions and procedures of wicked problematics is often as complex as finding their solutions. In response, the practice of systemic design or system-oriented design, offers design-based methodologies for holistic analysis and knowledge creation. Systemic design can be defined as a "design-led practice that integrates dialogue in co-creation for sensemaking and decision-making" [9] In this case, the wicked problem that we're designing interventions for at SPARC is the issue mobilising higher education to take on stronger roles and adjust their structures to work towards the SDG goals [10].

Due to technological advances and the launch of open AI sources such as ChatGPT, the edge of Artificial intelligence (AI) has now been unlocked and popularised. AI is mostly being developed to function independently from human intelligence for task fulfilment; however, even with AI's efficacy when facing tame problems, the use of AI on its own, is often not feasible to respond to the complexity of the "open-ended nature problems" we are facing, problems we could once again refer to as wicked problems.

Although, nowadays Artificial intelligence can't completely substitute human intelligence unassisted for the solution of wicked problems, AI tools could be highly beneficial for their research. Intelligence amplification (IA), also known as Augmented intelligence, is a type of AI that aims to enhance human intelligence by working alongside it, thus, it doesn't want to replace humans but assist them. For instance, generative AI can create content and ideations, which in collaboration with human experiences, could help to address actual challenges in decision-making processes [11].

Furthermore, Hybrid Augmented Intelligence (HAI) [12], is born from the synergy between human cognitive capabilities and AI models, acknowledging the need for human comprehension in problematics that machines cannot unfold. There are two main models of HAI: 'Human-in-the-loop', an AI and human-collaborative model in which artificial intelligence provides the analytical information, while human intelligence is intuitive and empathetic, and 'Cognitive Computing-Based' IA, an AI with a designed cognitive model mimicking humans [13].

3 CONTEXTS OF THE CASE STUDY

SPARC is a student-led project created in collaboration between Oslo Metropolitan University, and AFI, Work Research Institute. SPARC's platform consists of researchers, scientific assistants and students, researching OsloMet's practice and strategies in the area of social environment, communication and collaboration. Research on the already existing practice for collaboration at academic grounds internally and also externally is included in its objectives together with the exploration and the design of new collaboration formats in education. With the diverse transdisciplinary skills and academic backgrounds of the team members, various outcomes are designed, such as the design of concepts for collaboration, based on the experience from conducted workshops, and the needs of students and staff employed at different units and departments of the university; design for the implementation of OsloMet's strategy goals and frameworks; and the holistic location of concepts about border systems of the university.

SPARC was ideated from a pilot project by researchers at Arbeidsforskningsinstituttet in unison with a team of students majoring in Design and Complexity at OsloMet in 2023. This pilot opened an arena for a student-led exploration of the systems at university, thus, students were invited to explore the ecosystem they were part of, aiming to find and shift, the barriers, silos and gaps OsloMet faces.

Using systemic design methodologies and analysis, students from SPARC have designed different practices for sustainable collaborations among different stakeholders at the university: this research showcases “SPARC AI”, an AI-generated persona whose knowledge gathers all the collected data through the previous workshops led by SPARC.

4 METHODOLOGIES

Using systemic design methodologies and analysis, such as stakeholder mapping, and participatory workshops, students from SPARC have designed different practices for sustainable collaborations among university stakeholders over a year, including workshops such as “What does sustainability mean?” giving voice to students, “Research-ship” an activation for researchers-students collaboration, and a pre-conference involving researchers, students, and professors as part of Storbykonferansen 2023. As follows, this research adopts an innovative methodology by using the collaborative qualitative data analysis gathered from previous workshops and processes in the collaboration between stakeholders, to generate the knowledge of the designed SPARC AI avatar. Furthermore, the AI avatar has been tested and evaluated by OsloMet's researchers, students and administrators for the ideation process on the possibilities of AI implementation at university systems.

5 IMPLEMENTATIONS

SPARC AI is an avatar that holds the co-created knowledge between stakeholders at OsloMet. For the creation of this avatar, students used 'Inworld AI,' [14] an advanced AI software designed for creating and shaping non-player characters within customised virtual environments, and ‘Unreal Engine’ [15], a game engine that can allow for real-time interaction and experiences. To develop the AI’s ‘brain’ - how it talks and behaves logically - the process involved providing the character with a fundamental description that imbues the avatar with contextual awareness and gives them the needed knowledge to respond to the user needs for each service. Additionally, users can tailor the AI's personality by adjusting its default emotions and responsiveness to player input, allowing a precise design of the interaction dynamics.

SPARC AI was provided with anonymised knowledge and data collected through earlier workshops and activities conducted in the research pilot. The AI’s goal was to provide users information about the SPARCs’ pilot project data collection processes, methodologies, and the data sets of results through discussion. For example, the AI should be able to tell you all about a ‘Research-ship’ workshop that SPARC conducted. - The design of the workshop, what happened, and the conclusions and feedback gathered. Qualitative data had to be formatted into easily digestible facts for the AI to read, line-by-line. As the workshops that SPARC conducted involved innovative, co-creative exercises, such as developing posters and artwork in group settings, all data had to be converted into readable text form manually.

The AI character was then given a visual anthropomorphic body through Unreal Engine’s ‘Metahuman’, allowing easy creation of a 3D, photorealistic digital human which can be fully integrated with InworldAI’s ‘brain’, complete with lip sync and audio output. Using a realistic human appearance was decided as a tool to invoke deeper discussions, visualisations and interactions with stakeholders. Recent research suggests that using a more anthropomorphic design can lead to a higher degree of social presence with users [16], which would be advantageous when we want to discuss and ideate upon this AI with stakeholders.

Figure 1. SPARC AI service

6 DISCUSSIONS

Universities are complex systems driven by the force of students, professors, research institutes, libraries and other actors and divisions making the organisation work. Hence, based on the strategies of OsloMet, the university states the importance of collaboration between stakeholders to improve sustainability and innovation. However, for these interactions to happen, SPARC advocates for a need to study and design new forms of communication that enable the system to be dynamic and flexible, increasing the efficiency of the existing resources, believing that; "In this new paradigm, the importance of knowledge is determined not only by competitiveness and productivity but by taking into account the creation of social welfare, the impact on quality of life, and the co-creation of knowledge as part of a partnership" [17].

SPARC's AI was tested with stakeholders within the university system, in particular, researchers, students and administrative staff. They were presented with the AI and encouraged to interact with the software and discuss their thoughts in a roundtable format. Stakeholders initially asked the AI about what it represented, finding more information on SPARC and what workshops the project did throughout the year. Afterwards, stakeholders began to ask broader questions on how to approach sustainable partnership, how to organise a workshop, or why the workshops were effective, and the AI replied back in a manner informed by the workshop data it was fed.

For example, when asked why a 'speed dating' networking event between students and researchers went well, the AI responded with *"... because it allowed them to find common ground and develop research questions together, leveraging their shared interests and expertise. This collaborative process fostered a sense of ownership and engagement, leading to meaningful and impactful outcomes."* When more broadly asked for advice in developing sustainable partnerships, the AI responded with: *"Sustainable partnerships can be fostered by creating spaces for dialogue, promoting shared values, and identifying common goals. By engaging stakeholders and building trust, we can work collaboratively towards a more sustainable future."*

These answers prompted further discussion, however directed in a more universal fashion rather than the current form of AI investigated. During testing with stakeholders, new ideas arose on how AI could be integrated into the university system. Stakeholders discussed how a form of this AI could be utilised on a more macro level, having data from multiple research projects, so that students and researchers could communicate with the tool, ideate and gather connections on existing research projects. There was discussion on how this type of AI tool could be used at the administration level, to gather meeting notes and strategies from different departments at Met and disseminate the knowledge in a more digestible way. It could also encourage connections and related topics between different departments and at different levels of OsloMet's structure. Thoughts on multiple instances of this AI tool in various environments were examined, and how it can be used to ensure good quality education for students and an engaging workplace. Stakeholders noted the way in which the chatbot spoke, and the notion that there were no power dynamics when asking and receiving information. Stakeholders could discuss freely their thoughts and opinions on SPARC and spoke about how this sort of chatbot would be useful when asking questions you're normally too embarrassed or worried to ask.

Questions arose on how an AI chatbot could be given 'neutral' data, as even things such as meeting notes can be biased depending on the person writing them. During testing and presentation, the AI could be seen using 'empty phrases', language which extended sentences, but didn't really provide more detail. Part of this is due to the amount of data inputted, and also due to the strict censorship settings, meaning the AI would try not talk about topics it had no data about. Thoughts followed on the importance of the data input into the AI, how many ideas should the AI be allowed to generate on its own, compared to reflecting the data, and if that could be different depending on the needs of the user. Could this AI chatbot be seen as a reflection tool, an ideation tool, or a relational one? Could it be hybrid?

Through the discussions, it can be noted that stakeholders viewed this AI software as a form of *Intelligence Amplification,* designed to enable users to understand a complex system and ideate alongside them, rather than *for* them. It could be argued that this prototype can impact the Quintuple Helix model by generating understanding and connections at a micro-relationship level, as the AI prompted a discussion between stakeholders on potential future systemic changes at OsloMet. There is large potential in this prototype to address the systemic wicked problem of transforming higher education structures towards the SDG goals, as seen in the discussion about the potential of this AI connecting amongst different levels at university. AI's such as this one, informed by qualitative, creative workshops towards sustainability, could help advise and inform educators and students on sustainable and design-informed ways of creating workshops and discussions that they may have otherwise not thought of.

The aesthetic design of the AI was not covered in discussions, however, may be seen as an important aspect of how users interact with the software and should be examined in future studies. The discussions and testing phase, whilst fruitful, could have involved more stakeholders in the university system, such as educators, course coordinators and librarians, to provide a much more holistic view. Whilst discussions naturally shifted towards a systemic and future perspective, there could have been more conversation targeted towards what makes this current AI iteration relevant and useful to stakeholders. The next steps for this AI would be more testing and development with researchers, educators and students to see how well of a tool this could be for those wanting to develop design-informed and active projects, workshops and research.

7 CONCLUSIONS

SPARC is a multi-stakeholder team that proposes new paradigms to re-arrange decision-making structures and processes at the university, providing arenas for co-creation through collaborative practices. These arenas require the participation of different stakeholders for their operation since diverse perspectives are essential to generate a common value. Highlighting the importance of micro relationships within university as innovation drivers, this paper showcases the latest approach of this research pilot that is driven by students utilising systemic design and AI as a tool to bridge stakeholders through a divided educational system.

SPARC AI offers a visualisation of how AI could potentially be used for service development at universities, even if this prototype is still an early model of AI as a facilitator in our relational and communicational systems, its design provoked new ideations and understandings among the stakeholders about how AI could be utilised beneficially.

Accordingly, this approach advocates for Hybrid Augmented Intelligence technological devices to foster solutions encompassing human cognitive intelligence and AI, understanding that AI cannot work independently to face wicked problems.

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