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Project: „From Models and Humans: Integration, Standardization and Individualization in Systems Medicine“

Concepts and Meanings of Integration in Systems Medicine

Introduction:

The first part of our project explores understandings and practices of integration in systems medicine. The application of high-throughput technologies in systems biology and medicine has led to a plethora of data. They need to be integrated in order to construe a meaningful representation of complex processes in biology and medicine. The pursuit of the goal of integration has created multiple challenges: Data are not only different in type, but have also been created by different methods, are stored in distinct databases and at different geographical sites. The questions we pursue is: What kind of challenges are relevant for the research processes; how can they be categorized and interrelated to understand the concepts and meanings of integration in systems medicine better?

Main goals of the first part of the project:

(1) Review of systems medicine literature related to integration; (2) Expert interviews (*empirical approach*). How do researchers in systems medicine conceptualize integration in different research settings and research processes?

Main Findings of Literature Review:

Integration of large amounts of heterogenous data involves **multiple challenges**:

- **technological** (e.g., data storage and retrieval, standardization of methods, etc.)
- **epistemic** (e.g., data comparability due to different contexts of data collection and to different terminology and classification systems used by different databases)
- **methodological** (e.g., data heterogeneity due to different levels of biological complexity and specialized technologies)
- **ethical/social** (e.g., data protection, audited data access, translation into clinical practice)

Literature review also revealed that – in analyzing complex phenomena – the **following approaches dominated in the past**:

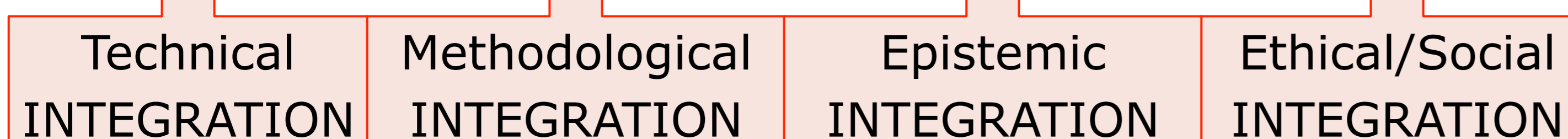
- **'Zooming-in'** on ever smaller subsystems (organs, biochemical pathways, molecules) or research questions
- **'Technological determinism'** with data/evidence being tightly linked to highly selective and specialized technologies/methods
- **'Epistemic contextualization'** of approaches, rendering results and conclusions meaningful to only one or few level(s) of complexity

Conclusion: Better theories/models of dynamic systems are required that guide the integration of evidence and results in order to better explain and control complex and dynamic phenomena

Epistemic context:

Every scientific specialty (genetics, physiology, brain sciences, etc.) constitutes an epistemic context consisting of specific premises, concepts, theories and methodologies.

INTEGRATION PROCESSES



Special Offer for eMed-participants! Extended Deadline!

„Integration and Translation in Systems Medicine“ from February 1-5, 2016 in Hamburg!
 Young academics from systems medicine/biology, philosophy, social studies and comparable fields are kindly invited to submit an abstract about their work until **November 12, 2015**. Contributions may focus on ✓integration, ✓standardization and data management, ✓translation, ✓systems medicine in clinical practice, ✓individualized medicine. The program will be a mix of presentations from participants, workshops given by international experts and interactive sessions. Confirmed speakers: Ulrich Krohs (Mainz), Ingo Brigandt (Edmonton), Gabriele Gramelsberger (Berlin), Sara M.E. Green (Copenhagen), Nadine Umbach (Göttingen), Angelika Eggert (Berlin), Jeanette Erdmann (Lübeck).
 For more information visit our website: www.uni-hamburg.de/fachbereiche-einrichtungen/fg_ta_med/projekte/winterschool.html

Discussion:

In systems medicine, a great deal of attention has been put on data integration to overcome technological and epistemic challenges. However, this **data-centered concept of integration** differs insofar from **philosophical concepts** as the philosophical debate rather emphasizes theoretical aspects and contexts of integration. These **differences in concepts and meanings of integration** in systems biology or medicine on the one hand, and philosophy of biology/medicine on the other will be explored further in order to clarify and further develop concepts, practices and implications of integration in systems medicine.