

American Medical Informatics Association Nursing Informatics History project

Purpose

The overall purpose of the Nursing Informatics History Project is to document and preserve the history of nursing informatics.

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Patricia F. Brennan

Patricia Brennan: I'm Patty Brennan. I'm the Moehlman Bascom Professor of Nursing and Industrial Engineering at the University of Wisconsin, Madison.

Interviewer: State your credentials.

Patricia Brennan: My credentials include I have a Bachelor's and a Master's in Nursing, and a Master's and a Ph.D. in Industrial Engineer. And I lack certification in nursing informatics.

Interviewer: How would you describe or define nursing informatics?

Patricia Brennan: Describing or defining nursing informatics gives me a little more freedom than having to state an explicit definition of it. And nursing informatics is an evolving field. It is... an intersection of nursing, the science and discipline, and informatics, the practice and research component. So we have a, a bridge, if you will. It is a... essentially, I consider nursing informatics a component of nursing, because it is the representation, the formalization of that which is nursing. And so the discipline itself controls the knowledge base. And yet the discipline has special needs and requires special skills to... special strategies to make those formalizations real, some of which exist within the discipline. We understand change over time, development cycles, encounters, interaction, and engagement. And those are special phenomenon that only nurses can understand, and, therefore, require nurses who have deep knowledge of nursing and the informatics skills to create the representation.

At the same time, there's a host of representational tools that come from informatics, and the absence of any particular domain in the structure of those representation tools makes them useful across all the health disciplines. So we have as... in nursing informatics the integration of informatics and nursing, neither of which would be complete without the base discipline.

Interviewer: You have a background other than nurse. Would you describe what your degree is, and how that brings you to the field of nursing informatics?

Patricia Brennan: I was in nursing informatics before we called it nursing informatics. And I was in nursing informatics before I got my... did my advanced studies. And, in fact, it was because of some of the pioneers in our field, particularly Virginia Saba, Rita Zeilstorff, Judy Ozbolt; that I actually ended up studying what I studied. And in the late 70's, I got quite interested in information technology and how it could be useful, not so much for the management of nursing information, but for creating simulated environments for nurses to be able to, on the fly, propose and plan the treatment of patients with complex presentations. At the time, I was looking for a way to understand the work of nursing, the context within nursing... within which nursing work occurred, and the computer tools that would allow me to create simulations of that. So I actually went seeking a course of study that would have enabled me to, if you will, bridge all three of those together. And so I examined nursing Ph.D. work. I examined the possibility of studying in business, where a lot of decision-making work was being done at the time, or psychology, where there was also decision-making work occurring at the time, and engineering. And it was through a nurse scientist at the University of Wisconsin, Madison, Joy Caukin, that I got connected to the industrial engineering group at Madison. That group has been working on computers and decision-making in health care for probably, at that time—this is the late, late... late 70's—it was probably about 10 years they had already been working on that.

So I went to meet with David Gustavson, who eventually became my advisor, explaining I was very interested in studying how computer technology could be useful to on-the-fly decision-making for nurses in practice, particularly in acute care practice. And he listened very excitedly, 'yes, yes, yes,' he understood exactly how this could be done, 'industrial engineering was the place to do it,' because in industrial engineering we had problem-solving skills, system analytics skills, computer science background, basics, and

the emphasis on improving the workplace through the application of technology. So it fit perfectly.

So I went to study industrial engineering, recognizing that what I wanted to study was a component of health care that hadn't been studied in industrial engineering before that is nursing, but it fit well within the concepts of health systems engineering—only to find out several years later that when I had gone through that interview and left so excitedly that my advisor had no clue what I was talking about, hadn't thought about information technology as it fit into the practice of care, and thought this sounded very interesting, and selected me as a student because he thought I could teach him what it was that we were going after.

So, industrial engineering actually served to be the right environment, not necessarily the right set of content, but the right environment to advance thinking in nursing informatics. Specifically, from industrial engineering I got skills in systems analysis, I got skills in problem-solving, not necessarily... I mean, I certainly learned lots of problem-solving methods. But the skills in problem-solving, and how to structure a problem and decompose it to solvable parts and then reintegrate it, is a basic strategy that we need in informatics and that that I've been relying on most of my career. But, also, more importantly, there's a component of industrial engineering that addresses socio-technical systems, the person in the context of technology. So I had the three key components that I needed. And I would say that I brought informatics into industrial engineering, rather than industrial engineering led me into informatics.

Interviewer: Did you have an a-ha moment when you realized the value of informatics, or how did you come to understand the value of informatics?

Patricia Brennan: Well, remember, we didn't call it informatics. All right? We didn't quite know what it was. Yes, I can tell you almost to the day when this moment happened. In 1979, I was a master student at the University of Pennsylvania. In that program, we had a research course that was taught by Barbara Jacobson, and in that research course we had to

develop some skill in analyzing a data set and some appreciation of what random processes were. So Barbara introduced us to a program called XPERSim, which was a simulation program that many of us remember from the 70's. It could create a series of numbers generated from a random process. And it was both an exposure to models as a way of understanding complex processes, as well as computer simulation as a way of generating data. And I found it fascinating. What I saw here is that almost... as long as you could find a process whose key components were represented in the same way that the simulation works, you could essentially recreate any process inside this computer simulation. And this required a level of abstraction—the first a-ha—and provided evidence that needed to then be compared to real world experience—the second a-ha.

So I got the sense that computer systems allowed us to create small worlds that would allow both an understanding of a real world aspect, and also some advice about how to study that real world aspect. And I would tell you that two things happened around the time that the a-ha was occurring. One of them was that I completely broke the budget of the School of Nursing in terms of the simulation lab, because I kept making run after run after run because I thought this was so cool. And the second part was I learned that nobody was understanding me at the time. And at the time, what I realized is that I needed to be with people who were already thinking about where health care, nursing, and technology was fitting together.

So this is 1979. In the... probably fall or spring of 1980, '81... my guess it was...in the spring, was the first Clinical Center Conference on Computers in Nursing. And that's where the a-ha got done, because I finally found a place where there were nurses, who thought about computers, and what they might do for health care.

Interviewer: What did you call yourself then?

Patricia Brennan: Oh, that's a really good question. What did we call ourselves then? We came up with funny names. It was like these secret societies were development. And in Milwaukee, where I was living—after I left Philadelphia, I went to Milwaukee and I taught at

Marquette—there were pockets of people that were working with computers in their health care systems. Oddly enough, at the time, I didn't know Judy Murphy, but she was already starting her work at Aurora, St. Luke's. But I did work with Marlene Durst at St. Joe's Hospital, and another couple of women across the hospitals in Milwaukee, calling ourselves WCANS, the Wisconsin Computer Applications in Nursing Society. And so we didn't really quite know what it was. Not everybody left the field. You remember that old SCAMC name? Nobody quite knew what this was, so we called computer applications, not realizing at the time that what was more important was the fundamental informatics knowledge in the field. So we kept thinking we were going to apply something that other groups knew to the processes of our profession. And what we realized, in turn, is that we had to generate new knowledge about the technology to make them useful, more useful for our profession.

So the transition from computer applications nurses to nurse informaticist really came up through the 80's, when we realized that it was not just about taking a computer and seeing if it worked in the hospital, but it was a lot more about how do you formalize and manipulate health information, and what kind of data structures are needed for that?

Interviewer: Do you consider yourself an informatics nurse specialist now?

Patricia Brennan: The advantage of being old is what... I was in a conversation earlier this week with a couple of other... the major leaders in our field, I think, are Zack Kohany and John Olampka. And we talked about the fan-folded business card, that we each... have lots of different titles along the way. I have, and I continue to maintain my identity as a nurse. I have at my university a joint appointment in nursing and engineering. I have a major university responsibility now where I have a leadership position in higher admin. But I basically consider myself a nurse. And what I bring to all of the questions that I address is the way in which the technology serves to aid in the diagnosis and treating of human responses, and capturing them and understanding them. And so I don't actually think of myself as much as by a title, as I think of myself as what I am able to do and think about

because I am a nurse who has this deep knowledge in technology. And, to be very honest, has a broad-based position of power and influence, so that I can ask and answer questions that might not be either well accepted or well understood, or even considered as valuable by others because I believe I've developed enough of a track record that suggests these questions may be worth answering, even if others don't quite get while they're important.

Interviewer: Talk about the track record a little bit. Can you talk about looking back at any accomplishments you had, why you were glad to have that role?

Patricia Brennan: I was involved in the leadership of AMIA from about 1992 or '3 'til about 2004. And besides having the most amazing engagement with very bright, very smart, very enjoyable...

Interviewer: I consider one of the major accomplishments of my career what... is the contributions and the experience and the, the work that I did with AMIA. It has... and the American Medical Informatics Association. And, and its earlier incarnations, because it felt to me quite a bit like a smooth less growth—although I understand it wasn't smooth—a smooth growth from the late 60's when the first societies were forming into the late 90's when AMIA was fully formed as an institution as being really essential for the field, for knowledge-building, and for creating a culture, an invisible college of intellectual sharing and stimulation that I don't think exists in most health care environments... health science environments.

I shepherded AMIA through its transition from being a meeting organization to being a membership organization, and the work that I led was to bring a very talented board into ownership of a strategic plan. And so what we did was we moved from... we'd all to meetings, and like seeing each other, and we know famous folks and get to drink in the bar with them, to we have a fiduciary accountability, we have an intellectual commitment, we have a manpower requirement to be active participants in the way information technology works in this country, and internationally. And I believe that to

some extent because I was a nurse, but to a huge extent because I was a woman, that I was able to bring this group into framing their responsibilities as not two meetings a year a couple of magazine to...towards a culture, an environment, a congregation, if you will, of talent in many different viewpoints—young and old, applications in basic science, clinical and bioinformatics. And so the work that I... that was going on from the mid- to late 90's when I was first elected president, through my presidency and afterwards, which is a four-year stint so you're around a lot, really allowed for constant dialogue at a very high level of how the field was changing and how the shape of the field has changed.

The second thing that I think I contributed very much to the, the society is I found and supported talented people, or I reinforced the support of talented people. And so projects became less mine, and more the associations. When you think of the presidents who went before me, who I have enormous respect for and still get to work with, you can identify initiatives that went along with them—Clayton and privacy, Gardner and the FDA software requirements. There are things that they did. And then there's me. And actually one of our colleagues, our male colleague, challenged me and he said, 'And, you know, nobody really knows what you actually did, but, but the society actually seems pretty good now.' And that's what I did is that nobody knows what I did because my job was to create and support an infrastructure of talented people. I think that's gender. I think that's one of the challenges women bring to science, and I'm very proud of it.

Interviewer: Can you describe something else that you've accomplished that you would like us to remember you for?

Patricia Brennan: A month ago, or six weeks ago, my son and I did the Story Corp interviews. Do you know them? They're on NPR. And my son asked me the same question, 'What would you like to be remembered for?' 'After you're gone,' he said, 'what would you like to be remembered for?'

Patricia Brennan: I believe that the research that I had directed in a large and strong interdisciplinary team of people has led to the realization that laypeople will use computers. Sick laypeople find

strength, direction, comfort, assistance through computer technology. And that information technology is not simply a tool for professions, but it's a resource for a society. And I believe that because of my work, we are less likely to design information systems that only take into consideration the viewpoint of the health professional, and we are more likely to need and find a way to engage the patient through interaction.

I believe that because of my work—and, again, all of my work has been done in large teams, and not in... I do very little solitary work—but because of the work that my teams have done, we have ways to characterize the group process of nursing practice, and then to draw from that characterization guidelines for information systems design. And now to extend those guidelines into the redesign of information supported, or what we call technology enhanced-nursing practice. And so I believe my contributions, I'd like to see my contributions ultimately be that people will say, 'She was the one that helped us reframe how we did nursing when people had computers.'

Interviewer: What overall vision has guided your work?

Patricia Brennan: I don't know if I can explain it... my... the vision that's guided my work. It can't be expressed by a vision. And maybe it will sound appropriately so, like it's been the integration of other people's framing into my life. But three things have been critically important. One of them is that I've believe I've been given many gifts. I've been given a good intellect, and a, a strong and, and impressive body, and a comfort in speaking. And having been given those gifts, I need to use them for the well-being, to give back to society and give back to the universe what I've been given. So, so it is my responsibility to, to use my gifts to advance the care of individuals with technology. And so, that... my therapist accuses me of being a poster child for responsible behavior. But I really very deeply believe that having been gifted, having been blessed with colleagues who have supported me and mentored me through my entire career, I need to continue to give. So that's one piece of it.

The second is I passionately believe that health and health care are two different issues, and that the work that we do in informatics must address both of them. And without someone who can think as a nurse does about both well-being as well as disease management, we're not able to go to information systems that are sufficiently robust to direct the health and health care of the future. So that's very much guided my work.

And the last part that has guided my work is that there is... a bit of goodness in every person and everything that we do. Sometimes that goodness comes out in a very proper and serving way, that we will serve this country well, we will make sure that certain people who need services get them. Sometimes that comes out in the fun, in the social engagement, and the supporting of another person when they need it. And this idea of that bit of goodness; and the need to find that bit of goodness in every circumstance has actually been demonstrated to me by so many people who have gone before me, and it is something that I believe carries after me. So at a meeting like today, I believe that I need to be open and actually seek opportunities to give to others, because so many people—Marion Ball, Margaret Greer, Harriet Werley—have given to me—Judy Ozbolt—people... Rita Zeilstorff... in 1979, I wrote Rita a letter and said, 'I heard about this computers in nursing, I heard you might know something about it—she sent me drafts of a book she was writing.' And so the incredible generosity of the field, I believe has charged me to continue to be generous.

Interviewer: Talk more about some of the people who have helped you...

Patricia Brennan: Oh, we... I don't think we have that much time. So let me tell you the people that I'm grateful for, that I want to make sure that I tell you about. Sue Bakken and Judy Murphy have been the kind of intellectual colleagues, personal friends, competitive peers that make a woman's career and personal life rich and exploding, and I would not be anywhere where I am without their support, their counsel, their challenge and their charge. And the ability to find personal engagement through professional activities has been just marvelous.

Judy Ozbolt 25 years ago took many hours talking to me about being a woman, being an adult, being an informaticist, being in a men's field, and, and helped guide my thinking in decision-making and decision support, becoming an academic, leading a life in institutional and organizational service, that I would be... I would be nowhere with it.

We have physician colleagues who've been incredible support mentors, teachers. Charlie Charles Saffran, Mark Frisse... Mark Frisse writes... Mark Frisse chaired the AMIA... the SCAMC meeting in 1992. And I submitted a paper, early... one of our early computer link projects, and it was too long. And they called me up, and I was, you know, out of my office, but I could hear him on my answering machine, 'Your paper's really good, but even you don't get this long of a paper. You've got to cut at least a page out of this. It's too long, and we're not going to publish it. But, it's really, really good, but we don't want to publish it unless it's shorter.' So the idea... I mean, just... here's this famous doctor calling me and saying, 'Fix the paper.' It was great.

Ted Shortliffe, Don Lindberg, and Clem McDonald and I gave a reaction to the NINR's first statement on nursing informatics and nursing... computer technology in the service of patient care. And we stood on the dais at the meeting in Baltimore, and the three of them and I, and one famous physician says to the other famous physician, 'I heard there was four doctors to comment here. Where's the fourth?' And I said, 'It's me.' 'Well, you're not a physician.' 'No, but, actually, guys, I am a Ph.D. There's...' So the opportunity to engage... and they took it very good nature. They were, you know, a little bit chagrined, but not, not totally changed by it. But the opportunity to engage in a... in an interaction with the head of the National Library of Medicine, the Director and founder of one of the most amazing lines of medical informatics knowledge in the country. And at that time, the president of our society, who was to me, both a testimony of the way men and women who had gone before me to set up the dialogue for interdisciplinary work in this area, as well as, frankly, my colleagues.

Patricia Brennan: About what? Traveling about the world, the expectation that everyone shares their work with everyone else. So many aspects of health science research are governed by a restrictiveness of the information. And we hear lots about ‘The results are embargoed until Tuesday.’ And there is almost a cult of honor given to not share it. And in our field when the knowledge is changing so quickly, the cult was share all the time, talk, send preprints, open things up, let people see your code. And, and it continues. And it’s really been shaping the way that it teaches across the disciplines, not just the way that I teach the informatics students.

There are... when I was nominated for the nursing academy, Margaret Greer called me up. And I had known Margaret very peripherally. She was at Illinois at the time that that I was at Wisconsin when we had some common colleagues, and once or twice we would have exchanged a paper. She called me up, and in that thick accent of hers, and she said, ‘How come you’re not in the Academy yet?’ Now, I was four years out of my Ph.D., maybe two years out of my Ph.D. ‘How come you’re not in the Academy yet?’ I said, ‘Well...’ And she said, ‘I’m going to... I’m going to nominate you this year.’ And I said, ‘Well, I appreciate that, thank you very much.’ And said, ‘Now, you better... you’re going to need to nominate other people.’ And so the opportunity to invite and the responsibility that comes with being invited have...long been in the field.

I have one story to tell on myself. Margaret... I’m sorry, Madelyn Wake, who is not the Provost at Marquette, early on was in charge of continuing education there, and she said to me when I was first there and first getting started with computers, she said, ‘You and I are going to get famous together... about information technology and health care.’ So she started me off on this, and I did a lot of public speaking very early in my career. And there wasn’t... weren’t many nurses who knew enough about how to think about computers and technology and bring all this together. So I did a lot of public speaking, and liked public speaking. And so, I gave an all-day workshop on something,

computerized care planning, something a long, long time ago. This is back in the early 80's, '82 '83. And at the end of the day, a woman comes up to me and she said, 'I have a question I wanted to ask you all day.' And so in my most benevolent, I said, 'Yes, how can I help you?' And she said, 'Where did you get your shoes?' She said, 'I'm getting married next month, and those shoes are perfect. I've wanted to ask you all day. Where did you get...?'

So I have learned... very early in my career, any talk that's going well may just be about my shoes. And you need to... you need to be humbled by that.

Judy Ronald got me appointed to the podium... to give a podium talk at the 1984 Calgary meeting. And at the time, I was terribly naïve, and I gave an unbelievably detailed talked, totally off-base, wrong for that audience, but it was a good... it was the right concept, but I gave it as if I was giving a tutorial, and I wanted to collapse everything I knew into a half-an-hour. The friends who tolerated me giving bad speeches through the years have been many, and I've been grateful to all of them who kindly said afterwards, 'Not really your best, but still interesting.'

Interviewer: Some people consider some people like Dr. Saba and Dr. Werley to be the mothers of nursing informatics. Do you have any good stories about either of them?

Patricia Brennan: I met Virginia, first, in 1981, and Virginia encouraged me to apply for my doctoral training, but because of Virginia I created and received a NIH Fellowship for studying, at the time... and you imagine this, in 1981, I typed on a typewriter a proposal to study decision support systems in nursing. And the irony of this typewritten proposal going in to study this thing was... has never been lost on me. Virginia... I convinced Virginia to come to Milwaukee at the time to give a speech. And she said, 'Can I... can I come, can I get up there? And how do you get there?' I said, 'Well, you fly to Chicago and then fly to Milwaukee, and that should be fine.' And she said, 'All right, that's, that's... I'll do that.' So we make the arrangements, she comes, I go to the airport to pick her up, and

she is white as a sheet, because at the time, we were flying 12-seaters from Chicago to Milwaukee, and she had never... swore she would never sit on a plane that small again.

I can't count the number of conversations that I've had with Virginia that, that come to mind so many times in my own work in the way I teach my students. Virginia did her doctorate at American University at a time that very few women were studying in this area. And she was still in the public health service, and she was an older student, as most of us were older students. I mean, most of us got our Ph.D.'s well after the usual cohorts. And she talked to me about the incredibly isolation that comes into your life during your dissertation period. Sorry. It's a lonely period. You live inside your brain. As much as you're collecting data, you live inside your brain. And she was reassuring that this ends, but it's supposed to be lonely, it has to be solitary. So... and she was... she was great. And her energy and her spiffiness was always an inspiration to me.

You guys will want to edit this...

Interviewer: That's okay.

Patricia Brennan: Over the course of my career, I've been married twice. I happened to have been married twice to two different men, but they were both named Patrick. So I'm bringing husband number two around to meet Virginia. And I said, 'Virginia, I want you to meet my husband.' And she said, 'I met him before.' And I said, 'No, this, this is a different one.' She said, 'It's Patrick. I met Patrick before.' 'But this is a different Patrick.' She said, 'No, we've met.' She started to explain like... and finally somebody took her aside and said, 'Virginia, that's a second husband. Same name, new husband.'

You may not want to put that in.

But I asked Virginia, you know, the... the Clinical Science... the Clinical Center Conference happened, and then we were all going to start coming to SCAMC for the first year, 1981, and I was given the grand total of, I don't know, \$500 to travel from my

school, and I needed to share a room. And it was this highly expensive Sheraton Hotel. So I... and somehow I got the idea that you should stay at the conference hotel. So I called Virginia, and I said, 'I'd like to find somebody to share a room with.' And she, 'Well, you know, Harriet Werley, she's always looking to save money. Why don't you call Harriet?' And so I did, and Harriet said, 'Well, I need a roommate. You could be my roommate.' And I was Harriet's roommate for maybe four or five years.

Now, you have to picture back. Its 1982, maybe '81. The field is new. We're all so excited. There is 2,000 men and 25 nurses, women, and that's it. So we... and the vendors were going big guns at the time, and there were lots of parties and all sorts of enjoyable festivities. So I would come to the meeting, and do my work, and give my papers, but I would party, as did all a lot of other people, I wasn't the only one. And so every once in a while, I would sort of sneak back into the room at 2 o'clock in the morning, and hope that Harriet was asleep. And Harriet was never asleep. I don't think Harriet ever slept. Harriet would be sitting in her jamas. She was editor of *Rhine* at the time, and she was editing manuscripts, and doing something. And one particularly momentous night, I remember coming it. It's 1983. It's about... I hate to admit, maybe 4 in the morning. And there's Harriet, and she says, 'I want you to take a look at this.' And it was the draft of the Minimum Data Set Conference plan, an invitation list. And what did I think of this? And here it is, it's 4 in the morning, and me, looking at what was a historically shifting event in our field. So I saw them from the other side, Harriet in her jammies.

Harriet always was great to... it was sharing these giant... I shared a room with her... I suspect Virginia did on many occasions. Harriet had little loyalty for... or little religiosity I guess, about nursing informatics, or the, the, the cultivating of a new field. She was determined that we needed good data for quality and research for nursing. Period. End of story. So her whole investment in informatics had really very little of the public policy. She just wanted better care for people, and she was going to make that happen. And she wasn't dismissive of my work; although she was really... she rubbed my work

off, and talked to me about it very early on. And questioned, ‘Well, what’s... where’s the real data in this? Where’s the... what’s your design?’ A lot of emphasis on the quality of the research, and, and really taught me that informatics serves the larger health care goal. It is not in itself an end point. That if you wanted to study computer technology, or language, or systems as an end point, you don’t involve in health informatics. You belong in computer science or organizational behavior, or some more basic area. But if you’re going to claim that this field, whatever we’re going to call it is yours, you’ve got to have at the end point the improvement of health and health care.

Interviewer: What are significant events that have shaped the field of nurse informatics?

Patricia Brennan: Right. I’m going to actually pull you a little bit away from the significant events to significant trends in events. The most significant trend that has shaped nursing informatics has been the enormous contribution of nurses to system implementation. We have contributed, offered, some would say sacrificed thousands of nurses from clinical care into clinical information systems. Now...and systems implementation. Now, that’s valuable for two reasons. One of them is that they will be sure that because of their experience and expertise and knowledge of the patients that the systems are likely to be useful for the patients. But they bring with them skill in negotiation, conflict resolution, feather-smoothing, vision, logistics, and timing that’s just as unknown elsewhere. And to me, we can’t talk about the field of nursing informatics without talking about the fact that most nurse informatics occurs in the implementation of information systems that are largely interdisciplinary. And yet as a discipline, back to my early definition, as a discipline, nursing has not simply taken on this service role to the greater good, but actually managed to balance system implementation and generating basic knowledge in nursing informatics.

The significant things that have happened over the years in nursing informatics are, thank goodness, many. So we’ve got the NEMIS project in the 80’s with Susan Grove. And the thinking of how do you take specialized knowledge into a professional education, and

make sure of technology to deliver this. She later brought that through in her work with the Lexicon... Lexicon work that she was doing in the early 90's, in trying to take an understanding from an anthropological standpoint of what knowledge is, and how one represents that.

Sue Bakken's work on reference terminologies, Nick Hardaker's later work on composition of vocabularies have brought into nursing a set of formalization tools that really weren't being developed by anyone else. It's not like they brought something to somebody else, and then simply applied it. They created it for us, because they knew nursing and they knew the basics underneath it.

I put my own work in the middle. I think that what I've done with technology and patient care has been... especially in home care has been very critical in not simply offering a companion intervention that nurses can use in improving care for patients, but also stimulated the idea of right-sizing the nursing investment to provide patient care. I think the work that Rita Zeilstorff did in setting up COSTAR brought into ambulatory care a presence of nursing concerns that went way beyond, frankly, the role of many nurses in ambulatory care. And I think her vision of implementation and understanding how nurses were practicing and how the demand... what... how screens should work, or how interfaces should work was really critical.

I think that Diane Skiba has taught me more about... and her setup of the outreach work in both Colorado and the co-laboratories for awhile, taught me way more about how, to, to make our field grow, without making our numbers grow. So Diane's concepts of, of technology as a way to spread expertise is, is really, really been terrific.

I think that we see collaboration in the operational areas in ways that are less well defined than we see in the academic areas. So significant events in, in nursing informatics have been the generation of, or, rather, the incorporation of nursing terminologies in SNOMED, which really isn't obviously seen anywhere, but happens to be the work of a lot of nurses. The certification exams for nursing informatics, the statement of practice of

nursing informatics, and the INA, to me it, it was a... very important put your foot down for the field and say, 'We own this. This is part of our discipline.' No other discipline came forward as clearly or as early as nursing did for that.

I think that we have had a couple of missteps that haven't, fortunately, shaped the field. So if you remember back to all that work in the 80's about nurse's resistance to computers, and it sort of went away. And this is a good thing, because we had people like Linda Edmunds helping us see how to work with vendors to make computers that were useful to nurses that they didn't resist. So there's... and now what I... what I'm delighted to see is the expansion of nursing thinking, integrating it with some organizational framing, or some socio-technical systems framing, including human-computer interaction, to actually look at the nurse at work and the technologies to support it. So we're maturing in ways that I think are very exciting.

Interviewer: Are there lessons that you have learned that you would like to pass on to a nurse who is looking to start in nursing informatics?

Patricia Brennan: Some. And not others. So some of the lessons that I have learned that I would pass on to a new nurse in nursing informatics would be to get the technical depth that you need—not that you want, and not that other people think you should have. But we, we need to have nurses with strong enough technical skills that they can participate in dialogues and in vision futures.

I would advise people to participate often and openly. Bring ideas into the public arena, whether they be through publication, or conference presentation, or posters as early as possible. Don't let perfect be the enemy of good. Let our conversations continue, because the vision that younger people are bringing in will help reshape and reframe what we're emphasizing now. And I think that's really important.

I so desperately want to increase the number of nurses in academic nursing informatics. They... our research capacity is, is very low right now, and I... think we need to expand

it. And I would encourage those nurses in nursing informatics who are interested in a research career to find mentors around the country because they're not going to find them in their home schools right now. And they need to not worry that they're not there. They need to not worry about being indifferent. For the last 15 or 20 years, nursing has sacrificed vision for precision, and, and that is true across our entire research community. That is death for nursing informatics research, because we are not precise, we are messy. We use clouded theories, and we bring them together in ways that don't always make sense. And we can't have our new researchers discouraged by that. They must be encouraged. And so find mentors, call people up, visit people, get support, because your ideas may not be well understood by those who are right next door.

Interviewer: Where do you think the field of health care informatics or nursing informatics is going? What opportunities are ahead? What roadblocks are ahead? Talk about the future.

Patricia Brennan: You, you, you can't talk about the future of health care informatics, medical informatics, nursing informatics without talking about the revolutions and biologically-based understanding of human phenomena and our response to, and our treatments to manage the responses. Where are we going? I got to... I want to... I'm working on being positive for this one, but I'm worried because I see an increasing split between our... the informatics supporting base of science research and the informatics supporting clinical practice, and that's got to stop. So I guess I'm... I... my optimism comes from the fact that novel therapies are moving into clinical practice so quickly that we've got to build the information tools to manage them, and that, in turn, is going to force the information systems development and informatics researchers to, to embrace those tools. And we'll move away from computational biology as the only point of interception for bioinformatics and basic science into the... what's referring to now is biology to the bedside, which I would prefer to expand biology to the bedrooms, since we're thinking about people in the community. And see information tools that, that capture and that appropriately represent phenomenon that will help us understand, interpret and elucidate the basis science phenomenon.

I'm well aware of AMIA's 10,000 by 2010, the initiative to increase the informatics practitioners, and I am in support of it. I'm less supportive of developing nurse practitioners and the absence of good advice about how the professions are changing. And so we can't presume that nursing, medicine, pharmacy, psychology will look the same in five years as it looks right now, because it's changing very quickly. So in our attempt to build the workforce for the informatics community, we must preserve the presence of professional knowledge in those development stages. And I think that can happen. I think that's why associations like AMIA are the better place to situate these endeavors.

I don't believe we're going to be paperless in five years. I don't believe the paperless chart is around the corner. I heard it was around the corner in 1980, '82, '87, '94, 2000, and 2003, and I just don't believe it anymore. I'm done. I do believe that our concept of what is a clinical record and what is decision support will change, maybe not in five years, but certainly in 15. Diagnosis is going to be playing less and less of a role in clinical practice, so our taxonomies that are organized around diagnostics end points will fall away. Symptoms, responses, time dependencies will become increasingly important, so work like the group at Stanford that's studying databases that are representational of time, work that is examining the proper setup terms to describe function, as well as they will all become increasingly important.

The huge demand on laypeople and clinicians to handle this just flood of data that's going to be coming at them once we open the RIO gates is... can, can only be managed if we build very, very good information brokering services, whether they be human services or avatars or agents, we need to find ways to pre-process the flow of information. And we have much to learn from... frankly, from other parts of manufacturing, other computer and, and planning tools from scheduling and from transportation, where there has also been the same flood of data and a need to manage it. Data that's coming in through

astronomy or through some of our geological work has... is overwhelming the ability to interpret it, and strategies are being built to help knowledge manage that, and those strategies, too, will come into our... will come into value in health, some of which can be borrowed, some of which will have to be grown anew, and I'm... starting to see new papers coming out about this in nursing, and new thinking about it. I'm very excited about this work. And I think that we get into this group of people, and we need to tell them, 'Find your mentors, and you're on the right track, but you're not going to necessarily find them at home.'

Interviewer: When you look at the field from being new to a mature field, where are we?

Patricia Brennan: You, I... I'm loath to make religious references in the middle of scholarly talk, but I'm going to do one here. Pope John's... in the Catholic tradition was a very, very visionary man, who described us as a pilgrim church, the Catholic Church was a pilgrim church, learning to emerge in a society... this is back in the 60's... in a society that was ever-changing. And although I have migrated in my own religious beliefs over the years, I have never forgotten that idea of a 2,000-year-old institution being a pilgrim group. And so rather than benchmarking us on a point of development, I'd like to consider us as a group of pilgrims, who are looking to the new lands, and the lands are ever-changing. And that, in turn, the process of learning a new land, and building these... is changing us, so we are not today what we were yesterday, and therefore, the comparison isn't exactly possible to make.

We're all older. I think that we all use more hair color. We don't stay out as late as we used to. I suspect that the younger generation that comes to share a room with Dr. Brennan as she's trying to save money will stay out more than I will stay out, maybe not anymore than I once did.

I think that... I'm so convinced that the future of nursing rests on nursing informatics and our identities as nurses that... and I a couple years ago was much more discouraged about this than I am now, that I actually believe that our presence and our strength is actually

strengthening our basis discipline. And so when I... if I had to say where we are, we are... we have arrived. Now, you can arrive early or late, but you're always... but being at the table, arriving at the table is, is a very important statement to make about nursing informatics. And I think we're here. People don't question our presence. They question our methods, they question our research, they don't quite know what to make of us all the time, but they don't question our rights.

Interviewer: Is there anything else you would like to tell us?

Patricia Brennan: Well, you know, I really appreciate being given yet another forum to bring my views forward, and it is... a precious gift, and I'm very grateful for that. I want to ask you and your group to talk to our colleague, who helped open the door and get out of the way, and let us come through. And so we need to talk to Ted Shortliffe, and we need to talk to Don Lindberg, and to Bill Stead, and Lee Gardner, and perhaps Octo and Homer, I mean, these people envisioned a physician-centric world, and they lost it, and they, they, they have to live with us. And I'd really be curious to know their view on the history of nursing informatics.

Interviewer: How has funding shaped you?

Patricia Brennan: So how's funding... how's funding shaped us. I was stunned to find out that in... this was about two or three years ago, I was identified as one of the earliest-funded researchers from NINR, which just amazed because I... first of all, I think of all the other people that never had funding before me. But, secondly, I didn't realize that actually I was funded by NINR in 1988 for nursing informatics intervention, and we didn't call it nursing informatics then, but it was very definitely how do we use technology to deliver nursing care, which is what we were looking at.

I think, and I have been, again, blessed by an excellent team, mostly wise reviewers, and a... good funding stream. So I have to be honest and say, 'I've probably had somewhere in the neighborhood of \$12-, \$13-, \$14 million of funding over my career. And, and I've

been... I've written enough papers, thank you, and no more grants, I'm not writing any more. This is it. This is... I'm done. But I think that it's been a...very... it's been a good ride, but sort of a very complex process, and it's going to be very hard in the next five years. So I came of age at the beginning of the doubling of the NIH budget. I was mentored by an outstanding grants writer, and my father worked for the Catholic Missions, so I know how to get money. And I was able to get money very... well, for visions and ideas that weren't necessarily well understood, and, and I've been very, as I said, fortunate that I had some reviewers who trusted me well.

And, and now, the NIH budget is not doubling, so that the challenge is going to be there, and it's going to be really quite difficult. But I, I think that the, the academic researchers, in particular, have to realize that we... our scholarship requires us to ask and answer questions. Our funding gives us the way to do that, but our research questions are not necessarily our funding. And so you will have incredible demands to be very true to the questions you're asking, almost independent of the funding that you're getting. And you have to be able to understand the funds allow you to conduct studies that are a pathway towards your larger questions. So in my own work, and whenever I'm reviewing proposals, one of the paragraphs that's the most important to me is 'where does this fit in with the greater scheme of your work.' This... so any given project can, can look, in and of itself, like an interesting project. But the, the investigator must be able to describe where that fits in in their knowledge trajectory.

Now, the cynics, and I may be one of them every once in awhile, and I certainly know many of them—take a look at my research trajectory and my fund... my funding trajectory, not my research trajectory, and they say 'You're AIDS, and then Alzheimer's, and then you're over here with this, and now you're doing that. What the heck are you doing? You're an opportunist.' And this is why my, my encouragement to young investigators to find mentors that will help them stay true to their questions, because you may have to find many ways to answer your question, and funding is only a, a way to answer the question. I'm not suggesting that you propose something and then do

something else, but I am suggesting that you use the opportunities for funding to make advancements towards the direction you're trying to make.

And I'd like to tell you, 'Ah, if they're good enough, they'll get funded.' I don't believe that anymore. I, I don't believe it. The, the, the field is close, it's small. The money is tight. Interdisciplinary, multi- but disciplinary teams are the way funding is going. Finding ways to hook a piece... a question onto another larger project is essential. But I will tell you that our field of nursing informatics desperately needs nurse researchers who are able to continue a line of thinking that is supported by, but not driven by the funding opportunities that are available. I don't believe that every study that has a nurse and computer is a nursing informatics study. But I do believe there are many studies that lack both that contribute well to the knowledge of nursing informatics. And that's what are nursing informatics scholars can offer us.

End of Interview