

# USE CASE

Scaling AI projects in the NHS: Leading digital change, interoperability and innovation



## HARIS SHUAIB

AI Transformation Lead

**AI Centre**

Consultant Physicist, Head of  
Clinical Scientific Computing

**Guy's and St Thomas' NHS  
Foundation Trust**

# AI Transformation at Scale

Haris Shuaib

Consultant Clinical Scientist, Head  
Clinical Scientific Computing | Guy's & St. Thomas NHS Foundation  
Trust

PEOPLE | PLATFORMS | POLICY

Director | Fellowships in Clinical Artificial Intelligence  
AI Transformation Lead | AI Centre for Value Based Healthcare



# Centre of Excellence in AI

Industrial Strategy Challenge Fund - From data to early diagnosis and precision medicine challenge

- £10M - one of five Centres of Excellence for digital pathology, radiology, AI and machine learning, and enabling integrated diagnostics
- £1.6M from Office for Life Sciences Department of Health and Social Care as additional scale up funding to three of the Centres
- Around £10M of in-kind matched funding from 15 industry partners



UK Research  
and Innovation



Department  
of Health &  
Social Care



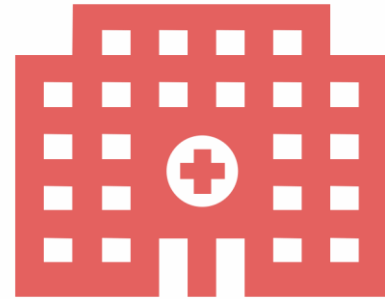
# Bridging the gap between AI innovation and adoption

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**AI**

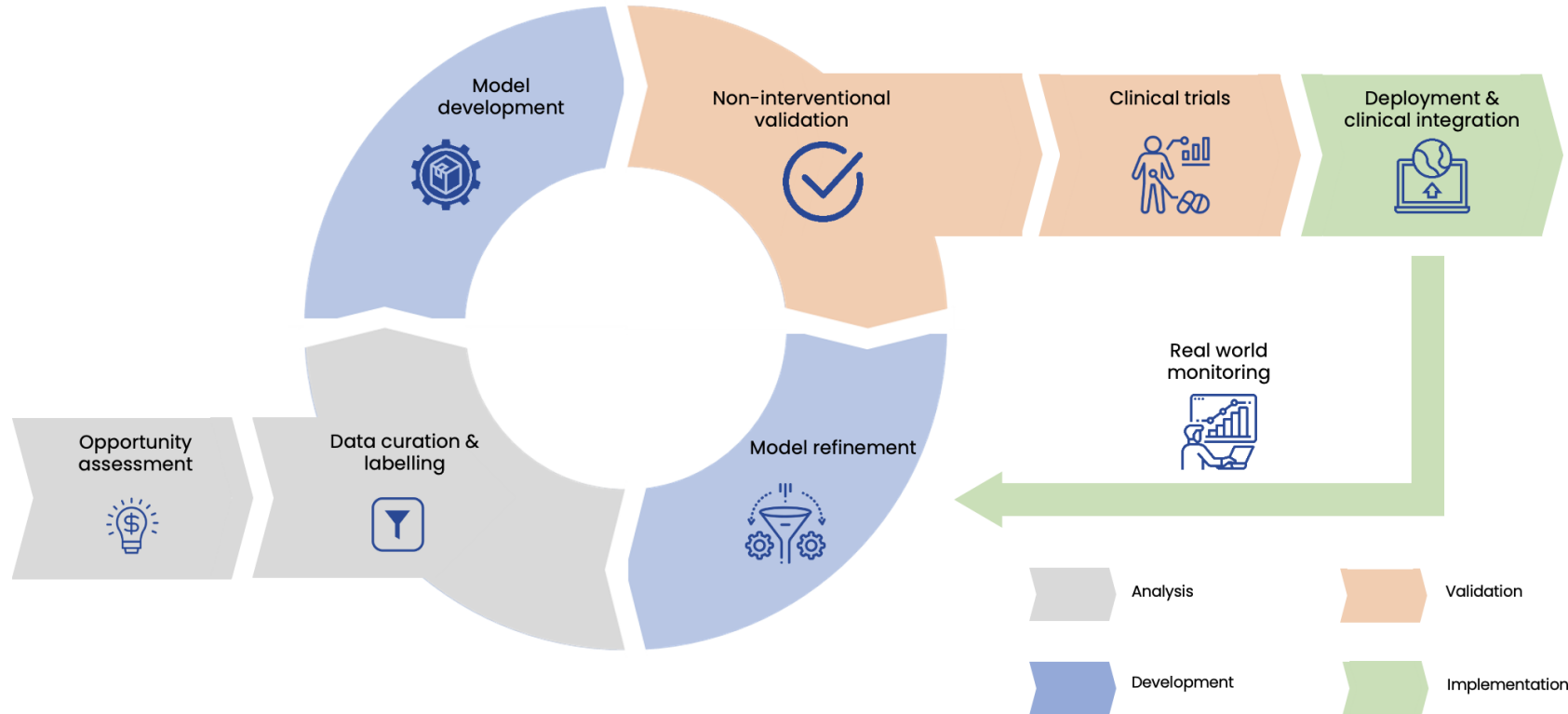
**SKILLS  
TECHNOLOGY  
INVESTMENT**



**NO PEOPLE  
NO POLICY  
NO PLATFORMS**

**NO VALUE**

# AI Lifecycle



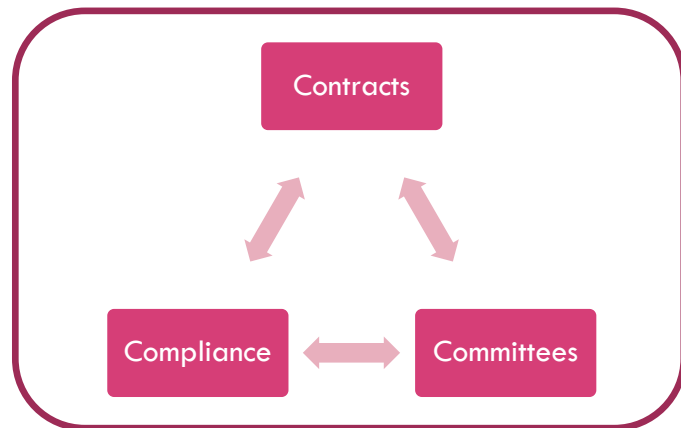
# Data Curation

The AI Centre is committed to using data safely to improve health care

Projects are reviewed by

- Data Access Committee
  - Includes patient representation
- Centre Management Committee

AI Centre projects can only access anonymised or pseudonymised data



# Model development



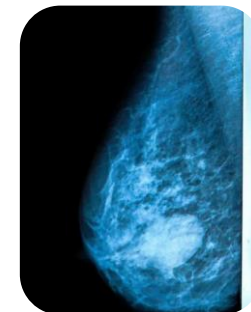
46

Partnerships between industry,  
Academia and the NHS



10

Projects have gone through product  
development, testing & deployment



18

Projects in active development with a  
further 6 in early-stage research



# Successes: clinical pathway models

## Cancer surgery planning

<b>Background</b>	7 million CT and MRI scans are performed every year up to 30% of these used for planning surgeries
<b>Project</b>	<b>Innersight3D</b> – a CE marked, AI powered surgery planning software tool that creates 3D models from existing CT and MRI scans for 2 separate pathways
<b>Support</b>	We are further developing, testing and regulating Innersight3D for Kidney and Lung cancer surgery



Prof. Prokar Dasgupta  
using Innersight3D

# Successes: clinical pathway models

## Radiotherapy Planning

<b>Background</b>	Image contouring allows clinicians to see areas of interest, AI can be used to enhance the contouring process
<b>Project</b>	<b>Mirada Medical DLC Expert</b> is a deep-learning auto-contouring solution
<b>Support</b>	We helped train DLCExpert on curated clinical data to improve model accuracy and create a more generalisable model  Project completed, and now GSTT carrying on further development for deployment



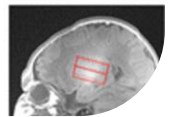
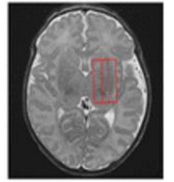
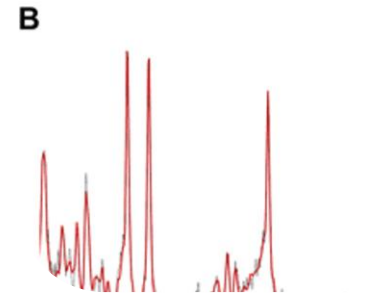
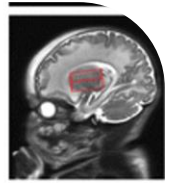
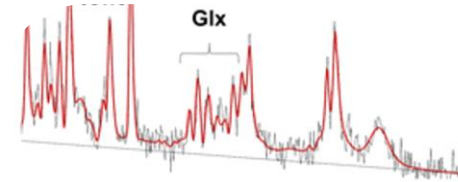
# Successes: clinical pathway models

## Hypoxic Ischaemic Encephalopathy

**Background** Babies asphyxiated from birth can suffer from HIE and can lead to permanent neurological deficit or even death. MRS can be used to measure lactic acid in the brain for prognosis.

**Project** Automate and integrate the spectroscopic analysis of brain metabolites in neonatal brains for immediate prognosis to improve patient care and communication with parents.

**Outcome** **24 hours -> 30 seconds**  
Median time to results



# Deploying AI in hospitals



**Deployment** of more and more AI models becomes an increasingly complex task to manage, creating large technical debt.



**Interoperability** is a particular challenge for healthcare due to heterogeneity in clinical systems and patient data models.



**Evidence generation** needs to be at the centre of the design, since many deployments of AI still require research and analysis of their performance.



# AIDE

A new OS for the hospital



1895



1995



2012



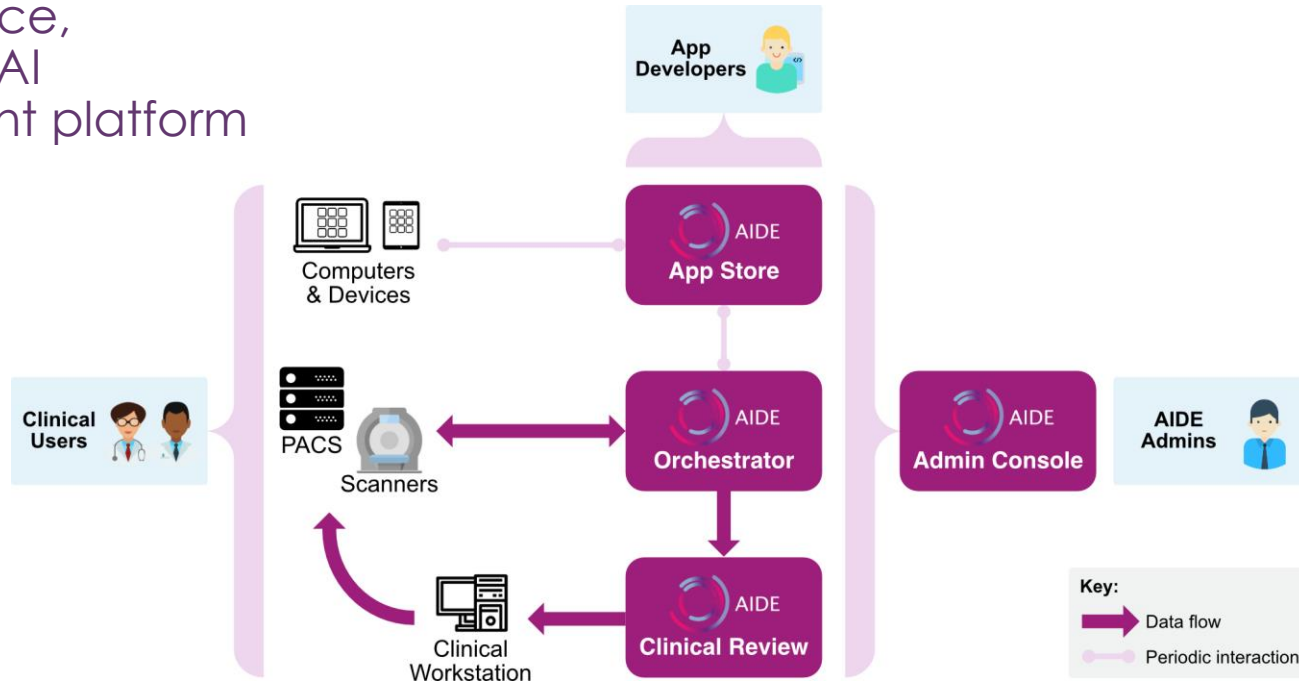
2021

1. One of the earliest photographic plates from Roentgen's experiments was a film of his wife, Bertha's hand with a ring, produced on Friday, November 8, 1895.
2. Setzner1337, CC0, via Wikimedia Commons

# AIDE

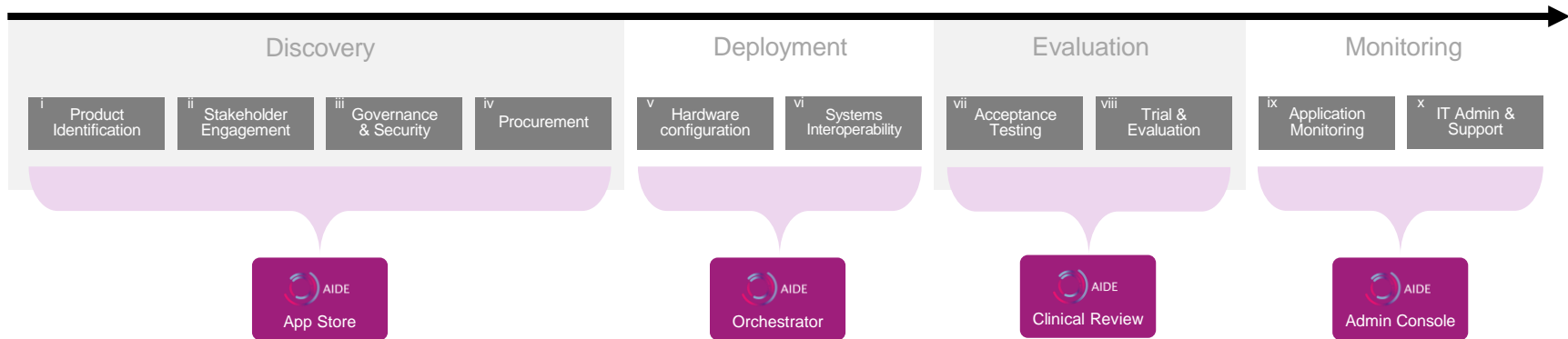
## A medical AI operating system for the hospital

- Open-source, enterprise AI deployment platform



# The AI Adoption Pathway: At present & without AIDE

AI adoption at present



AI Adoption with AIDE

# AI Evaluation Service

Transparently and in line with best practice

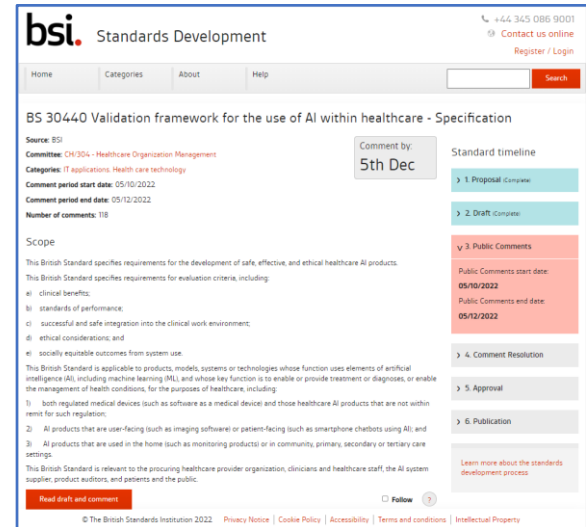
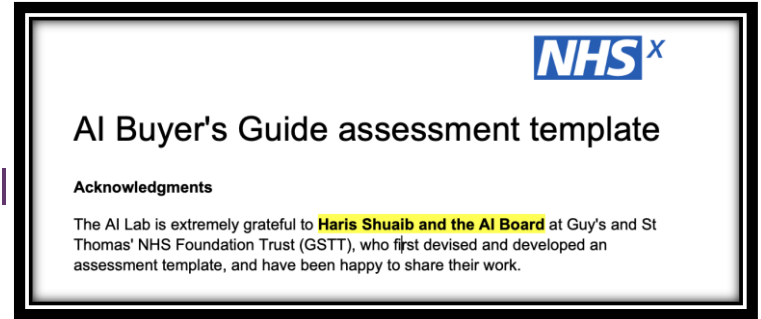
Evidence the utility and effectiveness of medical AI

Allow hospitals to effectively exercise choice

AI evaluation service to generate the evidence

Differentiate products according to quality

Build consensus on best practice, patient experience, and outcomes.





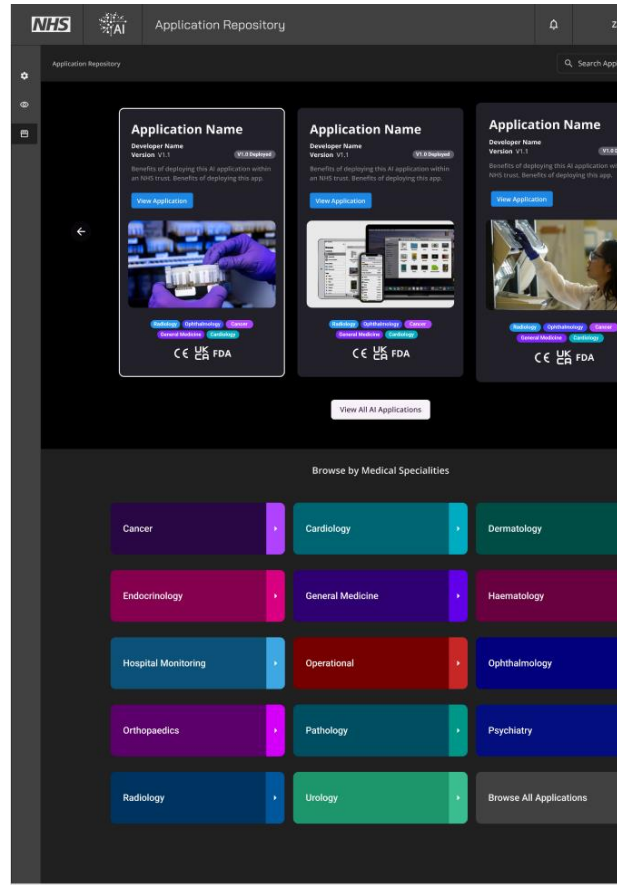
# Scaling up digital clinical trials

Deploying in shadow mode

QA & research mode

Centralised reporting

App store with associated documentation



## Trust Availability

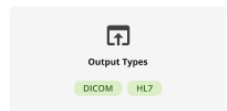
 This application is available to all trusts .

## System Requirements

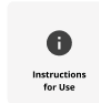
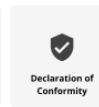
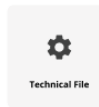
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## Input and Output Types



## Files



# Rolling out across England

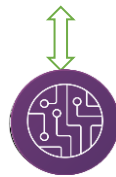
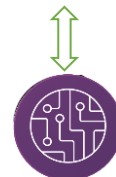
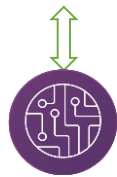
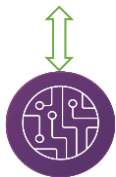
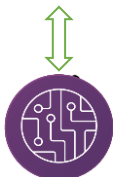
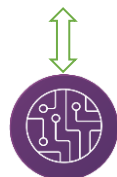
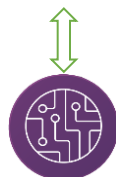
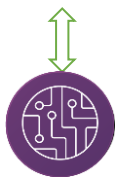
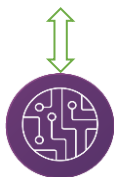
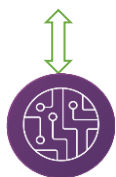
AI lifecycle management

Cloud-ready architecture

NHS "FUBU" repository

Package algorithms with compliance documents

Complex and composable pipelines



Imperial College Healthcare  
NHS Trust

South London  
and Maudsley  
NHS Foundation Trust

Brighton and Sussex  
University Hospitals  
NHS Trust

King's College Hospital  
NHS Foundation Trust

University College  
London Hospitals  
NHS Foundation Trust

Guy's and St Thomas'  
NHS Foundation Trust

Lewisham and Greenwich  
NHS Trust

Royal Brompton  
& Harefield  
NHS Foundation Trust

Barts Health  
NHS Trust

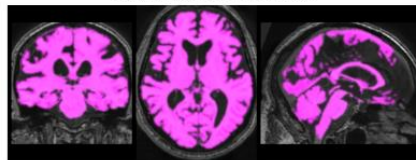
East Kent  
Hospitals University  
NHS Foundation Trust

# AIDE apps

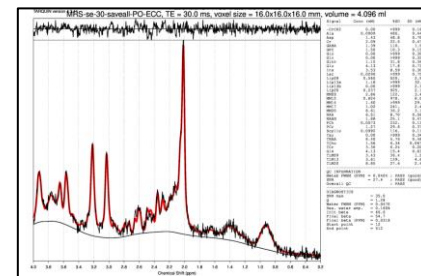
First wave



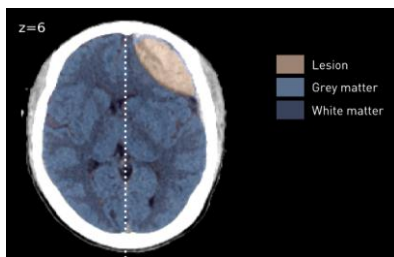
Brain Volume Fraction



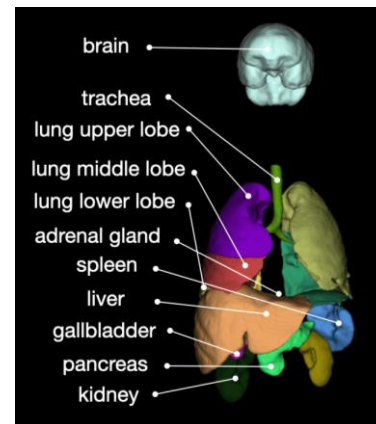
AI-derived automated brain MRI volumetrics



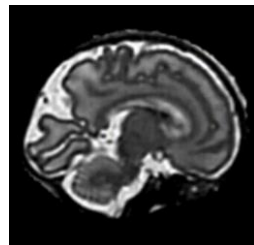
MR Spectroscopy modelling



AI automated stroke CT analysis

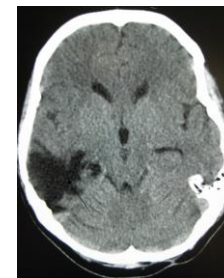


Automatic CT contouring



AI-driven motion-corrected 3D fetal MRI

Industry partner



AI head CT

+ many more...

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AI Transformation Lead | AI Centre for Value Based Healthcare



# INTELLIGENT HEALTH UK 2023

Breaking down the barriers  
between tech and healthcare