

Personalized Health Day, 24.08.2022

IICU

# Personalized, data-driven prediction and assessment of Infection related outcomes in Swiss ICUs




**Karsten Borgwardt (ETH)**  
Scientific Coordinator PHRT



**Adrian Egli (UZH)**  
Scientific Coordinator SPHN

# Goals of IICU

**National Data Stream for ICU patient data with harmonized clinical annotation for infections and outcomes, as well as for infection-related context and interpretation**

- 
1. Maintain **Personalized Swiss Sepsis Study platform** (2018-2022) and expand to **other infections**
  2. Focus on **data quality**
  3. Establish **sustainable network**
  4. Develop **procedures for rapid and precise assessment of patients**
  5. Provide **FAIR public data repository** including **machine learning toolbox**

# Governance – IICU Members

## Coordinators

- Prof. Karsten Borgwardt (ETH)
- Prof. Adrian Egli (UZH)

## IICU Data Manager

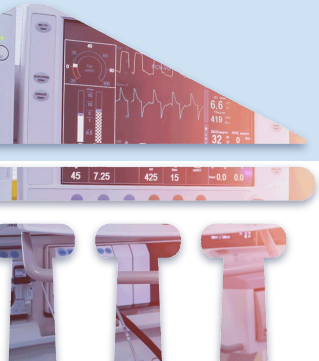
- Dr. Juliane Klatt (ETH)

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- Prof. Manuel Battegay (USB)
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## Patient representative

- Ms. Jamila Hedjal (France Sepsis Association)



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# Governance – IICU Management

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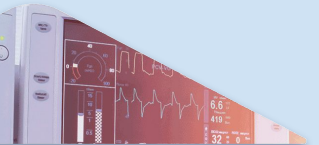
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# Governance – IICU Board

Authorized by  
Consortium Agreement

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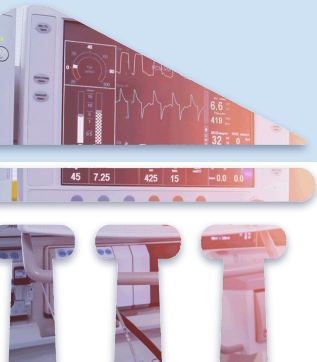
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# Governance – Continuity from PSSS

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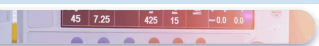
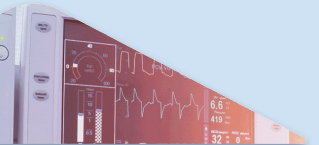
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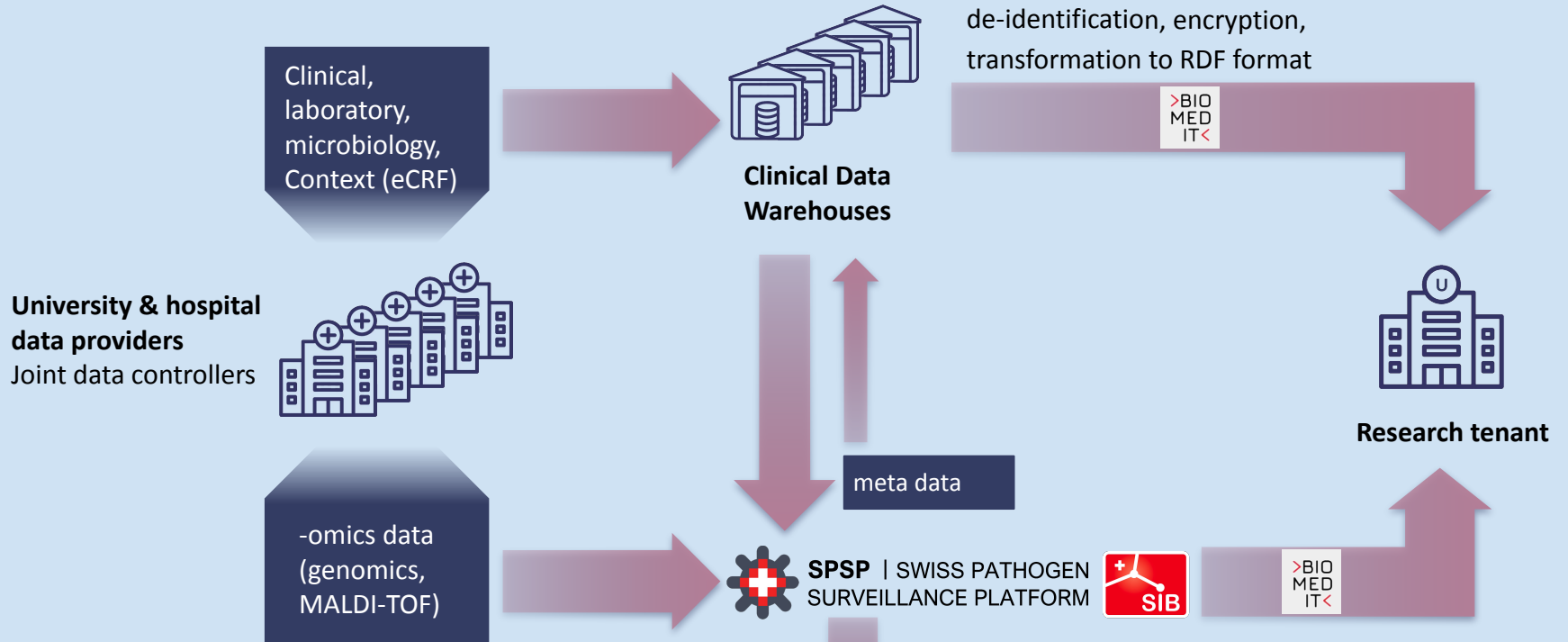
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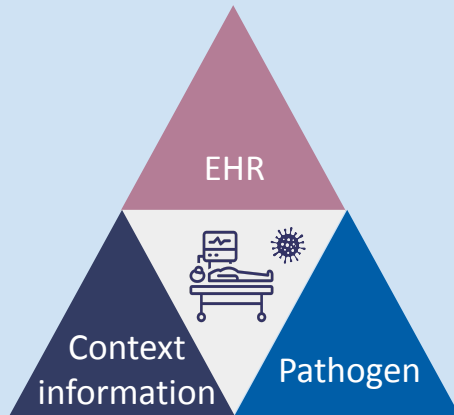
# Data flow and data management



# IICU – Lighthouse Project



**Research question:** Can we combine multimodal patient data (host, pathogen, and treatment information and their temporal dynamics) to enable prediction and interpretation of infection-related outcomes at an unprecedented level of detail?



Techniques for (semi-)automated treatment annotation based on machine learning and natural language processing

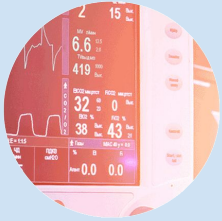


Approaches for patient representation learning



Algorithms for biomarker discovery and clinical outcome prediction based on multimodal patient data

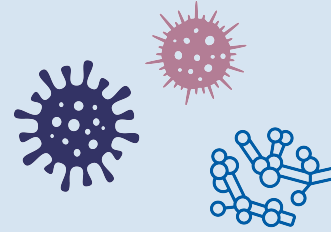
# IICU – Nested Projects



## Endotype discovery



## Analysis of infection with viruses and fungi



## Virulence and resistance of bacteria: Linking genotypes to clinical phenotypes



## Treatment optimization



Breakout session

# IICU – Personalized, data-driven prediction and assessment of Infection related outcomes in Swiss ICUs



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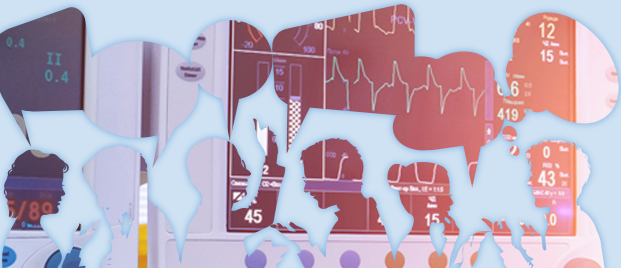


**Juliane Klatt (ETH)**  
Data Manager

# Discussion: What should be the ultimate role of AI in the ICU?

## Current state of the art of machine learning in the ICU

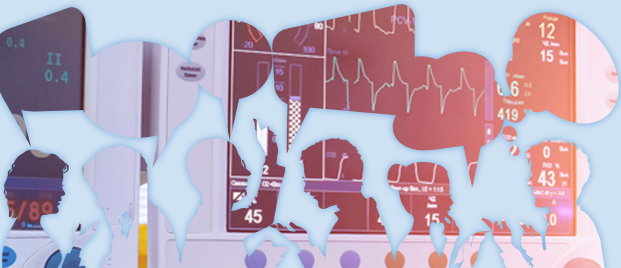
- Wealth of retrospective studies that predict clinical outcomes, yet often without external or even clinical validation
- Electronic health record is observational:
  - little to no clinical context for decisions
  - little to no molecular information on pathogens



# Discussion: What should be the ultimate role of AI in the ICU?

## What will be the contribution of the IICU NDS?

- IICU will bring together experts from AI and a clinical background
- IICU will create an ICU database with patient health information, clinical context annotation, and detailed pathogen information
- IICU will develop AI methods to support context annotation, define patient subgroups, predict treatment outcome



# Discussion: What should be the ultimate role of AI in the ICU?

## Remaining open questions after the IICU project

- How to make this research environment and data collection sustainable and efficient?
- How to show clinical benefit of these AI methods, both for the patient and for the hospital?

