

LHS Platforms Workshop 10/06/20

Platforms in LHS Workshop	
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The Mayo Clinic Case Study

The Mayo Clinic have created a 10-year Platform Strategic and Operating Plan. Mayo gives all new joiners a booklet detailing its values and culture. It outlines how they have always been innovative. They arguably invented the patient record in 1907 and created a network of pneumatic tubes, so that the record could follow the patient as they moved through the clinic.

They aim to transform healthcare by 2030. That would require:

- Technology components
- Business processes
- People

They needed a platform strategy to enable this. Internal consultation identified the following themes:

- We want to do analytics on all the data (digital and otherwise) generated by the clinic
- Needs to be done ethically
- With consent – GDPR and regulatory change over time has prompted them to develop a much more explicit consent system

Data Platform

They developed the Clinical Data Analytics Platform:

- 30 petabytes of historical EHR data
- 30 petabytes of imaging data
- 25 petabytes of histology data
- Genomes
- Microbiomes
- Etc.

Building scalable storage and compute for this couldn't be done on local servers. They needed to partner with a large cloud service provider and choose Google. Mayo became the lighthouse site for much of Google healthcare. They created a secure tenancy on Google cloud. Google does not have access to the data, but does provide data for analytics, metadata characterisation, search, etc.

They needed to de-identify all historical data and put it on the cloud – challenging for people with rare diseases. Unstructured data is even harder. They partnered with Inference to create a next generation de-id system based on looking at denominators of characteristics. Worked with the office of civil rights to determine the right bin size for de-id. They agreed on 10 people.

They built FIHR based interfaces to query the data, then created sub-tenancies on the cloud, where innovators could be given access to the de-id data within a controlled environment. They can export the insights, but not the data. This is a scalable approach. This is being used by innovators to generate typical care pathways, new triage systems, etc.

Virtual Care

What platform components do you need to deliver care at a distance?

- Store and forward (Asynchronous) – Take picture, send, get result.
- Ambulatory care – Video consultations.
- Acute care – Delivered in the home setting. Partnered with Medically Home, who had spent 8 years establishing what was needed to make home care safe. Continuous telemetry such as HR, BP, SATs, urine output, weight. Monitored by algorithms and command centre. Kaiser Permanente partnered with Mayo in response to Covid, creating virtual wards for high acuity care. CHS, COPD, etc. Early indications are that patients like it.
- Reusable modules.

Remote Diagnostic and Management Platform

Collect data, route it, perform an action, return the action.

Many departments at Mayo have AI algorithms that need to connect to varied data sources and report back. Radiation Oncology – needs an expert medical physicist to work out the regime for each patient. There is large quality variation. Mayo has published work, showing that its outcomes are better than most, so they built a system, with partners, to ingest DICOM objects (CT, MRI, etc) from any other provider and return a treatment plan. Planning to ingest Fitbit, Apple Watch, etc. data. They have already trialled ingesting phone activity data for changes suggestive of anxiety and depression – this identified large increases among university students, during covid. They then look to link them to interventions, including Apps.

These three platform building blocks allow departments to build their own use cases.

Epic has agreed to work with Mayo Clinic on a search function, providing the power of a Google search within the EHR.

Care Navigator system to allow previous patients to help new patients understand what their journey might look like. Consented search – Patients will be able to give consent to temporary access to their longitudinal record, so that google can provide a more personalised result.

AI Factory – there are many ideas for new AI systems, but limited development capacity. Now clinicians can bring their ideas and have access to the tools to build algorithms themselves.

80% of Healthcare Organisations in London are now sharing data at the point of care – inspired by the earlier work in Boston. Now trying to implement the data layer. 4.5m Primary Care Patients. Question now is how to help people with questions actually make use of the data? This is a gap:

- Mayo Clinic Data Analytics Platform
 - o Giving data directly to those with the questions doesn't generally work. You need to understand the nature of the underlying data (otherwise, garbage in garbage out).
 - o Data provenance
 - o Data Quality
 - o What questions can you answer?
 - o For commercial partners, Inference looks at the question and decides whether the data is sufficient to answer the question. Their tools and data scientists help the commercial partner to navigate the question.
 - o Mayo Clinic have a covid czar, internally, who receives all requests from within the clinic and acts as a navigator
- The Mayo Platform Team spend a lot of time meeting all levels within the organisation, explaining to them what they could do with the data. It requires a cultural transformation into platform thinking, so that you don't lose the staff.
- The AI factory is another approach.

The platform concept will eventually generate a net operating income, to support the clinic's work, but will require upfront investment. A lot of investment is in kind from partners.

How can smaller, less prestigious providers implement platform thinking. How can we commoditise this, to avoid the need for huge capital expenditure?

- Smaller providers will be able to subscribe to the platform products that larger providers create. They can contribute and consume products and contribute data.
- Sometimes Mayo will be the vendor, sometimes it could be a large IT company.
- Many small providers are struggling to survive and need a new operating model. This could help.
- A more data fluid, federated model
- Covid19 has accelerated changes in the industry.
- Mayo went from 50 virtual clinics to 7000, within 8 weeks. There have been helpful reimbursement changes to bring parity with face 2 face.

What can they do this year/next year:

- Mayo has been willing to disrupt the status quo.
- Ask, what experience would the patient like their journey to be?
- Covid has radically changed things.
- Ask, what partners do you need?
- You don't need a super-sophisticated IT department, you do need the vision.

Some organisations manage the digital implementation but then fail to realise change on the ground. It requires a multimodal change involving workforce, training, buildings, facilities, etc. The whole organisation needs to be tuned to business transformation. How do we close the circle?

- Technology is rarely the problem.
- Business process redesign and how platform approach helps:
 - o Mayo Clinic Lab is high quality/high throughput
 - o Needed to scale up Covid testing
 - o 4000 hospitals connected to the lab
 - o What if we partnered with other organisations that have lab capacity?
 - o Hospital orders test from Mayo, who then send it to another lab and send back the result.
 - o Mayo created a federated lab. The platform was the plumbing. Created virtual capacity.
- Get the business transformation and the workflow, then retrofit it with the technology.

AI and Machine Learning is a buzz word, but people often don't understand where it is useful and where it isn't. Mayo established a Centre for Excellence in AI, where clinicians can meet experts and learn what is feasible and how they can get involved. This can help to democratise some of these capabilities:

- Much of the work is about process improvement, patient flows, etc. rather than the high profile covid-cure.

Paying patients for data:

- Their data helps to generate value, the value doesn't go to an individual, but is put back into developing better care.
- Nebula Genomics allows you to contribute data and receive bitcoin when it is used. The administrative complexity would be huge.
- Mayo Clinic Staff are writing an article on this for NEJM (is this available yet?).
- A deliberative democracy project in London is informing policy – people are more anxious about commercial uses of data. People asked how the value could be returned to patients (to be published on 30th June).
- Perhaps Cambridge Analytica, etc. have awakened this contentious area.

For a provider who wants to develop a platform strategy, but has a lot of legacy systems in place, how can they make sense of what they have, what they need to add/remove:

- There are multiple ways to take a transactional system (EHR) and turn it into knowledge.
 - o EHR is a legacy system
 - o You can manually copy/extract data from the EHR onto an analytics platform.
 - o You can use a script to take data from the local EHR and create a numerator and denominator which is then reported for aggregation. E.g. is a particular treatment effective? Doesn't require any data science expertise at the hospital level.

UK Case Studies

We need a system that breaks free of the organisational silos and brings data together at the patient level and is available for other uses (research, third party apps), in real time, easily accessible (FHIR, CSV, etc.). Like the data layer that London is developing at a regional level. NHS Digital has such data available at national level.

Funding is more restricted in the UK.

The tools and infrastructure required to deploy the systems discussed are widely available – the tools have become commoditised before they have achieved widespread adoption. Cultural transformation, de-id, consent, etc. are often harder.

Important for the UK to push EHR vendors towards data fluidity, in the way that the Mayo Clinic has managed to.

Important to have a platform for data analytics and hypothesis testing.

The UK must find a way to do it more economically, given the lower health spend and the current economic situation.

Partnerships with industry are really important. How do we achieve this in the UK:

- Negative publicity around the Google – Royal Free partnership made it more difficult for other players and highlighted the importance of transparency.
- Creating Collaboration Platforms that are open by design, to avoid vendor lock in.
- Create a situation where the value flows back to the organisation and patients.
- Aim for long term relationships. Often NHS organisations come with a clear project that they are working up. They should also consider collaborations with industry where they aren't quite sure what their next move is, so that they can become thinking partners. They can often work backwards from business outcomes.

UK investment in digital maturity has been low over the medium to long term. All of our organisations do not have a base level of maturity. Our clinical and admin staff do not collect data to a standardised level. This is partially driven by reimbursement.

UK has a lot of governance overhead in terms of how we spend money and how we share data. This may be less within a large US integrated provider. We are earlier in the process of developing Integrated Care Systems.

The UK takes less risk commercially and in our perception of the public view of data sharing.

When we think of data acquisition, we think of staff typing data in. We need to move to more data flowing from the patient. This could give us a richer data set than we get from legacy systems. There are examples from remote telemonitoring, temperature, pulse, single lead ECG, spirometry, symptoms, etc. particularly during Covid. This might be a sign of how

healthcare is developing, to put the patient, rather than the hospital or clinic at the centre of healthcare. We will have much clearer data about behaviour, etc.

The NHS Digital Data Services Platform is reaching a level of maturity where partners can work together on a trusted research environment. We have done this for Covid. This platform approach allows us to keep more data within the organisation.

QCommunity – Network of 3500 people working on QI. Individuals from frontline, policy, management, etc. QCommunity allows them to come together, collaborate, share knowledge and enhance skills, through events, site visits (including other industries), Special Interest Groups, learning resources, website, etc.

What is a platform, beyond technical:

- A set of systems that work together to achieve something
- Must cover the full enterprise
- Mixed success at implementing platforms at a cross organisational level
- Don't think of platforms in terms of anatomy. Think physiology. Think about the impact of a platform.
- A linked view of the world, centred on citizens, that gives us a view on the inputs, processes and outcomes of care.
- Presents an opportunity for actionable insights that drive change.
- Verbs – Doing things – Conversations with the CEO, CFO, not just technical.

The UK has options about who hosts platforms:

- NHSD
- LHCREs
- Providers
- Universities
- Private sector
- We can have a mix of hosts.
- Different scales will be appropriate in different sections. For example, individuals like data for direct care to be kept locally. Data for research will be different.

Public access to their own data:

- Should they be able to download their data
- Should they be able to give it or sell it to third parties
 - o May need more patient education
 - o PatientsLikeMe
 - o Not many examples of third parties helping patients to do things with their healthcare data
 - o There are no markets for patients to trade their own data
- What about those who don't have access to digital – inequality, digital inclusion
 - o It must drive improvements in outcomes for everyone.
- The profile of digital healthcare has been increased during Covid, but can that be sustained?