

Human-centric Internet

What does it mean?

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IIK, NGINO 2022/11/29

1

How fast can we go?

And how fast is too fast?

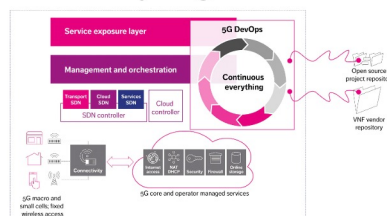
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The old way

- Design
- Modelling
- Specification
- Implementation
- Measure and Validation
- Deployment

The new way

- Agile Development
- DevOps
- Continuous everything



TransContinuum Initiative (TCI): our vision (2020)

5

2

The right way

- Be mindful of the
- Keep in mind the
 - On societal and
 - Human-centric
- Human-centric
 - Design
 - Management
 - Maintenance
 - Usage

The worst outage I never caused

Julien Goodwin

Root causes <https://youtu.be/AUTsDTVtfFE?t=607>

- Obsolete config not fully cleaned up
- Magic numbers in places humans need to deal with
- (Almost) no tests
 - One simple one validated syntax, but not content
- No simulation
- No clear ownership
 - Routing configuration regularly changed by people across three disparate teams, none of which "own" it.
- In short, classic haunted graveyard

3

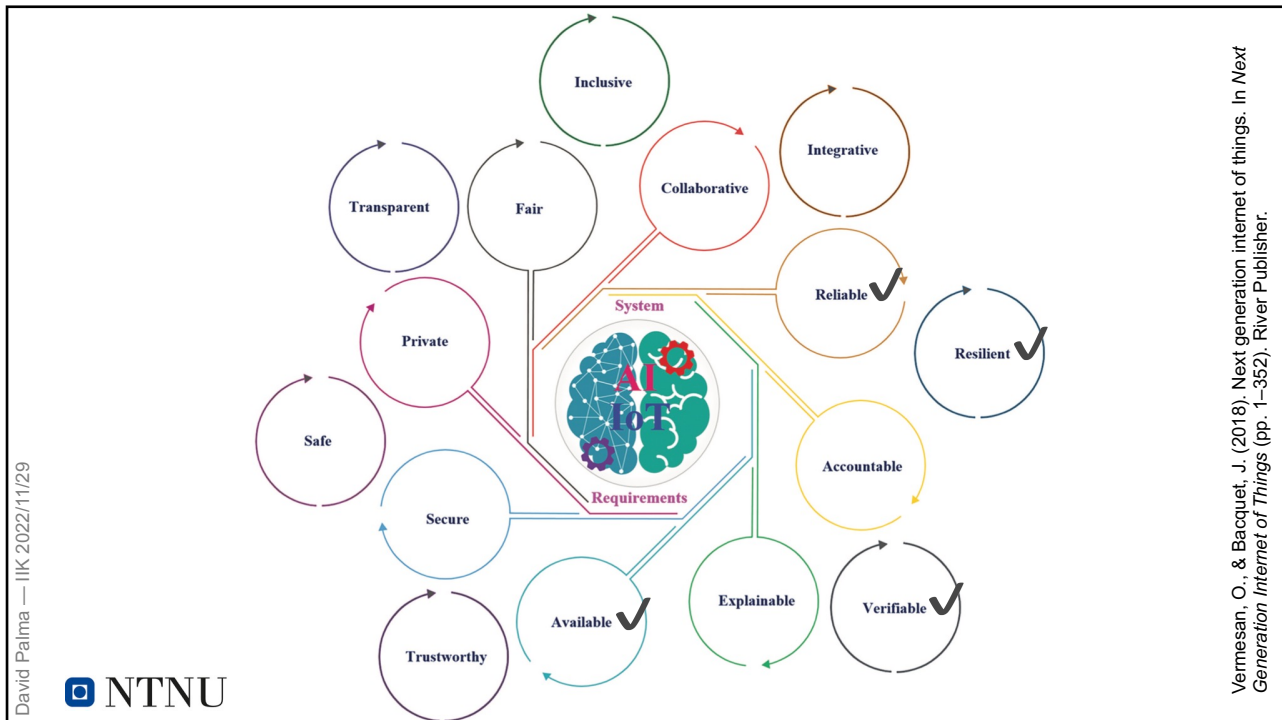
Tradeoffs in the Software Workflow

- 46x more frequent deployments
- 440x faster time from commit to deploy
- 170x faster MTTR
- 5x lower change failure rate

ACM Talk 26th October

Titus Winters, ACM Talk 26th of October 2022

4



5

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Table 1 Assumptions of social research paradigms. Based on Guba and Lincoln's "Basic beliefs (metaphysics) of alternative inquiry paradigms"^[7]. See Appendix for details.

Issue	Positivism	Postpositivism	Critical theory	Constructivism	Participatory
Ontology (assumptions about the nature of things)	<u>Naïve realism</u> . Reality is independent of and prior to human conception of it, and apprehensible.	Critical realism: Reality is independent of and prior to human conception of it, but only imperfectly and approximately apprehensible.	<u>Disenchantment theory</u> : there is a reality, shaped by social, political, cultural, economic, ethnic, and gender values and solidified over time, but it is secret/hidden.	Relativism: There are multiple realities and experiences of truth, constructed through social processes.	Participative: <u>multiple realities</u> , each co-experiences of truth, constructed through interactions between specific people and environments.
Epistemology (assumptions about how can know things)	Reality is knowable through reason and observation. It is possible to have findings that are singular, perspective-independent and neutral, atemporal, and therefore universally true.	Findings are provisionally true; multiple descriptions can be valid but are probably equivalent; findings can be affected/distorted by social and cultural factors.	The truth of findings is mediated by their value; how we come to know something, or who comes to know something, matters for how meaningful it is.	Relativistic: there is no neutral or objective perspective from which to adjudicate competing perspective or truth claims; <u>truth is relative</u> to a given perspective.	We come to know things, and create new understandings that can transform the world, by involving other people in the process of inquiry.

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M. Malik and M. M. Malik, "Critical Technical Awakenings," in *Journal of Social Computing*, vol. 2, no. 4, pp. 365–384, December 2021.

6

Issue	Positivism	Postpositivism	Critical theory	Constructivism	Participatory
Methodology (how we go about trying to know things)	<u>Experimental/manipulative</u> (hypothetico-deductive); hypotheses can be verified as true. Chiefly quantitative methods, and mathematical representation.	Modified experimental/manipulative; <u>falsification</u> of hypotheses; primacy of quantitative methods, but may include <u>qualitative and mixed methods</u> .	Dialogic (through conversation and debate) or dialectical (through a process of thesis, antithesis, and a synthesis which becomes a new thesis)	Dialectical, or hermeneutical (a process of reading sources "against themselves" to identify inconsistencies, underlying assumptions, or implicit messages, and thereby interpret meaning).	<u>Collaborative</u> , action-focused; flattening researcher/participant hierarchies; engaging in self- and collective reflection; jointly deciding to engage in individual or collective action.
Axiology (ethics; values; who matters, who is important, who has standing)	Knowledge achieved through hypothetico-deductive means is more valuable than other knowledge. The people who can carry out such investigation have <u>privileged access to the truth</u> , and thus have a special role and importance (and potentially a special responsibility).	Knowledge achieved through hypothetico-deductive is more valuable, but can be <u>distorted by social/cultural factors</u> , and this can sometimes only be uncovered by qualitative means and insight. Qualitative methods can provide checks and context, or raw material for quantification.	Marginalization is what is most important; experience of marginalization provides unique insights, and the knowledge of the marginalized is more valuable than the knowledge of dominant/legitimate paradigms.	Understanding the process of construction is what is valuable; value (including valuing understanding the process of construction) is relative to a given perspective.	Everyone is valuable. Reflexivity, <u>co-created knowledge</u> , and non-western ways of knowing are valuable and combat erasure and dehumanization.

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7

Human-centric IoT

Review of the theory, principles and design requirements of human-centric Internet of Things(IoT)

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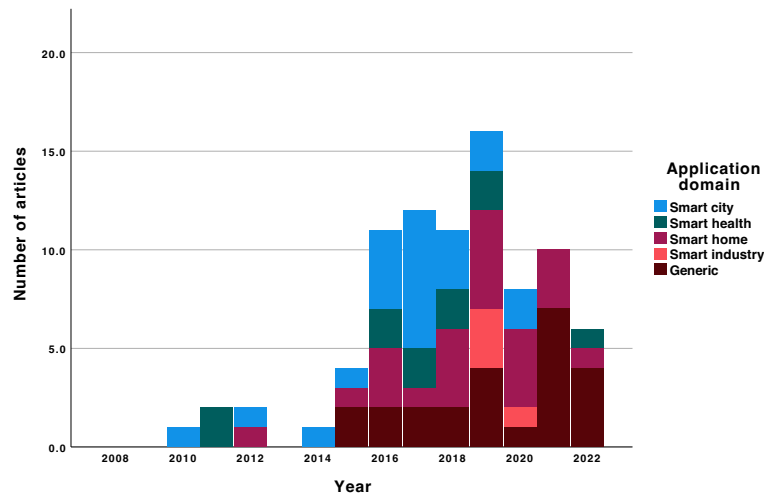


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8

8

Ystgaard et al, "Review of the theory, principles and design requirements of human-centric Internet of Things(IoT)", 2022



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Ystgaard et al, "Review of the theory, principles and design requirements of human-centric Internet of Things(IoT)", 2022

Characteristics	Category (percent)
Year	2016 – 2022 (88.1%), 2010 – 2015 (11.9%)
Geography	Europe (69.0 %), North-America (16.7 %), Asia and Middle East (11.9 %), Australia (2.4 %)
Publication type	Conference proceedings (60.7 %), Journals (39.3 %)
Discipline	Technology (81.0%), Social science (11.9 %), Humanities (7.1 %)
Expertise	Single (64.3 %), Multi-discipline (35.7 %)
Mindset	Expert (53.6 %), Participatory 47.3 %
Applic. Domain	Smart city (26.2 %), Smart home (27.4 %), Generic (28.6 %), Smart health (13.1 %), Smart industry (4.8 %)

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Mapping of policy goals to human-centric design outcomes

Policy goal	Intended outcome	Share
Guarantee security and privacy	<u>Security, Privacy, Control</u>	36 %
Personalized, mediated technology	Ease of use, Quality of life, Trust	20 %
Guarantee universal access	Transparency, Cooperation	15 %
Ethics and sustainability by design	Civic, Agency (situated meaning)	14 %
Respect fundamental rights	Empowerment, Agency (decision power)	14 %

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11

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Technical contribution	Major outcomes	Share	Adopted approaches
Design framework	Privacy, Security, Control, Empowerment, Trust, Cooperation	47%	User/human-in-the-loop Social IoT Participatory model Game theoretic model Privacy laws
Architecture	Privacy, Security, Control, Trust	27%	Privacy-by-design Blockchain and smart contracts Distributed architecture Human-object collaboration Digital twin
User interface	Privacy, Empowerment, Trust, Ease of use, Control	33%	Game theoretic model Personal assistant Incentives for user collaboration Emotion modelling Transparency
User monitoring	Privacy, Security, Civic, Trust, Easy of use	9%	User modelling Emotion estimation Perception layer

Major technical contributions of technical proposals of human-centred solutions
(note that some works have been associated to more than one contribution)

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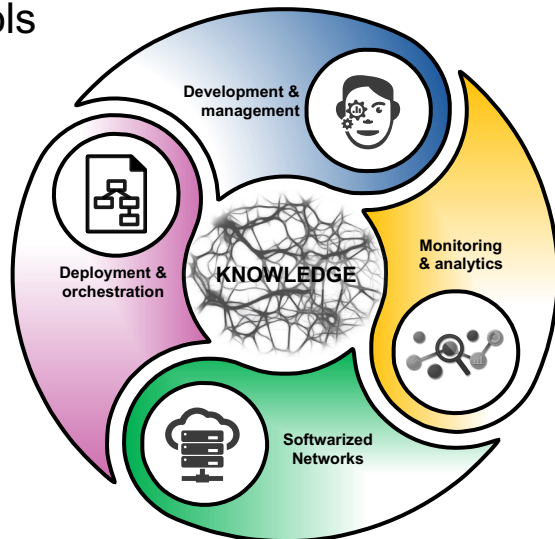
12

Knowledge co-creation

- Knowledge management tools

- Discrete logic
- Ontologies
- Semantics
- Inference
- ...
- Experts

↑
Explainable?



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Thank you

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