

# Artificial Intelligence: Augmenting Radiology for Precision Diagnosis

by Claudette Lew

As one of the most popular buzzwords making the rounds in today's healthcare circles, "precision medicine" refers to a time and place where conditions and diseases can be precisely diagnosed and precisely treated with therapies that are predictively effective.

We're not quite there yet, says Sham Sokka, PhD, but we are headed in the right direction.

Dr. Sokka, Global Marketing and Ventures Leader in Precision Diagnosis for Philips Healthcare, describes precision diagnosis as one of the most fundamental components of precision medicine. Philip's strategy of augmenting the role of the radiologist, he says, will help achieve important patient care milestones along their pathway.

## Making a plan

Though often the slowest to adopt significant change, the healthcare industry seems increasingly willing to leverage artificial intelligence (AI) to improve data analysis, help streamline clinical and administrative workflows, and provide insights through clinical decision support. This is especially apparent in radiology where, with the support of Philips' development of its own AI embedded within tools, workflows, operations, and clinical decisions, clinical care can be redesigned and/or enhanced, ultimately promoting progress toward realizing the promise of precision medicine. AI leverages Philips' deep clinical and operational knowledge within Radiology to apply various technologies to assist physicians with contextual insights embedded within their workflows.

Precision diagnosis combines diagnostic tools, procedures, and processes, and optimally



*Philips delivers AI-enabled solutions with contextually-aware toolsets for the radiologist.*

integrates the data generated by them so physicians have the right information at the right place and at the right time, Dr. Sokka says.

"Philips is going to help define and shape precision diagnosis, because we're uniquely positioned to bring the necessary technologies together for precision medicine," he explains.

The first and most important step toward achieving precision diagnosis and precision medicine, Dr. Sokka says, is getting the diagnostics right in the most cost-effective way possible. The second step is integrating all the data, while the last step is to use the data to propose and select the most appropriate therapy based on the context.

"The path of precision medicine guides patients from making sure they come prepared for the initial study, all the way through to suggesting the optimal therapy for them based on their diagnostic profiles," Dr. Sokka says.

## One step at a time

At each step, AI can be implemented in ways that support the role of the radiologist.

AI, says Dr. Sokka, is fundamentally about making someone's life easier. "It's about making patients' lives easier because they get a text message that tells how to prepare for their specific exams. For the technologists, it's about using technology to predict no-shows, and to automate their schedules to minimize risk so they can have a better working experience that day. It's also for radiologists so they can get the data aggregated and presented optimally so that a more informed and faster diagnosis can be achieved. At Philips, our philosophy is to create an ecosystem of AI innovation at each step in this connected chain."

### Standardizing the data

Dr. Sokka believes that, as an industry, healthcare is still using AI to build solutions for the "first phase" of care, such as using AI to help devise better schedules, recommend the right tests, or suggest potential findings from the imaging record.

"If I have three MRI scanners, what's the best way to schedule so that I can maximize the efficiency on each scanner? When I'm reading an imaging study or a pathology study, can I use AI to better aggregate the most relevant patient information?" he says by way of providing examples.

One reason the healthcare industry hasn't moved beyond this phase, Dr. Sokka says, is because of widespread challenges to data integration. He stressed that achieving data standardization is a prerequisite to moving forward.

"Most of the data that we use in the healthcare enterprise is not clean; and standards can only address part of the issue," he explains. "One institution may record everything around the patient episode, including any missed appointments, details about scheduling, their complete health record, and all their prior imaging studies. Another site may not have any of those data points recorded and the record around the patient can be much more ambiguous."

This lack of data standardization, resulting in the potential for an abundance of partial and inaccurate information in the medical record, is

a major stumbling block to data integration, Dr. Sokka says, noting that, "the inability to reconcile data from multiple institutions with a standard algorithm makes it extremely challenging to incorporate intelligent solutions that rely on this underlying data."

### Addressing the challenges

Philips is working with hospital providers and professional societies such as the American College of Radiology (ACR) to find ways to move the industry to open standards for recording and easily moving these types of data from one organization to another.

A second initiative is to create a standard way of reporting similar data from one hospital to the other. A good example is the variation in imaging study acquisitions from one institution to another. "In one place," Dr. Sokka says, "an imaging study might take five minutes and in another, it takes 30 minutes. In actuality, the study that took five minutes might be more accurate and have better diagnostic value than the one that took 30 minutes. Why is that?"

He explains that metadata, which in this case consists of all the data points recorded around an event such as an imaging study, is not recorded in a standard way. Recording information such as which protocols were used, who selected the study, how long the elements of each study took, and the study outcomes, will make a big difference.

"Going forward, if our goal is to get the right imaging procedure that first time, I need all of that data to figure out why patient information, in one place, was captured correctly and why, in another, it was not, in order for AI to learn from that and then offer predictive information."

Industry groups are working to help bring data standards into place; on the clinical side, meanwhile, groups are trying to set up standard workflows.

"This work is a prerequisite for AI to get to the next level," Dr. Sokka says. "What we're seeing today in most cases is anecdotal evidence of AI being helpful, but one of the reasons we're not able to apply its principles more



*At Philips, our philosophy is to create an ecosystem of AI innovation at each step in this connected chain.*

**Sham Sokka, PhD**  
Global Marketing and  
Ventures Leader in  
Precision Diagnosis  
Philips Healthcare

broadly is because we're not yet at the level of standardization and cleanliness on the data side to be effective.

"Right now, if I have 1,000 patients, 900 patients will lack key data elements in their record. One patient might have ten data points and another might have all 25 though they share the same ailment. If I have this sparse amount of data on which to build a model of an AI predictor for the right study, I can't do it effectively," Dr. Sokka says.

### AI right now

Dr. Sokka says AI has a better chance of success in places where the data is already standardized. Ironically, many examples of data standardization on the imaging side are already in place because of the industry's use of the DICOM standard. Many AI projects are being pursued in image analysis but have not yet been implemented into clinical workflows. There is risk associated with using predictive data analytics with patients' health. Bottom line: There are consequences if the AI is wrong.

As a result, AI adoption is more likely to be seen on the practice and administrative side of healthcare in the near future. Great opportunities exist for advancement. Even if clinical AI is at the level of providing more insights based on the data, administrative AI may take the next step toward more predictive modelling. But it all starts with having the right tools built into an ecosystem available to the hospital.

"One of our big philosophies at Philips is to create an ecosystem of AI innovation, and put people at the center of it," Dr. Sokka explains. "That can be an AI innovation that Philips developed, or an integrated AI from outside of Philips. We're integrating external AI developments across our solutions to create a better experience for the patient and the provider."

Philips recently announced its acquisition of Medumo, a Boston-based start-up that has developed a platform to help healthcare providers deliver patient-engagement and education services related to diagnostic, interventional, or therapeutic procedures.

"Medumo is a great example of a company that delivers AI and information to patients as they're preparing for their imaging studies," Dr. Sokka says. "Medumo's business model was initially based on preparing patients for colonoscopy because typically 10 to 15 percent of patients would come to the colonoscopy without their bowels optimally prepared. It's really about the same concept, getting the patient informed so that you can have a confident diagnosis."

Philips plans to work within the Medumo platform to engage patients for other types of procedures, such as diagnostic imaging, biopsy preparation, cardiology cath-lab preparation, and other situations that can directly engage patients in their diagnostic journey.

### Collaborative AI

In addition to incorporating AI from external sources, Philips is working continuously to develop AI solutions with its own customers. Some of Philips' innovations are built so that users can create their own AI algorithms to integrate into their workflow.

"Philips IntelliSpace Discovery<sup>1</sup> is a solution that allows customers to discover different AI techniques from their own images and build them into their own clinical production environment," explains Dr. Sokka. "We're working with customers on how to standardize the data, get it properly prepared and conditioned, and then we can change the workflows where we need to collect additional data and develop new AI algorithms together."

Artificial Intelligence, he says, is not meant to replace the radiologist; in fact, radiologists' expertise is at the heart of what is needed to develop AI and to enhance the value of imaging.

"As a company that is really taking AI forward," Dr. Sokka concludes. "Philips knows it's not just about providing the new technology, [but] about providing the full service; taking it all the way through to the workflow, and always keeping the people at the center of our innovations."

<sup>1</sup>IntelliSpace Discovery is for research use only and cannot be used for patient diagnosis or treatment selection.