Regenstrief Institute 50 Years of Research and Innovation

50 Regenstrief



Regenstrief Institute: Historical Overview



Dishwashers, Efficiency, Clinical Outcomes and AI!



Innovations to Implementation



So Regenstrief years nstitute www.regenstrief.org

Image loosely adapted from Stanford Biodesign

commercial means

OUTSTANDING FACULTY **AND STAFF**

FACULTY INVESTIGATORS



INVESTIGATORS WITH A TENURE OF 20 YEARS OR MORE AT REGENSTRIEF

TOTAL YEARS OF COMBINED FACULTY EXPERIENCE AT REGENSTRIEF









BUSINESS DEVELOPM



\$500,000 IN INNOVATIONS LICENSED

EVENTS WITH EXTERNAL PARTNERS





Regenstrief Institute

Keynote:

Artificial Intelligence for COVID-19 Outbreak Screening

Dr. Marco Antonio Gutierrez serves as the head of the Informatics Division, Heart Institute, University of Sao Paulo Medical School, Brazil. Dr. Gutierrez's research focuses on the application of machine learning to segment and classify biomedical signals and medical images. Dr. Gutierrez was elected by the Brazilian Computer Society as a Senior Researcher in Computing Applied to Health. He holds bachelor's and PhD degrees in electrical engineering and computer science from the University of Sao Paulo and completed postdoctoral training at the University of Southern California. Dr. Gutierrez will be joining the panel discussion following his address.



Regenstrief Institute

Artificial Intelligence: Applying Research and Engineering Solutions for Emergent Needs in Healthcare

Panel: The Building Blocks in Al

Umberto Tachinardi

CIO - Regenstrief Institute

Director of Informatics – Indiana CTSI



Umberto Tachinardi

Panel: The Building Blocks in Al



Allen Flynn

Mohammad (Adib) Adibuzzaman

Marco Antonio Gutierrez



With more than 30 years of experience in biomedical informatics, **Dr. Umberto Tachinardi,** CIO of the Regenstrief Institute, has a history of successfully developing and implementing health informatics technologies in organizations of all sizes. At IU and Regenstrief, his focus is to lead the informatics components of complex and large projects (Precision Health Initiative and the Indiana Center for Translational Sciences Institute – CTSI). Dr. Tachinardi was responsible for building and operating UW Health's translational research resources such as data warehouses and new functions in the electronic health record systems.





Dr. Mohammad (Adib) Adibuzzaman is a research scientist at the Regenstrief Center for Healthcare Engineering at Purdue University. His primary research interest is in health data analysis using artificial intelligence techniques, more specifically, causal inference methods. His secondary research focus is in high performance computing infrastructure for very large data sets in health sciences. Dr. Adib has a PhD and a Master's degree in Computational Sciences from Marquette University. Before going to Marquette, he worked as a Junior Research Assistant at the National University of Singapore and as a Software Engineer in Bangladesh. He also worked as an Oak Ridge Institute of Science and Engineering (ORISE) Fellow at the U.S. Food and Drug Administration in 2013 and 2014.





Dr. Allen Flynn worked as a network analyst for several years, followed by work in pharmacy practice as a hospital staff pharmacist. At Trinity Health, Allen was promoted to Informatics Coordinator. For the next eight years, he held informatics leadership roles while developing his expertise in EHRs and medication system safety. This real-world experience inspired him to focus his career on improving the knowledge-delivery capabilities of health IT. Today, Allen is an Assistant Professor who leads the Knowledge Grid research effort for the University of Michigan Medical School's Department of Learning Health Sciences. His team aims to make computable biomedical knowledge more findable, accessible, interoperable, and reusable (FAIR).





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Topics Covered in this Panel

- The Building Blocks in Al
 - Data
 - IT infrastructure
 - Implementation





The Building Blocks in Al: Data

- Data integration Retrospective/Prospective
 - Harmonization (Common Data Models, Mappings)
 - Linking patient level data
- Data quality
 - Accuracy
 - Completeness
 - Duplication
- Data governance
 - Data access
 - Ownership/Guardianship
- Ontologies
- Metadata, data models
- Real vs Synthetic data



The Building Blocks in AI: IT infrastructure

- Infrastructure
 - Storage + Computing + Network
 - On premise vs cloud
 - Data organization Hadoop/Data Lake/Data Warehouse
- Compliance/Privacy
 - HIPAA
 - De-identified vs identified
 - Encryption
- Al in action
 - Interoperability, standards (e.g. FHIR)
 - MCBK
 - EHR APIs
 - Web services
 - Jupyter Notebooks



The Building Blocks in AI: Implementation

- Development of AI resources
 - Testing, Validation, Generalization
 - Certification
- Al resources as a product
 - Algorithm lifecycle
 - Governance/regulation
 - Commercialization (e.g. Liabilities, IP)
- AI and EHR systems
- Disparities, biases, fairness
- Localization (e.g. re-calibration)
- Safety
 - Active/Passive Monitoring
 - Dual/triple logic, manual override
- Education, training and certification



Data Infrastructure at Regenstrief



Data Infrastructure Future State:



Data Capabilities Future State: S Industry Ŋ Clinical MDCL**O Regenstrief Institute** LIFEOMIC Deidentification Data Integratio phenotyping ynthetic Dat Machi **Ш** неалтн NLP < ESKENAZI Govt/Public Health Academia MODELS RECRUIT -MENT FEASIBILITY COHORTS Ψ DECISION SELF-TOOLS LGORITHMS PREDICTORS SERVICE PATIENT TOOLS LISTS 50 Regenstrief



Grand Challenge Precision Health Initiative

Impacts



Drive Innovation

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Accelerate Clinical Translational Research

Enable Learning Health Systems/ Real World Evidence (RWE)

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Informatics-Driven Research

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New Opportunities for Partnerships

New Framework/Resource for Advanced Data Science



Leverage Artificial Intelligence (AI) and Machine Learning (ML) in Healthcare

