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Green Information Systems: Directives for the IS Discipline

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Abstract:

Green IS offers the promise for IS scholars to make a significant contribution to reducing greenhouse gas emissions and mitigating the effects of global climate change and other environmental problems. While significant achievements have been made in shaping Green IS as a subfield in the IS discipline, the emergence of Green IS is still by far too slow, given the magnitude of the problem. Against this background a panel was organized at ICIS 2012 in order to discuss future directives for the IS discipline. This article, co-authored by the panelists, reports on the major issues raised by this panel. First, the article gives an account of major achievements in the field of Green IS. Second, it presents five specific directives which we agree are important for the future of our discipline.

Keywords: Green IS, sustainability, business transformation, energy informatics.

Editor's Note: The article is based on a panel presentation at the International Conference on Information Systems (ICIS), held in Orlando, Florida, USA, December 2012.

I. INTRODUCTION

Industrialization over the last three centuries has changed the chemical composition of the earth's air, land, and waters. This period, extremely short by geological periods, has so transformed the environment that it is seen as a distinct epoch, the Anthropocene. Some human societies have overstressed their local environment and collapsed [Diamond, 2005]. Now, there is the considerable risk that we may soon exceed the boundaries for sustainable life for global human civilization [Rockström et al., 2009].

Manifestations of environmental degradation include climate change, with increasing droughts, floods, and extreme weather conditions; rising sea levels; and declining food and water resources [Stern, 2007; UN, 1987]. The leading scientists in this domain attribute environmental degradation on a global scale to human behavior. More than 190 countries accept their scientific evidence and have formally committed to take action [UNFCCC, 2007]. The challenge to be addressed is of global proportions: changing current polluting practices by business, government, and society [Porter and Reinhardt, 2007; Stern, 2007].

Green IS has emerged as a new area of scholarship that addresses issues created by the Anthropocene period. It offers the promise for IS scholars to make a significant contribution to reducing greenhouse gas emissions and mitigating the effects of global climate change and other environmental problems. While information technology creates an environmental load because of the electricity required for its operation and the problem of disposing of obsolete hardware, innovative information systems can reduce environmental problems.

While significant achievements have been made in shaping Green IS as a subfield in the IS discipline, the emergence of Green IS is still by far too slow, given the magnitude of the problem. This is alarming, mainly for two reasons: first, the IS discipline may miss an opportunity to contribute to one of the most important problems of our modern society; second, the IS discipline may lose a historic chance to prove relevance and thus strengthen its position as an academic discipline.

Against this background, a panel was organized at ICIS 2012 to discuss future directives for the IS discipline [vom Brocke, Watson, Dwyer, Elliot and Melville, 2012]. The panelists covered different perspectives such as research, teaching, transfer, and community building. Each panelist specifically addressed "what the IS discipline needs to do" in order to fully leverage the potential of Green IS. This article, co-authored by the panelists, reports on the major issues raised by this panel. First, we give an account of major achievements in the field of Green IS (Section II). Second, we present the panelists view on the development of the IS discipline. We present the views in a consolidated way by suggesting specific directives that we agree are important for the future of our discipline (Section III).

II. A REVIEW ON WHAT HAS BEEN ACHIEVED

Green IS has evolved as a subfield of the information systems discipline investigating how Information Systems can support sustainability [Watson, Boudreau and Chen, 2010]. It contrasts from Green IT in that it is not limited to the energy efficiency and equipment utilization of IT, but focuses on the design and implementation of information systems that contribute to the implementation of sustainable business processes [Watson et al., 2010]. Green IS is considered to have high transformative power, as it addresses the transformation of socio-technical systems in a number of application areas [Boudreau, Chen and Huber, 2008].

To date, a number of path-leading contributions have helped shape the field of Green IS. In addition, considerable work has been done in order to establish Green IS as an academic community. In this section we present an overview of major achievements of both research and community building in order to ground the discussion of future directives for the IS discipline.

Selected Scholarly Contributions

In the following, we illustrate selected contributions that characterize the contemporary field of Green IS. For further accounts of the literature, we refer to Brooks, Wang and Sarker [2012], Corbett [2010], Vazques, Rocha, Dominguez, Morales and Ahluwalia [2011], and Kossahl, Busse and Kolbe [2012].

It is argued that establishing environmental sustainability is "one of the most important global challenges of the 21st century" [Melville, 2010, p. 14] and that the information systems discipline has both a responsibility and an opportunity to contribute to solving this challenge [Watson et al., 2010]. On the one hand, IT contributes approximately 2 percent of global greenhouse gas emission [WWF/Gartner, 2008]. Mitigating these effects through more energy-efficient systems with minimized environmental impact is the domain of Green IT [Chen, Watson, Boudreau and Karahanna, 2009; Elliot, 2011; Iacobelli, Olson and Merhout, 2010]. More broadly, Green IS is suggested as a means to also address the remaining 98 percent [Elliot, 2011; Watson et al., 2010] through designing information systems that serve as "a potential enabler of green, sustainable solutions" [Seidel, Recker, Pimmer and vom Brocke, 2010, p. 1] and as potential enabler of behavioral change by individuals, organizations, and society [Iacobelli et al., 2010].

It has been argued that in the past information systems have provided solutions for all kinds of human problems [Melville, 2010; Watson and vom Brocke, 2011], which gives IS a major opportunity in the area of sustainability [Bengtsson and Ågerfalk, 2011; Melville, 2010]. Unfortunately, there is only limited focus on sustainability in IS research so far [Dao, Langella and Carbo, 2011; Melville, 2010]. Recently, attention to sustainability has increased within different business disciplines [Dao et al., 2011]. For instance, from 2000 to 2010, the focus on Green IT and Green IS research has increased every year [Vazques et al., 2011].

In order to contribute to environmental sustainability, Elliot [2011] argues that the unsustainable behaviors of individuals, societies, organizations, and governments need to change toward more sustainable behavior. Based on the principles of General Systems Theory [von Bertalanffy, 1996], a cybernetic relationship has been identified between the natural environment, business, government, and society (including education/universities), such that each impacts and is impacted on by the others [Elliot, 2011]. In this way, the outcome of persistent unsustainable practices leads to deterioration of the environment that then impacts negatively on business, government, and society (e.g., in the form of extreme natural catastrophes). Melville [2010] presents the Belief–Action–Outcome (BAO) framework as an initial research agenda on sustainability. This framework consists of three parts: belief formation, action formation, and outcome. The intention to adopt Green IS is influenced by several factors, for instance, by environmental concerns, attitude, subjective norms, and normative beliefs [Kranz and Picot, 2011].

In order to drive behavioral changes, the importance of information is highlighted by several authors: Dumont and Brison-Chraniotis [2008], Kranz and Picot [2011], Loock, Straake and Landwehr [2011], Melville [2010], Watson et al. [2010], Watson, Boudreau, Chen and Sepúlveda [2011]. Feedback information, in particular, has been identified as an important influence on behavioral change at the individual level, i.e., descriptive normative and injunctive normative feedback, especially in comparison with a reference group [Kranz and Picot, 2011; Loock et al., 2011]. People have to be supported in adapting new behaviors [Bengtsson and Ågerfalk, 2011], for instance, through innovative applications of technology [Elliot, 2011]. Information systems, in particular, can be an enabler for adopting sustainability practices.

Green IS research has also examined the organizational level. Watson et al. [2011] have argued that organizations can develop innovative solutions when they focus on eco-effectiveness instead of eco-efficiency. While eco-efficiency is characterized through minimizing the ecological footprint of existing solutions, eco-effective focuses on solutions which are sustainable per se [Watson et al., 2011]. Seidel et al. [2010] have argued further that, to be accepted as credible providers of such innovations, companies need to be internally sustainable as well. The development of organizations toward more sustainable practices have been investigated, referring to "green IS initiatives" [Bengtsson and Ågerfalk, 2011; Watson et al., 2010] or "sustainability transformations" [Seidel, Recker and vom Brocke, 2013]. Iacobelli et al. [2010] have argued that these transformations not only mitigate the environmental load, they also help organizations create large-scale benefits such as competitive and strategic advantages through green IS initiatives. Thus, it is important not to isolate Green IS initiatives, but rather to capitalize on the potential of information systems in comprehensive sustainability transformations [Dao et al., 2011; Hedman, Henningsson and Selander, 2012].

Resistance to sustainability issues increases when changes in existing routines are required [Bengtsson and Ågerfalk, 2011]. Therefore, solutions have to be defined that consider all stakeholders [Bengtsson and Ågerfalk, 2011]. Support from middle management, transparency, as well as social-altruistic and bio-centric values and motives, are further important factors of successful green IS adoptions [Kranz and Picot, 2011; Seidel et al., 2010]. Institutional arrangements have to be taken into consideration as well [Fradley, Troshani, Rampersad and De Ionno, 2012]. In alignment with the environmental strategy of the organization, a green IS strategy should be defined. It should outline the significance of IS for the core business and its environmental impacts and be the basis for business process reengineering toward more sustainable processes [Loeser, Erek and Zarnekow, 2012].

Seidel et al. [2013] have identified four specific affordances of information systems that particularly provide for sustainability transformations, namely, reflective disclosure, information democratization, output management, and delocalization. Reflective disclosure affordances allow for a reconsideration of belief formation, action formation, and outcome assessment related to work practices. Information democratization affordances enable dissemination and interaction about sustainability-related information from both internal and external sources. Output management affordances enable the management of environmentally harmful outputs and the associated resource consumption of work practices. Delocalization affordances enable work practices to become location-independent and thus reduce negative sustainability impact stemming from resource movement to location of work (e.g., traveling).

Apart from understanding the role of IS in contributing to environmental sustainability, the importance of solutions has been put forth [Watson et. al., 2010]. Watson claims that the IS discipline should "reorient itself as a solution science" [Loos et al., 2011, p. 249]. To date a number of solutions have been presented, including several in the areas of smart grids and smart metering technology [Kranz, Gallenkamp and Picot, 2010; Kranz and Picot, 2011; Wunderlich, Veit and Sarker, 2012], greening of data centers (e.g., Karanasios, Cooper, Deng, Molla and Pittayachawan, 2010; Alaraifi, Molla and Deng, 2011; Brandt and Bodenstein, 2012; Bodenstein, Schyrn and Neumann, 2011), cloud computing [Hedwig, Malkowski and Neumann, 2010], sustainability management information systems [Petrini and Pozzebon, 2009; Butler, 2011; Kerschbaum, Strüker and Koslowski, 2011], office solutions for pollution prevention [Ijab and Cooper, 2012], and information systems for individuals, such as specific green apps [Pitt, Parent, Junglas, Chan and Spyropoulou, 2011].

The literature advocates that sustainability should be considered a major objective in information systems research. Environmental objectives should be handled as nonfunctional requirements in the development phase of IS artifacts [Zhang, Liu and Li, 2011]. Apart from the design and use of specific information systems, vom Brocke and Seidel [2012] present general guidelines for sustainable design in IS design science research. As an example, for a new research stream dedicated to solutions for environmental sustainability, the field of "energy informatics" has been established [Watson et al., 2010]. Building on the premise that "energy + information < energy" [Watson et al., 2010, p. 2], energy informatics is concerned with increasing the efficiency of energy demand and supply systems through information systems [Watson et al., 2010].

Selected Initiatives by the Community

In addition to academic literature, the community has started initiatives to foster research on Green IS. In 2010 a special interest group on Green IS (SIGGreen) (http://siggreen.wikispaces.com) was established. The mission of SIGGreen is to nurture and build a community of Green IS scholars. SIGGreen has held two initiating workshops—at the International Conference on Information Systems (ICIS) in 2010 at St Louis and at the European Conference on Information Systems (ECIS) in 2012 at Barcelona. The proceedings of these workshops have been published on Sprouts (http://sprouts.aisnet.org/view/organization/SIGGreen.html). In addition, SIGGreen has produced online virtual workshops that attracted participants from countries around the world. For example, the SIGGreen virtual event from November 10–11, 2010, attracted visitors from thirty-one countries.

The SIGGreen group has considered Green IS from a variety of perspectives, including Education and Curriculum Section, Glossary of Terms and Concepts, Research Theories and Methods, Solutions, Changing Behavior, Virtual Collaboration Tools, and Requirements and Use Cases. The SIG also features a list of Green IS references and a link to Centers and Communities. In addition, it communicates recent activities in the field (http://siggreen.wikispaces.com).

Apart from supporting and building a community of Green IS scholars, SIGGreen is also concerned with how to make academic activities less resource intensive. It has developed a series of programs that leverage online collaboration tools. SIGGreen organized a "demo" event where participants tested different collaborative tools, including trial versions of corporate tools such as WebEx and GoToMeeting. An important objective for SIGGreen has been to identify the functional requirements for academic online collaboration.

Members of the SIGGreen have organized Green IS tracks at a number of conferences of the Information Systems community, including the European Conference on Information Systems (ECIS), the International Conference on Information Systems (ICIS), the Americas Conference on Information Systems (AMCIS), the Pacific Asia Conference on Information Systems (PACIS), and the Australasian Conference on Information Systems (ACIS). In addition, a number of panels have been organized at these (and other) conferences (e.g., Pernici et al. 2012).

Apart from conferences, journals have also acknowledged the importance of the topic of Green IS. Position papers have been published (e.g., Loos et al., 2011) and a number of special issues have been organized, including *Management Information Systems Quarterly* (MISQ), *Journal of Strategic Information Systems* (JSIS), *Information Systems Journal* (ISJ), *Electronic Markets* (EM), and *Business and Information Systems Engineering* (BISE). Since

2011, several books in the field have been published, such as *Energy Informatics* by Watson and Boudreau [2011] and *Green Business Process Management. Towards the Sustainable Enterprise* by vom Brocke, Seidel and Recker [2012]. All of these initiatives demonstrate that there is a vibrant, international community of Green IS researchers.

In summary we can conclude that both the scholarly contributions and the services to the community led to an adoption of Green IS in the IS discipline. Some remarkable achievements have been made. Still, given the magnitude of the problem, we consider the uptake far too slow. In the following, we advocate specific actions for accelerating the development of the field.

III. PERSPECTIVES ON WHAT NEEDS TO BE DONE

The Queen's Question

We start off our discussion with an opening example Richard T. Watson used on the Green IS panel at ICIS 2012 in Orlando—The Queen's Question:

> *During a visit to the London School of Economics at the height of the financial crisis, the Queen of England asked a simple question, "Why did academic economists fail to foresee the crisis?" Imagine if the Queen were to visit a highly reputable Information Systems department, she might start with the following simple question. "How is information systems different from computer science?" Our IS colleague gives an answer his grandmother might understand: "Computer scientists study how to make computers work better, whereas in Information Systems we study how to make organizations work better." The Queen, thinking she understood the answer, continued, "Did Information Systems academics help build the Web, e-commerce, social media, and all those iproducts that Apple makes?" At this point, the Dean volunteers to answer, hoping it will advance his chances of a knighthood, "My Information Systems department doesn't build things, it builds theories," he proudly proclaims. "Like the economists," states the Queen. Jony Ive later received a knighthood, for helping to build those Apple iproducts.*
>
> Richard T. Watson, Introductory Statement at the Green IS panel at ICIS 2012.

If IS wants to pass the royal test of social value, we need to start solving significant social problems, and we believe Green IS is the best candidate that we have. Global warming is the most critical threat humans have faced in tens of thousands of years. Climate change has threatened the survival of Homo sapiens previously [Calvin, 2002], and it would be unwise to assume that we will blithely overcome the first case of human-induced mass climate change unscathed, because human-initiated local environmental degradation has caused the collapse of civilizations in recorded time [Diamond, 2005]. Information systems have been perhaps the greatest force driving global change over the centuries (e.g., language and computer-based IS) and have certainly been the driver of change in the last half-century. Thus, there is a major opportunity for IS scholars and practitioners to play a key role in reducing and reversing the impacts of global climate change. Though major achievements have been made in the field of Green IS, the Information Systems discipline should do more in order to prove leadership. Therefore, we indicate a number of specific directives we deem important for further contributions to challenges of environmental sustainability through information systems research.

Directives for Future Developments

Building on the viewpoints of the panelists and the discussion with the audience at the Green IS panel at ICIS 2012, we have abstracted five specific directives we deem critically important for the IS discipline. We discuss consequences for both IS research and IS community practices stemming from these directives. An overview is provided in Table 1.

1. We need to change the field's orientation from inward-looking to an outward-looking. The IS discipline needs to develop from an inward-looking preoccupation with challenges confronting the IS discipline to an outward-looking determination with challenges faced by society. That way, IS could establish, as a means to solve high-visibility, high-impact global challenges [Agarwal and Lucas, 2005]. A related call is for the IS field to broaden its focus and to undertake more applied research by designing and developing systems to solve problems or achieve goals confronting people [Lee, 2010].

That said, we do not disregard the importance of problems within the IS field, such as IS adoption or IS integration. We do, however, call for widening the scope to more global challenges of our society, including environmental sustainability and social welfare. We firmly believe that by anchoring our research in societal problems and by providing solutions for these challenges through knowledge in IS, we can demonstrate the value and improve the appreciation of the IS discipline.

Table 1: Directives for Green IS Development		
Directive	Orientation of our research	Practices of our community
1. We need to change the field's orientation from inward-looking to outward-looking.	Select problems of societal relevance and work on IS empowered solutions.	Communicate your research outside the IS academic community (e.g., through blogs).
2. We need to push our research beyond theories and orient ourselves toward solutions to global societal challenges.	Build on observation and description in order to predict and design.	Consider products and prototypes as outcomes of IS research.
3. We need to emphasize the social value of a research contribution rather than counting publications.	Focus on research that matters rather than on research that counts in numeric terms.	Acknowledge the societal impact of our work in tenure and promotion processes (e.g., advisory positions).
4. We need to reach out to non-IS scholars of environmental issues for discussions, critique, insights, and possible collaboration.	Engage in interdisciplinary research partnering with experts both from application areas and other solution sciences.	Create space for meeting with scholars from other disciplines (e.g., through joint venues).
5. We need to set an example of sustainable academic practices.	Include sustainable academic practice as an area of IS research.	Incorporate principles of sustainable academic practicing in our daily work (e.g., video conferencing).

Apart from selecting research topics that matter to society, an outward-looking orientation also calls for communicating IS research outside our community. IS researchers should foster their contribution to the public discourse through, for example, blogs or advisory positions in society. Such actions should increase the visibility and impact of IS research among practitioner-oriented thought leaders.

2. We need to push our research beyond theories and orient ourselves toward solutions to global societal challenges. Fundamentally, we need to recognize that there are four phases to research, namely, observation, description, prediction, and design. The last two phases—prediction and design—are the social returns that might earn the royal nod. At present, we seem excessively focused on description (e.g., theories and frameworks) as the endpoint for research, and this is especially apparent when you look at our journals and conferences. Global climate change, in particular, is a problem that needs solutions today and maybe even yesterday. For this, we need to go beyond theories. We should be applauding IS solutions that contribute to solving the contemporary problems of our society, and these should be most prominent in our premier journals. Sadly, for humanity and our field, this is not the case.

One way of contributing to these challenges is to consider design-oriented research [March and Smith, 1995] as a paradigm aiming at the design of innovative systems [Hevner, March, Jinsoo and Ram, 2004]. That said, we do not question the role of theory. However, we do believe that, in order to solve the grand challenges of our society, we need to advance beyond theory. We need to design solutions and evaluate their usefulness in practice. Such solutions can build on theory. The knowledge gained from applying the solutions in specific use contexts can, in turn, contribute to theory [Gregor and Jones, 2007].

As an academic community, we need to provide more opportunities to discuss information systems designs for significant and novel problems. Apart from academic publications, demonstrations of products and prototypes need to be acknowledged more strongly as an output of our academic work. As an example, the eighth international conference on design science research in information systems and technology (DESRIST, 2013) featured a product and prototype track (www.desrist2013.fi). This track was organized as an integral exhibition at the conference where IS scholars were presenting IS-enabled solutions to a variety of contemporary challenges. We need to have more of such venues in which we can share and discuss solutions to societal challenges enabled by the IS community.

3. We need to emphasize the social value of a research contribution rather than counting publications. The fixation on hits in a selected group of journals as a measure of one's academic worth often rewards practices that focus on the easily published topics rather than the issues that are socially important. The basket of eight and the three premier journals have created a monopoly. We essentially have one outlet with multiple brands because of the lack of differentiation by field journals. Monopolies rarely innovate and settle on conservative incrementalism. As a result, the tenure-and-publish game is not aligned with social needs such as global warming.

As a community, we have to reject the ecological fallacy that all A-journal articles are superior to all B-journal articles. The reviewing system is fallible, and important contributions can easily end up in what are perceived as lesser-quality outlets. There are Nobel prize-winning articles that the supposedly best journals have rejected [Gans and Shepherd, 1994]. Reviewers and editors need to get much better at assessing the social contribution of

research and emphatically focusing on accepting articles that furnish solutions for societal challenges such as global warming. Such a refocusing will be good for the planet and good for the field. Because times have changed, we must judge journal submissions on their contribution to solving the major societal threat. The old order is not helping us to solve global warming.

With this directive, we neither disregard our academic journals, nor do we criticize the role of rankings as a means to evaluate the quality of diverse outlets. We do think it is necessary, however, to broaden the set of evaluation criteria. Indications of social contribution might include invitations to translate our research for executives and government leaders, or perhaps an annual prize initiated by AIS for socially relevant research.

Accounting for the societal contribution of our work would set incentives for researchers to focus on the social impact of their research rather than on credits associated with certain publication outlets. Ideally, such outlets would be the most prestigious ones that offer the highest dissemination of work to society. Academic journals, such as *Nature and Science,* for instance, reach a high number of readers from diverse academic disciplines.

4. We need to reach out to non-IS scholars of environmental issues for discussions, critique, insights, and possibly collaboration. Collaborating with non-IS scholars can accelerate development of science-based practical insights for management. First, it is valuable to gain deeper understanding of application areas where societal challenges arise, such as housing, transport, and energy supply. Second, knowledge in neighboring disciplines, such as engineering, architecture, and computer science, can contribute to innovative solutions. Given the variation in scholarly knowledge accumulation across disciplines, it makes sense for IS researchers to understand what is known in adjacent fields for similar problem domains. Bansal and Hoffman [2011], for instance, provide an account of contributions to environmental sustainability in different areas of management. Research across disciplines can accelerate much-needed knowledge of wicked Green IS and Green IT problems, such as how to generate new sources of value with smart energy systems in the area of energy informatics [Watson et al., 2010].

Regarding academic practices, this calls for an increase in opportunities for exchange with colleagues from other fields. On the one hand, this would mean to foster the participation of IS scholars in venues (such as conferences) of other areas. On the other hand, this means opening the IS community to involve colleagues from other fields. Both tracks at conferences and special issues in scholarly journals could focus more on boundary-spanning topics involving experts from neighboring fields. For that to work well, academic communities, not only the IS community, need to appreciate more the contributions of other fields, e.g., in tenure processes. As long as we primarily count publications in journals ranked in our own rankings, we will not stimulate research on pragmatic challenges of our society.

5. We need to set an example for sustainable academic practices. Academic scholars need to be more aware of the environmental footprint of their work. At present, academic discourse and networking essentially takes place at conferences, which can require extensive global traveling and expensive lodging in conference hotels and can make little use of information systems to lessen the environmental effects. That said, we do not suggest the replacement of conferences per se by virtual meetings, but we need to evaluate to what extent personal meetings are necessary and in which settings they are organized best in order to allow for positive effects on social networking while treating the environment with care.

This sets an exciting research area for the IS discipline investigating innovative ways of accumulating knowledge and problem solving utilizing information technology. The study by Seidel et al. [2013], for instance, identified affordances such as information democratization and the delocalization that might enable new ways of interaction. In addition, SIGGreen has identified functional requirements for academic online collaboration, including a shared-content repository, a platform for “rich” real-time virtual interaction, and a discussion board for asynchronous collaboration.

In addition, we believe that the IS community should demonstrate leadership in adopting sustainable academic practices. We think that the information systems discipline has both an obligation and an opportunity to serve as a role model for innovative and more sustainable ways of conducting research and teaching on a global scale. SIGGreen, in particular, should continue to set a good example of such practices. It is hoped that pioneering solutions evolving from this effort will be followed by other disciplines.

IV. SUMMARY AND OUTLOOK

This article evolved from a panel on Green IS at ICIS 2012 in Orlando which discussed the current state and future directives for the IS discipline. First, we gave an account of major achievements in the field of Green IS, including both scholarly contributions and community building. Critically reviewing the results, we present the panelists’ views

on future directives for the IS discipline. We presented the views in a consolidated way by suggesting five specific directives that we think are important in order to further contribute to environmental challenges as an academic discipline.

In addition to establishing Green IS as an important research topic, we argue that our discipline also needs to evolve in the following ways. First, we need to reshape the field from inward- to outward-looking. Second, we need to push our research beyond theories and orient ourselves toward solutions to global societal challenges. Third, we need to emphasize the social value of a research contribution rather than counting publications. Fourth, we need to reach out to non-IS scholars of environmental issues for discussions, critique, insights, and possible collaboration. And fifth, we need to set an example of sustainable academic practices.

These directives raise substantial issues on how to organize an academic discipline in order to enhance research-community effectiveness and efficiency. We believe that the IS community should take a leading role in this discussion. IS has proven leadership in innovating and transforming organizations in many ways during the past decades. Now, there is a historic chance to transform science to better serve humanity. In order to capitalize on this opportunity, two things need to be done: First, we need to identify innovative ways to organize research communities through IS. Second, we need to start acting on these new ways in our academic work. While the former calls for research on the organization and function of a scholarly community, the latter poses sociopolitical challenges to implement a new modus operandi. We hope that this report can help stimulate the discussion needed to facilitate what we believe is a much-needed change.

Of course, this report needs to consider a number of limitations. First and foremost, the report is an opinion piece of the selected experts on the panel, so other scholars may come to other conclusions. In addition, the viewpoints presented in this article are strongly time-bound. It is the intention of this article to stimulate the discussion in order to further develop the field. Hopefully, future audiences will see a number of our directives already integrated into our discipline.

Global warming is the most significant issue facing society. We need to reorient to become a solution science that focuses on critical societal problems, and very specifically the bulk of the field should address global warming as a key challenge in sustainability research. As such, IS can demonstrate leadership in solving the grand challenges confronting our society. In addition, it can show how science, in general, may be organized by leveraging IS for increased societal impact. IS practice has and can reshape society for the better, and IS scholars can do a better job of supporting practice by focusing on solutions to our most pressing problem.

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Editor's Note: The following reference list contains hyperlinks to World Wide Web pages. Readers who have the ability to access the Web directly from their word processor or are reading the article on the Web, can gain direct access to these linked references. Readers are warned, however, that:

1. These links existed as of the date of publication but are not guaranteed to be working thereafter.
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Nigel Melville examines how innovative applications of information systems can shift environmental beliefs, enable new courses of action, and impact sustainability performance in organizations. He authors a popular scholarly blog entitled "Information Systems for Environmental Sustainability" (over 25,000 views), wrote the IS chapter for the recently published *Oxford Handbook of Business and the Natural Environment,* which reviews the state of the field across all management disciplines, and has authored several published and working papers at the nexus of IS and environmental sustainability. He is currently focusing on enterprise information systems for managing energy and carbon emissions in organizations.

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