Multimedia Appendix 11 - Conceptual networks of clustered metaphors

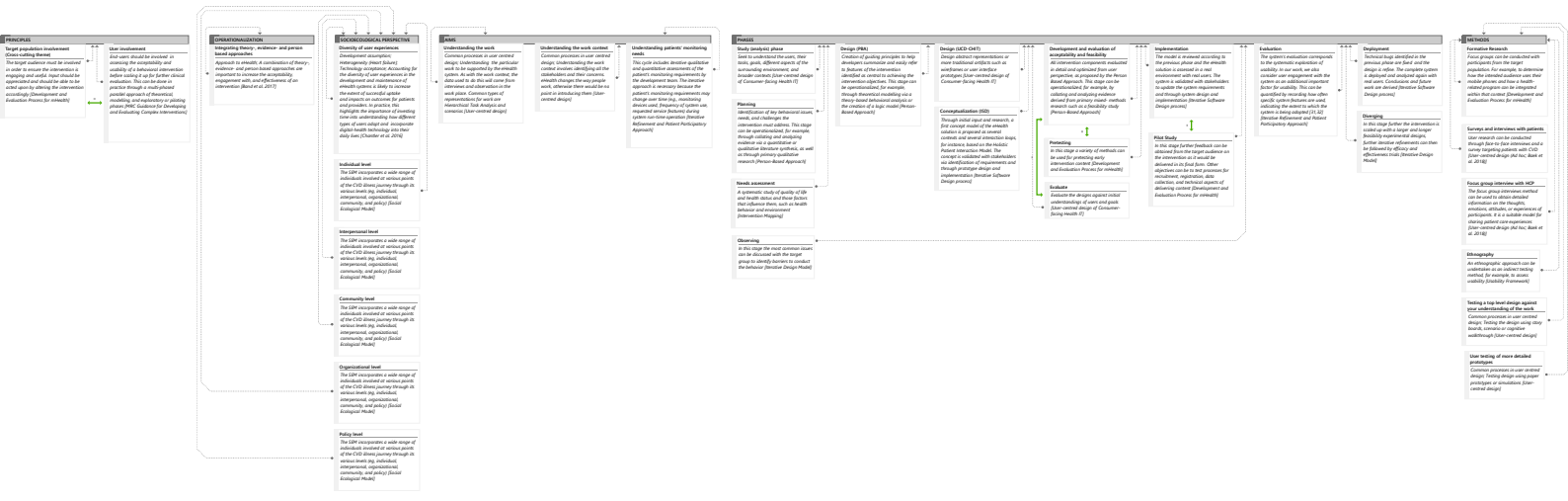
_____ Reciprocal translation (=)

_____ Refutational translation (<>)

Grey boxes are themes and organizers for the synthesis

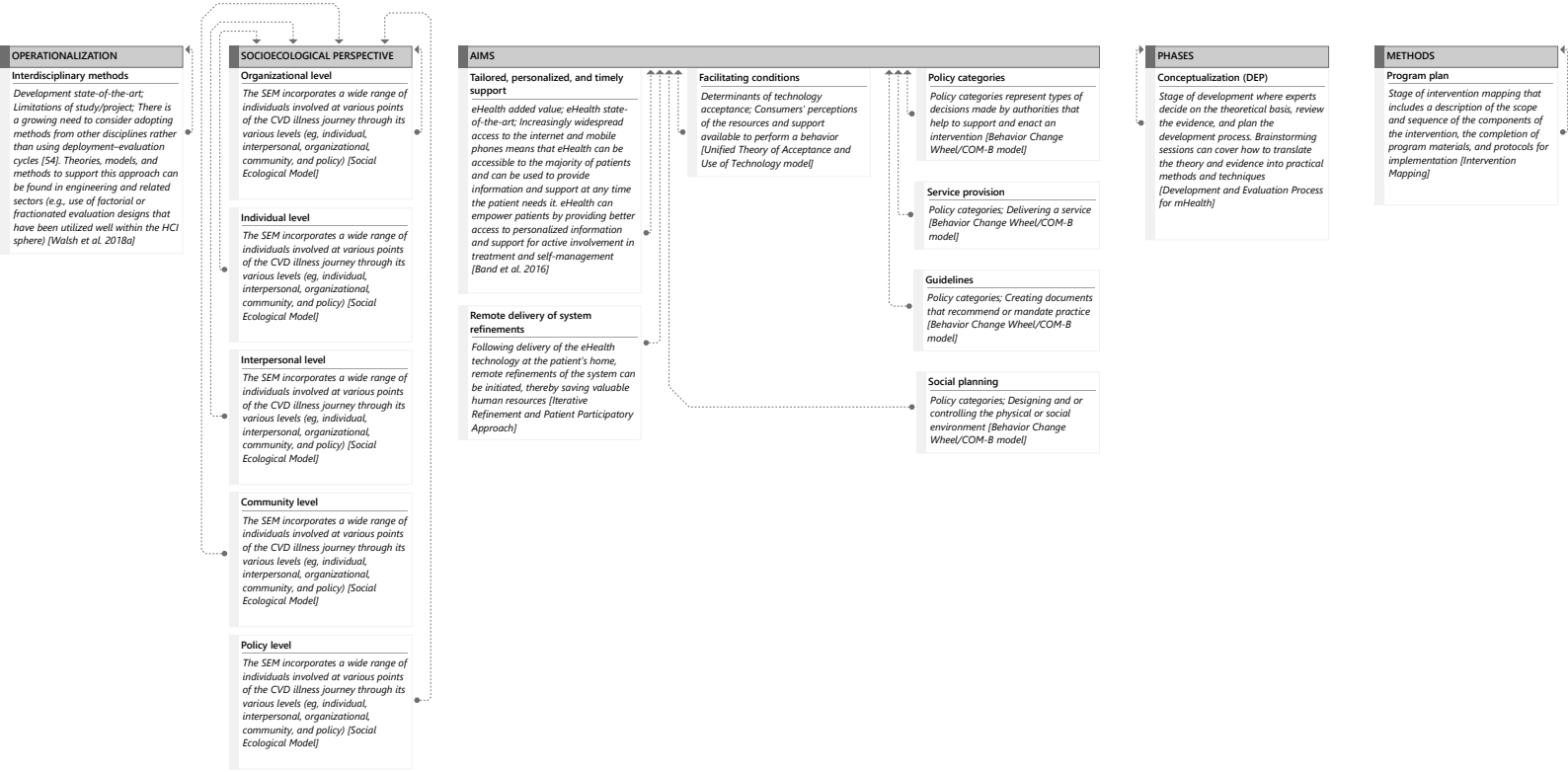
eHealth is a participatory development process

Line-of-argument (Conceptual network)



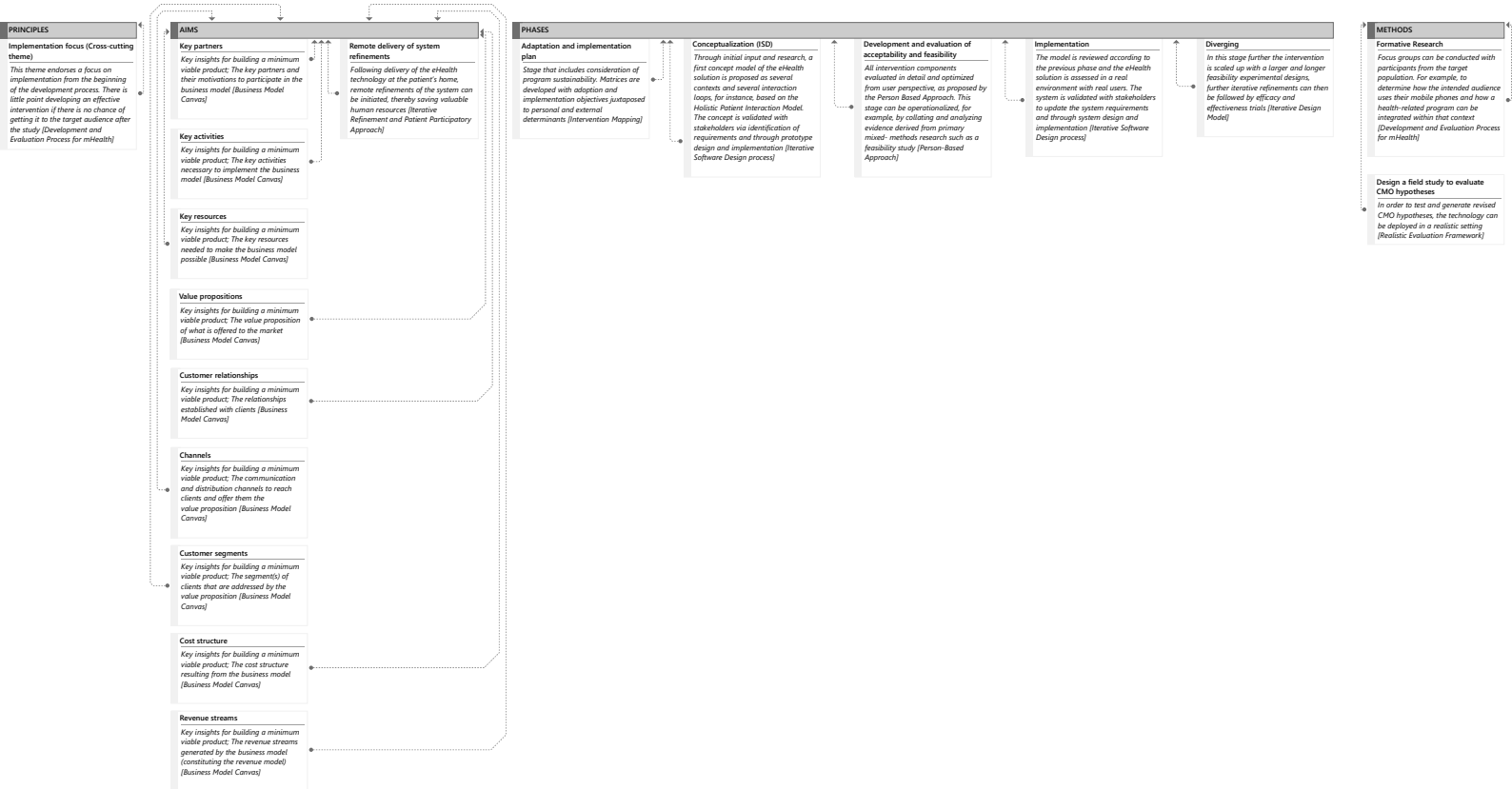
eHealth development creates new infrastructures for improving health care, health, and well-being

Line-of-argument (Conceptual network)



eHealth development is intertwined with implementation

Line-of-argument (Conceptual network)



eHealth development integrates theory, evidence, and participatory approaches for persuasive design

Line-of-argument (Conceptual network)

OPERATIONALIZATION

Integrating theory-, evidence- and person based approaches

Approach to eHealth; A combination of theory-, evidence- and person based approaches are important to increase the acceptability, engagement with, and effectiveness of an intervention [Band et al. 2017]

AIMS

Tailoring and personalization

Heterogeneity (CVD); An individual assessment (e.g., on psychological readiness for change) and tailored and personalized features can be useful to achieve health behavior change, to empower patients to make choices and direct them to the most appropriate content for them at a specific time [Walsh et al. 2018a]

Habit

Determinants of technology acceptance; The extent to which people tend to perform behaviors automatically because of learning, also equated with automaticity [Unified Theory of Acceptance and Use of Technology model]

Facilitating conditions

Determinants of technology acceptance; Consumers' perceptions of the resources and support available to perform a behavior [Unified Theory of Acceptance and Use of Technology model]

Hedonic motivation

Determinants of technology acceptance; The fun or pleasure derived from using a technology [Unified Theory of Acceptance and Use of Technology model]

Performance expectancy

Determinants of technology acceptance; The degree to which using a technology will provide benefits to consumers in performing certain activities [Unified Theory of Acceptance and Use of Technology model]

Social influence

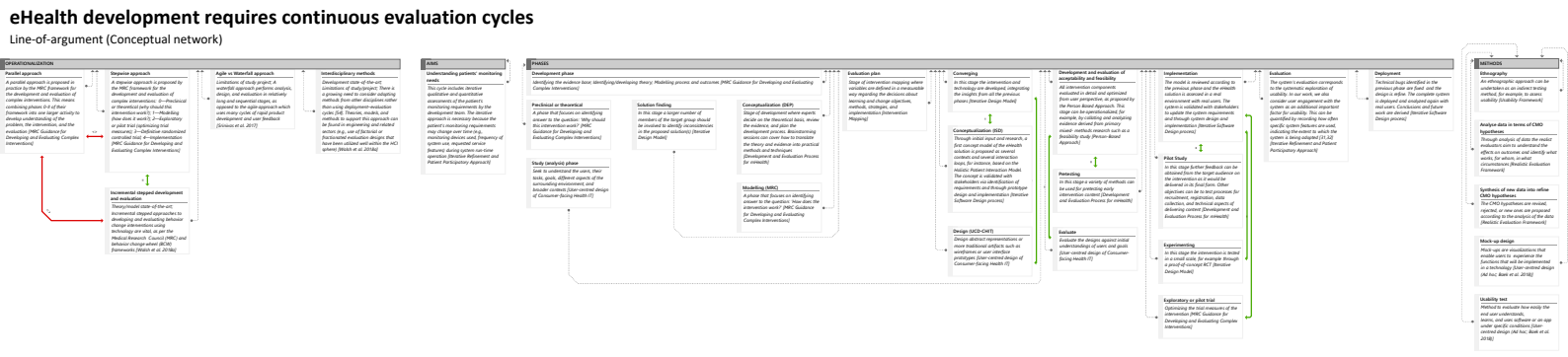
Determinants of technology acceptance; The extent to which consumers perceive that important others (e.g., family and friends) believe they should use a particular technology [Unified Theory of Acceptance and Use of Technology model]

Automatic Motivation

Parameters of effectiveness; Target constructs (sources of behaviors); Automatic processes involving emotional reactions, desires (wants and needs), impulses, inhibitions, drive states and reflex responses [Band et al. 2017; Behavior Change Wheel/COM-B model] Parameters of effectiveness; Sources of behavior; Motivation describes the brain processes that energize and direct behavior and includes both automatic motivation (e.g., habits) and reflective motivation (e.g., cost-benefit decision making) [Walsh et al. 2018a; Behavior Change Wheel/ COM-B model]

eHealth development requires continuous evaluation cycles

Line-of-argument (Conceptual network)



Behavior change

Line-of-argument (Conceptual network)

OPERATIONALIZATION

Self-management (sociotechnical concept)

Self-management is a complex set of processes with multiple goals, embedded in a complex, interacting sociotechnical system, and associated with multiple outcomes. Chronic disease management work is collaborative in that it is performed by a collective group, with agents including patients, informal caregivers, and healthcare professionals. In many cases, however, there are multiple breakdowns and barriers, which can be addressed by technologies or other interventions [Srinivas et al. 2017]

Tailored, personalized, and timely support

eHealth added value; eHealth state-of-the-art; Increasingly widespread access to the internet and mobile phones means that eHealth can be accessible to the majority of patients and can be used to provide information and support at any time the patient needs it. eHealth can empower patients by providing better access to personalized information and support for active involvement in treatment and self-management [Band et al. 2016]

Meaningful feedback

Self-management assumption; For technology to support self-management, the information gathered by the technology must be fed back to the patient in a way that increases understanding and empowerment [Bartlett et al. 2014]

Positive feedback and medication reminders

Development assumption; Self-management assumption; Provision of positive feedback over time and motivational personalized messages can stimulate self-efficacy and autonomous regulation, leading to changes in desired behavioral outcomes [McGillicuddy et al. 2012]

Real-time feedback in self-care

eHealth added value; eHealth state-of-the-art; Self-management state-of-the-art; Real-time feedback enhances self-care by providing patients with timely instructions and support. Harnessing the value of these 'teachable moments' is critical and should be part of well-designed and supported eHealth systems to improve patients' experience of living with their condition [Chantler et al. 2016]

Potential for delivery of behavior change techniques

eHealth added value; eHealth state-of-the-art; eHealth (mobile) solutions deliver many additional behavior change techniques (BCTs) that are not possible, for instance, with standard pedometers, such as goal setting, social support, and cues to action. These new techniques embedded within an eHealth framework may move toward helping to tackle one of the key issues of long term sustained behavior [Duff et al. 2018]

SOCIOTECHNICAL SYSTEMS PERSPECTIVE

Personal skills and behavior lens

Integrates aspects of patients and their environment such as knowledge, cognitive functioning, health literacy, attitude, motivation, readiness to change, behavior, social support, self- efficacy, and self-regulatory skills [Patient Work Lens for Consumer-facing Health]

PSYCHOLOGICAL & BEHAVIORAL DETERMINANTS

Patient activation

Self-management state-of-the-art; The term 'patient activation' is employed to represent patients who are 'more effective managers of their health and healthcare' (Lupton, 2013). However, even these digitally engaged, tech savvy patients may find the obligation of self-care surveillance overwhelming, forcing them to confront their illness, engage in routine actions they would rather avoid, or deal with digital interactions that are tiresome (Oudshoorn, 2012) [Athilingam et al. 2018b]

Self-efficacy

Parameters of effectiveness; Proposed mediating variables (Logic model); The expectation that one can successfully execute the behavior required to produce the outcomes [Band et al. 2017; Social Cognitive Theory]
Parameters of effectiveness; People's judgements of their capabilities to organize and execute courses of action required to attain designated types of performances. It is concerned not with the skills one has but with judgments of what one can do with whatever skills one possesses [Bradbury et al. 2017; Social Cognitive Theory]
Parameters of effectiveness; Perceived self-efficacy that one can exercise control over one's health habits [Walsh et al. 2018a; Social Cognitive Theory]

Perceived self-efficacy

Parameters of effectiveness; Perceived self-efficacy that one can exercise control over one's health habits [Social Cognitive Theory]

Outcome expectancy

Parameters of effectiveness; Proposed mediating variables (Logic model); Outcome expectancy is defined as a person's estimate that a given behavior will lead to certain outcomes [Band et al. 2017; Social Cognitive Theory]
Parameters of effectiveness; A judgement of the likely consequence a behavior will produce [Bradbury et al. 2017; Social Cognitive Theory]

Outcome expectations

Parameters of effectiveness; Outcome expectations about the expected costs and benefits for different health habits [Duff et al. 2018; Walsh et al. 2018a; Social Cognitive Theory]

Goals

Parameters of effectiveness; The health goals people set for themselves and the concrete plans and strategies for realizing them [Duff et al. 2018; Walsh et al. 2018a; Social Cognitive Theory]

Perceived environmental impediments and facilitators

Parameters of effectiveness; The perceived facilitators and social and structural impediments to the desired changes [Duff et al. 2018; Walsh et al. 2018a; Social Cognitive Theory]

Information

Parameters of effectiveness; Information about ones' health and/ or ways to change unhealthy behavior [Athilingam et al. 2016; Information, Motivation, Behavioral skills model]
Parameters of effectiveness; It is the basic knowledge about a medical condition that might include how it develops, its expected course, and effective strategies for its management [Athilingam et al. 2018a; Information, Motivation, Behavioral skills model]

Motivation (IMB)

Parameters of effectiveness; Personal or intrinsic motivation and social motivation from support of family and friends to change the unhealthy behavior [Athilingam et al. 2016; Information, Motivation, Behavioral skills model]
Parameters of effectiveness; It encompasses intrinsic motivation of personal attitudes toward adherence to the behavior and perceived social support for such behavior [Athilingam et al. 2018a; Information, Motivation, Behavioral skills model]

Motivation (COM-B)

Parameters of effectiveness; Sources of behavior; Motivation describes the brain processes that energize and direct behavior and includes both automatic motivation (e.g., habits) and reflective motivation (e.g., cost-benefit decision making) [COM-B model]

Automatic Motivation

Parameters of effectiveness; Target constructs (sources of behaviors); Automatic processes involving emotional reactions, desires (wants and needs), impulses, inhibitions, drive states and reflex responses [Band et al. 2017; Behavior Change Wheel/COM-B model]
Parameters of effectiveness; Sources of behavior; Motivation describes the brain processes that energize and direct behavior and includes both automatic motivation (e.g., habits) and reflective motivation (e.g., cost-benefit decision making) [Walsh et al. 2018a; Behavior Change Wheel/ COM-B model]

Behavioral skills

Parameters of effectiveness; It includes ensuring that the patient has the specific behavioral tools or strategies necessary to perform behaviors such as daily weighing, symptom assessment, and exercise [Athilingam et al. 2016; Information, Motivation, Behavioral skills model]
Parameters of effectiveness; The adoption or acting out of healthy behavior skills that result in desired behavior change [Athilingam et al. 2018a; Information, Motivation, Behavioral skills model]

Psychological Capability

Parameters of effectiveness; Target constructs (sources of behaviors); Knowledge or psychological skills, strength or stamina to engage in the necessary mental processes [Band et al. 2017; Behavior Change Wheel/ COM-B model]
Parameters of effectiveness; Sources of behavior; Capability is the individual's ability to perform a behavior and includes both physical capability (e.g., skills) and psychological capability (e.g., knowledge) [Walsh et al. 2018a, 2018b; Behavior Change Wheel/ COM-B model]

Social Opportunity

Parameters of effectiveness; Target constructs (sources of behaviors); Opportunity afforded by interpersonal [Band et al. 2017; Behavior Change Wheel/COM-B model]
Parameters of effectiveness; Sources of behavior; Opportunity describes the factors that lie outside the individual that facilitate or prompt behavior and includes both physical opportunity (e.g., affordability) and social opportunity (e.g., cultural norms) (e.g., cost-benefit decision making) [Walsh et al. 2018a, 2018b; Behavior Change Wheel/COM-B model]

NORMALIZATION PROCESS COMPONENTS

CH: Communal specification

Target constructs (Logic model); Gaining info about the condition and its management with the help of others; Discussing or altering current management plans with others (family, HCPs) [Normalization Process Theory]

CH: Differentiation

Target constructs (Logic model); Understanding and differentiating between aspects of the illness & treatment – for example, when titration is necessary and when it is not [Normalization Process Theory]

CH: Individual specification

Target constructs (Logic model); Gathering own info about condition, or developing own understanding; Patient chooses to continue with self-monitoring or treatment escalation regime [Normalization Process Theory]

CP: Enrolment

Target constructs (Logic model); Engaging with others (family, HCP) to enable them to support BP management [Normalization Process Theory]

CP: Initiation

Target constructs (Logic model); Organizational aspects of behavior involved in management of blood pressure [Normalization Process Theory]

CP: Legitimation

Target constructs (Logic model); Seeking reassurance from others about appropriateness of management plans [Normalization Process Theory]

CA: Interactional workability

Target constructs (Logic model); Taking medications, medication side-effects, engaging with DI, lifestyle changes – integrating all of these in to everyday life [Normalization Process Theory]

CA: Skillset workability

Target constructs (Logic model); Developing the skills and routine to self-monitor [Normalization Process Theory]

RM: Individual appraisal

Patient chooses to continue with self-monitoring or treatment escalation regime [Normalization Process Theory]

RM: Reconfiguration

Target constructs (Logic model); Altering a set routine (such as medication escalation) when required [Normalization Process Theory]

RM: Systematization

Ways to keep up with newly available treatments [Normalization Process Theory]

PRACTICAL APPLICATIONS

Familiarization phase

Practical applications; For example, through a preliminary phase of face-to-face exercise consultation [PATHway]

Home platform access

Practical applications; For example, the inclusion of a dashboard (front-end visualization of use), technical support, or training videos/manual [PATHway]

Assessment

Practical applications; This feature includes daily patient alerts to check weight and complete a symptom questionnaire [HeartMapp]
Practical applications; Inclusion of different types of assessment, such as lifestyle, behavioral change, and health and fitness [PATHway]

Self-monitoring

Practical applications; Self-monitoring is a theory-based technique. An intervention designer could hypothesize that including self-monitoring (theory-based mechanism) in their intervention will increase physical activity (outcome) [Control Theory Framework for Personality-Social, Clinical, and Health Psychology]

Patient: Self-monitoring & BP entry

Practical applications [HOME BP]

Feedback

Practical applications; Inclusion of different types of feedback, such as:
- Sensor instructions for wearing prior to use
- On-screen visual/verbal avatar instructions prior to exercise
- On-screen positive reinforcement during Exerclass (related to exercise accuracy)
- Sensor physiological feedback (i.e. Microsoft Band 2, blood pressure monitor, Zensor)
- End of exercise summary feedback
- Good habits visualization (following lifestyle assessment)
[PATHway]

Feedback on activity

Practical applications; Mechanisms (CMO hypotheses); My review [Touch screen computer]; Review daily walk as 'too hard', 'just right', or 'too easy'; Adjust tomorrow's walking [CHF PSMS]

Feedback on activity performance

Practical applications; Mechanisms (CMO hypotheses) [CHF PSMS]

Behavioral change

Practical applications; Inclusion of features such as health behavior change goal selection, calendar logging of health behaviors, or calendar for events/exercise sessions provided by the eHealth system [PATHway]

Goal setting related to user's lifestyle

Practical applications; Mechanisms (CMO hypotheses) [CHF PSMS]

Patient: Self-selected lifestyle changes

Practical applications [HOME BP]

Home exercising

Practical applications; For example, through facilitating a way to practice individual exercise, promoting different physical activity options (e.g., ExerClass/ExerGame/Active lifestyle), and including several features such as multiplayer classes, decision-support for exercise adaptation, or exercise prescription [PATHway]

CHF info/knowledge

Practical application; Enabling patients to read and listen to CHF educational information on daily self-management, medications, diet, and physical activity, managing other chronic diseases or conditions, and managing feelings (emotions) about CHF [HeartMapp]

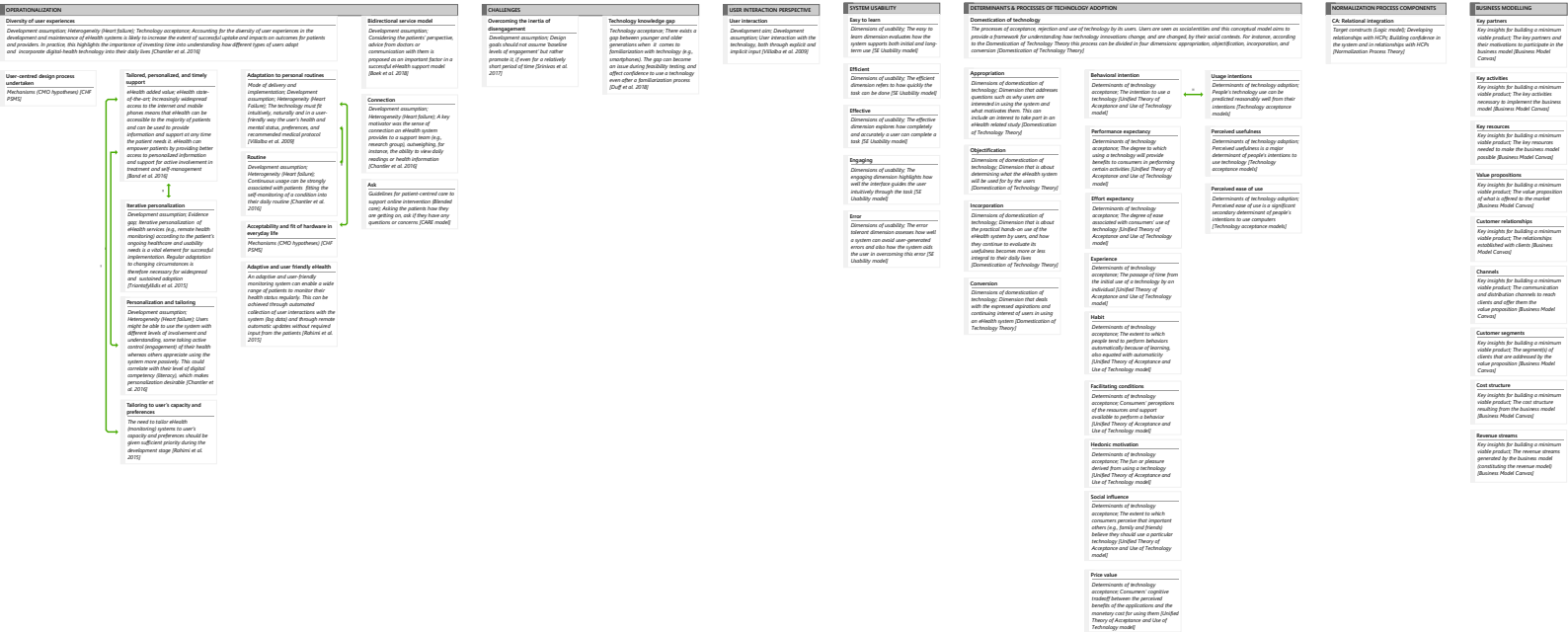
BLENDED CARE

HCP: Support for lifestyle changes & BP monitoring

Practical applications [HOME BP]

Technology adoption

Line-of-argument (Conceptual network)



Healt-related outcomes

Line-of-argument (Conceptual network)