Supplementary Appendix A - Search Results

PubMed – 3	3.17.2021	
Search #	Query	Results
#1	(Co-Design[tiab] OR Co-Creation[tiab] OR Co-Production[tiab] OR Participatory Design[tiab] OR Human Factors[tiab] OR User-Centered Design[mesh] OR User-Centered Design[tiab] OR Participatory Approach[tiab] OR Human-Centered Design[tiab] OR Universal design[mesh] OR Patient Participation[mesh] OR patient participation[tiab])	38,538
#2	(Aged[mesh] OR Older Adults[tiab] OR Older People[tiab] OR Elderly[tiab] OR Geriatric[tiab] OR Aged over 60[tiab] OR aged 60[tiab] OR Seniors[tiab] OR Over 65[tiab])	3,333,143
#3	(Electronic Health Records[mesh] OR Electronic Health Records[tiab] OR Electronic Health Record[tiab] OR Electronic Healthcare[tiab] OR eHealth[tiab] OR "mHealth"[tiab] OR Decision Aid[tiab] OR decision aids[tiab] OR Electronic Healthcare Aid[tiab] OR Healthcare Application[tiab] OR digital health[tiab] OR health information technology[tiab] OR health information technology[tiab] OR health technologies[tiab])	59,271
#4	#1 AND #2 AND #3	495

Embase – 3	3.17.2021	
Search #	Query	Results
#1	('human factors research'/exp OR 'user-centered design'/exp OR 'Universal design'/exp OR 'Patient Participation'/exp OR ('co-design' OR 'Co-Creation' OR 'Co-Production' OR 'Participatory Design' OR 'Human Factors' OR 'user-centered design' OR 'Participatory Approach' OR 'Human-Centered Design' OR 'patient participation'):ab,ti)	42,464
#2	('aged'/exp OR ('older adult' OR 'older adults' OR 'older people' OR elderly OR geriatric OR geriatrics OR 'aged over 60' OR 'aged 60' OR 'over 60' OR 'aged over 65' OR 'aged 65' OR 'over 65' OR senior OR seniors):ab,ti)	3,460,578
#3	('electronic health record'/exp OR ('electronic health record' OR 'electronic health records' OR 'electronic healthcare' OR 'ehealth' OR 'mhealth' OR 'electronic decision aid' OR 'electronic decision aids' OR 'electronic healthcare aids' OR 'electronic healthcare aids' OR 'healthcare applications' OR 'Decision Aid' OR 'decision aids' OR 'digital health' OR 'health information technology' OR 'health information technologies' OR 'health technology' OR 'health technologies'):ab,ti)	59,924
#4	#1 AND #2 AND #3	246

Scopus – 3	.17.2021	
Search #	Query	Results
#1	TITLE-ABS("co-design" OR "Co-Creation" OR "Co-Production" OR "Participatory Design" OR "Human Factors" OR "user-centered design" OR "Participatory Approach" OR "Human-Centered Design" OR "patient participation")	78,052
#2	TITLE-ABS("older adult" OR "older adults" OR "older people" OR elderly OR geriatric OR geriatrics OR "aged over 60" OR "aged 60" OR "over 60" OR "aged over 65" OR "aged 65" OR "over 65" OR senior OR seniors)	657,056

#3	TITLE-ABS("electronic health record" OR "electronic health records" OR	54,356
	"electronic healthcare" OR "ehealth" OR "mhealth" OR "electronic decision	
	aid" OR "electronic decision aids" OR "electronic healthcare aid" OR	
	"electronic healthcare aids" OR "healthcare applications" OR "Decision Aid"	
	OR "decision aids" OR "digital health" OR "health information technology"	
	OR "health information technologies" OR "health technology" OR "health	
	technologies")	
#4	#1 AND #2 AND #3	94

records before duplicates removed: 835records after duplicates removed: 625

Supplementary Appendix B - Study Classification Methods

Category	Variable	Classification method
Summary	Year of publication	Metadata
characteristics	First author's geolocation	Metadata
	Study setting	Metadata
	Number of stakeholders	Metadata, mean
	Number of older adults	Metadata, mean
	Study population	Metadata
Co-design	Terminology or definitions	Manual, binary
approaches	Theoretical framework/design principles	Manual, binary
	Iterative development	Metadata, mean
Stakeholder	Participant types	Metadata
involvement	Types of Involvement Processes	Leinonen et.al [24]
	Learning Levels	Bateson [25], Argyris [26]
	Levels of participation	Vaughn et.al [3]
Electronic healthcare tools	Types of healthcare tools	WHO classification of digital health interventions [17]
	User testing	Metadata

## Supplementary Appendix C

Author	Theoretical Framework/Co-Design Principle	Level of Involvement							Inve	olvem	ent F	roce	sses								U	ser Testing Measu	res and Validation	n	
	.,																					Objective	Subjective		
			Α	В	С	D	Е	F	G	н	1	J	К	L	М	N	О	Р	Q	Endpoint	Other	Measure	Measure	Physiological	Validated
Abujarad	User Centered Design	Empower																		confidence and			CES		Х
[52]	Approach																			computer					
			х	х	х	х	х			х					х	х		х		efficacy					
			1																	emotional			I-PANAS-SF		Х
																				reactions	-		CLIC		.,
Ahmed	Dantiniantana Danian	F																	-	usability health literacy			SUS NVS		X X
[34]	Participatory Design Approach	Empower																							
[54]	Арргоасп																			patient			ACE (Altarum		Х
	Developed		Х	Х					Х			Х	Х			Χ		Х		engagement - self report on			Consumer		
	recommendations for																			health			Engagement)		
	framework																			behaviors			0.0		
Bogza	Center for eHealth and	Empower																					Ottawa		Х
[29]	Wellbeing Research																			quality of	1		Acceptability		
	guidelines																			decision aid	1		Scale		
																							Likart -		
	Inductive thematic				٠,	.,	.,									.,		١.,		satisfaction			unspecified		
	qualitative analysis				Х	Х	Х								Х	Х		Х	Х	usability			SUS		X
	approach																			·			Decisional		Х
	IPDAS																						Conflict Scale		
	IPDAS																			Comprehensio	teach back				
																				n	method				
Cornet	User Centered Design	Involve																		cognitive					Х
[12]																				workload			NASA-TLX		
	Developed recommendations for			l			l													health literacy			NVS		X
	framework			Х	Х	Х	Х			Х	Х			Х		Х	Х			usability	-		SUS		Х
	Hamework																			user acceptance			Likart - unspecified		
																				errors		Not stated	unspecified		
Gonzalez	none	Involve																		enois	<b>†</b>	NOL Stated	Likart -		
[33]	none	IIIVOIVE																		appearance			unspecified		
[55]																				арреалинее			Likart -		
																				comfort			unspecified		
					х											х							Likart -		
					^											^				functionality			unspecified		
																							Likart -		
																				reliability			unspecified		
																				1.10			Likart -		
G : 11:		0 11 1	-	-														-		usability	-		unspecified		
Grimaldi [11]	Human computer design approach ISO	Collaborate																		quality of interaction			Us.E 2.0		
[11]	13407:1999 [ 1 ] revised																			interaction			Likart -		
	by ISO 9241-210:2010		1	х	х	х	х			х				х		х		х		satisfaction	I		unspecified		
	,			l ^	l ^	^	l ^			l ^				l ^		^		^		Satisfaction	1		Likart -		
																				usability	1		unspecified		
																				errors		Not stated			
Gustafson	NIATx model as a	Empower																			Spending				
[14]	framework																			1	time				
																				1	teaching				
	Developed		Х		Х	Х			Х			Х			Х	Χ		Х	Х	1	older adults				
	recommendations for		1											1				1		ĺ	how to use		Libraria		
	framework																			usability	technology in		Likart - unspecified		
	I	l	1				<u> </u>		L	ш		<u> </u>	<u> </u>	<u> </u>			L		<u> </u>	usability	a classroom	l	unspecified		

																			setting			
Harringto	Experience-based co-	Empower																			Likart -	
n [9]	design																	usability			unspecified	
[2]	Developed		Х	Х	Х			Х				Х					Х					
	recommendations for																		Likart -			
Harte	framework HCD methodology ISO	Empower	-	+				-		_	-					-	+	usefulness cognitive	unspecified		NASA-TLX	х
[7]	9241-210 standards	Empower																workload			NASA IEK	
																		efficiency			ASQ	Х
																		satisfaction			Likart - unspecified	
			Х	Х	Х	Х			х	х	Χ		Х		Х	Х	Х	usability			SUS	Х
																		errors		Mistakes		
																		Performance		Counted Time to		
																		renomiance		Complete		
Hoffman	IPDAS	Empower																			Ottawa	Х
[39]	Ottawa Decision Support																	quality of decision aid			Acceptability Scale	
	Ottawa Decision Support			Х	Х	Х	Х	Х		Х	Х			Х	Х	Х	Х	values clarity			SURE	Х
																		-		Observed		
Holden	Age-Related Research-	Empower	-	-				-		_						-	+	errors		errors		
[53]	Based Usability	Empower																usability		Mistakes	SUS	Х
	Guidelines																	errors		Counted		
	Principles and Creative			х	х		х		х					Х	х		х			Times		
	Human Factors																	need for assistance		Request Assistance		
	Approaches																	doorstariee		Time to		
				<u> </u>												<u> </u>	<u> </u>	Performance		Complete		
Kim [38]	Grounded theory approach	Involve	х	х	х			х			х	х		х								
			''																			
Mansson	Karagianni's Optimized	Empower																findable,				
[35]	Honeycomb model																	accessible, usable,				
							х		х			х			х		х	desirable,	UX Honeycomb			
																		credible,	Model			
																		useful, and valuable	ALL QUALITATIVE			
Martin-	Nielsen's Heuristics	Involve																				
Hammond					х	х				х	Х		Х		Х	х						
[36]				<u> </u>													<u> </u>	usability	qualitative			
Nguyen [42]	Medical Research Council framework	Empower																satisfaction			Likart - unspecified	
1					х		х		х			х		х	х		x			Observed		
	Developed recommendations for				^		^		^			^		^	^		^	errors		errors		
	framework																	Navigation	Google Analytics			
Nielsen	HCD International	Empower	t			H			1									Transpation	7 1101 7 1103			
[44]	Organization for				1			.			,,			١,,			1					
	Standardization (ISO) standards for human-							х			Х			Х	Х		х				Likart -	
	centered design for			1													1	usability			unspecified	

[41]	Method	Empower		Х		Х	х	Х					Х		Х		satisfaction			unspecified		
Ummels	Double Diamond	Empower	-						-	+		-	-	_			acceptance			unspecified Likart -		
										^							usability user			unspecified Likart -		
J.,	research theory									x					x		with others			unspecified Likart -		
Scandurra [37]	Human-Computer Interaction (HCI)	Empower															share experience			Likart -		
	Human-Centered Design framework																					
[40]	approach			х	х																	
Portz	Grounded theory	Involve	-		_				-	$\perp$			-	-			performance		Complete			
																	values clarity		Time to	Conflict Scale		
																	numeracy			Decisional		Х
																	numoracy			specified validity		
								х	Х							х	graphicacy			validity Likart -		Х
																	/			specified		
			1														gaze fixation			Likart -	eye-tracking	Х
																	/recall			validity		Х
Poirier [28]	IFUAS	Consult															comprehension			specified		
Poirier	IPDAS	Conlt	-		-	+	_	_	+	-	-	-	+	1	1		information			unspecified Likart -		
			1														value of the			Likart -		
																	usability			Likart - unspecified		·
				Х	Х								Х		Х		satisfaction			unspecified		
																	effectiveness			unspecified Likart -		
1																				Likart -		
Petersen [45]	IPDAS	Empower															comprehensibil ity			Likart - unspecified		
																	Performance		Complete			
			1														assistance	-	Assistance Time to			
																	Need for		Request			
	Study guideline																errors		Counted Times			
	Systematic usability study guideline		1	х	х			х					Х	Х					Mistakes			
																	usefulness			Likart - unspecified		
	Nielson heuristic principles																satisfaction			unspecified		
[43]	principles																ease of use			Likart -		
Or [43]	Human Factors Design	Collaborate																		Likart - unspecified		
	(Kanstrup & Bertelsen, 2011).																user acceptance			Likart - unspecified		
	management method																					
	techniques from the user innovation																					
	principles and																					
	for Standardization, 2010) and applied																					
	(European Committee																					

	MoSCoW model  Ummels Framework  Developed recommendations for framework													usability		Likart - unspecified		
Van De Dijk [54]	User Centered Design Approach	Involve	х			х	х		х				х					
Van Velsen [55]	MoSCoW method	Involve					х	х	х	х				usability	qualitative			
Wikberg- Nilsson [8]	None	Empower		х					х		х		х	cognitive process usability	qualitative		eye-tracking	

- A. Contextual Inquiry
- B. Survey
- C. Interview
- D. Cognitive walkthrough
- E. Think aloud
- F. Remote evaluation
- G. Focus group
- H. Task analysis
- Scenarios
- J. Prototype (low fidelity)
- K. Working Group Workshop
- L. Use Cases
- M. User Stories
- N. Prototype (medium fidelity)
- O. Heuristic evaluation
- P. Prototype (high fidelity functional/Beta version)
- Q. Other Process

## Supplementary Appendix D

Co-Design										
Approach	In	form	C	onsult	In	nvolve	Co	ollaborate	En	npower
	n	ref	n	ref	n	ref	n	ref	n	ref
Co-creation (n=2)	2	[35,41]	2	[35,41]	2	[35,41]	2	[35,41]	2	[35,41]
Co-design (n=5)	5	[8,9,39,42,44]	5	[8,9,39,42,44]	5	[8,9,39,42,44]	5	[8,9,39,42,44]	5	[8,9,39,42,44]
Human centered computing (n=1)	1	[9]	1	[9]	1	[9]	1	[9]	1	[9]
Human Centered Design (HCD) (n=3)	3	[7,11,40]	3	[7,11,40]	3	[7,11,40]	2	[7,11]	1	[7]
Human Factors (n=1)	1	[33]	1	[33]	1	[33]	0		0	
Interaction Design Process (n=1)	1	[9]	1	[9]	1	[9]	1	[9]	1	[9]
Participatory Design (n=7)	7	[8,9,34,37,38,44,55]	7	[8,9,34,37,38,44,55]	7	[8,9,34,37,38,44,55]	5	[8,9,34,37,44]	5	[8,9,34,37,44]
Usability Evaluation Approach (n=1)	1	[43]	1	[43]	1	[43]	1	[43]	0	
User Centered Design/Approach (n=9)	9	[12,14,29,36,39,41,52 -54]	9	[12,14,29,36,39,41, 52–54]	9	[12,14,29,36,39,41, 52–54]	5	[14,29,39,41,53]	6	[14,29,39,41,52,53]
Other (Did not Specify) (n=2)	2	[28,45]	2	[28,45]	1	[45]	1	[45]	1	[45]