Sustainable, Secure, and Smart Collaboration (S^3C)

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ABSTRACT

We live in an increasingly interconnected world, where collaboration is the order of the day, stimulating the transition to a more sustainable society. This workshop focuses on sustainable and smart collaboration, which might also take place in virtual and remote settings. While the virtual environment represents a step forward in breaking down geographical and social barriers, they require to deal carefully with security concerns. In this context, the Sustainable, Secure, and Smart Collaboration (S^3C) workshop is meant to connect researchers, industries, educators, and technologists related to Human-computer Interaction (HCI) blended with immersive systems, smart cities, and security awareness which can take advantage of the collaboration. It resulted in the presentation of 6 contributions proposed by researchers and companies all around Europe, exploiting collaboration to guarantee learners' engagement, security awareness, and smart solution design. The contributions confirm the pervasive role of collaboration that has the potential to improve human interaction in the presence or remotely.

CCS CONCEPTS

• **Human-centered computing → Collaborative interaction**; **Human computer interaction (HCI)**; • **Social and professional topics → Sustainability**; • **Security and privacy → Security requirements**.

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1 INTRODUCTION

We live in a world where no individual is independent of those around them. Hence, interconnection, interdependence, and collaboration are shaping the framework of modern society as they stimulate the transition to a more sustainable society [4]. Sustainability goals embrace health and safety, diversity and inclusion, education and training [7]. How we collaborate today strengthens our future relationships [6]. A collaborative environment drives and enables sustainable practices allowing merging different perspectives to guide decisions while increasing trust, promoting an innovative culture, driving innovation, sharing responsibilities, and working together to achieve more than could be achieved by an individual on their own [2].

Collaboration is generally based on interactions, mainly between people. However, technology is rapidly shaping our lives [1], requiring us to redefine collaborative environments, letting geographically distant people easily communicate and work together, experiencing immersive virtual reality which emulates real social interactions, and designing interactive and smart environments. Hence, this workshop focuses on sustainable and smart collaboration, which might also take place in virtual, remote, and online settings [5].

While it represents a step forward in breaking down geographical and social barriers, virtual environments should carefully deal with security aspects [3], above all, when young and inexperienced users are involved. Hence, besides focusing on sustainable and smart collaboration, we should not forgive the security concerns.

The Sustainable, Secure, and Smart Collaboration (S^3C) workshop[1] is meant to connect researchers, industries, educators, and technologists involved in different and diverse areas connected to Human-computer Interaction (HCI) blended with immersive systems, smart cities, and security awareness which can take advantage of the collaboration. It encourages the presentation of approaches and interfaces to mediate human and digital solutions while supporting collaboration.

2 WORKSHOP CONTRIBUTIONS

We accepted 6 contributions exploiting collaboration while considering at least an aspect concerning sustainability, security, and smartness.

[1]S^3C workshop: https://sustainablesecuresmartcollaborationws.github.io

Guasti et al. are researchers and technologists who report on a game-based approach to support young students to familiarize themselves with blockchain. In particular, the article speculates on the role of collaboration while participating in a role-based board game.

D'Ambrosio and De Vinco from the University of Salerno, Italy, reflect on the collaboration in the metaverse by collecting application contexts that can take advantage of collaboration implicitly enabled by the metaverse and the pro and cons of giving voice to university students. Results are coherent with the literature and create a clear connection with security concerns and sustainability aspects.

Amorese et al., from the Università degli Studi della Campania, Italy, report on an experience of automatic speech recognition in the direction of developing an automatic depression diagnosis system and speculate on the influence on the performance according to the speaking language of the involved users. This contribution is strictly connected to the CHI community and can provide interesting feedback on the impact of these biases in working collaboratively. It addresses the sustainability aspect, interpreted as aspects concerning the human health conditions, promoting more sustainable behaviors from the point of view of how sustainability can be applied as a critical lens to the design of interactive systems.

Gennari et al. propose a contribution supporting a joint work of the University of Bozen and Venice and Perlatecnica, an association in the Campania Region, demonstrating collaboration between researchers from academia and industry. This contribution is supported by the GREEN[2] Erasmus+ project, which aims to support the design and development of innovative solutions for environmental sustainability. In particular, the article discusses the engagement achieved by university students during the collaborative design of smart solutions. Results are promising, and the adopted procedure is detailed in such a way to inspire similar workshops.

Andriessen et al. and Luidold et al. present two contributions supported by the CS-AWARE-NEXT[3] European Project that focuses on the awareness of cybersecurity by exploiting collaboration. They are two joint works embracing researchers and entrepreneurs from Italy, the Netherlands, Estonia, Austria, Finland, and Germany. The first contribution focuses on a systematic comparison of open-source collaboration platforms by underlying that none of the considered platforms offers better features than the others, but all of them strive to be the ones behind a supporting community that adds new features and updates the current versions. The second article enters into the merits of the European project, underlining the importance of providing organizations and local or regional supply networks with a dynamic and collaborative ecosystem to build a shared situational awareness of potential cybersecurity issues.

Overall picture. Looking at the word cloud (Fig. 1) generated starting from the contributions abstract. With no surprise, collaboration is the most common word due to the workshop topic. It is interesting to notice that while smart is big enough, and security appears both as security and cybersecurity, sustainability is the less covered aspect of the workshop topics. Data is a recurring topic,

Figure 1: Word cloud generated from the contributions abstract.

probably because three of the articles focus on data-driven collaboration to explore knowledge graphs in the metaverse and improve cybersecurity awareness. The discussed contributions are anything but theoretical, proposing platforms, game-based approaches, technological solutions, and open-source projects coherently with the CHI conference focus. According to the recurring verbs, the proposed interfaces are proposed in the direction of engaging end-users while letting them design, learn, discuss, explore, and improve their capabilities. Coherently, the most recurrent application context is education modeled as students, learners, university, and learning. It underlines the perceived role of forming a sustainable society for future generations by raising awareness among students regardless of their school age.

3 CONCLUSION

The S^3C workshop has been proposed in the direction of connecting researchers, industries, educators, and technologists involved in different and diverse areas related to HCI which can take advantage of the collaboration. As a result, it attracted contributions from academia and industry belonging to different European countries, with the potential to discuss different points of view during the workshop. Contributions contextualize collaboration implicitly offered by the metaverse or grounding on the collaborative-learning and its effectiveness in engaging learners of any age while letting them learn about smart cities, sustainability, blockchain, or cybersecurity. Besides being compliant with the workshop topic, the authors also pay attention to CHI aspects, discussing automatic speech recognition, virtual reality, collaborative platforms, smart board programming, and game-based interfaces. The creativity of the authors and the interesting contributions exceeded our expectations and let us imagine the potential of discussions and collaborations that could arise during the presentation, comparing contributions with different points of view and authors with different maturity. Last but not least, we dedicate a big thank you to the program committee of the workshop, which provide the organizers with timely reviews and the authors with valuable comments.

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