# Value co-creation 'gradients': enabling human-machine interactions through AI-based DSS

Nudges from Heathcare

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- HMIs… why? -

Artificial Intelligence-based Decision Support Systems (AI-based DSS) are becoming increasingly important in many contexts. There is the need to define a type of human-machine interactions for new value co-creation processes' ranks, to help identify factors that can stimulate value co-creation in human-machine interactions.
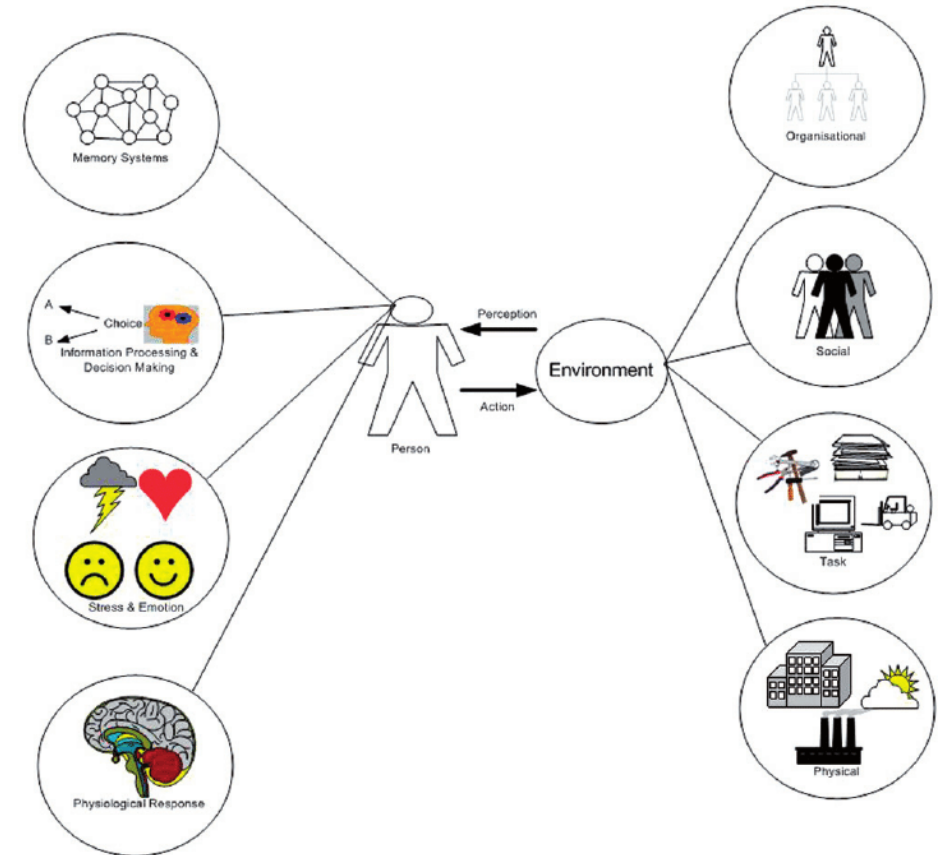
- **Insight n.1:**
  - participants really 'active',
  - resources (every kind) basically 'available', 'expendable' or 'usable' when requested,
  - interested entities (individuals, organization or whatever) ready, prepared, educated, motivated.

- **Insight n.2:**
  - value co-creation can happen when some conditions are respected,
  - everything is personal, experiential, and some doubt that could occur anytime strongly arise,
  - the distinction between human and not human appears evident.

- **Insight n.3:**
  - technological tools, digital platforms and similar instruments can enable value co-creation,
  - interactions are intended as complex and still not well understood,
  - HMIs are not deepened at all in the logic of value co-creation.

- HMI's structural pre-condition -

From human side	From not-human side
personal predisposition/tendency	technological instrument sensitivity
people education, experiences and background	machine training
individual learning ability	algorithm elements' readiness
known language used	instructions' availability and disposal
finality and cognitive alignment	embeddedness (integration / rooting)
user role (at a stated moment)	variety/variability management through ICT
user acceptance capacity	set up and connectivity appropriateness
contextualization (human side)	context-driven technology (not-human side)

- Gradients of structural preconditions -

Gradients of structural precondition
Human side
(example of personal predisposition)

- group former
- collaborative
- compliant
- acceptor
- sensitive/habituated
- unconcerned/unaccustomed
- not accepting
- not condescending
- uncooperative
- group ruiner
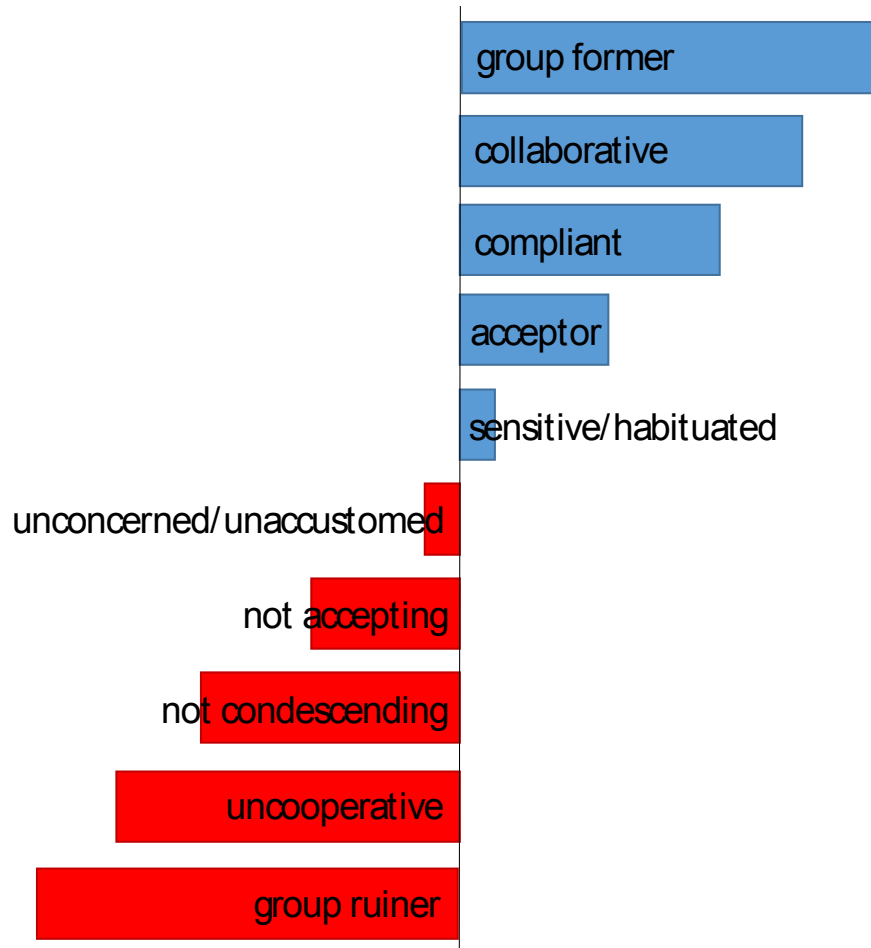
Gradients of structural precondition
Not-human side
(example of instructions' availability and disposal)

- intuitive and user-friendly
- immersive advertising
- tacit knowledge
- self-instructions
- not self-explaining
- restrictions
- unattainable applications
- not easy to use
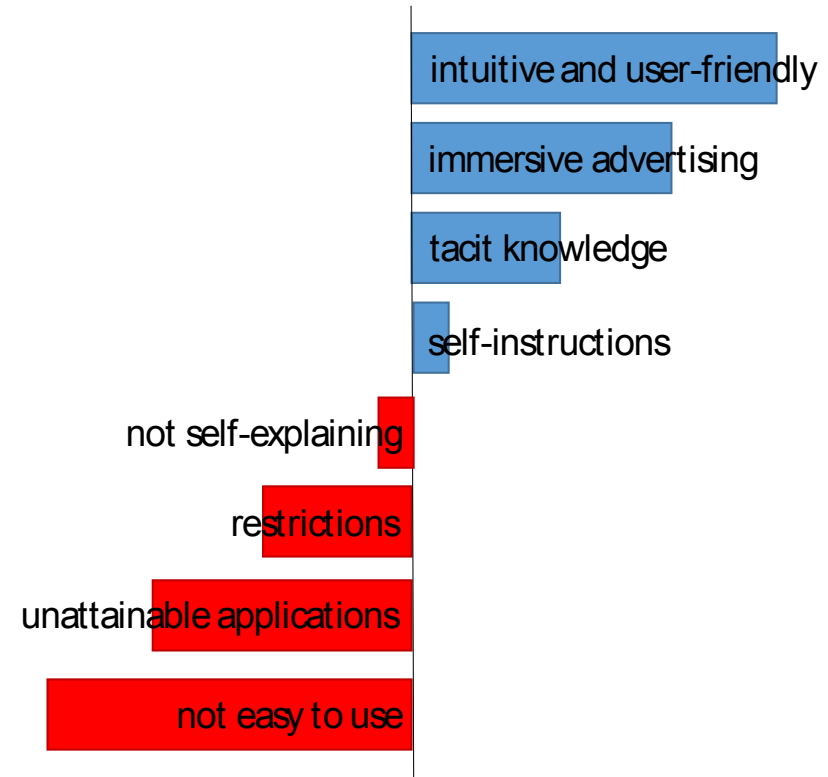
- Taxonomy of HMIs -

Taxonomy of interactions' groupings

Class
Order
Family group
Gender
Species
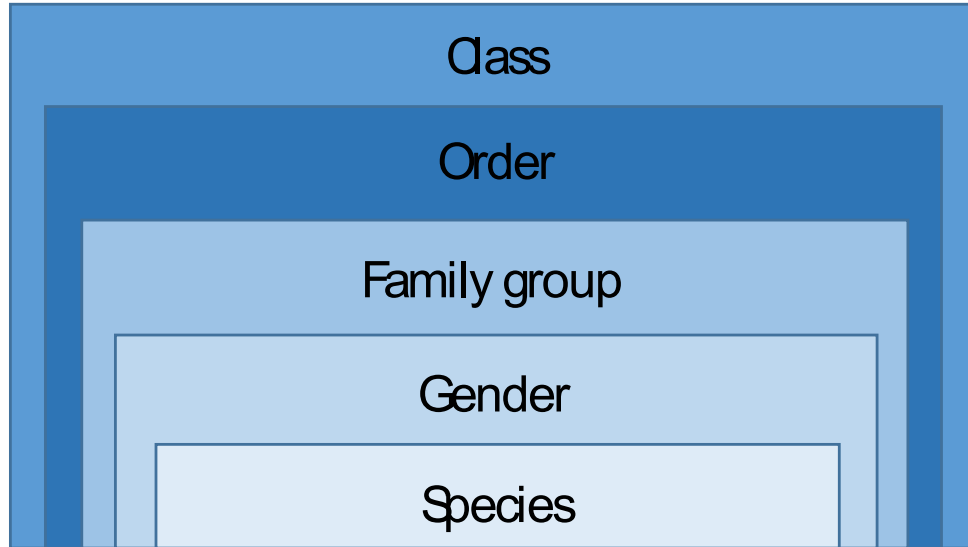
Taxonomic levels spectrum

-	No interaction	Occurred interaction	+
-	Negative conditions	Positive conditions	+
-	Static situations	Evolving situations	+
-	No feature's cluster	Many feature's clusters	+
-	Only one feature	Many features	+

- HMI's systems determinants -

From human side	From not-human side
continuity	reliability
relevance	completeness
engagement	speed, real time (timely)
coherence (congruence)	understandability
participation, pro-activity	digital divide avoidance

- Spectrum of HMI in terms of value co-creation -

Successful interactions ▭ Worst interactions

Relevant interactions ▭ Not relevant interactions

Coherent interactions ▭ Not coherent interactions

Finalized interactions ▭ Not finalized interactions

Partecipated interactions ▭ Not partecipated interactions

Agreed interactions ▭ Misunderstood interactions
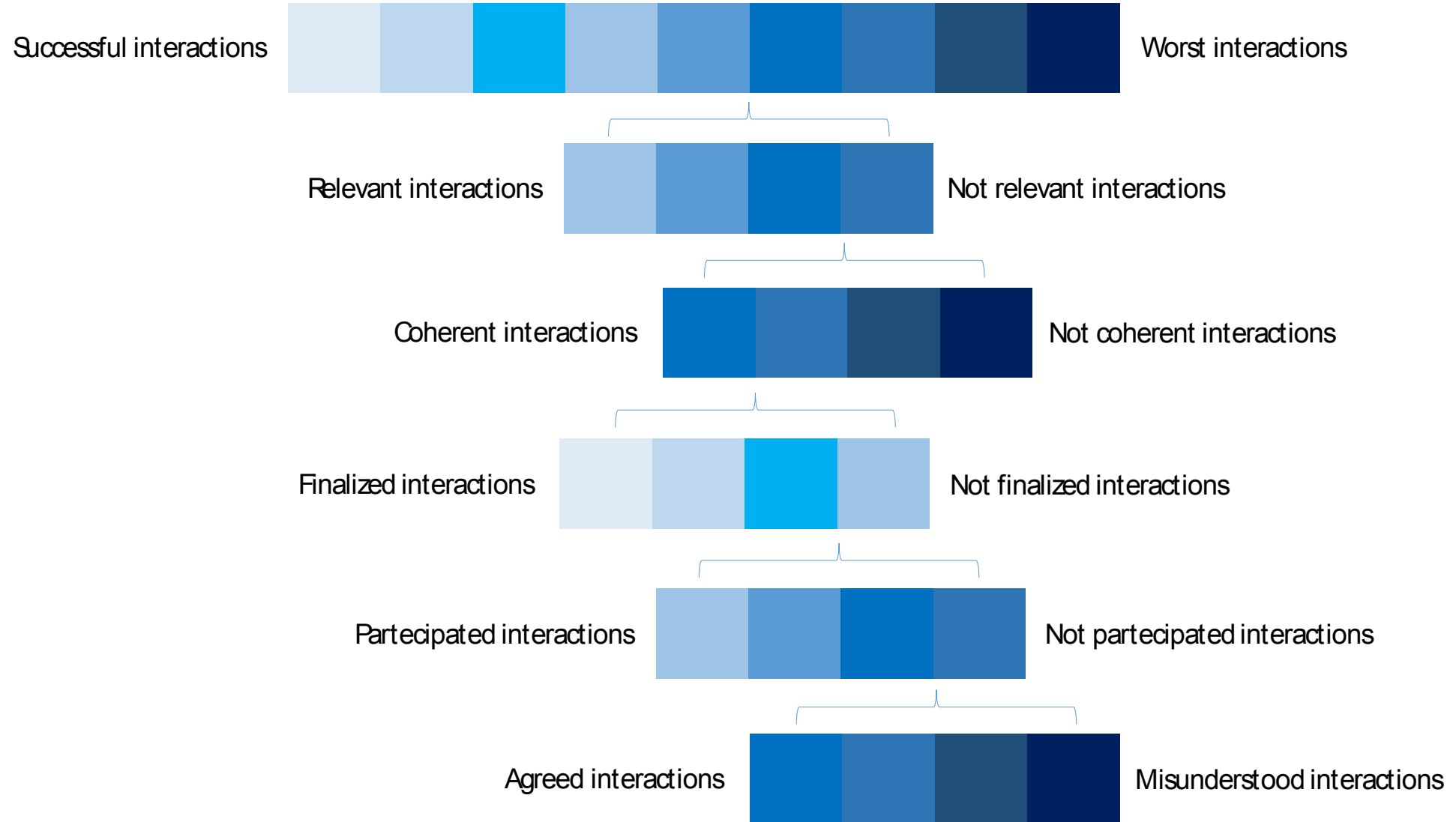
- Rank of value co-creation in HMI -

Value co-creation rank in human-machine interactions

Successful interactions — Value fully co-created

Positive interactions — Value not-fully co-created

Developing interactions — Value not yet co-created

Embryonic interactions — Still co-creating value

Developing interactions — Still co-destructing value

Negative interactions — Value not yet co-destructed

Worst interactions — Value not fully co-destructed

Value totally co-destructed
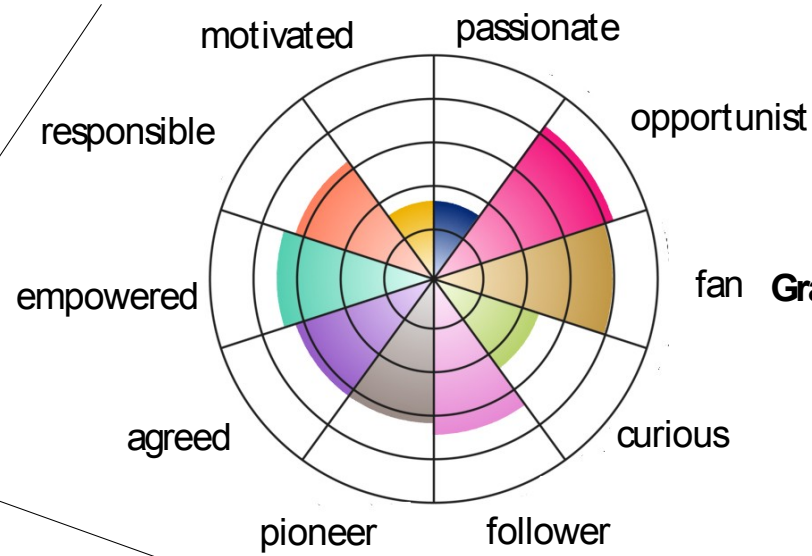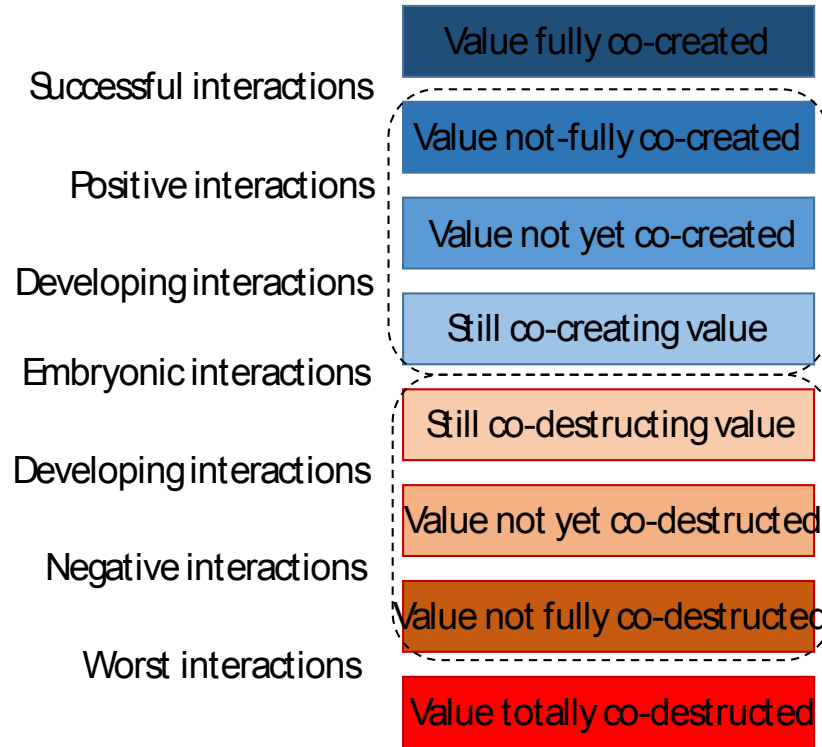
Gradients of systems determinants
Human side
(example of engagement)

motivated, passionate, responsible, opportunist, empowered, fan, agreed, curious, pioneer, follower
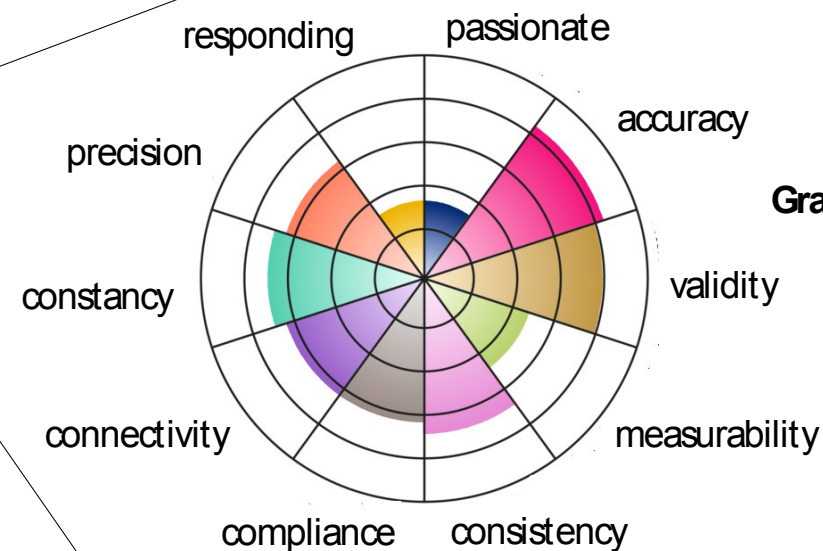
Gradients of systems determinants
Not-human side
(example of reliability)

responding, passionate, accuracy, precision, validity, constancy, measurability, connectivity, compliance, consistency

How many problems in terms of value co-creation?

Infographic: AI in Healthcare

Patient-Facing
- AI Chatbots: buoy, Your.MD, medwhat, GYANT, Dr.AI
- Wearables & Devices: phys iQ, QARDIO, sano, DietSensor, kiwi.ai, BIOSERENITY, Jodytrak, Magnea, kinsa, SCANADU, aira, AliveCor, 19 Labs, CliniCloud
- Personalized Genetics: iCarbonX, rthm, CG, DAY TWO, Positive Medicines, LIFE NOME, MEDICUS, 23andMe, VITAGENE, Arivale, habit, Suggestic, VIOME
- Mental Health: Woebot, TOUCHKIN, BIOBEATS, Ginger.io, X, AURA, koko, NeuroLex
- Women's Health: CYRCADIA HEALTH, bloomlife, celmatix, flutter, eva, Clue, elyse, Natural Cycles
- Skin: SkinVision, skinIO, skin analytics, SCANZ, skin, DOCTOR HAZEL, FIRST DERM

Telehealth
- Telemedicine: ada, SENSELY, babylon, anamnèse, Remedy, pager, Z, spruce, MDLIVE
- Lifestyle Management: AiCure, MedAware, Ovia health, next IT, Catalia Health, lucina, Healthcare, Health Next Gen, Doctella, Narrative Dx, cardiogram, Wellframe, Welltok, CareAngel
- Disease Management: prognos, INFOBIONIC, HealthReveal, HEALTH FIDELITY, DIABNEXT, SENTRIAN, TEMPUS, dreamed diabetes, Healint, WIKAYA, FLASHBACK TECHNOLOGIES, RxPREDICT, BELONG

Research
- Drug Discovery: Mind the Byte, SapS for Drug Discovery, DATAVANT, QUANTITATIVE MEDICINE, Standigm, BERG, RECURSION pharmaceuticals, ENVISAGENICS, BenevolentAI, Athelas, Exscientia, NuMedii, healx, transcriptic, Numerate, twoXAR, Atomwise, InSilico Medicine, CloudPharmaceuticals, Globavir
- Information & Clinical Trials: trials.ai, PathAI, BenchSci, CYCLICA, Mendel.ai, Qrativ, peptone, Brite Health, iPLEXUS, antidote, Plex Research, nference, RESULTCARE
- Genetic Research: MolecularMatch, Blueprint Genetics, VERGE GENOMICS, NURITAS, diploid, HUMAN LONGEVITY INC., SOPHIA GENETICS, freenome, FDNA, PATHWAY GENOMICS, deep genomics, DESKTOP GENETICS

Doctor-Facing
- Medical Records: APIXIO, AUGMEDIX, clinithink, MODERNIZING MEDICINE, saykara, nimblr, emr.ai, WellSheet, hCue, patientory, SANSORO HEALTH, PROTENUS, BloomAPI
- Data Analytics: ZEPHYR HEALTH, burst iQ, MD.ai, Infermedica, CLOUDMEDX, jvion, CareSkore, ROAM, Hindsait, Oncora MEDICAL, flatiron, PROFILITY, lumiata, GRAIL, MEDALOGIX, ensodata, pulseData, healthcare.ai, Ken Sci, COMBINOSTICS, impacthealth, LYTICS
- Medical Imaging: VIZ, AMARA HEALTH ANALYTICS, enlitic, zebra, inferVISION, CureMetrix, BAYLABS, VUNO, ADVENIO, koios, BUTTERFLY Network Inc., SIG TUPLE, Behold.ai, imagia, ARTERYS, IMAGEN, Mindshare MEDICAL, aidence, aidoc, HubMedX, Lunit, Cardiologs, Genetesis, DIA IMAGING ANALYSIS, SemanticMD, Blackford analysis
- Hospital: FORWARD, Qventus, MedyMatch, gauss, orgo.ai, MEDASENSE, P3d, AURIS, VERB SURGICAL, Qualaris

Thank You

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