

What smartphones can tell us about human behaviour

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Talk given at CSIRO
Clayton, Melbourne*

A lot

Human-Computer Interaction

14 staff

10+ postdocs

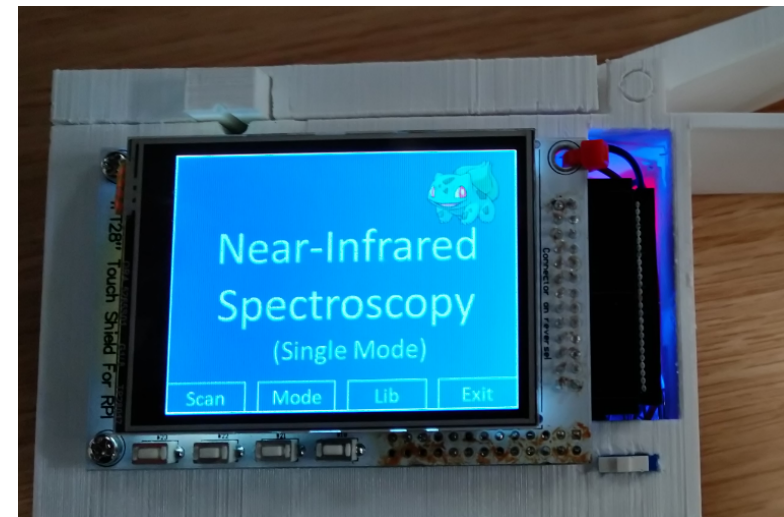
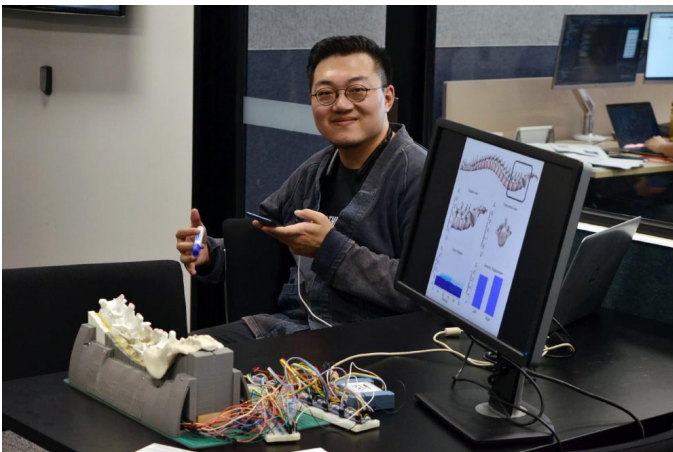
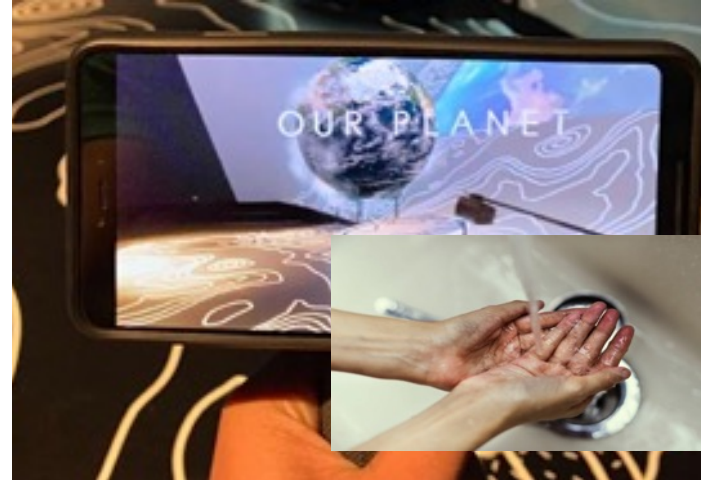
50+ PhD students

\$5 million annual staff costs

Computing
Psychology
Design

Mission:

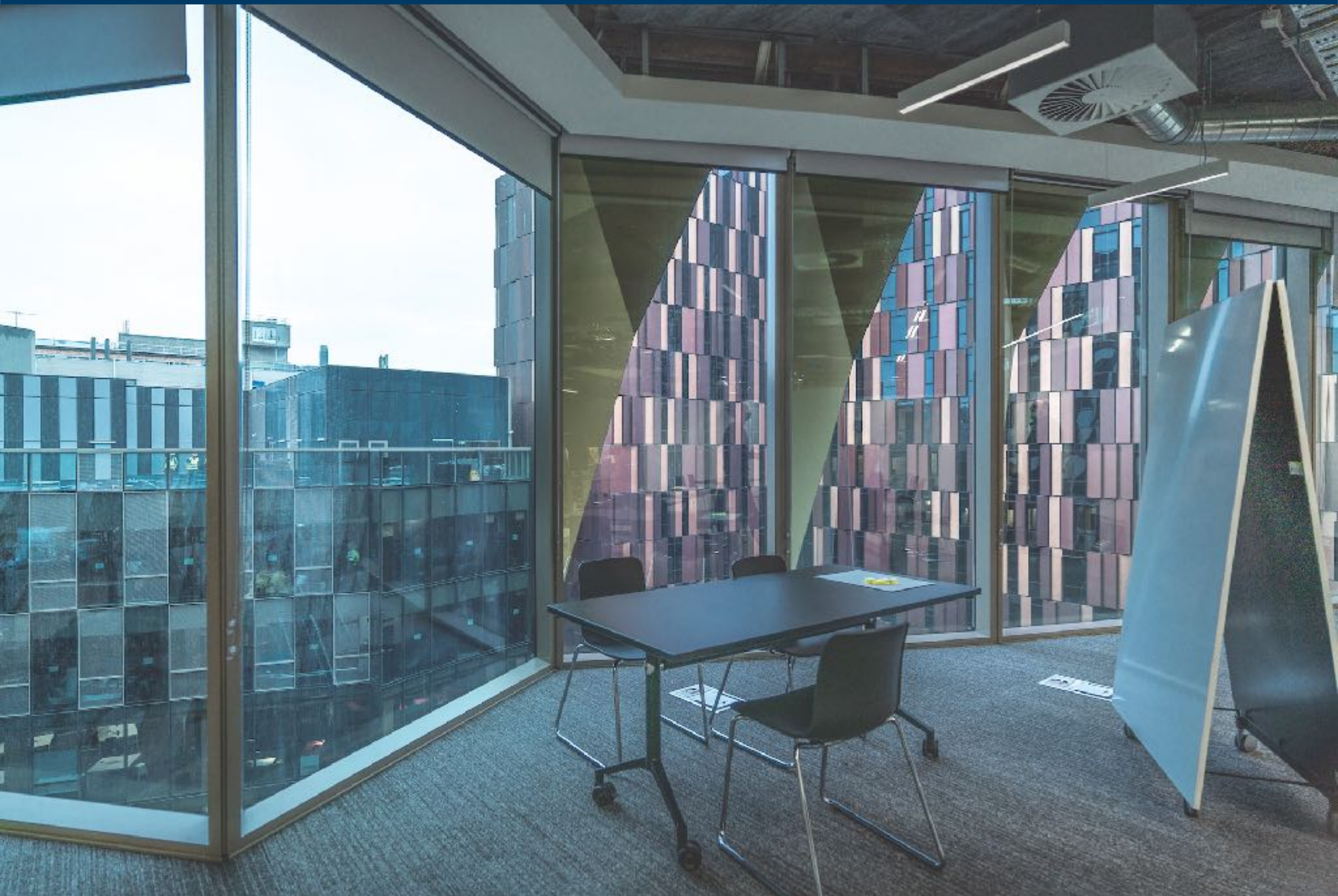
**Create the next generation
of Interactive Technologies**

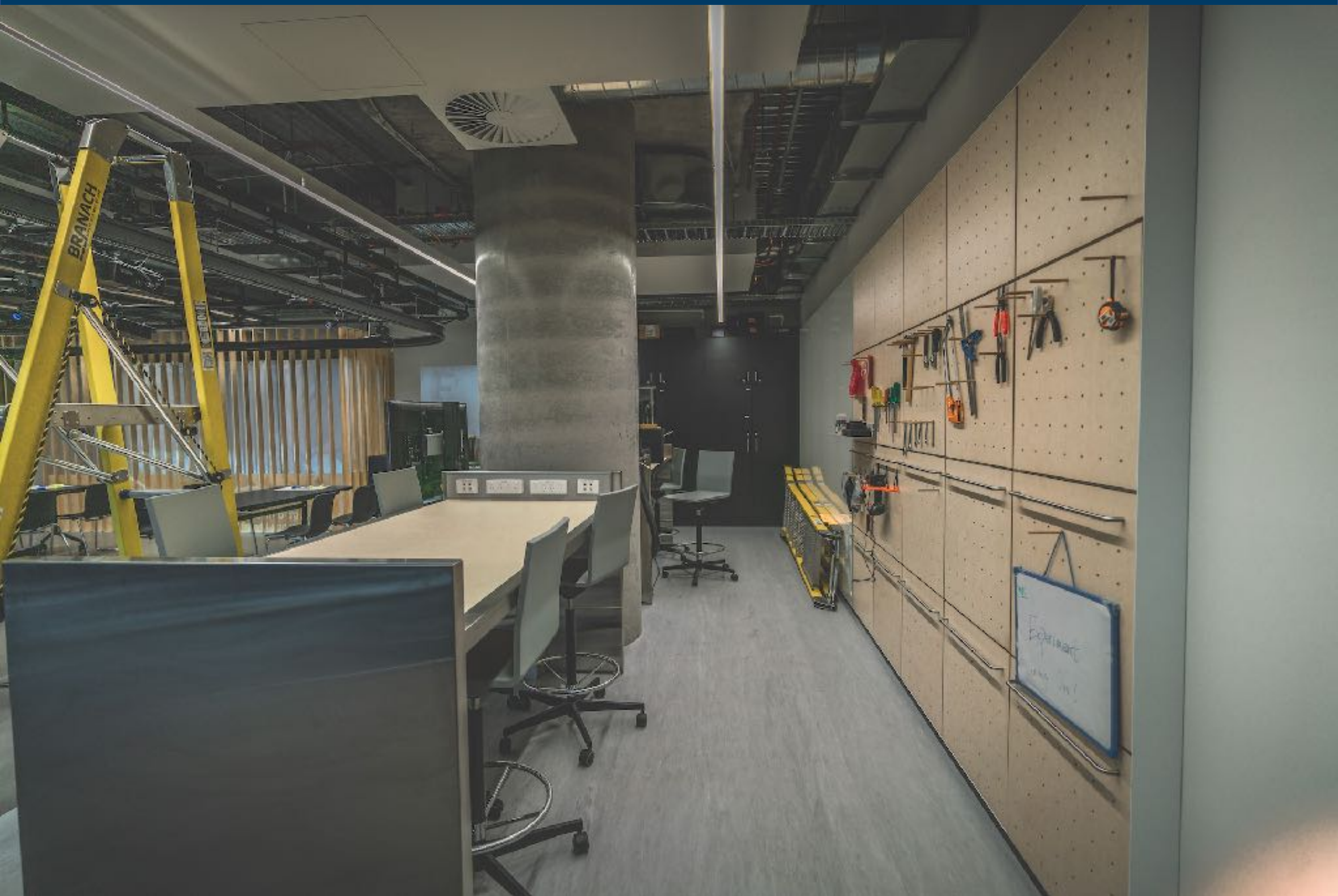




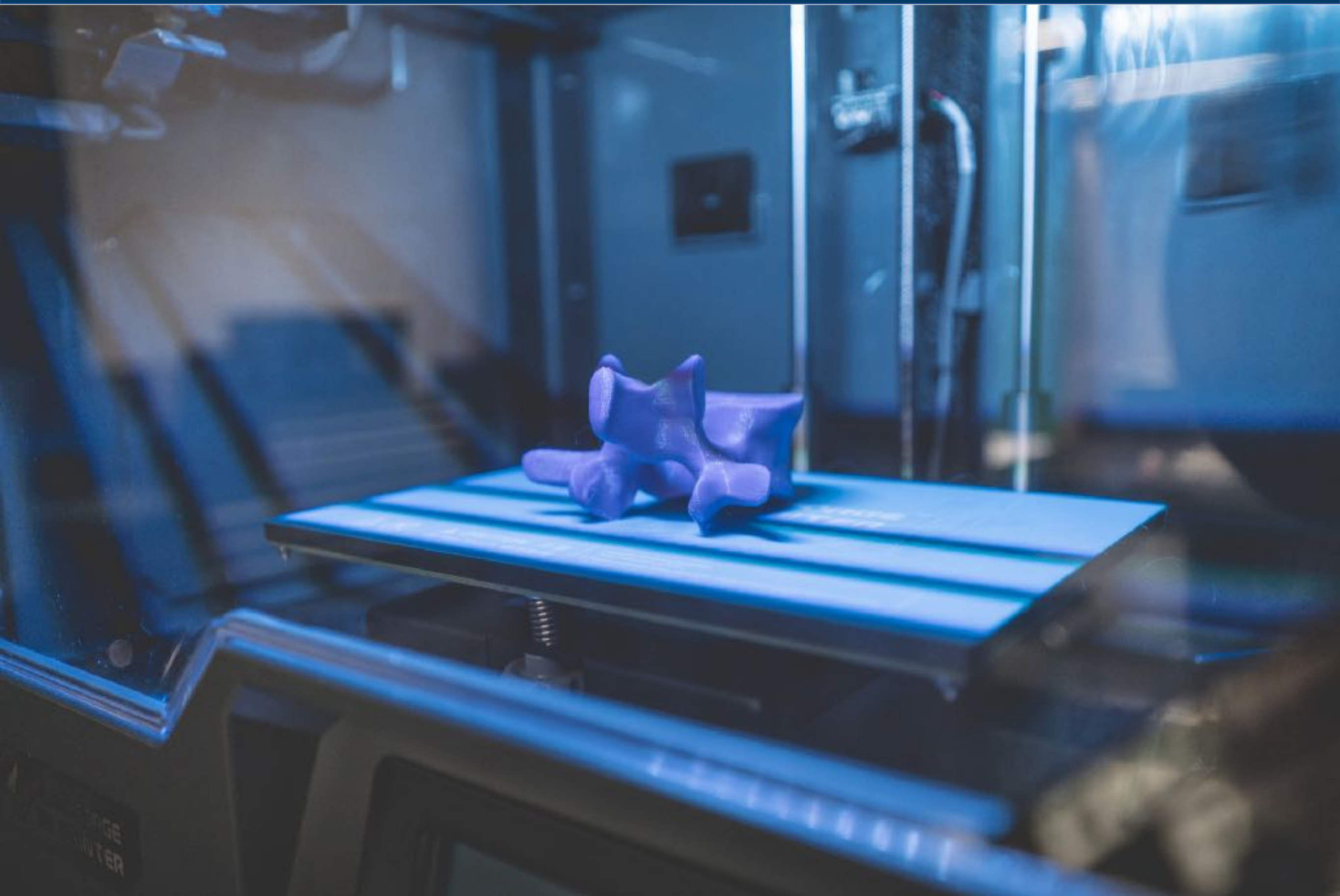


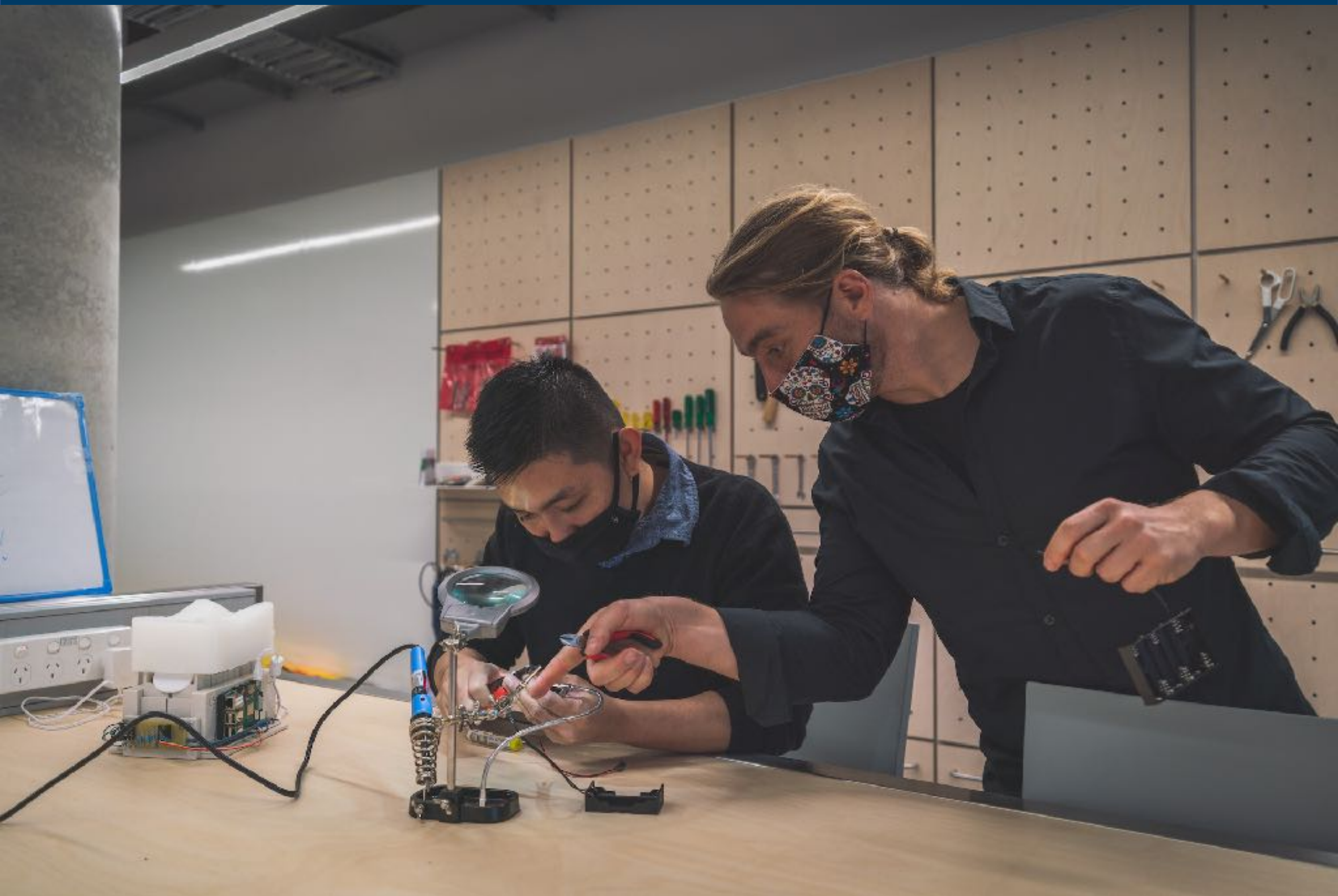






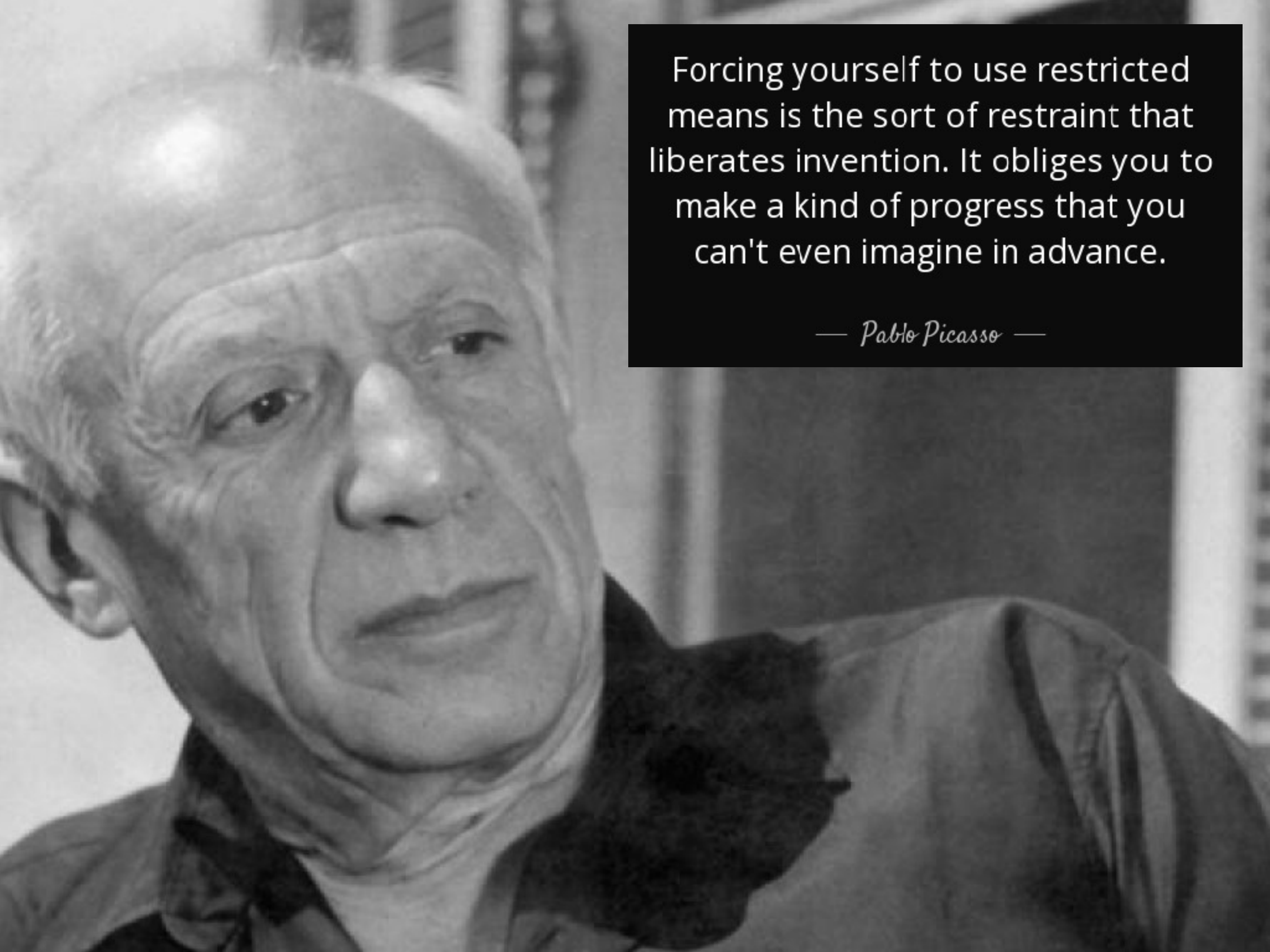








Activities



Forcing yourself to use restricted means is the sort of restraint that liberates invention. It obliges you to make a kind of progress that you can't even imagine in advance.

— *Pablo Picasso* —

Brief history of computing



1960's



1980's



2000's

3 “Waves” of computing

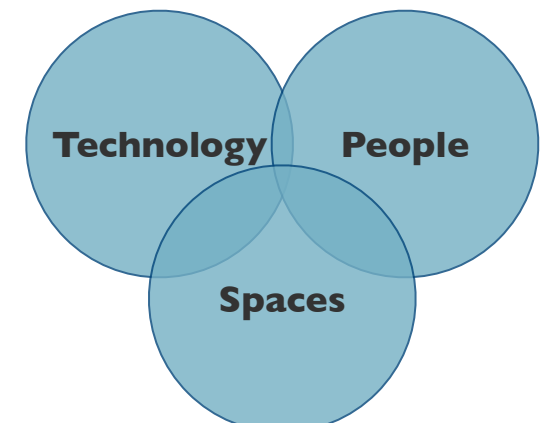
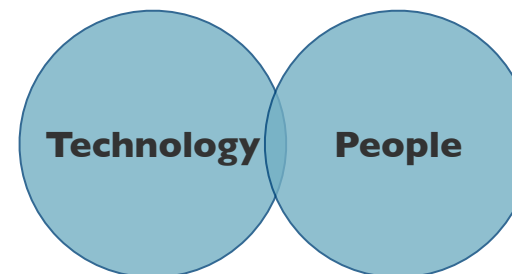
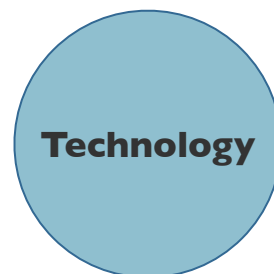
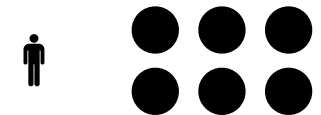


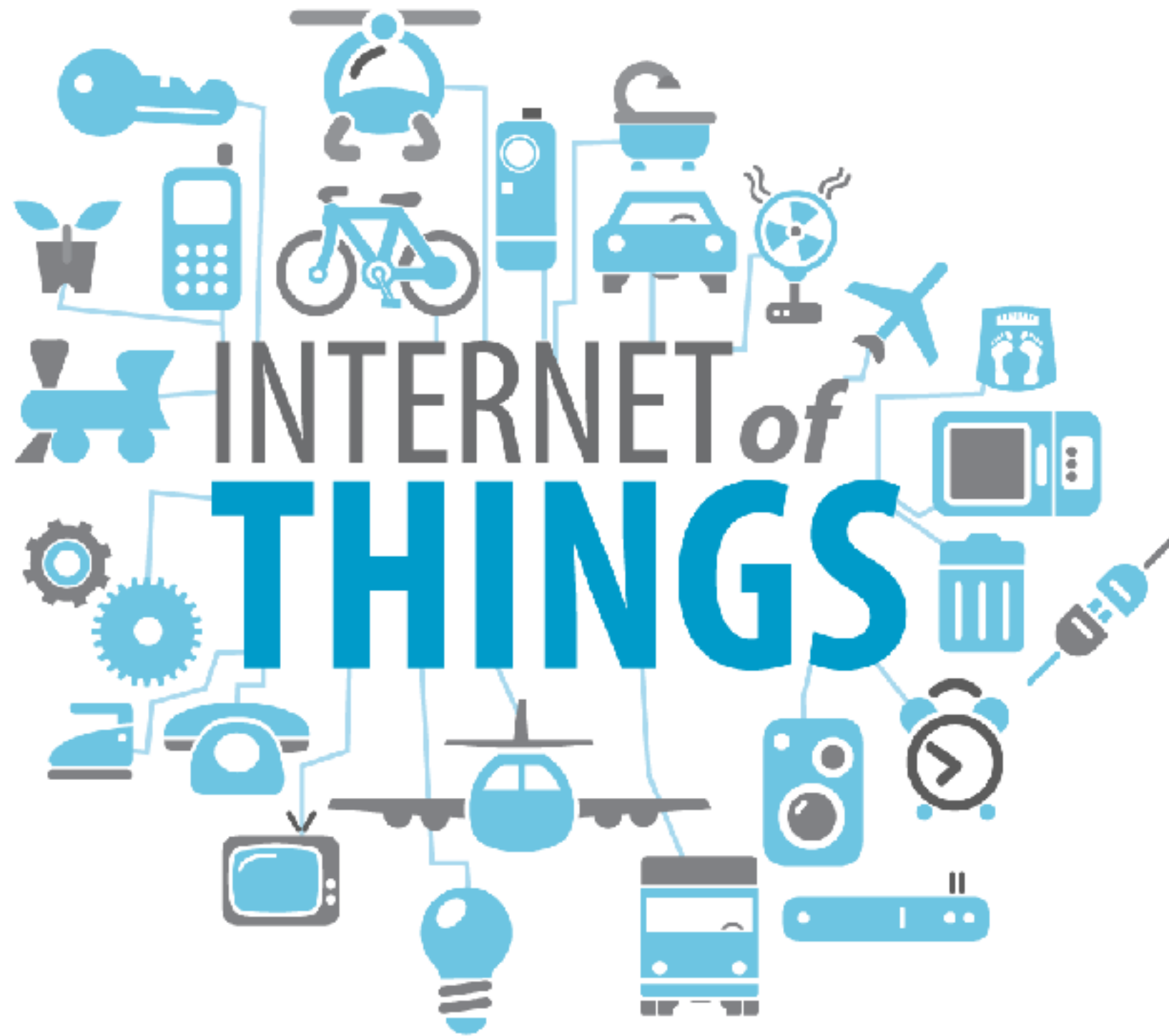
Capabilities

Size

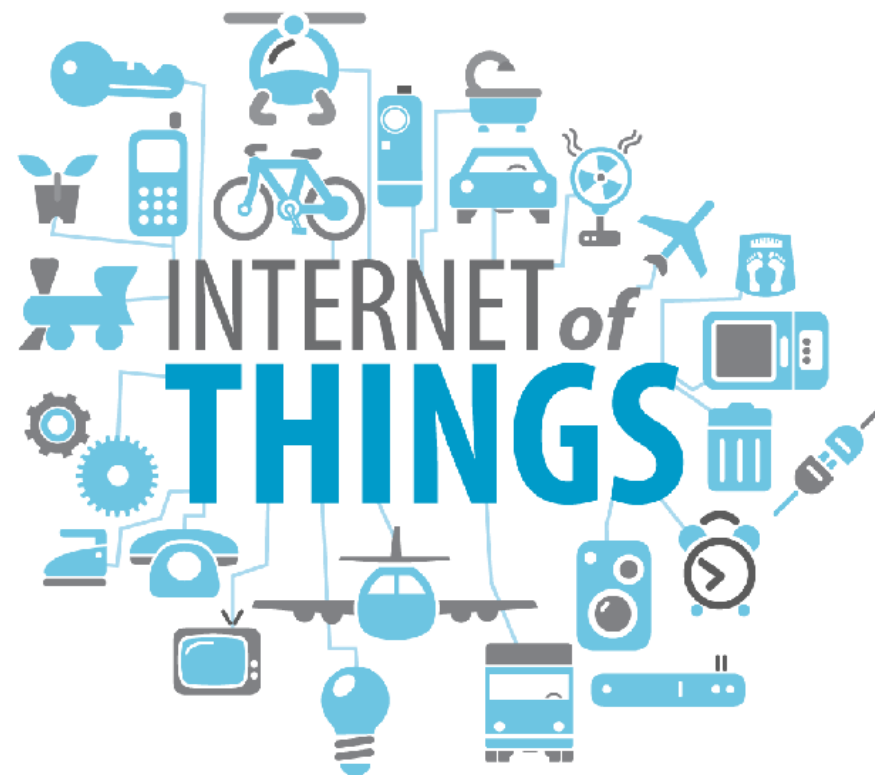
Usage

Research





Understand people -> build better technology



Study technology -> better understand people

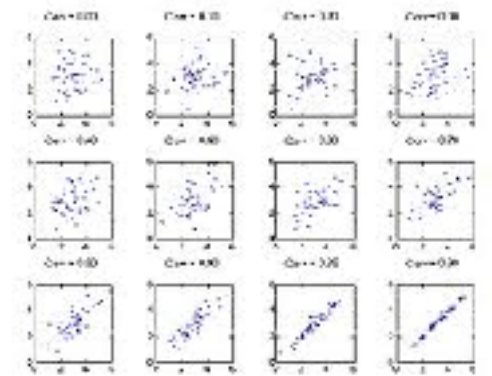
Modus operandi



Smartphone/Facebook
data



Calculate metrics



Establish correlations
Describe behaviour



Behaviour, attitudes,
questionnaires, etc.



Calculate metrics

Sources

Social Media
Smartphone use
Smart city
Interaction



Insights

Happiness
Personality
Habits
Exposure

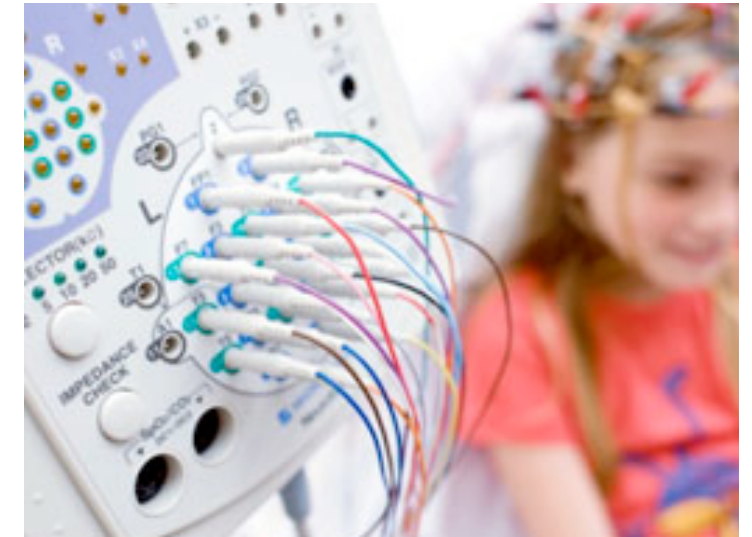
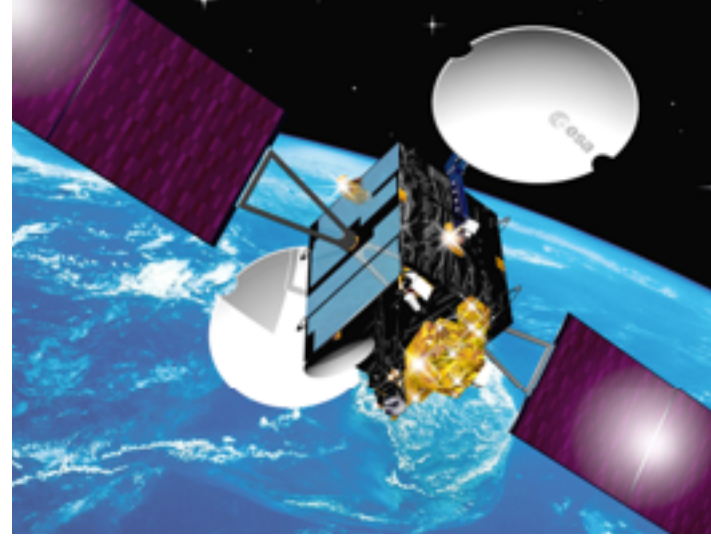
Methods

Smartphone instrumentation
Crowdsourcing
In-the-wild methods

Smartphones for science



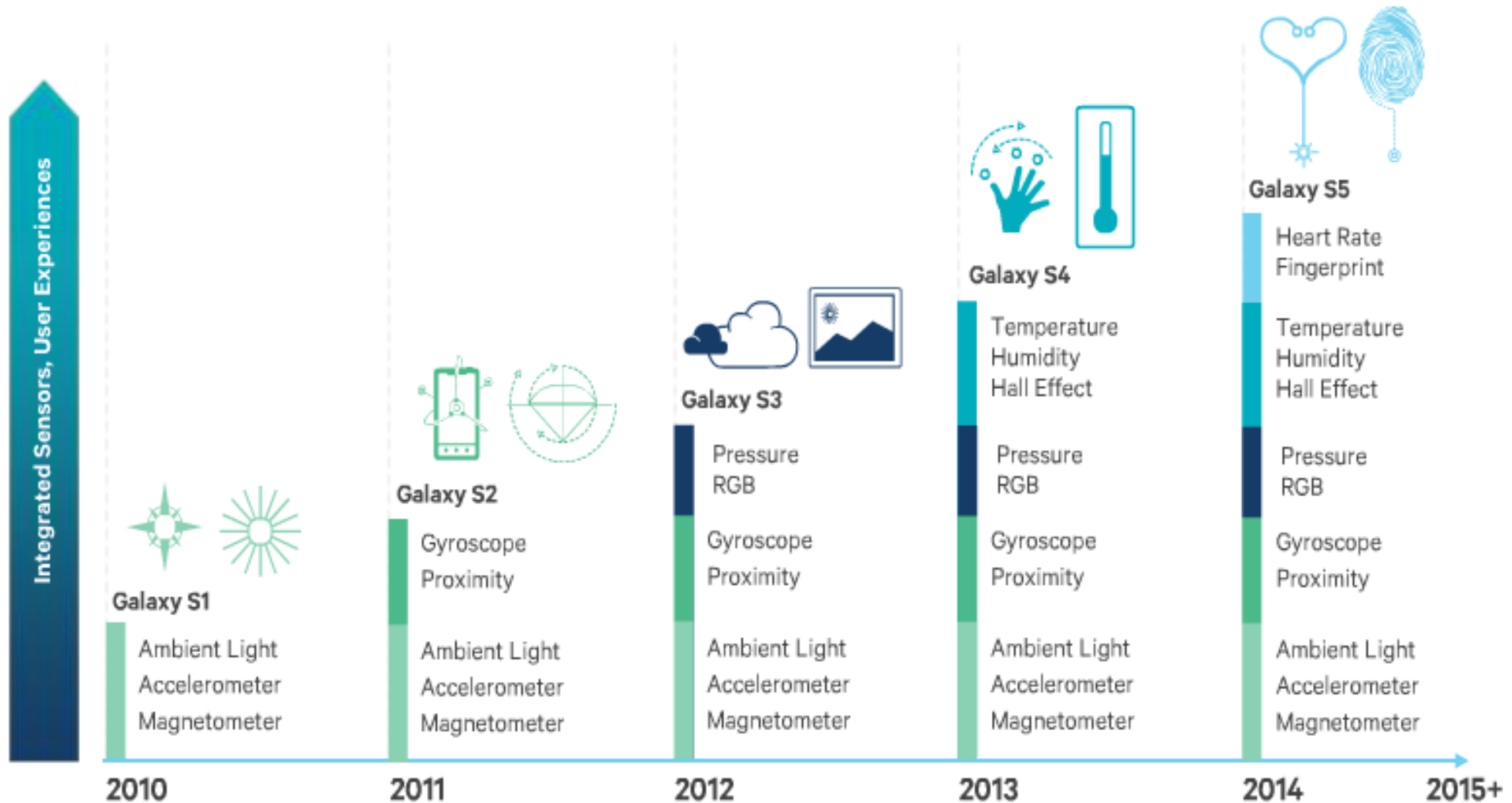
Scientific instruments



Non-invasive sensing



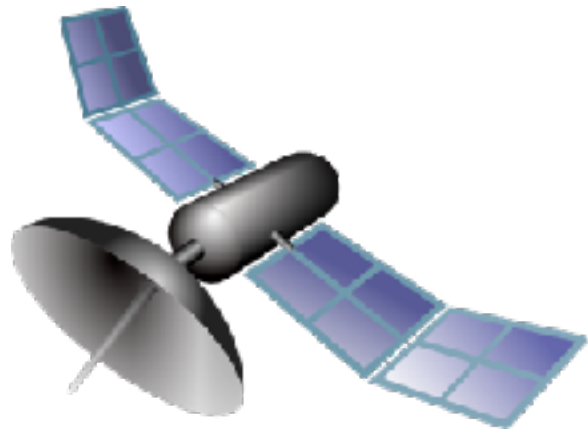
Sensor growth in smartphones



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In the next year



1 700

80 000 000



350 000 000



1 500 000 000



5 x



dreamstime.com

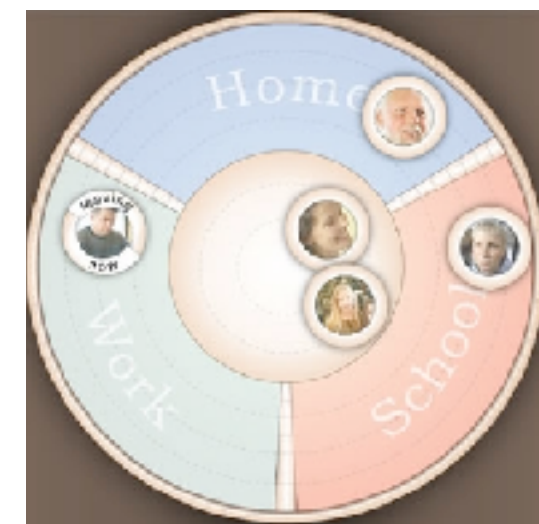
What to
analyse?

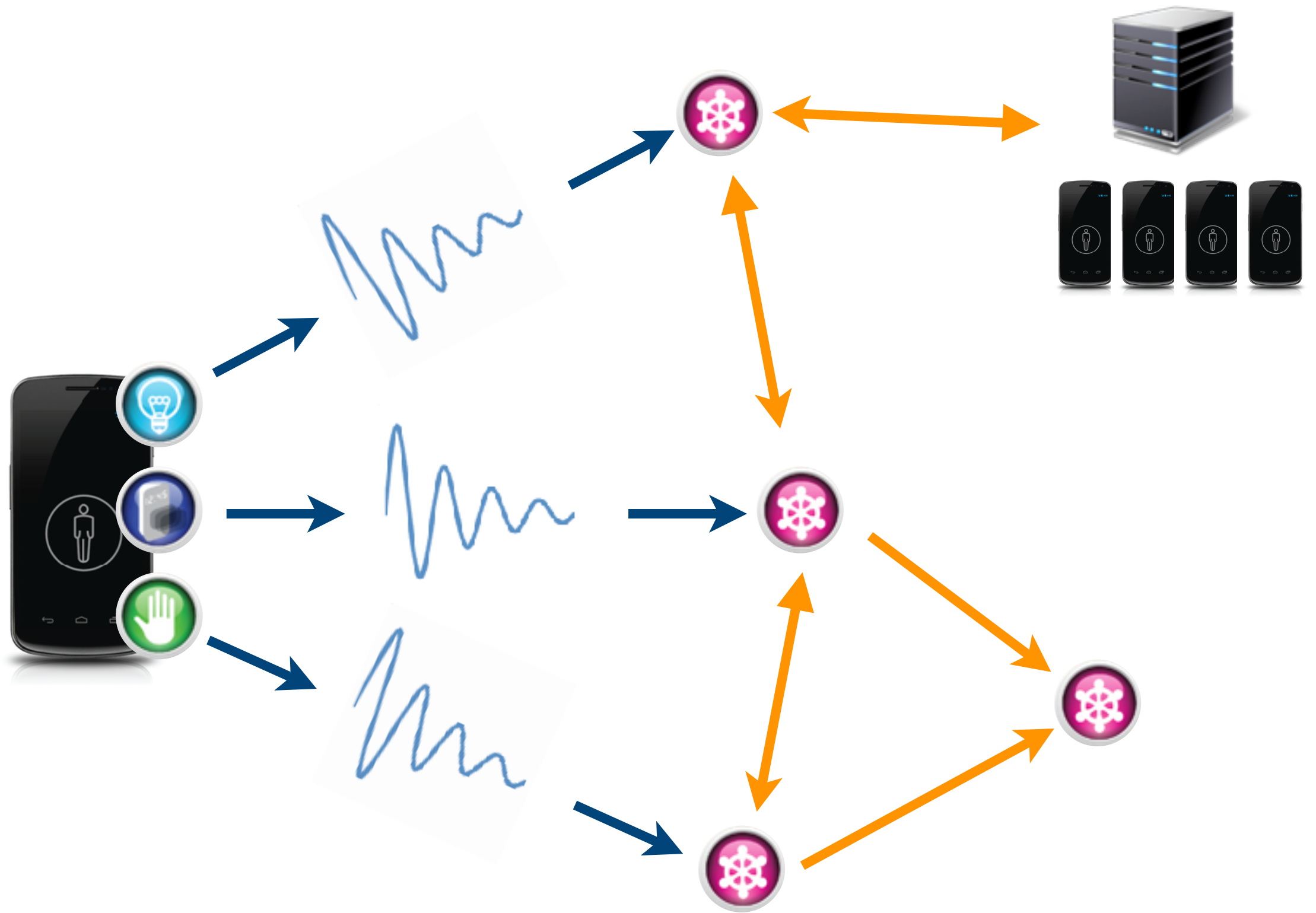


How to
analyse?



Start
from
scratch





Hardware



Software



Human



Meta

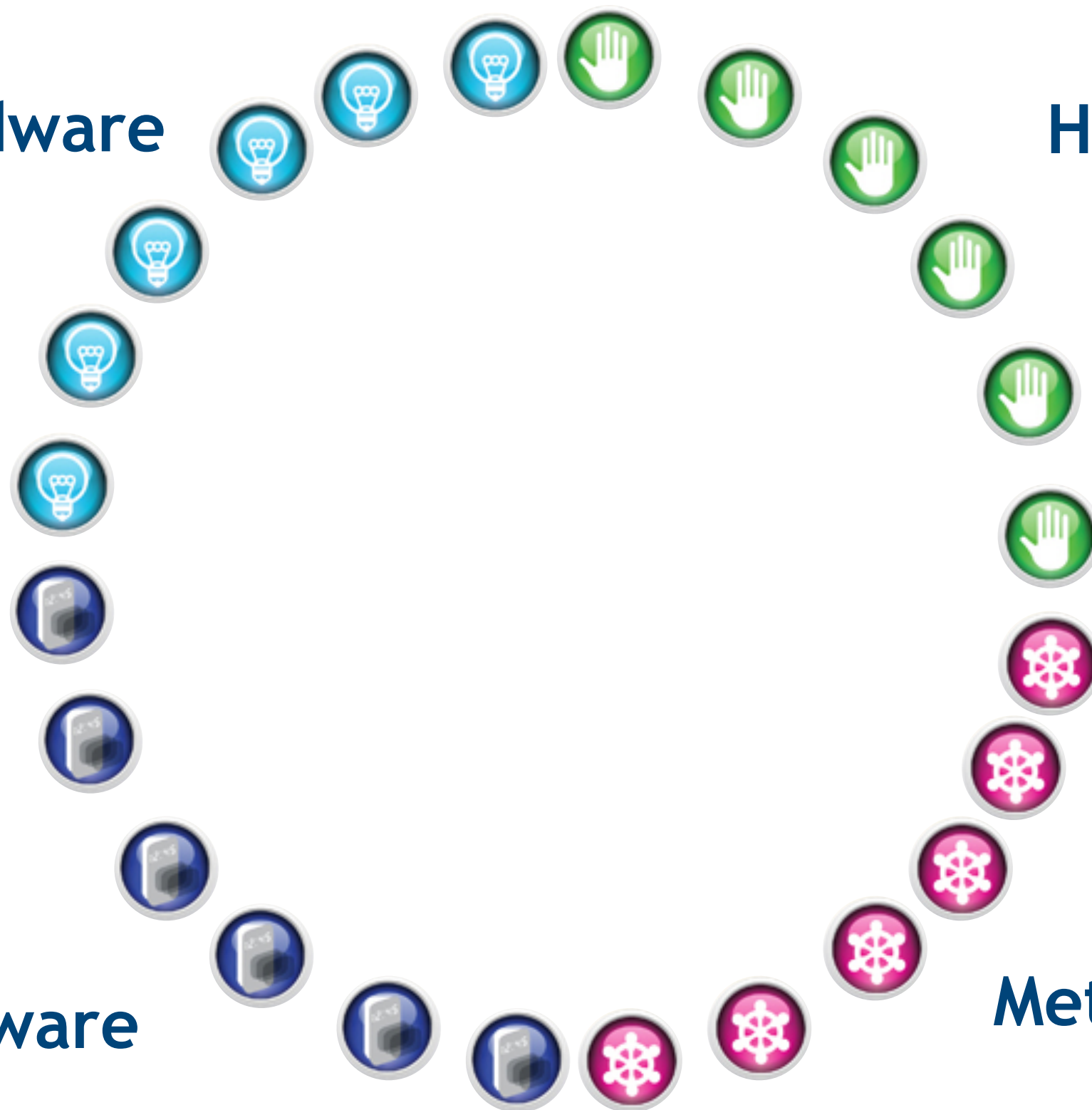


Hardware

Human

Software

Meta

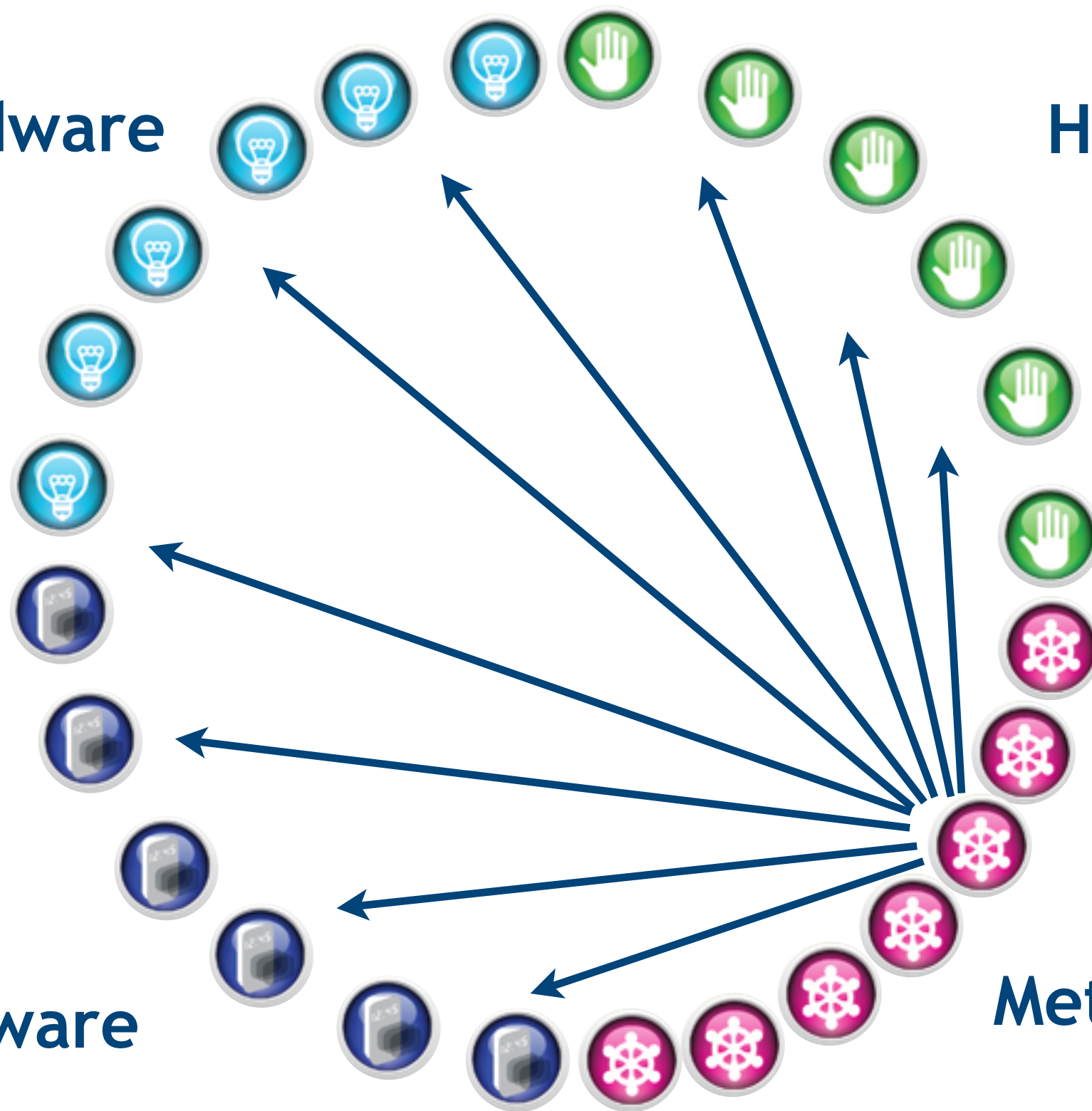


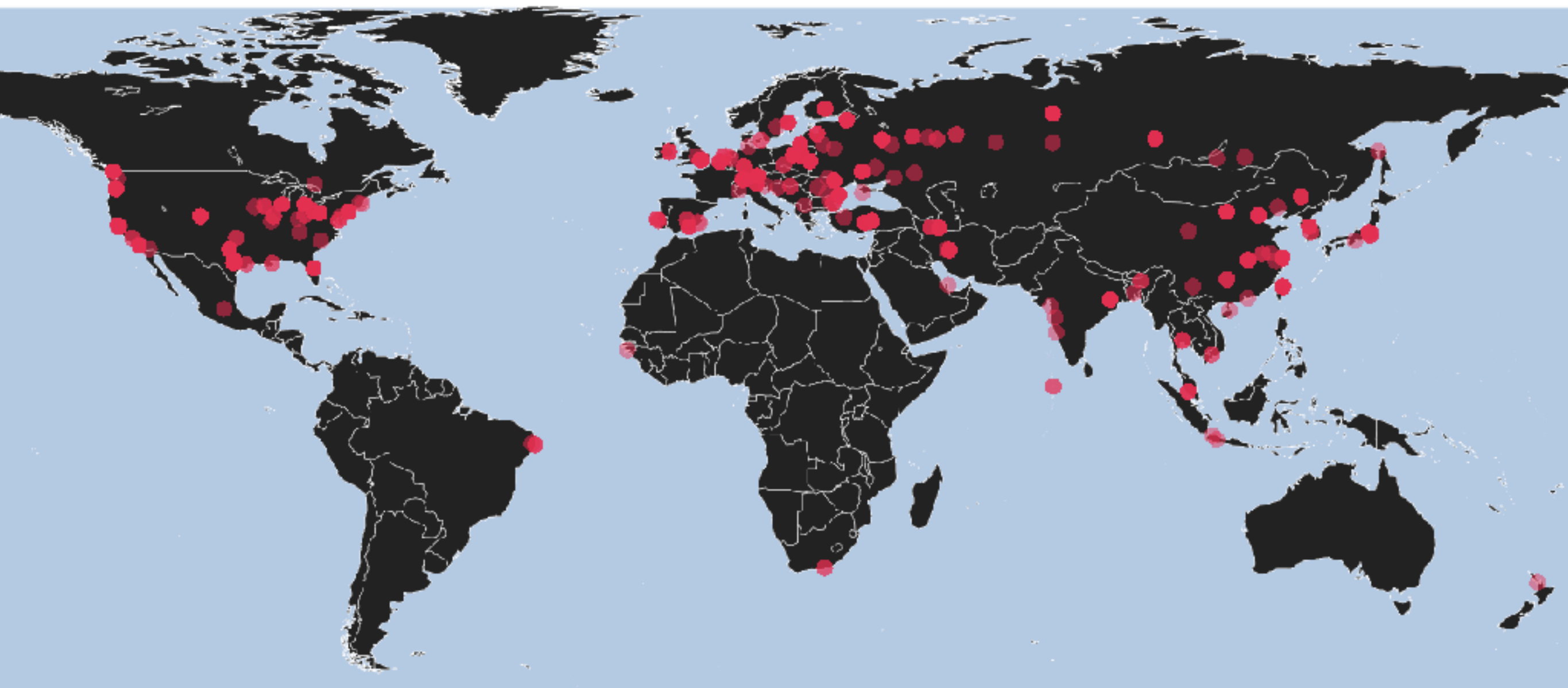
Hardware

Human

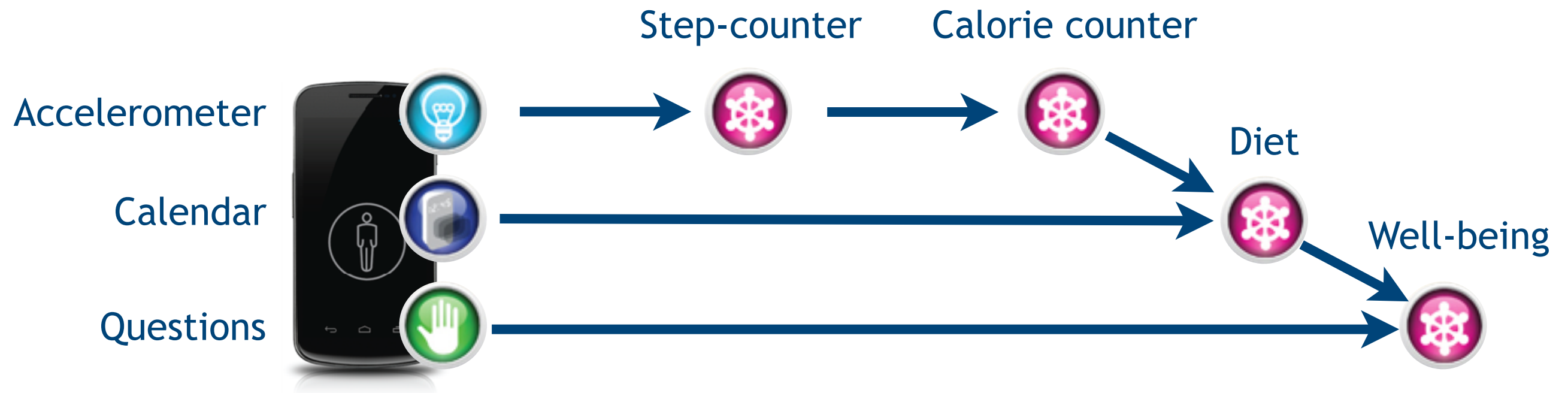
Software

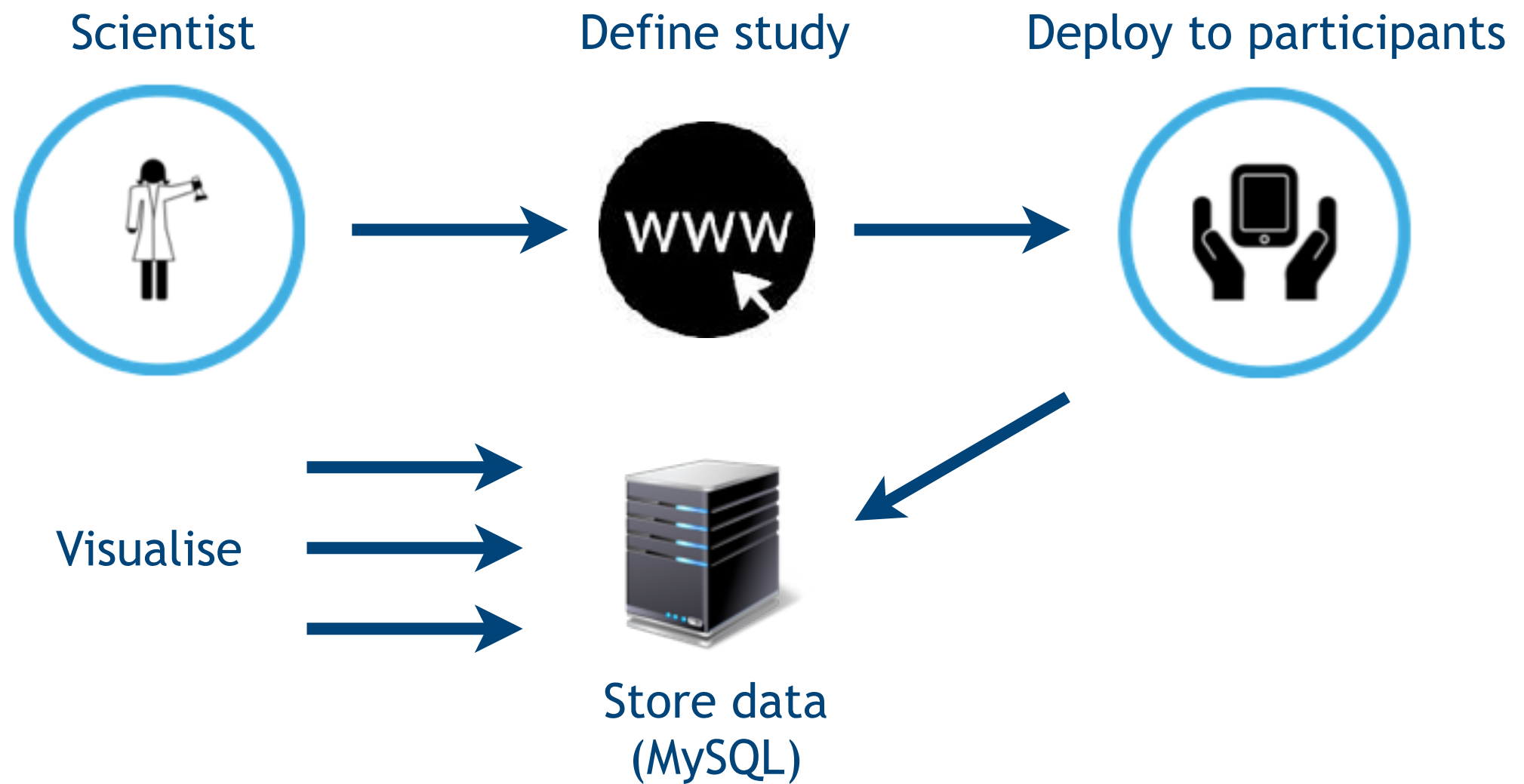
Meta





“LEGO” - context





Scientific instrument



Experience Sampling Method

Passive sensor collection

Behavioural studies
(Personality prediction)

Medical studies
(Parkinson's / Cancer / Pain)

Environmental exposure studies
(Urban mobility)

Transport engineering
(Crowd simulation, queue modelling)

Economics
(Power consumption modelling)

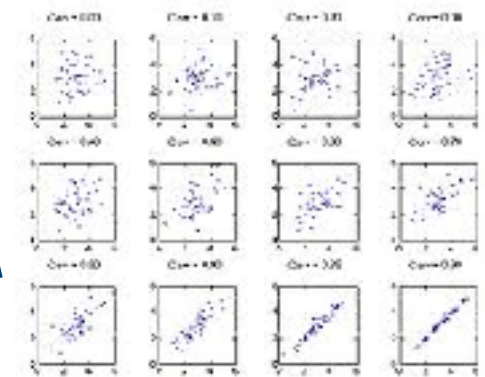


Measurement

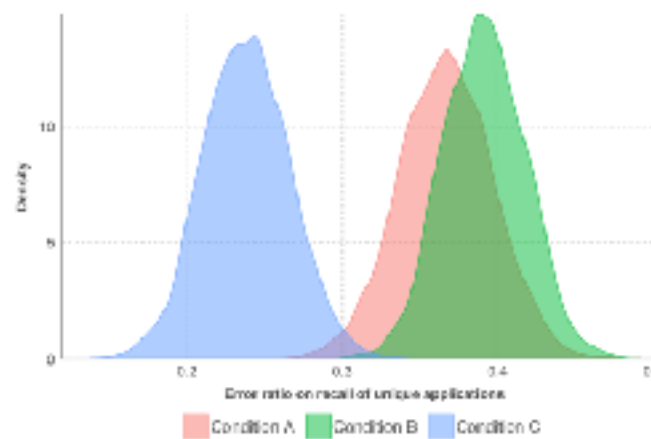
Phenomena



Sample data



Analysis/Statistics

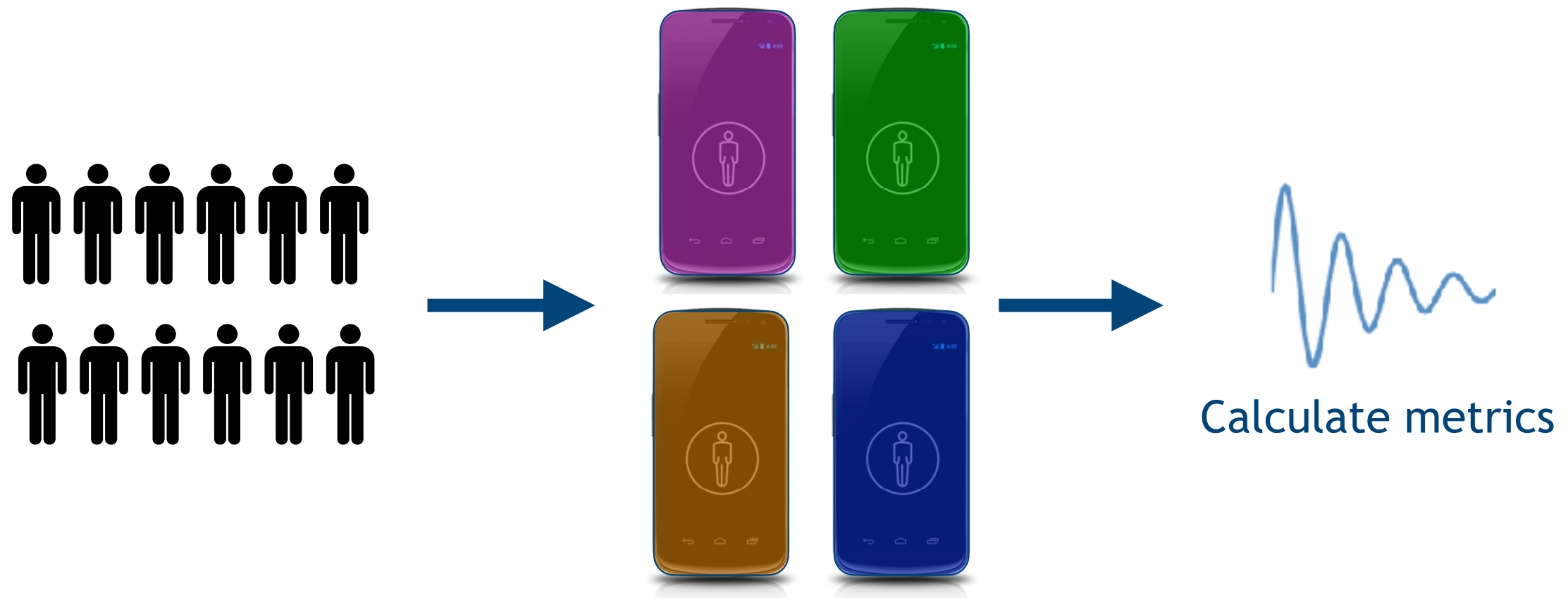


Concerns

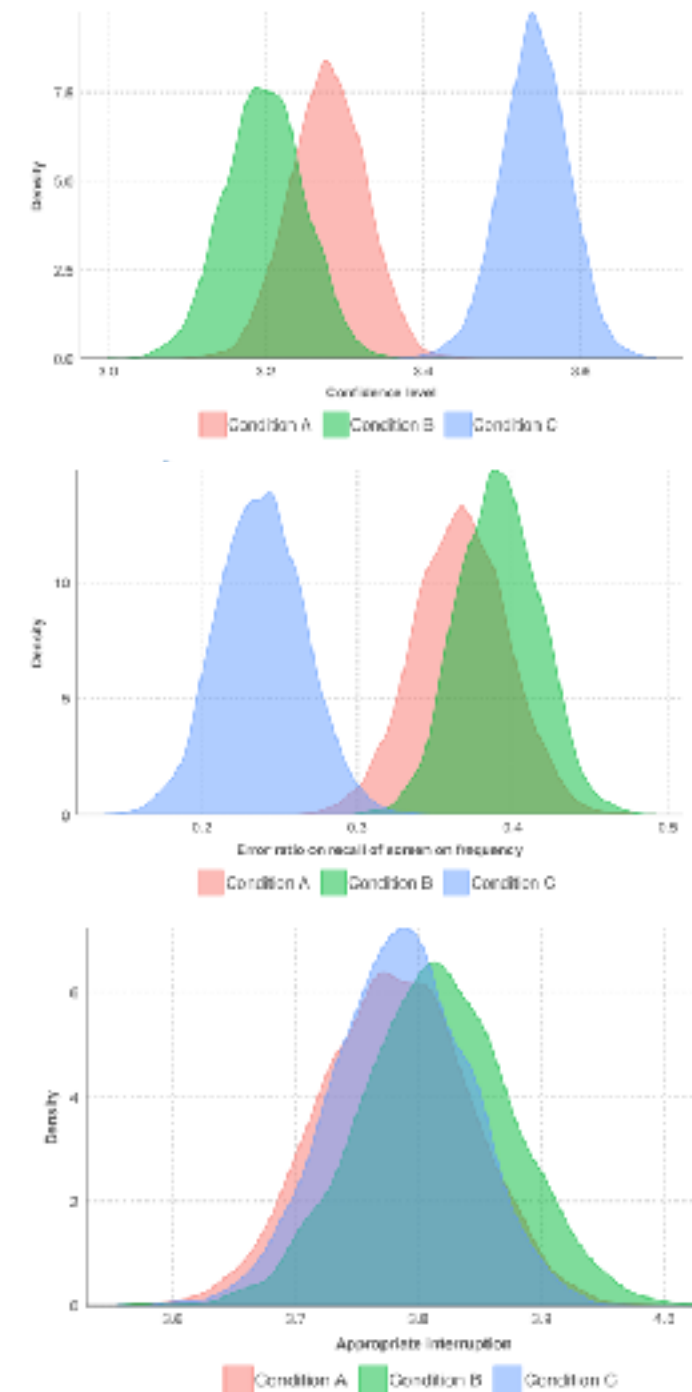
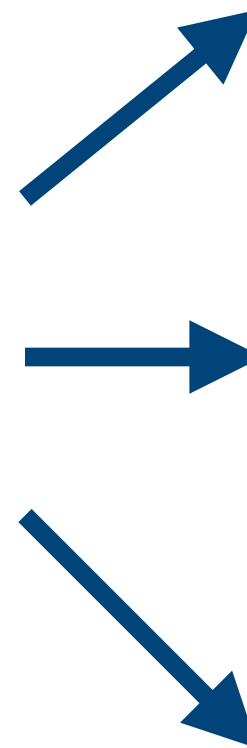
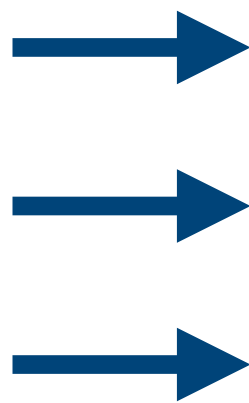
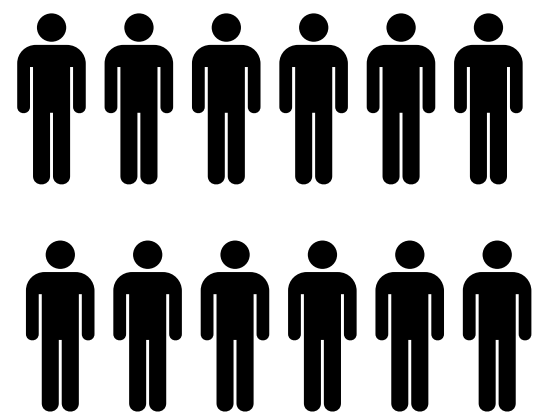


- Bias
 - Reliability
 - Transparency
 - Repeatability
-
- Privacy
 - Battery life
 - Convenience

Repeatability: automated testing



Reliability: ESM/EMA accuracy



Privacy: on-board inference



Convenience: gamification



Convenience: crowdsourcing

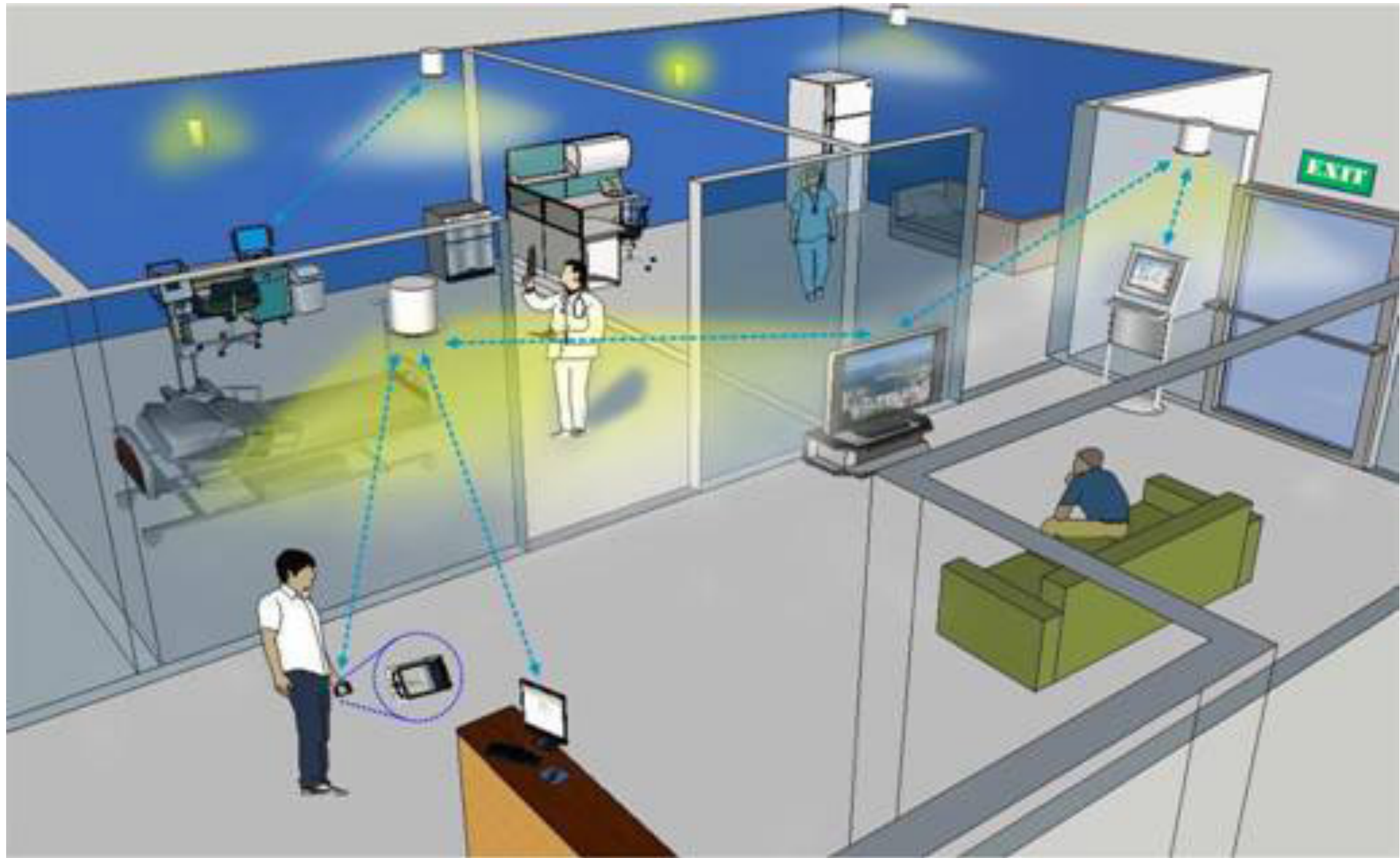


Convenience: crowdsourcing

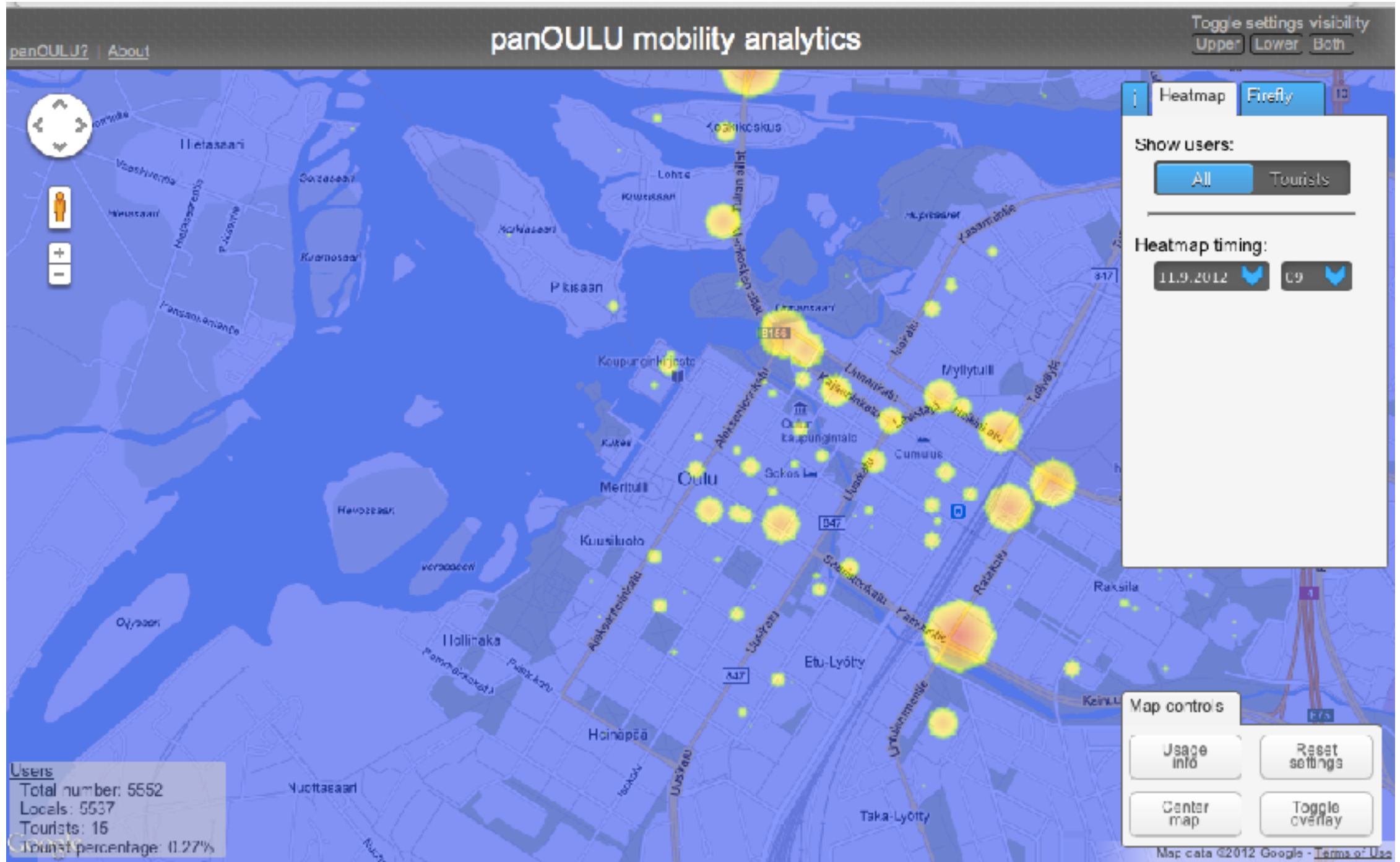


What the future holds

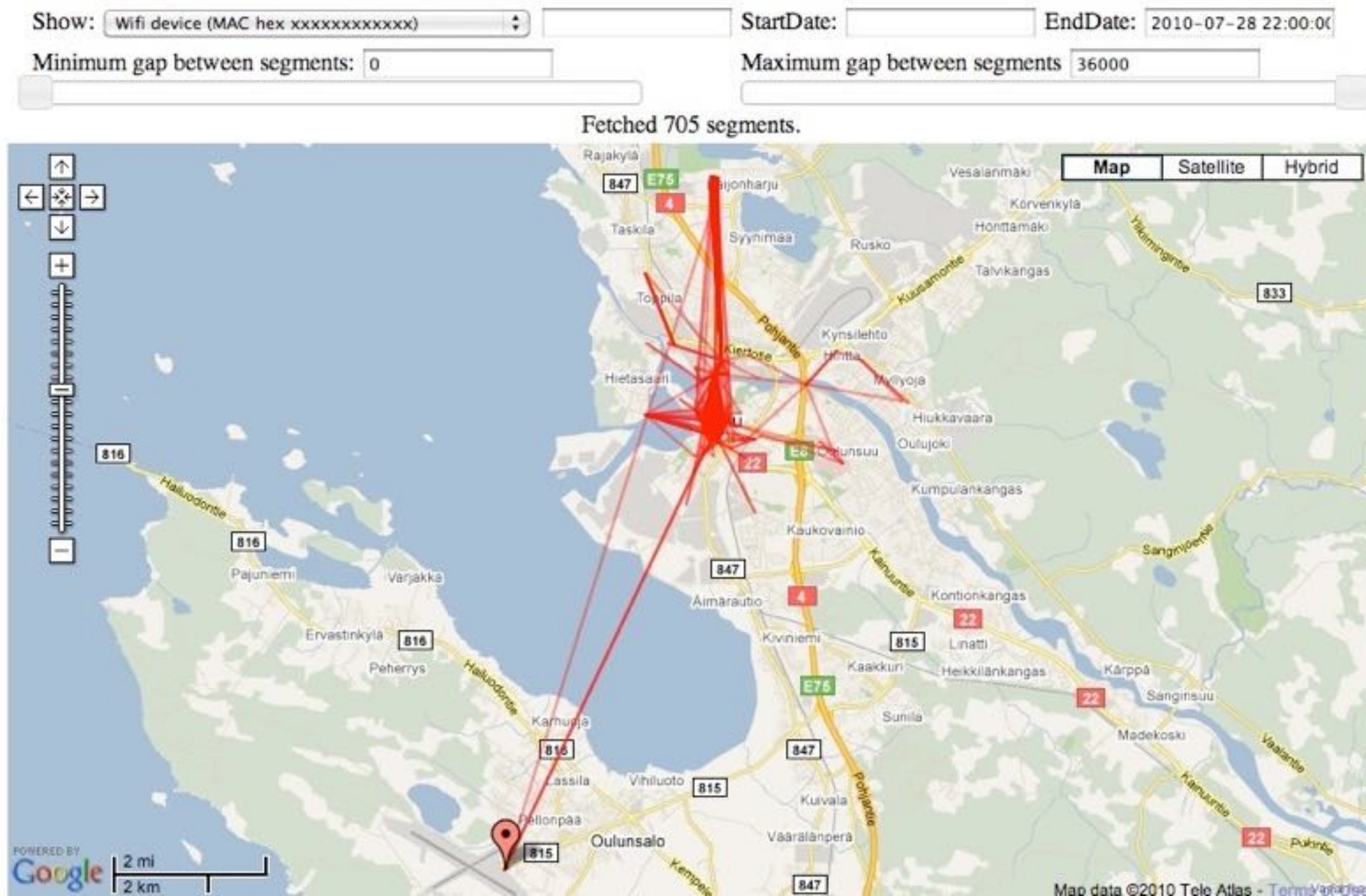
Affordability

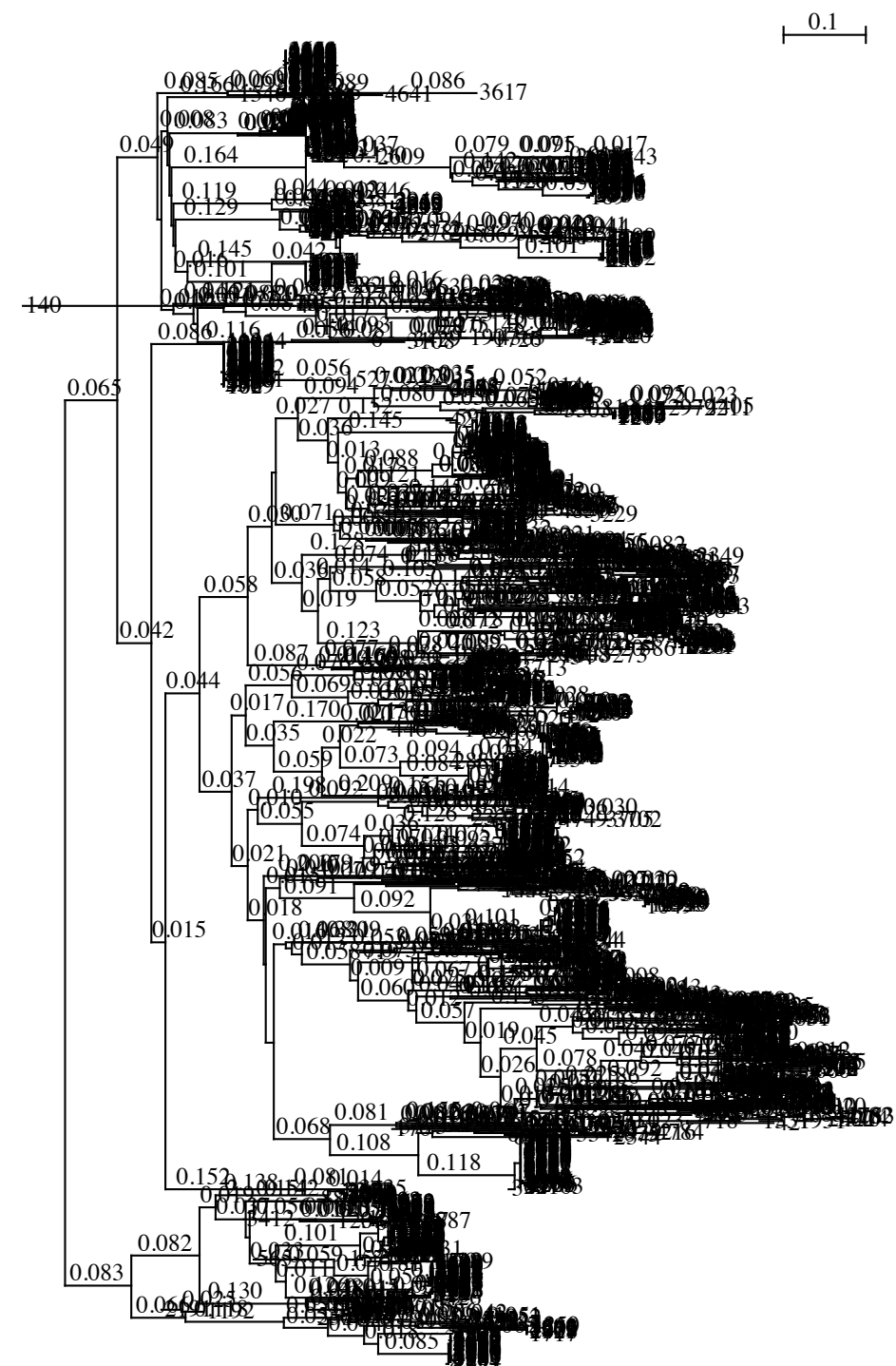
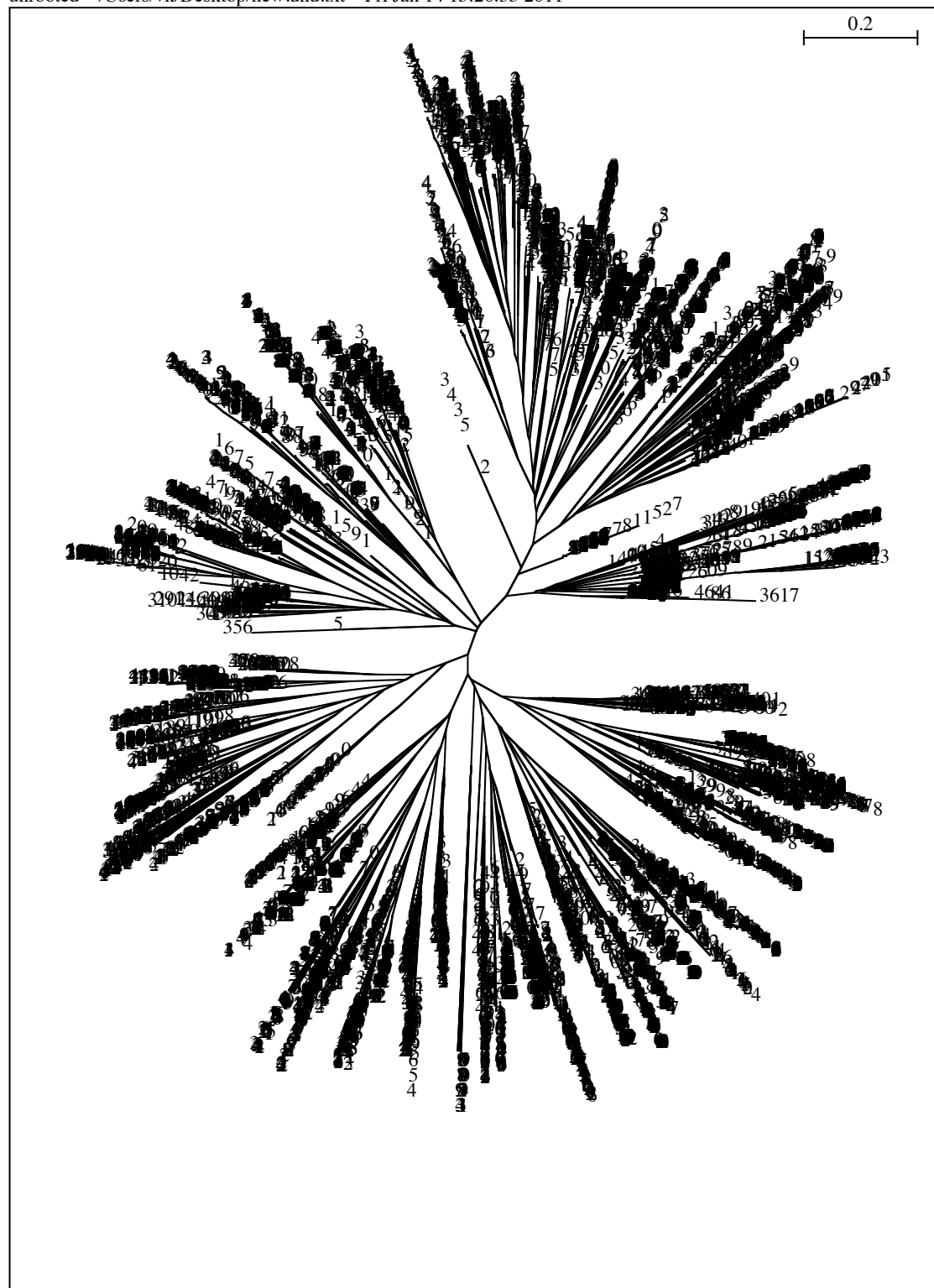


Smart cities - public goods



Profiling behaviour





Lifestyle sensing





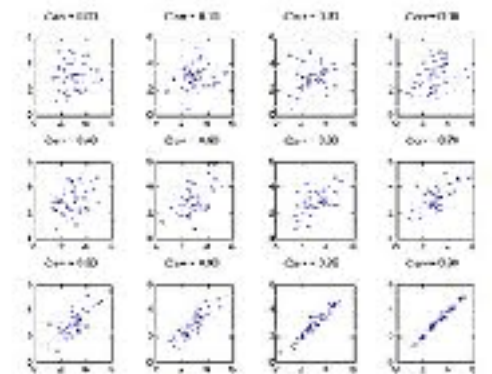
Modus operandi



Digital phenotype



Calculate metrics



Establish correlations
Prescribe treatment



Treatments



Calculate metrics



Cool new sensors



NIRS: Near Infrared Spectroscopy

The end!

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