



Tracking People: Design Considerations

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Structure

Who I am and What do I do?

Challenges in Designing Complex (Tracking) Systems:

Specialisation

Collingridge's Dilemma

Bounded Rationality

Tools that might help(?):

User-Centred Design

Sociotechnical Systems Analysis

Critical Design

Who am I?

BEng (hons) Mechanical Engineering

PhD Mechanical Engineering

Lecturer in Product Design

Chartered Engineer

Research:

Rehabilitation Robotics

Engineering Design and Ergonomics

Measuring Motor Capabilities
and Task Demands



I don't work alone...



Psychologists



Mark Mon-Williams



Rachel Coats



Geoff Bingham

Sociologists



Angharad Beckett

Engineers



Brian Henson



Martin Levesley



Pete Culmer

Clinicians



Rory O'Connor

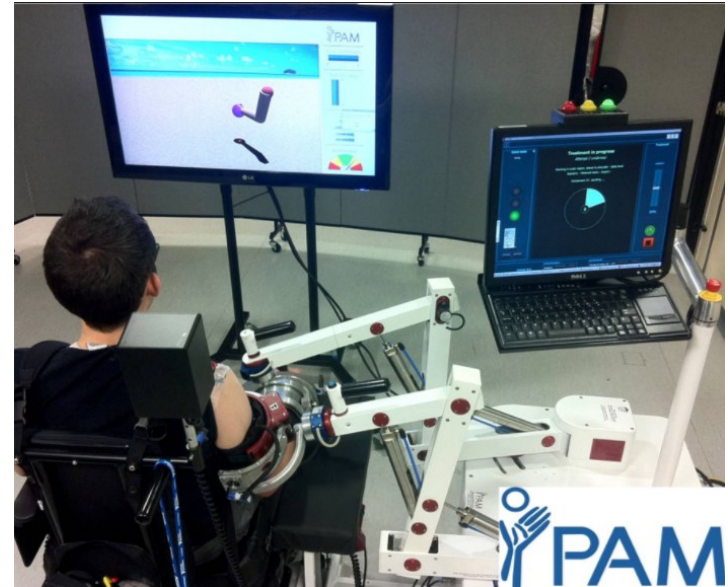
Rehab Robotics

Research upper limb impairments, particularly due to CP or stroke
Particularly how we can improve upper limb function through power-assisted movement

We specialise in “Robots for the Field”: deploying outside the lab.



MyPAM



iPAM

Engineering Design

Interested in how conditions combine with environmental factors to enable or disable activities of daily living...

...And how we can design objects/the environment for ease of use.

Also assessing fitness for purpose of AT and rehab devices – ensuring user needs are kept in focus.



Together Through Play

Measuring Motor Skills

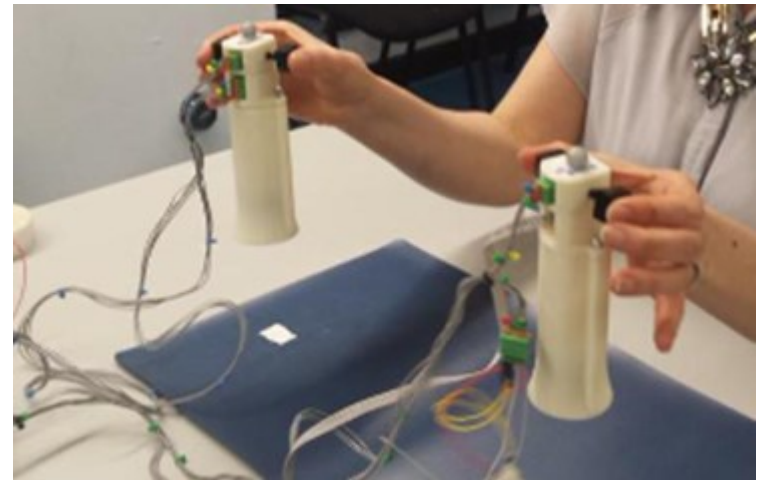
We need measures of motor skills for:

Rehab: Diagnosis and progress monitoring – current tools very blunt

Design: To assess the usability and inclusivity of designs – linking capabilities to task demands.



Postural Sway Assessment Tool



Finger Force Measures

Where's the Tracking?

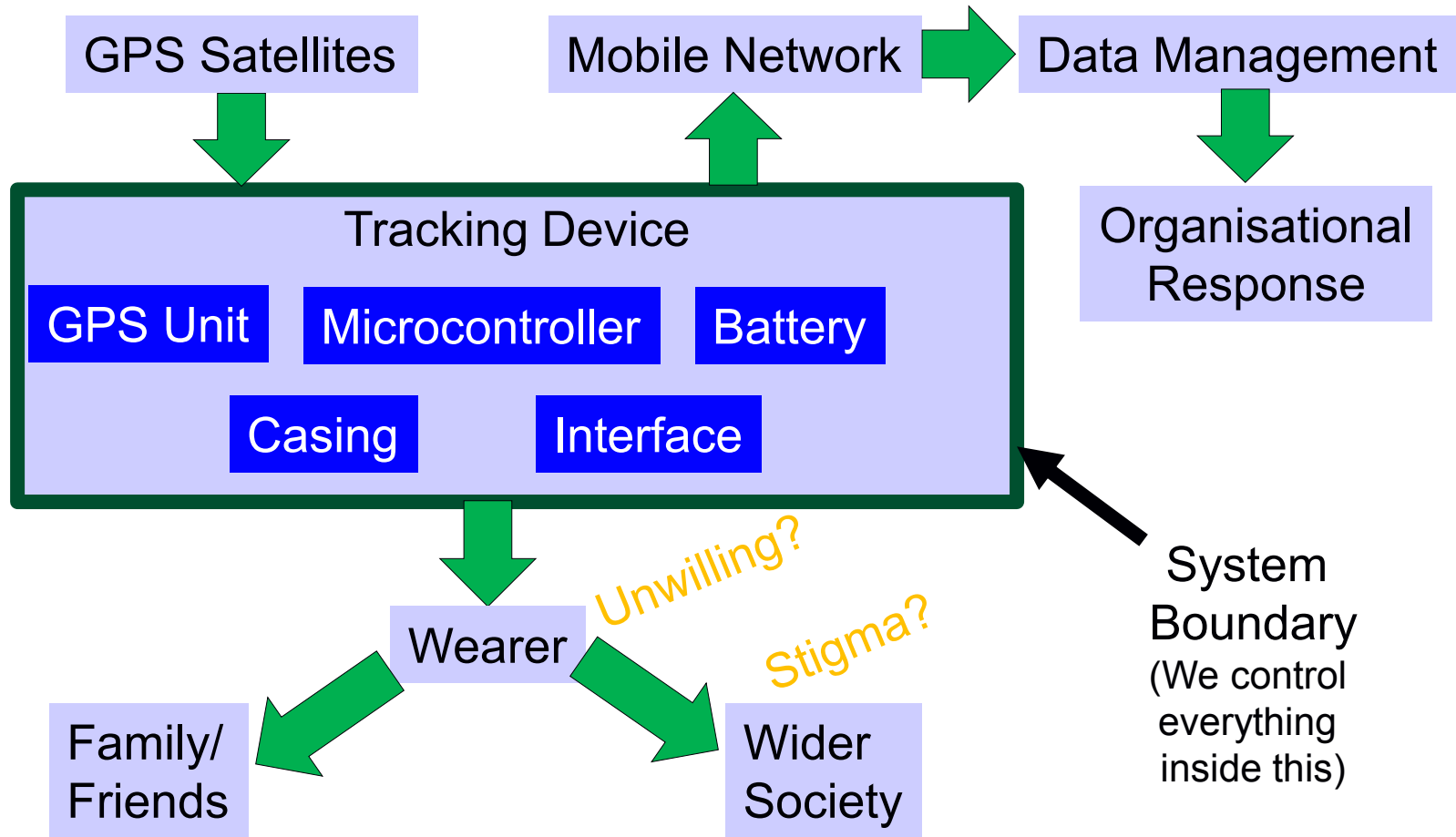
- 1) Monitoring of individual progress with rehab – feedback, and informing clinicians
- 2) Gathering large datasets on children's capabilities
- 3) Designing effective devices – we want these things used!



Challenges in Designing Complex (Tracking) Systems

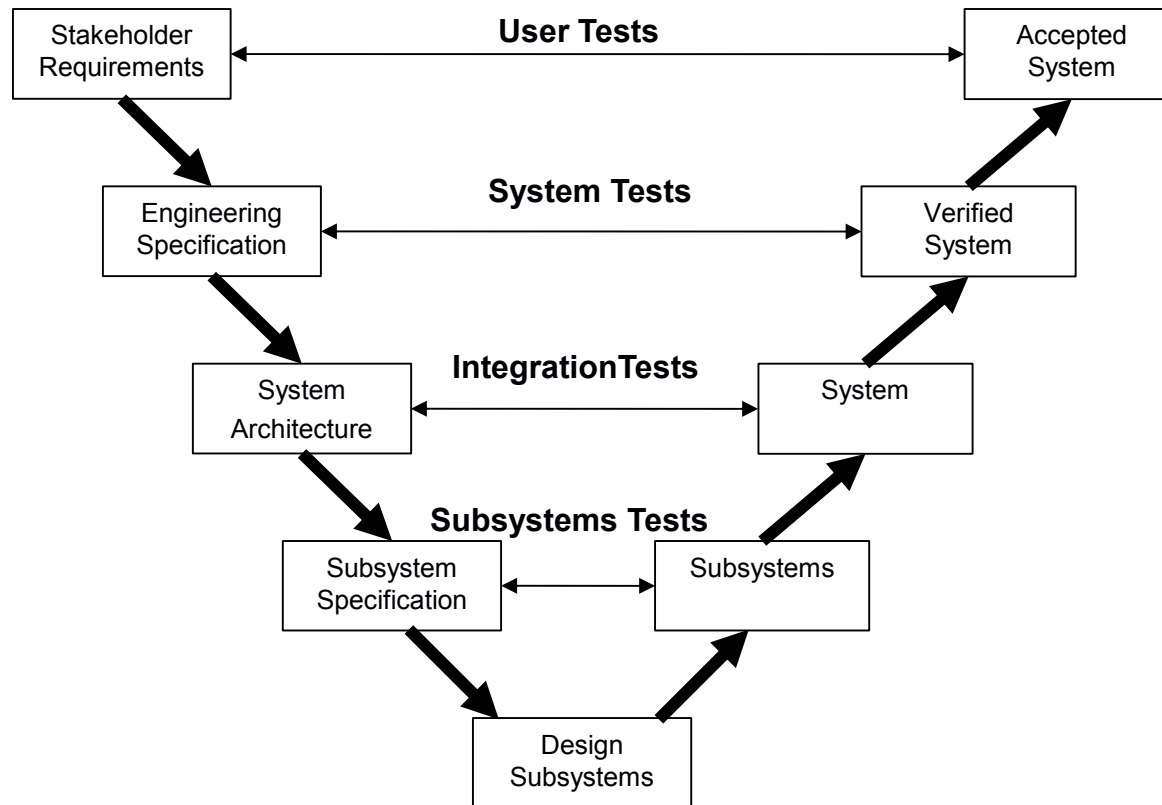
Designing Systems

All the World's A System... And So is Everything In It.



Designing Systems

The V-Model of Systems Engineering

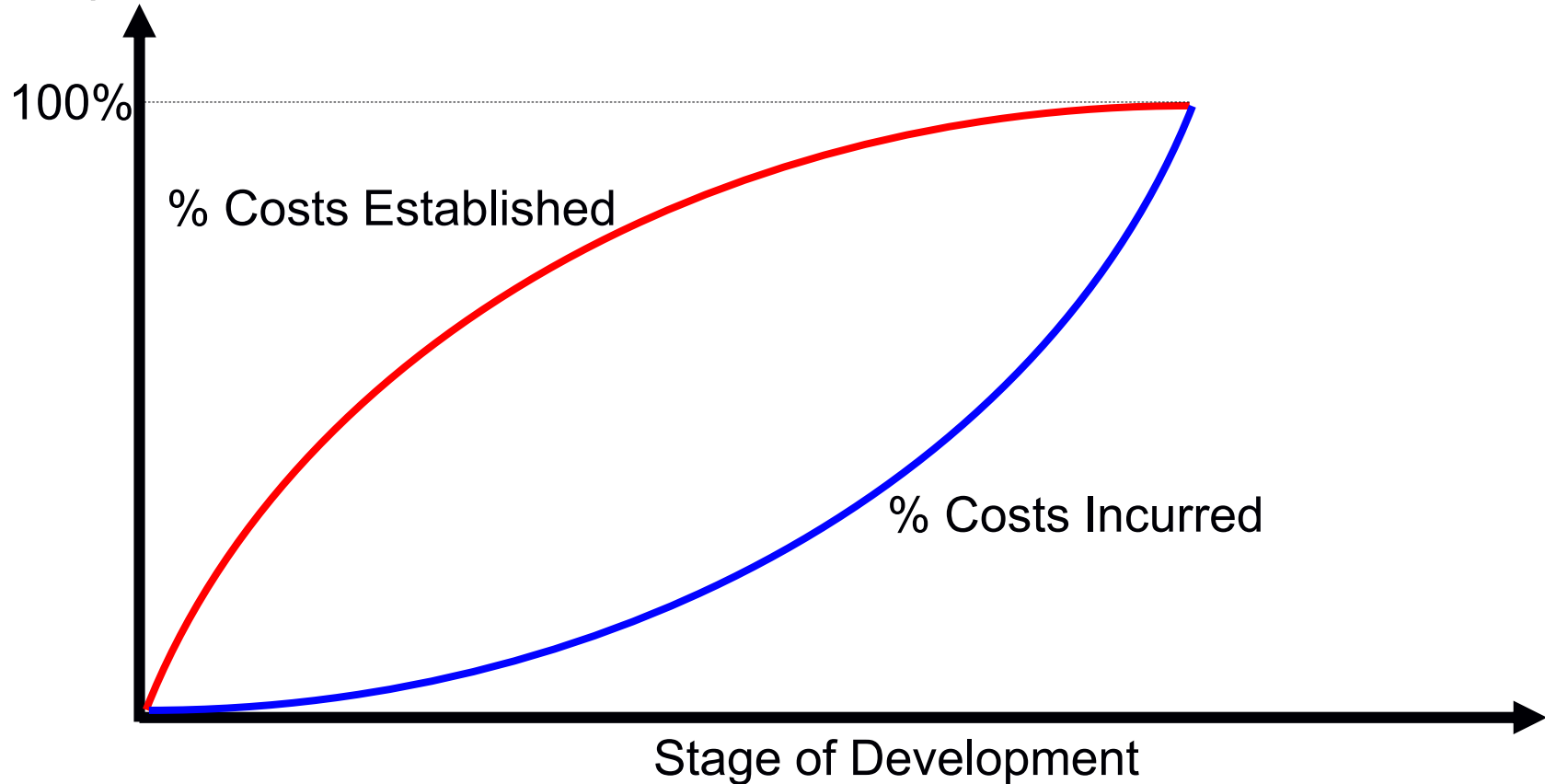


Designing Systems



Changes get harder as development progresses

Proportion of Total Cost



Designing Systems



Challenges:

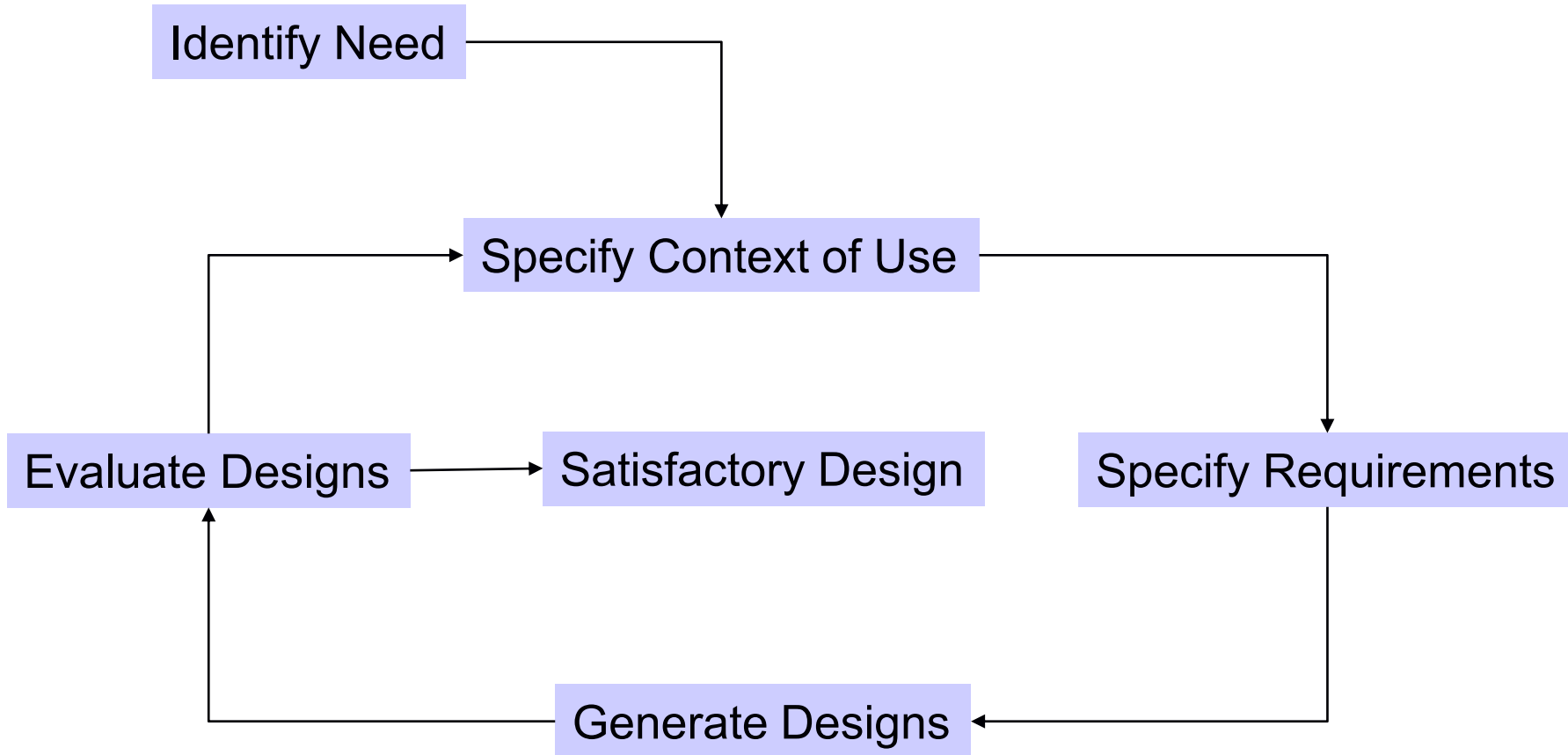
- 1) **Specialisation** - most engineers don't have the full picture.
- 2) **Collingridge's Dilemma** - by the time we know what the risks are, changes are difficult.
- 3) **Bounded Rationality** – it's hard to hold keep your attention on everything.



Some potential

Solutions for Designing Complex (Tracking) Systems

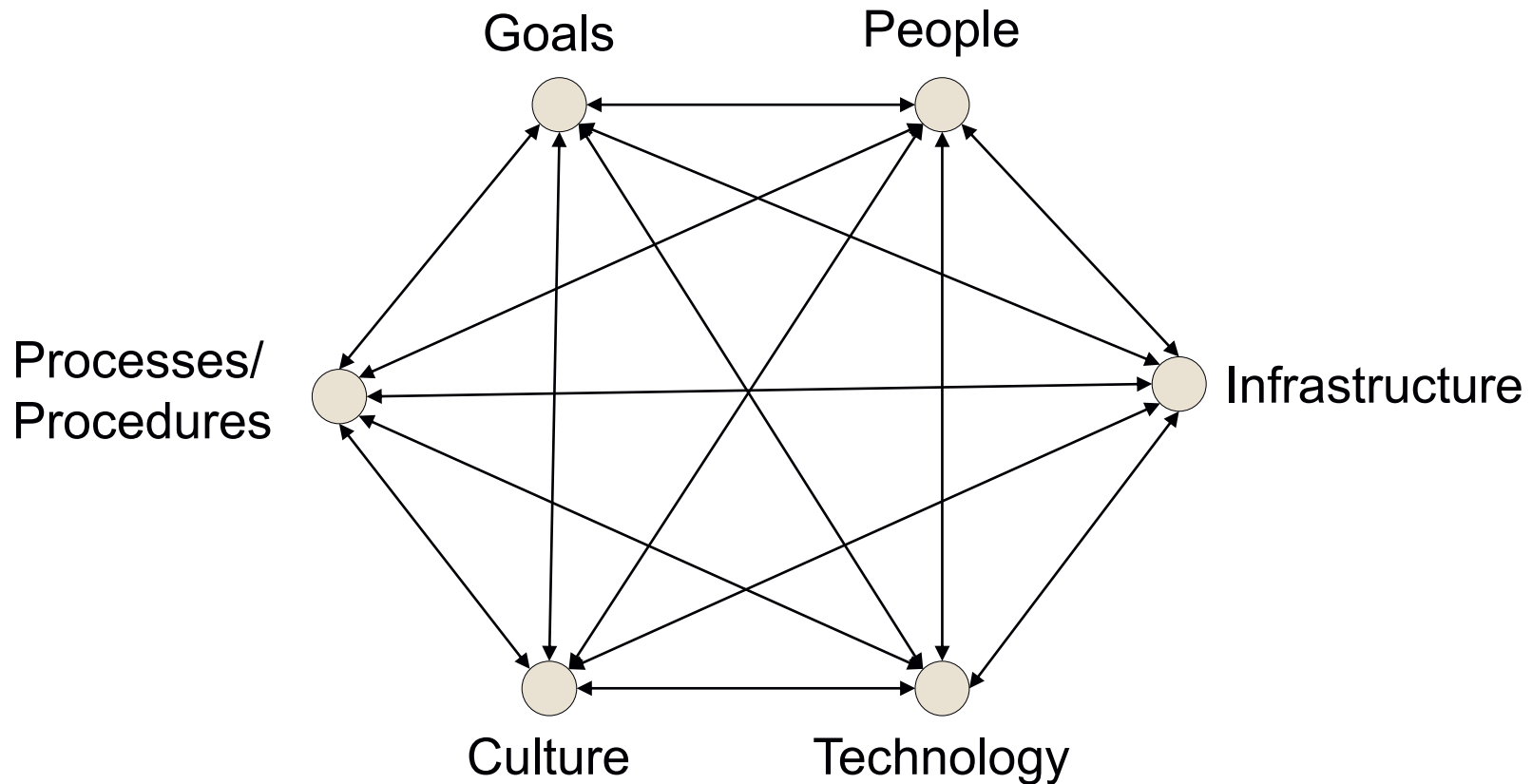
User-Centered Design



After ISO 9241-210: Ergonomics of Human-System Interaction

Sociotechnical Systems

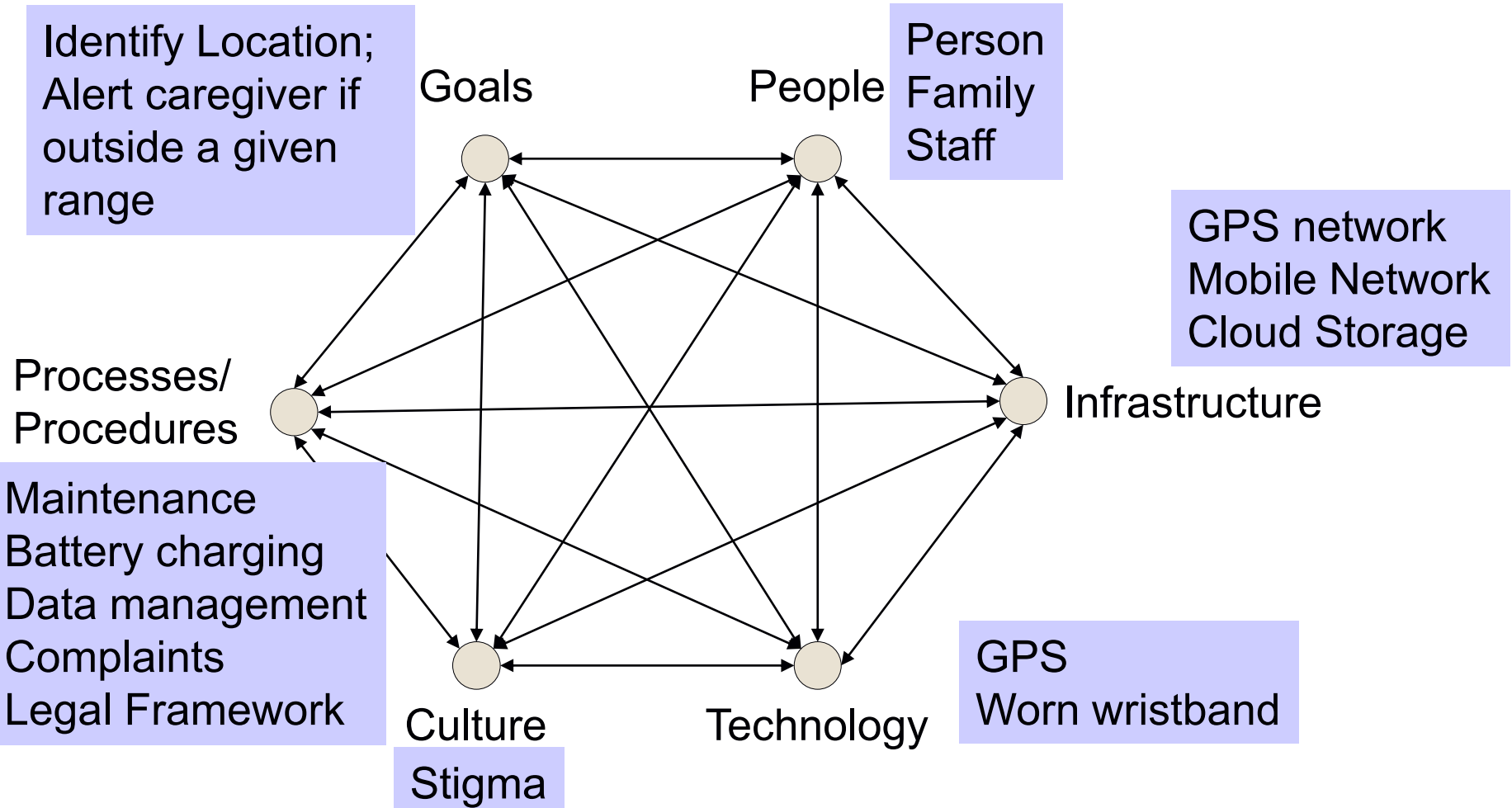
The Sociotechnical Framework (Clegg and Challenger, 2011)



Challenger R.& Clegg CW (2011) Crowd disasters: a socio-technical systems perspective
Contemporary Social Science 6(3)

Sociotechnical Systems

The Sociotechnical Framework (Clegg and Challenger, 2011)



Critical Design

Tuneable Cities - Car Radio

DUNNE & RABY



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