Karmen Williams: This episode is part of a special collaboration between ACM ByteCast and AMIA: For Your Informatics Podcast, a joint podcast series for the Association of Computing Machinery, the world's largest educational and scientific computing society, and the American Medical Informatics Association, the world's largest medical informatics community.

Sabina Hsueh: In this new series, we talk to women leaders, researchers, practitioners, and innovators who are at the intersection of computing research and practice, to apply AI to healthcare and life science. They share their experiences in their interdisciplinary career paths, the lessons learned for health equity, and their own visions for the future of computing.

Hello and welcome to the ACM AMIA joint podcast series. This joint podcast series is for the interdisciplinary field of medical informatics, where both the practitioners of AI/AML solution builders and stakeholders in the healthcare ecosystem take interest. I am Dr. Sabina Hsueh, with The Association for Computing Machinery podcast series. And co-hosting with me today is Dr. Karmen Williams from For Your Informatics Podcast with the American Medical Informatics Association. We have the pleasure of speaking with our first guest of the series, Dr. Wendy Chapman.

Karmen Williams: Thank you for joining us. Dr. Wendy Chapman is the director of the Centre for Digital Transformation of Health at the University of Melbourne. Her research focuses on developing computer algorithms to understand information typed into electronic medical records, natural language processing of clinical text. She sees incredible opportunities for improving healthcare delivery and individual health if we can harness information to make decision making, improve processes and behavioral change. She enjoys skiing, mountain biking, cooking and visiting dog parks and beaches with her two Huskies. She moved to Melbourne with her husband and youngest son, and looks forward to the time when her older children can visit. Thank you so much again for joining us, Wendy.

Wendy Chapman: Yeah. Thank you for having me.

Sabina Hsueh: Great to have you here, Wendy. As you know, in this new podcast series, we would like to focus a bit more on the career path of people who have been working in the disciplinary areas. And you have been working in the interface between computer science and medicine for a long time. What made you decide to start your career on this path initially? And did anything particular motivate you in the beginning?

Wendy Chapman: Yeah. My story is like a lot of people's stories in this field where there was a lot of wandering and a bit of serendipity. I started graduate school in 1994 and I had a bachelor's degree in linguistics with a minor in Chinese and had been admitted to a PhD program in Chinese literature. And my husband was doing electrical engineering and he decided he wanted to do medical applications. So

he applied to the informatics department at the University of Utah. And when he interviewed there, he met with Peter Haug, who does natural language processing. And he talked with one of the graduate students who was an electrical engineer and he said, it's not rocket science, but the linguistics is killing me. And so Brian told me about this and I thought that might be a really nice field to go into because I can apply my love of language and it's something practical and potentially helpful to the world.

So we moved back to Utah, we were in Wisconsin at the time. School had already started, but my husband's advisor encouraged me to apply. So I applied and they let me in on probation because I had never had biology or physiology. I didn't know how to program computers. And all I did have is I had good GRE scores and I'd had calculus and gotten good grades in calculus. So they let me in on probation. And after the first semester I did well and so they let me keep going. It took me six years to get my PhD. Yeah, I had a lot of classes to take, a lot to learn. And so my motivation was really pretty shallow. I was just really looking for a career and this seemed like something interesting.

Karmen Williams: Thank you. It's always fascinating to hear your story. And then I'm wondering, you already mentioned a few of the interdisciplinary kind of areas you're into. And so were there any challenges that you confronted? And then how did you overcome them?

Wendy Chapman: Yeah. Graduate school was really hard. The courses, for me. Because taking physiology and things that I hadn't had before but the real challenge was learning how to program and because I was in graduate school, but had never taken any programming classes, I had to take undergraduate programming classes, but they didn't get credit for them. I learned to program in C++, and I had a one year old when I started graduate school. And this was back in the days of modems. We had just started using the internet and you couldn't really do what you needed to at home. And so I would go to the computer lab at the university. And one time I took my one year old, I don't remember why I took him, but it was two in the morning and he stretched across my feet sleeping. And I was the only woman in this computer lab with 40 men sitting there working on their computer programs. So that was the hardest thing for me, was learning how to program and there wasn't a clear pathway for people in informatics. And I think there still isn't, in general.

Sabina Hsueh: Yeah. I had a similar experience, Wendy, and it's always fascinating to hear from another woman who has overcome so many barriers to be where she is today. And you have taken up several leadership positions from there in your career path. You have been Director at Utah and most recently at the Center of Digital Transformation of Health at the University of Melbourne. Just wondering, then how did you decide to pursue a leadership role and what led you to your current role?

Wendy Chapman: Yeah, another serendipitous story. So in 2013, the position of Chair of Biomedical Informatics opened up at the University of Utah and that's where I graduated from and I love that department. And so it took me several months to get up the courage to apply and actually a lot of discussions with people and arguments with my husband about, am I really chair material? I was the one saying, I can't do this. I'm too young, it's too early in my career. People will look at me and say, who does she think she is applying for this position? And he's like, you sound so stupid. Come on. You need to at least apply. So I finally got up the courage and applied and I ended up taking the job and it was a real curve pivot for me because I left my research.

I didn't leave it but I had to spend a lot of time on the leadership parts. And so my research time really decreased, but I took it because I wanted to have more impact. And I felt like where I was at in natural language processing was too far away from impact on the patient. And I wasn't a good software engineer where I could really be applying the NLP in real settings and having impact that way. So I decided to go down the leadership role where I could have potentially influence over a broader stage. And so after six years there, we were looking at other opportunities.

I was at AMIA in San Francisco and I went across the street and had lunch with a friend and another colleague came and sat with us and she had just happened to be in the restaurant at the same time. And I told her I was looking around and she said, oh, we have this position in Melbourne that they never filled. And so ultimately I ended up interviewing and we made the big move to come down under.

And what appealed to me was it's a new investment here at the University of Melbourne. They haven't had very much strength in informatics or digital health, and Australia's really behind in a lot of ways. And there are some fabulous pockets of excellence here in informatics and digital help, but in general, the healthcare field is behind. And in fact, the hospitals that we are affiliated with, most of them didn't even have electronic medical records when I moved here. And so four of the main hospitals we work with just installed Epic a year ago. I thought there was a lot of opportunity to take the things that I had learned in the past and bring them to a new place where I could potentially have more impact.

Sabina Hsueh: What a story. This is exactly why we have this joint series to looking to this interdisciplinary area between ACM and AMIA. We want people to see how to make an impact in real world applications. And you are certainly making examples of that. Thank you. And as we also have an international audience here, wondering if there is any other opportunity you see specifically in Asia Pacific after you move there?

Wendy Chapman: At least in Australia, it has a very different funding model for healthcare. And so it's been a big learning curve to figure that out because as we all know, the

funding model really drives the type of innovation that you can put into place or not. And so I think there's a ton of opportunity for better connection and our vision in our center is connected health. That the patient really, when they interact with the healthcare system, they have a more connected journey and there's huge opportunity to improve in that here so that would be one of my main goals.

Sabina Hsueh: Wonderful. You might have just attracted more people to follow in your footsteps. And switching gears a little bit here, I also want to talk to you more about the women leadership program you have been pushing for years.

Wendy Chapman: Yeah, so the Women in AMIA committee has a leadership subcommittee, which you know because you lead that right now or co-lead that. And we thought that there was need for a leadership program to help. And it really stemmed from a lot of our experience where we weren't applying for awards or positions or promotions, because we weren't confident enough that we could do it, just like me with the job at Utah, it's part confidence, it's part skills. There's things that you don't learn as a researcher. To be a leader, you have to understand more about finances and there's more politics and change management and those types of things you don't learn.

And so we wanted to make a program where we could increase the confidence of women, we could increase their competence in those areas that they had less training in, and we could improve their connections with each other and helping encourage each other and give each other advice. So we launched the Women in AMIA leadership program, and it's now in its second year, it has its second cohort, they're about halfway through. And I think it's been really fabulous for a lot of people. We also launched it here in Australia. We had the kickoff two days ago and we have 27 women starting the Women in Digital Health leadership program here.

Karmen Williams: That's wonderful. And as being a part of the second cohort of that leadership program, it's amazing and I am already learning so many great things. And so thinking about that, what would you say are the most pressing issues you're facing in your new role?

Wendy Chapman: The first challenge for me, I think is it's creating these multidisciplinary teams to be effective. And we haven't figured that out yet, how to do that. And this happens with all of us in this field. It's very multidisciplinary and we know that in order to get the outcomes that we want, we need people with computer science expertise, statistics, sociology, psychology, linguistics sometimes, informatics, and bringing those diverse people together to work together can be really challenging. So I think that's my biggest challenge, is figuring out how to work as a team. Another challenge is... I'd say the funding models, really getting a hold on them and understanding them and then being able to innovate within the environment that you're in, because there's so many barriers

Sabina Hsueh: I would like to dive in a little bit more here. When you mentioned the challenge coming from the funding model, is it because it's more driven by the government or is it because you have to go out there to do fundraising a little bit more than what you used to do? Can you elaborate a little bit more on the challenge on this front?

Wendy Chapman: Yep. So they have a mixed system here. There is government funded healthcare, but there's also private healthcare. But the government funded healthcare, the big challenge is that hospitals and acute care are funded by states and primary care is funded by the federal government. And so they have very different models and they don't connect with each other and they're funded in different ways. So it's that fragmentation between primary care and acute care. And you see in the US and in other places, they're starting to have integrated systems, we don't have that here.

Sabina Hsueh: I see. Yeah. So you also have to integrate these different data sources on your side and try to navigate the process of doing all this integration.

Wendy Chapman: And just like when you're collaborating between computer science and medicine, and you see that the funding models for our jobs are so different as faculty, in computer science, they have a nine month contract. The way that they're paid and the way that they're incentivized is different than in medicine. And that makes it hard to work together. And it's similar when the federal government and the state government systems are incentivized differently and it makes it hard to integrate them.

Sabina Hsueh: Right. But to drive patient outcomes, you really need to have them all integrated in order to understand the pictures end to end.

Wendy Chapman: That's right.

Sabina Hsueh: Thanks a lot for sharing. That's certainly a very common problem in this field that we all need to think more about how to tackle. Switching gears back to our career related questions, for our audience here who are early in their career, they would like to know more about what were some of the earlier career moves that you have found useful in hindsight. And now you are here, can you recommend to newcomers in this area who might have background on one side but not on the other side, what would be your advice for them to make impact in a multidisciplinary team?

Wendy Chapman: Yeah, it would be the same for no matter what stage I think. Okay, I would say first say yes. And we're always hearing you need to learn to say no, and that's true. But most of my opportunities came from me saying yes to things that either I didn't really want to do, or I thought I shouldn't be doing, it was the wrong timing, or I thought I couldn't do. And people could see potential in me, leadership potential, that I couldn't see myself. And so they would give me opportunities to lead in certain areas. For example, the AMIA natural language

processing working group. And somebody nominated me to be the chair of that and I never would've thought of doing that.

And I talked to him, he was in France and I said, I don't want to do this. I have no idea how to do this. And he said, oh, it's so easy. You don't really have to do anything. So I'm like, okay. And then I made it, I got elected and I thought, oh, I better do a good job. And so I made it my own thing and went down that path and surprised myself in the things that we were able to accomplish. And I've had so many examples of that, where someone kind of sponsors me and says, I want you to do this and it's going to take more time, and it takes time away from the things that I thought were important and that it's too early in my career, but I did them and they opened up so many new doors. So that'd be my first piece of advice.

And the second piece of advice would be go ahead and pivot. This is more mid-career. Pivoting is scary and you lose a lot. And becoming the chair was really hard for me. And even through the whole six years, I just felt like a novice. When I left UC San Diego as an NLP researcher, I was feeling kind of at the peak of my research career and really confident in that space. And then when I became the chair, I knew nothing about how to do my job. And I was thrown in with all these clinical chairs, chairs of surgery and pathology and medicine and the CEO of the hospital. And there were all these things I didn't know about how healthcare worked and the things that they cared about. And I made a fool of myself a lot.

I remember asking in this meeting with all the chairs, they were looking at spreadsheets and they had bad debt. And I'm like, what's bad debt? And that's when patients don't pay their bills, but these are things that I potentially should have known, but I didn't know. And so just feeling like a novice and it's the same thing coming here. Every time I go into a new role, I feel like I left that comfort and confidence behind, but it opens up new opportunities and I've grown new strengths and been able to do things that I never would've been able to do before.

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So switching gears just a little bit, health equity is an issue that is in the news and in the world today. It is a very important issue that we're trying to relate to the world. So what would you say health equity is to you and then what would be some of the most pressing issues?

Wendy Chapman: I think that we get treated differently when we go to the doctor, depending on our sex, our skin color, our financial situation. And if we really had health equity,

that wouldn't be the case. And sometimes it's explicit, but most of the time, I think it's this implicit bias that we have. And so I think that's a huge issue and it's surfaced now and I think it's clear to people that it's happening, which is really good because that first step is identifying it. A pressing issue I think for us in our field is that as we build machine learning algorithms from the data that we have, that data was collected in a biased way and it represents biased workflows and biased processes and biased decisions. And we're using that to train systems to make decisions in the future. But I think again, that we recognized that's a problem, and so we're addressing it, but we need to be really cognizant not to hard code the biases that exist into our automated systems as well.

Sabina Hsueh: That's also one of the reasons why we started a series to look into the real world application between computer science and medicine. We want to see what's the best practice now. And with regards to the health equity issues, did you see any potential problem here that can be handled by people who are sitting in the middle?

Wendy Chapman: Yeah. I think the application of artificial intelligence in healthcare is a perfect place for these two groups to come together. And there's so much work to be done in terms of getting better data training systems that, like we said, aren't encoding the biases that the system has, but also in creating interpretable machine learning tools so that the developer and the researcher and the clinician can sit together and can look at what's coming out of that machine and talk about it and learn from it and say, oh, I see what's happening. It learned a shortcut here. That's a typical thing. It's trying to see if a patient has COVID on a chest x-ray exam but what it's really seen is that the font of the hospital that have more COVID patients is being recognized and that's what's it's predicting. And so I just think we don't know often what our programs are predicting and having interpretable methods to be able to look at that can help us avoid those types of errors that can be real safety risks.

But they can also help us have conversations with the clinicians about what's happening that can give them insight to help make changes into the algorithms. I think Rich Caruana is one of my favorite researchers, he's at Microsoft Research and he spent two decades working on interpretability and look him up. He has great stories of building tools that if he would've implemented them, could have had grave consequences, and has been working on techniques for that. And then the implementation of AI tools into healthcare in a way that really supports people and fits in the workflow. So I think that's a prime space for our collaboration.

Karmen Williams: Wonderful. As the founder of the Women in AMIA committee and the Women in AMIA leadership program, I'm sure there are many changes that you are proud of. And so what are some of those changes that you have facilitated to make that possible? And are there any new changes you would suggest?

Wendy Chapman: What I'm most proud of with Women in AMIA is professional organizations tend to be really top down. In theory, they're member driven organizations and that's what AMIA aspires to be, but it's really hard to engage membership. And I think what the Women in AMIA committee did is it created this grassroots movement, and we got a bunch of women together and started seeing where are the areas that we can work. And then they got more women to work in those areas. And now there's dozens of women who are working together to do things where they see need. And I just love that bottom up, bringing the things that we care about to the table and then doing them and our unofficial motto is women coming together and getting shit done. And I love that because that's what I'm most proud of. And I don't have any particular areas or changes that I think I would make just to keep it being this grassroots movement, where lots of people are able to be involved.

Sabina Hsueh: And thank you for doing that. A lot of us certainly benefited from what you have started. Our leadership awards subcommittee is one. And I also love the motto, women getting together, to get shit done. This motto has certainly set us up to keep pushing in a grassroots manner. And this podcast series is one of the products out of that as well. And now let's go back to that question, how we can collaborate between ACM and AMIA on health AI. As we know the maturity of infrastructure has helped us to support large scale computing now and the availability of the pretrained model has helped researchers and commercial organization to quickly people their commercializable systems into something they can potentially use to improve patient outcome. What's your take on that? And what did you see as the most important opportunities here?

Wendy Chapman: That's a hard one because I think there hasn't been a lot of AI applied yet, but there's two areas where I think there's a lot of promise and can have huge impact and one, the image recognition to help developing countries. And so being able to have automated systems that can provide feedback about images to clinicians that don't have imaging training or where you don't have a bunch of radiologists to rely on, I think that can have really big impact in the world. And then the second area is identifying patients who have more risk and directing our resources to those patients.

And so I just watched a panel yesterday with Claire Sullivan, who's in Queensland here in Australia, and she was talking about, we still do medicine like it's the 1950s. And every person goes into the doctor regularly and sees the doctor one on one and we don't have enough resources to be doing that model anymore. We need to be identifying the patients who are at risk and putting more resources into them and then supporting people and their health in a less resource intensive way. So those are the areas I think where there's a lot of potential and there are applications that are beginning to be put in place. But I would say that a lot of us think that AI is this solution to so many problems. And I think nine out of 10 times, the problem that you're trying to solve doesn't require AI. And we want to go to the fancy thing and we need to try the simple thing first.

Karmen Williams: That's a very good point. And so thinking about the past decade, and particularly the past few years, it's been transformative for artificial intelligence, or AI, and so not so much in terms of what we can do with the technology as far as what we're doing with it. So do you agree with the statement, if so, why do you think the view of society has changed that made AI possible in health enterprise strategy, but not just being seen as IT projects?

Wendy Chapman: It seems like in our lives, as we see different technologies in our life outside of healthcare, on our phones and all around us, we see the power of it. And then we think, oh, we should be doing that. Why am I not getting that in my healthcare as well? And so I think that's really the power, seeing it around us. There's so many things we can do. And we on the technical side, get really excited about that, but we're doing very little applied artificial intelligence. And an example of that is there is a recent paper in the MIT Technology Review that there were 400 imaging applications for COVID, deep learning imaging applications and 250 decision support AI applications and not a single one of them is being used. And Eric Topol makes that point a lot too. I think that's the huge gap.

Sabina Hsueh: Yeah. Dr. Topol talked about that in the AMIA 2021 Keynote and also the Health AI Real World Strategy Panel. He helped chair with us also with Dr. Suchi Saria, Dr. Marzyeh Ghassemi, Dr. Ziad Obermeyer and Dr. Karandeep Singh. And the consensus now is that evolution is really key to winning confidence and trust when applying codes to clinics. Is there any particular example that you have seen from the past or in your current role that you feel worth mentioning? Can you exemplify for us what would be the best practice of how people should do things here?

Wendy Chapman: Yeah. So this is kind of my passion here at the University of Melbourne and that's that we build something and we test it out and we make sure it works well. And then we want to put it into practice and evaluate it when really we should be thinking about the evaluation from the very beginning. And we need to be thinking about what clinical outcomes we want to have from that and how it's going to fit into the financial system that we're in, who's going to pay for it. And we need to think about those things from the very beginning, so that we design what we're doing to potentially be successful. And so we're developing something called the digital health Validitron. And this is a way to take innovators through these steps of thinking through those questions from the very beginning.

Things like who's going to pay for it, in order to go and try to get insurance to reimburse it, or the federal government to pay for it, whoever you want to pay for it, you need to demonstrate things to them about the comparators and the outcomes. But what we do is we build something and then we go say, oh, let's try to get this reimbursed. And here, we did this evaluation, look how well it does. And they say, that's not what I want to know. So we need to have them

sitting with us from the very beginning, helping, and then we design what we do differently to make sure that we answer the right questions in the end.

And so in The Validitron, we have a simulated digital ecosystem where we have a simulated version of Epic, a simulated telehealth client, all the tools that you need to accomplish what you're trying to do with this new intervention in a simulated place, so that you can start to build the connections for the data flow, the FHIR connections, the interoperability, work on the user interfaces, bring users to the table to test out all the small components and validate them as you go along. And then we have physical space that's being built that will have a GP office, a hospital room, and a patient living room, and the one way mirrors so that you can look in and do experiments with real people to make sure it fits into the workflow. We think that if you're thinking about all the things that the stakeholders care about from the beginning and designing them in and co-designing and validating as you go, you're much more likely to be able to embed this into real practice and have it be adopted.

Sabina Hsueh: This is a wonderful and very comprehensive framework. Now let's take a moment to think about scalability. Say that we establish the right workflow for one system, how do we then go beyond from one system to multiple systems eventually across the nation? How do we reinforce the same sets of standards for health AI applications and evaluations? It will be more like nutrition fact labels for the foods perhaps? Can you share some insights with what you think as a reasonable next step here?

Wendy Chapman: Yeah, I think that's always going to be a hard problem, no matter what we do, because when you are trying to scale something or bring it to a new place, it has all kinds of new workflows, new cultural issues, new data and technology systems. So there's always going to need to be customization. But if we are building on standards, then you have a foundation to be able to just now customize, rather than having to start from scratch and do all the work over again.

Sabina Hsueh: Did you see this more as a government's role to make regulations? Or is it something that might come more a bottom up out approach that people start choosing their preferred standards and merge at some point?

Wendy Chapman: I think that's a really hard question, but I want to quote Chuck Friedman. So he was at the office of the national coordinator and we had him come give a talk at Utah, on learning health systems of course, and had dinner with him. And he said his biggest lesson in government is that you can't do things top down, it doesn't work. And I think the same lesson with our Women in AMIA committee, you can't just force people or say, here's what you're going to use. But at the same time, you need to support the grassroots movements to be able to be scalable. And I think that there's a place for legislation.

So the 21st Century Cures Act, is that what it's called? And how you can't do information blocking now, that legislation is going to have huge power to increase the use of standards and then create that connected journey for patients. And so legislation like that, not you have to use X and Y and Z, and here's what X and Y and Z need to look like and you have to use what we built and only we can build it. Not that, but just saying you can't be blocking information and maybe a few other details, and then having government funding to support the bottom up groups to develop out the standards that let the market forces choose which ones are working. And so SMART on FHIR is becoming a really powerful standard. And it's got this kind of bottom up and top down working together.

Karmen Williams: Thank you so much, Wendy. And coming to kind of the end of this particular episode, is there anything that the two strongest professional societies, AMIA and ACM can partner up to help?

Wendy Chapman: Yeah. I always think that having one particular thing that you work on together is the way to do it, because there's just so many areas. But if we were to pick something like interpretability of AI or usability of AI systems in healthcare, some area like that and say, let's have this as a theme for the next five years and having that focus can open up a lot of opportunities to make progress together that you wouldn't have if you didn't create that focus. So that would be my suggestion.

Sabina Hsueh: Thank you so much, Wendy. Did you have any parting words for our audience here?

Wendy Chapman: I would say that I'm very sensitive when we're admitting students into programs about their backgrounds. And we can be really quick to judge, oh, they don't have a background in medicine or they don't have the computer science background and they don't know exactly what they want out of their career. And there are people like me who have no idea what I wanted out of my career, had this very different background and are able to come and make a contribution. And so when I see people with passion that come from other fields like music or philosophy, and if they're smart and they're interesting and they're interested, that we should give them a chance. And then on the other side of that, all of us, when we come to these multidisciplinary collaborations, we're going to feel inadequate because we don't know all of the parts that are needed to know to complete the project. But I want everyone to feel like what they bring to the table is needed. All different types of expertise are needed to feel confident in being part of a multidisciplinary field.

Sabina Hsueh: Thank you for listening to today's episode. ACM ByteCast is a production of the Association for Computing Machinery's practitioners board and AMIA's For Your Informatics is a production of Women in AMIA. To learn more about ACM, visit acm.org and to learn more about AMIA, visit amia.org.

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