

Digital Avatars: The Clinician's Point of View

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The Case For.....

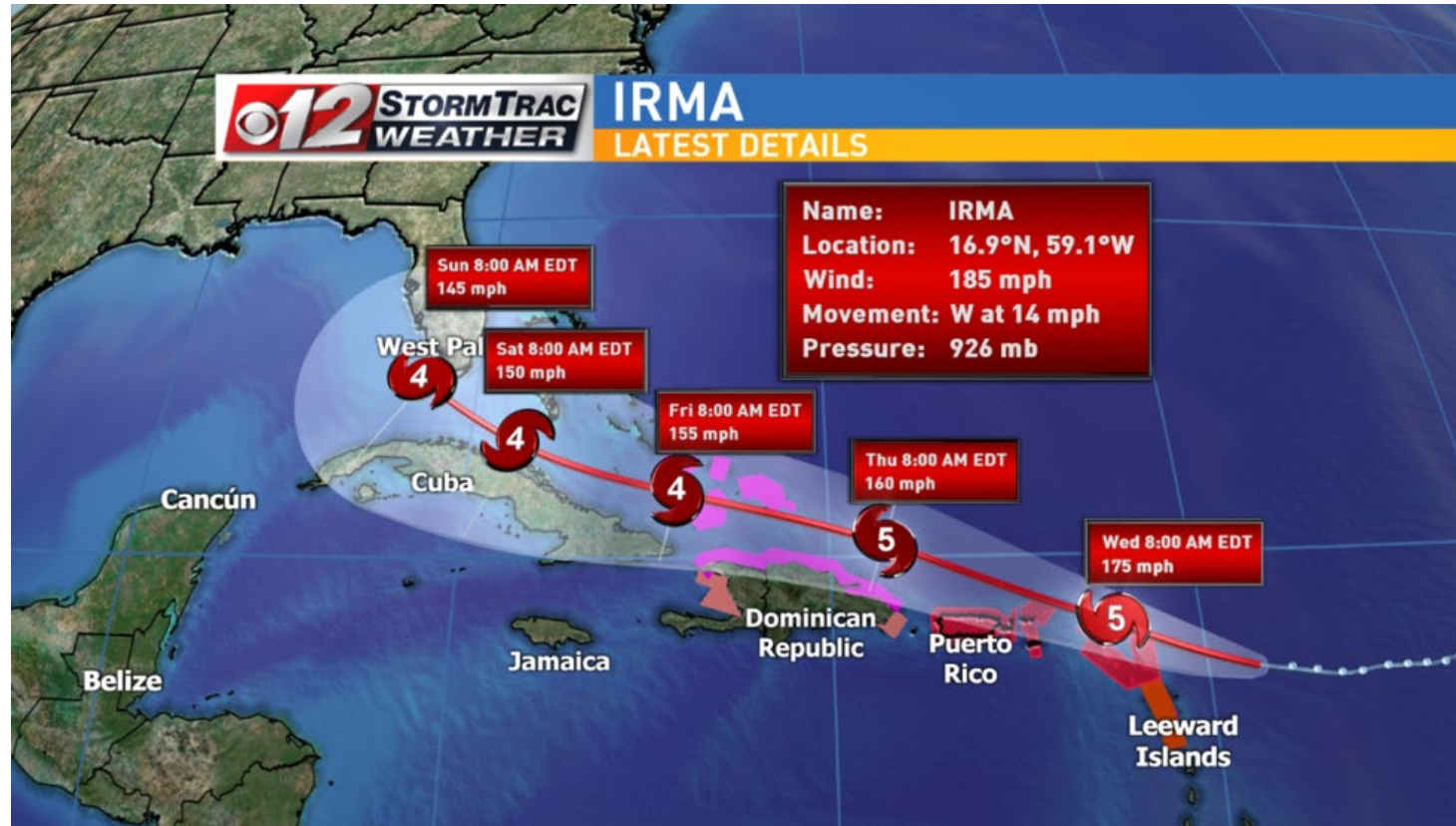


Avatar: A digital representation of a person or being



Today's technology can predict weather...

SENSORS → BIG DATA → MODELS → COMPUTING → WEATHER FORECAST

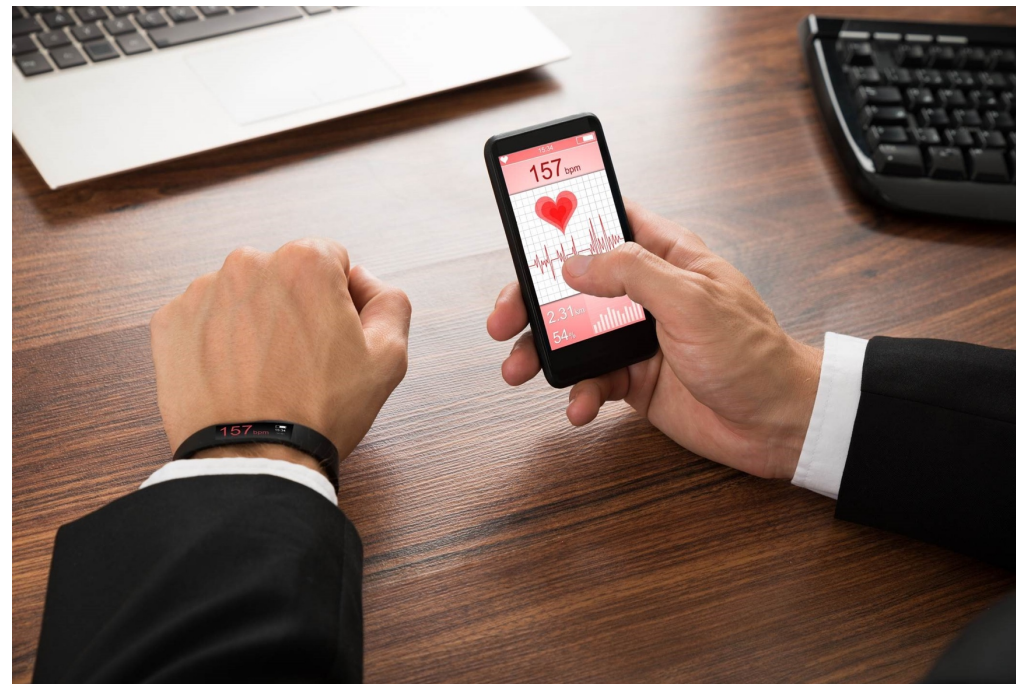


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... but cannot predict health status

- Goal: turning a stream of information into predictions of outcomes
- **Can a Wearable Fitness Device Predict Your Heart Attack? Value chain!**

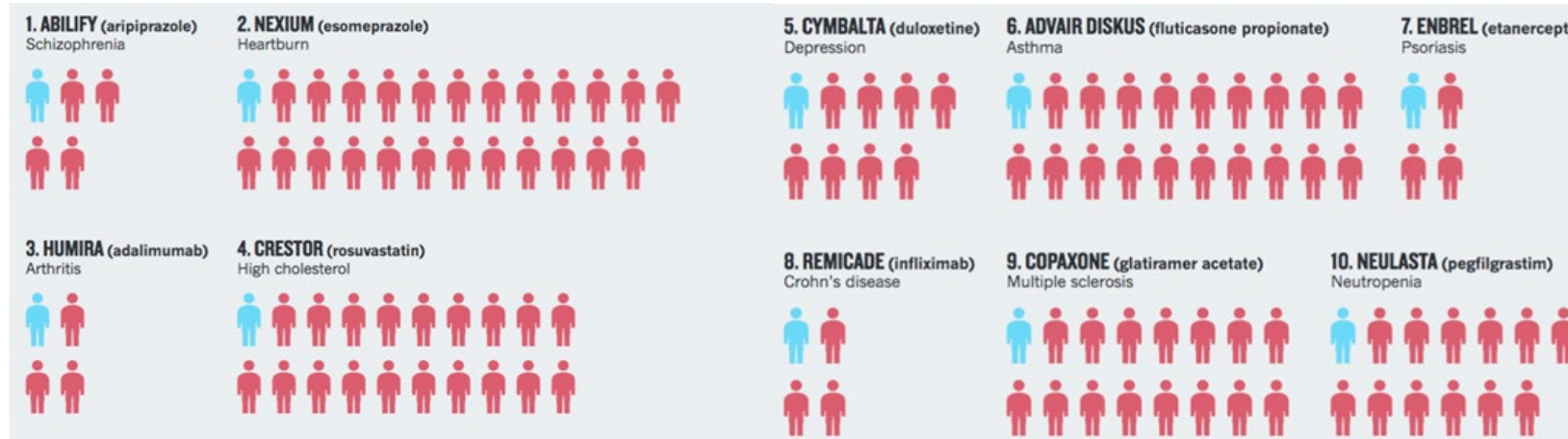
SENSORS → BIG DATA → MODELS → COMPUTING → HEALTH FORECAST



2018: Imprecision medicine era

For every person they do help (BLUE) the ten highest growing drugs in USA fail to improve the conditions of 3 to 24 people (RED):

IMPRECISION & HIGH COST!



Personalized medicine: Time for one-person trials

N.J. Schork, Nature, 2015.

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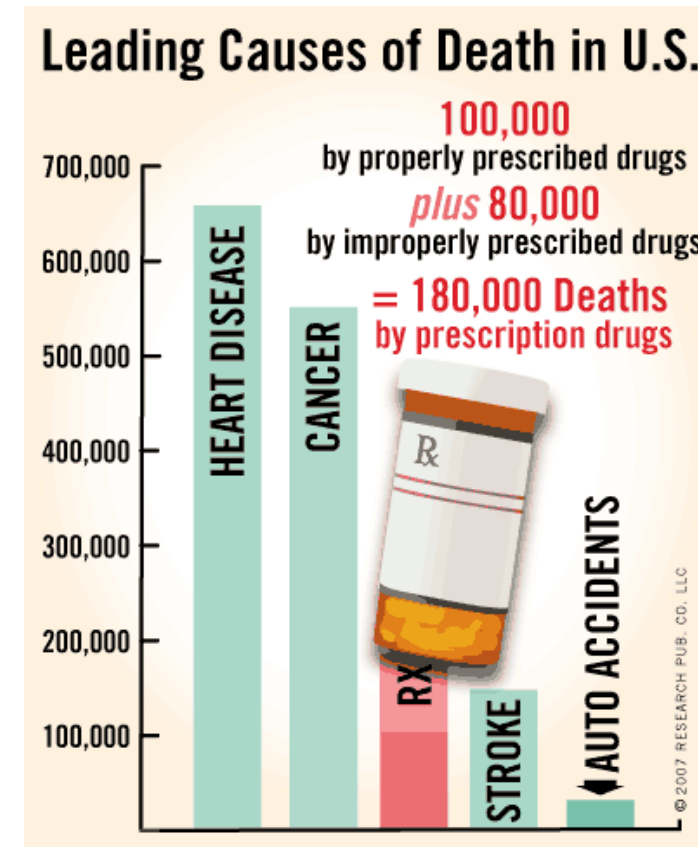
Severe consequences

Adverse drug reactions:

kill **197'000** Europeans every year

kill **180'000** Americans every year

This is more than colon cancer!

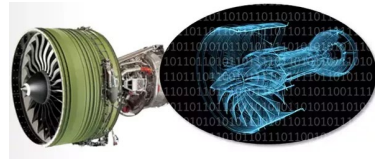
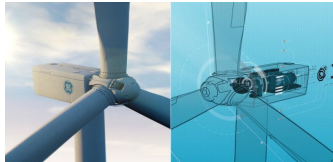
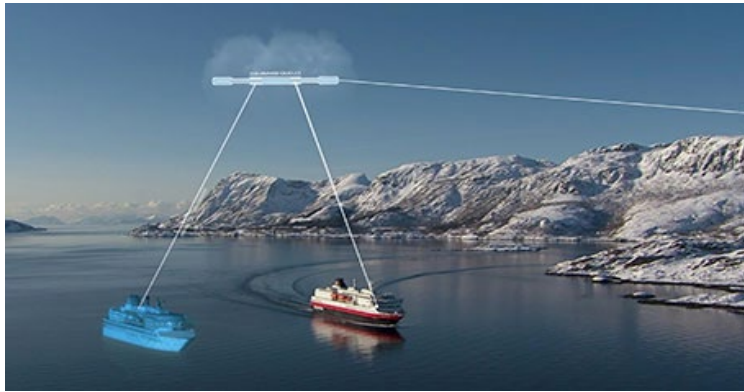


SOURCES of Data: U.S. Centers for Disease Control and Prevention and Journal of the American Medical Association (JAMA).

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2030: From Object to Human Digital Twins

Digital Twins of All Objects



Digital Twins of All Humans



*A Truly Personalised and
Preventative Healthcare System:
SUSTAINABLE*

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Information overload?

3D
Printing

Big Data

- Genetic
- Epidemiological

VR/Augmented
Reality

Computer
generated
reconstructions

Anatomical &
pathophysiological
models

Simulation of
therapeutic
results

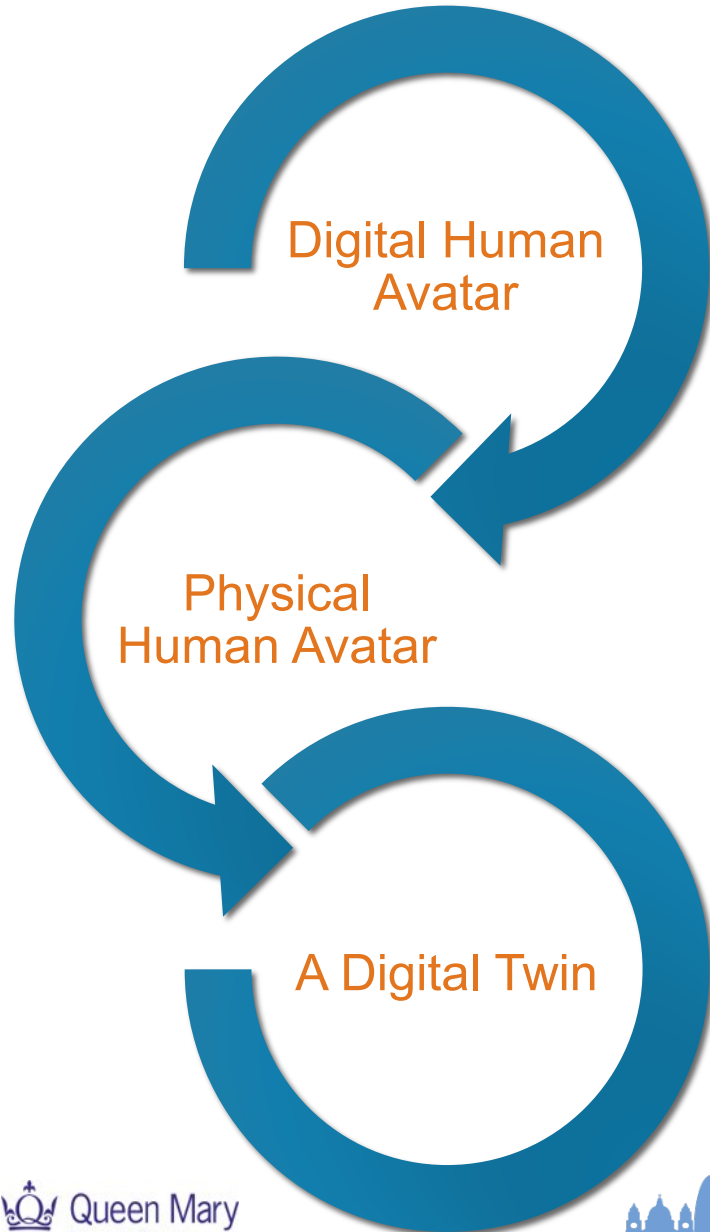
CorPath GRX

Precision Vascular Robotics

Corindus
Vascular Robotics



The ideal clinical avatar:

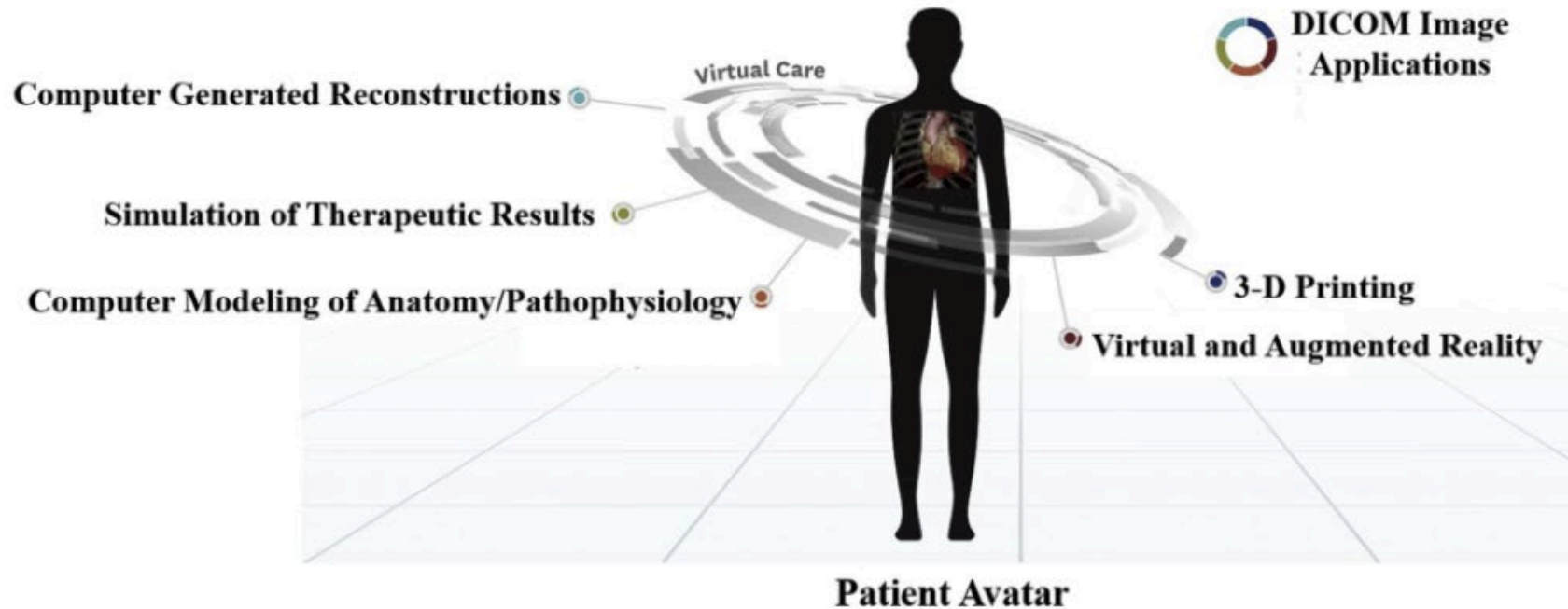


Experimental, sensory, multi-omics and imaging technologies that can characterise multiple cardiac parameters on an individual basis

Digital representations of heart/body functions, comprising of technologies that understand & predict disease

A healthcare personal assistant: driving forward personalised cardiovascular medicine

Digital Avatar - Clinical



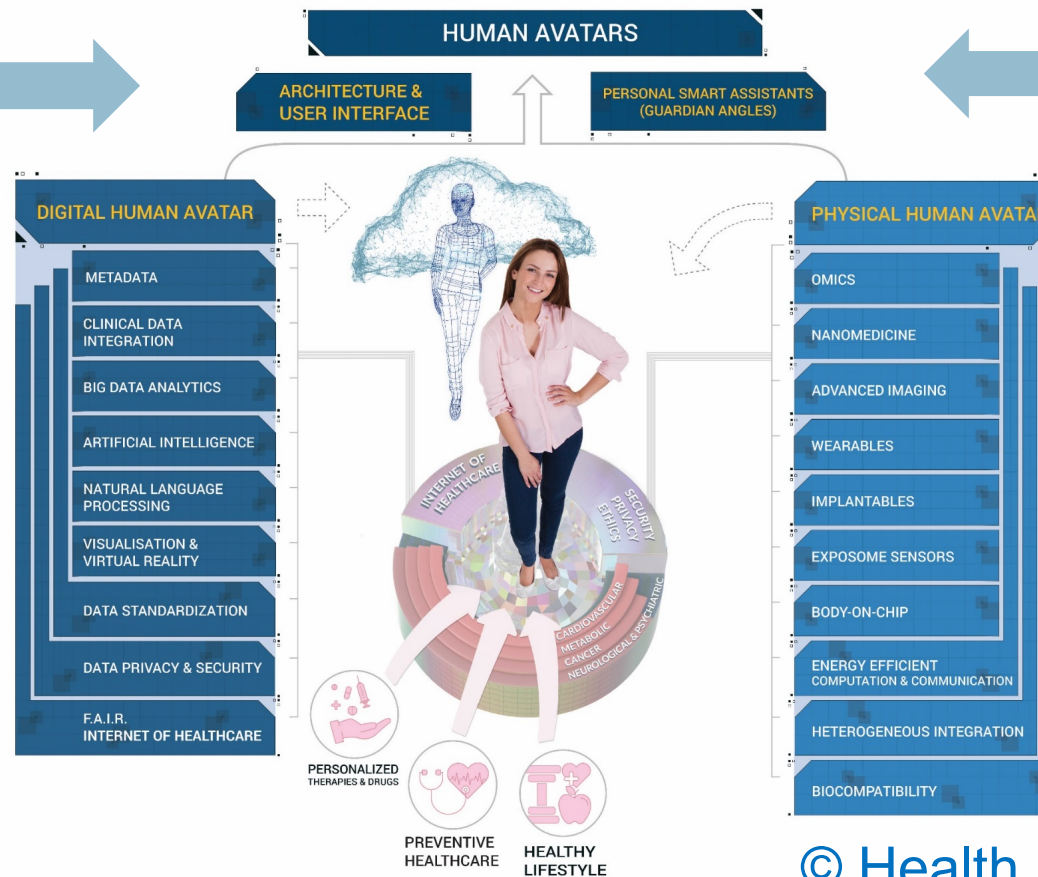
Together with

Cardiac Catheter Labs



Health EU Integrative Technology Platform: Much more than a Digital Twin...

Big Data
IoH
AI



Data
Generator
Technology
Body-On-
Chip

© Health EU

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The Case Against...



2016 - £400M new Barts Hospital is open !



- Barts Heart Centre
- Serves 6 M people with high rates of CV Disease
- 40,000 patient episodes
- Unites the CV Care, Research and Education Brings 3 hospitals together - London Chest Barts & UCLH Heart Hospital and UCL

15:49:41
The CQC have left the building! Well done everyone!

12:29:23
ICT problems-path labs- More info shortly

12:30:17
Random computers logging off- SAVE ALL WORK

12:38:28
Another Issue. Water temp rising in CMR. Real deal this time.

12:38:38
Cardiac CT just gone down

12:41:45
2 engineers on way to 2nd floor- we have a lift entrapment

Thursday 11th May 2017

Friday 12th May 2017



WhatsApp

**CODE
PURPLE**

12:44:45
Intermittent problems through east wing

12:45:53
6A ITU all computer systems down

12:54:33
All ECHO and PACING pacing down

25 minutes

12:56:26
Urgent - please can you turn every computer off now. Please can you do this and get message out

27 minutes

Cardiac Cath labs shut down



1:05:10
All office PCs powered off

1:06:33
All PCs off in cath labs

1:12:41
All PCs off on 4th floor

1:12:46
All PCs off in East Wing

1:17:43 All off in ICU first floor
1:18:13 All of in theatres

24 minutes
To turn off all PCs

Major Incident Declared

- A&E divert set up
- Heart attack/ Stroke and Major Trauma suspended



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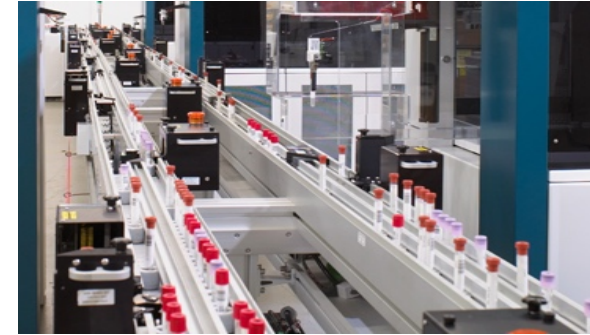
News > UK

Barts Health NHS Trust warns of further disruption at London hospitals three days after Ransomware cyber attack

SEAN MORRISON | Monday 15 May 2017 08:38 | 0 comments

Immediate reality

- No Email- phones unreliable
- Paperless hospital- no notes
- All Blood Ix and Imaging requests electronic
- No PACS and imaging results
- No Blood analyzers and No robots (10,000 samples/ day)
- No printers
- No blood (fridges networked)
- Who is in, and Who is coming in
 - Patients/ staff



Solving the IT

- **Human** Team spirit
- Many staff changed roles
- IT managers recruited and trained up 'Fixers and Patchers'

- Sweeping and patching all PCs
- **3000 infected PCs**

- Slow process turning the network/ PCs back on
- **Incident stood day 24th May -**
- **13 Days**



Conclusion

- Avatars - Great idea!
- Context - Vast amounts of data needs integrating and utilising – improved health outcomes and reduced costs
- Personalised individual medicine – Precision medicine
- SECURITY – establish autonomous solutions?

Questions

