

Interview with Jay F. Nunamaker, Jr. on “Toward a Broader Vision of IS Research”

Dr. Jay F. Nunamaker, Jr. is Regents Professor and Director of the Center for Management of Information at the University of Arizona. He was a faculty member at Purdue University prior to founding the MIS department at the University of Arizona in 1974. Under his leadership for twenty years, the department has become known for its expertise in collaboration technology and the technical aspects of MIS.

In 1996, Dr. Nunamaker received the DPMA EDSIG Distinguished IS Educator Award. The GroupSystems software resulting from his research received the Editor’s Choice Award from PC Magazine, June 14, 1994. At the GroupWare 1993 Conference in San Jose, he received the GroupWare Achievement Award along with recognition of GroupSystems as best of show in the GDSS category. In 1992, he received the Arthur Andersen Consulting Professor of the Year award. Dr. Nunamaker received his Ph.D. in systems engineering and operations research from Case Institute of Technology, a M.S. and B.S. from the University of Pittsburgh, and a B.S. from Carnegie Mellon University. He was an original member of the ISDOS project (PSL/PSA) under the direction of Professor Daniel Teichroew at Case and the University of Michigan from 1965 to 1968.

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BISE: While the behavioral approach to IS research is often suffering from a lack of relevance, some claim that the design science research approach to IS research often lacks rigor. As one of the founding fathers of the IS discipline who always proposed innovative artifacts aiming at solving important, relevant prob-

lems in organizations, what is your position?

Nunamaker: My version of the design science model is predicated on rigor by definition, as it follows the basic research wheel diagram, first published in JMIS 1991 (see Fig. 1).

The key to my approach is evaluation of the IS artifact whether it is in the lab or the field and it is an expansion or derivation of a theory to guide the process. You can start at any position on the diagram as long as it includes the theory, prototype and validation by experiments or field study.

When innovative artifacts are created, however, a specific challenge arises which I call “going the last mile”. The last research mile includes three phases: proof of concept, proof of value and proof of use. This means that a designed artifact is not really understood and cannot really be evaluated before it is actually implemented. A good example is the moon landing which has been simulated and subject of experiments for years, but which created totally unexpected challenges and insights not before it was actually done. If they had stopped a mile short, it would have been entirely different. Researchers cannot predict the impact of their results when only sitting at

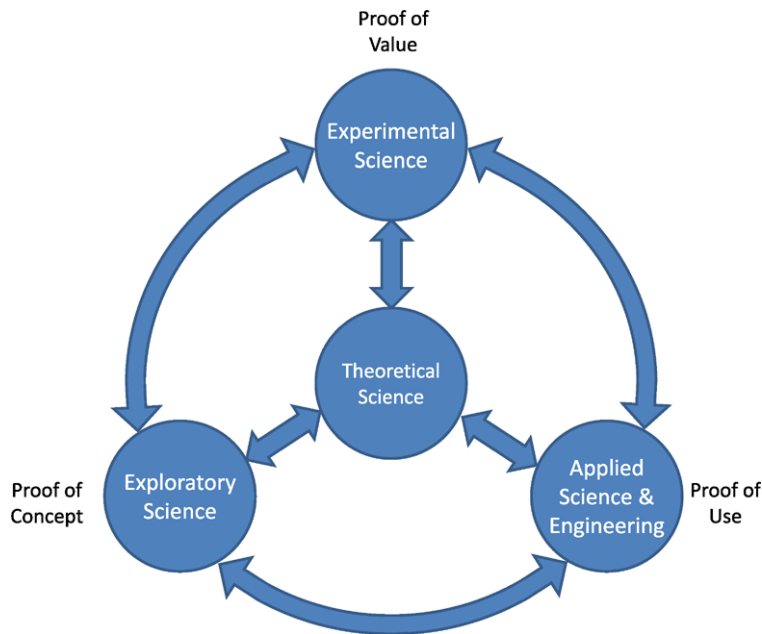


Fig. 1 Design Science embraces the continuum of scientific method using each aspect to inform system design choices and using systems technology to inform the science. MIS researchers must conduct their science both in the lab and in the field

their desk. In addition to a proof of concept and a proof of value, they should also strive for a proof of use. GroupSystems is a good example for novel insights and innovations that came only during use.

BISE: In contrast to your statement that information systems research should aim at proposing innovative artifacts and putting them into use in order to gain novel insights, most A journals of the IS discipline focus on adding to a descriptive, explanatory theory base. As an example, the so-called AIS-6 basket of journals publishes design science research only rarely, mainly in occasional special issues. Since both young as well as established researchers need to publish in such journals, do you agree there is a chasm between mainstream editorial policies and your opinion of what would be useful for the IS discipline?

Nunamaker: While we honor our foundation which grew out of accounting and management, we must expand our vision, to include information for all kinds of organizations and teams. Bioinformatics, medical informatics, government operations, border security and national defense, etc. are all the domain of IS. Wherever knowledge workers are found is an important domain of IS. IS researchers should be there, solving information problems and creating new knowledge. That said, we should publish in journals outside the traditional

domain of MIS. In my opinion, the IS discipline is engaged in a downward spiral because of its increasing narrow-mindedness. You cannot restrict yourself to explaining existing concepts and systems while everyone wants to hear about is what is new and what is coming next. The reason for these problems might be that IS researchers are mostly associated with business schools or business departments. Therefore, in striving to be accepted within their institutions, IS researchers are caught in the trap of wanting to be like them and focus on the business domain. One solution would be to create distinct IS departments. I see, however, the business school or business department is a natural home for IS research – but only if people do not put on blinders. IS research needs to be multi-disciplinary. This is its unique value proposition and its chance for success: no one single discipline has the capability to understand the complex intertwining of people, tasks and technology so that it can create innovative problem solutions that integrate all these aspects. But IS research groups need to understand that they should create value not only for the business school or business department, but for the whole university and society in general. By attracting interdisciplinary funding, that no one individual can attract, this can be achieved. Look for the multidisciplinary and multi-

university grants, or you will become extinct.

BISE: What are the most important application areas where the IS discipline can and should make such “unique contributions”?

Nunamaker: Security and information assurance are hot topics. We found an extremely important application area in border security. That is, the automation of the screening process for people crossing a border or arriving at a checkpoint. Neither computer science alone with its technical solutions nor psychology or other behavioral disciplines are able to address the challenges of today’s security problems in a sufficiently integrated way. In many regards, deception detection goes through the same process that I went through with collaborative systems technology for decision making twenty years ago. It is important to go the last mile in research, i.e. to put innovative artifacts into action and analyze how they are used and how they perform. You will see things that you did not see in the lab and that you cannot see sitting at your desk. There are many areas that also need an integrated, multi-disciplinary approach.

BISE: Design theories transform explanatory kernel IS theories in a way that they support the actual construction of useful IS artifacts. Due to the large variety of design problem classes and the multifaceted IS field, I see no commonly accepted reference system for design theories. What is your view on design theories?

Nunamaker: Design theories and explanatory theories provide guidance. A good example is that a theory provides direction but is often insufficient to evaluate an operational problem. When applying a theory, we have often found that we need to extend it and as a result the theory becomes more complicated. If you strive for explanation, you want simplified models. And if you do not go the last mile, you end up with too simple theories.

BISE: Do you think that we sufficiently understand the iterative search process of design? We have a plethora of “bottom-up” design theories as well as many approaches to better understand various design problem classes in a “top-down” way. Simon and many others recommend performing an iterative, maybe hierarchical search that combines “bottom-up” and “top-down” components. What is

your experience with the search process in design research?

Nunamaker: I am a bottom-up person with top-down guidance for systems projects. The process starts with a theory, with experiments and collecting data. It then becomes a kind of “middle-out” process. An important finding is that, as iterations continue, there is no way of avoiding the adjusting of the theory. The proof of value and proof of use stages added incredible depth to our understanding and theory development. We needed 15 years of iterations to develop our work on group decision making into a theory of collaboration – and we are not there yet. But we are getting very close to having a theory of collaboration after running hundreds of experiments and field studies.

BISE: Which implications has your experience with and understanding of design oriented IS research for research organization and, maybe even more important, for research funding?

Nunamaker: Over the last 20 years, we went from 90% industry funding to 95%

government funding. Although companies are actually benefiting from our research, they are reluctant to finance it more than just in terms of short-term studies. It takes three to six months to put a research team together. The long-term perspective that is needed for several design iterations can only be achieved by government funding. It is important to note that, in my opinion, IS research is not only multi-disciplinary, but also multi-university. Collaboration between research institutions and pooling of funds are necessary.

BISE: Given the fact that the establishment of top tier journals that not only occasionally publish design oriented IS research needs time: What alternative publication outlets do you recommend? What needs to be done to integrate alternative publication outlets in scholarly assessment and promotion processes?

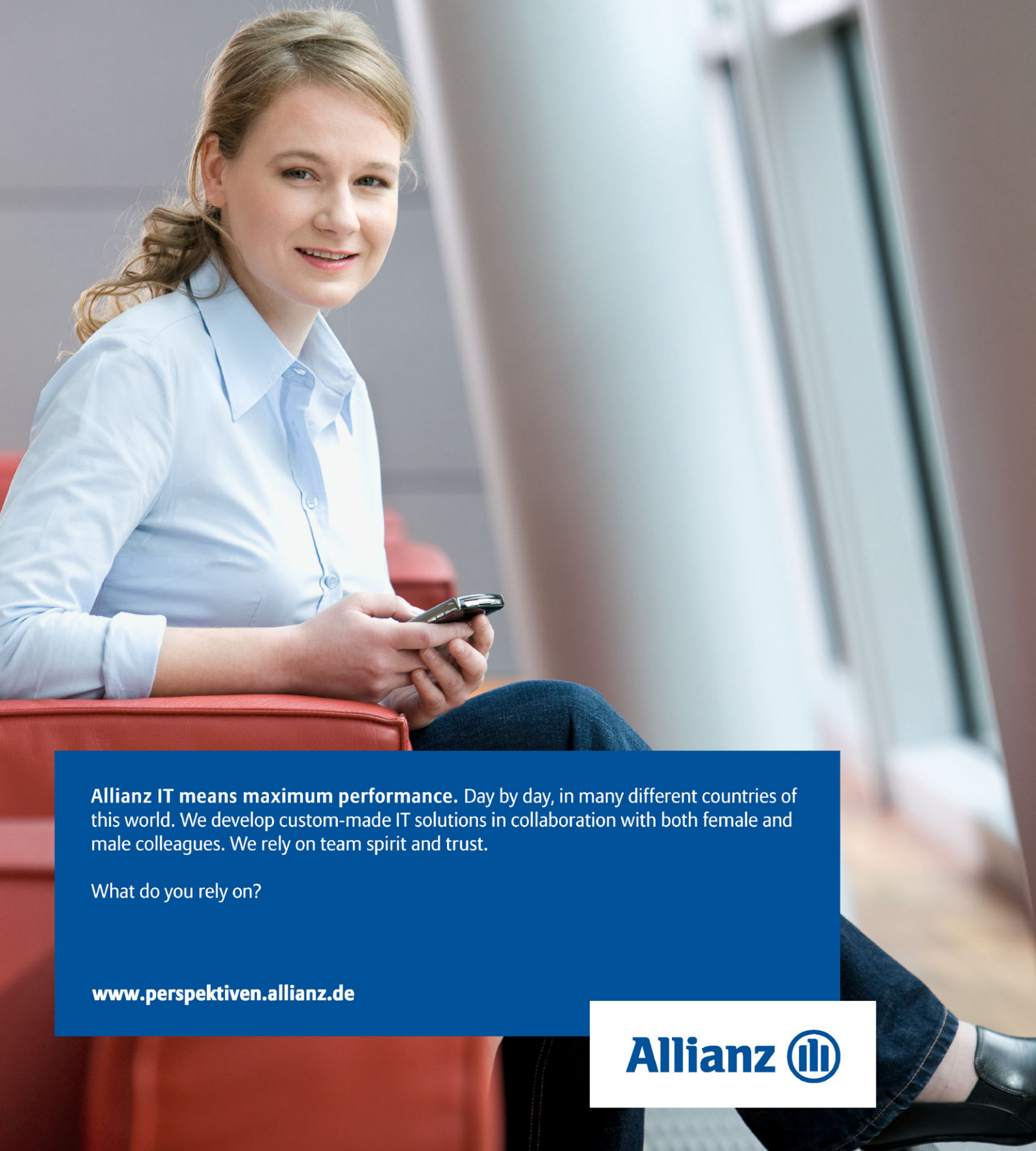
Nunamaker: First, hedging is a strategy that also works for publishing. There are lots of top tier journals out there that might publish inter-disciplinary work as

long as it is relevant and rigorous – for example in psychology, linguistics, computer science or management. We should not limit ourselves to the IS journals. Of course this requires promotion committees not to base their recommendations on a narrow list of mainstream IS outlets. A second strategy is the establishment of outlets that do not restrict themselves to the wrong focus on explanatory, descriptive theory building. Let the market decide which outlets will be in the prime basket in a few years. My advice is to also publish in the reference journals. I have found support for Design Science Research papers in IEEE Intelligent Systems, JMIS, Group Decision Support and Negotiation, IEEE Intelligent Transportation Systems, CACM. A new journal ACM Transactions on MIS will publish its first issue in the fall of 2010. TMIS will come from the University of Arizona with Professor Hsinchun Chen as Editor-in-Chief.

BISE: Prof. Nunamaker, thanks for sharing your thoughts with us.

Challenge, trust, a strong team. My know-how counts.

Dr. Petra Stephan,
Allianz Deutschland AG, IT Manager



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Business & Information Systems Engineering (BISE) is the new peer-reviewed scholarly e-journal for the entire techno-economically oriented community with a focus on design science-oriented research. It continues the 50 years' tradition of the journal WIRTSCHAFTSINFORMATIK by that all articles appear both in English and in German. Moreover, authors benefit from our double-blind, constructive, and rapid review process.

„I believe the time is opportune for the IS community to provide such outlets for design researchers. BISE, however, has some unique advantages for positioning itself as a desirable outlet for design science research.“

Alan R. Hevner

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