

Design and Diffusion of Systems for Human Benefit: Toward More Humanistic Realisation of Information Systems in Society

John R. Venable

School of Information Systems, Curtin University of Technology, Perth, Western Australia, Australia,

Jan Pries-Heje

Department of Communication, Business and Information Technologies, Roskilde University, Roskilde, Denmark,

Deborah Bunker

Department of Business Information Systems, University of Sydney, Sydney, New South Wales, Australia, and

Nancy L. Russo

Department of Operations Management & Information Systems, Northern Illinois University, Dekalb, Illinois, USA

Abstract

Purpose

This paper introduces this special issue of *IT&P* on *Systems for Human Benefit (S4HB)*, develops and promotes the idea of *S4HB*, and advocates that more research be conducted on the design and diffusion of *S4HB*.

Design/methodology/approach

This conceptual paper argues that *S4HB* are systemically under-researched based on a historical perspective on IS research and proposes an agenda for research on the design and diffusion of *S4HB*.

Findings

The paper identifies extant areas of *S4HB*, such as health and education, but also advocates that new areas of *S4HB* be identified and new kinds of *S4HB* be designed. It further discusses how diffusion is a key issue to the realisation of human benefits and contrasts diffusion of *S4HB* with more commercial business systems as a motivator for further research. Finally it sets out a brief agenda for research in *S4HB*, including (1) development of a vision for research on *S4HB* that emphasises design for solving human problems (2) research on diffusion of *S4HB*, (3) revision of the way impact is assessed by journals to include assessment of the significance of the problem and the achievement of human benefit, and (4) promotion of a research culture, policies, and funding that emphasise *S4HB*.

Originality/value

This is the first paper to pull together a common perspective on the disparate areas of *S4HB*. The paper identifies what *S4HB* are, what their goals are, what areas are concerned, and sets out an agenda for what research is needed to realise them and their benefits in society.

Keywords: Information System, Human Benefit, Design Science Research, Technology Adoption and Diffusion, Not-for-Profit Organisation

Introduction

Information Systems (IS) is a relatively new field of study compared to many other areas of science and technology, but one that has nonetheless been developing for more than 50 years. The arc of its evolution has been one that has seen it progress from one bound heavily in technology, especially computing technology, but also communications technology, through its application to detailed data processing, on to provision of information for managerial decision making, interactive support for complex managerial decision making models and processes, and then to support for group

interactions and processes. Early applications were decidedly piecemeal with 'islands of automation', which has progressed to highly integrated systems such as systems for Enterprise Resource Planning (ERP), Customer Relationship Management (CRM), and Supply Chain Management (SCM), the latter of which integrates not just within an organisation, but across multiple organisations. Progression in the field has also seen it move from one with an emphasis purely on technological efficiency to recognition of the socio-technical nature of information systems and the concomitant recognition of the importance of the human-computer interface and usability, but also fit with work practices as well as processes and issues of adoption and diffusion of technology across industry and society. In concert with these evolutionary changes, IS have progressed from back room systems operated only by experts with specialised technical training, to the technological pervasiveness of today, in which IS are endemic to every part of the organisation and indeed many people's daily lives, whether at work, at home, about town, or on the road.

Methodologically, research in IS began firmly rooted in the engineering paradigm (designing and building new kinds of systems), expanded and progressed through positivist empirical research examining the efficiency and effectiveness of different aspects of IS (e.g. the Minnesota Experiments), on through the addition of interpretive empirical methods to develop understanding of complex social interactions in the development and use of IS, eventually coming full circle to the recent (re-)emphasis of Design Science Research (DSR) and its research goal of developing new technologies and new uses of technologies. DSR extends the domain of research beyond examining existing technologies and their interaction within a socio-technical environment to embrace the development of new technologies to support and improve the ways we work and live.

Throughout this development, the Information Systems field has generally been closely allied with the business disciplines, particularly in North America, but also in Asia, Oceania, and much of Europe. Many schools and departments of information systems are firmly situated within the business discipline, their members are judged by the criteria prevalent in business schools, and they are funded by organisations that promote business research in the name of economic progress. As such, as in other business disciplines, research in the IS field has been focussed on achieving greater understanding and improvement in its application to business, through achieving greater organisational efficiency, effectiveness, flexibility, and competitiveness. Put simply, the bottom-line goal for most of this research is the bottom line – i.e. profit for the business owners. Trickle-down economics and free market economic theory aside, this is a narrow and perhaps suboptimal goal.

Indeed, the world today is moving away from one emphasising profit as the only goal because it is often short term at the expense of other desirable goals. Today's world sees a shift to sustainability and the triple bottom line as more appropriate and enlightened goals, in line with a humanistic value system rather than one exclusively of rights of property and the use and preservation of capital for personal gain. Environmental and social sustainability are increasingly seen as essential both for society and for business itself in taking both a longer term and a more humanistic perspective. It behoves the IS field to embrace this shift and these changed goals, by applying ICT in new ways that further goals of sustainability and human benefit. The thesis of this paper and the goal of this special issue is to promote such a shift, by articulating its nature and providing exemplars of research that design and enhance diffusion of new technologies that have the express goal of human benefit rather than profit per se.

The journal Information Technology and People has from its inception had as one of its major concerns and themes the advocacy of the design, development, use, and management of information systems and technologies from a humanistic perspective. As such it is a perfect venue for promoting the above shift.

This special issue builds on the work of the IFIP WGs 8.2 + 8.6 International Working Conference held in March-April 2010 in Perth, Western Australia (Pries-Heje et al, 2010), which was co-organised by the co-editors of this special issue. That conference brought together researchers from around the world to consider how design science and diffusion research could be better targeted toward achieving human benefit through design science.

In the next section, we further explore the idea of *Systems for Human Benefit* and identify some key areas of extant and potential research. We then discuss issues of diffusion and adoption of such technologies. Following that, we propose an agenda for research in the design and diffusion of information *Systems for Human Benefit*. Finally, we introduce the papers included in this special issue of Information Technology and People.

Systems for Human Benefit: An Analysis

The fundamental distinction between *Systems for Human Benefit (S4HB)* and IS in their more traditional role is that their goals are fundamentally different. As noted above, traditionally the IS field has been allied with business and has been concerned with IS that have goals of increasing profit through increased business efficiency, effectiveness, and competitiveness. *Systems for Human Benefit*, while not denigrating the utility of increasing organisational efficiency and effectiveness, focus on other more humanistic goals, ones that seek to improve the human condition. In our view, business and economic efficiency goals are (or should be) subservient to the goal of improving the human condition *for everyone*. The heretofore over-emphasis on business and its goals in the IS field needs to be better balanced with goals of human benefit, including Design and Diffusion of new technologies for human benefit.

Research Areas

Information systems have the potential to provide human benefit in a number of areas in order to achieve the above and other humanistic goals. Such humanistic goals include improvement of education, provision of social and other services to the public, health and well-being, work-life balance, environmental sustainability, democracy and self-determination, freedom, emancipation, poverty reduction, and social equity.

Information and communication technologies can be used to improve education in many ways. They can enable the delivery of educational systems and materials to a global audience, reaching populations who have been poorly served in the past (and improving social equity). They can be used to improve the learning process, by making learning more interactive and interesting. They can relieve teacher workload, by providing online instruction or aiding in marking and provision of feedback for student learning, thus leveraging teacher's time and skills. There is already much research in the technology of teaching and learning, but more emphasis would be a great help in an area where funding is typically being cut rather than increased as the advent of a knowledge society

would suggest. Importantly, it behoves the IS research community to appropriately value such research, which is often viewed as less important than research relating to business.

Via electronic government (or e-government) information systems it is possible to improve access to information and services for citizens and to provide greater accountability and transparency (Carter and Belanger, 2005). Additionally, it is possible to increase citizen interaction with law and policy makers through technologies and applications such as online polling, social media, discussion groups, blogs, wikis, and distributed versions of more structured forms of problem formulation, problem solving, and decision making. Much more research is needed in this area.

Improving health is another key area that already receives much interest, but could be further emphasised. Some e-government initiatives incorporate health and well-being initiatives (Madon, Sahay, and Sudan, 2007), and ICTs are increasingly being used to expand the capabilities of the health care system. This is an area where research is growing quickly and the IS community is involved, but more could (and should) still be done.

In addition to government provision of services including health services, non-government organisations (NGOs) and not-for-profit organisations (NfPs) also have key roles in providing such services and enhancing the human condition within society. While the NfP sector represents only about 5% of western economies, whether they are health information and service organisations, arts organisations, sporting clubs, or the essential providers of services for the poor or those affected by emergencies, the impact of NfPs is far greater on the lives and well-being of people than the economics imply. The IS field could help greatly in the development of new technologies to support NGO and NfP sector organisations in their work and help them overcome their chronic lack of funding, staff, and skills. This is an under-valued area of IS research that is only beginning to receive attention in the IS community, e.g. with AMCIS having a track on it this year (2011).

The human condition is greatly affected and influenced by the environment in which we live. Recently, there have been increasing calls to apply information systems research to ecological concerns such as energy efficiency and environmental sustainability (Watson, Boudreau, & Chen, 2010). Studies have created models of the potential impact of information and communication technologies (ICT) on environmental sustainability efforts (Hilty, et al., 2006) and models that demonstrate how information systems can be leveraged to support ecological objectives (Chen, et al., 2008). The IS field is becoming more active in this area with the formation of an AIS SIG, conferences and tracks in this area, journals focussing on this area, and special issues of major journals.

Part of the environment in which we live includes the organisations, especially businesses, that employ people, consume resources, provide products and services, pay taxes, provide income for their owners, make charitable contributions, and issue by-products, such as pollution, all of which influence the human condition. Some organisations are “good citizens” while others are not so good. Information Systems for Benefit have a potential role to play in providing information about and influencing organisational behaviour, e.g. through collecting and providing social accounting information and influencing customer buying behaviour, thus providing an incentive for business and other organisations to act like (or actually *be*) good citizens.

Finally, there has recently been much work in developing and using ICT to enhance the democratic process, involve more citizens, reduce corruption, and develop a stronger voice for the public (as opposed to often heavily funded corporate interests). Activist organisations like MoveOn.org, GetUp! (getup.org.au), and Avaaz.org are using technologies to galvanise support and organise for various causes, such as gay rights or combatting climate change. Additionally, there is work on technologies to promote free speech and other freedoms and especially democracy in areas where there is oppression of all or subgroups of the populace by the government. For example the LiberationTech mailing list run out of Stanford University (liberationtech@mailman.stanford.edu) discusses much such work, among other things.

While these are some of the key extant areas of application of IS for Human Benefit, we further suggest that these are not a comprehensive and definitely not a fixed list. We further need creative research to identify new goals relating to the human condition and new means for achieving them.

Having discussed these, we now turn our discussion to issues of diffusion and adoption of *Systems for Human Benefit*.

Diffusion and Adoption of Systems for Human Benefit

Systems for Human Benefit (S4HB) may have a different purpose than those used for business. When dealing with human benefit, system stakeholders (i.e. system users, those who fund systems and pay for them, those who develop systems and advocate for them) may have different objectives regarding a system's use, its distribution, and the way research about it is funded and promoted. This different adoption and diffusion focus is likely to have a strong impact on the way knowledge about *S4HB* is disseminated. Organisations that develop and implement systems for societies, organisations and individuals, may have differing views on how they are appropriated by such groups and individuals for use. Such differences warrant careful study and the development of appropriate *theory* for how to accomplish improved diffusion and adoption of *S4HB* in *practice*.

Research promotion and visibility of a body of *Systems for Human Benefit* theory will likely be a key area. Dissemination of both knowledge and technologies, developed and implemented as a practical outcome of the application of these theories, will require the development of vastly different research avenues and venues. Research communication will need to target governments and appropriate government agencies such as NfPs, NGOs, as well as community groups, in order to build a community of researchers and practitioners who are interested in, and are supportive of this research area.

Government policy and funding will also need to be reviewed and re-structured for increased promotion and development of *S4HB*. Current emphases on health, education, and environmental sustainability show us that there is some critical mass developing, but this could be better leveraged for greater focus and impact. Better funding methods are needed, especially to support the NfP sector, which could be in the form of incentives (e.g. tax incentives and targeted research funding) to encourage or mandate businesses to fund, adopt and make use of *Systems (and Practices) for Human Benefit*.

Development of appropriate government policy to improve adoption of *S4HB* will also be vital to the success as many of these systems will not be used within the business context, instead being used by

individuals in their private capacity, as well as by NfPs and NGOs. Research into how policy and funding mechanisms can better promote these Systems will be essential for realising resulting Human Benefits in practice.

New distribution channels for *S4HB*, i.e. technological products, will also need to be established, understood, developed and enhanced to effectively meet changing requirement and needs in this space. New distribution channels such as App Stores (e.g. Apple's iPhone and iPad app stores) may be a good mechanism for distributing some applications for general public consumption. Other channels focussing on the NfPs and NGOs as customers and adopters must also be further researched in order to improve their effectiveness and other possible uses.

Finally and very importantly, a focussed research agenda based on the development of rigorous research methodologies and approaches, must be created in order to comprehensively understand how *IS for Human Benefit* work, what problems eventuate from their use, and how those problems can be resolved so that greater and better benefits to the human condition are realised.

Having discussed diffusion and adoption issues, in the next section, we present an agenda for research in and promotion of *Systems for Human Benefit*.

An Agenda for Research in Information Systems for Human Benefit

In order to develop and implement *Systems for Human Benefit*, we should consider what the key things are that need to be done and develop an agenda for Research in Information *S4HB*.

First on the agenda we believe is the development of a vision for *Information Systems for Human Benefit*. We need to become better at *designing* IS to fulfil needs or solve problems. This problem orientation will lead us away from the more technology-oriented and often technology-driven development of new IT systems. Instead, with a sound focus on problems (including problem diagnosis and formulation: What are the problems? How are they perceived by people? How do they manifest themselves?), we really *can* achieve human benefit. This change of focus to being more problem-oriented may not sound as new as it will be. E.g. papers in this and other journals will need to clearly describe what problem was solved for whom and how. Probably this will lead to fewer "student-as-examples" papers where students pretend to have some pedagogically constructed problem and more papers with real people and real problems. The notion of rigor may change towards how rigorously problems were identified and how rigorously they were solved.

This brings us to the second item on the agenda namely *diffusion*. In the past diffusion has mainly focused on understanding the mechanisms involved in the diffusion of new technology. However, a new agenda that really advocates and creates human benefits will require diffusion to be more solution-oriented. We not only need to design the System for Human Benefit, but we also need to design a system for diffusing and assuring adoption of the System for Human Benefit by those who must use it in order to achieve the human benefit. How is this new thing best applied for solving this problem at hand? How will it be disseminated and how effective will that dissemination mechanism be? And how do you evaluate those things? This will bring renewed focus to the evaluation in practice. Really showing that IS research has solved real problems for real people in the real situation requires naturalistic evaluation (Venable, 2006). Evaluation, of course, has always been

part of design. But we believe it needs to be raised to new importance. Applying new designs for problem in practice is not an easy task. Often it requires several iterations and active involvement of researchers – a new and important role for different types of action research. But doing so will definitely bring better realisation of human benefits.

High on the agenda is also a change of the way *impact* is perceived by journals. These days more and more journals focus on impact and use the impact factor as the most important success criteria. The problem with this approach is that the impact factor does not measure anything relevant in relation to human benefits. The measure is purely a measure of whether it has an impact on other researchers. Instead we need a measure of impact outside the world of research. A measure where the importance of the problem solved and the strength of the evaluation and application of the solution to the problem are included.

Finally we need to focus on key areas of IS for human benefit, such as social accounting, Green IT, Health IT, Education IT, eGovernment, work-life balance, and not-for-profit applications. While we have already identified these areas, we need to further identify and research other, new areas where the potential for human benefit is large and promising, but where we as researchers are not doing enough. This lack of research is often because funding is pushing us in other directions motivated by innovation, profit, space or defence related issues. We need to improve and promote policies and funding for research in IS for human benefit – in our professional organisations and in our governments.

In the next section, we introduce the papers included in this issue and how they contribute to the above agenda.

Introduction to the Papers in this Special Issue

Each of the papers in this special issue develops a design theory for or an instantiation of a new kind of System for Human Benefit.

The paper by Karlheinz Kautz explores a case of customer and user participation in an agile software development project and derives a first version of a theory of participatory design in agile software development. This theory clearly will yield human benefits in that it shows that a framework for user participation consisting of well-established concepts brings about benefits and will have utility when used in a new context to understand what participatory design is and how, when and where it can be performed as an instance of a design process in agile development.

The paper by Hossain and Quaddus shows that along with technological, organizational, and environmental factors, RFID adoption also depends on expectations and self-efficacy. The paper can be seen as an exemplar of the problem-oriented focus on diffusion. The practical implication being that policy-makers can find a solution for a mandatory RFID policy in organizational applications. In the concrete, policy-makers can compare their experience with the findings of this study, evaluate the past, and find their own future direction – i.e. their own solution to the problem of using RFID in organizations.

The paper by Watts and Wyner develops a design theory for Mobile Technology-mediated Ethical Consumption (MTEC) Tools. MTEC tools aim to influence consumer behaviour toward choosing products or services provided by organisations that are better or more ethical citizens than those

that are worse or less ethical citizens by providing information about their behaviours as reported according to legal requirements. The design theory is well grounded in kernel theories of dual-process cognitive theory and social capital theory. The technical design features allow the consumer to choose which measures of ethical behaviour they use (or ignore) according to their individual ethical perspective and position. While the design theory is as yet untested empirically, it contributes to the goal of encouraging better (more ethical) organisational behaviour in order to preserve or enhance the sales of their products or services, thus yielding overall human benefit.

Johri and Nair use the Value Sensitive Design (VSD) framework as a lens to examine the impact of values on the design of an information system to support a rural job guarantee program in India. They found that the system designers had strong idealistic values for the project, but these had to be balanced with more pragmatic, constraining values. Specifically, the designers believed that by increasing transparency (making data visible to the public) and using technology they could reduce the potential for corruption and thereby increase the impact of the program to reduce rural poverty. However, they were constrained by their perception of the need to create systems that were easy to use at a low cost. Whereas these values influenced the outcome of the development project, they were for the most part uncovered only as the project progressed and the designers learned more about the context. The authors highlight the benefits of extending the VSD framework to account for emerging values as well as the importance of examining the role of values in studies of information systems to support development programs and eGovernance.

The paper by Gripenberg researches and develops a new means to improve the IT skills and IT self-efficacy needed to be an effective private citizen in the increasingly IT-enabled environment of government services, one in which non-IT-based services are increasingly being phased out or otherwise not available. It considers the problem of private citizens in more rural locations who don't have access to learning IT through schools or their employers (they may for example be self-employed or house bound invalids). The solution they propose and develop is to provide support at a community level, through community services, training courses, and the like. They develop a framework that relates learning strategies to the different kinds of IT skills that citizens need. The clear human benefit as a result of the development and provision of this learning approach is more-IT-capable citizens, who are better able to take advantage of government and other services and the reduction of their prior disadvantage.

Conclusions

In this paper, we have made a call for more and better research in the IS research community on *Systems for Human Benefit*. We believe that the goals of profit and organisational efficiency, which have traditionally been the emphasised in the IS research community, should be subservient to achieving the goals of improving the human condition, including health and well-being, work-life balance, education, social equity, poverty reduction, democracy, freedom, and emancipation. We have argued that research including design and diffusion of *S4HB* is an important means (but not the only one) for realising these goals.

We have explored what Human Benefit means, some of the application areas of *Systems for Human Benefit* and the state of their perceived relevance and emphasis within the IS field, with some recommendations for increased emphasis. We have also explored the issues of diffusion and adoption as they relate to *S4HB*, as distinct from the more researched diffusion and adoption

domain of Systems for Profit. We have proposed an agenda for research in this domain, including increased emphasis on problem solving and design, diffusion and design of diffusion, revising our notion of impact in our journals and other publication venues, and development of extant and new areas of *S4HB*.

Finally, we have introduced the papers of this special issue, each of which makes a contribution to one or more of the areas of *Systems for Human Benefit* above.

Our hope is that this paper will convince and motivate IS researchers to undertake research in this domain, help to develop, improve, and fulfil the agenda that we have proposed, and ultimately to help develop and diffuse *Systems for Human Benefit*.

References

- Carter, L. and Bélanger, F. (2005), "The utilization of e-government services: citizen trust, innovation and acceptance factors", *Information Systems Journal*, Vol. 15, pp. 5–25.
- Chen, A.J.W., Boudreau, M.-C., and Watson, R.T. (2008), "Information systems and ecological sustainability", *Journal of Systems and Information Technology*, Vol. 10, No. 3, pp.186 – 201.
- Hilty, L. M., Arnfalk, P., Erdmann, L., Goodman, J., Lehmann, M., and Wäger, P.A. (2006), "The relevance of information and communication technologies for environmental sustainability – A prospective simulation study", *Environmental Modelling & Software*, Vol. 21, No. 11, pp. 1618-1629.
- Madon, S., Sahay, S., and Sudan, R. (2007), "E-Government Policy and Health Information Systems Implementation in Andhra Pradesh, India: Need for Articulation of Linkages Between the Macro and the Micro", *The Information Society: An International Journal*, Vol 23, No. 5, pp. 327-344.
- Pries-Heje, J., Venable, J., Bunker, D., Russo, N.L. and DeGross, J.I. (eds.) (2010), *Proceedings of the IFIP WG 8.2 + 8.6 Joint International Working Conference on Human Benefit through the Diffusion of IS Design Science Research*, Perth, Western Australia, 30 March-1 April 2010, Springer, Berlin, IFIP AICT 318.
- Venable, J.R. (2006), "A Framework for Design Science Research Activities", *Proceedings of the 2006 Information Resource Management Association Conference (CD ROM)*, Washington, DC, USA, 21-24 May 2006.
- Watson, R.T., Boudreau, M.-C., and Chen, A.J. (2010), "Information Systems and Environmentally Sustainable Development: Energy Informatics and New Directions for the IS Community", *MIS Quarterly*, Vol. 34, No. 1, pp.23-38.