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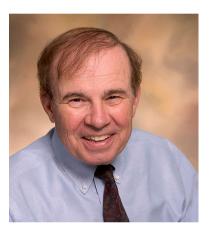
# Interview with Jay Nunamaker on "Computer-Supported Cooperative Work and Social Computing"

**Robert O. Briggs**

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Jay F. Nunamaker Jr. is Regents Professor and Soldwedel Professor at the University of Arizona. He founded the MIS department at University of Arizona in 1974, and the Center for the Management of Information in 1985. Dr. Nunamaker has over 40 years of experience in analyzing, designing, testing, evaluating, and developing information systems. His multidisciplinary research is built on a foundation of computer supported collaboration, decision support, deception detection and determination of intent. Nunamaker's research has led to major breakthroughs in collaboration, decision support systems, and automated systems analysis and design. He is known for developing generalizable solutions to important classes of unsolved real-world problems, and testing his systems with scientific rigor. He was elected a fellow of the Association for Information Systems in 2000, and in 2002, he was the recipient of the LEO (lifetime achievement) Award from the Association of Information Systems, at ICIS in Barcelona, Spain. In a 2005 article in Communications of the Association for Information Systems, he was recognized as one of the most productive information systems researchers, ranking no. 4–6 for the period from 1991–2003 based on the number of papers in top IS journals. He received his Ph.D. in systems engineering and operations research from Case Western Reserve University.

**BISE:** You were a pioneer in the field of group support systems. What do you see as some of the major accomplishments of the early years of collaboration systems, CSCW, and Social media?

**Nunamaker:** Perhaps the most fundamental breakthrough was conceptual – the notion that teams could use technologies in ways that made them more successful. Once we had the concept, there were a lot of opportunities to explore. A lot of studies showed that groups using group support systems (GSS) could cut their project cycle times by 90 %, and cut labor hours by 50 %, while producing higher-quality deliverables. You may have heard the old saying, "Faster, better, cheaper – you can have any two, but you can't have all three." Well, collaborative work with GSS could faster, better, and cheaper – so it was a paradigm shift.

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Even after we built the first systems, took them into the field, and got good results, we could not explain why improvements were so big. It surprised us. It surprised the reviewers, too. It took us 3 years to get some of the first GSS studies published, because they contradicted decades of evidence that the effectiveness of groups larger than five people declined with each additional person added to the group. Reviewers were concerned that we might be making up the data.

It was a breakthrough when we framed the effects of GSS in terms of process gains and losses – things that advance a group process and things that interfere with group process. We analyzed every study available at the time to derive the general model of process gains and losses that we published in the 1991 CACM paper on electronic meeting systems (Nunamaker et al. 1991). It was one of our major contributions up to that point.

**BISE:** What research have you seen that grew out of that paper?

**Nunamaker:** Even though we were up to our elbows in field research at the time, when we brought all the input constructs together in the general model, it was still surprising how many were related to group outcomes. We never could have guessed that from our desk chairs. When we gathered all the constructs into one model, we could see the scope and complexity of collaboration for the first time. It's been a handy reference for people working on experiments and field trials. Each construct is a research topic on its own, and there are interactions among multiple constructs. It's more than a single researcher or research group could investigate in a lifetime. It's been cited almost 2000 times by people all over the world, and people are still working on it.

**BISE:** What are some of the highlights from that research?

**Nunamaker:** One of the most interesting to me was the value of anonymity for some parts of a collaborative work process. During idea generation, for example, we know that people are reluctant to propose an unpopular idea, especially if it's unpopular with the boss. When we used electronic brainstorming in the lab, the people who contributed anonymously generated significantly more useful ideas of higher quality. When we went into the field, though, we not only got the good ideas, but we also got to the elephant in the room. It's especially valuable in situations there is a difference of power among participants. We once ran a session for the president of IBM and the 12 senior executives who reported to him. The question was, "What are the last details we must address before we launch our new strategic plan?" For the next half-hour he got answers like, "This plan will never work. We'll spend all that money and it will still cost us market share". When the anonymous brainstorming session was

over, he asked, "Why is this the first time I'm hearing these things? Why did you not tell me this sooner?"

The executives said, "We did tell you! You asked, 'How is the plan coming?' and we said, 'There are problems, Sir, but we're working on them…'" Anonymity turned out to be a powerful tool, not only for idea generation, but also for idea evaluation and idea organization. It's a tool though, not a universal solution. It can even be counter-productive when a group is trying to create shared understanding or working to build consensus. As much as we know about anonymity, we still have more questions than answers. It still a rich research opportunity. One still-unexplored area is whether and why people in power will tolerate frank anonymous input. We've seen cases where leaders who embrace anonymous responses took action that benefited the organization and increase their standing. We've seen other cases where leaders cut off anonymous brainstorming when the first negative comments appeared. That's a rich, undeveloped research stream.

From sitting in on a number of sessions, I've come to appreciate the diversity of opinion that comes from all segments of the organization. As state funding for my university declined, for example, we had to find other sources of income. We had a real challenge to build consensus around adding fees for special programs. We ran eight or ten anonymous brainstorming sessions for stakeholder groups up and down the organizational chart and all over campus. We got a lot of diverse opinions. More than you could have imagined. There were surprising insights that were helpful for establishing special fees that stakeholders could accept, and these fees now generate a tremendous amount of income. The anonymous sessions gave us a much-more sophisticated understanding of what was needed and why, and how the students would benefit from it. We use the fees for things like 24/7 computer labs with hardware and software for courses like Systems Analysis and Database. We also use it for additional teaching assistants to help the students succeed. Without the collaboration system, we could not have designed a fee structure that the students and others would support. We would not have been able to include students, faculty, administrators, and the board of advisors in the same sessions.

**BISE:** What were some of the early contributions from other universities that might have impressed you at the time?

**Nunamaker:** The University of Minnesota' garnered a lot of attention with their 'Minnesota Experiments.' In the days of mainframe computers and monochrome monitors, Minnesota focused on the role of color and graphics in delivering information to decision makers, and in their understanding of the information. Minnesota, Gary Dixon in particular, was probably the first to bring rigorous

scientific experimentation into MIS. I came from an Engineering background, where the focus was not on science, but design. The methods of Engineering focused on exploratory research and trial-and-error, so Minnesota's approach was sort of new to me. Bringing science and design together – it was a lightbulb going off. Now it's so obvious, but at the time, it wasn't so obvious. Their work inspired me to use experimental methods in the collaboration systems research.

**BISE:** Were there any early CSCW contributions that you particularly admired?

**Nunamaker:** ShredIt. It's a contraction of Shared Edit. Shredit was Clarence Ellis's approach to collaboration systems – he was out of computer science. ShredIT was one of the earliest examples of an editor to which multiple people could contribute simultaneously. Ellis was a leader in CSCW. He observed and studied what was going on at the time, then went off and did something different. It was a solid starting point for a lot researchers who followed after. University of Michigan borrowed his approach for their early work. I was on the NSF review team for Ellis's project, and was impressed by what he was doing. It was a systematic approach to building collaborative tools. He was among the first to do that.

**BISE:** The CSCW and group support systems research streams split in the early 1990s. What was the issue there?

**Nunamaker:** In the end, it came down to designing collaborative processes. People in the CSCW stream believed that all structure was bad, and that all group processes should 'emerge naturally.' The GSS community found that some process structure could be useful to for getting things done. We did not impose structures on groups from the outside. We used our knowledge to help groups design processes that they liked. Empirical evidence of our successes did not seem to persuade the early CSCW community that structure isn't always bad. The bigger the group gets, the more important it is to design a good process in advance. Jimmy Carter once ran a GSS session of 200 people to develop ideas for improving the quality of life in Atlanta, GA. It would have been impossible to run that session with that many people without a well-designed process.

**BISE:** Turning your attention to the present, what among the current research catches your attention?

**Nunamaker:** The Collaboration Engineering (CE) research has come a long way over the past 15 years, and they are on the leading edge in some areas. We saw that, even with triple-digit ROIs on GSS installations, organizations had a hard time maintaining a GSS capability in house. GSS depended on an expert facilitator, and the expert facilitators tended to get promoted pretty quickly, and then there was nobody left to run the software for the teams. In 1999, we posed the "Facilitator-in-a-box"

challenge at a collaboration conference: How can we package enough collaboration expertise with the collaboration technology in a form that non-experts can execute a well-designed process with no training on either the tools or the techniques? The collaboration engineering researchers took up the challenge. They have done lot of conceptual work to codify the tacit knowledge of collaboration experts into reusable chunks of knowledge; for example, the ThinkLets design pattern language and the Six Layer model of collaboration. In 2013, Bob Briggs and some of his colleagues published a JMIS paper about a prototype facilitator-in-a-box system prototype called ActionCenters, and showed that non-experts could use it to run a well-designed process with no training. There is a lot more research to be done there, but it's a good milestone. The collaboration engineering community recently started extending its approach to crowd-sourcing, too. Now you are talking about tens-of-thousands of people collaborating. That's a big step forward.

**BISE:** Where would you like to see the collaboration systems/CSCW/Social Media research go in the future?

**Nunamaker:** It's all about automation. I get a sense that the hostility the CSCW community used to feel toward designed collaborative work practices is fading – they are starting to see the benefits of process design for some kinds of collaboration. As CSCW and collaboration systems research streams converge, I think we'll see some outstanding work on automating the role of the expert facilitator – the use of AI for preliminary classification and clustering thousands of ideas; the use of digital avatars as group facilitators; the use of expert systems to help novice groups design effective collaborative work systems for themselves. The output of such technology-assisted process design sessions could be automatically generated process support applications, tailored specifically to the group's desired process. With the six layer model of collaboration, and all the concepts it organizes, we know enough about collaboration processes to make that a real possibility.

It also looks like social media, collaboration systems, CSCW, and even computer operating systems are converging. The whole computer experience will become social and collaborative, and all work will become cooperative.

If we've learned anything over the last 30 years, thought, it is that good technology is not enough. Going back to our 2009 CACM paper on principles for virtual teams (Nunamaker et al. 2009), we're going to have to focus on, for example, realigning reward structures to motivate teamwork. There is a saying in the US Navy, "Up to a certain point in your career, you earn medals for what you do. After that point, you earn medals for what you lead others to do." We're going to need an analog for that to reward teamwork in organizations. We're going to have to

realign reward structures to reward not what "I" do, but what "we" do.

We're also going to have to find new ways to focus attention on tasks. In the 1960s, Herbert Simon predicted, "In the future, the scarcest resource will be human attention." That future is here. We're in it. We are overrun with information. How can we know what we should pay attention to? I get so many emails that I miss key messages. Then, sometimes my emails get quarantined by the firewall, sometimes for a few days. When they finally get plugged in, they are way down my list. More and more people are going to instant messaging instead of email. That just shifts the problem to a new device. It's likely to become worse than email because there are many fewer tools for managing it. Email and messaging are just the tip of the iceberg. The next big challenge for collaboration researchers, I think, will be conservation about attention.

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