



The Digital Human Body of Knowledge

- Health Variant -

Strategy  
Co-Design  
Corpus  
Operating Model

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# DIGITAL HUMAN BOOK OF KNOWLEDGE

MASTER

COMPOSITE DECK

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about us

background to DHCC patient #1

# about us



**Marie Johnson**  
Managing Director  
Centre for Digital Business

- **Global role:** World-Wide Executive Director Public Services and eGovernment for Microsoft (Seattle)
- **Senior executive government roles:** Chief Technical Architect; Chief Information Officer; Head Technology Authority National Disability Insurance Scheme; services innovation; large scale service delivery.
- **Board and Advisory roles:** Australian Information Industry Association (AIIA); Australian Federal Police (AFP) Spectrum Board; NSW Digital Government Advisory Panel; Accenture Global CIO Council; Melbourne Business School Alumni Council; Australian National University (ANU) Cyber Institute Advisory Board.
- **Global speaker and commentator:** artificial intelligence; technology; digital services; ehealth; identity; innovation.
- **Health domain experience:** Human Services Chief Technology Architect (CTA) Health and Human Services Access Card; technology business cases bringing together Centrestrik (Australia's welfare agency); Medicare Australia and Child Support Agency to become Human Services; Australian Department of Immigration Global eMedical system (100 countries in collaboration with Citizenship and Immigration Canada); National Disability Insurance Scheme (NDIS); Singularity University Exponential Medicine Faculty 2019.
- **Intelligence and law enforcement:** Defence; organized crime task force; state revenue intelligence; Australian Federal Police (AFP) Spectrum Board; Australian Department of Immigration and Citizenship digital strategy and innovation; National Translation and Interpreting Service.
- **Awards:** UN Government O-Visa for individuals with extraordinary skills (to take up Microsoft role); UN Public Services Award; Australian PM's Award for Excellence in Public Sector Management; Innovative CEO of the Year – Australia; 100 Women of Influence; and "Exceptional Woman of Excellence" by the global Women Economic Forum.
- **Certifications:** Graduate Australian Institute of Company Directors (GACD); MBA Melbourne Business School; Senior Executive Fellows Program John F. Kennedy School of Government Harvard University; Bachelor of Arts, Deakin University.



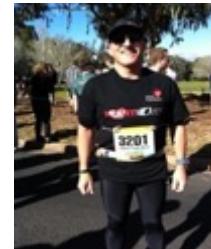
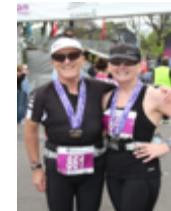
**All (Allan) Johnson**  
Director Health and Safety Innovation  
Centre for Digital Business

- Military Veteran – former RAAF aeronautical engineering officer.
- All is a Patient #1 for the Digital Human Cardiac Coach.
- He is a heart patient with 13 years lived experience that includes other chronic conditions. This experience includes four heart surgeries – 8 cardiac bypass grafts, 2 stents – attending cardiac rehabilitation in both the USA and Australia.
- All has devoted the time since his first surgery (2006) to understanding his condition and mastering the complex journey of recovery, rehab, secondary prevention.
- As part of this journey he has trained and been certified as:
  - personal trainer with specializations in older adults and female fitness
  - Personal Trainer Instructor
  - Rehab Trainer
  - Kinetic Link Trainer
  - National Heart Foundation Heartmoves leader
  - Heart Support Australia Inpatient counsellor
- To give back to those who have helped him and to educate others he has, as a volunteer (in addition to many fundraising activities):
  - Developed education and awareness programs for The Canberra Hospital
  - Presented the consumer perspective to anti-National Heart Foundation Ambassador program that trains allied health practitioners in cardiac care
  - Presented to various industry bodies including Pharmaceutical Society of Australia
  - Presented on the use of technology, especially the digital human cardiac coach and the Apple health ecosystem, to the CEOs and key executives of the National Heart Foundation and Heart Support Australia
  - Mentored individual heart patients on their own journeys.
- All was recognized as a "Digital Human Cardiac Coach" in Australia after which he was a finalist in the Health Category of their New You Awards in 2009, and he has also been recognized in various publications such as REVUS (an Mills organization) and Fitness First magazine.
- All has been able to transfer this education and experience into the development of the Digital Human Cardiac Coach by leveraging his academic background and professional experience:
  - BEng (Hons), Milits (Capital Project Management). All's masters' research was into the use of expert systems, the forerunner of today's AI.
  - RAAF Aeronautical Engineering Officer with additional roles in occupational health and safety.
  - Chief Architect for various global software projects including Singapore Defence; Hong Kong EMSD; Orica Explosives USA; Turquoise Ridge Gold USA; Royal Australian Air Force; and the Royal Australian Navy.
  - Lead architect for various health projects including the Better Medication Management System (BMMSS) Australian Department of Health; re-engineering ERP processes and systems for NSW Health and Area Health Services; Hong Kong Hospital Authority; the Royal Children's Hospital Melbourne.
  - National Heart Foundation consumer representative on the development of the Australian Government National Action Plan on Heart and Stroke. At the seminal meeting for this plan All introduced the role of technology including digital humans and the Apple health ecosystem to group members including leading cardiovascular surgeons, the directors of major multi-hospital rehabilitation programs and to the CEOs of various advocacy groups. As a result digital humans have been recognized in the Plan.
- All has received various academic and employment awards, including Best Industry Principal for SAP ANZ across all industry sectors.

**Marie Johnson** is a global commentator on digital disruption and AI, based on decades of major digital transformation delivery experience, including health and human services. She is the co-creator of Nadia — the world's first AI digital human for service delivery — and with the common themes of health illiteracy and stigma, sees application for this co-design innovation beyond disability including cardiac health and other health applications. Marie believes that digital innovation through universal co-design amplifies all human potential, empowering and liberating the disadvantaged, disabled and chronically ill.

**Allan and Marie** are fitness enthusiasts, and since Allan's first heart surgery, have run marathons and half-marathons together under the guidance of his cardiologist and medical team.

Their lived experience and professional expertise uniquely combined to create the "digital human cardiac coach".



# the burning platform

# the problem: the cost of CVD health-illiteracy

## what has been known for some time

Heart disease has a huge personal, societal, business and economic cost; the obesity epidemic is increasing the total number of potential heart patients and increasing the incidence of heart disease amongst the young

Cardiac rehabilitation and secondary prevention are effective in reducing repeat heart events and surgeries; in many countries less than 30% attend CR and the 'best' is around 50%

Participation in cardiac rehabilitation is especially low for women, ethnic minorities and those with psycho-social, socio-economic and location disadvantage

Adherence to the lifestyle and medication regimes taught in cardiac rehabilitation is low; this leads to ineffective secondary prevention for many consumers resulting in diminished lifestyles, repeat events and surgeries

Significant duplication of resources and effort exists in the preparation of cardiac rehabilitation education and information; this is despite the global commonality of the required lifestyle changes and medications

## what we now know

Health and general literacy are very low, including in western countries such as Australia and NZ. Many patients cannot read medicine or nutrition labels, and cannot understand CR education

In the USA CR programs are around 12 weeks compared to Australia's 6 weeks to better achieve enduring lifestyle change; research has shown that this is still often insufficient

Reasons for non-attendance at facility based CR include too busy at work and home (many of the new younger patients), limited parking, too hard to travel to, CR considered not relevant and not offered.

After CR there is little ongoing support; Australian patients rely on Medicare (if eligible) & Private Health Funds for allied health support with diet, exercise and psychology but these are rationed & the gaps are large

Information on medications & lifestyle is constantly improving but CR graduates are unaware unless they proactively visit the Heart Foundation website; there is no alumni communication of updates

## what is being done?

'Outreach' programs that include home visits are being implemented; these programs are limited by the availability of skilled and trained resources and budget for travel etc.

Information is being put on-line such as with the UK NHS 'The Heart Manual'; this is being used in other countries and was apparently trialled in Australia and then rejected

Patient forums such as the British Heart Foundation's HealthUnlocked enable patients to share information and support each other; ineffective moderation results in patients receiving highly dangerous advice

Mayo Clinic has funded small trials of patient support mobile applications and 'Second-Life' style virtual lessons (e.g. healthy shopping); these have shown good results but not yet implemented

## is there still a problem?

Simply putting information from CR booklets on-line is ineffective for ethnic minorities, those with psycho-social and socio-economic disadvantage and anyone with low literacy and health literacy

Applications and chat-bots cannot build rapport; studies have shown that rapport (and anonymity) increase the disclosure of sensitive information (e.g. still smoking, not exercising)

The current massive duplication of resources and effort in developing and updating CR education and information prevents wholesale change of literacy level and its ongoing management

The problems will rapidly worsen unless effective mechanisms are implemented to move heart patients from CR to autonomy where they understand and follow the required medication & lifestyle regimes

# the wicked problem... the gatekeepers...literacy and numeracy...

Definition – Health Literacy: "...constellation of skills, including the ability to perform basic reading and numerical tasks required for functioning in the health care environment." (AMA)

\*\*\* 1 in 5 American adults read < 5th grade level \*\*\*

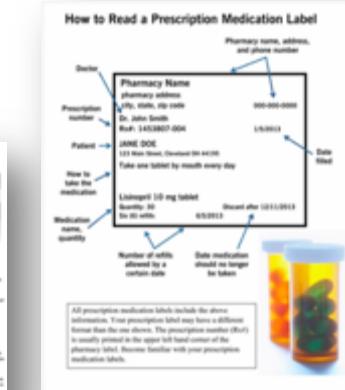
\*\*\* yet...most health care info written at 10th grade > to college level

\*\*\*

- US: 70 million suffer from CVD
- US: 90 million people inadequate health literacy
- US urban areas: 80% indigent & minority health illiterate
- US CVD costs: USD\$200 billion pa
- US cost health illiteracy: USD\$29 billion pa  
additional health care costs ie > 10%
- UK: 5 million adults "functionally illiterate"
- UK CVD costs: £19 billion pa
- Australia: 60% Australians "health illiterate"
- Australia: 4.2 million suffer from CVD
- Australia CVD costs: AUD\$8.8 billion pa



★ CVD...a disease of numbers



Nutrition Facts	
Serving Size 2/3 cup (55g)	
Servings Per Container About 8	
Amount Per Serving	Calories 230
	% Daily Value*
Total Fat 8g	12%
Saturated Fat 1g	5%
Trans Fat 0g	0%
Cholesterol 0mg	0%
Sodium 100mg	5%
Total Carbohydrate 27g	10%
Dietary Fiber 4g	16%
Sugars 10g	16%
Protein 7g	16%
Vitamin A 10%	
Vitamin C 8%	
Calcium 20%	
Iron 4%	
* Percent Daily Values are based on a 2,000 calorie diet.	
Your daily value may be higher or lower, depending on your calorie needs.	
Calories 230	
Total Fat 8g	
Saturated Fat 1g	
Trans Fat 0g	
Cholesterol 0mg	
Sodium 100mg	
Total Carbohydrate 27g	
Dietary Fiber 4g	
Sugars 10g	
Protein 7g	
Vitamin A 10%	
Vitamin C 8%	
Calcium 20%	
Iron 4%	
*Percent Daily Value (DV) tells you how much a nutrient in a serving fits into a daily diet. 100% DV means a food provides all the essential nutrients a person needs in a day.	



Patient Outcome Barriers
No Evolution
Trust
Low / no empathy
Rapport
Anonymity
Poor accessibility
Requires literacy & numeracy
No codesign
Low / no post rehab support
Limited info bandwidth
Lacks currency
Limited scalability
One size fits few
Requires time & travel



# the next great advance... from a patient perspective



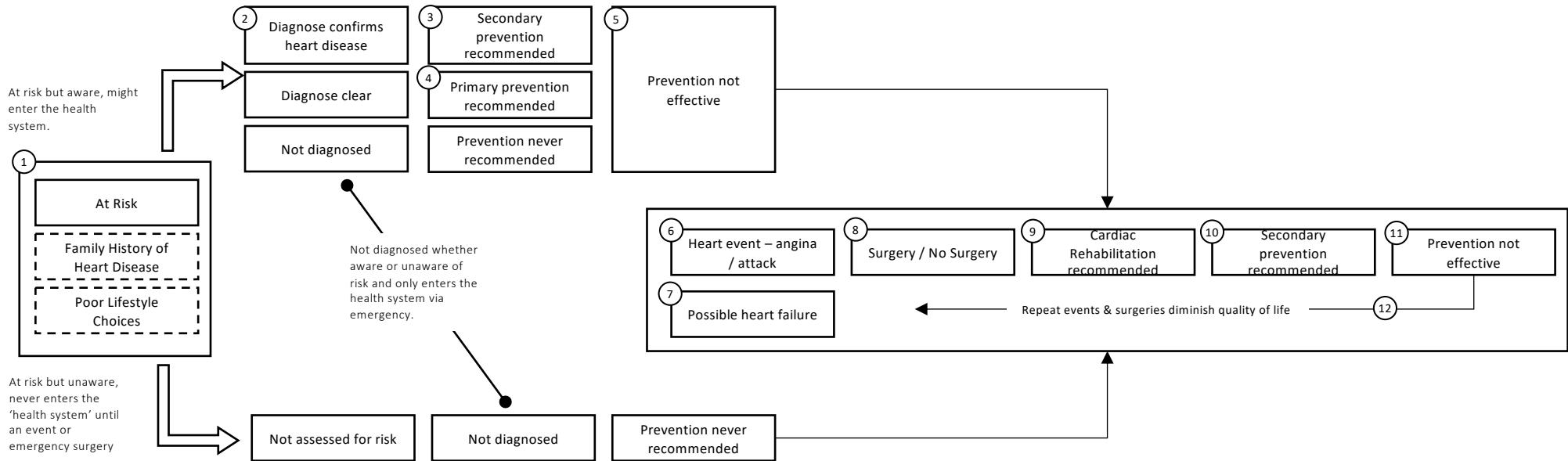
- As a former **Air Force engineer** with an MBA I could **read or calculate anything** and thought nothing of it.
- I was attending my third cardiac rehabilitation program in 12 years when the patient next to me said **they couldn't understand the oversized nutrition label** the dietician was handing around with other food objects during a diet lesson.
- As I was explaining where it said '**saturated fat**' and '**2.5 g per serve**' and what that meant for a typical lunch sandwich I realised that **another half dozen patients had clustered around to listen** intently to my explanation.
- During our exercise session after the lesson I asked them why they had been interested in what I had said and was shocked to hear their answers ranging from '**I can't read words like that**' to '**I can't do sums in my head**'.
- During subsequent lessons on topics such as psychology and exercise I observed their **frustration with wordy text in presentations and trying to understand what to me were simple concepts such as working out where I was on the Perceived Rate of Effort Scale**.
- Finally, I observed both in them and myself **a complete shutdown of concentration** when unaware clinicians peppered their talks with '**motivations**', probably well meant, such as '**you are now likely to die within 3 years if you don't follow my advice**'. Some had **tears**, many just hung their heads and stopped listening, **lost in their own private grief**.
- Six one hour lessons like this and a few simple exercise sessions and we are **supposedly ready for our new journey as a heart patient**.
- We aren't, and **something has to change**.



*“...lost in their own private grief...”*

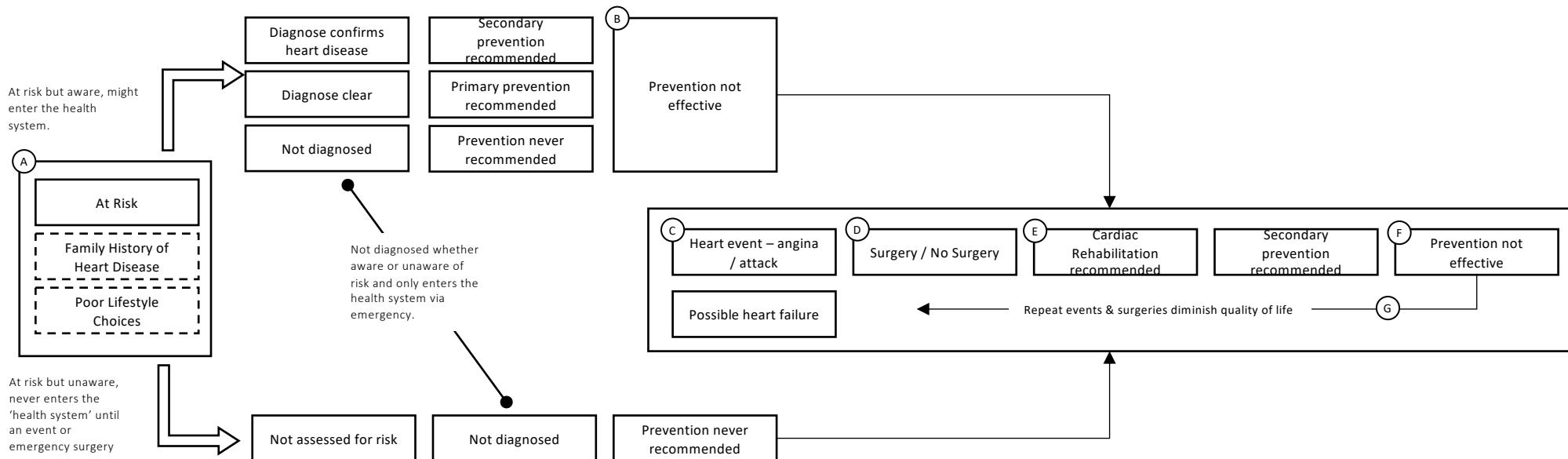


# the heart disease life cycle



1. The risk of heart disease is related to family history and lifestyle factors such as smoking, poor diet, inadequate exercise, excessive drinking and others.
2. Diagnosis in support of risk assessment can include various non-intrusive and intrusive methods such as scans and angiograms. People that are not assessed as 'at risk' because they don't visit a doctor won't be diagnosed.
3. An early confirmed diagnosis will normally result in a recommendation of secondary prevention which consists of lifestyle changes and prescribed medications such as statins (cholesterol lowering medications).
4. A clear diagnosis will still result in a recommendation of primary prevention which is lifestyle changes without medications.
5. Prevention will be ineffective if the recommended lifestyle changes are not implemented or adhered to and/or if the recommended medication are not taken. Many patients have poor health literacy or suffer from socio-economic disadvantage and do not implement effective prevention.
6. Ineffective prevention will often result in angina pain which will send a patient back to a doctor where they will be diagnosed. Patients might also suffer a heart attack.
7. If a heart attack occurs a patient might experience heart failure where part of the heart is damaged – this is extremely serious and can permanently limit working and lifestyle participation.
8. Surgery can include angioplasty to open blockages and open heart surgery to bypass blockages with veins/arteries taken from the leg or arm. A bypass requires months of recovery and rehabilitation.
9. Cardiac rehabilitation involves guided exercise to recover from surgery trauma and lectures on heart conditions and treatment, stress management, smoking cessation, diet, exercise, medications and other topics. It has proven to be effective but many patients do not participate or poor health literacy, socio-economic disadvantage etc limit its effectiveness because lifestyle changes are not permanent.
10. Secondary prevention following rehabilitation will usually include a greater range of medications and stricter lifestyle requirements.
11. As with primary prevention, secondary prevention following an event or surgery is often ineffective because patients stop taking their medications and don't adhere to the recommended lifestyle.
12. Repeat events and surgeries are a major cause of high health costs and degrade quality of life and economic participation for patients.

# the “wicked problem” affecting the heart disease life cycle



- A. Many people are not aware they are at risk. Visit the websites of most heart advocacy sites and their front pages are devoted to seeking donations. Trying to dive deeper on these websites requires general and health literacy and the sites are not accessible. Also, most people don't use websites these days – they use apps because they are simple to use and targeted at specific use cases. If people don't suspect they are at risk they won't visit a doctor for diagnosis.
- B. Diagnosis might confirm heart disease but even if it doesn't, being at risk requires people to follow a prevention program to avoid heart disease. Evidence based research confirms that few adhere to prevention programs. They are difficult to understand and pamphlets handed out by a doctor are not the long term lifestyle change program recommended by organisations such as the American College of Cardiology.
- C. Most people only know heart attacks from TV and movies – the classic chest pain. They don't know that pain anywhere from the jaw and down the arm, shortness of breath and even reflux and stomach discomfort can indicate heart problems. As a consequence they don't seek treatment until it becomes an emergency.

- D. Preparing for hospital is confronting and the actual confinement before and after surgery confusing and frightening. Some patients are given booklets by their doctor or admissions staff but these don't address the problem. Just look at the hundreds of patient questions and cries for help on the British Heart Foundation's HealthUnlocked blog. There is no way a human call centre could scale, even if budget was available, to meet this demand.
- E. Cardiac rehabilitation has been found to be effective but in many countries fewer than 30% attend. The best is Britain at around 50% but even there women and ethnic minorities are not well represented and those that do attend from these groups have poor outcomes. Dieticians show patients nutrition labels and tell them to check for saturated fat but many are illiterate and can't read the labels nor understand the numbers. Patients are told to walk for heart health but there is no advice for the many younger patients who want to get back to the gym, cycling etc. Also, these education programs are developed by hundreds of organisations around the world, even in the one country, and not to a standard; patients don't get to see updates once they've left the programs. This duplication costs millions.

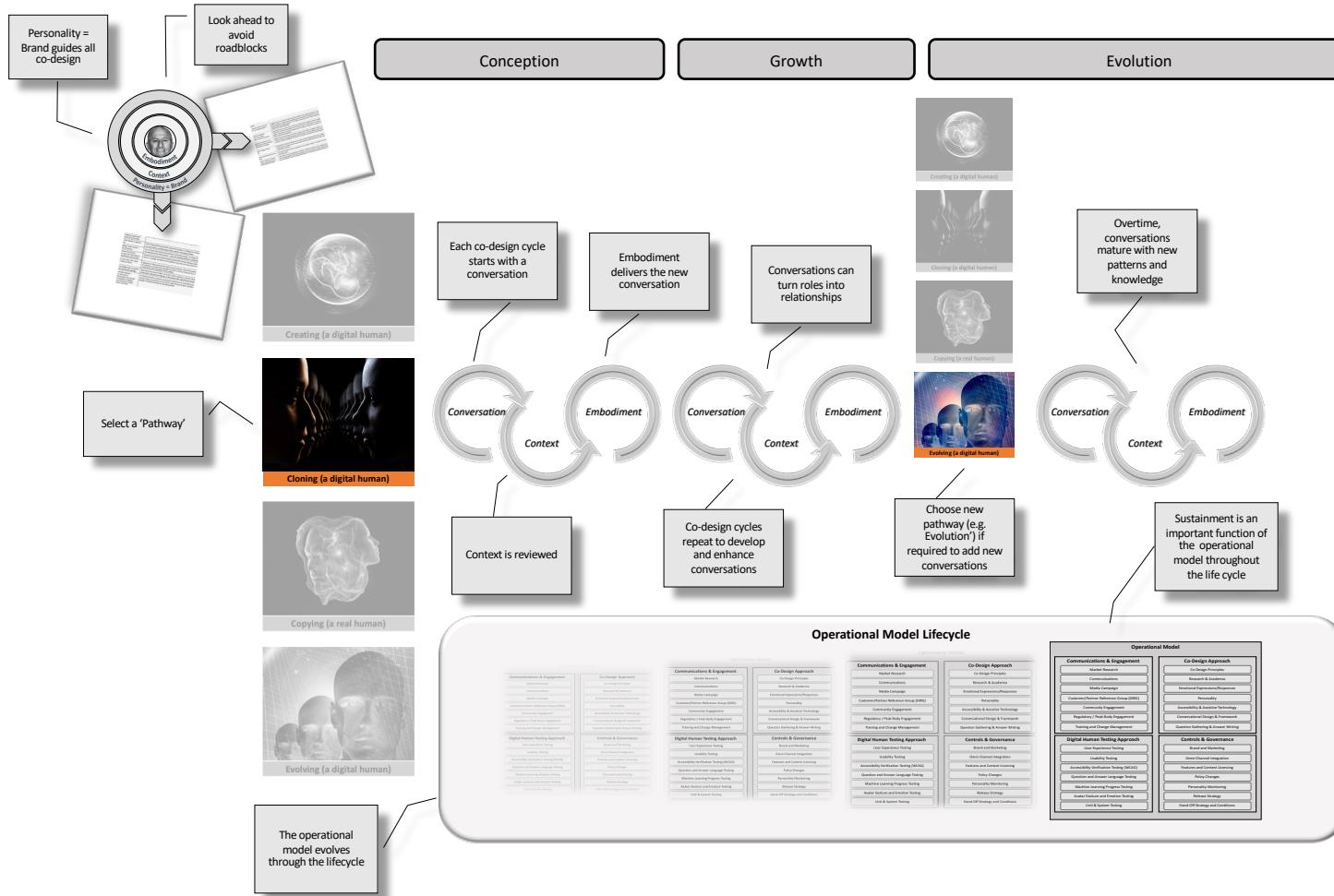
F. After one hour lectures on their condition, smoking cessation, diet, exercise and medications patients are left to their own devices to change their lifestyles. Most don't and also soon stop taking their medications. Most "fall off a cliff" when they finish rehab and the psychological impact on patients and their families is enormous.

G. In Australia around 30% of heart surgeries are REPEAT surgeries. What is needed is ongoing coaching and the ability for patients to ask questions at anytime with answers they can understand. In Australia doctors can offer patients a few (usually 5) subsidised sessions with an allied health practitioner and some health insurers might partially cover some costs but seeking ongoing support from dietitians, exercise physiologists and psychologists is expensive and out of reach for most. Also, those still in the work force often can't attend rehab let alone make time to attend other practitioners for advice and support. Research has found that many of these practitioners over estimate the literacy of their patients and their advice is not understood nor sustainable.

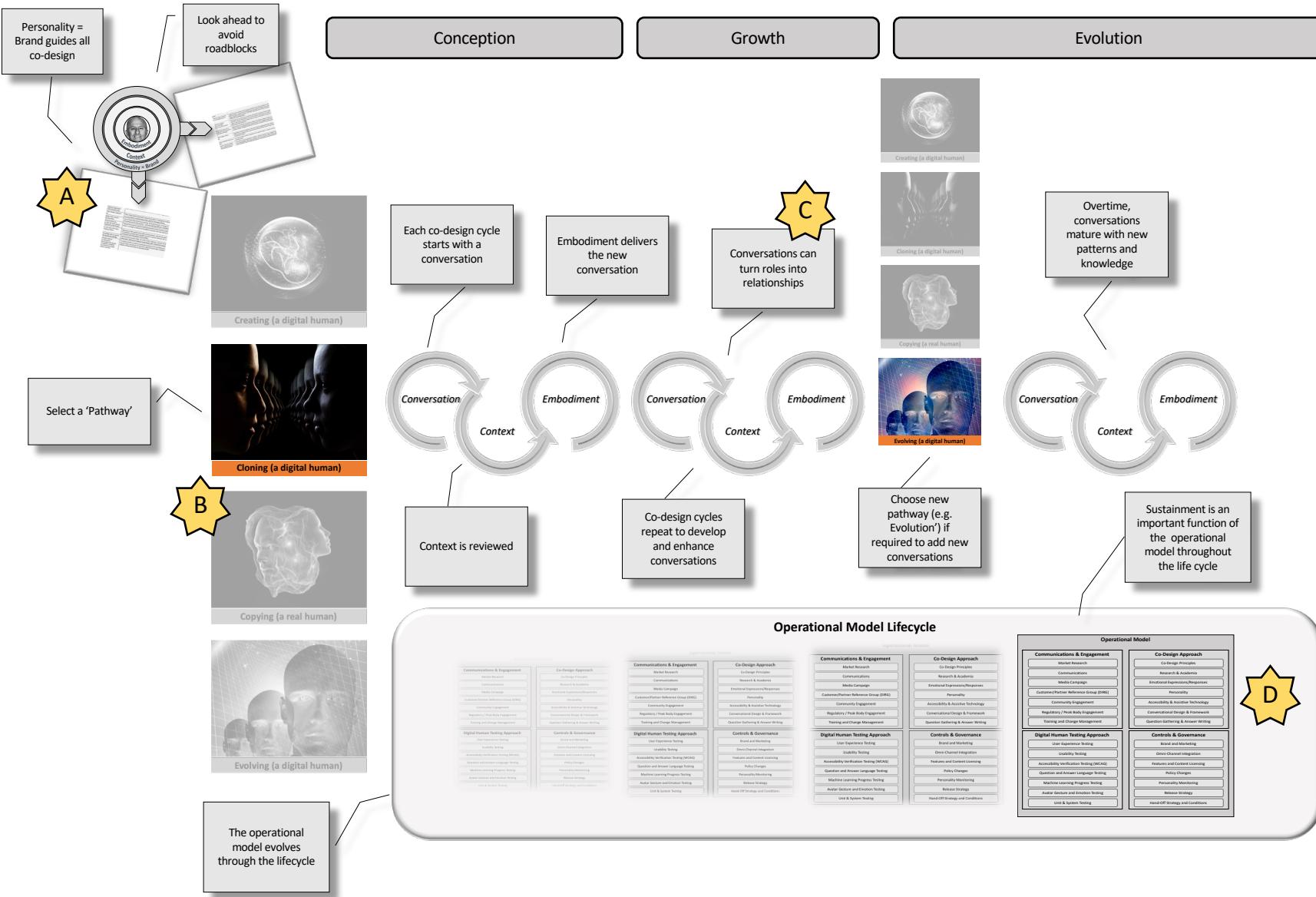
co-design summary & use cases

includes “Embodiment Exchange”

# the co-design architecture - from conception to evolution



# the co-design architecture - from conception to evolution



# co-design starts with a desired personality or brand expressed as context and delivered by embodiment

A



**A1**

Element	Description	Process
Brand	The brand of the organisation, product, service or celebrity. The brand is the promise of an experience.	If the brand is not known nor explicitly stated – eg gov – or a new brand, co-design involving workshops, survey, research is necessary to identify or propose key brand attributes that are then reflected in the personality of the digital human. Without this, there could be incompatibility between the brand, the behaviour of the digital human and the customer experience.
Community	The community that the digital human will serve, be part of or represent. This can be local or global.	Examples of community include: disability community; Indigenous community; cycling community; football community. Definition of the community is essential, for focused and effective co-design.
Culture	Ethnographic, psychographic, or organisational.	Co-design to include consideration of culture as influence on personality and other embodiment elements.
Domain	Specific industries, sector clusters of industries, or emerging industries.	A digital human for a beauty brand, would have different personality attributes to a digital human for a utilities industry. With this industry context comes knowledge about the industry the digital human would need to have: sourced via co-design workshops; industry journals – see “Other Information Assets”. Given industries evolve, this element of context is maintained via operating model.
Policy	Policy settings of government or an organisation which could accelerate or limit the introduction of digital humans.	Co-design workshops with brand mgt; psychologists; customers. Ongoing iteration with performance feedback via operating model. Personality matures – not a once off process – care needs to be taken that personality and brand do not drift out of alignment.
Other Information Assets / Features	Features are elements such as such as maps, graphics, video, sounds, recordings. Features can be combined through co-design to achieve an experience. Sourced via pre-existing assets or specifically commissioned.	Face influenced by personality, brand and purpose. Co-design workshops with brand mgt; psychologists; customers. Becomes the face of the brand / organisation.
Internal	Digital human operating internal to an organisation.	What is the personality of the brand? The personality of the digital human should reflect the personality of the brand. Co-design workshops with brand mgt; psychologists; customers. Ongoing iteration with performance feedback via operating model. Personality matures – not a once off process – care needs to be taken that personality and brand do not drift out of alignment.
External	Digital human in external customer service, mass market influencer, or controlled therapeutic/coaching setting	Face influenced by personality, brand and purpose. Co-design workshops with brand mgt; psychologists; customers. Becomes the face of the brand / organisation.
Personal	Digital human as a personal assistant, digital replication of an individual or celebrity.	Accent; male; female; computer generated.
Expertise	Digital human as an expert; trained opinion setter/influencer.	Voice influenced by personality, brand and purpose. Co-design for attributes of voice. Source voice via: voice library; computer generated; specific recording by talent.
Fellowship	Mass market or social media follower. Different to but related to community.	Use of hands determined by personality, brand and purpose. Co-design to determine when hands are introduced and for what purpose – eg hand modelling different complexity to sign language.

**A2**

Element	Description	Process
Personality	Friendly; conservative; authoritarian; vivacious; warm; understanding.	Appearance influenced by personality, brand, purpose, cultural and psychological factors. Co-design for attributes of appearance eg bright lip colour could be important for a cosmetic brand, equally could assist with accessibility via lip reading.
Face	Male; female; age; cartoon character; ethnicity; actual real person; celebrity; augmented characteristics and colouring.	General domain specific Q&A: call centre scripts; webinars; customer workshops; survey; letters; observation. Maintained ongoing via operating model. Add domain knowledge for specific contexts
Voice	Accent; male; female; computer generated.	An interaction model is a pattern of questions; statements; clarifications; pauses and tempo; length of responses; handoffs; escalations; taxonomy; topics; related topics; intents; chit chat. Interaction models can be common across industries.
Hands	Sign language; hands used for modelling; instruction.	Co-design to build on common conversation patterns such as escalation pattern and handoffs; pauses, tempo and amount of chit-chat to align with personality. An interaction model can be reused almost completely across similar industries and geographies; for example different utility organisations in different geographies could re-use the interaction model for “how do I”. Other interaction models could be built upon through co-design. Confidence levels and learning progress refined and tested via operating model.
Gestures & Mannerisms	The movement of the eyes, eyebrows, face and head; pauses; frowns; expressions; eye contact.	Body of knowledge about a specific topic and/or general knowledge.
Appearance	Lip colour; eye colour; hair style; glasses; makeup; clothes.	Identified via workshops with customers and practitioners eg industries such as utilities have words with particular meaning; different gov programs have specific phrases; celebrity code words; all to be understood by customers. Industry language models are progressively built up over time, established via AI industry insight.
Corpus	An interaction model is a pattern of questions; statements; clarifications; pauses and tempo; length of responses; handoffs; escalations; taxonomy; topics; related topics; intents; chit chat.	Co-design with psychologists and ethnographers will influence how English can be applied in different cultural settings - certain multilingual phrases could be included to align with personality and purpose. Sign language is not a literal translation. A straight forward Babbel translation cannot simply
Interaction Model	Language Model	Domain specific words, phrases; cultural specific slang or references.
Language	English; other spoken/written language; sign language; domain/ culture specific sign language.	

# layers of context

LAYERS OF CONTEXT		FINDING CONTEXT
Element	Description	Process
Brand	The brand of the organisation, product, service or celebrity. The brand is the promise of an experience.	If the brand is not known nor explicitly stated – eg gov – or a new brand, co-design involving workshops, survey, research is necessary to identify or propose key brand attributes that are then reflected in the personality of the digital human. Without this, there could be incompatibility between the brand, the behaviour of the digital human and the customer experience.
Community	The community that the digital human will serve, be part of or represent. This can be local or global.	Examples of community include: disability community; Indigenous community; cycling community; football community. Definition of the community is essential, for focused and effective co-design.
Culture	Ethnographic, psychographic, or organisational.	Co-design to include consideration of culture as influence on personality and other embodiment elements.
Industry	Specific industries, sector clusters of industries, or emerging industries.	A digital human for a beauty brand, would have different personality attributes to a digital human for a utilities industry. With this industry context comes knowledge about the industry the digital human would need to have: sourced via co-design workshops; industry journals – see “Other Information Assets”. Given industries evolve, this element of context is maintained via operating model.
Domain	Domains are groups of like interaction models from which conversations can be constructed for specific industries.	Examples of domains include general information; specific information; advice; coaching; assistance; and influencing. The process of co-design will identify opportunities for the re-use or extension of domains from one industry to another. In the domain “general information”, there would be common patterns of interaction across a number of industries – for example “how do I?”
Policy	Policy settings of government or an organisation which could accelerate or limit the introduction of digital humans.	Digital humans potentially touch all policy settings: accessibility; workplace relations; privacy; security. Conduct inventory of policy settings, including organisation specific policies, and map digital human scenarios to position and anticipate reactions; prepare messaging. This element of context is maintained via operating model.
Other Information Assets / Features	Features are elements such as maps, graphics, video, sounds, recordings. Features can be combined through co-design to achieve an experience. Sourced via pre-existing assets or specifically commissioned.	Depending on industry and domain, the corpus could be augmented by maps, videos, images, sounds or recordings. Sourced via pre-existing assets or specifically commissioned. Maintained via operating model.
Internal	Digital human operating internal to an organisation.	The internal model could be a progression to the external model, or a specific use case in its own right. Maintained via operating model.
External	Digital human in external customer service, mass market influencer, or controlled therapeutic/coaching setting.	Each of these external applications is different. External customer service: digital human is part of customer service front line working together with human employees, and across channels. Mass market influencer: could be a celebrity; or new face of a brand or trend. Therapeutic/coaching: in a controlled environment such as a reading coach; or debriefing first responders, returning service personnel.
Personal	Digital human as a personal assistant, or digital replication of an individual or celebrity.	Digital human as a consumer product purchased/licensed from library: consumer “teaches” the digital human – operates on mobile devices. Digital human as a replica of the individual: digital replication service purchased; consumer or celebrity records/uploads experiences; operates on mobile device; commercial model for celebrity. “Other Information Assets” can be procured to enhance personalisation.
Expertise	Digital human as an expert; trainee; opinion setter/influencer.	Digital human could be deployed as a trainee (internal or external) with co-design to determine roadmap/progression to expert. In scenario of mass market influencer, expertise is differentiated from opinion setter.
Followship	Mass market or social media followship. Different to but related to community.	Digital human with followship could influence the market or community. This is an important contextual element, as a digital human followship could be a precursor to and/or trigger broader consumer demand for digital humans, and could influence policy as it would be ahead of the demand/adoption curve.

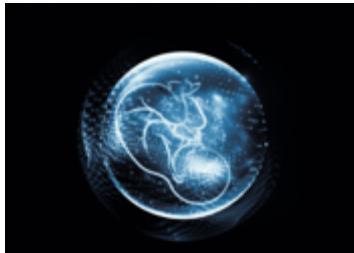
# layers of embodiment

A2

LAYERS OF EMBODIMENT		CO-DESIGNING AND CREATING EMBODIMENT
Element	Description	Process
Personality	Friendly; conservative; authoritarian; vivacious; warm; understanding.	What is the personality of the brand? The personality of the digital human should reflect the personality of the brand. Co-design workshops with brand mgt; psychologists; customers. Ongoing iteration with performance feedback via operating model. Personality matures – not a once off process – care needs to be taken that personality and brand do not drift out of alignment.
Face	Male; female; age; cartoon character; ethnicity; actual real person; celebrity; augmented characteristics and colouring.	Face influenced by personality, brand and purpose. Co-design workshops with brand mgt; psychologists; customers. Becomes the face of the brand / organisation.
Voice	Accent; male; female; computer generated.	Voice influenced by personality, brand and purpose. Co-design for attributes of voice. Source voice via: voice library; computer generated; specific recording by talent.
Hands	Sign language; hands used for modelling; instruction.	Use of hands determined by personality, brand and purpose. Co-design to determine when hands are introduced and for what purpose – eg hand modelling different complexity to sign language.
Gestures & Mannerisms	The movement of the eyes, eyebrows, face and head; pauses; frowns; expressions; eye contact.	Gestures & mannerisms determined by personality, brand, purpose, psychological and cultural factors. Co-design workshops and feedback necessary, and may involve ethnographic input.
Appearance	Lip colour; eye colour; hair style; glasses; makeup; clothes.	Appearance influenced by personality, brand, purpose, cultural and psychological factors. Co-design for attributes of appearance eg bright lip colour could be important for a cosmetic brand, equally could assist with accessibility via lip reading.
Corpus	Body of knowledge about a specific topic and/or general knowledge.	General domain specific Q&A: call centre scripts; webinars; customer workshops; survey; letters; observation. Maintained ongoing via operating model. Add domain knowledge for specific contexts.
Interaction Model	An interaction model is a pattern of questions; statements; clarifications; pauses and tempo; length of responses; handoffs; escalations; taxonomy; topics; related topics; intents; chit chat.  Interaction models can be common across industries.	Co-design to build on common conversation patterns such as escalation pattern and handoffs; pauses, tempo and amount of chit-chat to align with personality. An interaction model can be re-used almost completely across similar industries and geographies: for example different utility organisations in different geographies could re-use the interaction model for “how do I”.  Other interaction models could be built upon through co-design. Confidence levels and learning progress refined and tested via operating model.
Language Model	Domain specific words, phrases; cultural specific slang or references.	Identified via workshops with customers and practitioners eg industries such as utilities have words with particular meaning; different gov programs have specific phrases; celebrity code words; all to be understood by customers. Industry language models are progressively built up over time, establishing AI industry insight.
Language	English; other spoken/written language; sign language; domain/culture specific sign language.	Co-design with psychologists and ethnographers will influence how English can be applied in different cultural settings - certain multilingual phrases could be included to align with personality and purpose. Sign language is not a literal translation. A straight forward Babbel translation cannot simply be inserted without reference to personality and co-design.

# 4 co-design pathways to a digital human

B

**Creating (a digital human)****Explanation:**

This pathway represents the ab initio creation of a digital human, effectively co-designed from the ground up.

**Use Cases:**

Creation of a new brand, requirement for a new style of conversation, no suitable digital human for cloning or evolving (doesn't exist or unavailable)

**Comments:**

Will be default pathway (except for replicating a real person) until a number of digital humans exist.

**Cloning (a digital human)****Explanation:**

This pathway represents copying a digital human to a new conversation or brand.

Changes are likely to be made from name through to some facial features and mannerisms.

The new owning organisation would like adapt questions and answers, and features, in the corpus.

**Use Cases:**

Taking a digital human from a retail power organisation and cloning it for a retail power organisation in a non-competing market or for a similar utilities purpose such as retail water or retail gas.

**Copying (a real human)****Explanation:**

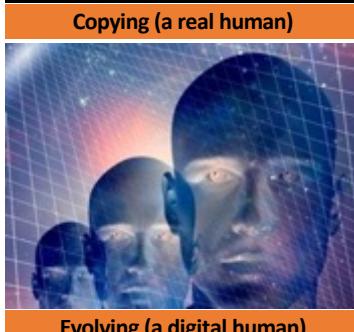
This pathway represents the ab initio creation of a digital human based on a real person, alive or deceased.

**Use Cases:**

Extending a human influencers brand, preserving human knowledge and capabilities, egotistic digital immortality.

**Comments:**

Might be used to create a digital human that is a composite of several digital humans (e.g. to preserve indigenous history)

**Evolving (a digital human)****Explanation:**

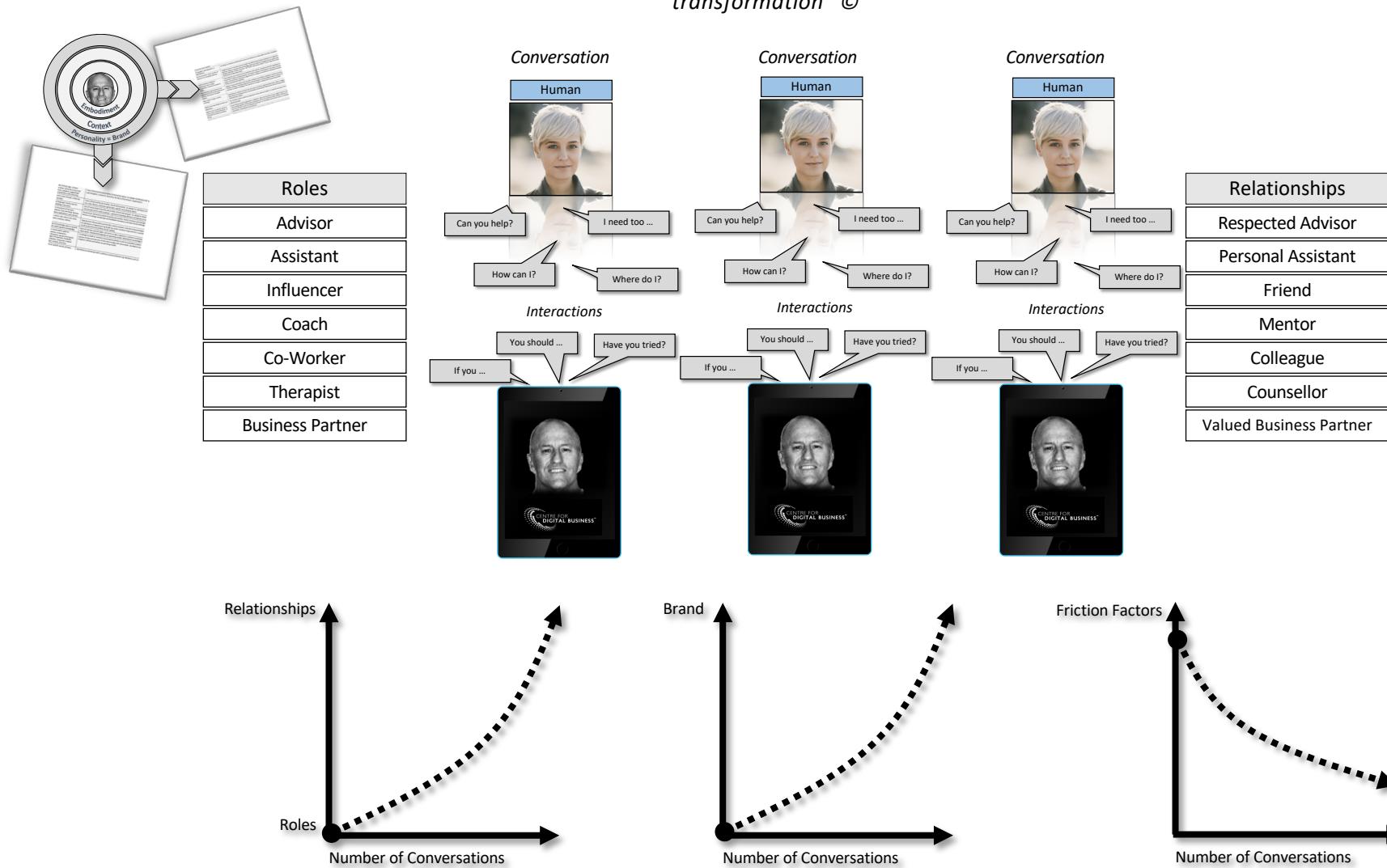
This pathway represents adding to the capabilities of a digital human within an existing organisation.

**Use Cases:**

Extending a retail power service management digital human to handle connections and billing.

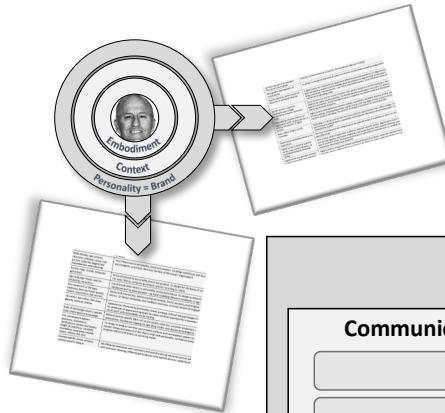
# contextual conversations build relationships

*"With a fully realistic digital human conversations can, over time, turn roles into relationships - building brand trust and reducing conversation 'friction factors'. Co-design of personas and conversations are critical components of this transformation" ©*



# operational model for the co-design and sustainment of a digital human

D



*"The Operational Model of a Digital Human is not an IT function" ©*

Operational Model		What's It For?	What It Does
<b>Communications &amp; Engagement</b> <ul style="list-style-type: none"> <li>Market Research</li> <li>Communications</li> <li>Media Campaign</li> <li>Customer/Partner Reference Group (DIRG)</li> <li>Community Engagement</li> <li>Regulatory / Peak Body Engagement</li> <li>Training and Change Management</li> </ul>	<b>Co-Design Approach</b> <ul style="list-style-type: none"> <li>Co-Design Principles</li> <li>Research &amp; Academia</li> <li>Emotional Expressions/Responses</li> <li>Personality</li> <li>Accessibility &amp; Assistive Technology</li> <li>Conversational Design &amp; Framework</li> <li>Question Gathering &amp; Answer Writing</li> </ul>	<p>The strategic purpose for the digital human must be clear – even as a proof of concept – as this will shape the operational model.</p> <p>An OpModel will be needed, even for a Pilot, as this will affect the success or otherwise of the digital human initiative.</p> <p>Importantly, without upfront consideration of the OpModel, brand could be affected.</p>	<p>The OpModel describes the various types of activities necessary for the co-design and sustainment of a digital human.</p> <p>The OpModel is the orchestration of activities across the functional areas, to achieve the layers of embodiment and context that define the unique attributes of personality and brand.</p>
<b>Digital Human Testing Approach</b> <ul style="list-style-type: none"> <li>User Experience Testing</li> <li>Usability Testing</li> <li>Accessibility Verification Testing (WCAG)</li> <li>Question and Answer Language Testing</li> <li>Machine Learning Progress Testing</li> <li>Avatar Gesture and Emotion Testing</li> <li>Unit &amp; System Testing</li> </ul>	<b>Controls &amp; Governance</b> <ul style="list-style-type: none"> <li>Brand and Marketing</li> <li>Omni-Channel Integration</li> <li>Features and Content Licensing</li> <li>Policy Changes</li> <li>Personality Monitoring</li> <li>Release Strategy</li> <li>Hand-Off Strategy and Conditions</li> </ul>	<b>Making It Work / Governance</b> <p>The OpModel should be owned and operated by a dedicated multi-disciplinary strategic unit embedded in the brand / communications/marketing area.</p> <p>Rather, there should be the progressive buildout of the team to ensure continuity of knowledge and purpose of the OpModel. This is essential to support a development roadmap of evolution and innovation.</p>	

# co-design lexicon | 1 of 2

Concept	Definition	Example
<b>Co-Design</b>	<p>Co-design is a lifecycle process not an event – that is, co-design is not a one-off event or deliverable. Co-design does not assume a “solution” but rather is about understanding the background, the emotions, and day to day lives of people in their search for information, services, and engagement. The key point is not starting with a “solution” and getting “input” – this is a common fundamental error.</p> <p>Understanding the emotions is a key component of co-design, as emotions – frustrations, anxiety, confusion and desire – all drive interactions and conversations which may or may not be efficient or productive and may impact brand. In relation to co-design for a digital human, the co-design lifecycle process contemplates brand and personality from the outset.</p> <p>The co-design lifecycle for a digital human is an architecture of componentised and commoditised assets, processes and accelerators.</p>	<p>In the health industry, the co-design process for a cardiac coach digital human would involve the people who are likely to be impacted by or will benefit from the process and/or the outcome, either directly or indirectly – importantly for cardiac patients and their families, the co-design process creates a shared understanding of the emotions throughout their journey ( see below) and the gaps in the current model.</p>
<b>Persona</b>	<p>A persona is a realistic description of a fictitious person that embodies typical characteristics of the potential user/client group. The work with personas is about using the everyday experiences of people, their experiences and their needs as a starting point when developing new products or services. This leads to inclusion of the users' perspective in all aspects of the co-design lifecycle process. Personas help you notice and amplify experiences and emotions that otherwise go unnoticed.</p>	<p>The co-design architecture contains a series of candidate personas in different industries. A persona for a premium beauty brand is very different from a persona involving an emergency in the utilities sector – in this example, the different personas represent different emotions, desires and journeys</p>
<b>Customer Experience Pathway</b>	<p>The customer experience pathway is a visualisation –created through co-design – from the perspective of the customer experience, and their community. The customer experience pathway is a representation of how people feel, their apprehension, who they trust, their excitement, and who and what influences their opinions and contact with the organisation.</p> <p>The customer experience pathway helps to explain what's happening and predict what will happen – in this sense, the experience pathway is very different from a business process diagram.</p>	<p>Many organisations mistakenly look at the interaction between the customer and the organisation from the organisation's perspective – this is classic in health services.</p> <p>From the health customer experience perspective, the overall journey is disjointed, confronting and depersonalised.</p> <p>The customer experience pathway illustrates the interaction with health providers as a small but extremely frustrating subset of the customer's overall health journey.</p>
<b>Friction Factors</b>	<p>Psychological (emotional and character) attributes of a human persona that can slow or hasten a conversation with a digital human. These can vary for the same persona over different domains and industries.</p>	<p>Friction factors need to be taken into account when re-using or co-designing interaction models. For example, in the situation of an earthquake people would likely to be very anxious and in need of information – these are the friction factors in this instance. The interaction model (see below), would be co-designed for quick responses and no chit-chat for example.</p>
<b>Features</b>	<p>Features are elements such as maps, graphics, video. Features can be combined through co-design to achieve an experience. Sourced via pre-existing assets or specifically commissioned</p>	<p>For example, how a map integrates with the service management process for a utility handled via a digital human omni-channel.</p>
<b>Content</b>	<p>Content is information contained in a feature. A particular feature such as a map could contain different content.</p>	<p>For example, a map being a feature – might contain content relating to “electricity outages”. The same map (feature) might also contain content relating to “telephone outages”.</p>
<b>Embodiment</b>	<p>Embodiment is a co-design process that gives human form (physical, behavioural) to the concept of empathetic AI. An embodied entity (digital human) can reproduce; develop; grow; interact; exist in time and space; and evolve. Embodiment reflects and connects engaged entities. Embodiment is necessary for empathetic conversations and relationships.</p>	<p>In the case of the digital human, elements of embodiment include: personality; appearance; face; voice; knowledge; gestures; and language. A digital human representing an adventure sports brand for example, would have a personality and appearance reflective of adventure.</p>
<b>Context</b>	<p>Together with embodiment, context is a determinant of and influencer of brand and personality. Whilst embodiment can be through of the design factors that give shape to the human form of the digital human, context can be thought of as the environmental, community and cultural determinants of the initial co-design and ongoing evolution of the digital human.</p>	<p>Contextual elements include: community; culture; industry; policy; and whether the purpose of the digital human is to serve (internal or external customers) or influence and grow a fellowship.</p>
<b>Domain</b>	<p>Domains are groups of like interaction models from which conversations can be constructed for specific industries.</p>	<p>Examples of domains include general information; specific information; advice; coaching; assistance; and influencing. In the domain “general information”, there would be common patterns of interaction across a number of industries – for example “how do I?”</p>

# co-design lexicon | 2 of 2

Concept	Definition	Example
<b>Conversation</b>	A conversation is co-designed to comprise one or a number of interaction models.	For example, in the health industry, a cardiac coach digital human conversation could be comprised of the interaction model relating to "general information" about cardiac health; the interaction model relating to "specific information" on recommended medications; and a "feature" of a map showing information about walking groups.
<b>Interaction Model</b>	<p>An interaction model is a pattern of questions; statements; clarifications; pauses and tempo; length of responses; handoffs; escalations; taxonomy; topics; related topics; intents; chit chat.</p> <p>Interaction models can be common across industries.</p>	<p>An interaction model can be re-used almost completely across similar industries and geographies: for example different utility organisations in different geographies could re-use the interaction model for "how do I".</p> <p>Other interaction models could be built upon through co-design.</p>
<b>Language Model</b>	Domain specific words, phrases; cultural specific slang or references.	Industries such as utilities have words with particular meaning often defined by industry practice and compliance standards. Different gov programs have specific phrases. Language models are largely replicable.
<b>Embodiment Exchange</b>	The Embodiment Exchange is a Proprietary Digital Marketplace that will Accelerate and Shape the Digital Human Economy. It enables the Rapid Innovation, Development, Augmentation and Evolution of Digital Human Products and Services through the re-use of Proprietary Digital Marketplace of Common Elements, Patterns, Features and Insight.	For example, interaction model for general information in utilities could be re-used and evolved through co-design for the telco industry. The Embodiment Exchange would keep the inventory of interaction models.
<b>Memories</b>	A memory is a lived experience of a real human captured in stories, news, photos, video (GoPro etc.), music, sounds, text written by or about a person, maps of where they have travelled.	For example, co-designing a brand ambassador that has "lived" the company ethos (e.g. mountain climber) but there are no photos of a specific mountain
<b>Digital Influencers</b>	<p>Currently social media is a platform for celebrities, politicians and activists to influence through the amplification of their personality and message. This is the current paradigm of digital influences.</p> <p>In the digital human economy, digital humans will be the new digital influences through their own existence, fellowship and brand.</p>	<p>A digital human digital influencer could be a copy of a real human celebrity</p> <p>There could also be a digital human digital influencer specifically created for a cause or brand.</p>
<b>Operational Model</b>	The Operational Model describes the various types of activities necessary for the co-design and sustainment of a digital human. The Operational Model is the orchestration of activities across the organisation's functional areas, to achieve the layers of embodiment and context that define the unique attributes of personality and brand. This is not an IT function.	The Operational Model should be owned and operated by a dedicated multi-disciplinary strategic unit embedded in the brand / communications/marketing area.
<b>Digital Immortality</b>	<p>Refer to paper published on Medium on 5 January 2018:            "Immortality is available now — and it's not as science fiction predicted"</p> <p><a href="https://medium.com/@mariehjohnson/immortality-is-available-now-and-its-not-as-science-fiction-predicted-4bafa7a9655f">https://medium.com/@mariehjohnson/immortality-is-available-now-and-its-not-as-science-fiction-predicted-4bafa7a9655f</a></p>	See the link to the paper (left) for examples.

# the “Embodiment Exchange” & commoditisation of digital humans

**...the significance of utilities and other asset intensive industries...**

What are Utilities?	The Opportunity for Digital Humans Customer Facing	The Opportunity for Digital Humans Engineering and Assets	Other Asset Intensive Industries
<p><b>What are Utilities?</b></p> <ul style="list-style-type: none"> <li>○ Utilities are generally regarded as power, water and gas.</li> <li>○ Power consists of three main phases, often run by different commercial or government organisations: <ul style="list-style-type: none"> <li>➢ Generation – thermal (e.g. coal), hydro, solar, wind, nuclear etc.</li> <li>➢ Transmission – moving power from where it is generated to where it is consumed (e.g. large cross-country transmission networks of overhead cables)</li> <li>➢ Distribution (retail) – moving power from the transmission system to points of consumption – homes, business etc. Usually via overhead cables on power poles or via underground cables.</li> </ul> </li> <li>○ Water consists of: <ul style="list-style-type: none"> <li>➢ Capture and storage (e.g. dams in catchment areas)</li> <li>➢ Treatment - removing soil and other debris, pathogens and toxins. Desalination is another form of treatment where water is drawn from the ocean rather than inland catchment areas.</li> <li>➢ Distribution – moving processed (potable) water to points of consumption such as homes and business via networks of pipes, tanks, pumps and valves etc.</li> <li>➢ Sewage – returning used water from points of consumption via networks of pipes, tanks, pumps and valves for processing prior to discharge at sea or further consumption.</li> </ul> </li> <li>○ Gas consists of: <ul style="list-style-type: none"> <li>➢ Extraction - drilling for gas can be at onshore or offshore well heads.</li> <li>➢ Processing to remove water vapour and other volatiles. This usually occurs at the well head.</li> <li>➢ Distribution via systems of pipes, valves, pumps and tanks (gas main) from which connections are made to point of use such as homes and businesses.</li> </ul> </li> </ul>	<p><b>The Opportunity for Digital Humans Customer Facing</b></p> <ul style="list-style-type: none"> <li>○ All utilities are asset intensive industries with a large customer facing focus.</li> <li>○ The customer facing focus includes interactions such as: <ul style="list-style-type: none"> <li>➢ Connecting/disconnecting a service</li> <li>➢ Billing and payments</li> <li>➢ Sourcing advice on, or actually buying appliances</li> <li>➢ Service management including responding to: <ul style="list-style-type: none"> <li>• individual service delivery problems</li> <li>• general outages affecting areas</li> <li>• Emergencies where services need to be disconnected (e.g. forest fire)</li> </ul> </li> </ul> </li> <li>○ All of these can effectively utilise digital humans as part of an omni-channel strategy.</li> <li>○ Brand awareness is now critical because competition has entered these industries; digital humans can help build this brand awareness.</li> <li>○ Importantly, the same interactions are repeated throughout each country wherever utility services are delivered by a discrete organisation.</li> <li>○ Often, these organisations are not competing with similar organisations elsewhere in the country (competition tends to be local) and almost never compete with similar organisations in other countries.</li> <li>○ Therefore conversations developed for a utility can be copied and deployed many times across countries and around the world, significantly reducing co-design costs and deployment times.</li> <li>○ Many utilities also use the same Customer Relationship Management (CRM), Enterprise Asset (Service) Management (EAM) and other ERP systems (SAP, Oracle, Infor, Maximo etc.) therefore connecting a digital human to these systems is also highly replicable. IBM is already looking to connect Watson to Maximo for data analysis for asset intensive industries.</li> </ul>	<p><b>The Opportunity for Digital Humans Engineering and Assets</b></p> <ul style="list-style-type: none"> <li>○ Utilities present another digital human growth opportunity based on commoditisation; internal engineering and maintenance.</li> <li>○ Engineering and maintenance are big budget items; they acquire (e.g. build) and sustain the infrastructure used to generate revenue.</li> <li>○ All utilities face the same problems. For example, how often should they replace sewage pipes, many of which are large concrete structure that have been in the ground for decades. Too soon and you waste money, leave it too long and you can major unplanned service outages that cause consequential damage and ruin brands. For example, across the world thousands of engineers are all trying to perform the same analysis on pipe ‘cohorts’ to build predictive models.</li> <li>○ Digital humans as engineering assistants could take over the research and calculations – identifying complementary data sources, testing these and evaluating their relevance. Whilst this is largely an AI task it is critical that humans can use conversational means to explore with the AI various methods and data sources.</li> <li>○ The maintenance of the complex assets (processing plants, pumps etc.) is often dependent on experienced staff who are near retirement who act as maintenance planners. Replacing them with digital humans would reduce this key person risk and provide an easy way for trades staff and contractors to plan their work, obtain resources such as cranes, test equipment and spares, and report work done and faults found.</li> <li>○ Safety is critical in these industries and the economic ideal is one person crews whereas safety often requires an idle observer. Digital humans could monitor conditions and the job, provide warnings and obtain rescue if needed.</li> </ul>	<p><b>Other Asset Intensive Industries</b></p> <ul style="list-style-type: none"> <li>○ Other asset industries where these opportunities exist are: <ul style="list-style-type: none"> <li>➢ Transport (rail, light rail etc.)</li> <li>➢ Petrochemicals (especially downstream oil and gas)</li> <li>➢ Chemicals (e.g. plastics)</li> <li>➢ Mining (especially ore processing)</li> <li>➢ Automotive</li> <li>➢ Fast Moving Consumer Goods (FMCG)</li> <li>➢ Etc.</li> </ul> </li> </ul>



# utilities retail power | digital humans - the new service managers dealing with a high friction (difficult) persona

**Persona**

**Bill Taylor**

**Background:**

- Bill is an ex-pat Aussie who runs a successful building contractor business

**Goals and Interests:**

- Make more money
- Cars
- Fishing

**Concerns:**

- Blackouts cost him money
- Has bought one of the first Tesla cars in NZ and needs power to charge it

**Demography:**

- 54 years old
- Been in NZ 15 years
- Lives with family in large home in Mission Bay



**Interaction History:**

- Complains angrily to staff about outages
- Wants to know details about when fixes are made and threatens to not pay power bill

**Friction Factors:**

Easily confused	↔	Comprehends advice
Concerned	↔	Accepting
Reserved	↔	Talkative
Aggressive	↔	Complacent
Inquisitive	↔	Uninterested

**Current Conversation**

Bill checks the outage map online but it doesn't show anything. He isn't aware of the iOS app and hasn't downloaded it.

Bill sees the link to "my power's out, why isn't it showing on the outage map" and is taken to a message saying use the outage app on your smartphone (which he wasn't aware of and doesn't have) or ring xxxxx

Bill hates waiting on call centres and sees the **contact us** link but it takes him to a whole page of numbers where he sees that the emergency number is the same as the outage number and same as the connect services number.

Outraged, Bill rings and when he finally gets through yells at the staff member, demanding to know why his power is out, why it was out last week, what is being done about the shoddy service etc.

**Situation**

**Digital Human Conversation**

Bill is at home in the early evening and the power has just gone out. Bill has traded his work car for a new Tesla and has just plugged it in to charge overnight. He has to drive to an important client meeting in the morning. He is angry because his Tesla won't have enough charge if the power is out for more than four hours. He demands to know when the power will be restored.

Also, the power was out for two hours at one of Bill's building sites the previous week. He believes that the power outages are worsening this year and wants to know what is being done about them in general, and why should he pay for service he isn't receiving.

Bill goes online and sees the link to Sparky who can help him with emergencies and outages.

Sparky identifies Bill and asks what he can help with. Bill yells 'my power is out and it keeps happening!' Sparky says 'I understand how frustrating that is but first, are you at home or calling about another property'. Sparky confirms Bill and his address in the CRM system.

Sparky brings up the outage map and tells Bill there isn't an outage reported for Mission Bay and puts it on the map. He tells Bill that he will have a tech investigate and offers to contact Bill with an update as soon as he has one. He asks Bill if he'd like a call, text or email and confirms the contact details in the CRM system.

Sparky then says 'Bill, you mentioned that you've been having problems with your power and I can see you've had to call us 4 times over the past year. I'll file a request to have a service representative contact you to discuss this' – Sparky again confirms preferred means of contact.

**Explanation**

Note: Some utilities use IBM Maximo for Service Management therefore potential exists for fast integration with IBM Watson.

This interaction depicts how a digital human might function in a high friction interaction in a call centre (service industry variant). High friction interactions often result when a 'difficult' persona is faced with a real or perceived lack of service. Note the use of supporting 'features' to convey non-verbal information. Note also how information such as expected call back time is updated as information becomes available to the digital human in the background, either through update from an ERP system or human service technician. Bill could be identified automatically (depends on combination of device and CRM system) or via dialogue. Sparky is able to discuss past outages/calls because he has connection to the CRM system. Sparky takes the opportunity to propose a channel (smartphone app) that could help Bill easily see issues affecting his home and building sites, and provide real information on historical outages. This approach helps bridge the gap until Sparky is available on smartphone.

Industry	Conversation	Version	Date
Utilities – Power - Retail	Outage – High Friction Customer	1.0	29/01/2018

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# utilities retail power | digital humans - the new service managers dealing with a low friction (digital savvy) persona

## Persona

**Atarangi Huata**

<b>Background:</b>	<ul style="list-style-type: none"> <li>Atarangi is final year architecture student at Auckland University.</li> <li>Born and raised in Waitangi.</li> <li>Works part-time in Little &amp; Friday Cafe</li> </ul>															
<b>Goals:</b>	<ul style="list-style-type: none"> <li>Wants to work on construction projects in Christchurch</li> <li>Charity work with the SPCA</li> </ul>															
<b>Concerns:</b>	<ul style="list-style-type: none"> <li>Feels pressure to complete final assignments and exams for the year</li> </ul>															
<b>Demography:</b>	<ul style="list-style-type: none"> <li>24 years old</li> <li>Māori</li> <li>Shares flat with another student in Newmarket</li> </ul>															
<b>Interaction History:</b>	<ul style="list-style-type: none"> <li>Limited – signing up for electricity</li> </ul>															
																
<b>Friction Factors:</b> <table border="1"> <tr> <td>Easily confused</td> <td>←</td> <td>Comprehends advice</td> </tr> <tr> <td>Concerned</td> <td>←</td> <td>Accepting</td> </tr> <tr> <td>Reserved</td> <td>←</td> <td>Talkative</td> </tr> <tr> <td>Aggressive</td> <td>←</td> <td>Friendly</td> </tr> <tr> <td>Inquisitive</td> <td>←</td> <td>Uninterested</td> </tr> </table>		Easily confused	←	Comprehends advice	Concerned	←	Accepting	Reserved	←	Talkative	Aggressive	←	Friendly	Inquisitive	←	Uninterested
Easily confused	←	Comprehends advice														
Concerned	←	Accepting														
Reserved	←	Talkative														
Aggressive	←	Friendly														
Inquisitive	←	Uninterested														

## Current Conversation

Atarangi uses her browser to check if there is an outage in Newmarket. She sees that there is, and that it will be out until 945pm. She also sees that there are a number of other outages.

Atarangi calls xxx xxxx from her flatmates mobile as her own battery is nearly flat and she is on hold for some time. Not wanting to flatten her flatmate's battery, or waste more study time, Atarangi hangs up and decides to go to her friend's place.

Atarangi plugs in her devices at her friends and activates 'keep me updated' on the website so that she will know when she can go home.

When she receives a message that the power has been restored she decides to ride back home to finishes her studies.



## Situation

## Digital Human Conversation

Atarangi is studying at home for her final year architecture exams when the power goes out. She has enough battery power in her notebook computer and smartphone (providing her internet access) to last for several hours but is worried that if it goes longer than that she won't be able to do her exam revision.

After several hours Atarangi checks online and sees that the estimated repair time is now past when her batteries will die and has to decide whether to cycle to a friend's place to keep studying or take a chance and stay home.

Atarangi goes online and sees the link to Sparky who can help her with emergencies and outages. She is able to get straight through.

Sparky identifies Atarangi and asks what he can help with. Atarangi explains the situation and Sparky advises that there has been a problem at a substation and that there are now a number of outages keeping the crews busy and that they can't guarantee the estimated repair times.

Sparky reinforces that the estimated repair times will be updated regularly and asks if Atarangi wants to be notified and how as changes occur.

Sparky then says 'before I go, we have an app you can download for your smartphone from our website or the app store that makes it easy to keep track of outages without having to use your computer'.



## Explanation

Note: Some utilities use IBM Maximo for Service Management therefore potential exists for fast integration with IBM Watson.

This interaction depicts how a digital human might function in a low friction interaction in a call centre (service industry variant). Low friction occurs when the person is knowledgeable and forgiving, even if a bit stressed. In this interaction the main benefit of the digital human is that Atarangi was able to connect with someone to help her without having to wait when she is under time pressure. She has also been provided with information about the app that might help her in future outage situations. Whilst the use of the digital human in this case wouldn't change her decision to ride to her friend's place to keep studying it does allow her to make that decision with confidence that it is the best option because the power is unlikely to be back on before her batteries run flat.

Industry	Conversation	Version	Date
Utilities – Power - Distribution	Outage – Low Friction Customer	1.0	29/01/2018

# utilities retail power | digital humans - the new service managers dealing with a medium friction (ESL) persona

**Persona**

**Roger Chen**

**Background:**

- Roger is a retired labourer who moved to NZ in 1985
- English is poor, fluent Cantonese
- Reasonable health but two chronic conditions

**Goals and Interests:**

- Live a quiet life
- Plays bowls at Pakuranga Bowling Club

**Concerns:**

- Uses a CPAP Machine for sleep apnoea that requires electricity
- Medications need to be refrigerated

**Demography:**

- 68 years old
- Chinese POC moved to NZ in 1985
- Lives alone in an apartment in Pakuranga



**Interaction History:**

- Sent emergency message
- Wrote in power outages likely (storms) or underway
- Failures anywhere in Auckland worry him

**Friction Factors:**

Easily confused		Comprehends advice
Concerned		Accepting
Reserved		Talkative
Aggressive		Friendly
Inquisitive		Uninterested

**Current Conversation**

**Situation**

Roger is at home when the power goes out. He calls a neighbour who says their power is also out. Roger has registered his medical devices and receives a notification when an outage is planned so he knows this outage is not planned.

Because it is getting close to his bedtime Roger decides to ring to see when the power might be restored.

Whilst Roger's spoken English is poor he can read and write English quite well.

**Digital Human Conversation**

Roger goes online and clicks on Sparky. Roger's son has shown him how this is all he needs to do; he doesn't need to understand the website.

Sparky identifies Roger and through CRM guesses that he is probably calling about the outage where he lives because of his medications and CPAP machine.

Sparky brings up the text feature and completes the call with Roger.

Roger calls the service number but has trouble getting through because storms have created a number of outages.

Roger finally gets through but has trouble understanding the options. He selects emergency and when put through starts explaining he needs power for his medicines. There is some confusion until he identifies himself and the contact centre works out what Roger wants.

The call centre staff want to finish the call because of the backlog but Roger wants to stress he needs the power and has to go to bed and can't wait for it to come back on. The CC tries to direct Roger to use the outage function on the web site but he says its too difficult to understand.

The call finishes with Roger not knowing when the power will be back on.

Explanation			
<p>Note: Some utilities use IBM Maximo for Service Management therefore potential exists for fast integration with IBM Watson.</p>			
<p>This interaction depicts how a digital human can work with someone with speaking/hearing difficulty be that disability, language or hearing loss. A digital human can be multi-lingual but assuming that as a future capability, the text feature works quite well in this interaction. Note that the other advantages here are avoiding having to navigate the website and getting through to someone straight away. Also, in times of high demand call centre staff can be freed up to deal with real emergencies or calls diverted to them from the digital human according to the interaction protocol. Obviously, with power out, the caller needs to be able to use a battery powered device such as a tablet or smartphone. Currently(in Australia), translation and interpreting services to assist non-English speakers interacting with government and other service providers is provided by the National Translation and Interpreting Service (TIS). TIS is funded by government with providers paying fees which go to subsidise TIS operations. TIS has approximately 2000 contracted interpreters across a range of languages. A DH able to deliver information in multiple languages would be a better service for customers, provide greater security and intelligence, and would disrupt the TIS model.</p>			
Industry	Conversation	Version	Date
Utilities – Power - Distribution	Outage – Medium Friction Customer	1.0	29/01/2018

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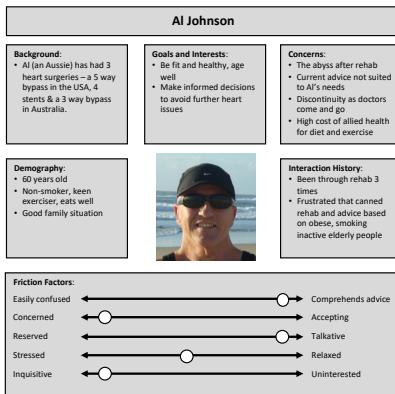






# cardiac rehabilitation conversation

## Persona



## Current Conversation – Institutional Journey



Al's Dr is on leave so he sees another Dr in the practice, unfamiliar with Al's history. This Dr has to make several long phone calls to a cardiac surgeon to determine what treatment to prescribe for Al's DVT because the traditional blood thinners might affect his recovery from surgery. The Dr says Al should wear a compression stocking and says he thinks there is a pharmacist up north who can fit them but has no details. Al has to find them himself.

Al completes rehab but hasn't been able to do all of the exercises because of his DVTs – he is still wearing a compression stocking. He doesn't know what exercises he can safely do to rebuild his endurance and strength, especially since he now has 8 bypass grafts, 4 stents, several DVTs and other chronic conditions. Al finishes rehab and falls into the abyss; he hasn't been given a plan nor advice on what to do next.

Al books to see his physiotherapist of 10 years about exercise but she is on leave and he is sent to a new therapist in the practice who is unfamiliar with Al's history. Note that much of Al's early history was lost when the practice computerised. Al is frustrated at having to explain his long and complicated medical history and the therapist is uncertain how best to proceed. After several sessions this therapist also takes leave and Al abandons seeking help there.

Al books to see his dietitian and has to again explain what has happened. He tries to book some sessions in advance to work on any necessary dietary changes but she is also about to take a month's leave. Al decides to worry about dietary changes after his DVTs have resolved.

**After many sessions with various Drs and allied health professionals Al still does not have a plan to continue his heart recovery after rehab!**

## Situation

Al had his last heart surgery, a 3 way bypass, in August 2017. The removal of his saphenous vein for the bypass gave him DVTs that left him in severe pain and disabled for several months. Most of the cardiac team were disinterested in this 'side effect'. His first 5 way bypass used endoscopic vein harvesting that his medical team believes has caused the need for the 4 stents and latest bypass. Al is frustrated because since his first surgery he has followed cardiac rehab advice he was given at the time but has still needed more surgery. Al completed his latest rehab in November 2017 and has since spent over \$2000 not covered by his health fund or Medicare on allied health professions – pharmacists, exercise physiotherapists, dieticians etc. to try and develop a healthy regime to protect his heart. During that time his 'experts' including his Dr have all taken extensive holidays.

## Digital Human Conversation – Patient then Life Journey



When he is assessed at the hospital as requiring another bypass Al is assigned Coach, a digital human, as his **cardiac coach**.

Although not necessary, Al authorises Coach to access his full medical history and Apple eHealth data. Coach answers Al's initial questions and concerns about what has happened and the procedure ahead. She also checks his dietary preferences and advises the hospital of meal plans for his stay based on preferences and medical requirements.

After the surgery Coach is available whilst Al is in hospital to answer any other questions and to start preparing him for discharge. Al finds this much better than the one size fits all hardcopy discharge booklet normally issued to patients. Coach assists Al to make the follow-up appointments with the surgeon and cardiologist and talks Al though his changed medicines. Coach suggests they have a chat each morning about the day ahead whilst he is recovering. These chats enable Coach to monitor Al for early signs of depression following the surgery.

Coach books Al into cardiac rehab and helps him run through the awareness sessions before he attends the program so that he is prepared. Al asks Coach questions about what he sees.

Coach also shows Al videos of the exercises he is likely to do at rehab and asks if he is familiar with these or has any concerns.

Coach prepares a pre-rehab report for Al that is forwarded to the rehab team so that the education and exercise can be tailored to his needs.

At the completion of rehab Coach puts together a plan based on feedback from the rehab team and Al. She provides Al with **content** – exercise plans, meal plans etc.

Coach advises Al to add the Apple wireless ECG band to his Apple Watch and to buy a wireless BP monitor so that she can monitor his exercise and check his blood pressure each day.

Coach helps Al find recipes, video cooking demonstrations, exercise demonstrations, guided meditations and other content to help him live a healthy life.

Coach monitors Al's Apple eHealth data to check on his sleeping, heart rate when resting and exercising, diet etc. to provide alerts or advice.

## Explanation

Cardiac rehabilitation is a six week program of 6 one hour lectures that provide limited awareness of heart anatomy, heart disease, and diet, exercise, medications, and psychology. There is also around 6 sessions of 1.5 to 2 hours by exercise physiologists to provide basic exercise tolerance, restore basic movement and recover from the surgical sternal injuries. These exercise sessions do not provide functional fitness. Rehab graduates do not leave with initial exercise programs, diet plans or any of the tools they will need to continue their recovery. Many rehab patients are fearful and see finishing rehab as dropping into an abyss. Also, despite the preparation for, recovery from and secondary prevention of heart disease being universal constants most hospitals and health funds develop their own rehab procedures and education that are largely identical. This is a massive waste of money. Finally, adherence rates to what patients are taught in rehab is very low (largely because it is only awareness), leading to high repeat cardiac events and revascularisations amongst heart patients, an avoid financial drain on healthcare.

Industry	Conversation	Version	Date
Medicine – Heart Surgery	Rehabilitation	1.0	29/01/2018

# use case - cardiac rehabilitation



Stage 3
<ul style="list-style-type: none"> <li>○ Ability to infer intent during conversations and respond appropriately</li> <li>○ Digital human interactions begin at admission to build rapport and continuity</li> <li>○ Could use value adds such as identifying and purchasing 'heart relevant' goods and services related to lifestyle.</li> </ul>
Stage 2
<ul style="list-style-type: none"> <li>○ Conversations extended including presentation of educational materials (but still supported by video etc. where appropriate)</li> <li>○ FAQ and Q&amp;A added for a much broader range of topics</li> <li>○ Suitable for home use by patient and family with tight guardrails</li> </ul>
Stage 1
<ul style="list-style-type: none"> <li>○ High re-use of existing video, image and text (if literacy appropriate) content with introductions and comprehension check</li> <li>○ FAQs</li> <li>○ Q&amp;A on high frequency and 'critical to outcomes' topics</li> <li>○ Used in controlled setting (e.g. outpatient facility)</li> </ul>

Content Effort	
Thriving	Living
Surviving	
<ul style="list-style-type: none"> <li>○ Providing support for activities that require modification for most heart patients such as skiing at high altitude, scuba diving etc.</li> <li>○ Moving on from being a heart patient to being an athlete</li> </ul>	<ul style="list-style-type: none"> <li>○ Extending advice on diet, exercise, travel etc. to support returning to normal life in the community</li> <li>○ Advanced topics such as requiring other surgeries (e.g. knee replacement, hip etc.)</li> </ul>

Health Topics	Health Topic Extensions	
About my condition	Understanding comorbidities	Dealing with comorbidities
Medications	Remember & track meds	Travelling with meds
Quitting tobacco	Specific support programs	Your family smoke
Diet	Dining out/take out	Healthy groceries & cooking
Exercise	Walking programs etc.	Community exercise
Psychology	Sleep	Family
Regular Immunisations (e.g. flu)	Others (e.g. pneumococcal)	xxxxx
xxxxx	xxxxx	xxxxx
Events	'Bucket List' Topics	
Returning to work	Exercising at altitude	
Resuming driving	Endurance events & HIIT	
Travel (esp. flying)	Water sports	
Prep for other surgeries	Weightlifting precautions	
Dealing with setbacks	Celebrating success	
xxxxx	xxxxx	
xxxxx	xxxxx	
xxxxx	xxxxx	

# cardiac rehabilitation conversation

About the Persona	What Happened in Hospital	During Cardiac Rehabilitation	Other Considerations
<ul style="list-style-type: none"> <li>Al is a 60 year old male. In March 2006 he had a 5 way bypass in Seattle in the USA. He then had 4 stents via angiogram in November 2006. He recently (August 2017) had a 3 way bypass.</li> <li>Al has never smoked but has a genetic predisposition to heart disease exacerbated by a high stress career.</li> <li>Al's first bypass used endoscopic vein harvesting, a technique that meta data studies (2009) have found to have a high risk of restenosis.</li> <li>Al's cardiologist believes this is why, despite his exercise and diet regime, he has required the stents and additional bypass.</li> <li>Al has engineering and master's degrees and has done considerable research into his condition and treatments. He has also performed volunteer work with cardiac rehab and the Heart Foundation, both have given him a well above average patient's understanding of heart disease.</li> <li>On all occasions before his surgeries Al has only had mild arm pain and shortness of breath, no chest pain. He has vigorously exercised until only a few weeks before his surgeries without angina making it difficult to take early action.</li> </ul>	<ul style="list-style-type: none"> <li>Al was vegan after his first bypass but after working with a dietician changed to lacto-ovo vegetarian.</li> <li>The hospital (an expensive private one) constantly served Al the wrong food, or missed delivering meals altogether.</li> <li>The nurses both before and after surgery sometimes gave him the wrong medications; Al is educated enough to pick this up but worries about other patients.</li> <li>Al was given the wrong medications by the hospital pharmacy on discharge.</li> <li>Al was discharged with undiagnosed DVTs despite severe swelling and pain in his leg.</li> <li>After discharge Al went the rounds of various doctors, specialists and the hospital to try and work out what was wrong with his leg and what treatment was required.</li> <li>He was delayed starting rehab because of the problems with his leg.</li> </ul>	<ul style="list-style-type: none"> <li>Al is well known to the nursing staff because of his volunteer work but the exercise part of rehab is performed by the exercise physiology (EP) department at the hospital.</li> <li>The EPs had no knowledge of Al's prior exercise programs and tolerance, nor that he is a Level 2 Personal Trainer registered with Fitness Australia and therefore very knowledgeable about exercise, including for those with his heart condition.</li> <li>The exercise program they gave Al and made him perform in the hospital gym was well below what he was safely capable of, and therefore did not prepare him for return to community based exercise. In fact he lost muscle mass and fitness during the program.</li> <li>Al sat through the awareness lectures and was dismayed that, except for the talk on anatomy and heart health by the nurses, they were either difficult to hear and follow, or failed to address anything beyond basic concepts. Few handouts were given so none of the patients had anything they could follow at home.</li> <li>Many of the patients were concerned about what would happen at the end of the program, whilst some had to keep leaving early to return to work or pick up children from school.</li> </ul>	<ul style="list-style-type: none"> <li>The content Al was given in the Canberra Australia rehab awareness sessions in 2017 was identical to the content presented to him in rehab in Seattle USA in 2006.</li> <li>At least in Australia, each hospital prepares their own materials. Even in Canberra, the main public hospital and private hospital performing heart surgery, across the road from each other on the same campus, have their own rehab programs.</li> <li>This is a monumental waste of health resources.</li> <li>Interestingly, Al attended a Heart Foundation conference in Australia in 2011 where various researchers said they were trying to obtain funds to test the efficacy of telephone based support for heart patients post-surgery. Al pointed out to them that these were already used in the USA in 2006 by his health fund, Primera, and given the USA health funds' focus on outcomes and cost why did we have to waste research dollars in Australia; we should have just implemented it.</li> <li>Telephone support is still not routinely available in Australia although the Heart Foundation now has a number you can call to ask advice. This is different to what Al had in the USA where a nurse called each week to check up on him, offer advice etc.</li> </ul>
<p>Half-marathon entrant knows all about heart and soul</p>  <p><i>Al (Allan) Johnson is a retired RAAF Aeronautical Engineering Officer. Since leaving the RAAF in the late 1990s he has worked across Asia, the USA and the Middle East as an ERP specialist covering enterprise asset management, supply chain, project management, portfolio management and human resources. His clients have included major hospitals and health authorities, defence forces, power and water utilities, gold and coal mines, oil companies and chemical companies. His master's research project was in critical success factors for expert systems and he has provided advice on big data analysis for predictive modelling of complex systems. Since his first heart bypass in the USA in 2006 Al has had a parallel 'career', learning everything he could about heart disease and its treatments, attending conferences, fundraising, mentoring other heart patients and volunteering with cardiac rehabilitation. During this period, and despite his 5 way bypass and 4 stents, he has also qualified as a personal trainer, cycle class instructor, body building coach and rehabilitation exercise specialist. He has also run several half-marathons and marathons in that time.</i></p>			

# women are underserved – digital humans can change this

Alzheimer's and dementia, another areas of sexist bias where women's cognitive pattern is not taken into account. By the time women are diagnosed, it's on the advance stage. And she struggled to cope for so long with obvious symptoms. How sad is that?

I had discomfort for 3 days before my husband called 111, they asked all sorts of questions and sent a paramedic to check me. He told me that the indigestion I thought I was suffering from was in fact heart related. Trip to A&E, an admission, a stent, drugs, and release. It was the cardio nurse when I started exercise rehab that told me I had in fact had a heart attack. Not sure how to feel about that! Good to hear about other women's experiences, unfortunate that it is only after the event that we become aware of the differences in symptoms reported between men and women.

[Home](#) > [Information is power](#) > [Heart Matters magazine](#) > [News](#) > [Behind the headlines](#) > [Heart attacks will kill fewer women if they had same treatments as men'](#)

Women are dying after heart attacks. In rates that could be avoided if they were given the same treatments as men, a new study suggests. We look behind the headlines.

8 January 2016

Women are not being given the same treatments for [heart attacks](#), and are dying unnecessarily as a result, new research suggests.

In the year after having a heart attack, the research found that women were dying at higher rates than would be expected. These women had an excess mortality of up to three times higher than men who'd had a heart attack.

The excess mortality is the extra deaths in a particular group of people, above and beyond what you would expect in that group of people. It's a more accurate way to study the death rate related to a specific issue, as it adjusts for the fact that women generally live longer than men.

## Women with heart attacks more likely to die when treated by men

7 August 2016 | [Lancet Heart](#)  
[Category: BHF Comment](#)  
Research shows that women are more likely to die if they are treated by a doctor of the opposite sex, but men are at no disadvantage.



Sciences from the University of Washington, who conducted the research, said the difference may be due to sexism underpinning the care for women and misdiagnosing heart attacks in women.

A review of nearly 162,000 heart attack cases over 19 years showed female patients had a significantly higher survival rate when women treated them in the emergency room. The study also showed that women had a better survival rate with male doctors who had a male patient, compared to women who had a male doctor who had a female patient. Women who experienced heart attacks, but not more than if they were treated by a woman.

Women, rather, Senior Faculty Nurse at the British Heart Foundation, suggested the findings could be explained by a lack of understanding about the role of heart attack for women.

The study, "The misconception heart attack patients is often thought to be a middle-aged man with chest pains. But the reality is very different, with heart attacks affecting a large number of the population, including thousands of seemingly healthy young adults. In reality, the vast majority of heart attacks are in women. This study has shown that there has already been a striking difference in the treatment given to men and women suffering from heart attacks, and inaccurate stereotypes may be a contributing factor."

What about minimal or even no pain when heart muscle is dying? My only symptoms when my heart muscle was dying was fatigue and shortness of breath. Which I attributed to other health problems. Now the only reason my heart is still pumping is because of an ICD.

I did access Cardiac rehab as the only women in the classes for quite a while. When I joined the after care classes at regular gyms, the experience was very negative. So I complained about the treatment I was experiencing from a couple of the male participants. While the gym apologised for their behaviour, I was the one who felt I could not remain. So maybe it is feeling vulnerable and not wishing to be put in that situation that puts women off attending.

I am a woman



We were talking about this a couple of weeks ago and lots of responses confirm there is a definite male/female divide in how women are treated, or in the case of women not treated as often we are ignored or get a pat on the head and told its anxiety and it's generally the male doctors with that attitude.

Thanks for bringing this to everyone's attention. I had no pain, just a really uncomfortable heavy feeling and as I'd just been exerting myself cutting a hedge I thought it was muscular. I drove 35 miles before I spotted a sign for Airedale and went to A. and E. I waited about 5 seconds in a busy waiting room before I was whisked through and my care at Airedale, Leeds and Blackburn was fantastic. The stories from all the women I met proves the research. I didn't speak to anyone who had sought immediate treatment, one woman waited 3 days.

I haven't had a HA but had a bypass as I was at extreme risk of having one. I had symptoms such as breathlessness (thought it was the cold weather), tightness of the chest again thought the cold weather was to blame. I had also suffered with heart burn for a while. What bugs me is that there are a number of heartburn/indigestion ads on TV for reflux medication. There are no warnings about what it could be, such as heart related. I wonder how many other people are just taking indigestion tablets and it could be much worse. Should the BHF do a program of awareness around what to look for in both women and men. I know when I went to rehab everyone was different. Its not just the common misconception of left arm etc. I had a friend who had pain in her right arm!

## Social and cultural impact on health literacy

Immigrants are more likely to be affected by health literacy issues as English is often their second language. However, the social and cultural variances among even the English speaking population create problems in understanding health care. In one study of 75 black women aged 45–70 years who were receiving treatment for essential hypertension, 54 described their disease as "pressure trouble" or simply "pressure." Thirty-two of the women believed they actually had two diseases: "high blood," a disease of the blood and heart in which the blood was too "hot," "rich," or "thick," and "high-pertension," a condition in which blood would "shoot up" toward their head when they were emotionally excited, then "fall back" as they calmed (CDC 1990). These perceptions influenced the women's view of and adherence to treatment. Instead of medication and diet, for instance, they believed the appropriate treatment for "hot blood" was to use folk remedies such as lemon juice, vinegar, or garlic water to "cool and thin" their blood so it would drop to a lower level in the body, while the treatment for "high-pertension" was to reduce stress or abstain from pork, hot or spicy foods, and "grease" (CDC 1990). Of the 32 women who believed in either of the two folk illnesses, 37% complied with antihypertensive treatment compared to 73% of the 22 who believed in biomedical hypertension (CDC 1990).

I had no pain prior to my severe heart attack due to blocked artery. I saw two docs. and my blood tests, echocardiogram and bp. checks were all normal. But I was having severe breathless and weakness attacks and could hardly walk! They made me feel I was suffering from Stress! I complained afterwards and the head dr. said I did not fit their medical Textbooks! He thinks I am an interesting case! Definitely Women's heart attack symptoms and pain are different from men and drs. need to take this on board. I was fortunate in that when the pain did hit I got rushed off straight to theatre for a stent with no waiting and after 3 months have made a full recovery.

[PRINT](#) [EMAIL](#) [COMMENT](#)

Not my problem? Why women should be aware of heart and circulatory diseases

Heart disease has typically been seen as a condition affecting older men with an unhealthy lifestyle, but is this really an accurate picture of those living with heart and circulatory disease across the UK? Not

[Read more](#) [\[BHF\]](#)



Heart and circulatory disease is just as much a women's issue – of the 7 million people living with cardiovascular disease in the UK, half of them are women. That's 3.5 million women, and that's something we should be aware of.

Women are twice as likely to die of coronary heart disease as breast cancer

## Women are 50% more likely than men to be given incorrect diagnosis following a heart attack

30 August 2016 | [BHF Press Office](#)

Category: Research  
Women have a 50 per cent higher chance than men of being given an incorrect diagnosis following a heart attack, according to a new study we part-funded.



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This research found that women who were initially diagnosed with the more serious type of heart attack, STIMe, had a 50 per cent greater chance of a misdiagnosis compared with men. Women who had a first diagnosis of NSTEMI had a 40 per cent greater chance of a misdiagnosis when compared with men.

## Quick diagnosis is vital

Receiving a quick diagnosis and getting the correct treatment after a heart attack is vital to ensure the best possible recovery. A quick diagnosis shapes treatment in the short term, and long-term outcomes. Women who were misdiagnosed had about a 10 per cent increased risk of death after 10 days than those who had received a correct diagnosis. The same was the case for men.

The findings are published today in the [European Heart Journal Acute Cardiovascular Care](#). The study looked at 465,000 heart attack patients over the course of nine years.



# digital human design principles & approach

## methodology – key concepts

# objectives of the design principles and approach

- Enable efficient development, build, operation and maintenance of the digital human capability.
- Maximize the effectiveness of the digital human capability in achieving the agreed use case and associated performance goals.
- Enable operation of the digital human in accordance with the approved Operating Model including, but not limited to:
  - Error identification and correction.
  - Implementing future modifications and enhancements including the addition of use cases.
  - Maximizing visibility of the capability for governance purposes.
- Minimizing key person risk by basing all design activities on a set of standardized principles, templates and accelerators.
- Documenting an easily understood framework for work to be performed by client SMEs.
- Enabling rapid and error free transfer of content between the AI corpus and external control/creation documents (such as spreadsheets).

# core SME design principles

Design Principle	Definition	Rationale
Reduce conversation complexity	Natural empathetic conversations are supported by embedded features (video, images, maps, text etc.)	Overly conversations can be difficult to understand and more costly to produce. Also, some concepts cannot be simply explained using words.
Postponement	Postponement is where variation is delayed until required.	Any variations in the middle of an answer reduce efficiency and effectiveness. Offering a video replay or telehealth consultation at the end of an answer facilitates connection to the next step e.g. playing the video or seeking clarification. Also, this facilitates the later addition of video content, telehealth consultations etc. to answers that don't initially support them.
Ease of Modification	Ease of modification is the use of small modules that can be easily changed or replaced	Corpus content will change over time because of R&D, regulatory and policy changes and so on. Long conversations, long videos etc. can all be difficult to change. For example, changes to a long rambling video might require a full reshoot whereas changing a small discrete segment in a structured longer video can be achieved with editing tools. The same applies to answers and conversations.
Choose Conversation for Empathy	Certain intents and answers are emotionally loaded, and conversation is preferred	Videos etc. are a 'one size emotion fits all' which is ok for supplementing many intents and answers. However, where empathy is critical for adherence etc. a lead in empathetic conversation is required before using any video content followed by a short empathetic clarification to check understanding and acceptance.
Consider Exit and Re-Entry Points	Every conversation needs to allow for the patient to exit and then, if required, re-enter	Exit points are mandatory for certain intents and answers that have an emergency component. For example, an intent to discuss a medication side effect will require an exit to an emergency pathway if the side effect is classed as dangerous (e.g. difficulty breathing, chest pain, bleeding). Re-entry points are required where the exit is temporary/non-emergency such as where the patient needs to go get a drink of water, wants to ask a side question etc.
Designing for Long Cycle Interactions	Psychologists are required to ensure that conversations over time meet design objectives	Each individual conversation can have a transitory emotional outcome but over time the cumulative result can turn a digital human from a role such as coach into a relationship such as mentor. This is especially true for more vulnerable patients. Psychologists advise on the empathy content of individual conversations and are also required to help design long cycle interactions with monitoring questions.
'Chunkories' of Memory	Answers and conversations should include no more than 3 to 5 concepts.	Research in the 80s identified the inability of humans to hold more than 3 to 5 concepts in their mind at the one time without writing them down. For very simple concepts such as lists the digital human might include 5 items such as don't smoke, eat healthy, exercise, don't stress and take your meds. However in most cases, and especially where some if/then logic is required less than 3 concepts should be used. If there is bounded rationality (see below) only introduce one concept at a time.
Bounded Rationality	Answers that are outside of the lived experience of a patient will be hard to understand	From the same research in the 80s, people struggle to believe or comprehend something that doesn't fit with their lived experience. Given the high prevalence of health illiteracy it is critical that anything new is introduced by itself, supported by analogy, and understanding is checked.
Nothing About Me Without Me	Users need to be included in all aspects of design and development, not just occasionally consulted	This is a humanitarian principle and is critical to usability and acceptance. This codesign principle is a critical component of the 'chain of proof' for reducing negligence claims in that a digital human to patient interaction in a transcript or recording can be proven to be fit for purpose because illiteracy, accessibility needs etc. have been met.
Specialization	Specialization is variations in intents and answers outside of the heart health domain but align in terms of Themes and Topics.	Where possible, removing specialization in the digital human cardiac coach intents and answers will enable much faster and cheaper expansion to other chronic conditions. Specialization should not be removed if it downgrades the effectiveness of the digital human cardiac coach
Localization	Localization is variations in intents and answers within the heart health domain that occur between organizations or regions. Localization can be administrative (e.g. will my insurance cover this, how much will it cost, who to contact etc.), procedural (how long does it go for, what do we do in a session etc.), terminology (physician vs doctor, physical therapist vs. physiotherapist etc.) and cultural (language, types of foods etc.)	Where possible, removing localization in the digital human cardiac coach intents and answers will better achieve the aims of a SaaS solution. Localization should not be removed if it downgrades the effectiveness of the digital human cardiac coach.

# developing a health corpus is not a web crawler exercise

- Industry Experience
  - NSW Health
  - Hong Kong Hospital Authority
- Use Case Experience
  - Patient Lived Experience over 13 years
  - Rehab x 3 USA and Australia
  - Mentoring other patients
- Domain Expertise
  - Developed patient education with Canberra Hospital Rehab Team over several years
  - Regular presenter cardiac rehab program
  - Regular presenter Heart Foundation Ambassador Program
  - Heart Support Australia Trained Facilitator
  - Qualified Rehab Trainer
  - Fitness Trainer with specialization in older adults and women
  - Occasional health presenter University of Canberra
  - Invited speaker Pharmaceutical Society of Australia and others
- Technology Experience
  - Research into Expert Systems
  - Large scale systems integration USA, Asia, Middle East and Oz
  - Global ERP health systems experience
- Commercial Experience
  - Successful sales of multi-million-dollar re-engineering and software projects around the world
  - Client executive for large systems projects
  - Chief Technology Architect for large systems projects in multiple industries

- Methodology
  - Proprietary digital human methodology for health
  - Deep co-design experience
  - Application of years of experience in consulting and systems with Big 4 consulting firms and global technology vendors to approach
- Corpus Content
  - Active member of heart patient on-line forums in Australia and overseas over 13 years
  - Developed hundreds of intents/questions/answers based on own experience
  - Review of hundreds of health and related websites and blogs over several years to extract relevant content and then rewrite to be compatible with digital human conversational format
  - Review of hundreds of health videos on government, insurer, hospital and vendor sites
  - Review of international language materials for heart health
- Liaison with industry bodies such as the Heart Foundation and Heart Support Australia on current and future trends in Cardiac Health
- Subscriptions to peer reviewed cardiac health publications and consolidation sites
- Reviewed hundreds of peer reviewed articles and research into cardiac health
- Attendee and speaker at national conferences of Heart Foundation and Australian Cardiovascular Health and Rehabilitation Association
- Member of Australian Cardiovascular Health and Rehabilitation Association
- Downloaded and reviewed multiple cardiac health applications

Unique knowledge and expertise in the application of technologies such as avatars and artificial intelligence to cardiac health including primary and secondary prevention, cardiac events and surgeries, hospitalization, recovery and rehabilitation.

# what are “themes” and “topics”?

## THEMES

*Logical groupings of patient intents largely based on the ‘traditional’ cardiac lifestyle events and educational sessions.*

THEME A | MY ONBOARDING

THEME B | MY MEASUREMENTS

THEME C | ABOUT MY CONDITION

THEME D | MY HOSPITAL STAY

THEME E | MY RECOVERY AT HOME (STRONG CARER FOCUS)

THEME F | MY CARDIAC REHAB PROGRAM

THEME G | MY MEDICATIONS

THEME H | WHAT WILL I EAT

THEME I | HOW WILL I MOVE

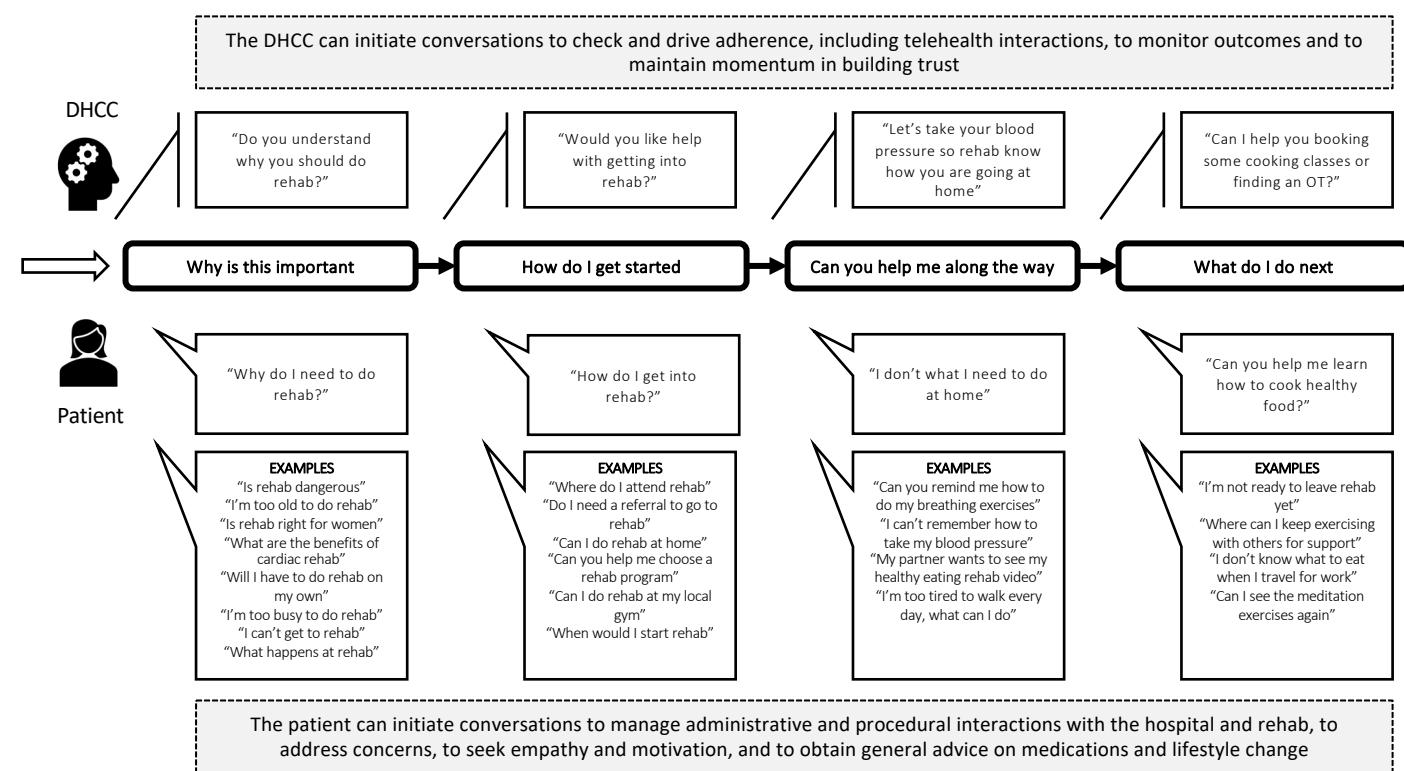
THEME J | MY SLEEP & RELAXATION

THEME K | I WILL QUIT SMOKING

THEME L | MY NEW NORMAL LIFE

## TOPICS

*The time/logic sequenced groups of intents that patients experience within each theme on their cardiac journeys. Each topic can be triggered by the patients themselves or by the digital human as part of conversational and physiologic tracking (code based) to ensure compliance and effectiveness. The sequencing of the topics works to address the barriers (including literacy and attitudes) to compliance with recommended recovery, medication and lifestyle regimes.*



# how are intents, questions and answers derived?

## Reference Organizations

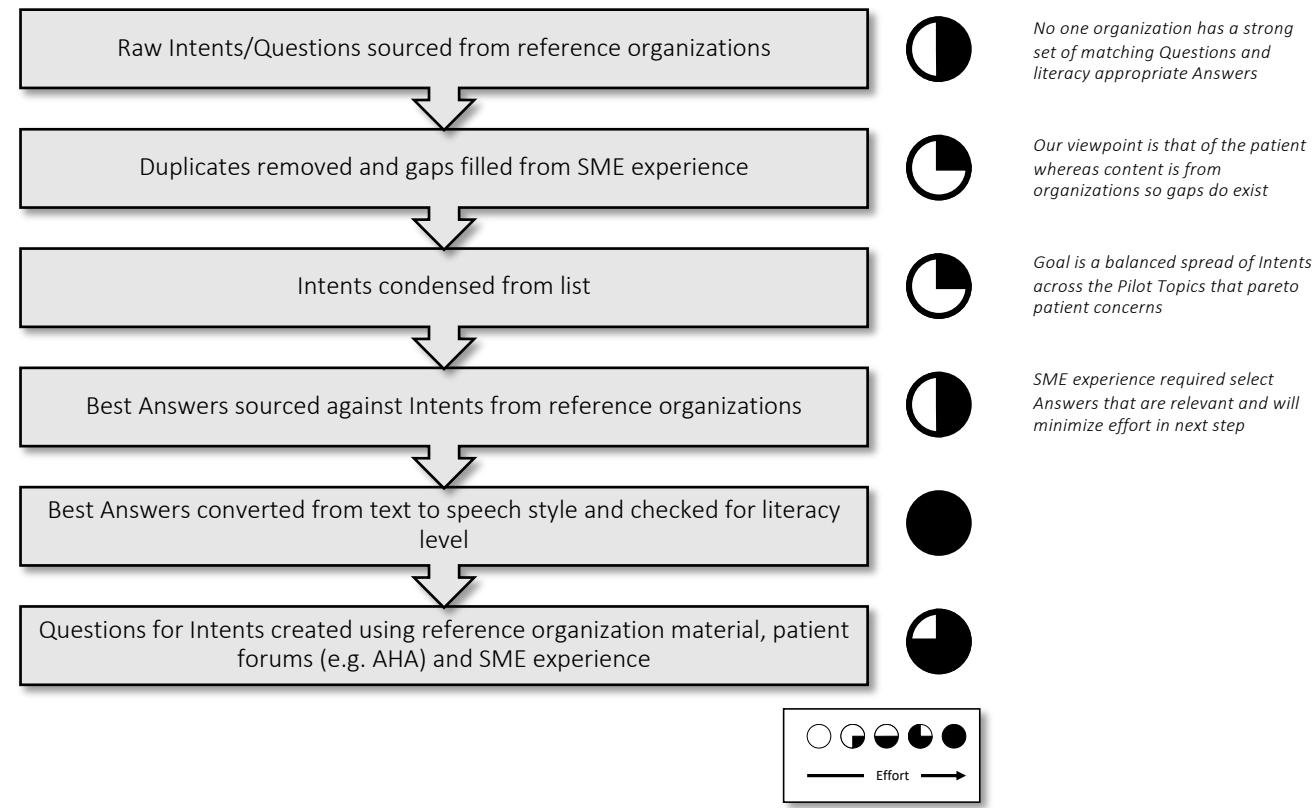
Note: this might not be the final 10. If there are gaps or too much duplication other sites might replace some in this list. Canadian site (Alberta Health) added as it is one of the best in the world for video content.

New Hanover Regional Medical Center
Kaiser Permanente
American Heart Association
Ornish Reversal Program
Mayo Clinic
Cleveland Clinic
Columbia Surgery
Drugs.com
Cedars Sinai
Myhealth.alberta.ca

## Process

Fundamental design principles include:

1. Minimizing rework when moving to full system
2. Making the end result globally applicable within cardiac care and maximally applicable within other relevant chronic conditions
3. Minimizing effort (and associated time and cost) to produce a winning Pilot



# extensive set of themes and topics

## THEME A | MY ONBOARDING

1. What is my DHCC
2. How do I get started
3. How will I use DHCC day to day
4. What do I do if having a problem

## THEME B | MY MEASUREMENTS

1. What do I need to measure
2. How do I measure these
3. When do I measure and report
4. What if I'm having a problem

*Themes and topics required for activating Codes*

*Therapeutic and Lifestyle Themes and Topics for Patients*

## THEME C | ABOUT MY CONDITION

1. What is heart disease
2. How did I get heart disease
3. Can I get better
4. What does this mean for my life

## THEME D | MY HOSPITAL STAY

1. How do I prepare for my hospital visit
2. Can you tell me about my surgery
3. I'm in hospital - what now
4. **What happens when I leave hospital**

## THEME E | MY RECOVERY AT HOME

1. What can I expect when I go home
2. How do I prepare for going home
3. What will each day/week/month look like
4. What if something goes wrong at home

## THEME F | MY CARDIAC REHAB PROGRAM

1. **Why should I do rehab**
2. **Can you help me get into rehab**
3. I'm on rehab ... but
4. What do I do after rehab

## THEME G | MY MEDICATIONS

1. **Why should I take my meds**
2. **How do I get my meds**
3. How do I manage my meds
4. Help - I'm having trouble with my meds

## THEME H | WHAT WILL I EAT

1. Why should I eat healthy
2. How do I get started with healthy eating
3. How do I manage my eating everyday
4. Help - I'm having trouble eating healthy

## THEME I | HOW WILL I MOVE

1. Why should I move more
2. How do I start moving more
3. How can moving be part of my life
4. Help - I'm having trouble moving more

## THEME J | MY SLEEP & RELAXATION

1. Why should I relax and sleep better
2. How do I start relaxing
3. How can relaxing & sleep be part of my life
4. Help - I still can't sleep or relax

## THEME K | I WILL QUIT SMOKING

1. Why should I quit smoking
2. How can I quit smoking
3. How can I live life without smoking
4. I'm still smoking - can you help me

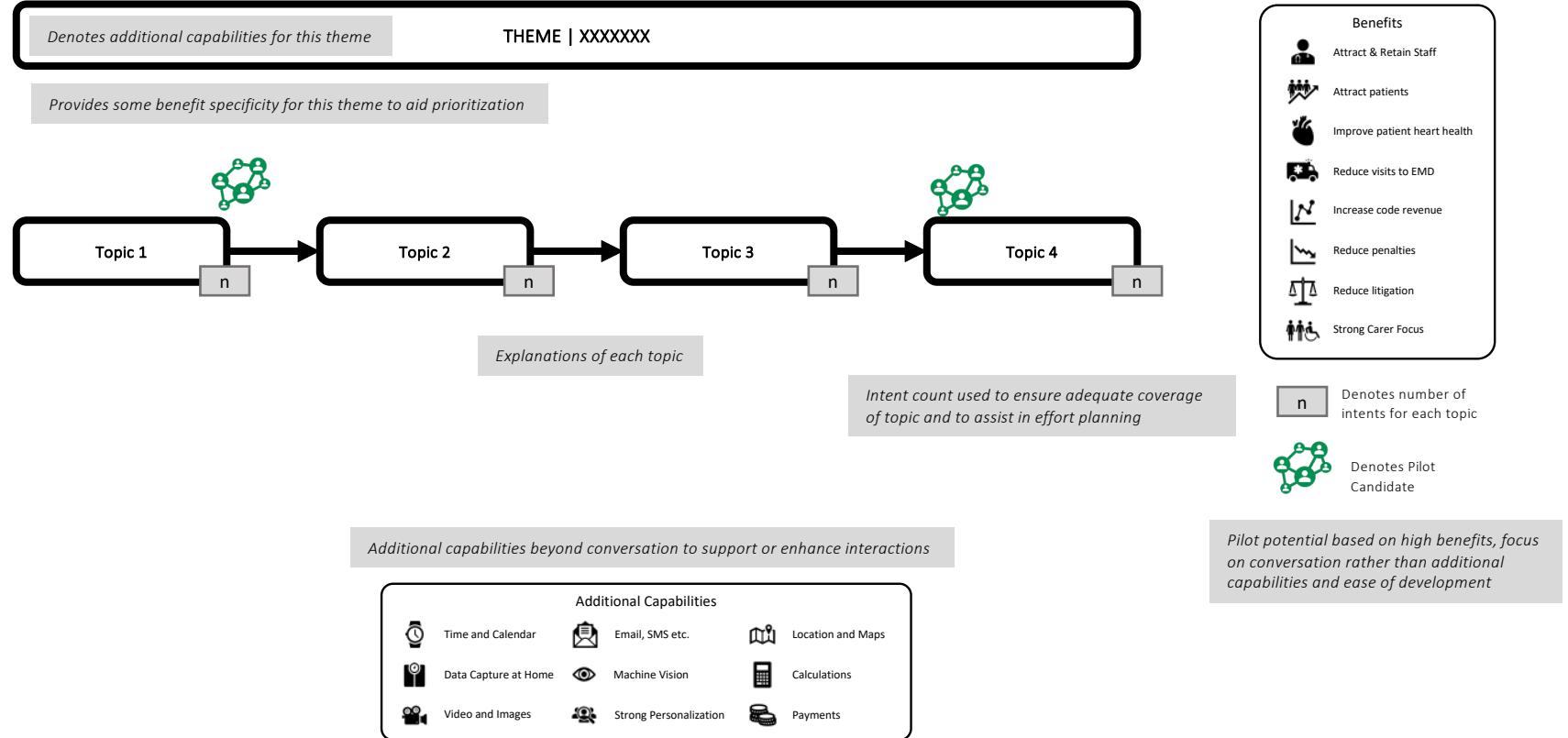
## THEME L | MY NEW NORMAL LIFE

1. What can I do with my new heart
2. How can I safely try new things
3. What if something goes wrong
4. I'm afraid to try anything new - help me

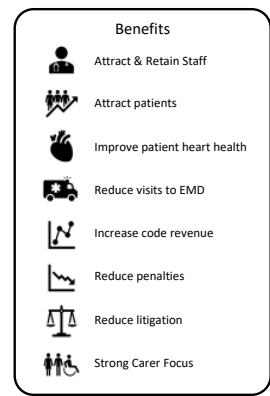
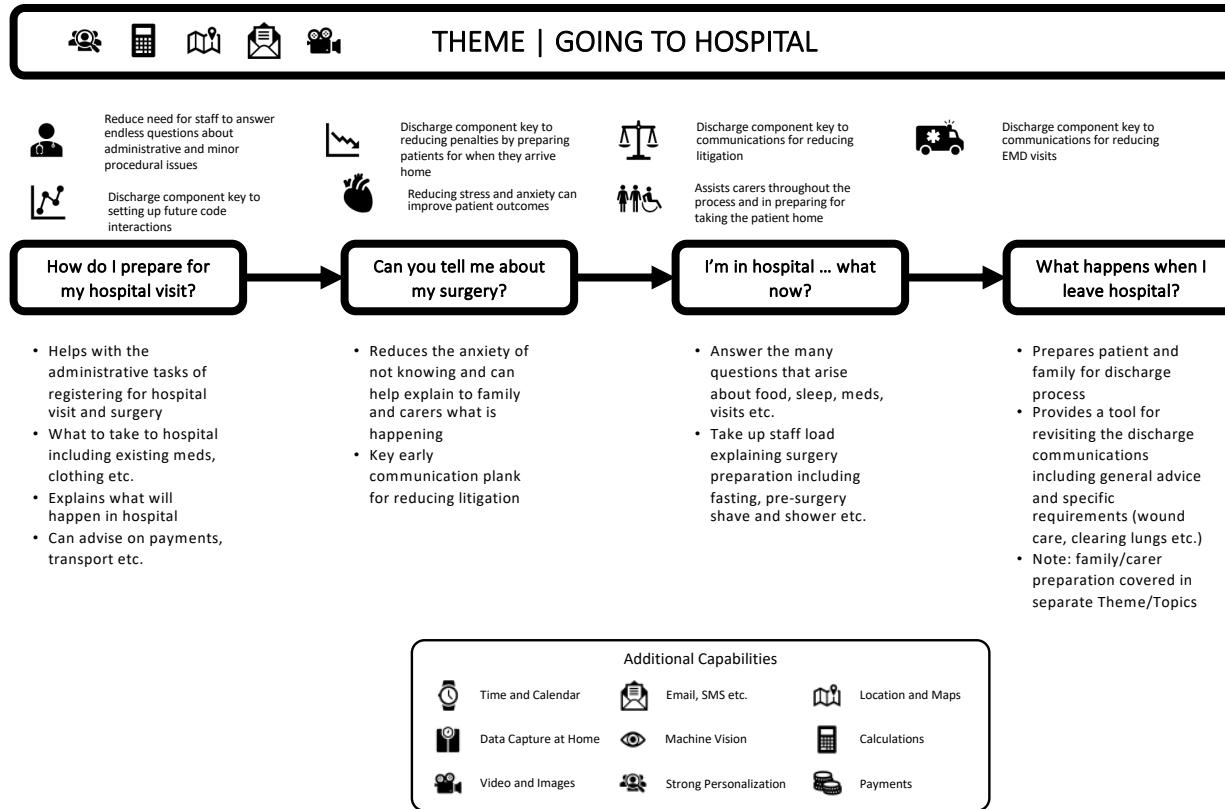
*Some Themes transition from Therapeutic to Lifestyle focused. Theme H | What will I Eat starts off with a Therapeutic focus on eating for recovery and adopting a new healthy diet but then moves to a Lifestyle focus on take-out, dining out with family, eating when travelling, eating daily at work and business functions etc.*

*Some Themes are predominately Therapeutic with little Lifestyle content. Medications, for example, would only have a few lifestyle questions such as travelling (overseas) with medications.*

# key to theme/topic representations for potential Pilot



# intent themes & topics | going to hospital



# intent themes & topics | cardiac rehab



 Reduce need for staff to answer endless questions about rehab and recovery from patients and their families

 Reduce ACA penalties by increasing rehab participation and comprehension

 Strong focus on communication to reduce litigation

 Increase code revenues for rehab participation

## Should I do rehab?

- Answers the questions and concerns patients have about cardiac rehab (including not knowing it exists).
- Motivates patients to the next step – registering for cardiac rehab

## Can you help me get into rehab?

- Reduces the barriers to patients attending cardiac rehab including referral, registration, payment, transport
- Answers social question around support whilst attending, family participation etc.

## I'm on rehab ... but?

- Aims to reduce patient drop out due to work and home pressures etc.
- Provides additional literacy appropriate information to aid understanding
- Addresses concerns about slow progress or inability to change (e.g. can't quit smoking)

## What do I do after rehab?

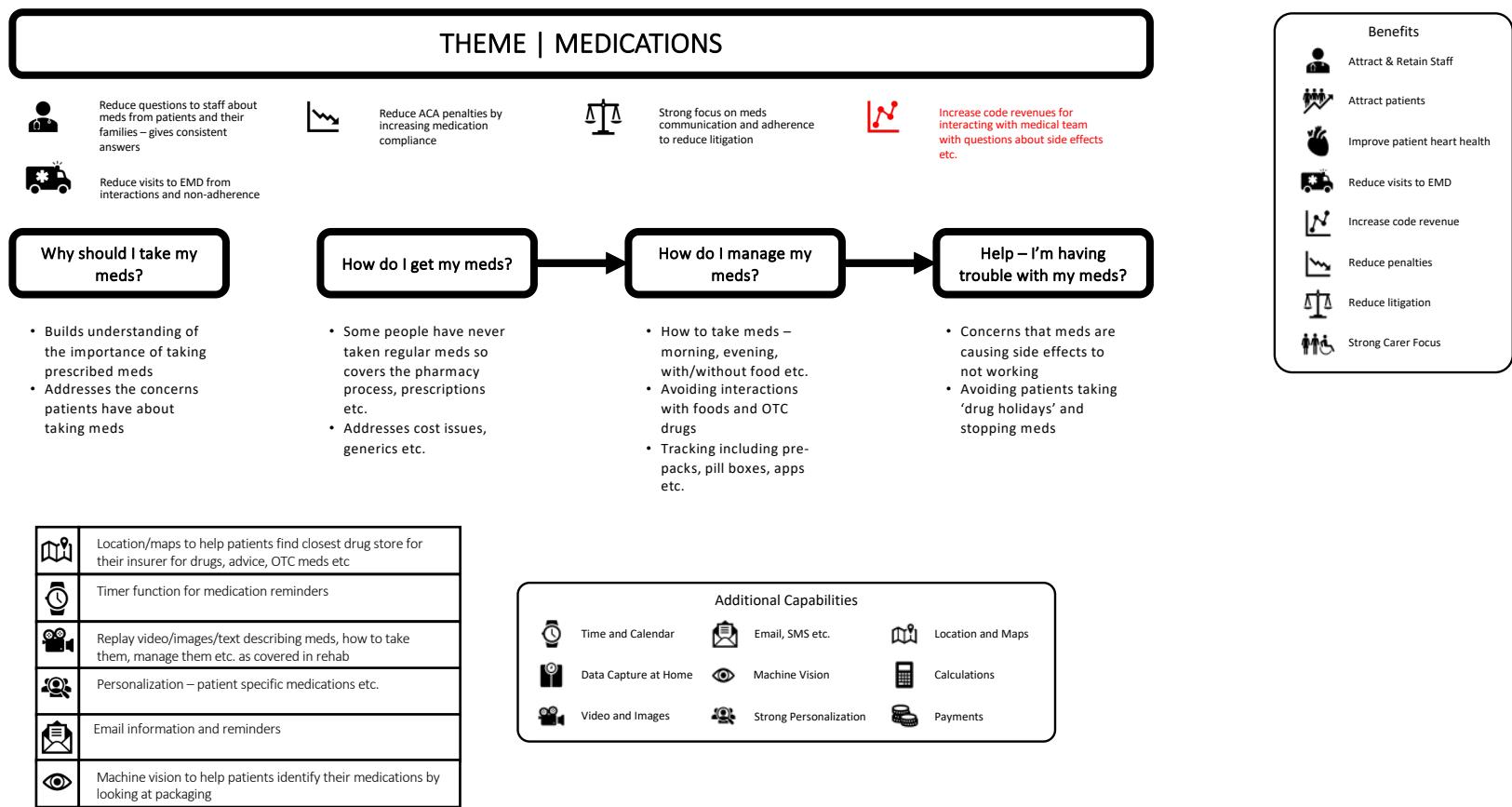
- Provides emotional and informational support to reinforce the lessons of cardiac rehab
- Bridges the gap between rehab and autonomy where patients just do the right thing as part of normal life

Benefits	
	Attract & Retain Staff
	Attract patients
	Improve patient heart health
	Reduce visits to EMD
	Increase code revenue
	Reduce penalties
	Reduce litigation
	Strong Carer Focus

## Additional Capabilities

 Time and Calendar	 Email, SMS etc.	 Location and Maps
 Data Capture at Home	 Machine Vision	 Calculations
 Video and Images	 Strong Personalization	 Payments

# intent themes & topics | medications



# sample rehab intents by topic

## strictly illustrative – detail in corpus documents

### THEME | CARDIAC REHABILITATION

Should I do rehab?

What is cardiac rehab  
 When will I do rehab  
 I don't have the time to do rehab  
 Do I have to do rehab to get better  
 Can I do rehab later  
 Where do you do rehab  
 I'm too old to get any benefit from rehab  
 I'm too sick to do rehab  
 What other options are there besides rehab  
 I'm too busy to do rehab  
 What are the benefits of cardiac rehab  
 What happens in cardiac rehab  
 How does cardiac rehab help me  
 How long does rehab go for  
 Will rehab help me  
 Who needs cardiac rehab  
 How long is cardiac rehab  
 What are the benefits of cardiac rehab  
 What should I expect before cardiac rehab  
 What should I expect during cardiac rehab  
 What should I expect after cardiac rehab  
 What happens at cardiac rehab  
 Who should go to cardiac rehab  
 Will I exercise on my own  
 How often will I need to go  
 How long does it last  
 When should I start cardiac rehab  
 What are the risks of cardiac rehab  
 What qualifications do the cardiac rehab staff have  
 Is cardiac rehab one size fits all  
 Is the cardiac rehab program tailored to my needs  
 Will cardiac rehab help me with everyday tasks at home

Can you help me get into rehab?

Do I need a referral from my doctor to start cardiac rehab?  
 My doctor is always so busy. How can I get a referral with so little time to communicate?  
 I can't get to rehab  
 I don't have anyone to support me doing rehab  
 How do I choose the right rehab program  
 How do I get onto cardiac rehab  
 Can I do rehab at my local gym  
 How soon can I start rehab  
 I can't afford rehab  
 Where can I get cardiac rehab  
 What should I consider when choosing a cardiac rehab program  
 Can someone come to cardiac rehab with me for support  
 Can my family do cardiac rehab with me  
 Can I do cardiac rehab at home

I'm on rehab ... but?

I'm not ready to finish rehab  
 Will I be asked to leave rehab if I can't stop smoking  
 Can cardiac rehab show me where to get travel insurance  
 Can I stay at cardiac rehab until I feel ready to leave

What do I do after rehab?

Where can I go after rehab  
 What do I need to do after rehab

# aligning patient intents/questions/answers



Patient

Why should I do this?	How do I do this?	How do I know its working?	From a Carer?
I don't feel sick	I wasn't/haven't been told what to do	I still feel sick – same symptoms	How do I help them
I've heard you don't need to do it	I don't understand what I was told	I feel worse than before	Will they be ok
I've heard its dangerous	I forget what I was told	Why is it taking so long	What are they supposed to do
I've heard it doesn't work	I don't have any support	I feel sick – new symptoms	They aren't like they used to be
I don't want to do it	I don't have enough money	My measurements aren't improving	xxx
I'm too busy to do it at all	I'm very busy – how do I fit it into my life	I don't feel any different	xxx
I've heard there are other things I can do	I can't access it	Why do I feel so sad	xxx
I'm sick of doing it	I keep forgetting to do it	xxxx	xxxx
Do I need to do it for ever	What do I do next	xxxx	xxxx
I miss my old life	Is there somewhere else I can do this	xxxx	xxxx



DHCC

Why should they do this?	How do they do this?	How do we know its working?	For a Carer?
To improve patient health outcomes to reduce ACA penalties and litigation costs	By using low cost revenue generating channels wherever possible such as CMS code interactions and totally within the DHCC where external input is not required	By ensuring compliance with physiologic measuring and reporting regimes and by using general reminders (e.g. have you had your flu shot) and self-assessment questions(e.g. do you have more energy this week) within the DHCC	Provide corpus content explicitly targeted at carers so that are better able (emotionally settled and informed) to help the patient meet the desired health outcomes

## Key Issues:

1. Balance is personality driven – a shy patient might require more DHCC initiated conversations whereas an extrovert might require the DHCC to 'push in' its conversational requirements to ensure they are met.
2. The mix could be subtly changed over time as the patient becomes more familiar with the DHCC
3. Psychologist input can help insert some simple baseline questions to determine broad personality type as part of initial personalization
4. Machine learning could then 'drift' the question mix for each personality type and (possible future functionality) tailor for each patient through personalization.

# templates to develop and document intents and questions for corpus | full system development will use co-design

Intents	Answers	Specialized	Localizations Required			
		Yes/No	Administrative	Procedural	Terminology	Cultural
Do I need any equipment when I go home	You will be told by the hospital what things you will need, how to get them and if you will need to pay.	No	Who informs the patient and what is policy on free issue, loans and purchase			
Can I stay in hospital if I'm not ready to go home	Your hospital team will assess you to see if you are physically ready to go home. They can arrange counselling if you have concerns and can make arrangements for home support if needed.	No	Who will arrange counselling, make home support arrangements etc. and what payment required	Where do these sit in relation to discharge – prior, during etc. What are the home care options (if any) including special care home if unable to go to own home		

Intents	Answers	Follow On Intents		Included Content		
		Next Intent	Next Answer	Video	Image/Text	CMS Code Interaction
I keep forgetting to take my medications	That's ok, it can be hard to remember anything at all when you first come home after hospital. Your druggist can pack your meds so it's easier to remember and take them but you can also use a diary or an app. <b>Would you like me to show you the rehab video on medications that can explain these to you?</b>	Can I see it later, I'm too tired today	Yes, you can ask me anytime and I'll remind you tomorrow morning.	Yes		
I think my meds are giving me a rash	A mild rash can be a side effect from some heart meds but it usually goes away. <b>If you are worried about it you can take a photo of the rash and send it to your doctor to have a look at it (CMS coded conversation).</b>	I can't remember how to do that	That's ok, I'll show you how to take the photo and send it to your doctor.	Yes – how to take photo and send to doctor	Yes, as an alternative to the video	Yes

INTENT	Am I allowed to lift things when I get home	Do I need any equipment when I go home	How will I get home from hospital
ANSWER	Your chest can take up to 3 months to heal, like any broken bone so you need to be very careful. You will have been told what you can lift and how when you left hospital but I can remind you now if you like. You can't lift things like groceries, children and suitcases until cleared by your doctor.	You will be told by the hospital what things you will need and how to get them. {procedural and administrative localizations}	If you don't have family to pick you up and drive you home you can use a cab but make sure you sit in the back and place your cushion between your chest and the seatbelt. If you don't know how you will get home talk to the discharge nurse. Don't forget that you won't be able to carry any suitcases or equipment you are taking home so the cab driver or someone else will need to help
QUESTIONS	Can I lift my children when I get home	Do I need to buy anything for home	I don't know how I will get home
	Can I carry my children when I get home	Do I need to take anything home from the hospital	Can I catch a bus home
	Can I carry the groceries when I get home	Do my family need to buy anything for me to go home	My partner can't drive
	Can I lift weights at the gym		Can I walk home

# standard lexicon for adding video and telehealth using “postponement”

## *I keep forgetting to take my medications*

That's ok, it can be hard to remember anything at all when you first come home after hospital. Your druggist can pack your meds so it's easier to remember and take them but you can also use a diary or an app. **Would you like me to show you the rehab video on medications that can explain these to you?**

Yes

Show video

No

Okay. You can always ask me later if you want to see the video.

## *I think my medications are giving me a rash*

A mild rash can be a side effect from some heart meds but it usually goes away. If you are worried about it you can take a photo of the rash and I can help you send it to your doctor to have a look at it (CMS coded conversation).

Yes

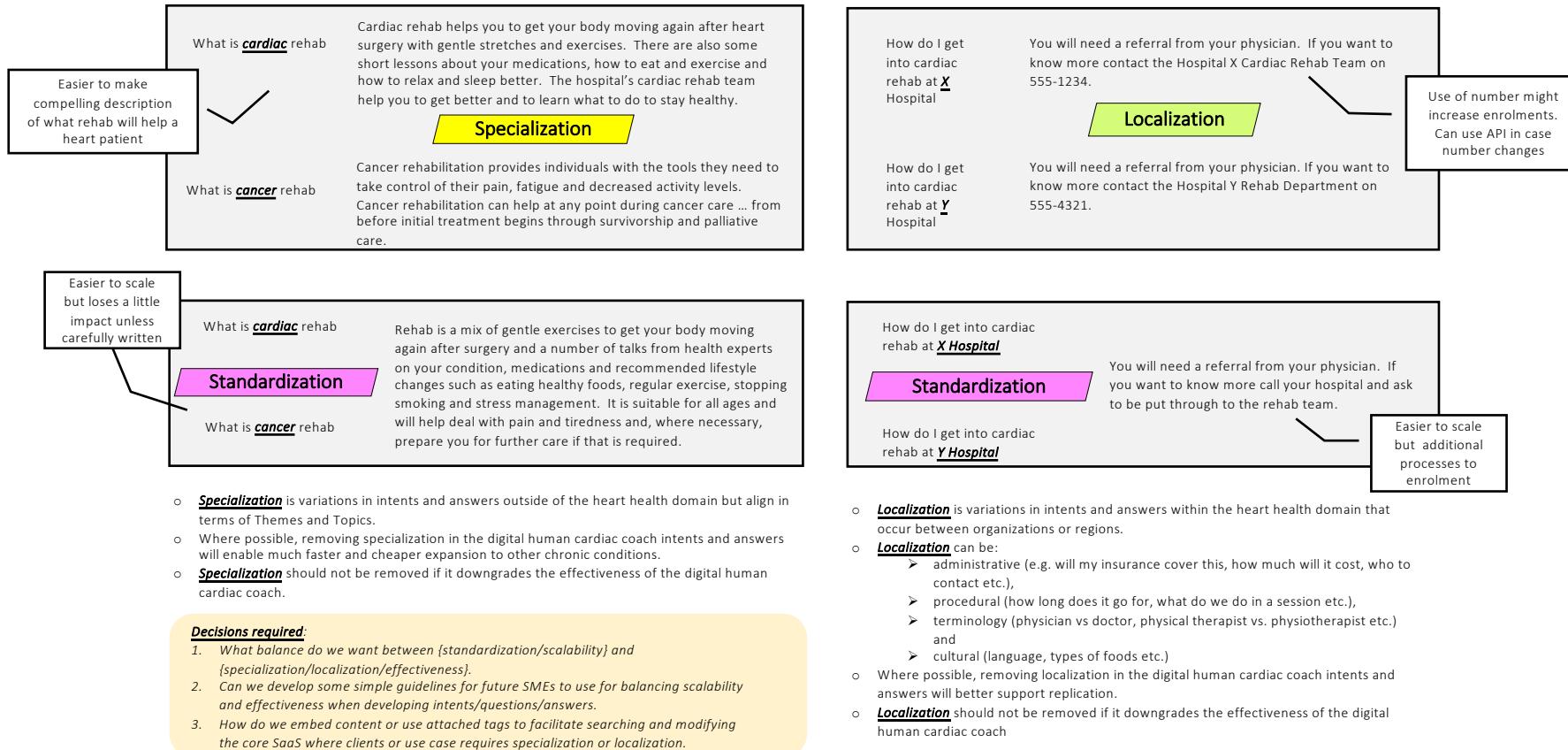
No

Initiate CMS coded conversation

Okay. If the rash is bleeding, or you have other symptoms such as pain or shortness of breath you should seek urgent medical attention.

# design principles & patterns for replication and scale

## designing for specialisation – localisation – standardisation



# determining potential scope

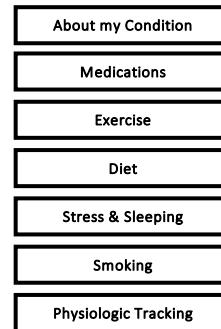
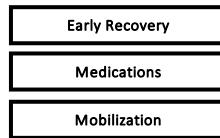
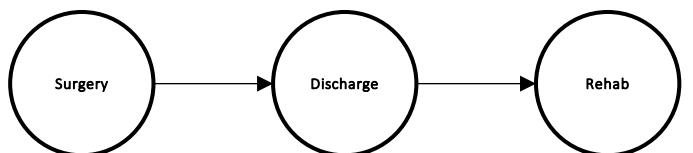
## DISCHARGE | Importance:

- Initial awareness and preparation for key concerns & activities
- Establish commitment
- DHCC allows patient and carers to replay content when they get home

## REHAB | Importance:

- Initial education and supervised practiced activities
- Further builds commitment
- DHCC makes demonstrations and education available after rehab finished

*Discharge, Cardiac Rehab and Medications all have significant impacts on 90-day success rates and if not successful can lead to ACA penalties and litigation.*



*Discharge, Cardiac Rehab and Medications all build on each other and have a reinforcing effect on understanding and compliance.*

## MEDICATIONS | Importance:

- Can have immediate adverse effect
- Adherence is a major contributor to poor outcomes
- Is 'safety belt' for poor diet

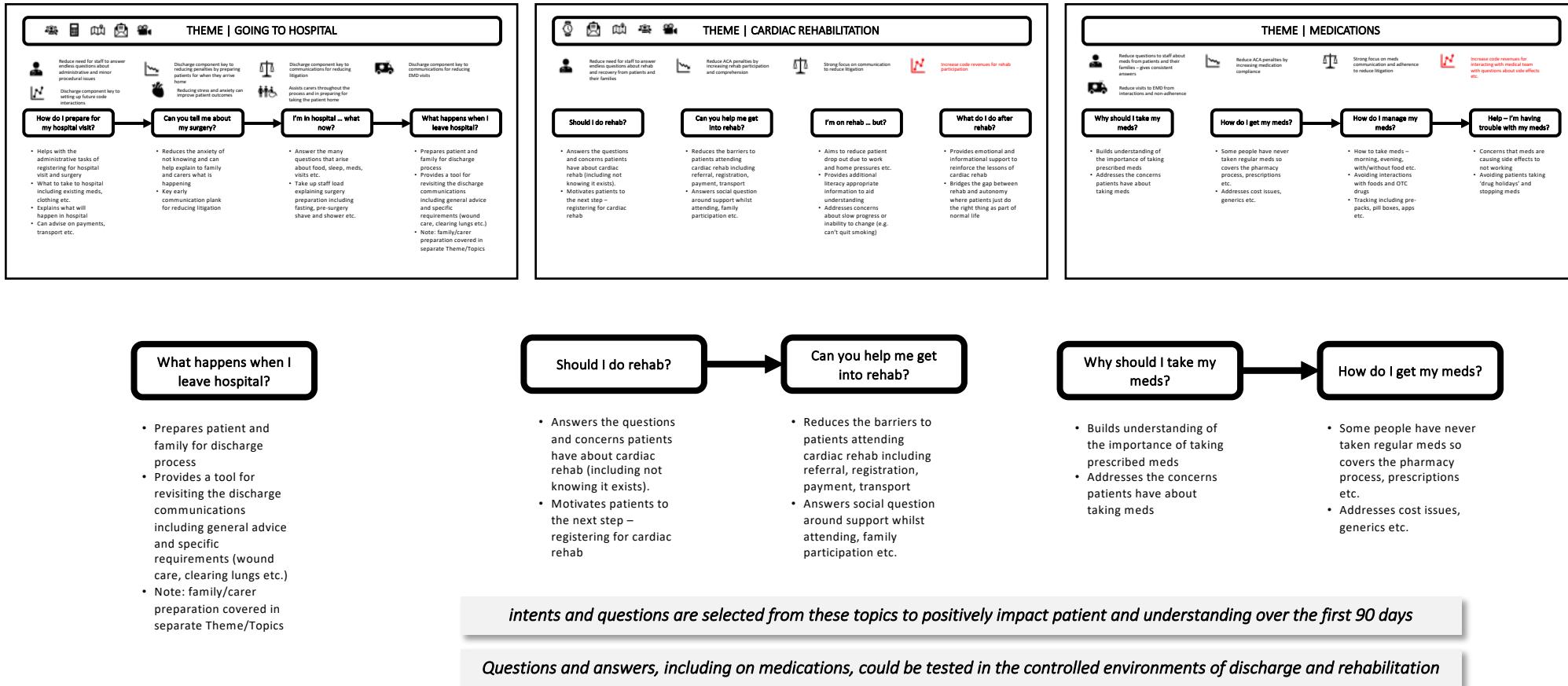
90 Days



- Don't get started – poor understanding and/or commitment
- Medication adherence
- Poor wound care
- Poor lung exercises
- Poor mobilization
- Home environment & support
- Doing too much too soon
- Not attending appointments

- Stopping – stress & commitment
- Diet
- Exercise
- Smoking
- Not tracking
- Not attending appointments

# determining initial scope



# theme D | my hospital stay

## THEME D | MY HOSPITAL STAY

1. How do I prepare for my hospital visit?
2. Can you tell me about my surgery?
3. I'm in hospital ... what now?
- 4. What happens when I leave hospital?**

### Qualifications & Assumptions

- This Topic would typically rely on prerequisite themes and topics to explain a patient's condition and personalize the DHCC with patient specific information so the interactions will need to accommodate these gaps without creating unnecessary temporary functionality.
- The Pilot will prioritize interactions that:
  - Motivate and assist patients to perform recommended actions at home (e.g. wound care) that meet the goal of reducing any unnecessary returns to hospital by stabilizing patient health
  - Establish the motivation and ability to perform the required measurements and reporting (against codes) to monitor patient progress
  - Educate the patient on the use of code interactions for scheduled provider interactions and when assistance is required.

- Process integrated with discharge activities
- Provides ability to revisit discharge information as reminder and for caregivers
- Provides repeatable guidance on measurement and reporting

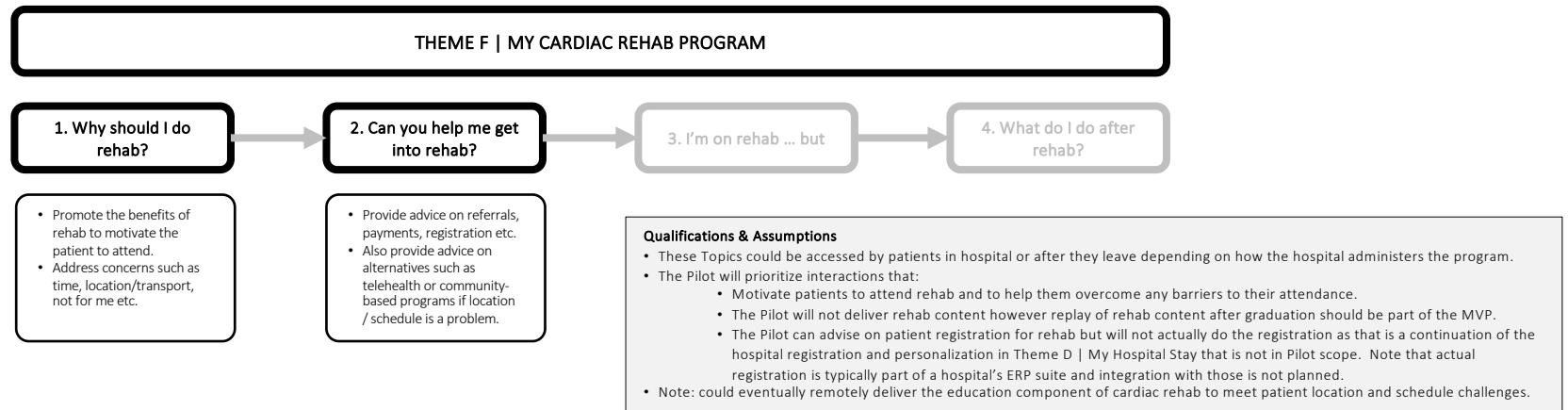
Design Objectives	
	Attract & Retain Staff
	Attract patients
	Improve patient heart health
	Reduce visits to EMD
	Increase code revenue
	Reduce penalties
	Reduce litigation
	Strong Carer Focus

	Design Objective
	Interactions to focus on those having high impact on <90-day adverse outcomes
	Clear literacy and numeracy appropriate communications to reduce litigation
	Strong communication of measurement / reporting requirements and use of devices (using video etc. in Pilot) plus other telehealth to drive code use
	Empower caregivers (e.g. family) to understand patient recovery procedures and any equipment to provide emotional and physical support
	Provide early information and advice to help minimize EMD visits
	Provide empathic gestures and lexical content to conversation to reduce anxiety and gain commitment
	Look for opportunities to move interactions from staff to DHCC to demonstrate how burnout loads can be reduced

	Additional Capability	Pilot Scope
	Demonstrate playback of video, image and text content as reminder and for caregivers/family and to reduce conversation complexity	IN
	Patient will be shown how to use measurement devices, report as required etc.	IN
	Calendar function would be used to record follow-up appointments etc. in DHCC – requires personalization	OUT
	Personalization would normally commence with Topic 1 and build through to 4 with specific discharge instructions	OUT
	Maps / location would be used to show where local services (drug store etc.) are located	OUT

Additional Capabilities	
	Strong Personalization
	Data Capture at Home
	Video and Images
	Time and Calendar
	Email, SMS etc.
	Machine Vision
	Location and Maps
	Calculations
	Payments

# theme F | my cardiac rehab program



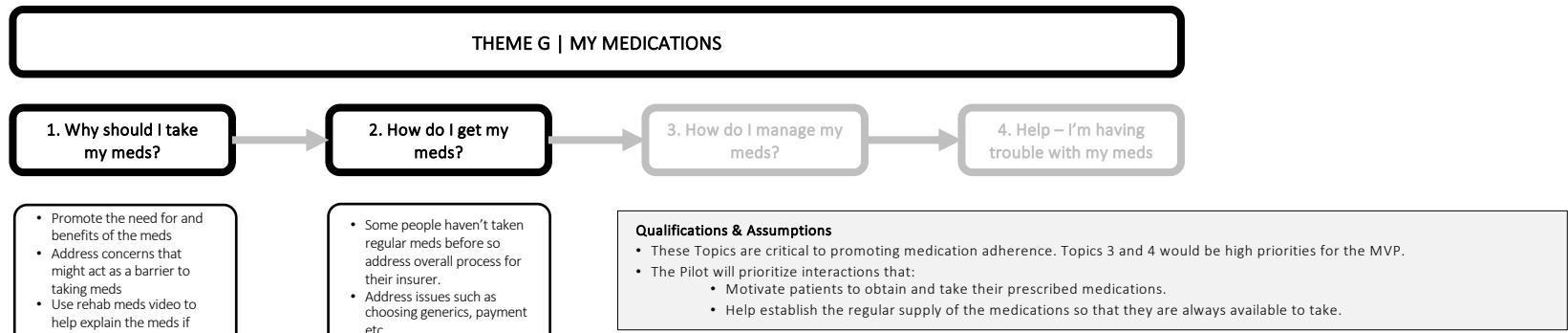
Design Objectives	
	Attract & Retain Staff
	Attract patients
	Improve patient heart health
	Reduce visits to EMD
	Increase code revenue
	Reduce penalties
	Reduce litigation
	Strong Carer Focus

Pilot Design Objective	
	Interactions to focus on those having high impact on <90-day adverse outcomes
	Clear record of patient being offered rehab and help with removing barriers to attendance using clear communications
	Include learning how to use telehealth and perform home physiologic measurements as part of benefits
	Empower caregivers (e.g. family) to understand patient cardiac rehab so as to provide emotional and physical support
	Use empathy to help overcome anxiety about attending cardiac rehab especially related to psychosocial factors.
	Look for opportunities to move interactions from staff to DHCC to demonstrate how burnout loads can be reduced (limited Pilot scope)
	Potentially draw fee paying rehab participants from other hospitals?

Additional Capability		Pilot Scope
	Demonstrate playback of video to show how rehab can be delivered and replayed as part of the Why should I topic	IN
	Demonstrate how SMS/email can be used to provide reminders or additional information	IN?
	Calendar function would be used to remind patient of rehab appointments and 'homework' – requires personalization	OUT
	Personalization would normally commence with Topic 1 and build through to 4 with specific program tailoring	OUT
	Maps / location would be used to show where rehab services are located and transport options	OUT

Additional Capabilities	
	Strong Personalization
	Data Capture at Home
	Video and Images
	Time and Calendar
	Email, SMS etc.
	Machine Vision
	Location and Maps
	Calculations
	Payments

# theme G | my medications



Design Objectives	
	Attract & Retain Staff
	Attract patients
	Improve patient heart health
	Reduce visits to EMD
	Increase code revenue
	Reduce penalties
	Reduce litigation
	Strong Carer Focus

Pilot Design Objective
Interactions to focus on those having high impact on <90-day adverse outcomes
Clear literacy and numeracy appropriate communications to reduce litigation
Promote code interactions if patient has concerns or requires assistance beyond those the DHCC can provide
Empower caregivers (e.g. family) to understand patient medications so as to encourage adherence and provide emotional and physical support
Provide a path to obtaining information about side effects to avoid EMD/hospital visits for side effects (full coverage of this is in Topic 4 which is not in Pilot scope)
Provide empathic gestures and lexical content to conversation to reduce anxiety about medications and promote adherence

Additional Capability	Pilot Scope
Demonstrate playback of video in Topic 1 using typical rehab meds content (existing video content?)	IN
Machine vision to recognize patient medications packaging. <i>Recording of session for legal</i>	OUT?
Calendar function for medication taking and resupply reminders – requires personalization	OUT
Personalization would normally commence with earlier Themes	OUT
Maps / location would be used to show where local services (drug store etc.) are located	OUT
Email/SMS would be useful for reminders and re-ordering as part of Topic 3	OUT

Additional Capabilities	
	Strong Personalization
	Data Capture at Home
	Video and Images
	Time and Calendar
	Email, SMS etc.
	Machine Vision
	Location and Maps
	Calculations
	Payments