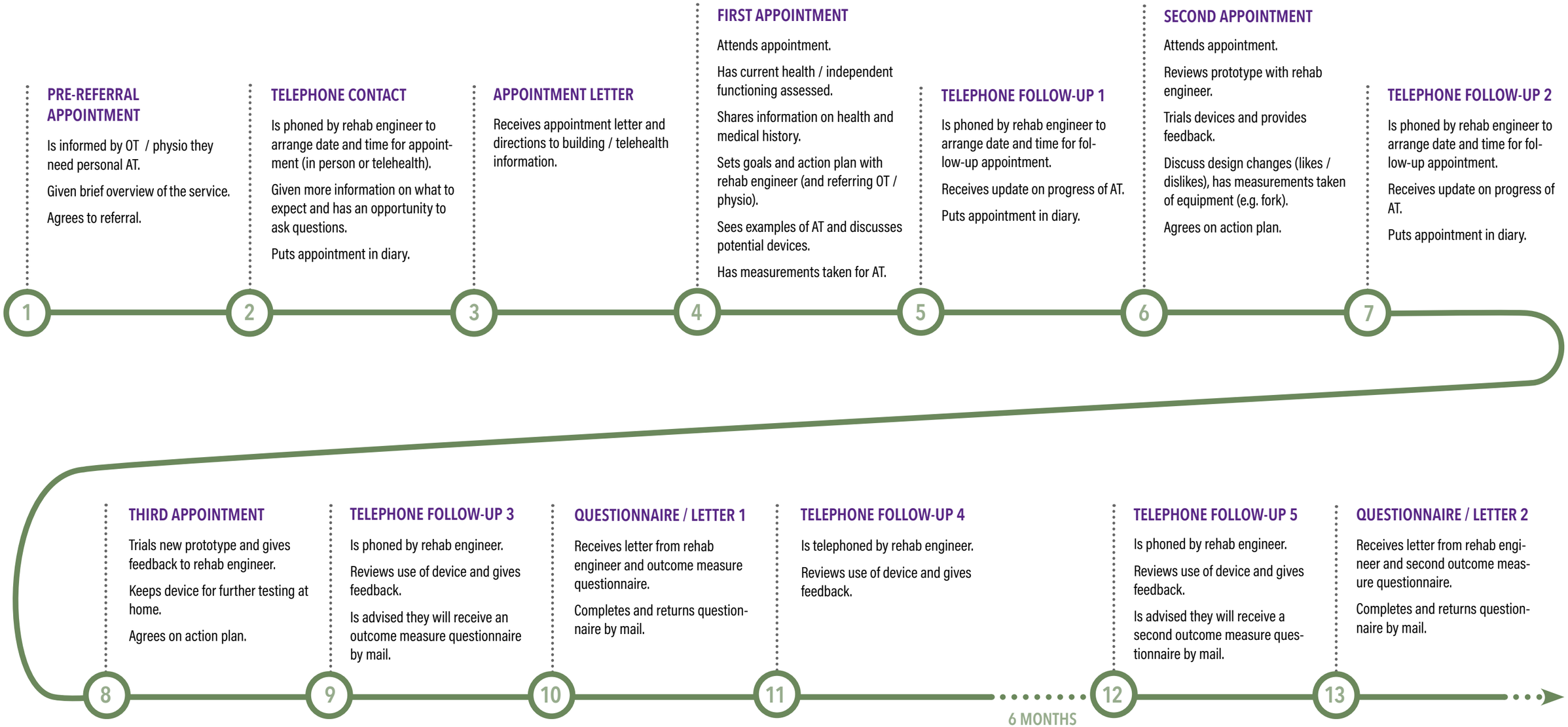
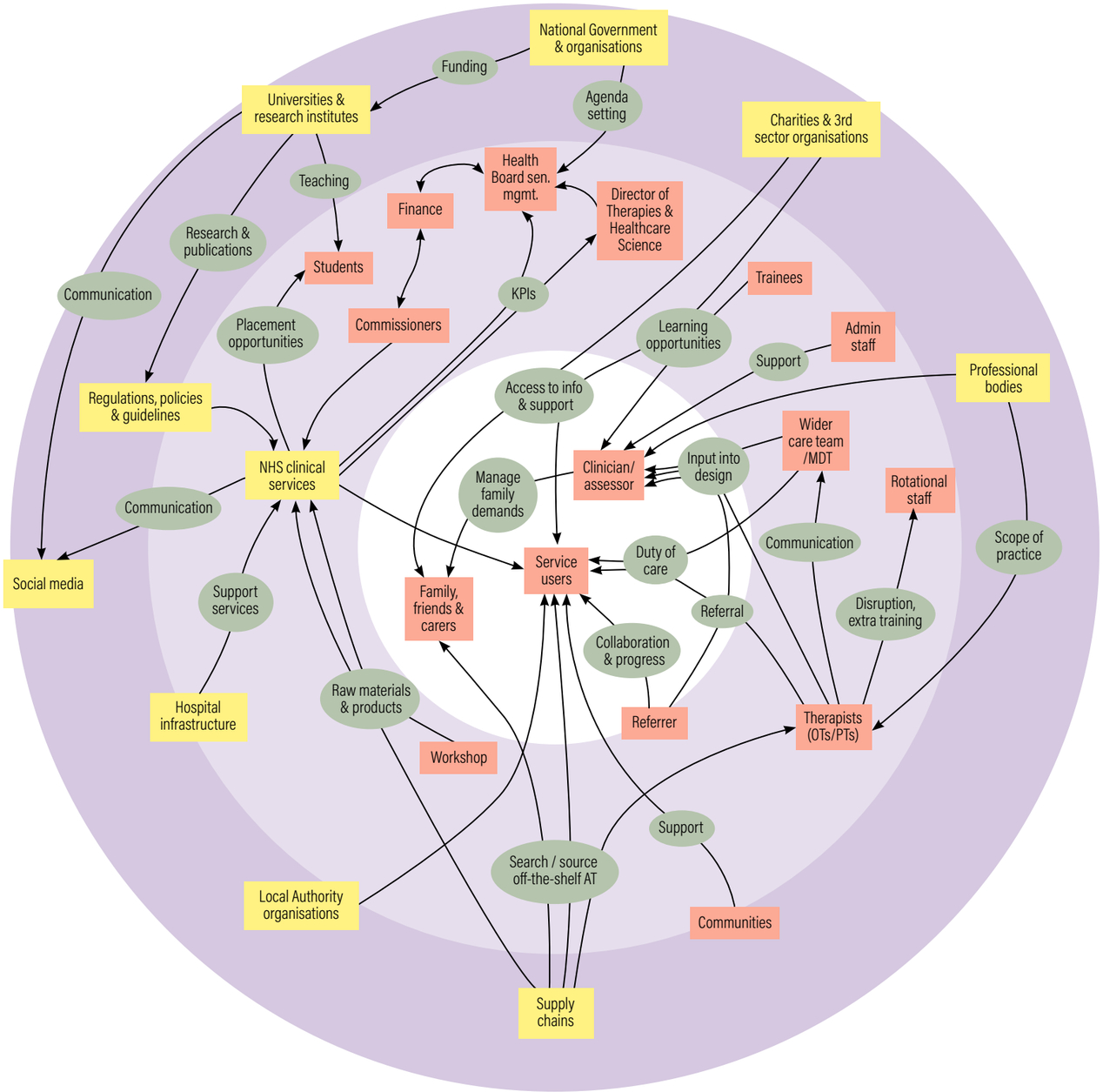
CURRENT USER JOURNEY



ECOSYSTEM MAP



KEY

- Systemic influence
- Local influence
- Immediate influence
- Individual stakeholder
- Program, service, organisation
- Relationship
- Relationship type

STORYBOARD

Inputs

Self assessment tool

Who	Patient directed by OT
Where	Remote or clinic
What	A protocol that prompts person to think about everyday needs in life. On a phone (or computer)
How	Internet enabled page that's designed with and sanctioned by OTs. Filters to prevent abusive use
Why	Allows proactive patients the opportunity to do more and improve quality. Empowers patients

Database

Who	Healthcare specialists, patients, charities
Where	Internet based
What	A database of off-the-shelf AT products and customisable AT including reviews, how tos, international best-practice... The modification of custom AT constrained by design rules and what's safe
How	Protocol incl option for custom AT & a digital system that's integrated into the wider network
Why?	Raise awareness, avoid duplication of effort (if something's already been developed), support with research-based evidence

Physical product library

Who	Healthcare specialists involved in AT needs identification
Where	Close to clinics
What	Library of custom AT examples that patients can try, healthcare professionals can learn from and inspire new ideas
How	Physical space dedicated for people to check devices out during clinics
Why	Physical prompts and examples are a valuable way to determine whether a solution is right for the person. It may also avoid waste - if a solution exists, there would be no need to do another custom design - just make another copy with aesthetics to suit the user needs.

Managed peer review

Who	Design (rehab eng, new specialists roles) & quality management specialists
Where	In-hospital / within the health board. Could happen remotely
What	Mechanism to check safety of design. Designs distributed to appropriate qualified people or self-review against pre-defined safety criteria
How	Digital dashboard. Designs for review distributed to relevant specialists, who can review and check off once completed. Can happen any time, anywhere
Why	Needed for QMS - regulatory compliance. Peer review is an important mechanism to check safe features. It also aids in learning.

Proceed to manufacture?

Wider community input

Who	Industrial and product designers. Industry and charity partners. Maker hubs.
Where	Outside NHS environment
What	Capacity to contribute where NHS capabilities cannot fulfil the user requirements. Perhaps when there is wider commercial potential.
How	Contribute in-kind. Co-develop funding applications. All vetted and work in harmony with QMS.
Why	It is unrealistic for the NHS to have all of the resources available for all AT product needs.

Main process

Consultation

Who	OT, patient (Rehab Eng/Healthcare specialist)
Where	Clinical setting or remote
What	Capturing holistic needs
How	Protocol incl option for custom AT & a digital system that's integrated into the wider network. On a tablet computer. Splash screen login for OTs. Options presented - search for AT solutions based on condition, etc... new consultation, access AT library...
Why?	Reduce time taken to identify need for custom & off-the-shelf AT

Database driven co-design platform

Who	Healthcare specialists co-designing/choosing option with patients
Where	Internet based - accessible through login
What	Simple user interface. Database of AT stuff that is easily searchable based on, for example, task, ability, etc then refined to customise design and manufacture options
How	Current CAD software, such as Rhino/Grasshopper. Built in options for materials and finish options. On a tablet computer. Selecting options and adjusting basic parameters leads to live adjustments to an onscreen render of the proposed solution. Aesthetic and physical characteristics are constrained to what can technically be fabricated.
Why?	We know people appreciate custom aesthetics and function - this would automate the customised design process, reducing dependence on a person doing it (most OTs don't want to be designers and/or don't have the time).

Fed into physical library

Distributed manufacture

Who	Any healthcare specialist who's had relevant training and access to the right equipment
Where	Hubs located in or close to OT clinics
What	Facilities that complement current AT manufacturing capabilities. Machines, such as 3D printers would be simple and cost effective to use and maintain, fast enough to fabricate components quickly and covered by QMS.
How	Current 3D fast printing tech such as Bambu Labs, Nexa 3D, etc combined with finishing stations
Why?	3D printers have become easy to use and fast enough for same day fabrication (in some cases). They offer the flexibility to produce in low volumes using a wide range of materials.

User trial

Who	Patient with OT, rehab eng, other therapist
Where	Clinics
What	Initial trail in clinical setting ahead of the person taking the AT home. Assessment of function, review of aesthetic and other elements of the solution. Inputted to the digital system.
How	Within clinics using tablet computers to input data
Why?	Assessment by qualified professionals will remain necessary to ensure quality and suitability. This stage would also feed in to the QMS and support continual improvement. Information would be added to the database (possible future machine learning).

User takes home

Who	Patient
Where	Home
What	User logs into the system and provides feedback and self-assessment of AT performance
How	Recorded on phone using app / web login with help of family and friends if required.
Why?	Feedback and self-assessment will form part of the database of customised AT solutions. It will also aid in QMS development as part of post market surveillance

Outputs

QMS & regulatory outputs

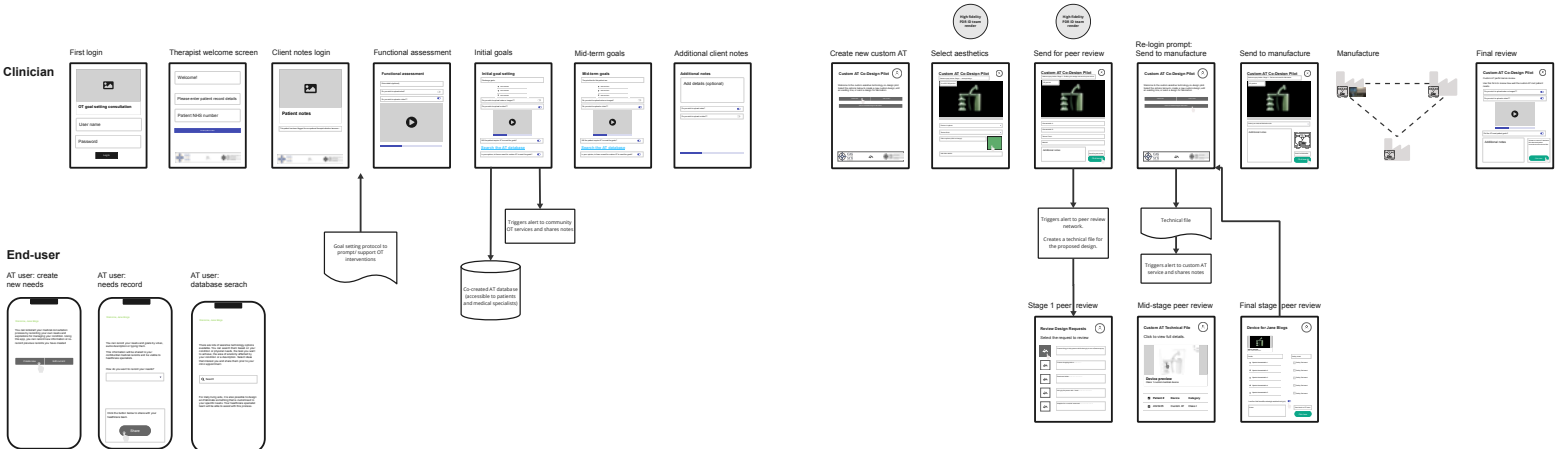
Who	Hospital-based regulatory specialists, design engineers.
Where	Happens in the background. Data kept on hospital servers.
What	Technical files created automatically. Checklists (do the outputs meet customer and regulatory requirements?). Information/instructions for patient automatically created. Files stored for easy auditing.
How	Automated form filling and record keeping. Information from clinical contacts, inputs and outputs of the system are coordinated in a secure, central place.
Why	Regulatory compliance is essential and hospitals must have a QMS. It will also help with rigorous record keeping and make it easier to audit and improve the system.

Physical products

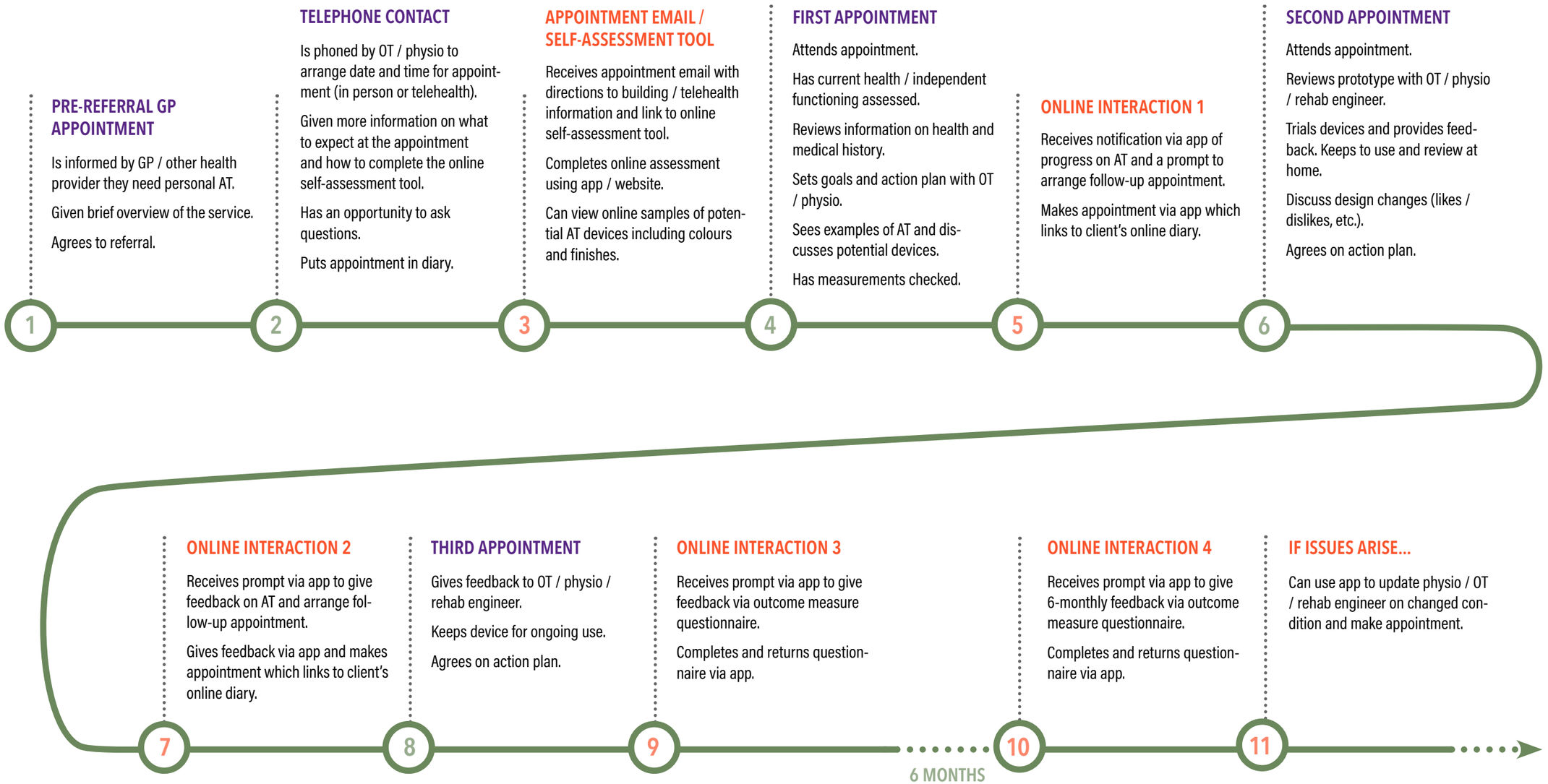
Who	Patient. OTs/Rehab eng etc may also keep a copy
Where	At patient's home. Healthcare professionals may keep their own library of parts
What	Customised AT solution
How	
Why	

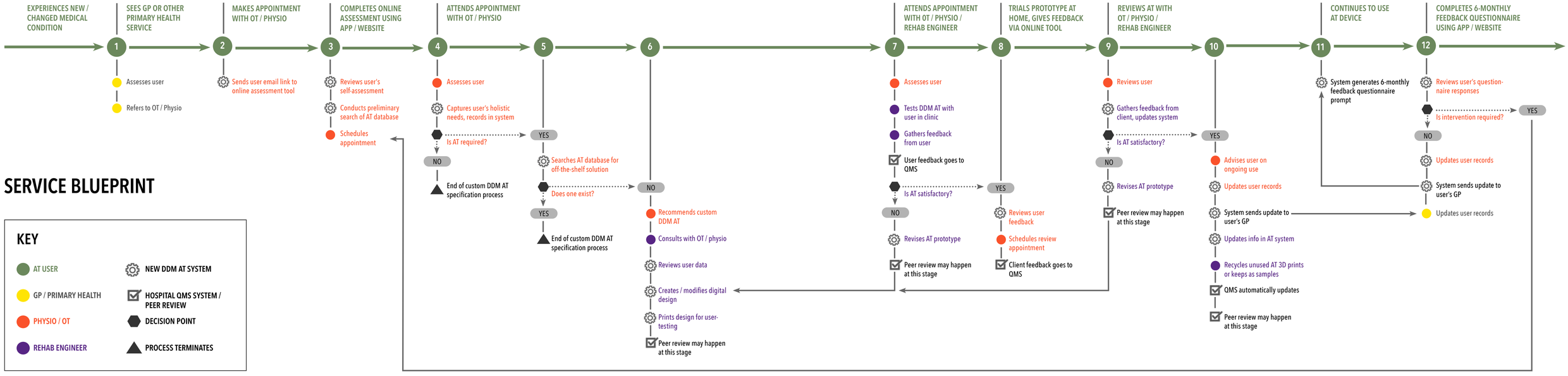
Image credits, left to right, top to bottom: cottonbro studio on Pexels, Lukas Blazek on Unsplash, researchers' own, Ivan Samkov on Pexels, ZMorph AE-in-One 3D Printers on Unsplash, Sincerely Media on Unsplash, Tom Claes on Unsplash, Gavin Allanwood on Unsplash, Tom Claes on Unsplash, Tom Claes on Unsplash, Arisa Chattasa on Unsplash, researchers' own.

DIGITAL SYSTEM WIREFRAME



NEW USER JOURNEY




EXPERIENCES NEW / CHANGED MEDICAL CONDITION
SEES GP OR OTHER PRIMARY HEALTH SERVICE
1
Assesses user
Refers to OT / Physio
MAKES APPOINTMENT WITH OT / PHYSIO
2
Sends user email link to online assessment tool
COMPLETES ONLINE ASSESSMENT USING APP / WEBSITE
3
Reviews user's self-assessment
Conducts preliminary search of AT database
Schedules appointment
ATTENDS APPOINTMENT WITH OT / PHYSIO
4
Assesses user
Captures user's holistic needs, records in system
Is AT required?
NO
End of custom DDM AT specification process
5
YES
Searches AT database for off-the-shelf solution
Does one exist?
YES
End of custom DDM AT specification process
6
NO
Recommends custom DDM AT
Consults with OT / physio
Reviews user data
Creates / modifies digital design
Prints design for user-testing
Peer review may happen at this stage
ATTENDS APPOINTMENT WITH OT / PHYSIO / REHAB ENGINEER
7
Assesses user
Tests DDM AT with user in clinic
Gathers feedback from user
User feedback goes to QMS
Is AT satisfactory?
NO
Revises AT prototype
Peer review may happen at this stage
TRIALS PROTOTYPE AT HOME, GIVES FEEDBACK VIA ONLINE TOOL
8
YES
Reviews user feedback
Schedules review appointment
Client feedback goes to QMS
REVIEWS AT WITH OT / PHYSIO / REHAB ENGINEER
9
Reviews user
Gathers feedback from client, updates system
Is AT satisfactory?
NO
Revises AT prototype
Peer review may happen at this stage
10
YES
Advises user on ongoing use
Updates user records
System sends update to user's GP
Updates info in AT system
Recycles unused AT 3D prints or keeps as samples
QMS automatically updates
Peer review may happen at this stage
CONTINUES TO USE AT DEVICE
11
System generates 6-monthly feedback questionnaire prompt
COMPLETES 6-MONTHLY FEEDBACK QUESTIONNAIRE USING APP / WEBSITE
12
Reviews user's question-naire responses
Is intervention required?
YES
NO
Updates user records
System sends update to user's GP
Updates user records
SERVICE BLUEPRINT
KEY
AT USER
GP / PRIMARY HEALTH
PHYSIO / OT
REHAB ENGINEER
NEW DDM AT SYSTEM
HOSPITAL QMS SYSTEM / PEER REVIEW
DECISION POINT
PROCESS TERMINATES

PROBLEM SPACE MAP

DATA

What types of data do you believe are available about this problem?

Current demand for AT in UK.

Current demand for AT world-side.

Percentage of AT that is prematurely discarded.

Reasons for premature discard of AT.

Evidence of impact of custom / co-designed digitally designed and manufactured AT on improved fit, function and aesthetics.

Evidence of impact of custom / co-designed digitally designed and manufactured AT on client well-being and satisfaction.

Regulatory requirements for AT products.

Costs associated with producing custom-designed AT.

TECHNOLOGIES

What technology is being used? What is available?

3D scanning.

3D printing (digital manufacture).

Digital designs for 3D printed AT are available online for free or at low cost.

PRODUCTS

What products are part of the current experience?

Huge range of manufacturers of off-the-shelf products.

So many that there is currently no single repository or database for clinicians to search.

EXPERIENCES

What are the problems with the current experience?

Lack of client input into custom designed AT.

Mismatch between client expectations of off-the-shelf products and their actual function / aesthetic leading to disappointment.

Time lapse between ordering and delivery of AT can be so great that clients' needs change and functionality is permanently lost.

Clinicians lack knowledge about both off-the-shelf and custom AT devices.

Clinicians lack training and experience with individuals producing custom AT.

Clinicians lack time and resources.

SYSTEMS

Are there any systemic issues? Which ones?

The sector generates unsustainable waste in discarded AT which does not re-enter resource stream.

Much AT material is not currently recyclable.

Lack of central repository of AT samples for clinicians in hospitals to access – this is frustrating for them.

Little budget in hospital system to buy AT – users must pay for own or seek charity funding.

Health system-wide lack of time and resources.

Clinicians are not learning about the possibilities of DDM during their training.

IMPLICATIONS

What societal trends or phenomena do you see?

Maker culture – people with home 3D printers sharing designs and creating products.

Regulation and safety issues with the above.

More users are interested in aesthetic aspect of AT and wanting a custom look.

Decreasing stigma regarding AT in some circles.

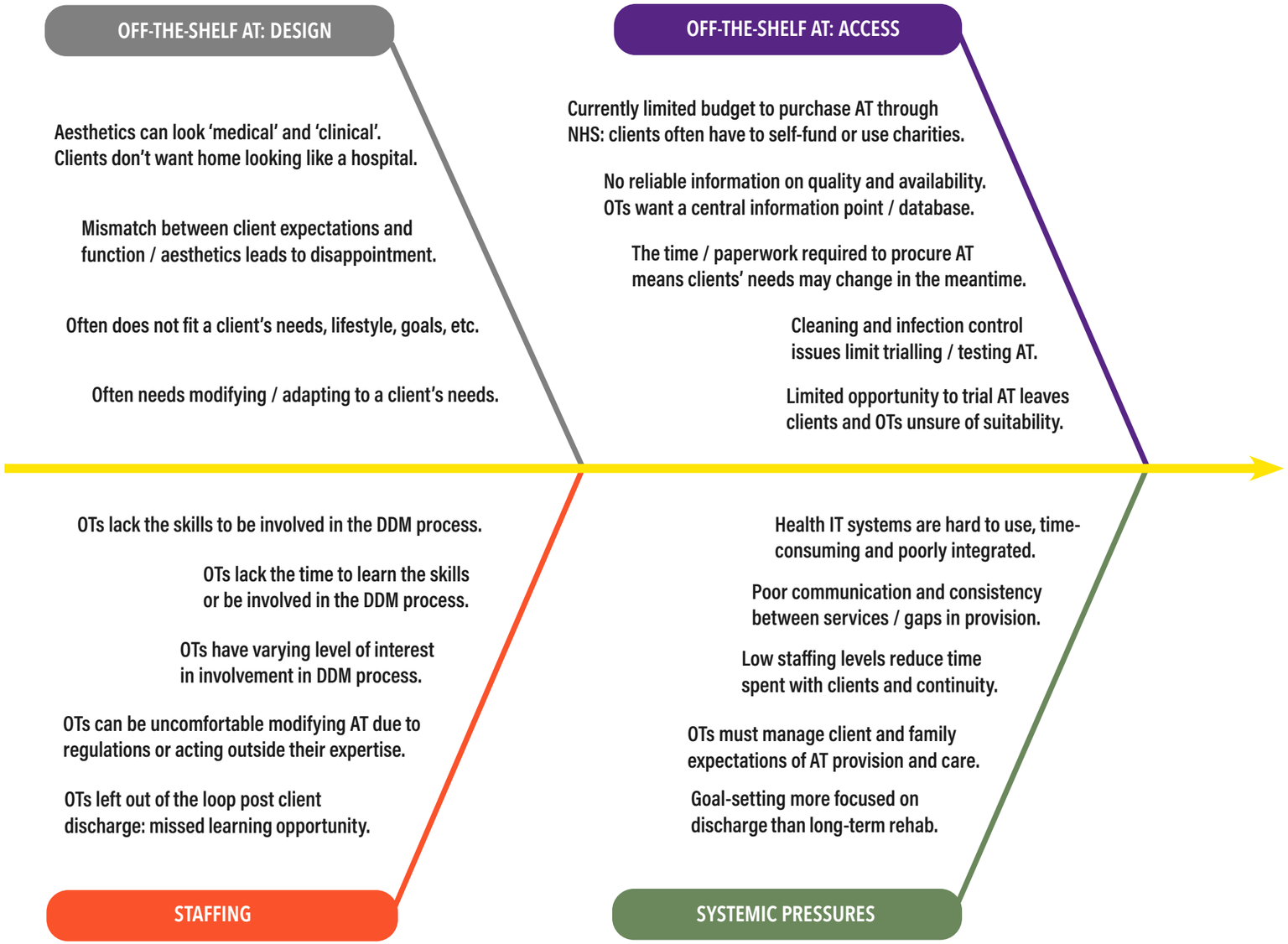
Increased use of AT for adaptive sports.

AT users are creating online video reviews of products.

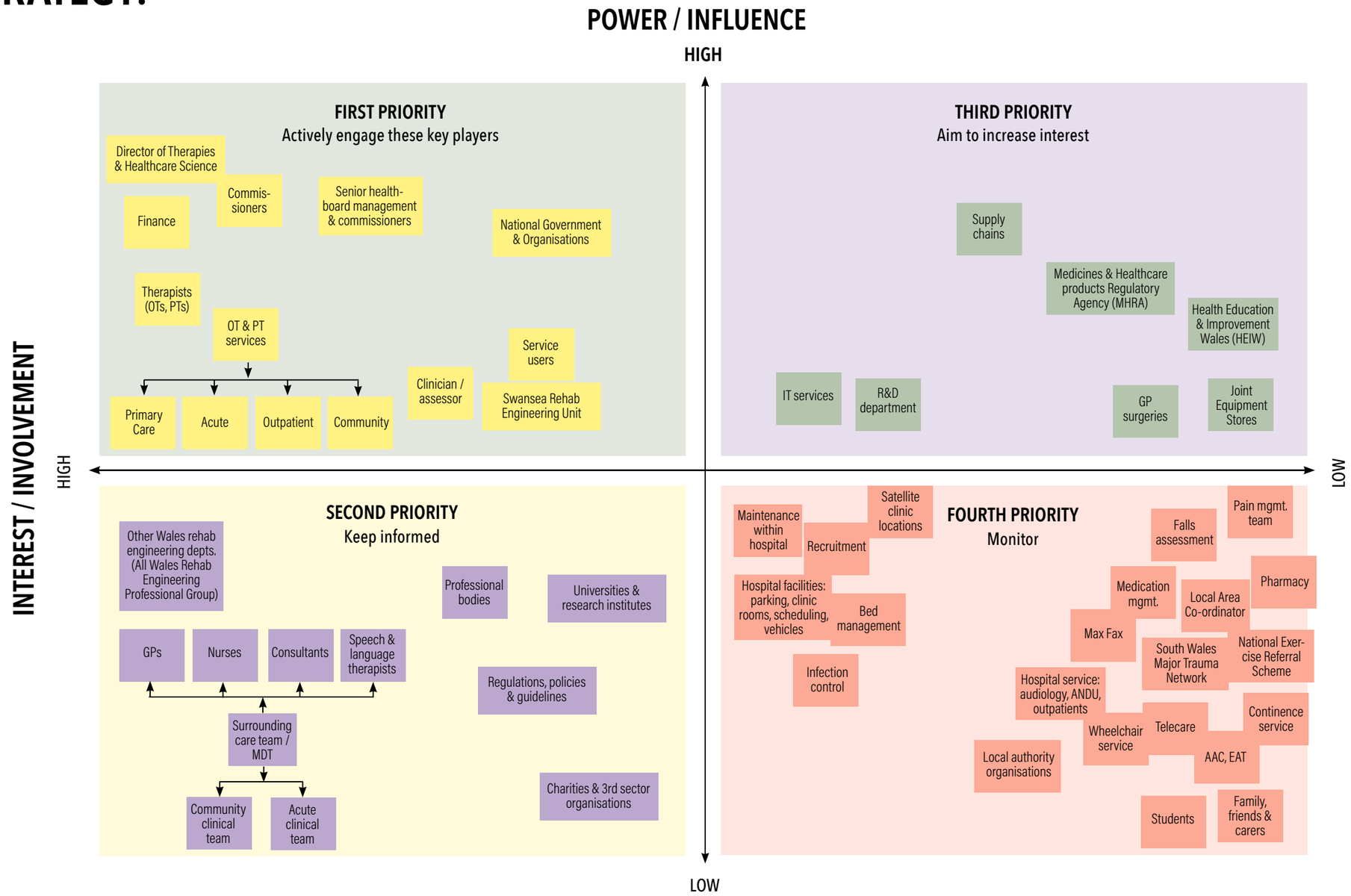
Sustainability is increasingly important.

Ageing population and rise of lifestyle diseases will increase AT demand.

PROBLEM ANALYSIS



STAKEHOLDER STRATEGY: ANALYSIS



STAKEHOLDER STRATEGY: ACTION PLAN

FIRST PRIORITY STAKEHOLDERS

How can we leverage the influence and interest of these key stakeholders?

Who?	How can this stakeholder impact our success? What do we need from them?	How does the stakeholder win? What motivates them?	How does the stakeholder lose?	What actions do we take as a team to support this stakeholder?
Service users	Influence the need for and use of the custom AT. Central to co-design process. Identifying their own needs for custom AT. Need their buy in for involvement in the co-design process, and completing of outcome measures. Influence in defining research areas and need (PPI involvement).	Provision of custom AT more suited to their needs and that can be used to help other individuals. Improving healthcare services for them and for others.	No provision of custom AT (currently or long-term).	Involvement of service users in the co-design process. Involvement in research proposals, steering group meetings.
Swansea Rehab Engineering (Clinicians)	Expertise around co-design of custom AT and application of medical device regulations. Current host department of research in this area. Future users of co-design AT service platform. Staff time and resources to continue on-going work in this area. Influence around research projects.	Funding for future service to co-design custom AT; expanding job roles. Publications and recognition of work in this area. Job satisfaction: improving lives of patients.	Lack of funding to continue research/future service development work in this area. Wasted resources.	Ongoing research proposals. Ongoing engagement with the wider team to facilitate research participation.
Healthcare therapists (OT/PT) & services	Referrals and input into the co-design process; providers of AT currently within healthcare services. Future users of co-design AT service platform. Knowledge sharing, time and ideas.	Working with patients and improving the lives of service users. Improved AT provision, reduction in need for input from clinical service. Improved awareness and training on future technology (DDM), expanding job roles.	Lack of access to custom AT solutions; unable to solve problems for their clients. Increased pressures on services.	Engagement in current and future research activities. Inclusion in research proposals.
Senior Health-board management & commissioners	Funding and commissioning of local services.	Maximise value in healthcare expenditure. Reduce pressure on healthcare services (free up hospital beds, reduce wait times for appointments/ surgery). Safe and quality care (improvement in patient outcomes).	Wasted healthcare resources. Increased pressure on healthcare services.	Engagement in research through presentation of results and recommendations for future research Outcome measures aligned to stakeholder motives.
National Government & organisations	Setting national agenda for AT provision. Influence over clinical service provision & research agenda.	Value for (tax payers') money. Reduce pressure on healthcare services.	Wasted healthcare resources and expenditure. Increased pressure on healthcare services.	Engagement in research through presentation of results and recommendations for future research.

SECOND PRIORITY STAKEHOLDERS

How can we keep them informed and make use of their interest?

Who?	How can this stakeholder impact our success? What do we need from them?	How does the stakeholder win? What motivates them?	How does the stakeholder lose?	What actions do we take as a team to support this stakeholder?
Surrounding care team / other health-care professionals (e.g. GPs, SALT, Nurses, consultant)	Support the use of AT by the end-user. Help to identify individuals who may benefit from custom AT; scoping of current landscape around AT.	Improve health outcomes for patients. Improve independence and reduce need for patients to contact healthcare professionals/services (e.g. reduce visits/ contact with GP) Learning and development opportunities around custom AT.	Increased reliance on service by patients (more contact).	Engagement in research activities; dissemination of findings and information about AT and services available.
Other (Wales/UK) Rehabilitation & Clinical Engineering Services	Scalability of co-design approach across other similar NHS services to host organisation. Engagement in future scoping work.	Expansion of existing services (increased funding and jobs). Increase knowledge around custom AT, better utilisation of DDM. Collaboration and working across NHS services. Improve patient's lives.	Wasted time and investment in expansion activities. Loss of resources.	Engagement and dissemination of findings and future planning of research projects.
Universities & research institutes	Research collaborations; (DDM) facilities, hosting of events, support with research grants.	High quality, impactful research output and findings; communication of findings. Funding opportunities and collaboration with healthcare partners for future research projects.		Engagement and dissemination of findings and future planning of research projects.
Regulations, policy and guidelines organisations (e.g. MHRA, NICE, Health board policy & procedures)	Regulatory guidance on medical device provision and manufacture. Policy and clinical 'best practice' guidelines. Recommendations for treatment & service provision.	Safe, quality and effective care provided. Reduce unnecessary harm to patients. Evidence base.	Non-compliance to regulations and policies; harm to patients.	Engagement and dissemination of findings (e.g. policy recommendations). Generate evidence to support recommendations.
Charity & 3rd Sector organisations	Current funding and provision of equipment. Scoping of demand for custom AT. Networks for PPI engagement, funding opportunities, engagement with end-users and dissemination.	Improve lives of people. Make best use of resources available to them. Reduce need for their services/ support.	Waste of resources. Improved reliance and need for input from them.	Engagement in research planning, activities and dissemination.
Professional bodies (e.g. HCPC, Royal College of OT, RCT, IPEM)	Professional competency for healthcare professionals. Training opportunities, teaching (recommendations), influence over national agenda, requirements.	Maintain professional standards. Future workforce training and planning.	Wasted resources. Misinformation.	Engagement and dissemination of findings (e.g. policy recommendations).