

## Previous implementation/evaluation frameworks for health and care technologies

*The frameworks below are specifically oriented to technology implementation. Additional frameworks for the adoption and implementation of innovations more generally are covered in the Background section of the paper.*

### **Theory-informed integrative reviews**

1. Van Gemert-Pijnen et al. [review] 2013 (diffusion of innovation, human-technology interaction, service improvement, organizational development) [43]
2. Van Dyk [review] 2014 (diffusion of innovation, e-readiness, technology acceptance and use, transactional economics, information system life cycle) [59]

### **Frameworks based on a logic model for developing and implementing a technology**

3. Eng et al. 1999 (conceptualization/design □ implementation □ assessment/refinement) [61]
4. Hebert 2001 (structure □ process □ outcome) [62]
5. Catwell & Sheikh 2009 (inception □ requirements/analysis □ design/develop/test □ implement/deploy – each with continuous evaluation) [63]
6. Chang et al. [review] 2015 (inputs □ activities □ outputs □ outcomes, plus stakeholders) [51]

### **Frameworks presented as a list of criteria (or ‘things to think about’)**

7. Shaw 2002 (clinical, human and organizational, educational, administrative, technical, social) [64]
8. Kazanjian & Green 2002 (population at risk, population impact, economic concerns, social context [including ethical, legal, and political concerns], technology assessment) [65]
9. Ganesh 2004 (people [patient/practitioner/provider], technical, knowledge [training], organizational, regulation/policy, social, economic) [66]
10. Dansky et al. 2006 (design and methodology, technology-related, environmental, logistic or administrative) [67]
11. Hamid & Sarmad 2008 (includes costs, benefits, ease of learning, ease of use, accessibility, compatibility, functionality, user satisfaction) [68]
12. Esser & Gossens 2009 (doctor-patient communication, technology-mediated communication, technology acceptance) [69]
13. Greenhalgh et al. 2017 (technology barriers, patient barriers, individual staff barriers, team barriers, business and financial barriers, and governance and regulatory barriers) [13]

### **Frameworks based on static models of systems**

14. Van der Meijden et al. 2003 (mostly DeLone & McLean model for Management Information Systems based on system quality, information quality, usage attributes, user satisfaction, individual impact, organizational impact) [50]
15. Yusof et al. 2008 ‘HOT-FIT framework’ (mostly DeLone & McLean, plus leadership, communication) [49]

### **Framework based on individual adoption/engagement**

16. O’Connor et al. 2016 (Digital health EngaGement mOdel [DIEGO], based on normalization process theory and burden of treatment theory) [48]

### **Frameworks based on dynamic/developmental models of systems**

17. Kushniruk 2002 (systems development life cycle) [70]
18. Kukafka et al. 2003 (extending Technology Adoption Model, social-cognitive theory, and diffusion of innovation theory with Green & Kreuter's PRECEDE-PROCEED model of complex organizational change) [58]
19. Kaufman et al. 2006 (specify needs □ develop components □ integrate components into system □ integrate system into clinical setting □ routine use of system) [71]
20. Greenhalgh and Russell 2009 (implementation and evaluation of e-health programs as contingent and political processes) [52]
21. Van Dyk & Schutte 2013 (Telemedicine Service Maturity Model) [57]
22. Abbott et al 2013 ('health IT implementation best practices', using a complex adaptive systems framing) [60]
23. Agboola 2014 ("pragmatic, multi-method, multi-phase approach" focusing on building alliances and overcoming front-line challenges) [56]
24. Greenhalgh et al. 2015: (ARCHIE principles for telehealth/telecare services: Anchored in what matters to patients; Realistic about the natural history of illness; Co-creative – evolving and adapting solutions with users; Human – supported through interpersonal relationships and social networks; Integrated, through attention to mutual awareness and knowledge sharing; Evaluated, to drive system learning) [47]
25. Mummah et al. 2016 (iterative design model, comprising empathize □ specify □ ground □ ideate □ prototype □ gather □ build □ pilot □ evaluate □ share) [55]
26. Wouters et al. 2016 (Technology Adoption Readiness Scale, derived from normalization process theory) [72]
27. Madjedi et al. 2016 (emphasis on partnership-building and democratic co-design with ethnic and underserved communities) [54]
28. Anton et al. 2017 (iterative design model, comprising optimise technology-enhanced services □ develop regulations and guidelines □ disseminate information □ improve organizational readiness □ provide ongoing training and technical support) [53]