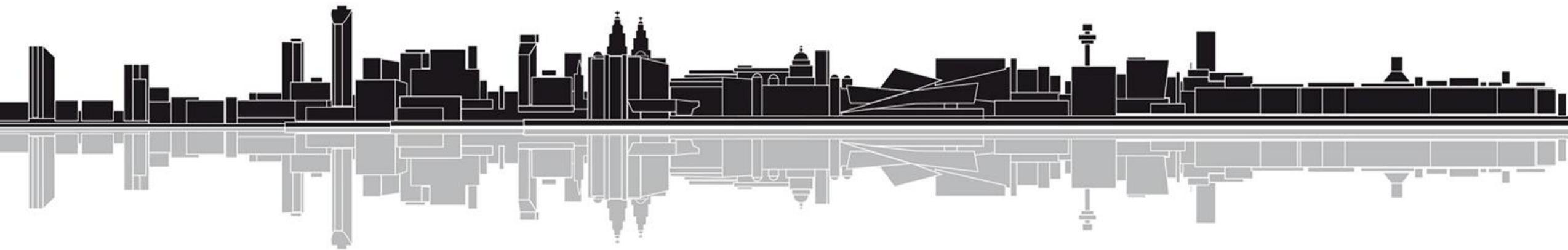
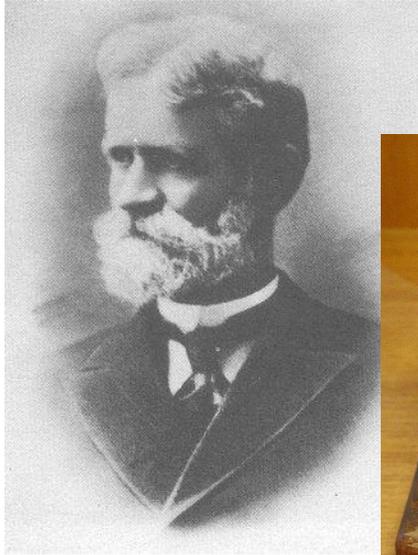


# Using Health Data to Transform Care

*Dr Dennis F Kehoe, AIMES Presentation,*  
MUN Conference September 2019



In 1878 Almon Brown Strowger had a problem in La Porte, Indiana....



Undertaker



Strowger ATE



J&G Crosland Taylor  
Helsby Green Dot



Strowger Works  
Liverpool 1930



140 years later Dr Simon Eccles has a problem in healthcare....

*“Retailing AI is now so sophisticated your order is shipped prior to you actually ordering it.....”*



CCIO NHS  
England



UK's largest  
Retailer

UK's largest  
Organisation



*“Every week, Monday takes the NHS by surprise.....”*

AIMES, Kilby House  
Liverpool 2019



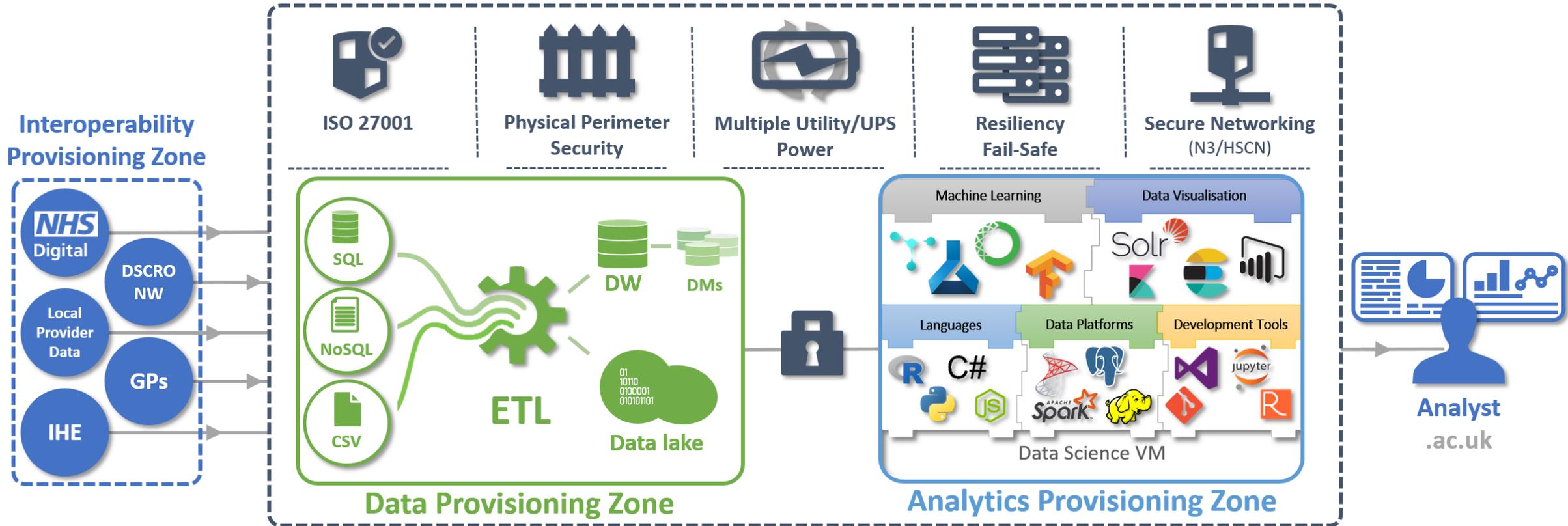
# Needs and challenges addressed by AI:



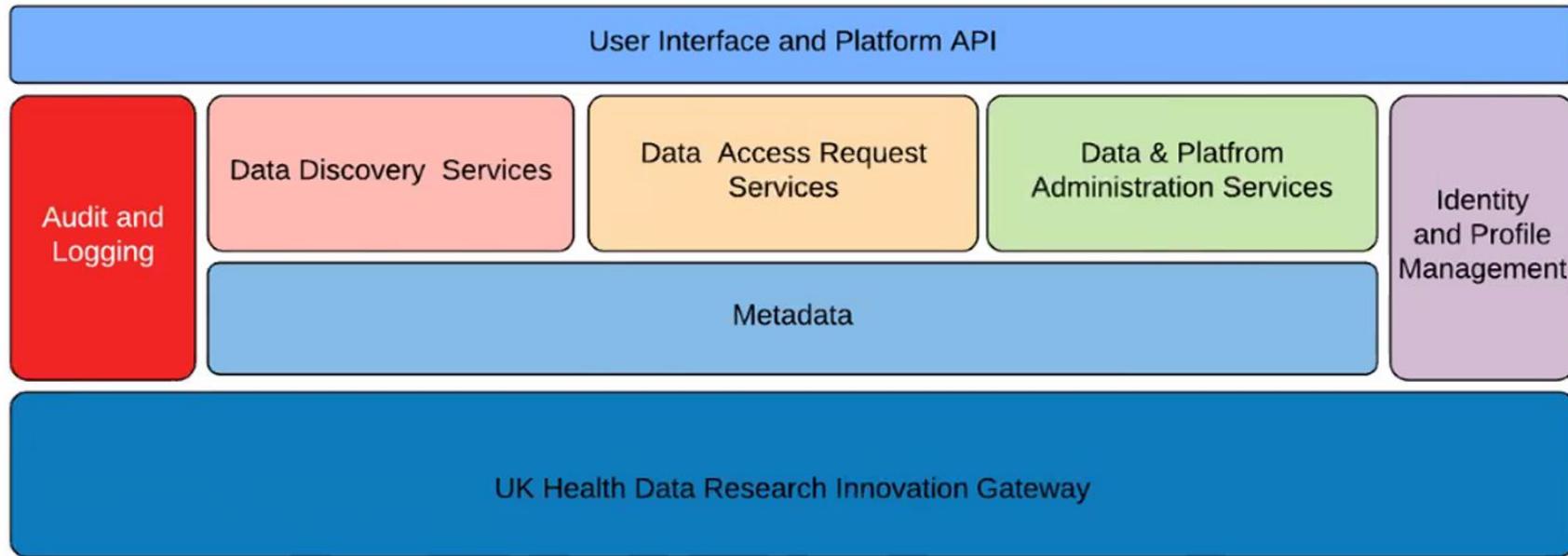
- Our need:
  - Automation of tasks better done by computers – improved repeatability and accuracy
  - Tools needed to cope with and to benefit from the data deluge
  - Monitoring and predictive interventions – routing in financial data.
- Our challenge:
  - Healthcare data is not well curated (typically episodically represented, poorly coded, unstructured)
  - AI development is continuous and has the potential for bias and discrimination.
  - We need to gain citizen trust
- Our Tools:
  - Allow unstructured data to be quickly consumed (NLP)
  - Allow dynamic querying and cohorting (Elastic Search)
  - Provide predictive capability (ML)



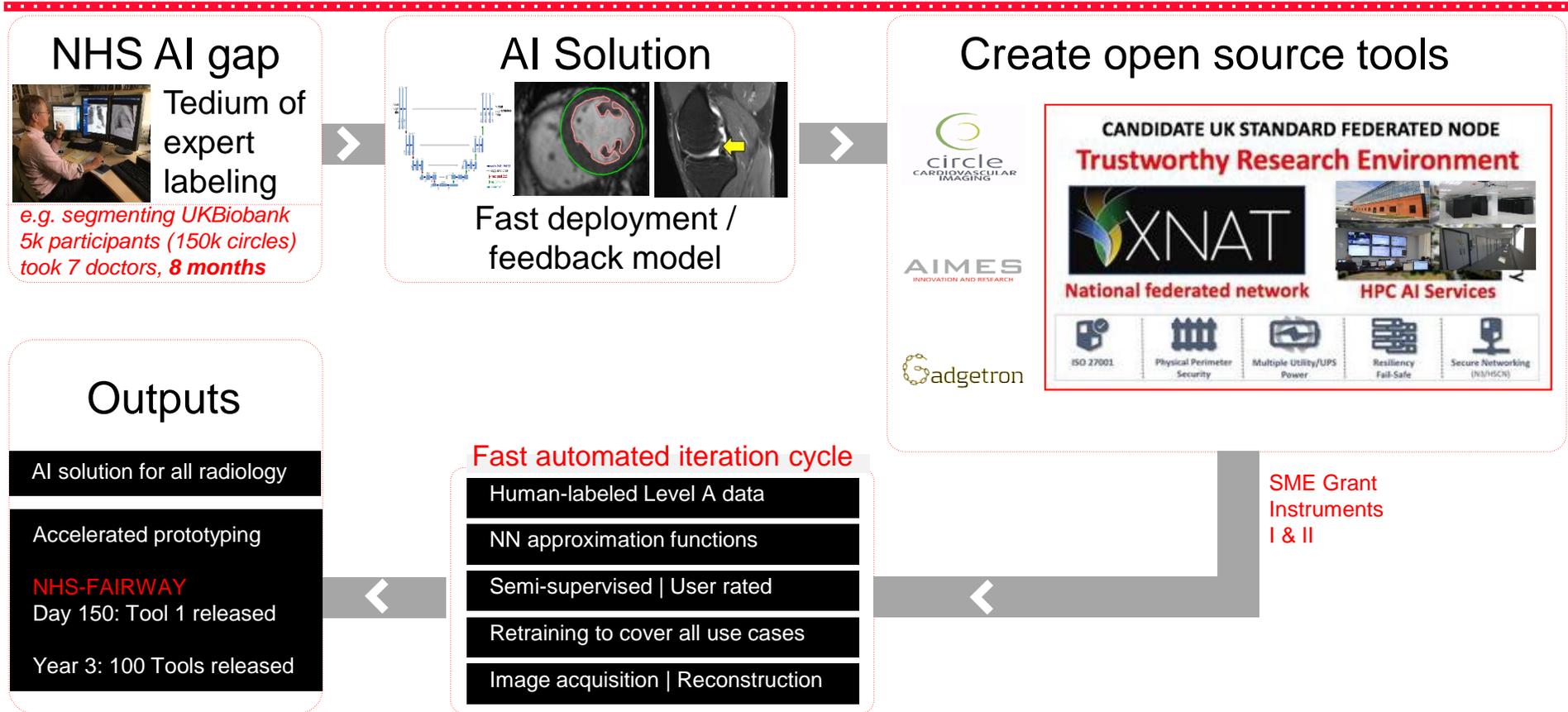
# AIMES contribution: Trustworthy Research Environments



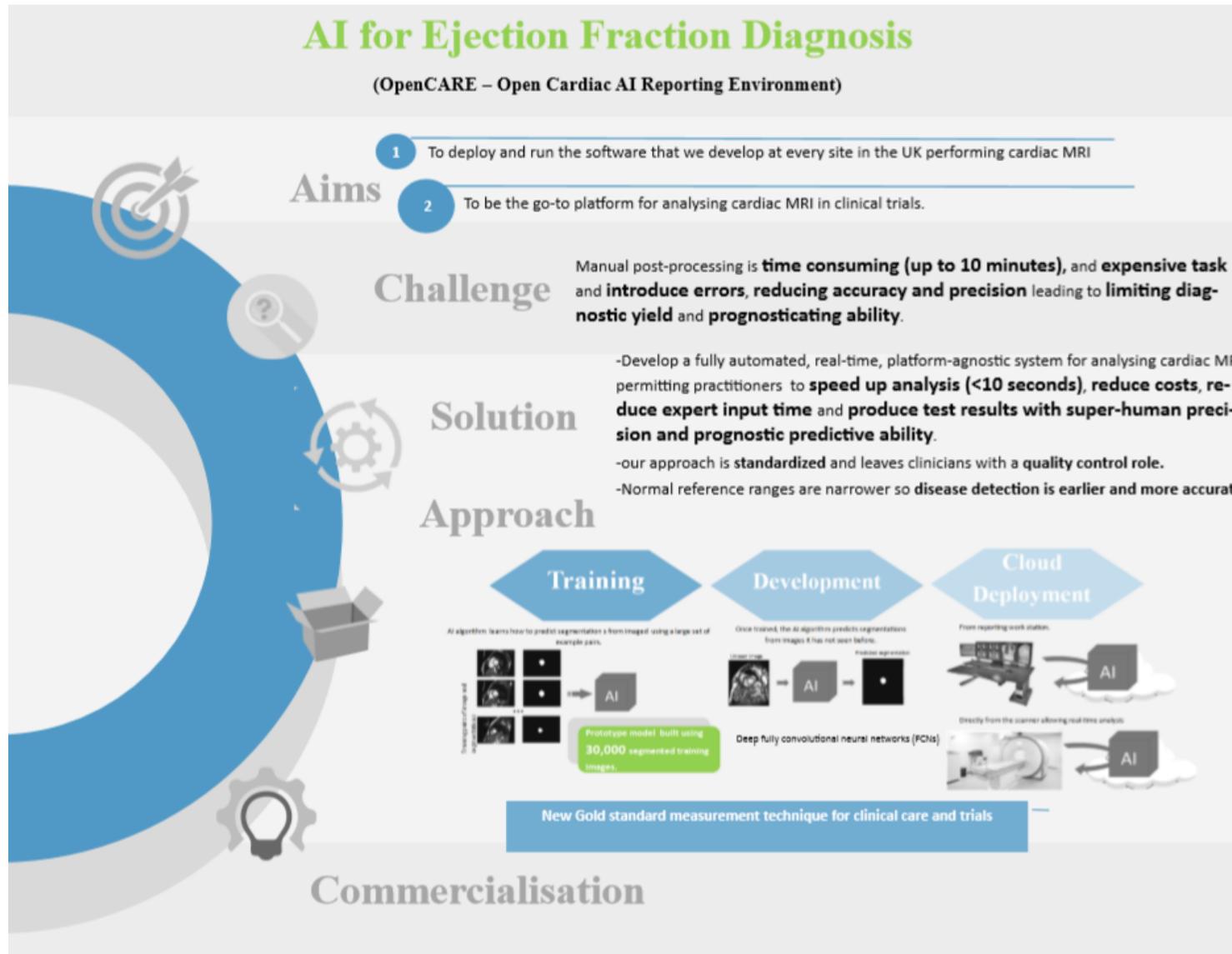
# Breaking News...The national framework for the use of health data 12<sup>th</sup> September 2019:



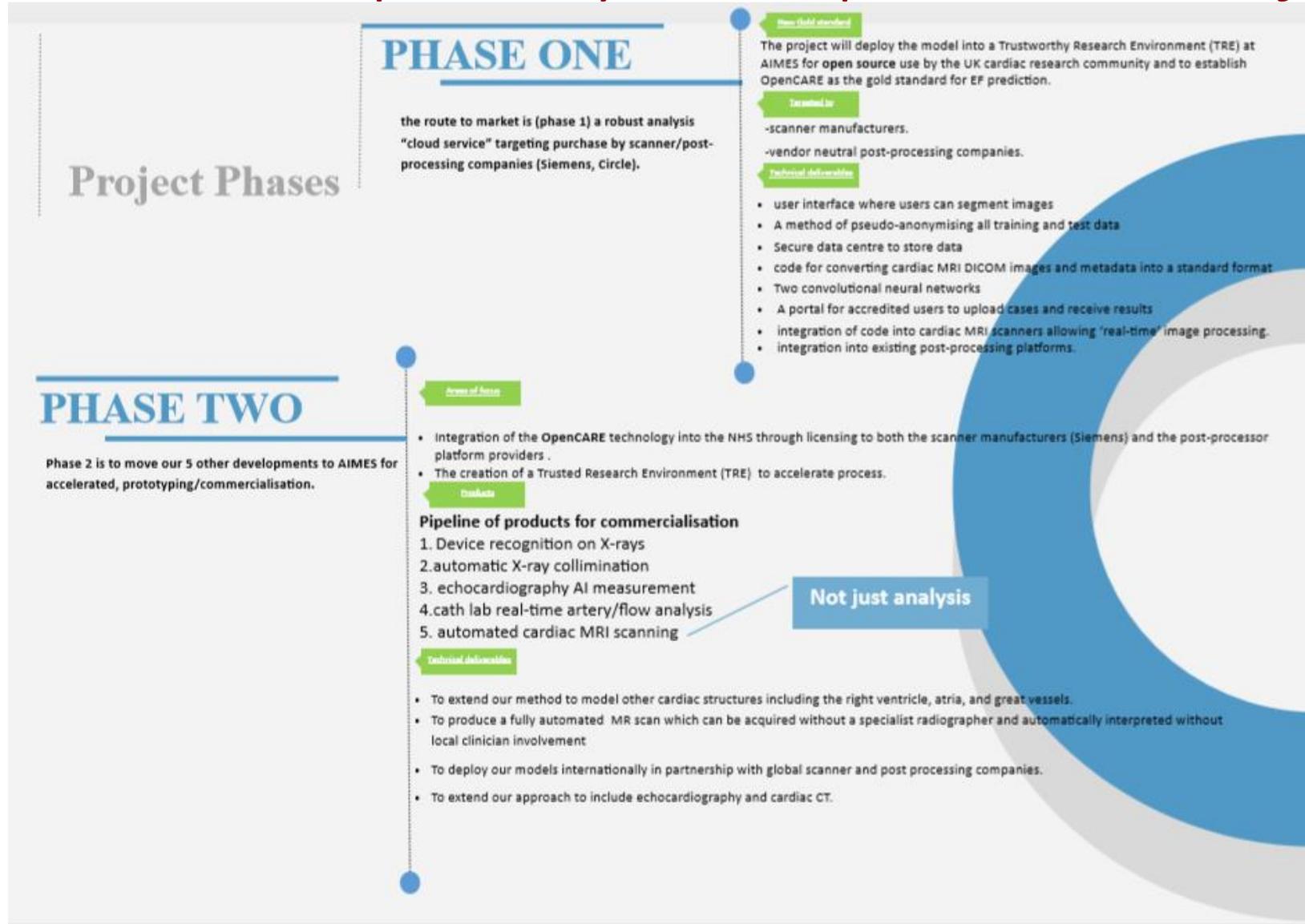
# Use Case 1: Radiology Services (Automation)



# Need or challenge addressed by OpenCARE Project:



# The Approach adopted by the OpenCARE Project:



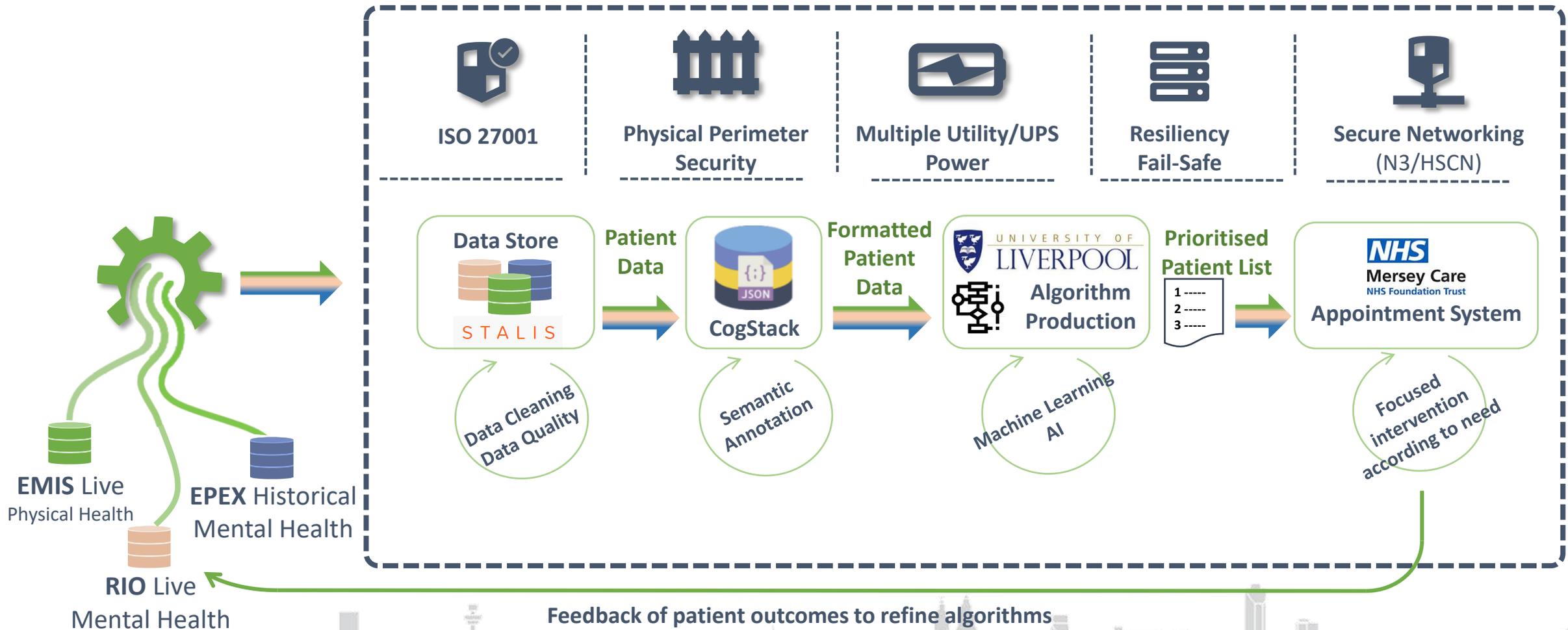
# Use Case 2: Mental Health (Predictive)

- **AVERT Project:**
  - uses AI-based predictive analytics to schedule clinical appointments based on risk of crisis rather than routine assignment of appointments with clinical psychiatrists.
  - is innovative in use of AI in mental health using:
    - Natural Language Processing technologies developed within the NIHR programme at Kings College London
    - Machine Learning algorithms from the data science researchers at the University of Liverpool.
  - uses both physical and mental health data to improve outcomes



# Predictive Analytics in Mental Health (AVERT project TRE)

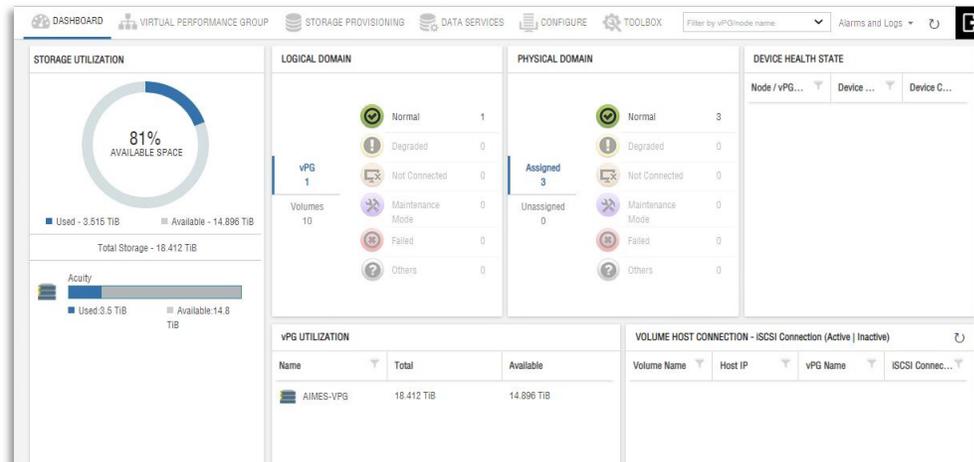
## - Natural Language Processing and Machine Learning



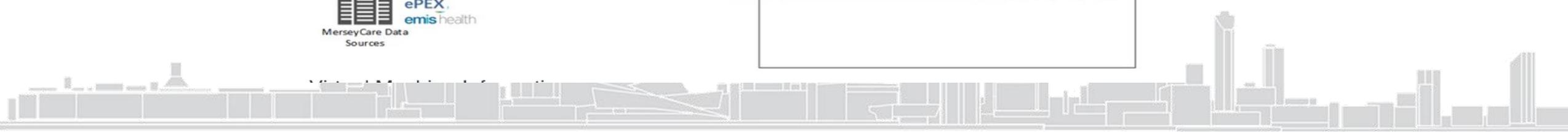
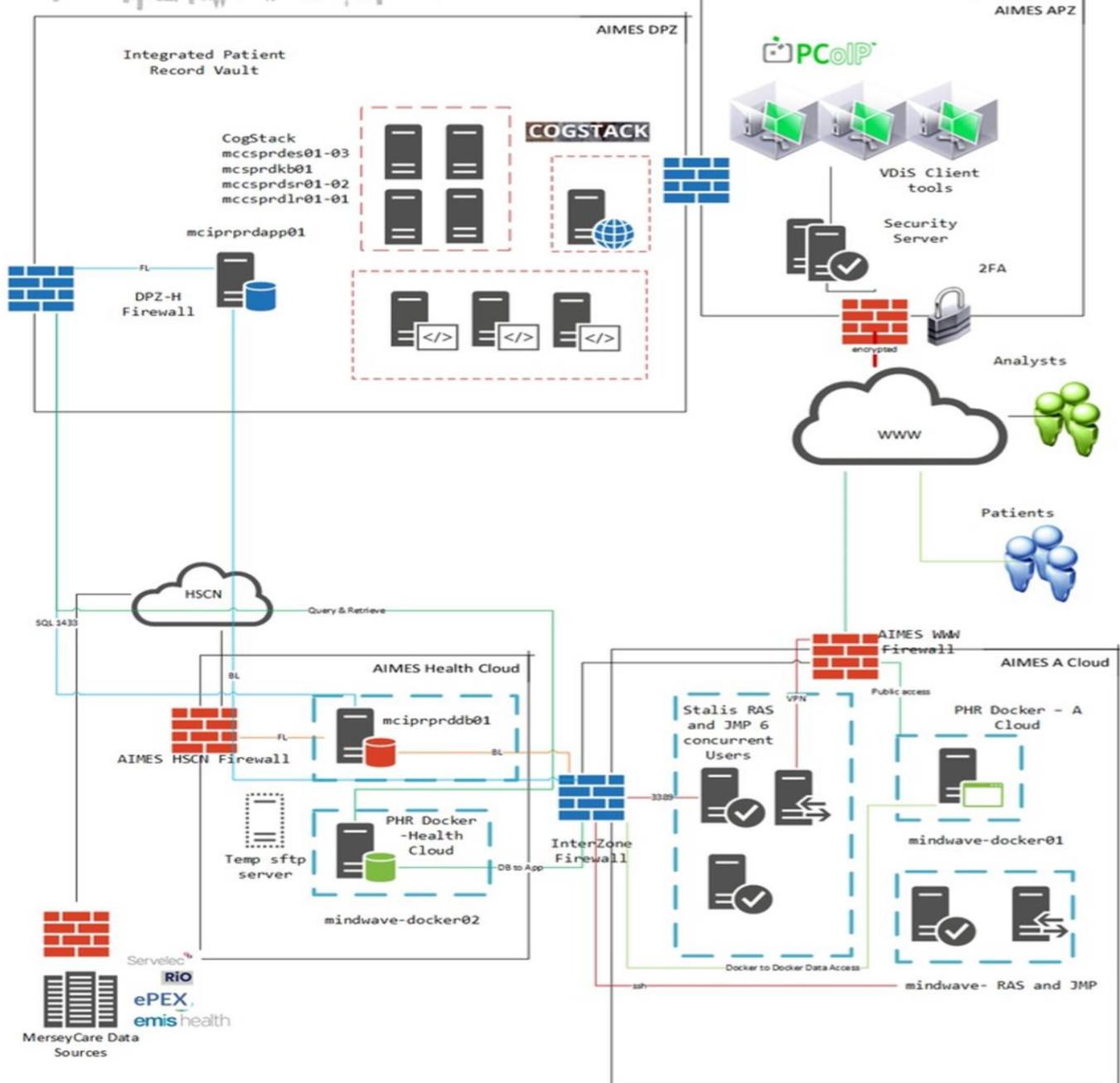
# Base AVERT Infrastructure



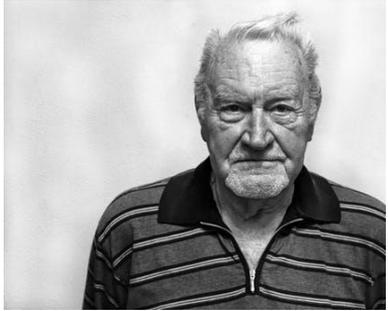
- Hyper converged Appliances
- Rebadged DELL Chassis
- Acuity file system
- 18TB
- 2 TB RAM
- 240 x 2Ghz CPU logical
- Optimised for VDI deployment



# AVERT TRE Components



# Brian's Story



**My name is Brian and I am 68 years old and I suffer from treatment resistant depression**.....back in 2018 I had two crises, the first after my wife Alison died following a short illness with cancer and then when I was diagnosed with type 2 diabetes. At that time I saw my psychiatrist Dr White every 6 months but on both occasions I ended up in the A&E department at Aintree Hospital and remained in hospital for over 14 days.....now following the implementation of the AVERT intelligent scheduling, I know that if things were to deteriorate, someone at Mersey Care will know, and send me an earlier clinic appointment to prevent things getting bad enough for another hospital admission.....

- Brian from Liverpool



**My name is Andrew and I am Brian's consultant psychiatrist at Mersey Care.** Brian has a chronic depressive illness that has twice before slipped into crises that resulted in time in an acute hospital. In our records we know what happened in those episodes and what specific warning signs for Brian that might provide an early warning – days and weeks before the crisis is reached. But our care is from a team of individuals and while a community nurse might notice poor sleeping, the outreach mental health team separately noted a reluctance to get his daily paper, and the social worker notes his garden is unusually overgrown – each insignificant alone but together and combined with a) his prior history and b) what we know about health behaviours... could well be the trigger to expedite a formal mental health assessment. All the information is in the current records – but lies unknown to the team because individual contacts are not enough to raise the alarm. AVERT is now constantly there to raise the question – and enable early intervention – to keep that person mobile and out of hospital.

- Dr White from Mersey Care



# Final thoughts.....

- We live in the most amazing times in perhaps the most amazing place....
- AI and data science has the potential to transform our healthcare in the 21<sup>st</sup> century in the way pharmaceuticals did in the 20<sup>th</sup> century
- The future is already here.....

