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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Jim Turley Interview

Interviewer: Dr. Turley, what is your name, your education, and your title?

Jim Turley: My name is Jim Turley. I'm currently an associate professor at The University of Texas Health Science Center at Houston, School of Health Information Sciences. My background actually started in a combination of American literature and philosophy, and did a master's—started a master's at the New School for Social Research in Continental Philosophy and Phenomenology, decided that I would be gainfully unemployed the rest of my life if I continued to do that, so I did a bachelor's in Nursing at Widener University in Chester, Pennsylvania, then my master's in Public Health Nursing at Case Western Reserve, my doctorate in Community Health Education at the University of Oregon, and post-doc at University of Minnesota, National Library of Medicine Fellow. So it's an eclectic educational background.

Interviewer: Dr. Turley, how would you describe nursing informatics?

Jim Turley: Well, I think, as people who have read my material know, that I've objected to the term "nursing informatics" for a long period of time. And I've always been concerned that the use of "nursing informatics" forced or allowed nurses to isolate themselves from other health care professionals and create an area of informatics then that was not interoperable and didn't communicate well. So, I've always suggested that we move to the notion of "health informatics" with a nursing perspective. So what I'd like to see is that health informatics looks at a variety of sciences—originally I would've said computer science, cognitive science—based on a model of health information, and then looking at it from a nursing perspective. But I think increasingly I would, I'd be looking at what is the information that's needed to look at health and health care from a patient perspective, and that what we need to do, as nurses being one of the disciplines involved in that patient caring—arguably the most important discipline—that we understand the unique perspective that we bring in assisting the patient-client move toward a health state. Now, given that as a framework, I believe that we should be looking at the whole area of

computational knowledge, and getting out of the data, into the information and knowledge, making that a fully computational platform, so that we can move into the next generation of health care. Kind of a long way around the definition, but I don't think a simple definition will do us well, or serve us well. So, I'd really say that the core now in informatics is the patient, is the client, and our job is to say, "What do we bring to assist patients and clients to become healthier? How do we codify that knowledge? How do we apply that knowledge? And then how do we make it computationally efficient?"

Interviewer: Dr. Turley, you're known in part for the model that was published in *Image*. Would you care to expand upon that?

Jim Turley: The *Image* model is an interesting one—came after my time at Minnesota. And we were looking at the fact that most of informatics at that time was doing, I think, an unfortunate intersection between nursing and computer science, and we were looking at informatics then as computer science applied in health care. We now call it "HIT"—you know, the Health Information Technology. And I was concerned that that model had a major problem in it in that it ignored the human component. So what we did there was to say, "We need to bring cognitive science in as a core component in this," because, both from the clinician-user and from the patient-user's side, there are limitations on memory, limitations on cognition, that we needed to understand and design with those in mind by creating systems, creating applications that don't bring the human component to bear. It means that we are inherently going to have systems that don't work. And what we have found over the years, indeed, that we have designed many systems that are completely dysfunctional because they were designed by designers. They weren't designed with people who understood both the cognitive approaches and limitations of the human.

Interviewer: Would you care to elaborate on the model that was published in *Image Journal of Nursing Scholarship*?

Jim Turley: Yeah, the *Image* model—it's interesting because it's the one that's probably the most heavily cited. It's still used, I hear from students periodically. It pops up again. And it's

the one that I, becomes the contact point for saying, "I disavow it," in the sense that it was too focused on nursing. And I think that, in working with our students now, I simply say that the whole idea that building it on nursing science was an inherent limitation, so that it really needs to be on the basis of health science. And now I'm shifting even further to say it needs to be on the whole idea of the patient or the client science. And, in health care, we have not done a very good job of understanding the taxonomic or the computational side of knowledge as the patients understand them. So, that, plus the fact that prior to that model in nursing, and I would say throughout the entire medical informatics community at that time, cognitive science was not a major component, and I think that model started the discussion on cognitive science as a component. Certainly when we built the program at Houston, which was the first interdisciplinary program designed not in a school of nursing or medicine or something else—but we really were our own school, our own degree-granting authority—that we built it from the ground up with cognitive science as a major component. And I think the research that has been done by the faculty and students there has positively changed the entire definition of informatics not only in the U.S. but globally. So now the question of cognitive limitations on interface design, or cognitive limitations on memory—short-term, long-term, working memory—all of this is an active part of any informatics discussion. And I think if we look prior to the 90's, that was not considered a major component. So I think that's been a major thrust that we've been able to help the whole informatics community to look broader. Now I think the time is to really look at the revolution a second time. We've gotten past, I would hope, nursing informatics, but we've not gotten to the point of a true health informatics that has the client as center. We talk about the client as the core point, but we very quickly revert back to our own discipline, be it nursing, medicine, public health, etc. And we're worried about modeling the components that are unique to our discipline. And I think about this, and I was kind of rummaging the other day about some of the people that I've known over the years. And one of the critical ones, I think, was Rosemary Ellis, who was one of the first nursing theorists and probably not well-known to this generation anymore, unfortunately. But Rosemary raised the whole issue of theory of and for nursing—that theory should not be nursing only. There should be

theory development within nursing, and it should be both of nursing and for nursing. But, theoretically, we should feel free to take knowledge and knowledge models from other domains and apply them within our own. So she always saw nursing and the science of nursing as an open interactive domain model. And I think that's part of what we're needing to relearn in informatics—that if we're really going to look at informatics as the computational representation of the knowledge of nursing, which I think is a good thing to do, we have to say, "What are we doing it for?" Are we doing it for nurses? If we do that, we're out of business tomorrow. It is to assist clients, whether they are individuals, families, populations, to achieve a higher health state, and to do that in a way that is comfortable with their values and their statements. So as we look at nursing in the interactive role that it has always had, we have to look at the multipurpose nature of that knowledge—the "in," "of," and "for" that Rosemary talked about in the 70's. And as we relearn that in an informatics side, we realize that we can't model just nursing. As we do that, the knowledge that nurses see, the knowledge that nurses use has to be communicable to the other health care team members and to the patient. And as we develop taxonomies and conceptual models that are not communicable, we have a problem of not only alienating team members, but making ourselves completely dispensable. So one of the stories I always kind of refer to is, because we set up our program in Houston as an interdisciplinary program, not just a nursing program, it meant that nurses couldn't make assumptions that everyone else in the room would know something. So we would say, "Oh, nursing diagnosis—fine." Well, the nice thing about that in a nursing community is everybody assumes that everybody understands the definition. And, of course, they don't. But because the assumption is there that we understand it, we don't discuss it. But sitting in the back of the room one day, I was listening to a nurse discuss NANDA with a dentist, and what became wonderfully clear in the discussion was, not only did the dentist not have a clue at what this person was talking about, neither did the nurse who was explaining it. And what I like about the interdisciplinary nature, then, is that it causes us to reflect back on our own assumptions, forces us to articulate them, and, again, looking back at Ellis, is that "in," "of," and "for" nursing that we're doing it. If it's for nurses, then it needs to be communicable. If it's

just in nursing, we can assume that it's domain-specific. But the wider context is what is critical as we look at nursing becoming a vantage point to look at the computational knowledge in health care. Kind of weaving a few things together. I know it's a long ways away from the original question, but it, I think, gives a broader view. The definition of informatics, while that is of interest, it really is looking broader at what are we moving toward. And I think informatics, as we look at computational knowledge, the application of computational knowledge—it really needs to focus on that client core, on the client center, and from the unique perspective that nursing has. But nursing cannot do it in isolation. It always has to do that understanding that the knowledge has to be computationally available to other health care providers, and most importantly in the future, to the client or to the patient. So we're going to have to look at doing taxonomic work, conceptual modeling, which merges that client-centric view with the unique vantage point that nurses bring to the situation.

Interviewer: Dr. Turley, briefly describe your career in nursing that led to your involvement in health care informatics.

Jim Turley: Career has been wonderfully interesting. I think I've had the wonderful advantage over the years of being able to be in many places where things were being tried and new things were happening. So, as I said before, I started out in philosophy, literature, moved into nursing from a career perspective, did my bachelor's at Widener University. And Widener was, at that time, shifting from being a diploma school to a university-based. I was there the year we got NLNAC accreditation, which meant the second graduating class. And it was one of the first baccalaureate programs that decided that public health nursing would be the indeed be the focus of the curriculum. So while we did all the pieces we needed for NLNAC accreditation, it was very clearly a public health focus, throughout [unintelligible] community nursing. And Dorothy Stewart, who was the founding Dean, I think was very responsible for that. So that was a very interesting place to be. From that, even though it was public health focus, did a lot of work in the New York area in intensive care, coronary care, back doing hemodialysis when the

hemodialysis machines were the size of washing machines, and did that to pay off student loans, like everybody else did, and before I got back into community nursing. So my master's then was from Case Western with a real focus on community-based nursing. From there, University of Oregon, teaching, went on to University of Oregon for my doctorate in Community Health Education. Taught in Montana, Wyoming, Florida, Texas, where I'm still currently at, and…. Now, the other part of that then was I think the real advantage I had was at Case, where Rozella Schlotfeld, Rosemary Ellis were still there on faculty, and, while they're not as well-known now, they were major, major thinkers in the movement of nursing to a—they didn't call it at that time a knowledge-based science—but that's indeed what it was. It was moving from the practice of nursing into a scientific understanding of the bases for that practice, the formulations of knowledge structures, and, so, within that, I think that was where part of my change started to occur. Then, as I came back out, I had a bit of eclectic research career. Everybody kept saying, "Well, what are you doing? What's your focus?" And I finally had to say, "Well, my focus is on knowledge. It's what nurses know, and how they know it." And I think that realization moved me fairly quickly then into the notion that we needed to have an informatics-based practice. Work there took me to Australia for the development of the Nursing Minimum Data Set for community health nursing in Australia, which was a wonderful project—was able to get that developed, started. Turned it over then to my good friend Charlotte Weaver, who did the second phase of the study there. That became a national standard for the collection of nursing data, and has since been rolled into the National Health Data Set, so the original work that was there now doesn't exist as a separate nursing package, which I would argue is good. It now is part of the integrated data collection for Health Care Australia. And then from that, came back, did the post-doc, and been working in the informatics area ever since.

Interviewer: Jim, did you have an "aha" moment when you realized the value of informatics?

Jim Turley: I don't think there was an "aha." I think it was more of a developmental.

Interviewer: Can you kind of repeat the question [inaudible]?

Jim Turley: Yeah. You know, really thinking about it—is it an "aha" moment or is it a developmental moment? Hmm. Certainly there were some aha's working with Rosemary Ellis and getting to the sense of science and formulation. What was also fun at the time—it's interesting to go back now and think about this, because this was, oh, what, late 70's—I actually, at Case, proposed doing a phenomenological study for dissertation defense. I was in the doctoral program at the time. And I was informed that I could not do it, because it would not be clinically related. I had people from the Philosophy Department already signed up, and I could not get nursing faculty to become part of it. So I actually left Case at the time, went on to do some phenomenological work because of my background in philosophy from the New School in New York, but it was interesting that now, phenomenology is such an integral part of the nursing science. It was considered too risky and too bizarre and not clinically practiced at the time. So, the fact that I couldn't do that was also a defining issue. It meant, to me, that a lot of nurses did not understand the core idea of what knowledge was, at a very basic level. And that's what was fun—to run that against working with Rosemary, who did understand that. And I think that became an evolutionary trend that then—plus an interest in computing that came later, and I saw another model that allowed us to work out some of these same knowledge issues in the computation world—that the merger of those two slowly evolved into the informatics that I, the type of informatics that I see happening now.

Interviewer: Dr. Turley, when did you first consider yourself a health care informatics specialist?

Jim Turley: Oh, when did I become a specialist in informatics? It would probably have been the work in Australia—the development of the Community Nursing Minimum Data Set—because while that was conceptually an interesting idea, and had a talk with Harriet Werley, who had developed the U.S. Nursing Minimum Data Set before I left, the question was, "How do we do a Minimum Data Set for community nursing which, in a different country with a different culture, with a different health care system?" It really required to getting an understanding of both the health care, the culture, and nursing from that Australian perspective. And in doing that, the question was, "How would we do this,

and how could we engage nursing at a very broad level to help create this data set?" And so after a lot of discussion—and I really went, had the luxury there of being able to drive around the country, meet nurses from all over the, every major state, go to the community nursing meetings. And what we decided to do was to create a Delphi. So we actually elicited volunteers from the first meetings, got a core group, and then used a rolling Delphi approach. So, by the end of the study, we had over 350 people responding. And in that, we looked at every possible piece of data that somebody wanted. Then we actually prioritized them, and continued using the Delphi approach all the way through definition. So we would send out three or four definitions for each data element, Delphi-ed them through, just kept a rolling Delphi going, plus a focus—the steering committee acted as a focus group—so we would then refine things through there, go back out. And, apparently, the whole process was successful, because by the time I left in a year's time, I had nothing to do with the data set anymore. It had been…. Ownership of it had been taken by the nurses who had actually developed it, and my job as facilitator disappeared into the product. And I think that's probably the best compliment you could ever have. From informatics' point of view, if the process gets in the way of the product, you've destroyed the product. If the product comes over and completely subsumes the process, and the process disappears, I think that's when you've been successful. Same model we use with information systems. When the information system disappears, and the work flow surfaces, and that's all you see is the work flow, then you have a successful product. So, I think the models of what was learned in Australia then became the founding issues that I took with me into the post-doc in informatics at the University of Minnesota.

Interviewer: Let's talk about your personal aspirations, or your accomplishments. You did talk about this a little bit already. What was the overall vision that guided your work?

Jim Turley: An overall vision guiding of work? That's assuming that there was one. I don't think I ever had an overall vision. Certainly, as I look back on it now, I would never have thought that I'd be involved with the things I've been involved with, nor that the students I've worked with would be involved with what they're involved with currently. I think

as, as nurses and as practitioners, we do an awful lot of opportunistic seeking. We know how to see an option, an opportunity, and we know how to grab it. And I think that's one of the things that makes nurses so successful, is that whole approach to seeing what's there, seeing what can be done with it, and seeing things that other people don't necessarily see are a possibility. So, in that sense, I wouldn't say I went into nursing or went into informatics with the idea of a vision of "this is what I want to do before I retire." But, as I look back, you know, there certainly are some great career moves. The ability to start a program from scratch—that's a once-in-a-career opportunity very few people have the luxury of doing. And I can only thank Doris Ross, who was the Dean of what was, at that time, School of Allied Health, who saw their school closing, and all the baccalaureate programs closing, and she had the insight to say, "Alright we need to come back up as an informatics program." And that was actually the founding of the School of Health Information Sciences in Houston. So that program, in a little over ten years, went from an idea to, I think we're at 21, 22 full-time faculty, which I think makes us the largest dedicated informatics program in the country, possibly globally, and the most diversified, because we are now a full bioinformatics, clinical informatics, and knowledge modeling laboratory. That's there. I think all faculty go back and look at the students they've worked with over the years, and the ones that are going to continue doing work that conceptually we never would've understood anybody doing five, ten years ago, and that becomes, I think, a great career statement. And I think the whole idea of the international movement, looking at the Minimum Data Sets in Australia, watching that move up and become integrated into the health care system—I think the opportunities that we have seen in creating international linkages in the nursing informatics community now—to realize that whatever we do in a country needs to be done with standards and interoperability at the global level. And I'm not sure that even our, our own country, or our own organization, understands yet fully what the impact of that's going to be, because as we look at computational knowledge in health care, people are migrating more, people move more, and you can't have knowledge models terminate at a border. It just doesn't work that way. So as we get more global, I think that what we're on the edge of seeing is that the computational knowledge will bring a global

model of health care. With that, I honestly believe we're going to go back to our roots as community health nurses, seeing that that focus is in the environment, is in the family structure—it is not in the tertiary care centers—and that the future belongs to a distributed community-based knowledge-modeled health care. So I'm, that's kind of a roundabout answer, kind of what I have done, and where I think things are going to go. Hope to be part of that for at least a while yet.

Interviewer: Jim, you've mentioned some of these people already, but could you review some of the people that you've collaborated with to accomplish your goals, and any special experiences with any of them?

Jim Turley: Oh, people I've collaborated with over the years—it's just been such a wonderful group of people that have not been in the same place at the same time and yet have been wonderful mentors. I've talked about Doris Ross most recently at University of Texas – Houston; Rosemary Ellis, Rozella Schlotfeld from Case; Dorothy Stewart, Dean of the first nursing program; certainly the students that I continue to work with and hopefully will continue to write papers with. I think, in addition, Judy Graves. And Judy is one of those kind of wonderful mentors, colleagues that sits in the background, and another person who does things from her own perspective, and I think Judy has a great impact on nursing—she and Sheila Corcoran with the original definition, certainly—but also the fact that Judy was willing to take risks any time to do things the way she saw they needed to be done. And, so I would say that Sheila Corcoran, certainly while I was at Minnesota, did a lot of work together there. Actually it was work we did there together got us to the first Medinfo in Geneva in '92. So I think those are among the critical players, and probably now I would certainly have to say the students that I've been working with and will continue to work with.

Interviewer: Including your achievements or those of others, what do you see as the significant events that have helped shape the field of health care informatics?

Jim Turley: Critical events that have affected informatics. Unfortunately, as is often the case, it's probably been many of the failures that have shown us the critical events. I think any patient, any client that is moved from one area to another only to see their entire health care record disappear is a critical event. I know in my own case, at one point, working with clinicians from one medical school and another medical school that happened to be across the street from each other, that the only way information could be moved from one to the other is if I carried paper from one side of the street to the other. Another time when a surgeon and cardiologist couldn't quite get together, and they wanted two different things—we were able to solve the problem by getting the research nurse from each of them to get together. They created a conference call between the two physicians, who had never spoken to each other, and were able to resolve it. So I think it's the breaking of systems, the breakage in health care, that points out a lot of what we need to do. More recently, this is coming up in doing—we've been developing a lightweight electronic record for work with the street homeless. So we've got a disempowered disenfranchised group. And to create the beginnings of an interoperable system so that these people, no matter where they're encountered on the street, the information about previous encounters goes forward. And another part of that project, almost an "aha" if you will, going back to a previous question, is that the development of large-scale information systems may be completely the wrong way to go. As we were presenting some of this material in Australia a couple years ago, I was speaking with Dr. Enrico Coiera after the meeting, and what Enrico said just brought me up short. He said, "You built something small and light. It works. You did it with a development team of three at zero cost." It was all volunteer. That's very different from the way than the way the business of health care is being built now, and I think Enrico's comment had made me think back that possibly the idea of building small, lightweight pieces, looking to interoperability, and standards to make the information communicate even if the systems don't interdigitate in the same way, may be indeed the right model. And, you know, if we look at a lot of Richard Dawkins' work, that would give us the same notion—that swarms are actually far more efficient than large animals. They have the ability to adapt, to move. And if we start to think about that, the knowledge, the information of health

care, if we look at it more as a swarm than as an articulated system, we might be far better off. And so it's kind of an interesting approach, and a way to rethink what's going on. I think that that's been one of the more recent "aha" moments, to say, "What's going on with systems? Where are we going? Do we really understand what we're doing? Do we understand the full impact of it?" And I think Enrico gave me the insight to say, "This could be a whole different approach. It may be more important than our just, our building our little record for the street homeless."

Interviewer: Now, you've done some research in health care informatics. Can you tell us some of the questions you addressed by this research? Or just tell us a little bit about your research in health care informatics.

Jim Turley: Again, it's been somewhat eclectic—the research over the years. We've looked at Minimum Data Set work—so, what's the key information, how do we define it, how do we make it interdigitate. Looking at knowledge—certainly working with students over the past few years, the doctoral students—we've looked at knowledge integration, the relationship of heterogeneous data sets, and how do we bring knowledge together. Rachel Richardson, one of our students, was, did that work for her dissertation, has become quite well-known as a terminologist in the Rare Disease Network. And those insights of saying, "We don't need to get data the same. We need to figure out how to communicate the data."—that becomes a major theme. Certainly Julie Brixey—looking at her work—in a certain sense the same issue of communication, now from a different point of view, looking at interruptions in the clinical work place, and how the communication of data changes not only within a person's thought, which is the cognitive science aspect to it, but the interpersonal communications, and now the addition of intersystems communication, so it becomes a whole set of computational knowledge issues on these points. Also, Constance Johnson, whose work has now moved—started looking at the data that was in an electronic record. How did nurses see it? How did physicians see it? And we saw that the entire cognitive model that the two professions built was completely different. And it started to raise a number of issues now, again on

communication of data. If nurses were looking at much broader data, but much shallower data, and physicians were looking at much narrower data, but deeper understandings of it, and we were causing both of them to use the same displays on an information system, it means that we're serving neither one properly. So, if we step back, and say, "Alright, what's the data? What's the communication? What's the goal?" then all of these themes come together, because these are cognitive, they're social, they're computational, and creating ways that they work within a societal context is probably the focus of the research over the past couple of years, and I think will continue to be.

Interviewer: When you think back to your first involvement in health care informatics, what were some of the earliest events you recall? You

Jim Turley: Some of the early events. Hmm. Certainly was a lot of the thinking I was doing before that, and then we were at a nursing research conference that Harriet Werley was at, and Harriet was talking about the Minimum Data Set, as Harriet always did, and was mentioning about the opportunity in Australia, so we were actually sitting with her at the time, and my wife leaned over and said, "He'll take the job." And that's, in short, how I ended up in Australia. And it was through Harriet's good auspices. So I think that was one of the first critical events. It was then working through that project that started me into a number of things. I remember a set of presentations with public health nursing in Michigan back around '92, and looking at data for the job versus record-keeping, and getting nurses to start thinking about record-keeping not as just the record of what they're putting down for their own memory, but really a record of what was the client perspective here, what was going on, and what was the data they needed to do their job. And it started people to think a little bit differently about how, what was the record at all, because it wasn't just that summary of client information, but it was a job, job performance, outcomes-based approach. So I think those projects, certainly. The research with students since then has been a real good focus. I've enjoyed it.

Interviewer: Can you tell us about anything happening in the social and political environment that either helped or constrained the development of informatics?

Jim Turley: Does the social environment constrain informatics? I certainly hope so. And that is because if you see that…. What is informatics, again? We'll go back to the question. If it's computational knowledge for the purposes of organizing and delivering care, it is inherently a communications aspect, and I think that's what Coiera has done such a very good job of bringing forward is the whole socio-technical model—that if we try to understand informatics at all, it's inherently socio-technical. So it doesn't matter whether we want to look at the macro level, what's going on in government, whether it's an initiative to bring health care records within ten years, whether it's a funding event in terms of how health care is going to be funded—all of these are critical players and will affect and should affect informatics because, at its core, it is communications- and socially-driven. It's also why we can't take models of health care and drop it into other countries. I think that's the other part that comes from that global perspective is the social construct of health, and the social construct of health care delivery are different in other countries. So, the modeling of health care, and then the modeling of the knowledge in health care is going to adapt to the model of health care, so there won't be a single model. What works in Australia because of a core underlying social value that health belongs to everyone and is built up from that—very different than ours, where our health value, let's face it, based on insurance, is to those who can afford it. And I look at that from a city where we have the highest percentage of uninsured in any place in the U.S. So, I'm in the fourth-largest country, but I've also got 25 to 30 percent uninsured. And the whole nature of informatics has to address health care throughout this set of continua. Now, that makes no sense to a country like Denmark or Sweden where the social value is that everyone has a basic level of health care. So, it's a very interesting situation, but I think it's also a critical one, to understand that all of informatics, because it is revolving around the nature of health and health care, is embedded in the contextual, societal values of that country.

Interviewer: Do you think it was difficult to establish the discipline of health care informatics?

Jim Turley: The notion of whether or not informatics is a discipline I'm not sure is a solved question, and I mean it very seriously. And I'm not sure it should be, for two reasons. One is that informatics, informated practice, needs to percolate throughout our system, so at that level, everyone will be an informaticist. However, that's very different than the people who will develop the new steps, and I'm…. Jack Smith, who's the Dean of our school, often makes a distinction between the tool users and the tool builders, and I think this is an important distinction because in nursing, as for medicine, as for public health, the majority of clinicians will be tool users. They will use it to do their job. And a well-designed tool will disappear into the work flow. A minority of people will be the tool builders, and that means people who understand the knowledge, understand knowledge modeling, the computational processes that are needed to develop the tools. And actually the tools are relatively simple to build compared to understanding the complex computational knowledge modeling, which I think is where there is a unique area for people who could be argued to be a discipline. So I think if there is a discipline, it will be in the sense of tool builders. Unfortunately, I don't think nursing has done itself always a favor, because I don't think we, our programs have been very clear that we need to build tool builders. So I'm not sure that nurses always understand the basics of knowledge modeling, the skill sets that are needed to build knowledge, the technology that's needed to make those computational, and certainly the skills that are needed to make them computationally efficient. So, if there is a discipline, I would say it will come out in the area of the tool builders. Now, the tool users—and that level of informatics, may well disappear in the future, because as it becomes an integrated part of the work flow, it may not be seen as a separate item. And I don't think I would be upset if that part of informatics disappeared, because that would mean that we had built tools that were so good that they were no longer visible, and I think that would be a very great statement if we could ever say we had a tool that was so good it just disappeared. Unfortunately we don't have those yet. So, I think this area of informatics—yes, there will be a set, probably discipline. I would like it to be interdisciplinary from the professional side. But they will be the knowledge modelers, the tool builders of the future, and ideally building

componentry that will interoperate, communicate, and then disappear into the work flow of the delivery of health care.

Interviewer: Do you have some lessons learned that you'd like to pass on?

Jim Turley: The lessons learned. Oh, probably one of the great ones is: Don't do what anybody tells you. I think that's what's important. Back to Dawkins' notion of swarming—I think the outliers are what are going to help us to define the future. If we continue to develop the way we are developing, we know that health care, in our country certainly, will disintegrate. We're at 16% of GDP. We certainly do not have stellar outcomes in any area. We have proven that we can create a health care system that's nonsustainable. Now that we've done that, let's get on with the business of delivering health care. And I think we need to reimagine—literally reimage—our notion of health, let the system that's currently in place disintegrate, and rebuild a whole new system based on a really computationally efficient model of health and health care. And, as an analogy, since analogies are always fun, I think many of the people who are here are of an age when we remember what banking was like—that you walked in with your two dollars as a kid and put it on the counter, and they would take your passbook and run it through this huge machine, and it would enter your two dollars and your little bit of interest. But there was a person there. And the bank was only open from nine until three. And then a great thing happened—the walk-up window came—and they were open until five o'clock. To the point now where people don't go to banks. We have the interesting quandary in Houston that there's now banks being built in all the street corners. Everybody's saying, "What are they going to do with them? Nobody goes to a bank anymore." Because everything's online. It's fully automated. You use your ATM. So that work flow of that business went from a very human-centered person-to-person transaction-based into a completely automated knowledge model-driven approach to the delivery of money movement. While I don't think health care will ever go to the same extent that banking has, that for the walking wounded worried well that are 80 percent of our health care encounters, we can automate much of that process. Now, the technology is there to do that right now—

that's not a problem. The problem is the social responses to what goes on in those encounters is what we'll have to renegotiate, because many of the encounters are done for the permission to get a day off work. If you have a sick day, you can have a day off and get paid for it, but you have to have a certificate of some sort. So much of our health care is really not the delivery of health care—it's the delivery of permissions to do something else. That is a social contract. So it gets back to your earlier question of how does the social context interact with health—wonderful example. If we really trusted people to make these decisions and not need external certification from providers, we wouldn't need much of the infrastructure that we have that we call health care now. And I think what we're going to see is the beginning of a new social contract on what is health and what is health care. And it will be driven, and feasible, because of the computational knowledge modeling. Now, the big question, to me, is: What will nurses bring to this table? How will nurses understand their role in a computational knowledge world? One of the recent papers that came out—we kind of looked at a couple of themes that were going to change health care and change nursing. One is genomic—it's all going to be personalized. The informed patient. The more information people have, the more they will interact differently with clinicians, as well they should. I think the whole notion of 24/7 health care—we've always claimed we're around the clock, but try to get a physician after five o'clock on a Saturday night, and we know there is no such thing as 24/7 health care. But, you know, if you call your hairdresser now and say, "Ah, I would like an appointment," they don't say, "Oh, come to me in three weeks, and by the way, you will come at 2:16, and you will leave by 2:45, and we'll charge you extra for that." The model doesn't work. In a consumer-driven model, we expect to go when we want, at our pleasure, at the price point we want. We don't negotiate that in health care. And I think the fourth point is going to be that, as health care transitions now, we're going to see people paying more and more. They are going to see that the out-of-pocket expenses, whether it's from their own pockets, from a health savings account, they will be paying, and that's going to change their relationship with providers. So I think if we take those four themes together, that will start the revolution in health care. I'm not sure how nursing will have something to sell in that market, and I think that's going to be the

challenge for nursing—to reposition itself as a knowledge provider in a customer-, consumer-driven market, where the consumer really is paying for nursing care, not just part of the room rate. And that's going to create both opportunities and potential problems for nursing in the near future.

[End of recording].

