The two sides of sharing health data

Data sharing is key to pushing the frontiers of what is possible in healthcare and can lead to saving more lives.

Covid-19 is said to have accelerated technology by five years and perhaps, no industry has been more impacted than that of healthcare. Vaccines that normally took 10 years to develop have been made available in under a year by leveraging technology. But this only happened when the pressure was on.

Data sharing is key to pushing the frontiers of what is possible in healthcare. More data can lead to faster and more accurate diagnoses, which can ease suffering or save lives.

However, many challenges remain for analyzing, transferring and sharing that data in a secure fashion. We discussed some of these opportunities and challenges with experts from the Making Sense team.

IoT

The quarantines and social distancing measures imposed by Covid-19 boosted the popularity of telemedicine and also shed more light on the importance of IoT devices.

The use of wearables was a trend that began before the pandemic but whose use have become more relevant than ever.

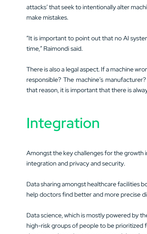
Wearables like smart watches have increasingly better data processing capacity and can provide valuable information for preventative care and treatment.

For example, Apple Watch can detect arrhythmias, or irregular heart rhythms, that otherwise would have gone unnoticed.

In the area of computer architecture, Making Sense has built "thin clients", which are low-performance user-facing systems that, with cloud access, can collect data from a remote connection and shift most of the processing work and software execution from the user location to a data center.

"[Thin clients] have several advantages. On one hand they give us greater control over an application. On the other hand, that gives us the control to innovate. With access to all that data we can detect areas for improvement," said Juan Diego Raimondi, Making Sense Software Solutions Architect and Head of Sata Science.

Making Sense has been using thin clients in a vast variety of projects and industries to ensure that the security and control over the systems is maximized for their customers.



"It is important health care centers avoid creating silos in order to find a quick solution to a problem. They have to think about scaling and making sure their systems are future proof"

Juan Diego Raimondi
Software Architect at Making Sense

Edge computer

Edge computing, which brings computation closer to where the data is collected, promises to revolutionize IoT. This technology can speed up critical response times and save bandwidth by selecting which data is relevant to send to a central data center and which can be discarded.

"We're going to reach a point where devices will have much greater processing power. They are going to be able to make predictions based on data being received from the body," said Raimondi.

Like everything there are advantages and disadvantages with edge computing.

The fact the data is processed on the device and not sent to a central server, reduces the security risk of the data being intercepted.

However, the level of processing that can be done at the edge is limited. And critical updates to firmware tend to take longer to arrive during which time these devices can be exposed to security threats.

Computer vision

One emerging area of artificial intelligence is computer vision, a field that trains computers to interpret and understand the visual world from digital images. Through deep learning, machines can accurately identify and classify objects and react to what they "see."

When applied to healthcare, computer vision can help doctors in checking scans for benign or malignant cancer growths, for example. The technology learns patterns and can process large quantities of data with increasing accuracy.

The debate, however, is to what extent we can depend on a machine to make a life-or-death decision. Moreover, there are new security threats such as 'adversarial attacks' that seek to intentionally alter machine learning model inputs to cause them to make mistakes.

"It is important to point out that no AI system can ever be 100% accurate, 100% of the time," Raimondi said.

There is also a legal aspect. If a machine wrongly diagnoses a patient, who is held legally responsible? The machine's manufacturer? The healthcare center? The doctor? For that reason, it is important that there is always a human element present.

Integration

Amongst the key challenges for the growth in the use of data in healthcare are systems integration and privacy and security.

Data sharing amongst healthcare facilities both within a country and internationally, can help doctors find better and more precise diagnoses.

Data science, which is mostly powered by the data made available, was used to identify high-risk groups of people to be prioritized for receiving the Covid-19 vaccine, beyond the groups based on age or essential workers.

There are technical challenges to data integration. Information needs to be transmitted in standardized formats that can be shared.

But many health care centers still use legacy technologies and store information in silos where data cannot be shared or integrated. That is a major future challenge, according to Raimondi.

"It is important health care centers avoid creating silos in order to find a quick solution to a problem. They have to think about scaling and making sure their systems are future proof," he said.

Security & privacy

A second, and perhaps more complex, challenge is privacy and security. How to maintain privacy while also sharing data for the benefit of the patient?

And what is more, how to secure data while at the same time making it easy to access?

"This is a constant issue of debate. The easier a system is to use and the fewer obstacles you have for accessing data usually means it is less secure. The challenge is to find the right balance to make data accessible but also highly secure."

One common solution is to replace the use of passwords for other means of authentication like tokens, which have no extrinsic or exploitable value as well as a time limit for their use.

Blockchain

Blockchain is an emerging technology that is best known for its use with crypto currencies, but is increasingly being applied to other industries like healthcare.

It can provide an immutable, digital audit trail of transactions verifying the integrity of data, so is seen as very secure and transparent.

However, it does have its limitations, which are always related to human errors, says Raimondi. The data is only as reliable as the person that inputs it.

International protocols

According to Raimondi, the introduction of international protocols, standards for data sharing and greater interconnection between healthcare systems will help drive the use of data in the healthcare industry to the greater benefit of the world.

"It showed we can do things faster. That we need international standards and that any delays in doing this will only hurt the people".

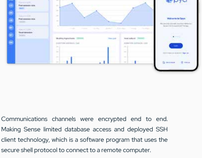
"The Covid-19 tragedy forced us to improve a lot of things, particularly communication between countries and cooperation on healthcare matters, which has been a sort of silver lining amongst all of the terrible things that have happened".

Making Sense success cases

Integration challenge with a healthcare insurance company

Integration of different data sets and regulatory compliance on data privacy were among the principal challenges Making Sense faced when working with a health insurance company that provides consultation and plan administration for students of US colleges and universities.

"The principal challenges we had were related to complying with regulations like PPI, PII (personally identifiable information) and HIPAA (Health Insurance Portability and Accountability Act). This had to do not only with data bases but also with APIs and integrating files with carriers and inputting files from the colleges," commented Mariano Jurich, Making Sense's Project Manager for this project.



Opya – Autism clinic

Data privacy was also a major component when working with another Making Sense client, Opya, an Autism clinic that provides personalized therapy services through connected apps to children with autism spectrum disorder (ASD).

Making Sense set out to create a system of integrated applications to enable parents, therapists and clinicians to communicate efficiently, faster and easier.

Solutions had to be compliant with the Health Insurance Portability and Accountability Act (HIPAA), which stipulates how personally identifiable information maintained by healthcare and healthcare insurance industries should be protected from fraud and theft.

According to Opya project manager Rubén Lunda, Making Sense had limited access to the areas where the patients were treated. And a system of permissions was implemented where individuals had access only to specific information they were entitled access to.

Communications channels were encrypted end to end. Making Sense limited database access and deployed SSH client technology, which is a software program that uses the secure shell protocol to connect to a remote computer.

Making Sense had no access to any information that could reveal the identity of the patient.

"The names of cases of patients were encoded so that none of the patients' data could be viewed," Lunda said. Daniel Gesik, technical Leader on the Opya project added, "I think the biggest overhead was having to be constantly aware of not letting any information escape because the slightest error or oversight could potentially be catastrophic for the project...it required an additional level of energy to always be extra careful."

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