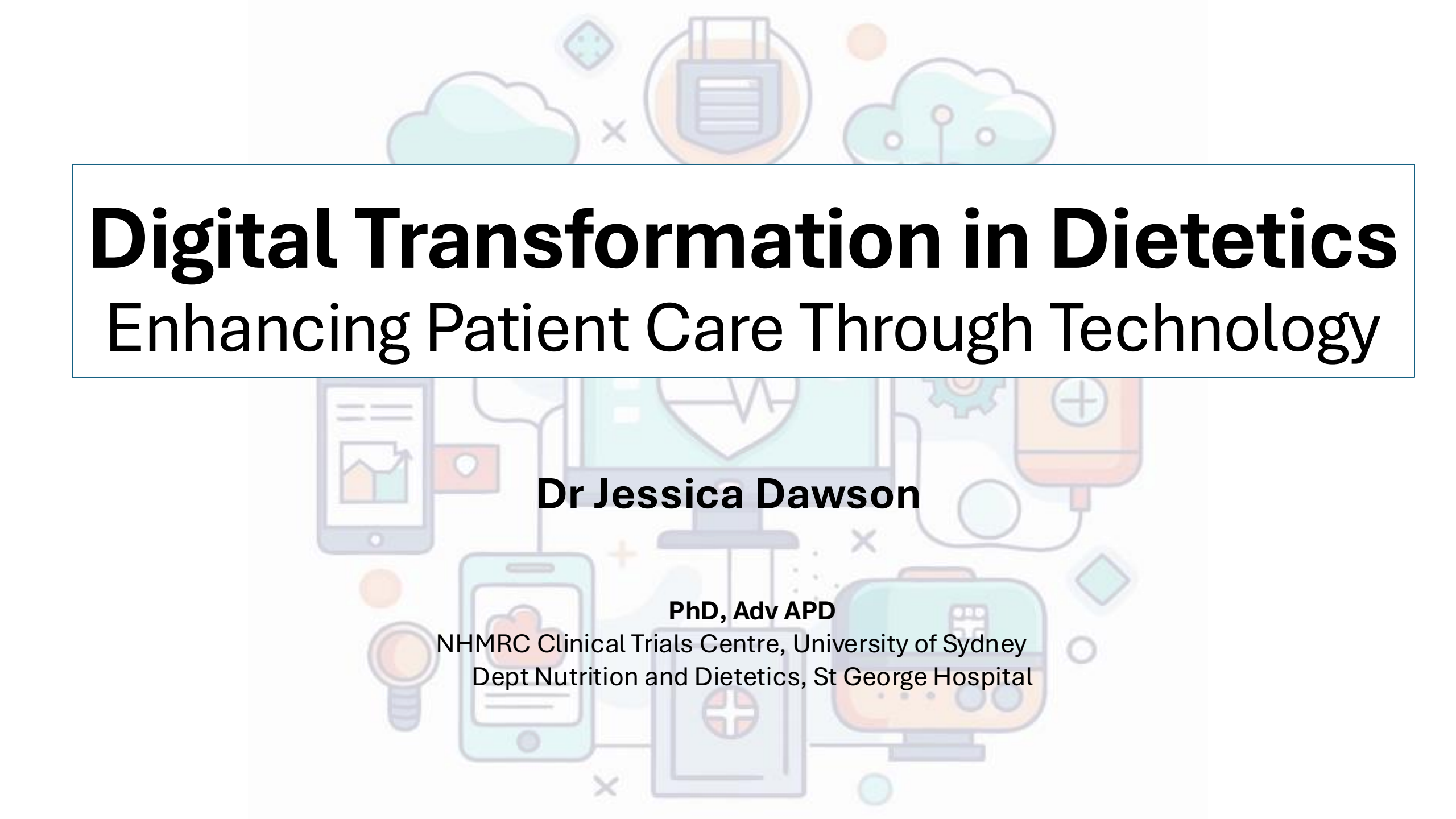


The background of the slide is decorated with various medical and technology-related icons. At the top, there are clouds, a shield with a document, and a tree. Below the title box, there are icons for a smartphone with a bar chart, a laptop with a heart rate line, a medical monitor, a smartphone with a heart icon, a magnifying glass, a smartphone with a plus sign, a medical bag with a plus sign, and a computer monitor with a plus sign. There are also several small 'x' and '+' symbols scattered throughout.

Digital Transformation in Dietetics

Enhancing Patient Care Through Technology

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Disclosures

Nil



Patient interventions

Clinician interventions

Health systems interventions

What is digital health?



Digital health



Digital health



ehealth

mhealth

IoT, AI, wearables etc

*What kind of
technology*

*Provides the digital
infrastructure*

Digital health



ehealth

mhealth

IoT, AI, wearables etc

Digital health intervention

*What kind of
technology
Provides the digital
infrastructure*

*How the technology
is applied*

*Specific use or application of digital technology designed to improve health
outcomes, health services, or health system efficiency.*

Wearables

- Activity monitors
- Smart watches
- Medical grade wearables (e.g.)CGM)



Telemedicine

- Telehealth
- Telephone



Mobile phone (mHealth)

- Text messages
- Apps

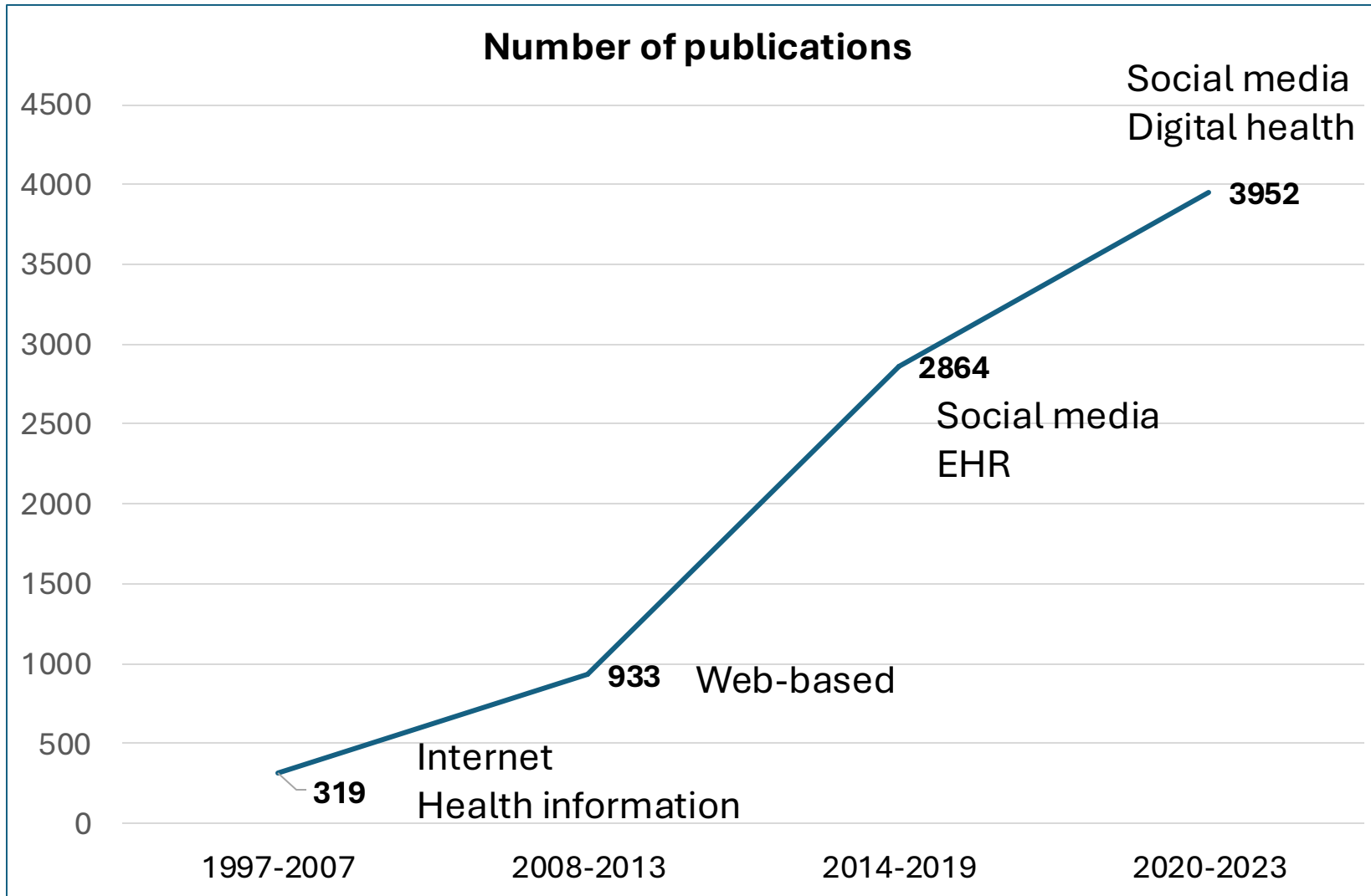
Computer

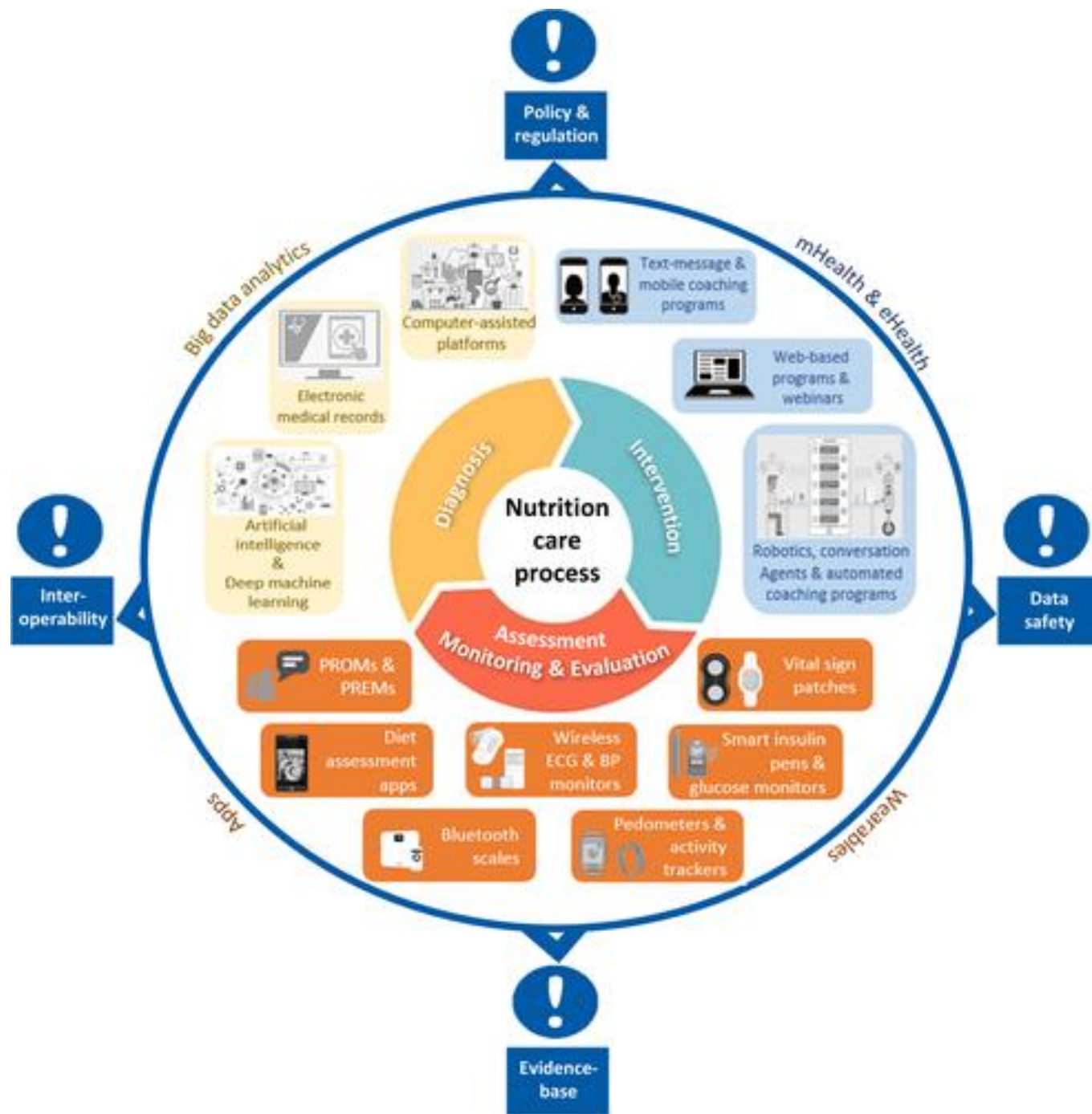
- Online platforms
- Websites, portals

Internet of Things

- Smart scales
- Electronic pill bottles
- Home BP measuring

Digital Infrastructure





Are DHI effective?

What is the evidence of digital interventions?

>1000 publications & 40 systematic reviews / meta-analyses diet-related RCTs

Heterogenous data makes it difficult to synthesize and translate results (type of digital intervention, duration, intensity, population, outcomes)

- Digital interventions are more effective than no care
- Digital interventions have similar effectiveness to face-to-face interventions (e.g., weight management, HbA1c)
- Overall effect sizes are small to moderate
- Outcomes are similar across different populations/diseases (predominantly o/w, T2DM)
- Most common outcomes are assessment or monitoring outcomes (weight, BMI, BP), less data re: behaviour changes or clinical outcomes (mortality, CV-risk etc)

Post-acute care

Study (Year)	Population (P)	Intervention (I)	Comparison (C)	Key Outcomes (O)
Lindhardt et al., 2017	Frail older adults (mean 79 y) discharged home (N = 36).	12-week tech-supported nutrition program: enriched meals + tablet app for goal-setting & feedback.	Usual care	↑ Muscle strength, HRQoL, and mood; ↓ readmissions (11% vs 31%) & mortality (11% vs 19%). Tech acceptable but some technical issues.
Roberts et al., 2021	Hospitalised adults ≥ 65 y or at nutrition risk (N = 71).	NUTRI-TEC bedside app via hospital EFS: self-monitoring + dietitian support.	Standard care	↑ Energy/protein intake (to ~80% of reqs), high satisfaction (86–94%), but lower recruitment (31%) & retention (69%).
Allenson et al., 2021	Post-HPB surgery patients at malnutrition risk (N = 19).	Dietitian counselling + MyPlate (food diary – self-monitoring) app for 30 days post-discharge.	Baseline trends	100% retention, ~79% high app use, ↑ caloric intake (52%→95% goal met). High satisfaction (~89%).
Molter et al., 2024	Inpatients with infectious diseases (19–65 y; N = 70).	ARIETI mobile app for nutrition risk assessment.	Paper tool	Same reliability (p < 0.001), ~250 s faster → improved efficiency for nutrition professionals.

What enhances effectiveness of DHI?

1. Blending technology with human interaction maximizes engagement and results

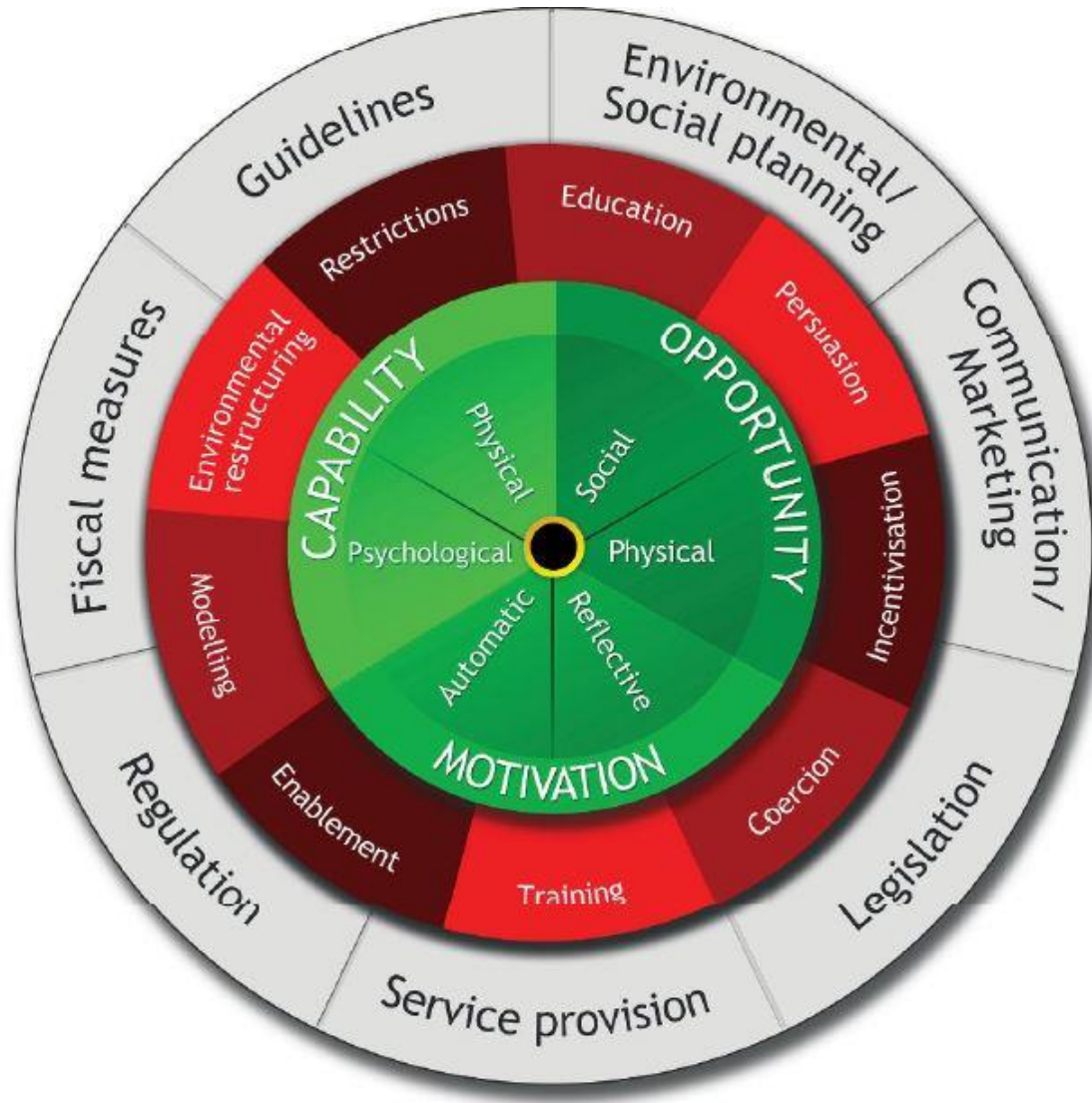
1. Blending technology with human interaction maximizes engagement and results

More effective interventions are:

- ***Hybrid*** interventions (in-person and digital) with either in-person or remote counselling component
- Using a ***mix of technologies*** – apps and phone calls



2. Development using behaviour change techniques (BCT)



1. COM-B model (green inner)

For any behaviour a person needs capability, opportunity, motivation

2. Intervention functions n=9 (red layer) underpinned by 93 distinct BCT

- “active ingredients” in interventions

3. Policy categories (outer layer)

Support delivery of the intervention on larger scale

Better outcomes seen when:

- using 5-10 BCTs associated with better outcomes
- **Goals and Planning** (goal setting, action planning, problem-solving)
- **Feedback and Monitoring** (self-monitoring of behaviour, feedback on performance/outcomes)
- **Social Support** (peer groups)
- **Shaping Knowledge** (instruction on how to perform the behaviour, information about health consequences)

SR of 29 studies utilising mHealth in overweight and obesity

BCT		example	Modality example
Self-monitoring	25 studies, 86%	- A participant uses a mobile app to log daily physical activity (steps, minutes of exercise). - Keeping a food diary to record meals and snacks.	- Mobile App - Wearable
Instruction on how to perform a behaviour	24 studies, 83%	- demonstrates proper portion sizes using visual aids during a nutrition counselling session. - instructions for preparing a low-sodium meal.	- Video - Web page
Feedback on behaviour	20 studies, 70%	Automated messages congratulating users when they meet hydration targets.	- Telemedicine - mHealth
Goal Setting	19 studies, 65%	Establishing a target of cooking at home at least 4 nights per week.	- E-counselling - Telemedicine
Action Planning	15 studies, 53%	Identifying strategies for eating a healthy lunch at work	- E-counselling - Telemedicine

3. Optimal intervention duration

On average RCT interventions $\approx$ 4-8 months.

- 6 months exhibited the largest weight loss effects
 - *Effects often peak around 6 months, with gradual decrease due to a decline in behaviour change adherence over time.*
- T2DM prevention (Changes in HbA1c) interventions of less than 12 months more effective
- Young adults physical activity change less than 8 weeks.

Lack of data re: maintenance



Decline in engagement

- app usage or engagement in discussion boards reported to decline in the **initial weeks**

General data shows:

- $\approx 25\%$ abandon an app after using it only once after installation.
- 75% of users fail to return to an app the day after first use
- $>50\%$ of all apps installed are uninstalled within 30 days.
- By day 30 after installation, 2-4% retention rate across all categories



Limitations and Knowledge Gaps

High heterogeneity among study populations, intervention designs, and outcomes reported → limits synthesis of what is (and is not) effective

Many studies focus on **short-term outcomes**, with a lack of maintenance / sustained behaviour change data

Clinical Significance is uncertain. Studies have focused on proximal outcomes (changes in anthropometry, biochem) and not on distal outcomes (e.g. CV risk reduction)

Studies in **diverse populations and diseases needed** - different social, cultural groups, predominantly overweight, obesity, T2DM

Advantages

- Increased access to care
- Less resource and time intensive
- Scalable
- Potentially lower in healthcare costs

Challenges

- **Digital divide, equity**

The gap between those who have access to digital technologies, and those who do not.

This disparity can deepen existing inequalities in education, healthcare, and economic opportunity.

- Costs to develop and maintain
- Medium-long term engagement
- Integrating into current clinical care processes (lack of data re: implementation)

How do we build an effective digital intervention?

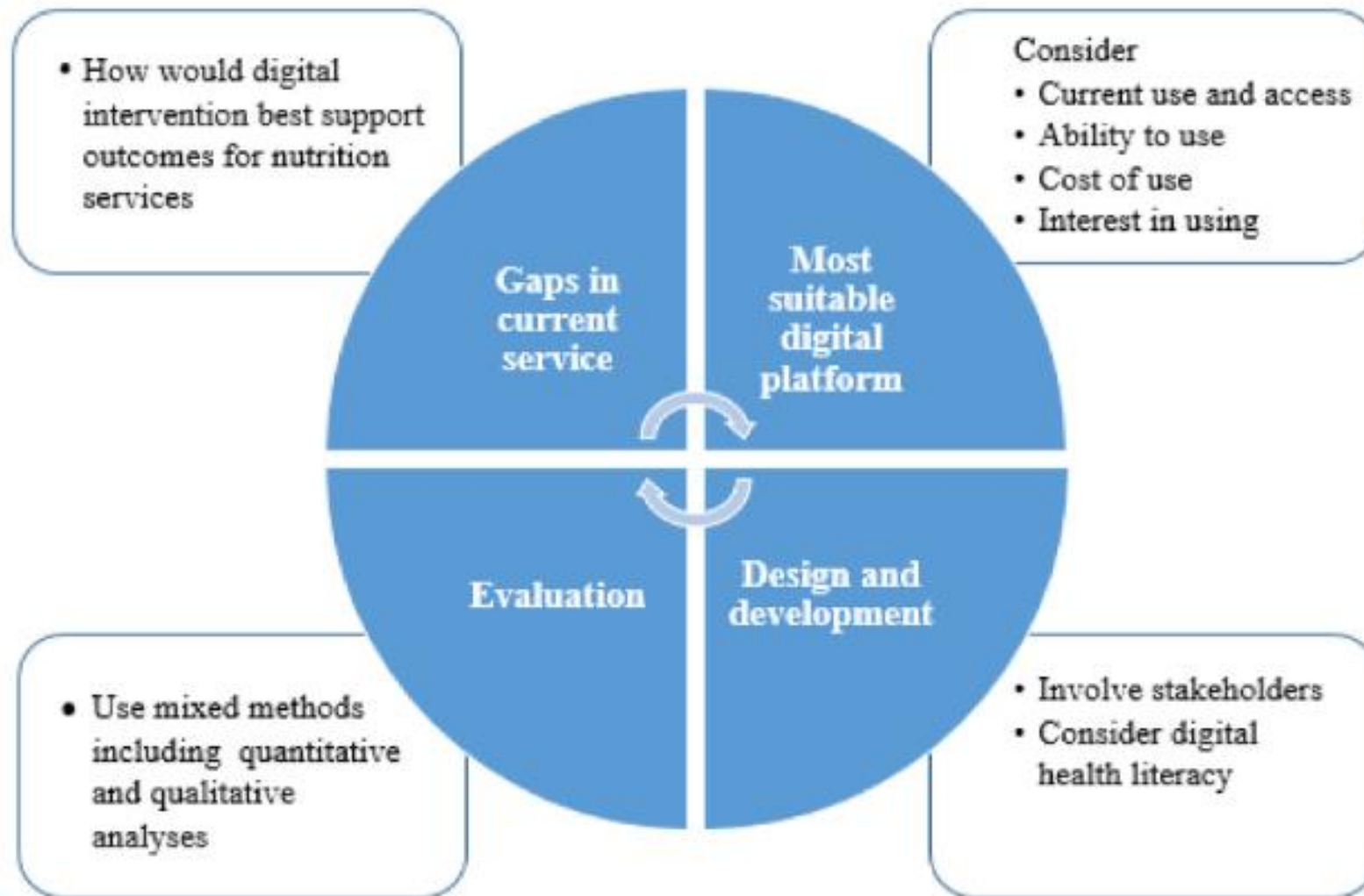


FIGURE 1 Considerations when designing, implementing and evaluating digital interventions

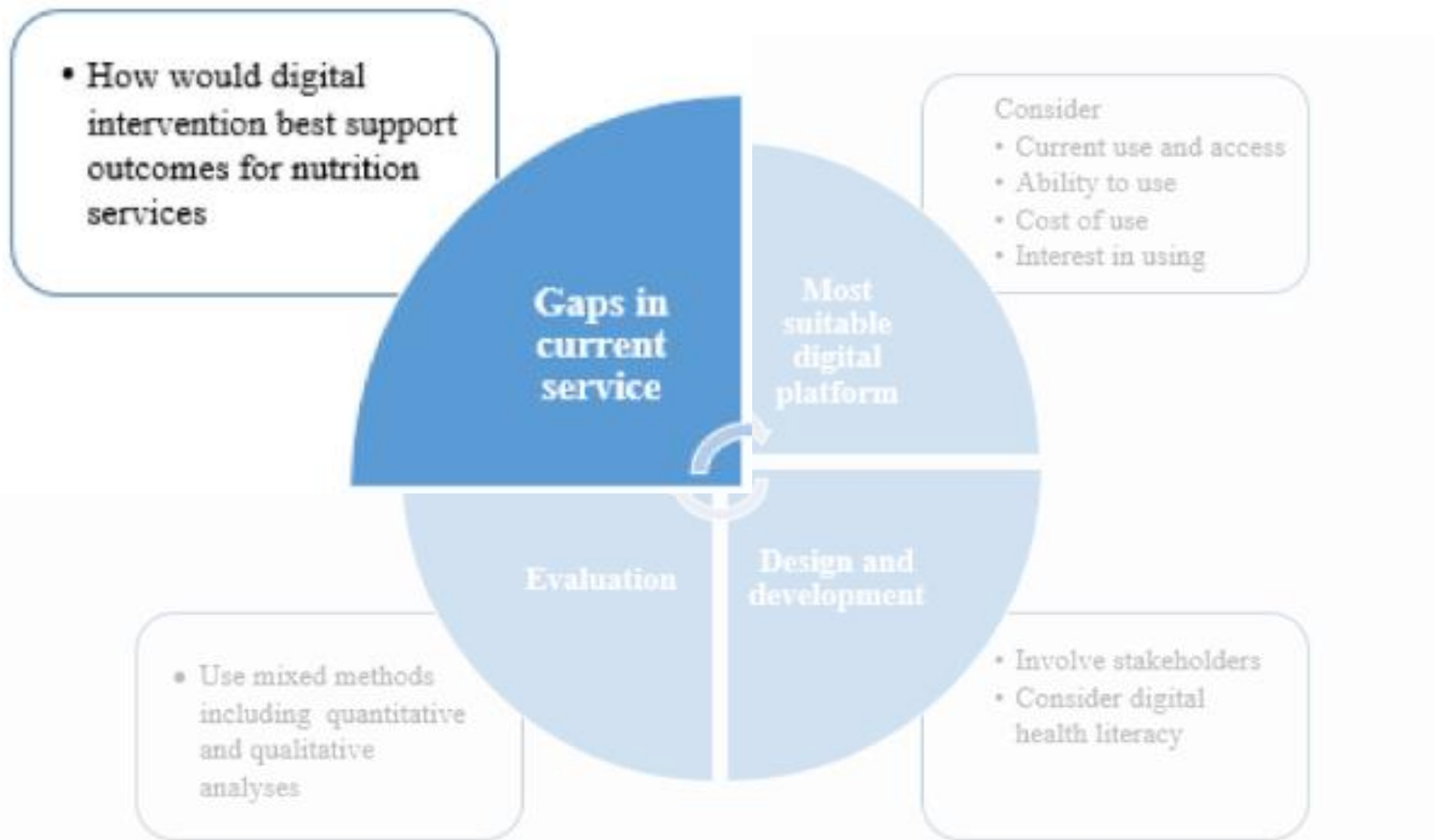


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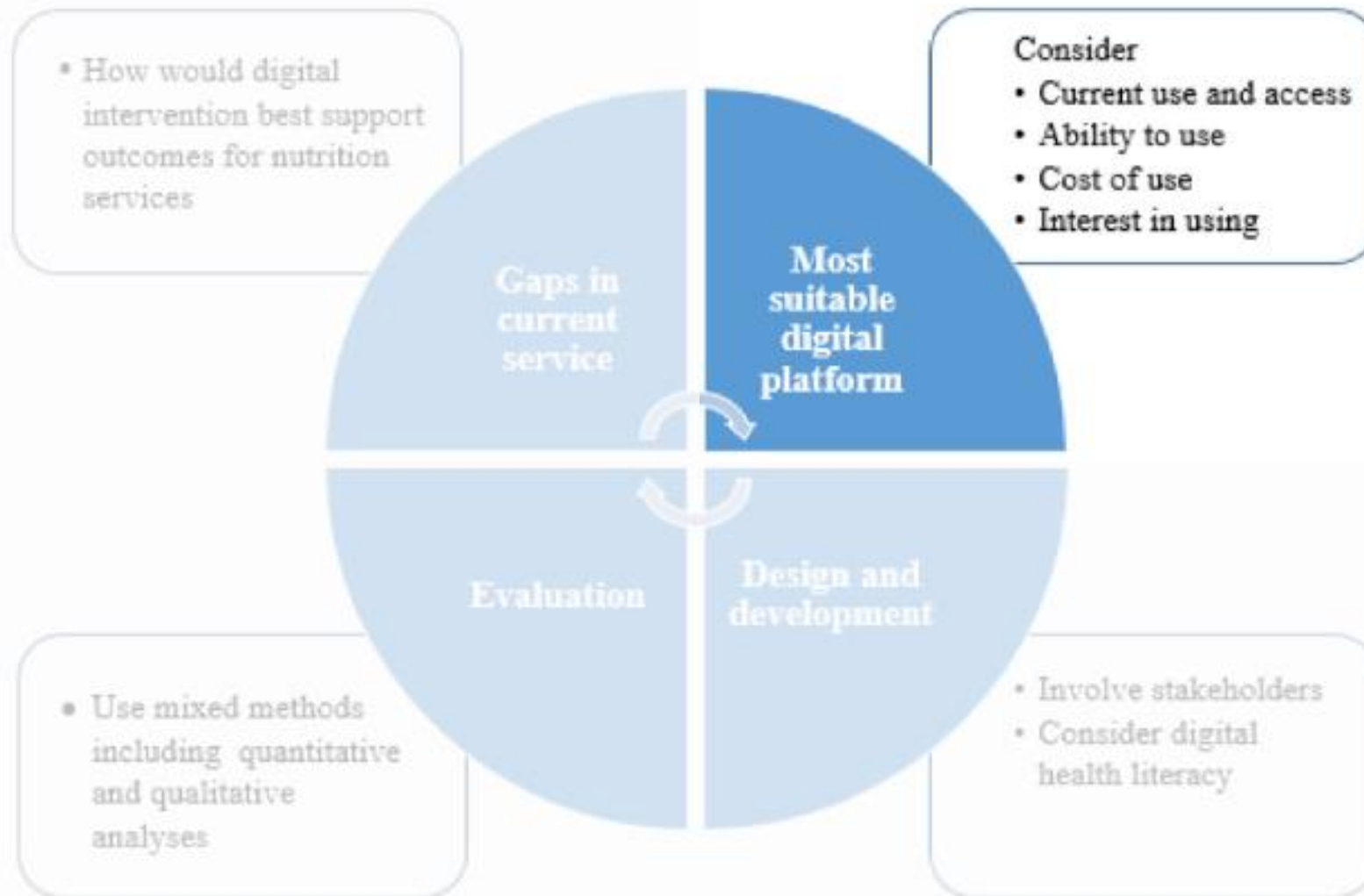


FIGURE 1 Considerations when designing, implementing and evaluating digital interventions

What digital intervention and for who?



Need to consider:

- Health outcome
- goal of intervention
- Target population
- Individual needs and abilities, circumstances
- Access to technology
- Cost (to patient, us to develop)

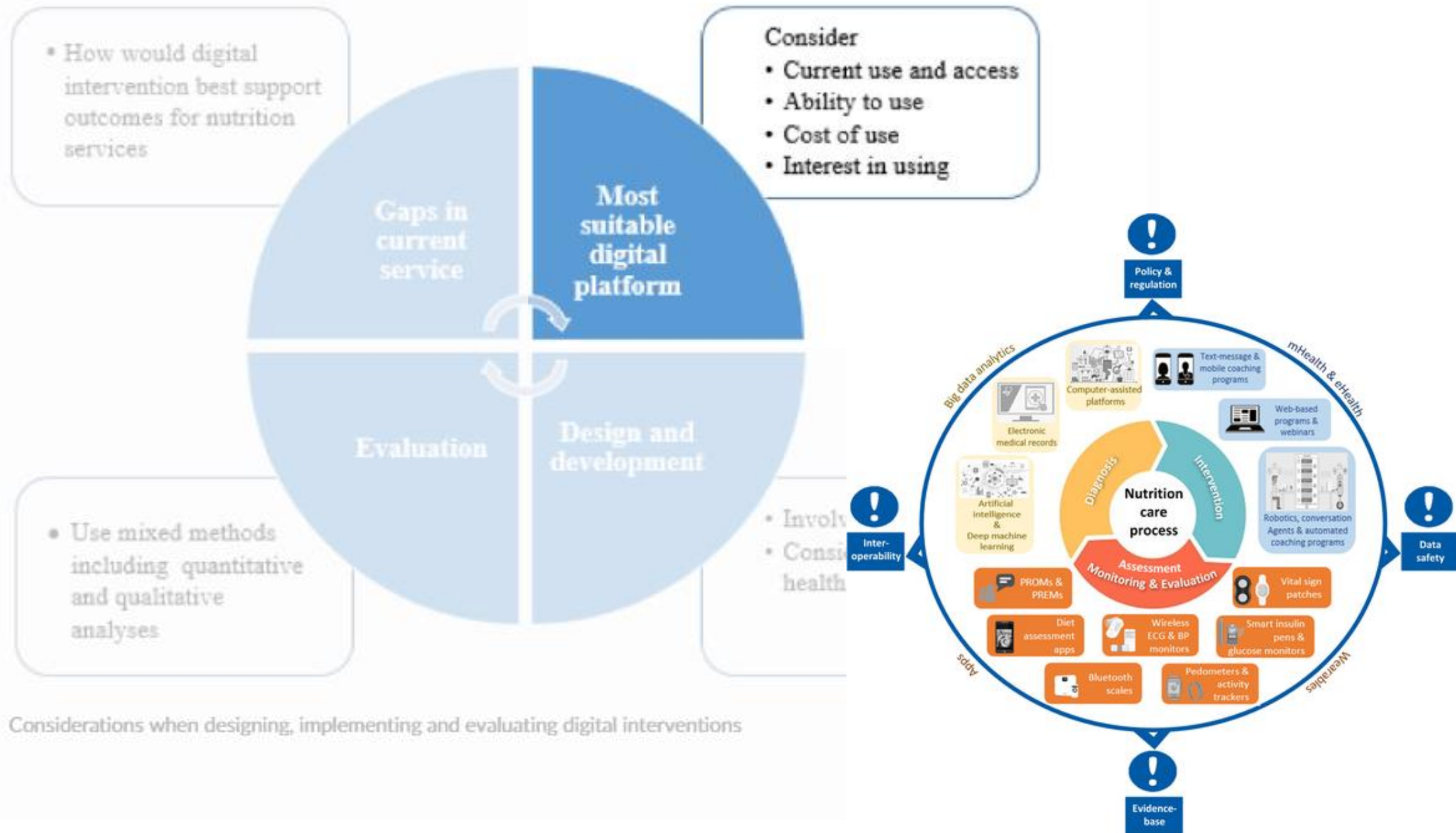


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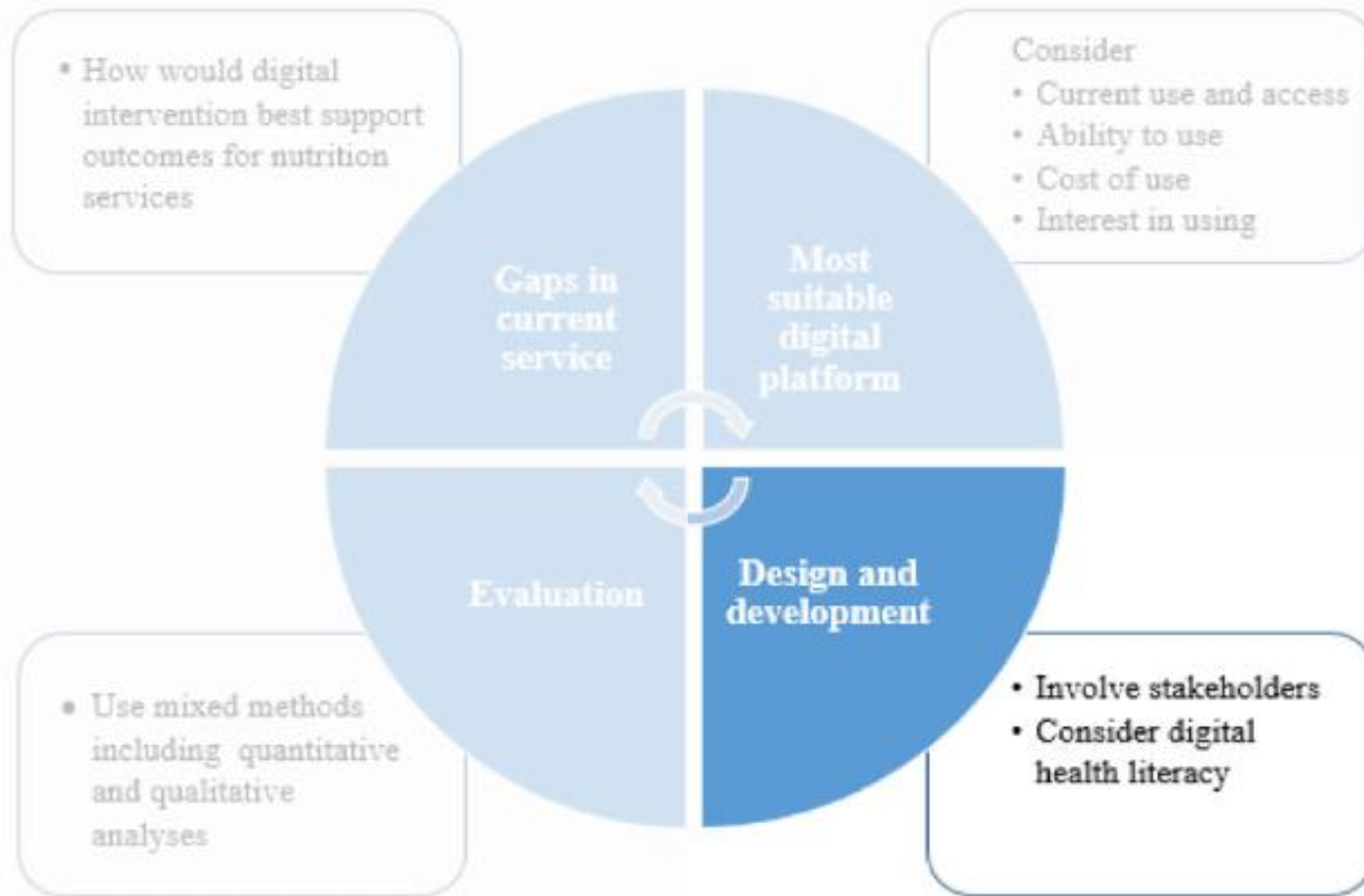


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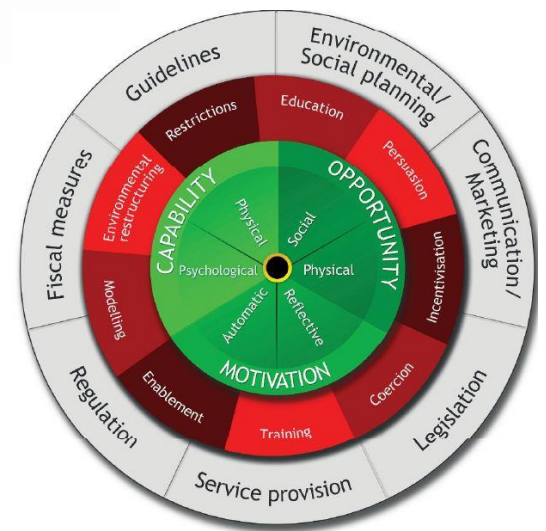
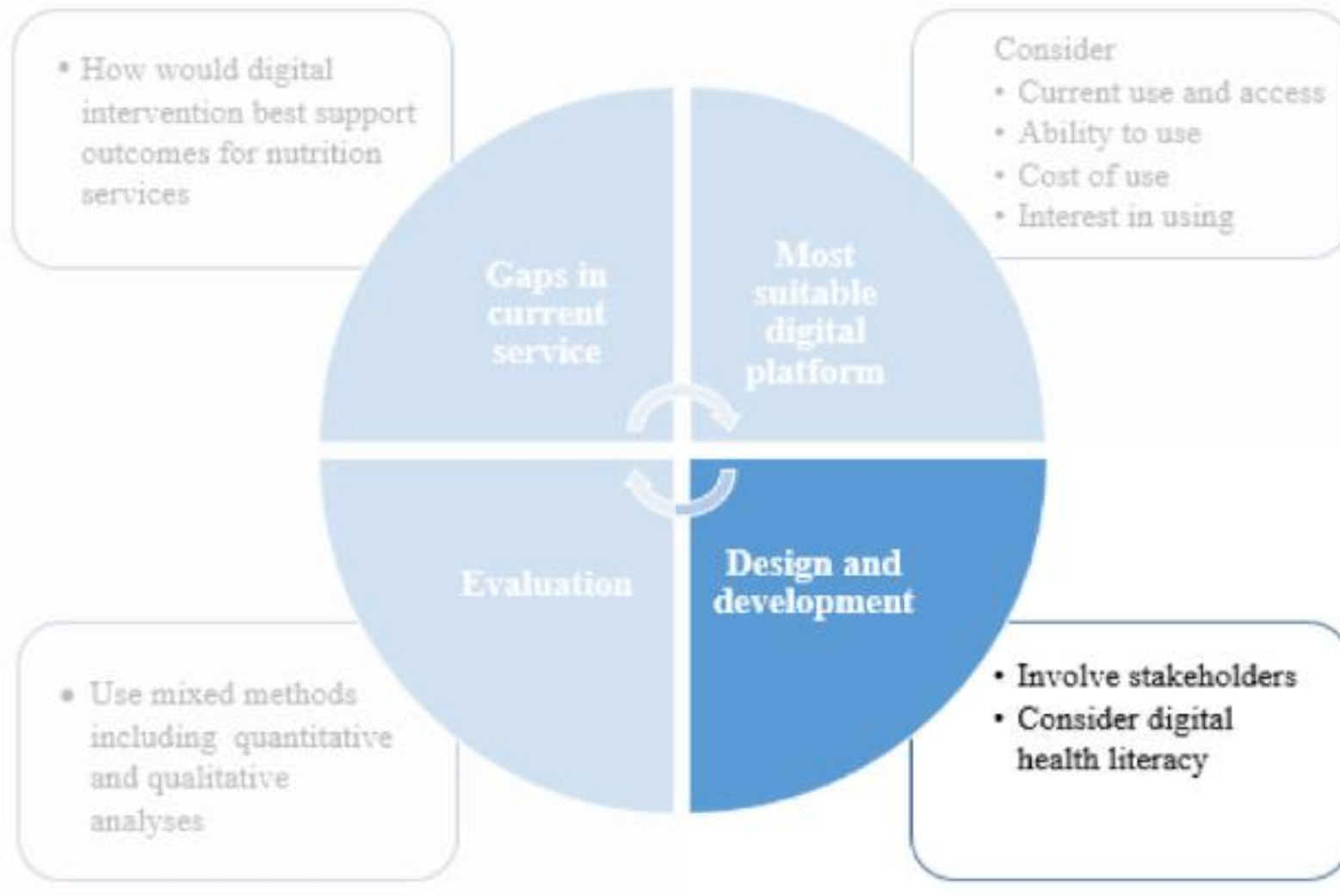


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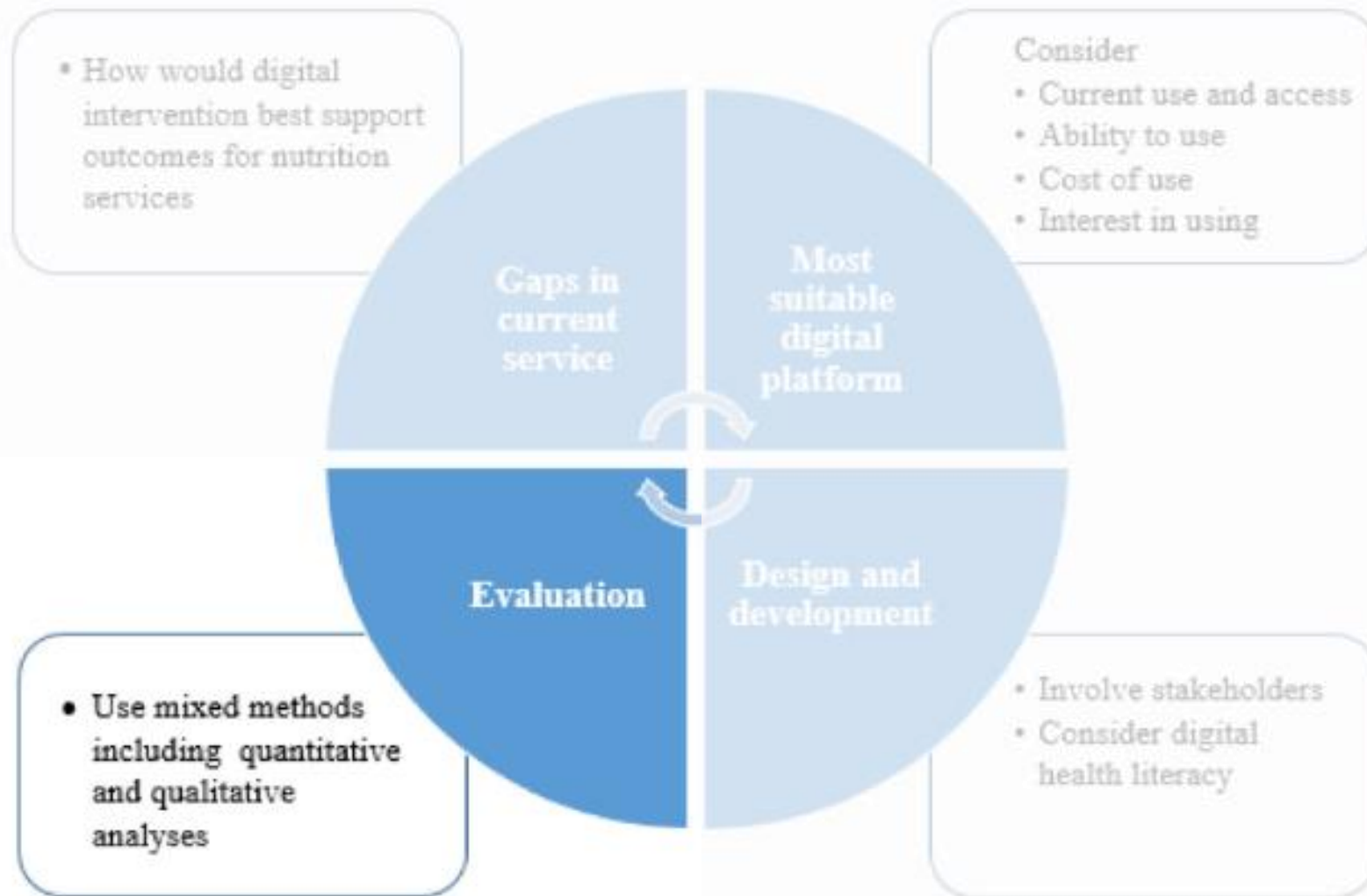
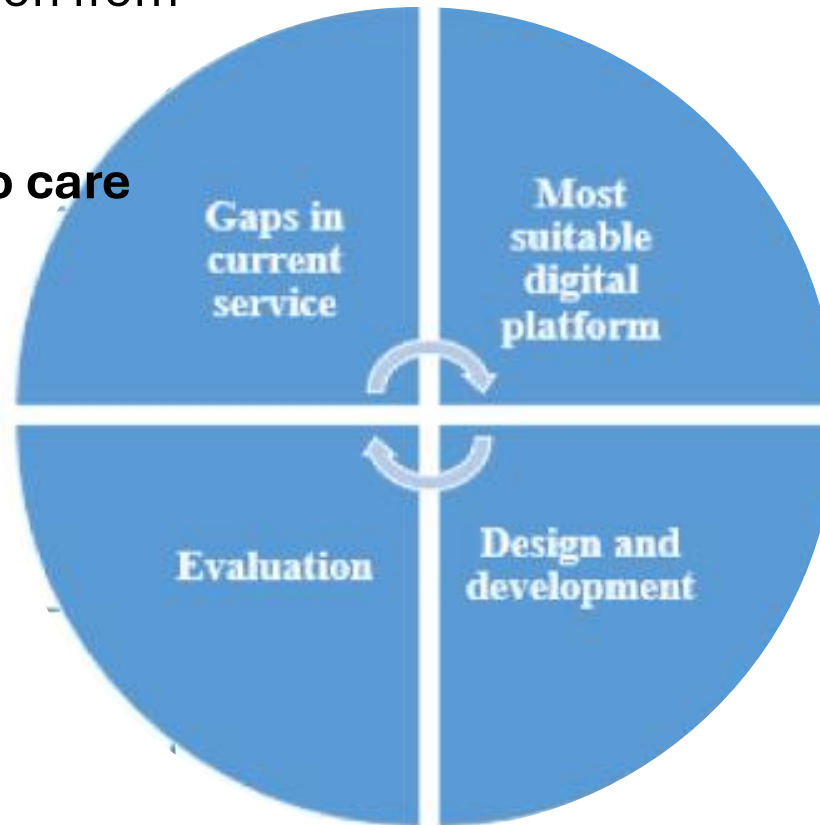


FIGURE 1 Considerations when designing, implementing and evaluating digital interventions

Dietitians cover $\approx$ 300 people on HD
Diet is complex
People want more information from
a trusted source

? DHI to improve access to care



RCT – 6 months
N=130
Quantitative, qualitative
evaluations

Cost of \$110 per participant

Older population
People of diverse backgrounds –
cultural, socioeconomic
Low technology & smart phone usage

→ Widely accessible, low-cost
intervention

→ **Text messages (KIDNEYTEXT)**

Co-designed with consumers and
stakeholders

- interviews
- text development using BCW, BCTs
- underwent iterative feedback
- final bank of 130 text messages
- intervention: 3 texts/week, semi-personalised + usual dietary care

What did we find

3 text messages / week for 6 months +usual care vs usual care only

- sig improved fluid management (a key clinical parameter)
- sig reduced dietary sodium intake (mean difference -320mg daily)
- likely cost saving due to a sig reduction in unplanned hospital admissions (approx. \$2000 per participants over 6 months)
- participants liked it, felt supported, provided some new information, useful as a reminder
- **but** also wanted in-person individualised dietary counselling

Of those receiving text messages (n=87), only 3 requested text messages to be paused early → acceptable, 88% retention rate

What don't we know

- whether behaviours were maintained beyond 6 months
- text message content vs texts acting as reminders
- Generic vs tailored messaging
- Can this system be implemented within the dialysis setting
- Costs of implementation and maintaining

My take-aways

Embrace how digital interventions can enhance our care and practice

- DHI can be effective when used in conjunction with in-person/ personal care
- Need to approach developing these in the same we do for complex interventions – systematically, evidence-based
- Co-design is crucial
- Newer tech is exciting but not always accessible for our patients
- Implementation has scarcely been evaluated – huge gap in our knowledge, evidence and care

Questions

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