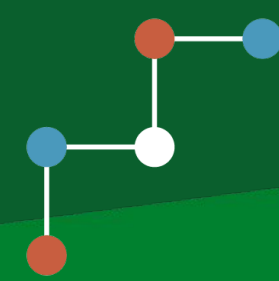


Event Knowledge Graphs with Ambiguity

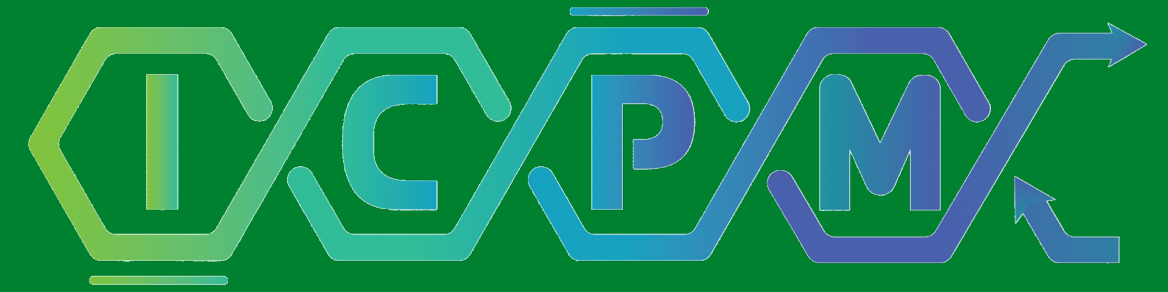
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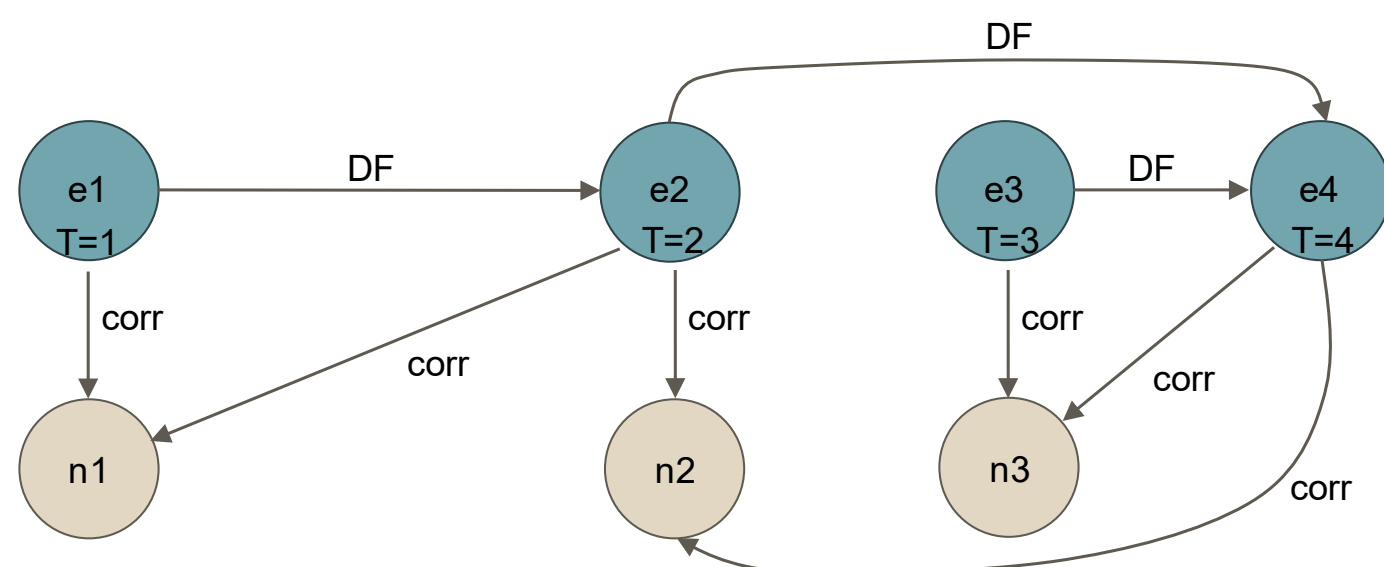


Motivation: BPM-IoT Integration for Process Monitoring

The BPM-IoT integration is an enabler of process mining tasks for processes executed in the physical world without PAIS support. However, the real-time IoT-driven generation of digital traces poses two challenges, compromising effective process monitoring:

- C1.** Digital traces may contain ambiguous events, leading to unclear event-instance and event-entity correlations;
- C2.** Participation roles of entities in events may not be immediately clear when events are observed.

Background: Event Knowledge Graphs



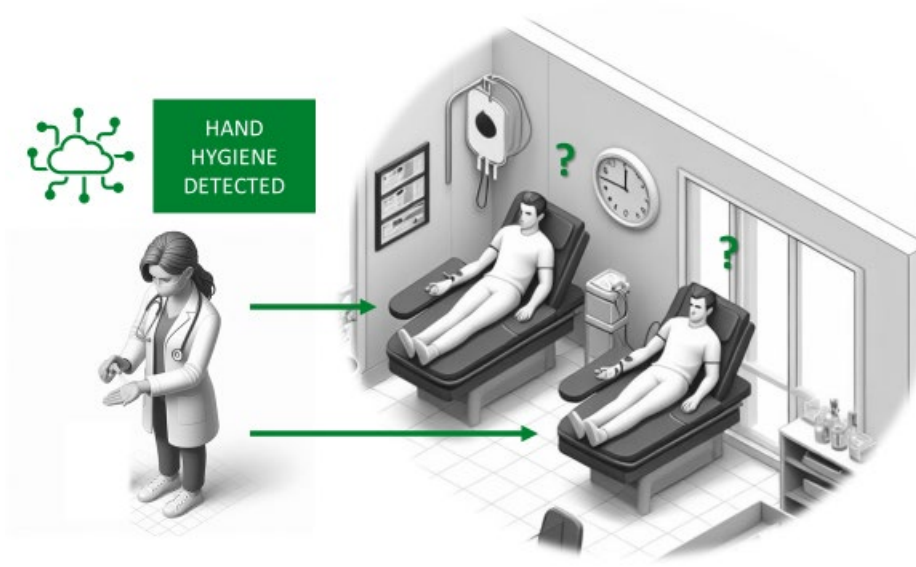
See Fahland, D.:
“Process mining over
multiple behavioral
dimensions with event
knowledge graphs”,
Process Mining
Handbook, 2022.

Nodes: events and entities; arcs: event-entity / DF relations.
Suitable for representing and analyzing process executions, however they do not model the likelihood of correlations nor specific correlations, leaving C1 and C2 open.

Motivating Scenario: Blood Donation Process

When observing events in presence of multiple donors:

- unclear *hand hygiene event-donor entity* correlations;
- unclear participation roles of *donor entities* in events.

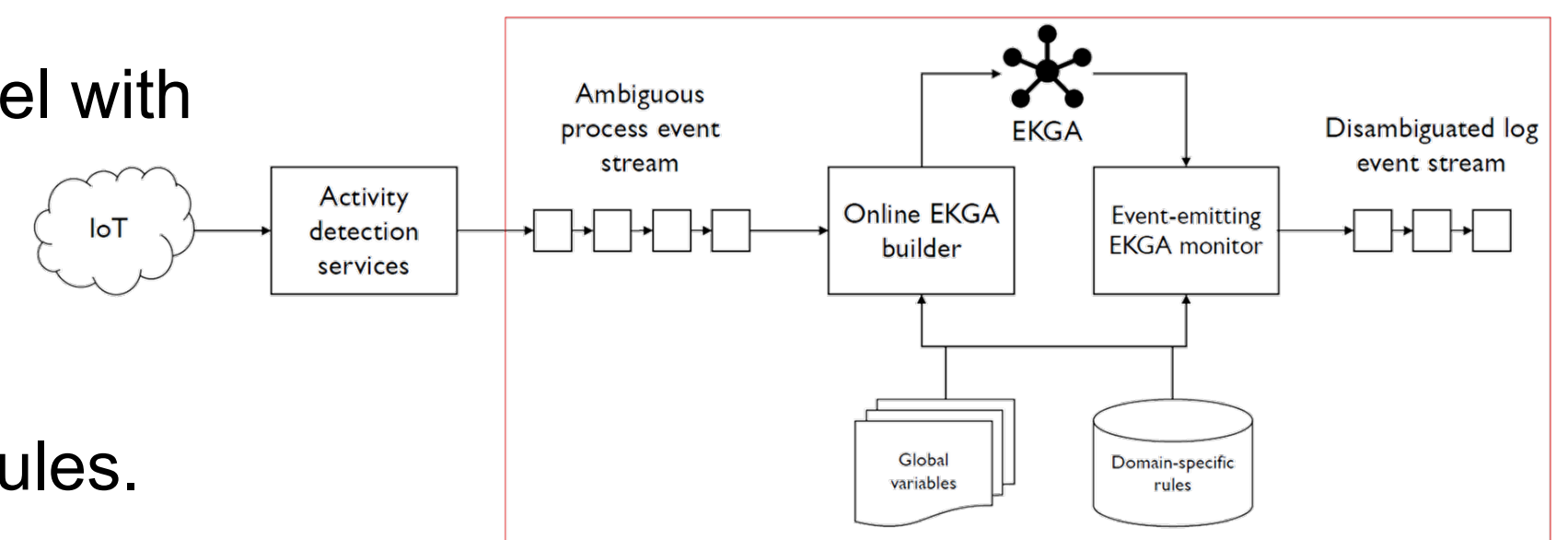


Tackling the Challenges with Event Knowledge Graphs with Ambiguity (EKGA)

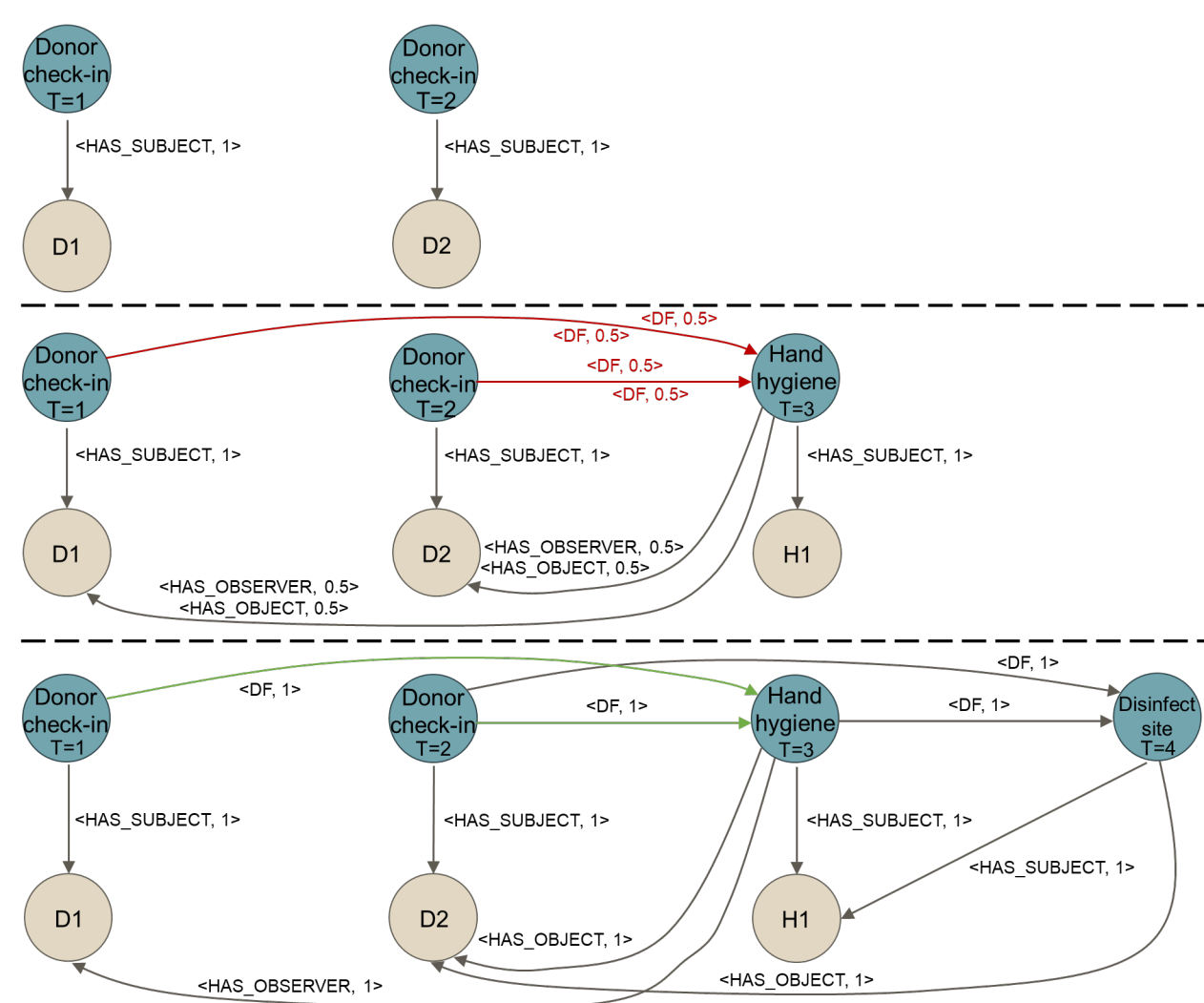
We propose Event Knowledge Graphs with Ambiguity, extending the EKG model with

- stochastic event-entity correlations and directly-follows relations,
- specialized event-entity correlations

and propose their incremental construction and update using domain-specific rules.



Incremental Construction and Update of EKGA



We assume a stream of process events as input, and the existence of event-specific rules.
For each new event in the input stream:

- add one new event node for the new event and new entity nodes for entities not yet in the EKGA,
- apply event-specific rules to establish new / update existing event-entity correlations,
- infer new / update existing directly-follows relations.

The approach is implemented as a Python prototype, with Neo4J implementing the EKGA. Experiments based on the blood donation process suggest the applicability of the incremental approach to online settings.

Let's stay in
touch!

