



KEYNOTE · AC 2026 · DSDI 2026 · ICWI 2026

From Trust to Insight

The Role of Intelligent HCI in Decentralized Healthcare

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ABOUT THE SPEAKER

Building trusted health ecosystems

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Full Professor at Unisinos, Brazil, and Director of SOFTWARELAB, a centre for software innovation.

Research at the intersection of distributed systems, artificial intelligence and digital health: intelligent, interoperable healthcare ecosystems built with blockchain and the Internet of Things.



10,000+

citations to date

2025

FAPERGS Researcher of the
Year in Computer Science

IEEE · ACM

Senior Member of both; CNPq
Research Fellow

SBC

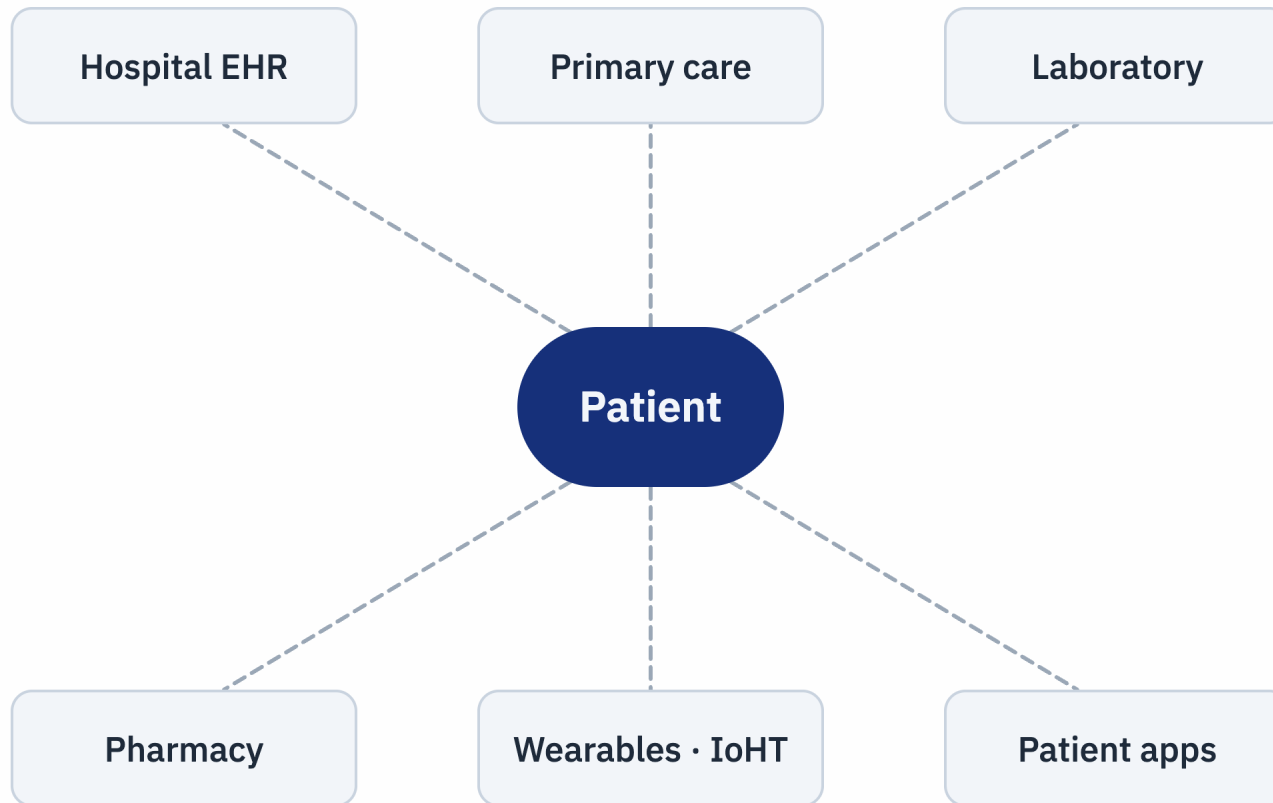
Coordinator, Special
Commission on Applied
Computing for Healthcare

THE PREMISE

Interoperability in healthcare is
not just a backend problem.
It is an HCI crisis.

THE PROBLEM

One patient, many disconnected records



The data exists. It rarely meets at the point of care.

Each system speaks its own model and vocabulary

The patient carries the context, often from memory

Continuous signals from home never reach the chart

THE PROBLEM

Where interoperability breaks down

Level	What it covers	Examples	Status
Technical	Moving data between systems	HL7 FHIR, REST APIs, IHE profiles	Largely solved
Semantic	Shared meaning of what moved	SNOMED CT, LOINC, ICD-11	Progressing
Human	Consent, comprehension, clinical workflow and trust	The interfaces patients and clinicians actually use	Largely unsolved

Two users, two failing interfaces

PATIENTS

Cannot see or steer their own data

- | Consent forms written for lawyers, not for people
- | All-or-nothing choices, signed once and forgotten
- | No view of who accessed their data, or why

CLINICIANS

Drown in data, starve for insight

- | More data streams, the same short consultation
- | Fragmented screens and alert fatigue
- | Nearly two hours of EHR and desk work for every hour with patients¹

¹ Sinsky et al., Annals of Internal Medicine, 2016

Blockchain as verifiable trust



Provenance and integrity

Every record carries a verifiable origin and a tamper-evident hash.



Patient-controlled consent

Permissions live in smart contracts the patient grants and revokes.



Transparent access

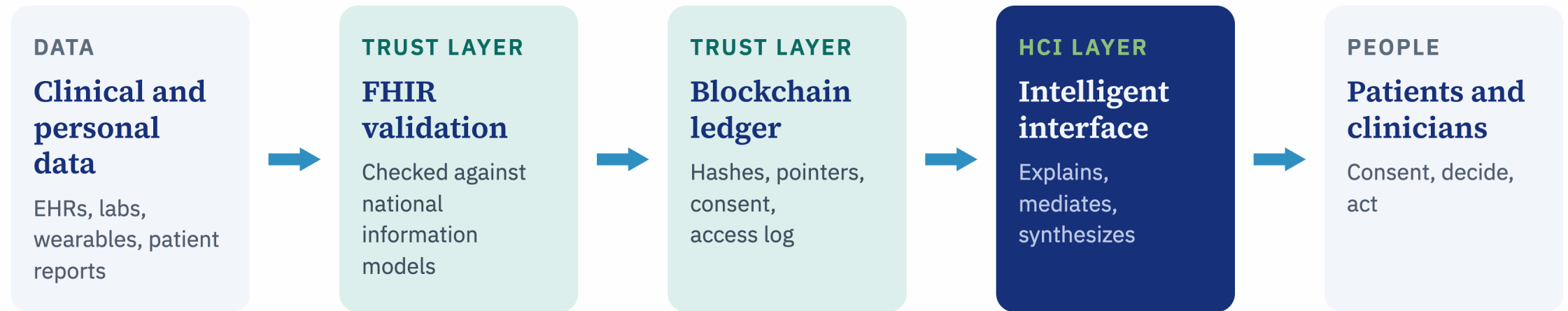
An immutable log of who accessed what, when, and for what purpose.



No single custodian

Trust shared across institutions instead of owned by any one of them.

A trust layer, not a data lake



Off-chain Clinical data stays in FHIR stores, under institutional and patient control

On-chain Only hashes, pointers, consent contracts and access events

InteropChain: consent and FHIR on-chain

A platform for on-chain validation of HL7 FHIR data, built on the information models of Brazil's National Health Data Network (RNDS).

What it unlocks

A longitudinal health history, evidence on the impact of interventions, and a basis for value-based care in SUS.

PILOTS

IoHT biosignals from older adults with diabetes and from people with sleep disorders

PATIENT ACCESS

Through the citizen's electronic health record, so patients see and steer their data

NETWORK

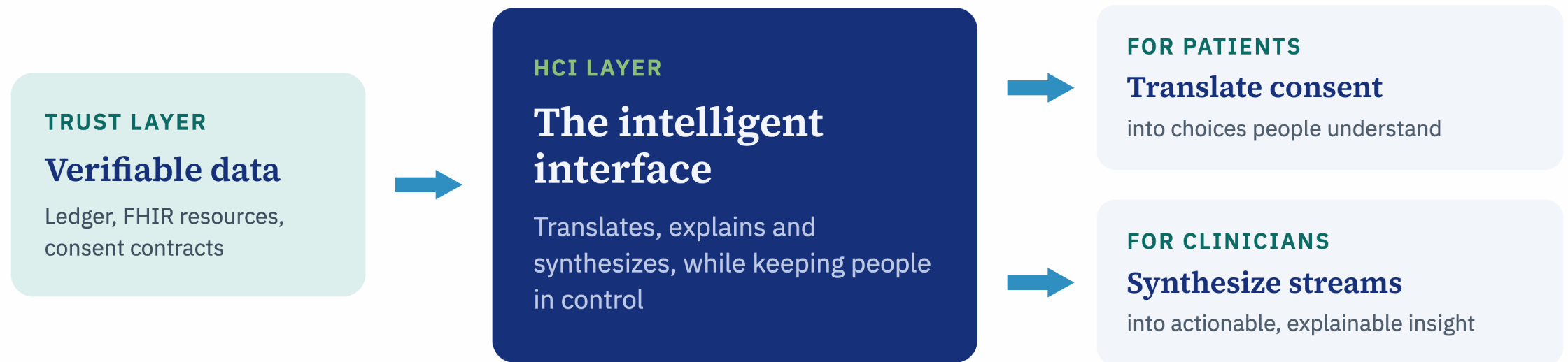
Unisinos, IFSul, SENAI CIMATEC, HCPA, Santa Casa, GHC and EBMSP

THE TURN

A ledger can prove that data is trustworthy.

Only the interface can make people trust it.

The interface as a mediator



🔗 Decisions flow back: every consent choice and every access is written to the ledger.

For patients: consent as a conversation

- | **Granular.** What, with whom, for how long, and why.
- | **Layered.** A one-line summary first; detail on demand.
- | **Dynamic.** Revocable at any time, with immediate effect on the ledger.
- | **Explained.** An AI assistant answers “what does this mean for me?”
- | **Accountable.** A readable receipt for every access to my data.

ACCESS REQUEST 

Dr. Chen, cardiologist

wants your heart rate and sleep data, last 30 days

Why: follow-up after your hospital discharge

Allow for 30 days

Summary only **Decline**

Recorded on the ledger · revoke anytime

For clinicians: from streams to insight

DATA STREAMS

 EHR history

 Laboratory results

 Wearables: heart rate, HRV, sleep, activity

 Patient-reported outcomes



AI INSIGHT

Confidence: moderate

Resting heart rate 9 bpm above her personal baseline for 6 days, with more fragmented sleep.

Patient, 67 · type 2 diabetes · discharged 12 days ago

 Wearable data, verified

 EHR and labs, verified

Suggested: review medication adherence and offer a teleconsultation this week.

[Schedule teleconsult](#)

[Why this insight?](#)

Insight from continuous signals

ONGOING PROJECT

Continuous, intelligent follow-up after ICU discharge

IoT, wearables and apps combined with clinical data in a deep neural network.

Explainability shows each marker's influence, identifying predictors of readmission and clinical evolution.

Partners: GHC, HCPA, UFCSPA, FAU Erlangen-Nürnberg

ONGOING PROJECT

Wearable physiological sentinel for oncologic risk

Resting heart rate, HRV, peripheral temperature, sleep and activity; deep learning at the edge detects persistent deviations from a personal baseline.

It does not diagnose cancer. It prioritizes who should be referred, when, and in what order.

Partners: UFCSPA, HCPA, LMU Munich

Six principles for the mediating interface

TRUST

Make trust legible

Show provenance and verification where decisions are made, not buried in a log.

TRUST

Consent as conversation

Granular, layered, revocable, and explained in plain language.

INSIGHT

Baseline-relative insight

Compare each person with themselves, not only with population norms.

INSIGHT

Explain, then recommend

Every insight links to its sources and to its reasoning.

INSIGHT

Calibrate reliance

Show uncertainty, so clinicians neither over- nor under-trust the AI.

TRUST + INSIGHT

Keep humans in the loop

The system prioritizes and suggests; people decide.

Open questions for our community

- 01 How do we measure whether patients understood a consent, not only that they clicked?
 - 02 How should provenance appear in clinical interfaces without adding cognitive load?
 - 03 When does AI synthesis lead to automation bias, and how can the interface counter it?
 - 04 How do we design trust and consent for older adults and people with low digital literacy?
 - 05 Who is accountable when an AI-generated insight is wrong, and how does the interface show it?
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THE CORE CHALLENGE FOR INTELLIGENT HCI

Designing the interaction that
makes data both *trusted* and
intelligent.

Trust → Interaction → Insight

FURTHER READING

Selected publications from our group

Publication	Citations
Roehrs, da Costa & da Rosa Righi. OmniPHR: a distributed architecture model to integrate personal health records. Journal of Biomedical Informatics, 71, 2017.	593
da Costa et al. Internet of Health Things: toward intelligent vital signs monitoring in hospital wards. Artificial Intelligence in Medicine, 89, 2018.	358
Antunes et al. Federated learning for healthcare: systematic review and architecture proposal. ACM Transactions on Intelligent Systems and Technology, 13(4), 2022.	920
Falcetta et al. Automatic documentation of professional health interactions: a systematic review. Artificial Intelligence in Medicine, 137, 2023.	134

Thank you

Obrigado · Questions and discussion

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