Research in Management Information Systems and the Sustainable Development Goals: Review and Research Proposals

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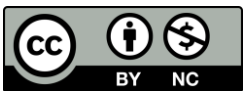
Introduction

Although gender equality is a fundamental human right enshrined in the Universal Declaration of Human Rights, our societies are still far from achieving this equality. For example, in France, women earn on average 22% less than men[1], and globally, they shoulder about three times as much unpaid domestic and care work as men[2]. Despite some progress, it would still take several decades, if not centuries, to achieve gender equality. To accelerate and promote more just, equal, inclusive, and sustainable societies, in September 2015, the 193 member states of the United Nations adopted the 2030 Agenda for Sustainable Development—a universal framework for action based on 17 Sustainable Development Goals (SDGs) and 169 targets to be achieved by 2030. These SDGs constitute a global call to action to eradicate, among other things, poverty and gender inequality, protect the planet, and improve the living conditions of all people, while opening up new economic, social, and environmental opportunities.

The SDGs have become a key framework for academia and have thus been gradually integrated into research. As a result, the number of scientific publications referencing the SDGs

[1] Insee, « Écart de salaire entre femmes et hommes en 2023 », publié le 3 mars 2025

[2] Organisation internationale de la Francophonie (OIF). (2025). Étude sur la contribution des femmes dans l'espace francophone : Pistes d'actions pour mesurer, valoriser et mieux prendre en compte le travail invisible des femmes – Termes de référence. OIF.



has steadily increased year after year (Figure 1). In France, as early as 2017, a white paper was submitted to the Minister of Higher Education and Research outlining a five-year strategy in which the SDGs were presented as a foundational framework to which higher education and research activities must contribute. Following this, in 2018, the conference of universities' presidents (France Universités) and the conference of Grandes Écoles published a specific guide proposing the integration of the SDGs into institutional strategies to contribute to the various challenges of the 2030 Agenda. In the same vein, the french national research agency (Agence National de la Recherche - ANR) reflects this momentum by requiring, since 2020, that project leaders explicitly indicate which SDGs their projects contribute to, regardless of the scientific field. In 2022, ANR reported that 77% of projects identified at least one SDG. French universities are not to be outdone and are now multiplying initiatives to integrate the SDGs into the heart of their scientific and institutional strategies, incorporating them into their strategic plans and cross-cutting research priorities focusing, for example, on the ecological transition, global health, social inequalities, or sustainable cities. For example, since 2023, the University of Bordeaux has published an SDG report that systematically lists the institution's actions contributing to the 17 SDGs. We can nevertheless observe that while French universities are increasingly explicitly integrating the SDGs into their strategies and research programs, this integration is gradual, heterogeneous, uneven across institutions, and rarely "complete" at the level of all laboratories. These national frameworks extend to the french national foundation for business management education (Fondation Nationale pour l'Enseignement de la Gestion d'Entreprise - FNEGE), which requires institutions to report the percentage of published articles primarily addressing a topic related to the 17 SDGs. In other French-speaking countries, the approach appears similar, with examples such as the Swiss Confederation's Sustainability by 2025 (Durabilité en 2025) program or Belgium's Federal Sustainable Development Plan (Plan fédéral de développement durable).

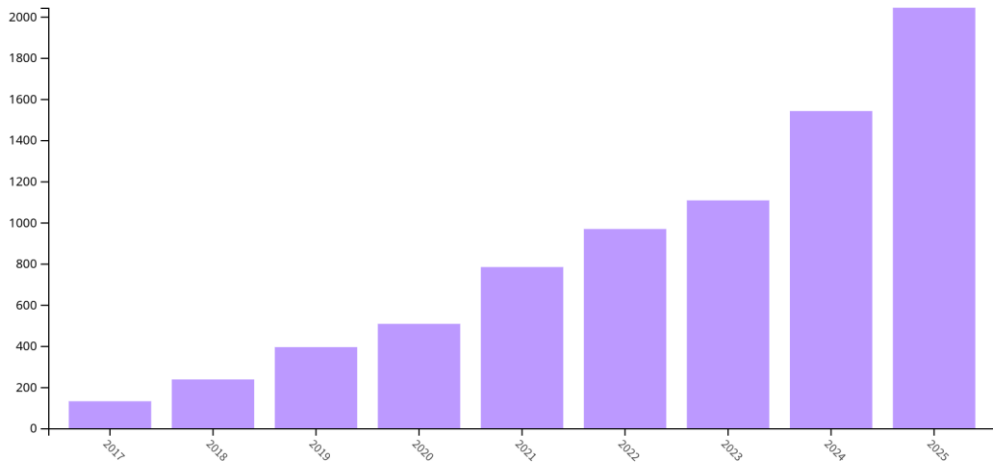


Figure 1 - Number of scientific publications available in the Web of Science Core Collection that include the keyword "Sustainable Development Goal"

Thus, the guidelines for integrating the SDGs into our research are numerous and varied. But what is the reality in Management Information Systems (MIS) research? To answer this question, after providing a historical overview and a precise definition of the SDGs, we demonstrate that the SDGs are still largely underutilized in MIS. We therefore invite the community to explore research avenues in MIS that incorporate these SDGs.

I The Historical Emergence of the SDGs

The trajectory leading from development to human development, to sustainable development, and finally to the SDGs illustrates a gradual broadening of the analytical framework, from material growth to planetary boundaries, and ultimately to individual freedoms and the imperatives of justice. It is on this conceptual foundation that the formulation of the SDGs is based.

The contemporary concept of "development" emerged after World War II in the context of decolonization, which aimed to help the global south catch up with the global north, with a focus largely centered on economic objectives and often reduced to a single indicator: Gross Domestic Product.

Complementary, the Club of Rome's report The Limits to Growth (Meadows et al. 1972), was one of the first warnings about the limits to growth and the unsustainable trajectories associated with continuing trends in population, industrialization, pollution, food production, and resource depletion. The authors demonstrate that these dynamics could lead to the planet's finite capacities being exceeded. On the political front, the awareness outlined in the Meadows' report led to the Brundtland report Our Common Future (1987), which states that no development strategy can henceforth ignore the planet's ecological limits or the deep inequalities that run through societies. Sustainable development is thus defined as development that meets the needs of the present without compromising the ability of future generations to meet their own needs. This definition places at the heart of the concept the need to balance economic progress, social equity, and the preservation of ecosystems within an intergenerational framework

Amartya Sen (2000), winner of the 1998 Nobel Memorial Prize in Economic Sciences, revitalizes the economic analysis of development by incorporating ethical considerations, proposing a conception of development centered on individuals' actual freedoms rather than on material growth alone. His major contribution lies in the theory of capabilities, which assesses well-being not based on the resources one possesses, but on the actual freedom to choose the life one wishes to lead, and which inspired the creation of the United Nations Human Development Index (HDI) in 1990. From this perspective, human development is defined as the expansion of people's capabilities to live better lives, which the United Nations Development Programme (UNDP) operationalizes around three main dimensions: life expectancy at birth, knowledge or level of education, and standard of living.

The Rio+20 conference in 2012 marked a turning point by deciding to develop the Sustainable Development Goals (SDGs) applicable to all countries, with a universal and integrated approach. In September 2015, the 193 UN member states adopted the 2030 Agenda, which sets out a clear framework for action by breaking down the economic, social, and environmental dimensions into 17 goals and 169 targets to be achieved by 2030. While the UN emphasizes the integrated and inseparable nature of the SDGs, it simultaneously considers that eradicating poverty (SDG 1) "*in all its forms and dimensions, including extreme poverty, is the greatest global challenge and an indispensable requirement for sustainable development*" (United Nations 2015). Complementarily, researchers such as Pradhan et al. (2017) or Kroll et al. (2019) have proposed studying the possible synergies between SDGs, which, under limited

resource conditions, could lead to a concentration of efforts on specific SDGs. Other authors, such as Folke et al. (2016) and Reid et al. (2017), have highlighted the systemic links between the SDGs and their modeling, for example using a tiered « *wedding* » cake model: the biosphere, the first tier of the cake, is a prerequisite for social justice, the second tier, and for economic development, the third and final tier.

II Research on MIS and the SDGs: A Current Overview

It is legitimate to ask where MIS research currently stands and to what extent the SDGs have been integrated into its objectives. We therefore present an overview that concludes that the SDGs have a limited presence in MIS research and that there is a lack of research explicitly focused on the SDGs in our journal French Journal of Management Information Systems (Systèmes d'Information et Management - SIM).

Indeed, at the international level, there have recently been calls for special issues, such as in the Scandinavian Journal of Information Systems, on the SDGs in MIS research (Henriksen et al., 2021) or in Communications of the Association for Information Systems on digital innovation for social development and environmental action (Corbett et al., 2023). Additionally, opinion pieces, in the form of editorials and commentaries, have appeared, providing an overview of current MIS research on the SDGs and calling for more systematic efforts in this area. For example, Watson et al. (2021), in Communications of the Association for Information Systems, compile a selection of significant MIS contributions to the SDGs and propose a framework to increase these contributions and better assess their impacts in support of the SDGs. Similarly, Kotlarsky et al. (2023), in their editorial published in the Journal of the Association for Information Systems, note that MIS research is not sufficiently engaged in its discourse and practices regarding the SDGs. In response to this observation and with a view to proposing a research agenda to promote the SDGs in MIS research, these authors notably develop the concept of digital sustainability, which integrates environmental, social, and economic sustainability and applies them to MIS research. The journal Business & Information Systems Engineering emphasizes the design of sustainable systems as an MIS disciplinary response to the United Nations' call for SDGs, advocating for action around the 10 R's (Refuse, Reduce, Reuse, Repair...) to preserve the resources involved in information systems (van der Aalst et al., 2023). More recently, an editorial by Brown (2025) in MIS Quarterly responds to the call for digital sustainability by urging further reflection on the SDGs. In this editorial, the authors propose the concept of responsible technology, which encompasses systems that pro-

mote prosperity, climate awareness, social equality, and individual well-being, while taking into account unintended consequences such as digital exploitation, environmental costs, or the erosion of public trust. Additionally, systematic reviews of the literature on the SDGs are beginning to appear.

For example, in the Journal of the Midwest Association for Information Systems, Klein & Hadidi's (2024) literature review analyzes all articles published in that journal and classifies them according to their contributions to the SDGs. Furthermore, Wolff et al. (2022) present a literature review including articles published in 2020 in the eight journals in Senior Scholars' List of Premier Journals of the Association for Information Systems . They explore the scientific justifications related to the SDGs cited by the authors of these articles. They conclude that explicit references to the SDGs can be found in MIS journals, such as in the Journal of the Association for Information Systems: "*Financial inclusion is critical for attaining social inclusion and achieving sustainable development goals (UN, 2015).*" (Tan et al., 2021, p. 1) or "*Achieving social inclusion—the equitable participation of every member of society in social institutions and relationships that enhance well-being (Alam & Imran, 2015) remains a significant grand challenge, prompting initiatives from institutions like the World Bank and UN Sustainable Development Goals (SDGs).*" (Qureshi et al., 2025, p. 1).

As for the SIM journal, the picture is less encouraging. We reviewed the titles, abstracts, and introductions of each of the 47 scientific articles (excluding editorials and book reviews) published from 2021 through 2024. No article explicitly justifies the research leveraging the SDGs, that is, clearly names the SDGs or explicitly aligns with one of the SDGs. Nevertheless, of these 47 articles, 20 articles implicitly address one or more themes included in the SDGs, that is, they discuss a topic related to the SDGs, even if the SDGs are never cited or explicitly mentioned. For example, themes such as quality of education are found, which refer to SDG 4 - Quality Education: "*While the pedagogical impact of digital technologies remains debated … a key challenge persists : establishing conditions that foster knowledge integration … and support learner autonomy*" (Bally et al., 2024, p. 1). We also find themes related to innovation that can be linked to SDG 9—Industry, Innovation, and Infrastructure: "*To respond to radical and unpredictable changes, agility is necessary for companies to remain innovative and competitive*" (Cohard & Messeghem, 2022, p. 1). The 20 articles that implicitly address themes related to the SDGs are distributed across 6 different SDGs (Table 1).

SDGs implicitly referenced in	**Number of**	**SDGs implicitly referenced in**	**Number of**

SIM	articles	SIM	articles
SDG1 – No poverty	0	SDG10 – Reduce inequalities	0
SDG2 – Zero hunger	0	**SDG11 – Sustainable cities and communities**	**2**
SDG3 – Good health and well-being	**8**	SDG12 – Responsible consumption and production	0
SDG4 – Quality education	**2**	SDG13 – Climate action	0
SDG5 – Gender equality	0	SDG14 – Life below water	0
SDG6 – Clean water and sanitation	0	SDG15 – Life on land	0
SDG7 – Affordable and clean energy	0	SDG16 – Peace, justice and strong institutions	0
SDG8 – Decent work and economic growth	**2**	**SDG17 – Partnerships for the goals**	**1**
SDG9 – Industry, Innovation and Infrastructure	**5**		

Table 1 – For each SDG, the number of articles published in SIM between 2021 and 2024 that implicitly address an SDG

Based on Wolff et al. (2022), we can observe a certain alignment of publications in SIM with the practices of other journals. Indeed, the SDG themes most frequently addressed in the eight journals in Senior Scholars' List of Premier Journals of the Association for Information Systems are SDG 3 (Good health and well-being), SDG 8 (Decent Work and Economic Growth), and SDG 9 (Industry, Innovation and Infrastructure)—namely, the same ones as in SIM. The same is true for the SDGs that are neglected in the research articles.

Discussion

This alignment with the rest of the international community in the field of MIS is not entirely satisfactory, in that the lack of explicit references to the SDGs in SIM, and the absence of even implicit references to certain SDGs, highlights the limited and uneven attention that the MIS community pays to the SDGs. We can even conclude that research in MIS neglects most of the SDGs and focuses only on a small number of them.

However, research in general—and MIS research in particular—is intended to address major contemporary scientific themes, tackle societal, environmental, and economic challenges, and generate meaningful outcomes. The SDGs are among the key issues to which the MIS community must respond.

We therefore put forward a few proposals in an effort to address this shortcoming.

First, we note that, in articles published in SIM, the fact that the relationship between research and the SDGs is left implicit undermines the impact of our scientific work. Without clearly and explicitly identifying the SDGs we address, it will be difficult to build cumulative knowledge; research will remain scattered, with the risk of limited social utility. Consequently, we suggest that MIS researchers wishing to publish in SIM clearly indicate the SDGs relevant to their research in their abstract and introduction. This will facilitate the identification of their research for the accumulation of knowledge.

Furthermore, we believe that the SDGs can guide our research and, above all, enrich our research questions, steer them, open up new research avenues, and even foster interdisciplinary collaborations. Indeed, the UN is convinced that information technologies and information systems can support all 17 SDGs: "*Technologies can help make our world fairer, more peaceful, and more just. Digital advances can support and accelerate achievement of each of the 17 Sustainable Development Goals*" (United Nations, 2026). Thus, and always with this perspective in mind, in line with the UN's philosophy—which treats all SDGs as equally important—we propose that MIS researchers embrace all of these goals, particularly those that have not been explored at all or only to a limited extent in MSI, as there is surely a wealth of untapped potential for progress.

To demonstrate how MSI research can contribute to all the SDGs and to inspire our readers, we propose, for each SDG that has been overlooked in articles published in the SIM journal, a research question that has already been addressed in an MIS scientific article (Table 2). For those seeking even more incentives and justifications to embark on SDG-inspired research, calls for special issues (Henriksen et al., 2021; Corbett et al., 2023), editorials, and opinion pieces (Watson et al., 2021; Brown, 2025; Kotlarsky et al., 2023; van der Aalst et al., 2023) and systematic reviews linking MIS and the SDGs (Wolff et al., 2022; Klein & Hadidi, 2024) also offer a wide range of suggestions for MIS research contributing to the SDGs.

SDGs not referenced in	**Examples of research questions related to the SDGs in other jour-**

SIM	**nals in the field of MIS**
ODD1 – No poverty	What the design-reality gaps are, and how do they manifest in social protection systems and how IS research can contribute to improving the current challenges of digitalizing social protection systems. (Ncube et al., 2023)
ODD2 – Zero hunger	How will blockchain technology improve the efficiency of (food) public distribution system? How to eliminate ghost demand from the public distribution system and quantify the adoption benefits of blockchain technology in public distribution system? (Kumar et al., 2021)
ODD5 – Gender equality	Do immersive platforms reduce gender biases resulting from gender role incongruity? (Wang et al., 2024)
ODD6 – Clean water and sanitation	How can we identify the best locations for drilling wells based on empirical knowledge? (Caceres and Osailan 2018)
ODD7 – Affordable and clean energy	Is it possible to use machine learning to create an IT artifact able to find energy-efficiency related household characteristics from the yearly electricity consumption data? (Hopf et al., 2016)
ODD10 – Reduced inequalities	How digital exclusion is shaped at the level of project design (Rothe, 2026)
ODD12 – Responsible consumption and production	How to design a decision support system for waste management decisions (Rybnytska et al., 2018)
ODD13 – Climate action	How to enhance and ensure the green IS-driven green performance in organizations from the operant resources hierarchy perspective ? (Ning & Khuntia, 2023)
ODD14 – Life below water	How blockchain is likely to affect key supply chain management objectives such as cost, quality, speed, dependability, risk reduction, sustainability and flexibility. (Kshetri, 2018)
ODD15 – Life on land	How do companies develop data sourcing practices in response to institutional pressures in the sustainability context? (Krasikov & Legner, 2023)
ODD16 – Peace, justice and strong institutions	How information technology helps communities to identify a pathway towards sustainable peace (Romanelli, 2021)

Table 2: Research questions related to the SDGs in MIS journals (other than SIM)

In conclusion, we believe that research in MIS must never lose sight of its social utility, which makes it essential for it to address the themes of the SDGs.

CRediT author statement

Sylvie Michel and Claudio Vitari ont contribué à parts égales à la conceptualisation, à l'analyse formelle, à la recherche, à la méthodologie, à la validation, à la rédaction du premier jet, ainsi qu'à la révision et à la correction.

Declaration of Generative Artificial Intelligence technologies

During the preparation of this work the authors did not use any Large Language Model (LLM), Generative Artificial Intelligence (Gen AI) or other AI tools.

References

Anand, Sudhir, & Sen, Amartya. (2000). The income component of the human development index. Journal of Human Development, 1(1), 83–106.

Bally, Frédéric, Le Breton, Claire, Dal Zotto, Pierre, & Bolognesi, Thomas. (2024). An ethnography of technology-enhanced learning: Exploring the relation between learners, teachers and a digital artifact. Systèmes d'information & Management, 29(3), 51–80. https://doi.org/10.54695/sim.243.0051

Brown, Susan. (2025). Beyond Green IT: From Digital Sustainability to Responsible Technology. Management Information Systems Quarterly, 49(4), iii–viii.

Brundtland, Gro Harlem. (1987). Notre Avenir à Tous, rapport de la commission mondiale sur l'Environnement et le Développement. Les Editions Du Fleuve, Paris (Traduction Française de Our Common Future.

Caceres, Claudia, & Osailan, Sarah. (2018, August 16). Water Wells Site Selection in East Africa Using GIS Applications. AMCIS 2018 Proceedings. https://aisel.aisnet.org/amcis2018/DataScience/Presentations/33

Cohard, Philippe, & Messeghem, Karim. (2022). A Measurement Scale for Agile Orientation. Systèmes d'information & management, 27(1), Article 1. https://doi.org/10.3917/sim.221.0039

Corbett, Jacqueline, Dennehy, Denis, & Carter, Lemuria. (2023). Introduction to the Special Section: Digital Innovation for Social Development and Environmental Action. Communications of the Association for Information Systems, 53(1), 22–41. https://doi.org/10.17705/1CAIS.05302

Folke, Carl, Biggs, Reinette, Norström, Albert, Reyers, Belinda, & Rockström, Johan. (2016). Social-ecological resilience and biosphere-based sustainability science. Ecology and Society, 21(3). https://doi.org/10.5751/ES-08748-210341

Henriksen, Helle Zinner, Thapa, Devinder, & Elbanna, Amany. (2021). Sustainable Development Goals in IS Research. Scandinavian Journal of Information Systems, 33(2). https://aisel.aisnet.org/sjis/vol33/iss2/3

Hopf, Konstantin, Sodenkamp, Mariya, & Kozlovskiy, Ilya. (2016, June 15). ENERGY DATA ANALYTICS FOR IMPROVED RESIDENTIAL SERVICE QUALITY AND ENERGY EFFICIENCY. European Conference for Information Systems. https://aisel.aisnet.org/ecis2016_rip/73

Klein, Barbara, & Hadidi, Rassule. (2024). Societal Impact and Accreditation: Implications for Information Systems Research and Practice. Journal of the Midwest Association for Information Systems (JMWAIS), 2024(2). https://doi.org/10.17705/3jmwa.000088

Kotlarsky, Julia, Oshri, Ilan, & Sekulic, Nevena. (2023). Digital Sustainability in Information Systems Research: Conceptual Foundations and Future Directions. Journal of the Association for Information Systems, 24(4), 936–952. https://doi.org/10.17705/1jais.00825

Krasikov, Pavel, & Legner, Christine. (2023). Introducing a Data Perspective to Sustainability: How Companies Develop Data Sourcing Practices for Sustainability Initiatives. Communications of the Association for Information Systems, 53(1), 162–188. https://doi.org/10.17705/1CAIS.05307

Kroll, Christian, Warchold, Anne, & Pradhan, Prajal. (2019). Sustainable Development Goals (SDGs): Are we successful in turning trade-offs into synergies? Palgrave Communications, 5(1), 140. https://doi.org/10.1057/s41599-019-0335-5

Kshetri, Nir. (2018). 1 Blockchain's roles in meeting key supply chain management objectives. International Journal of Information Management, 39, 80–89. https://doi.org/10.1016/j.ijinfomgt.2017.12.005

Kumar, Anup, Paul, Manas, & Upadhyay, Parijat. (2021). From Physical Food Security to Digital Food Security. Delivering value through blockchain. Scandinavian Journal of Information Systems, 33(2). https://aisel.aisnet.org/sjis/vol33/iss2/5

Meadows, Donella H., Meadows, Dennis L., Randers, Jørgen, & Behrens III, William W. (1972). The limits to growth-club of rome.

Ncube, Tomy, Murray, Una, & Dennehy, Denis. (2023). Digitalising Social Protection Systems for Achieving the Sustainable Development Goals: Insights from Zimbabwe. Communi-

cations of the Association for Information Systems, 53(1), 138–161. https://doi.org/10.17705/1CAIS.05306

Ning, Xue, & Khuntia, Jiban. (2023). The Hierarchy of Green Information Systems Capability in Organizations to Enhance and Ensure Green Performance: An Operant Resources Perspective. Communications of the Association for Information Systems, 53(1), 214–239. https://doi.org/10.17705/1CAIS.05309

Pradhan, Prajal, Costa, Luís, Rybski, Diego, Lucht, Wolfgang, & Kropp, Jürgen P. (2017). A Systematic Study of Sustainable Development Goal (SDG) Interactions. Earth's Future, 5(11), 1169–1179. https://doi.org/10.1002/2017EF000632

Qureshi, Israr, Bhatt, Babita, & Shaikh, Shena. (2025). Empowering Marginalized Communities: A Framework for Social Inclusion. Journal of the Association for Information Systems, 26(4), 1197–1221. https://doi.org/10.17705/1jais.00928

Reid, Andrea J., Brooks, Jill L., Dolgova, Lana, Laurich, Bruce, Sullivan, Brittany G., Szekeres, Petra, Wood, Sylvia L. R., Bennett, Joseph R., & Cooke, Steven J. (2017). Post-2015 Sustainable Development Goals still neglecting their environmental roots in the Anthropocene. Environmental Science & Policy, 77, 179–184. https://doi.org/10.1016/j.envsci.2017.07.006

Romanelli, Mauro. (2021, January 1). Avancing sustainable peace by technology. ITAIS 2021 Proceedings. https://aisel.aisnet.org/itais2021/11

Rothe, Franz-Ferdinand. (2026). Digital Development for Low-hanging Fruits? Exploring the Root Causes of Digital Exclusion in ICT4D. Information Technology for Development, 32(1). https://aisel.aisnet.org/itd/vol32/iss1/5

Rybnytska, Olga, Burstein, Frada, Rybin, Andrei V., & Zaslavsky, Arkady. (2018). Decision support for optimizing waste management. Journal of Decision Systems, 27(S1), 68–78. https://doi.org/10.1080/12460125.2018.1464312

Tan, Tianhui, Zhang, Ying, Heng, Cheng, & Ge, Chunmian. (2021). Empowerment of Grassroots Consumers: A Revelatory Case of a Chinese Fintech Innovation. Journal of the Association for Information Systems, 22(1). https://doi.org/10.17705/1jais.00658

United Nations. (2015, September 25). Transforming our world: The 2030 Agenda for Sustainable Development : [Resolution]. https://digitallibrary.un.org/record/3923923?v=pdf

van der Aalst, Wil, Hinz, Oliver, & Weinhardt, Christof. (2023). Sustainable Systems Engineering. Business & Information Systems Engineering, 65(1), 1–6.

Wang, Yen-Yao, Vakeel, Khadija Ali, & Wang, Tawei (David). (2024). The Effect of Gender Incongruence on Immersive Platforms. ICIS 2024 TREOS. https://aisel.aisnet.org/treos_icis2024/45

Watson, Richard, Elliot, Steve, Corbett, Jacqueline, Farkas, Dan, Feizabadi, Ali, Gupta, Ashish, Iyer, Lakshmi, Sen, Sagnika, Sharda, Ramesh, Shin, Namchul, Thapa, Devinder, & Webster, Jane. (2021). How the AIS can Improve its Contributions to the UN's Sustainability Development Goals: Towards A Framework for Scaling Collaborations and Evaluating Impact. Communications of the Association for Information Systems, 48(1). https://doi.org/10.17705/1CAIS.04841

Wolff, Bastian, Kelter, Lukas, Schlagwein, Daniel, & Schoder, Detlef. (2022). Is Information Systems Research Concerned with Societal Grand Challenges? ECIS 2022 Research-in-Progress Papers. https://aisel.aisnet.org/ecis2022_rip/11