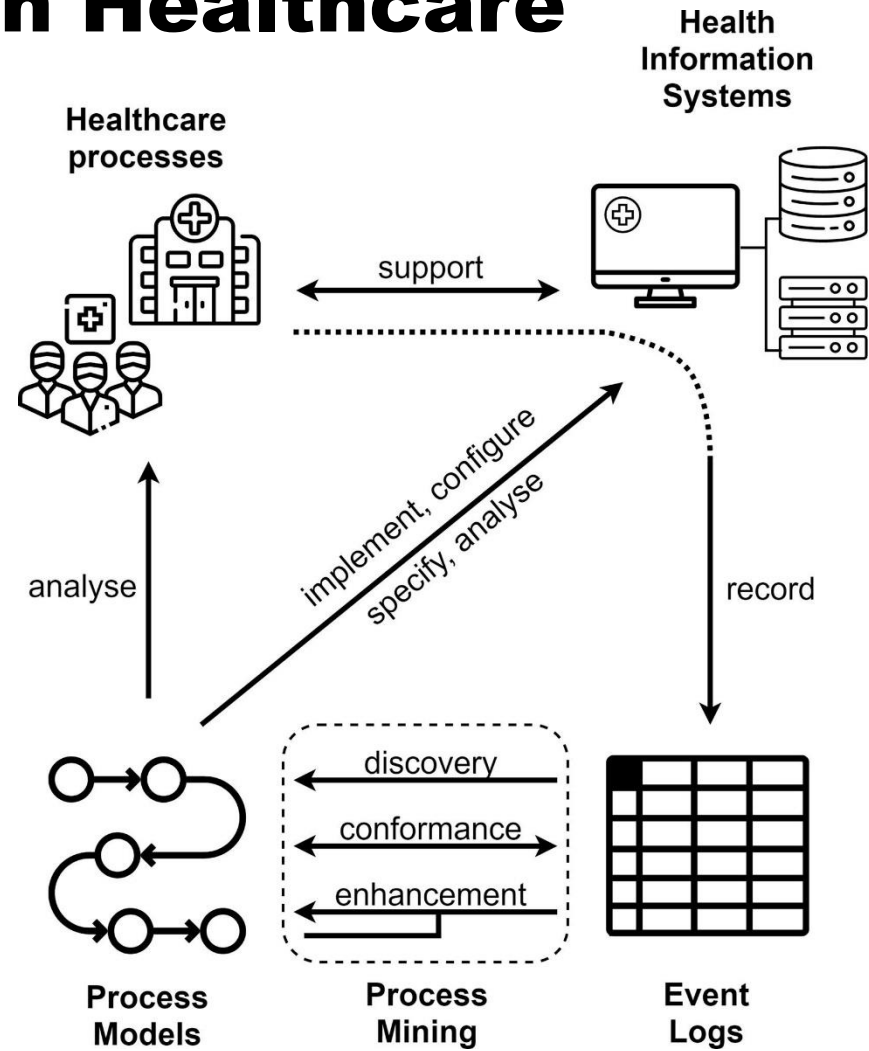


# **PROCESS MINING IN STANDARDS-BASED HEALTHCARE INFORMATION SYSTEMS**

# Process Mining in Healthcare



Jorge Munoz-Gama, Niels Martin, Carlos Fernandez-Llatas, Owen A. Johnson, Marcos Sepúlveda, Emmanuel Helm, et al.  
**Process mining for healthcare: Characteristics and challenges**, Journal of Biomedical Informatics, Volume 127, 2022, 103994, ISSN 1532-0464, <https://doi.org/10.1016/j.jbi.2022.103994>.

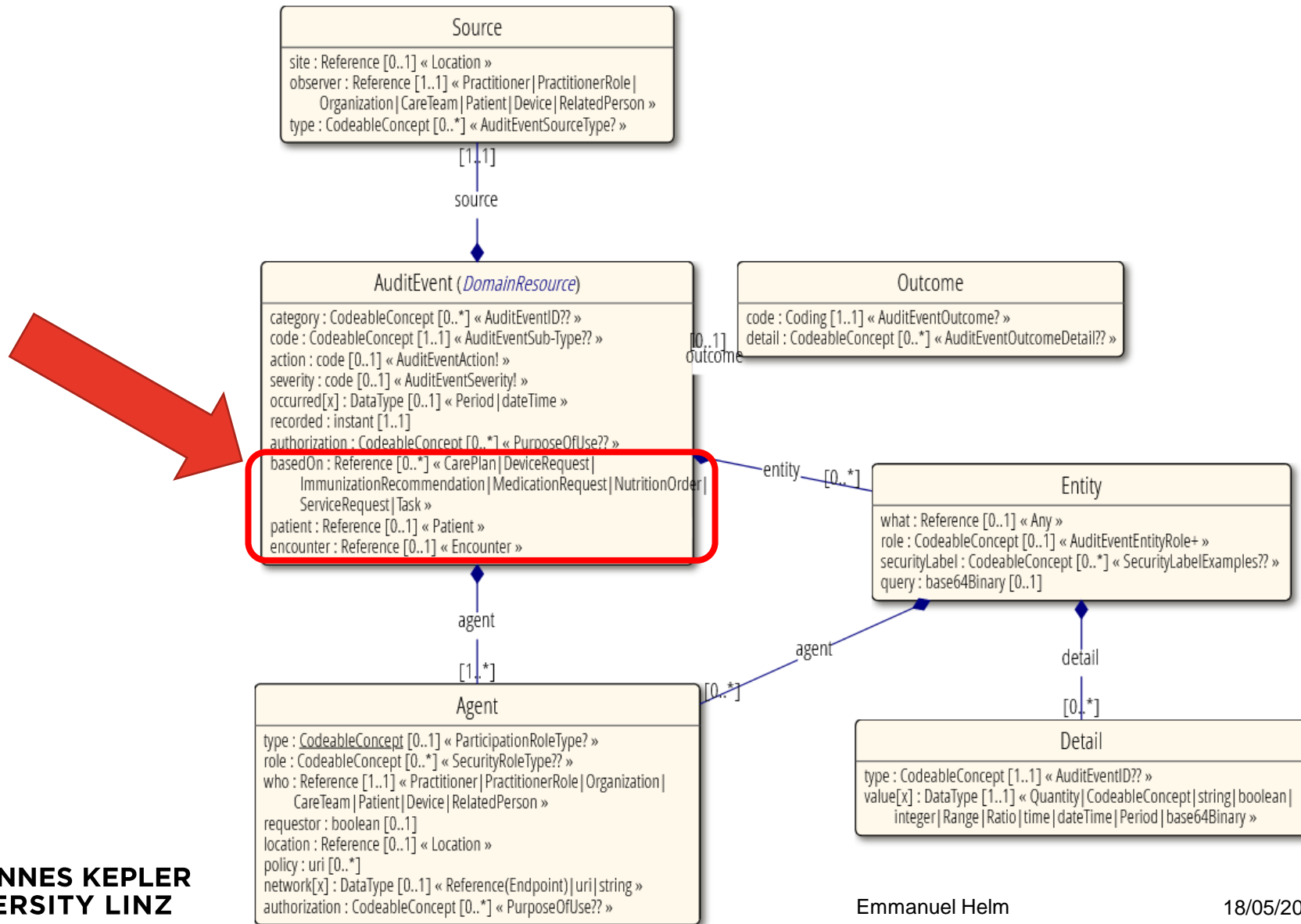
# Research Questions

- How can healthcare IT standards be used to overcome the challenges of process mining in healthcare?
- How can we reuse the data captured in the audit trails of healthcare IT systems to discover healthcare processes?
- How can we enable conformance checking in long-running healthcare processes?

# Answering the Research Questions

- How can healthcare IT standards be used to overcome the challenges of process mining in healthcare?
  - Syntactic – Semantic – Process interoperability
- How can we reuse the data captured in the audit trails of healthcare IT systems to discover healthcare processes?
  - Standards-based audit information and query and retrieve mechanisms
  - IHE ATNA, IHE SOLE, HL7 FHIR AuditEvent
- How can we enable conformance checking in long-running healthcare processes?
  - Solve the “snapshot problem” and make the target measurable
  - e.g., via log construction

# Impact on the HL7 FHIR Standard



# Contributions

- Overview of relevant healthcare data standards [1, 2]
- Overview of the current state of process mining in healthcare [3, 4]
- Transformation of standardized audit data to mineable event logs [5, 6, 7]
- A novel method to query event logs from healthcare information systems [8]
- Method and case study for conformance checking in long-running processes [9, 10]

[1] E. Helm (2020) "Towards process mining in radiology: Utilization of the sole"

[2] B. Traxler, E. Helm, et al. (2018) "Towards semantic interoperability in health data management facilitating process mining"

[3] E. Helm, et al. (2019) "Adopting Standard Clinical Descriptors for Process Mining Case Studies in Healthcare"

[4] E. Helm, et al. (2019) "Towards the use of standardized terms in clinical case studies for process mining in healthcare"

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[7] E.G.L. de Murillas, E. Helm, et al. (2017) "Audit trails in openslex: Paving the road for process mining in healthcare"

[8] E. Helm, et al. (2020) "Process mining on fhir - an open standards-based process analytics suite for healthcare"

[9] C. Rinner, E. Helm, et al. (2018) "An application of process mining in the context of melanoma surveillance using time boxing"

[10] C. Rinner, E. Helm, et al. (2018) "Process Mining and Conformance Checking of Long Running Processes in the Context of Melanoma Surveillance"