Medical Data Processing

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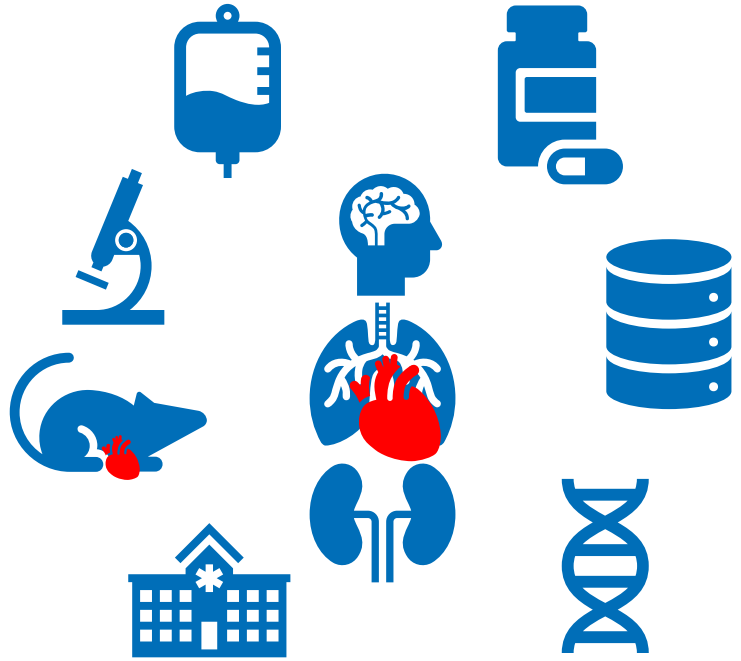
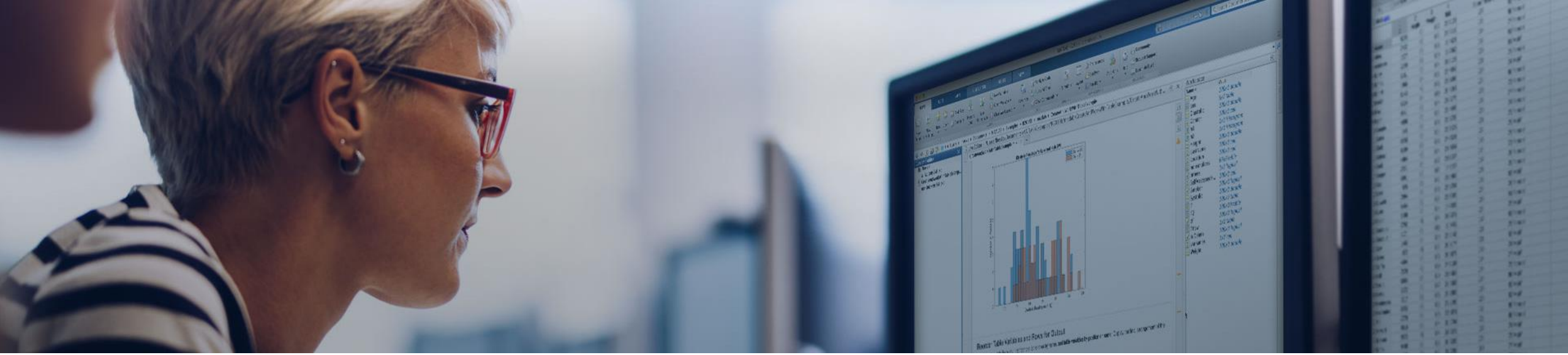
11 March 2025





- Millions of engineers and scientists worldwide use MATLAB and Simulink.

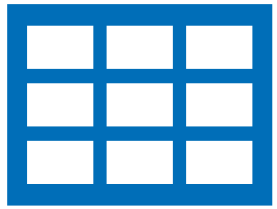
4 million+
users in 185 countries

100,000+
businesses, governments, and universities

All the top 10 pharmaceutical and medical device companies

MATLAB Has Strong Cross-Compatibility

MATLAB Natively Supports Read, Write, Analyze, and AI Applications for:

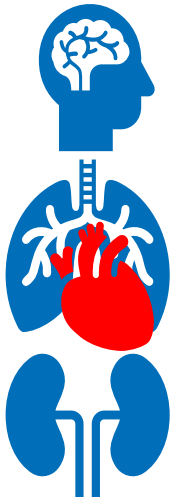


Tabular Data

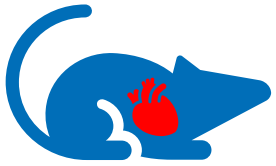
Signal

Text

Genetic Data



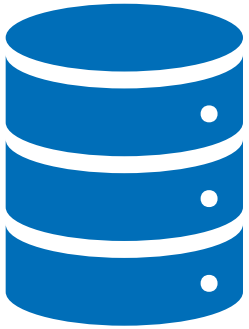
Clinical



Preclinical

Microscopy

Image Data

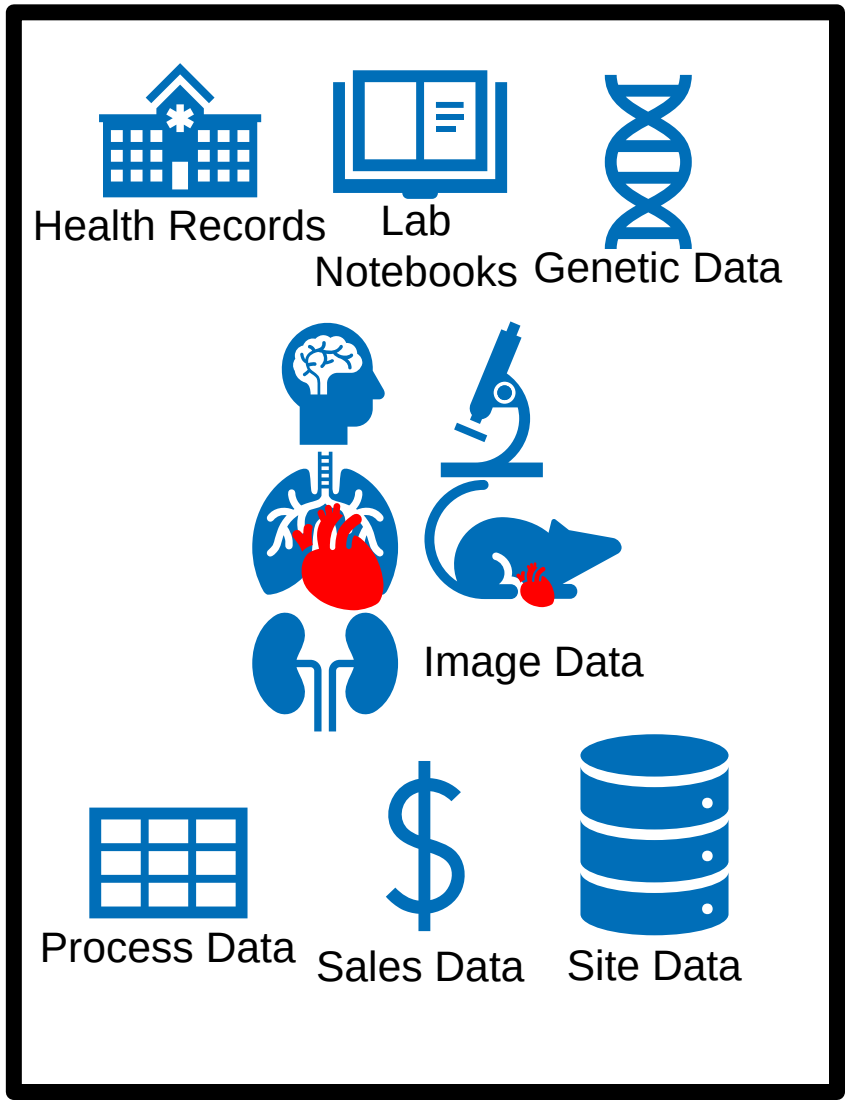


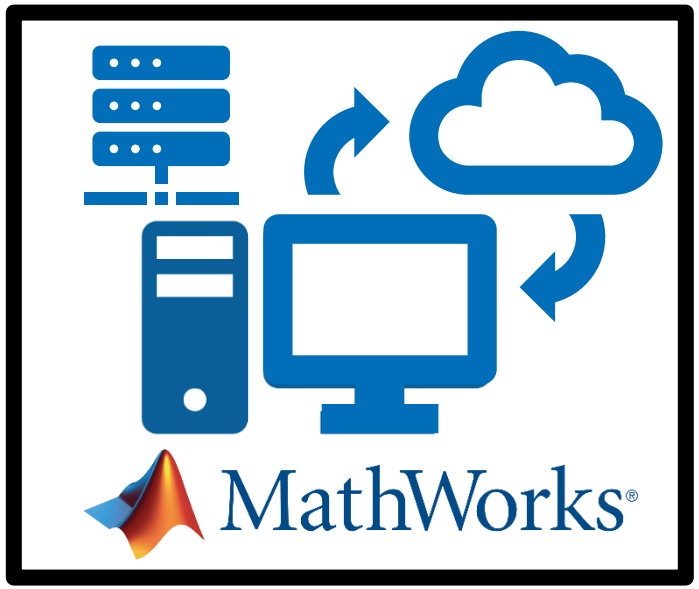
Database

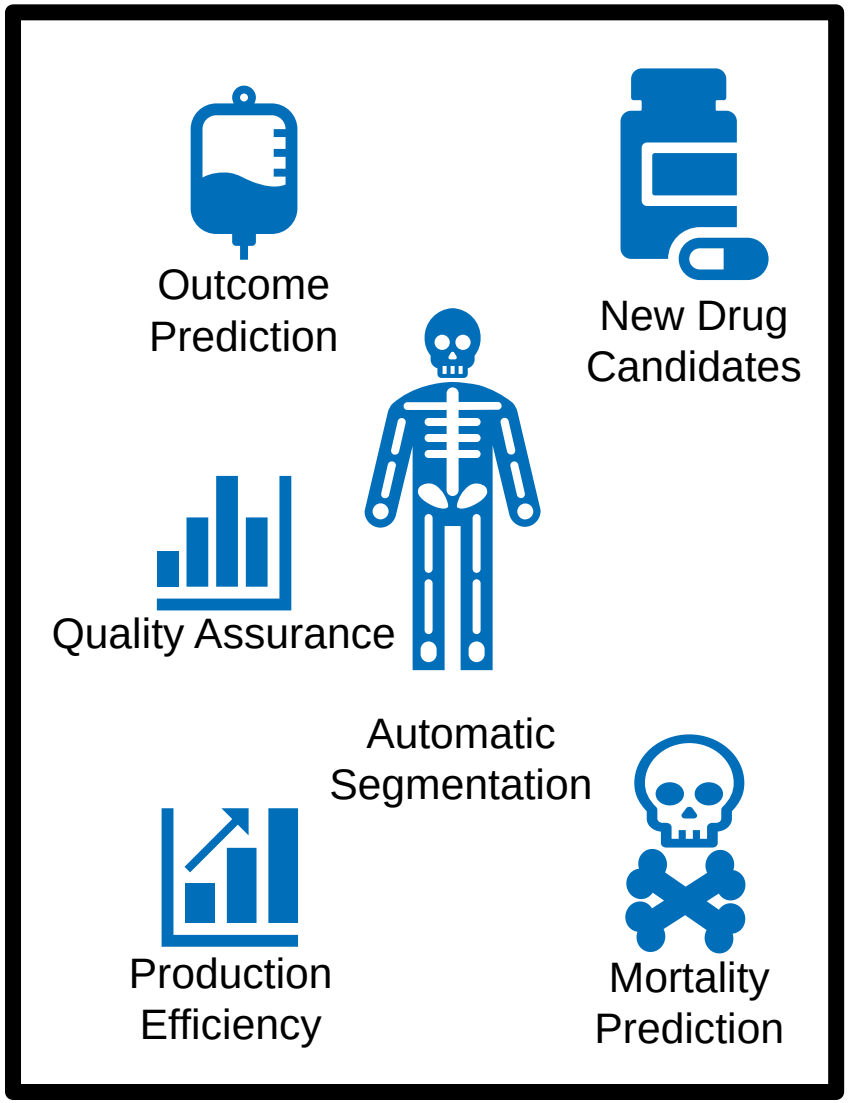
Cloud

Cloud Management

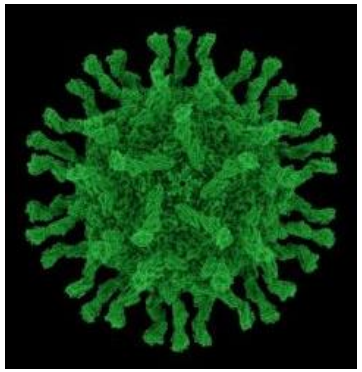
Many Data Streams Can be Powerfully Combined Using MATLAB



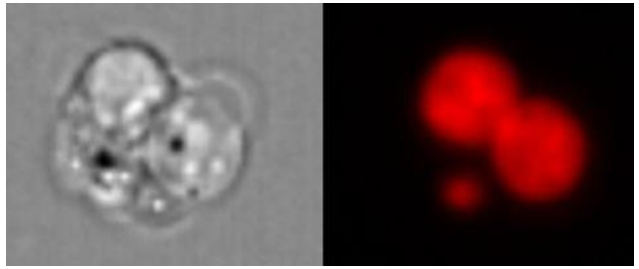




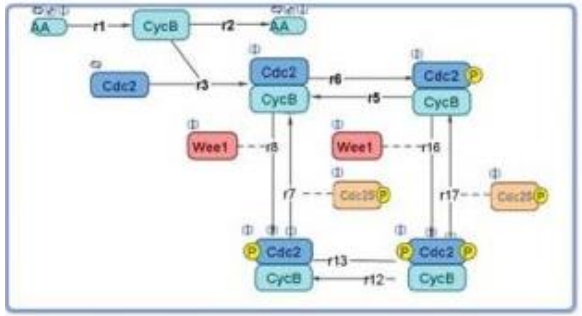
MATLAB AI is Everywhere in Drug Discovery and Development



American CDC Disease Tracking



Automating Flow Cyt. Toxicity Assay Using Deep Learning

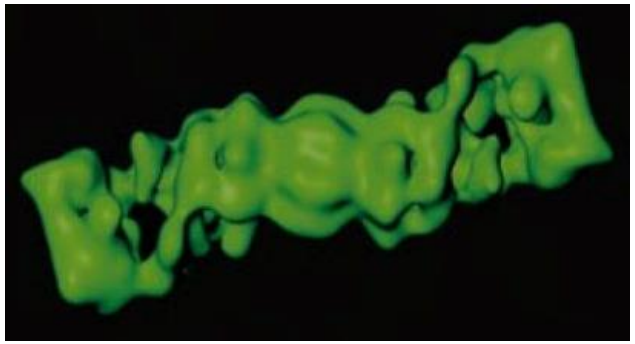


Pfizer Uses Model-Based Drug Dev to Reduce Phase II Attrition

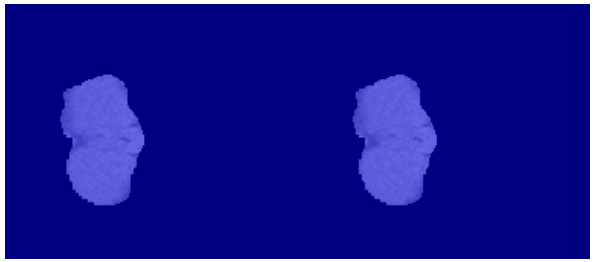
SENSODYNE®

GSK Uses AI on Historical Data: Improve Manufacturing Processes

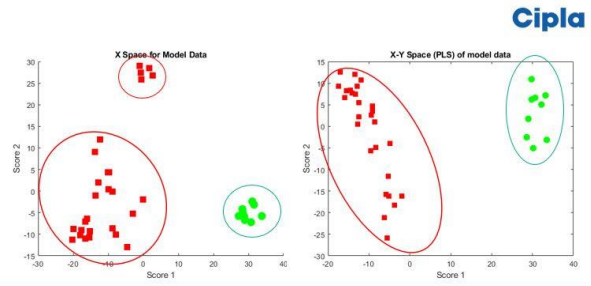
Basic Research → **Discovery** → **Development** → **Translation** → **Clinical** → **Scale Up** → **Manufacture** → **Post-Approval**



Predict Protein Structure Using AI



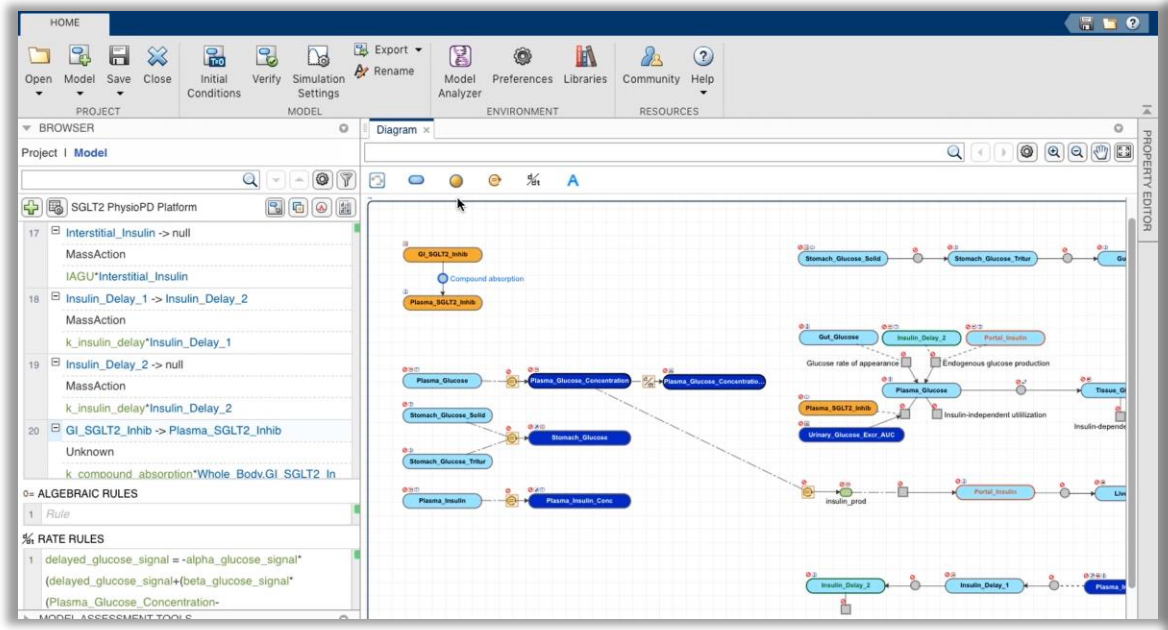
3-D Brain Tumor Autoseg Using Deep Learning

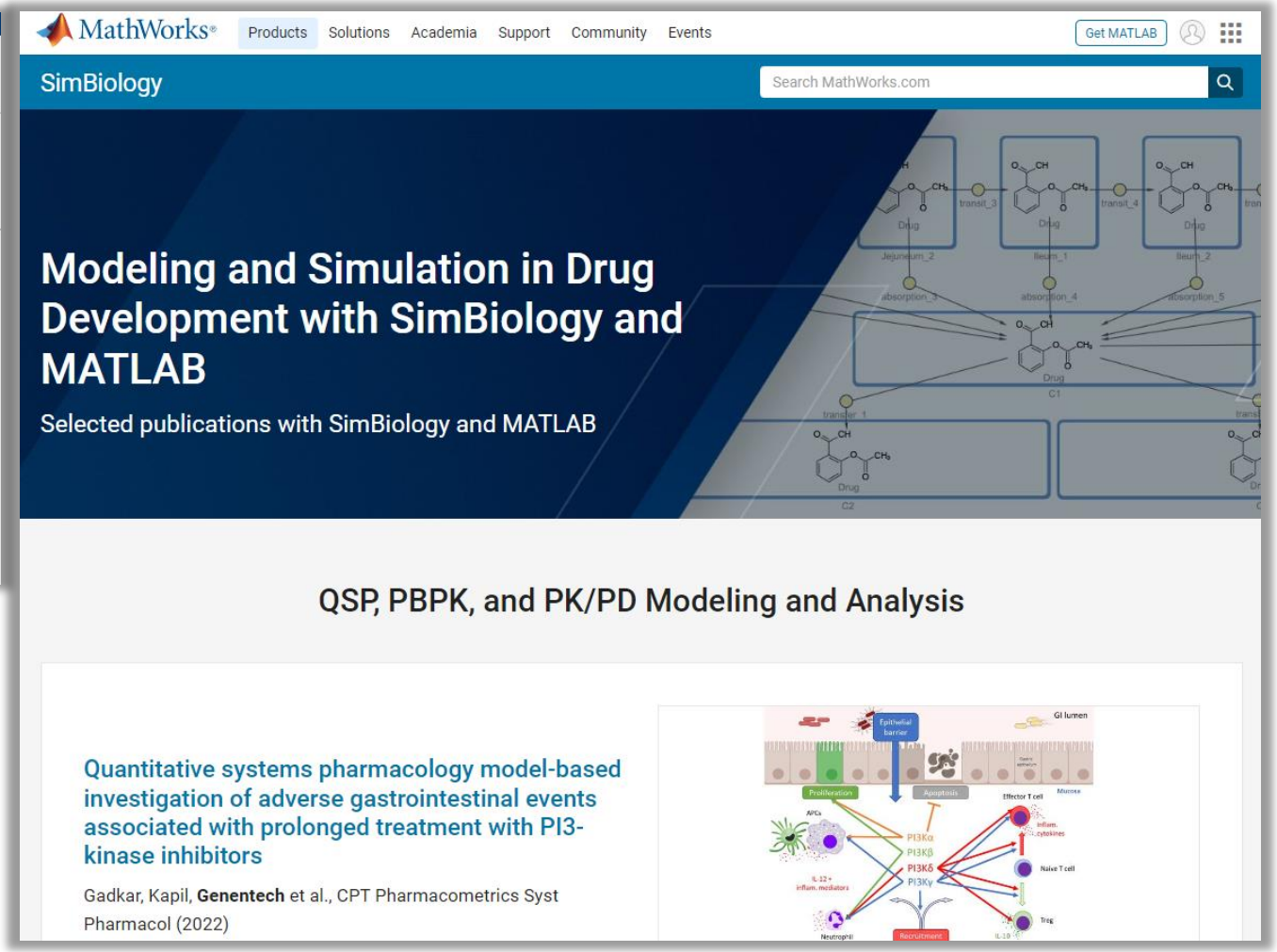


CIPLA Accelerates Manufacturing Analysis with App-Based Machine Learning

Predicting Hospital Readmission Using AI with EHRs

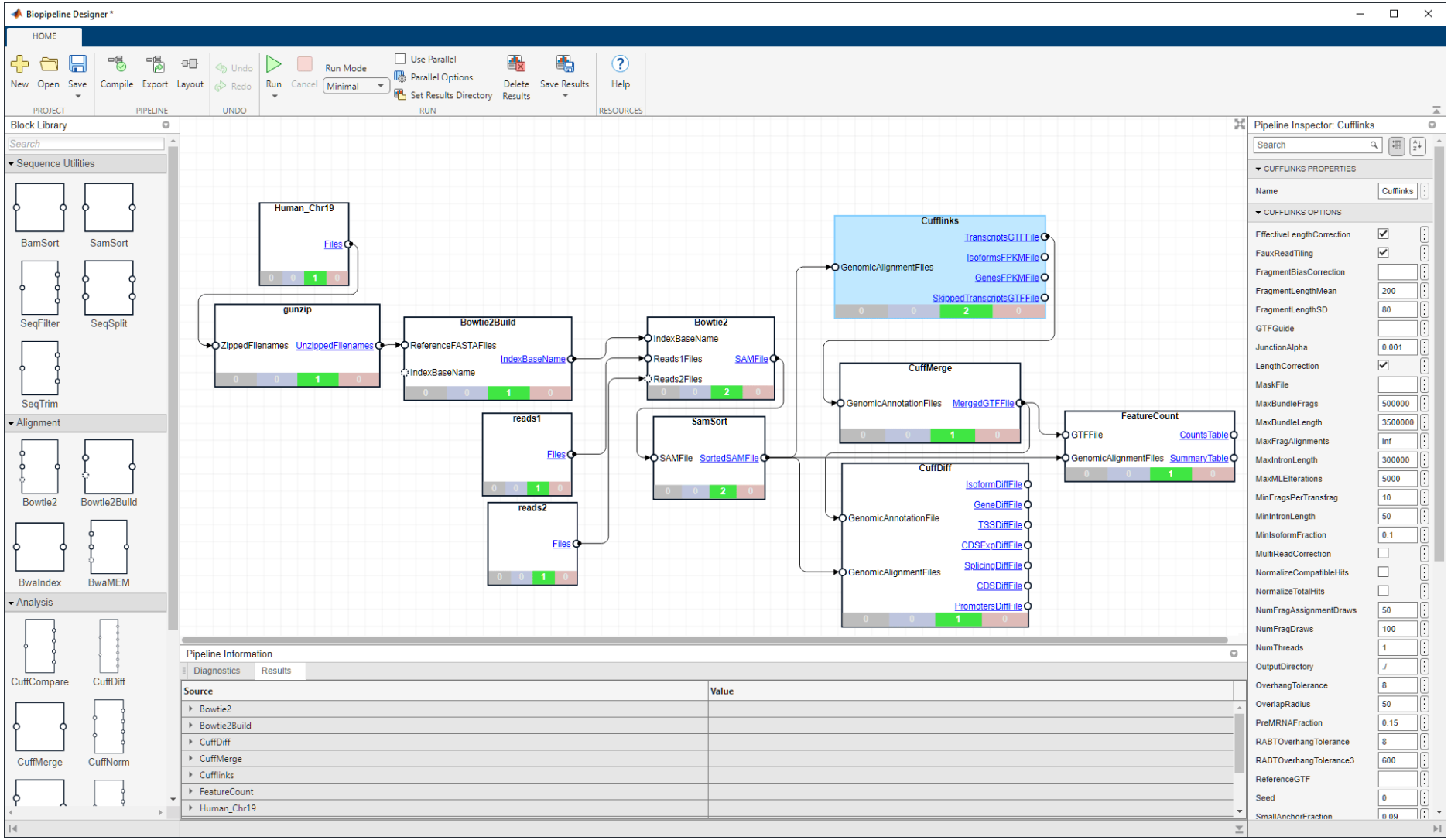
SimBiology – QSP, PK/PD, PB/PK





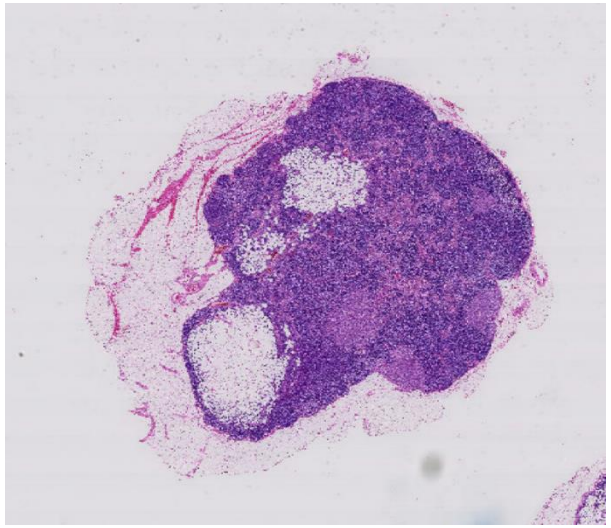
- Pharmacological modeling
- Dose studies
- Bio digital twin simulation
- *Upcoming seminar in series*

Build End-to-End Bioinformatics Pipelines using Biopipeline Designer

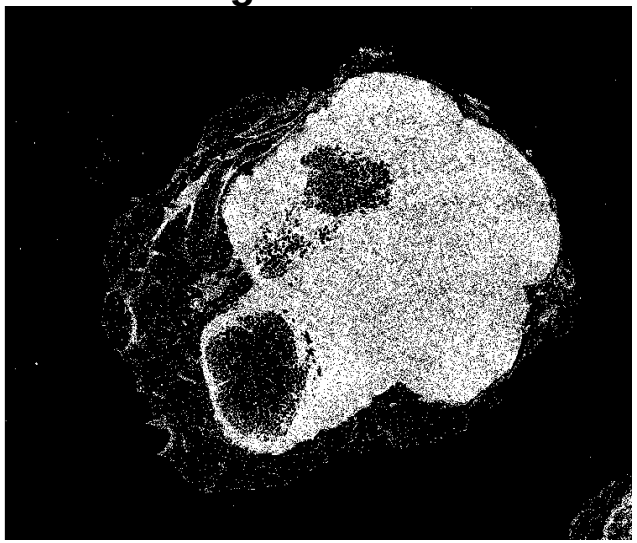


Digital Pathology and Microscopy

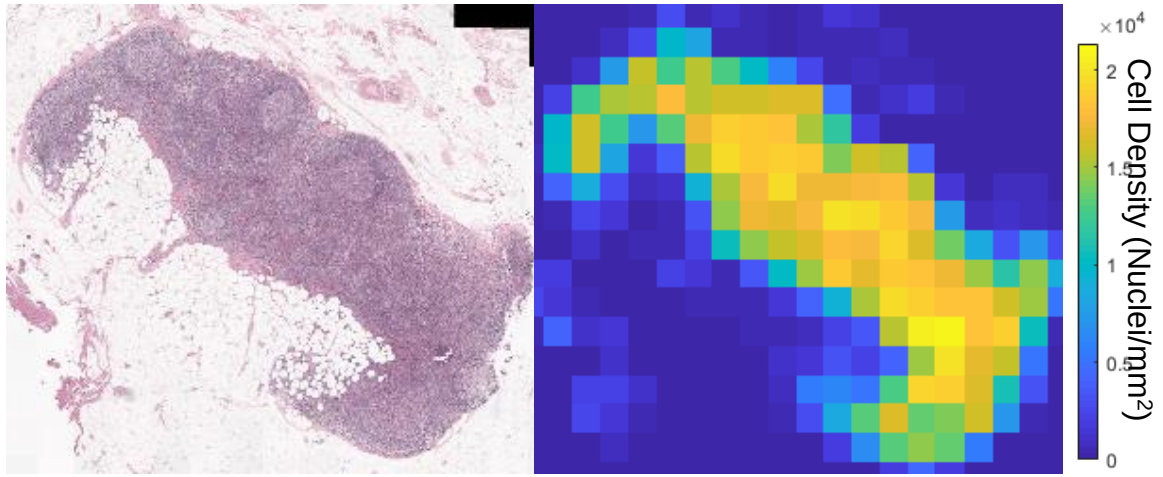
Original Image



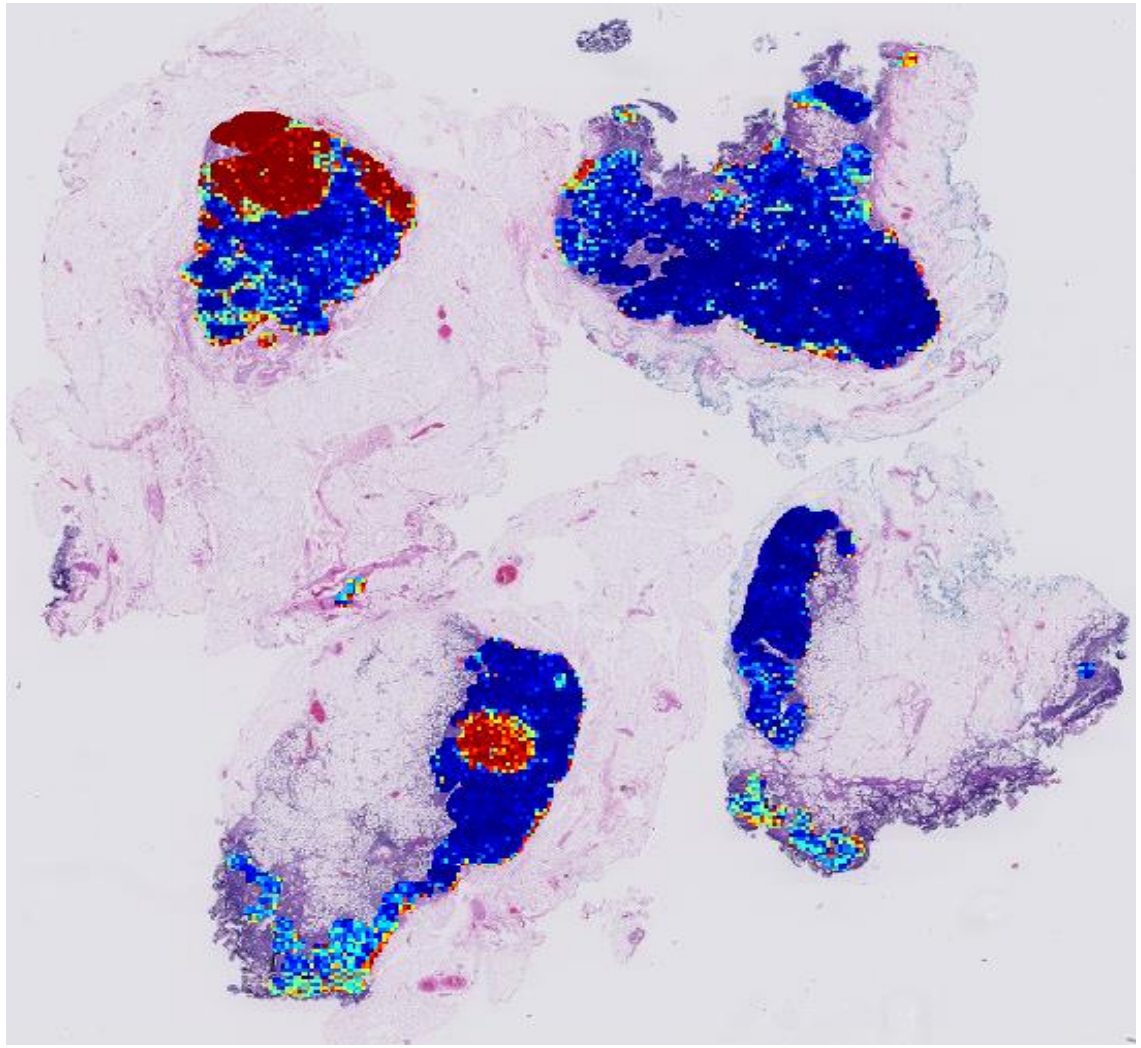
Segmentation



Cell Density

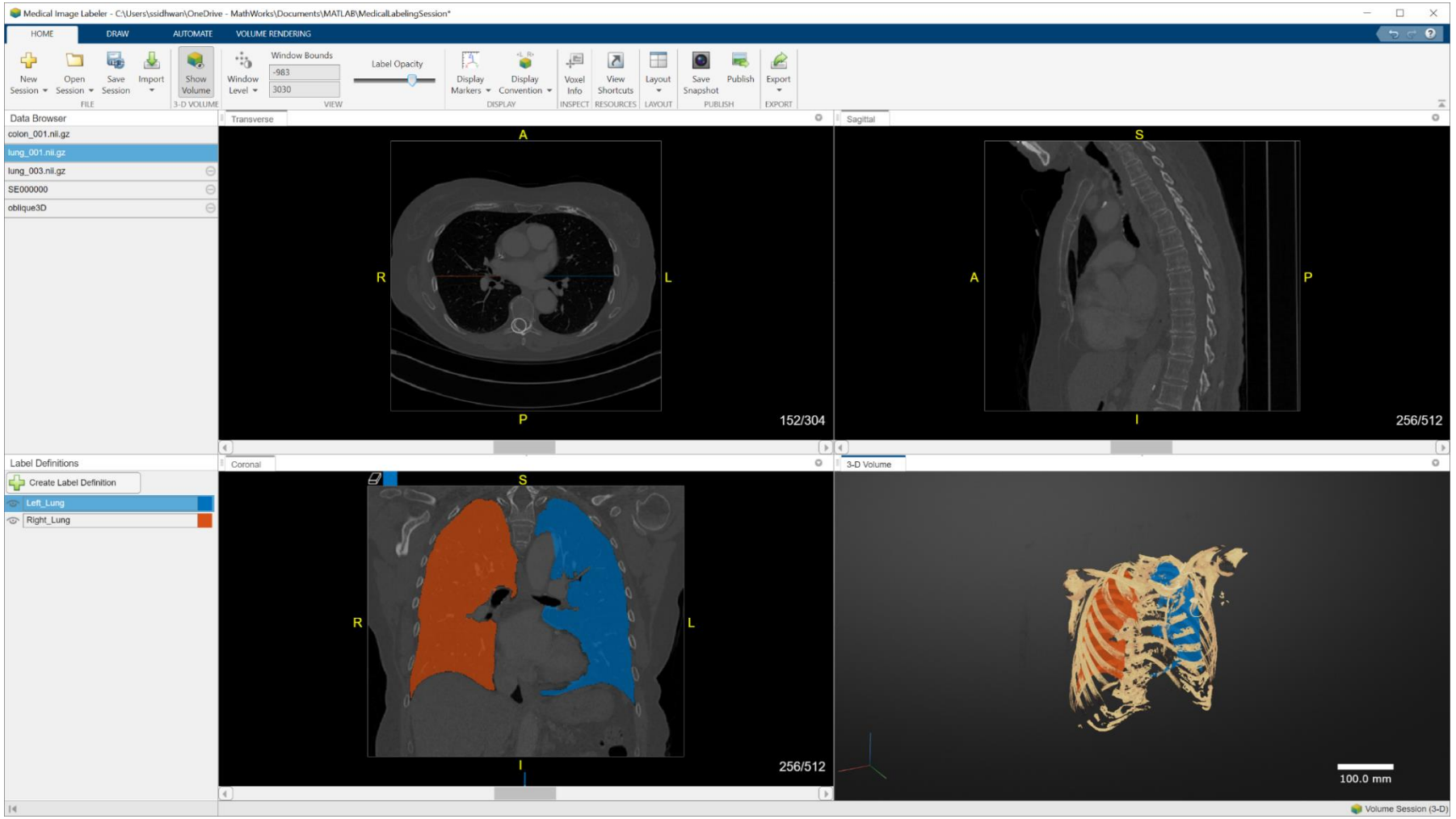


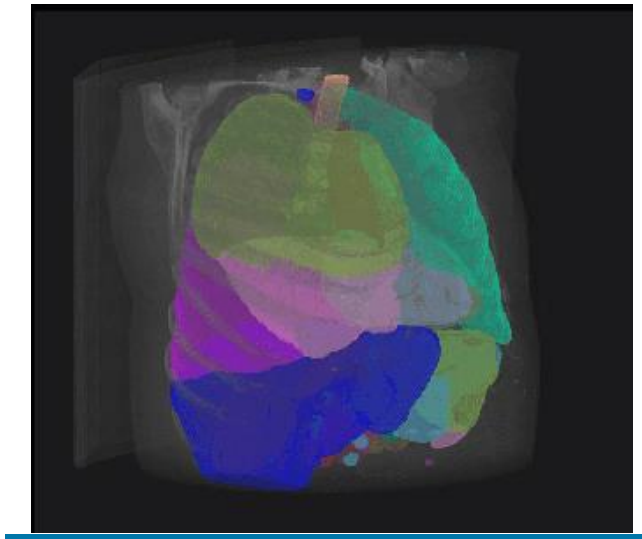
Tumor Heap Map from Deep Learning



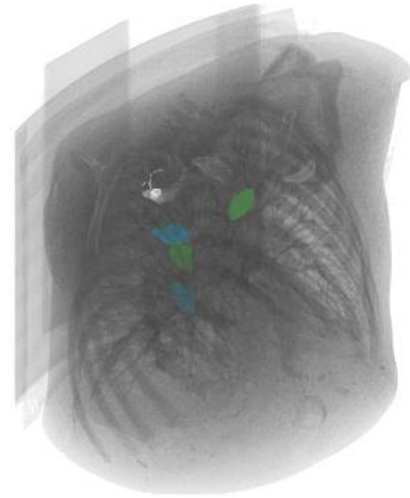
Medical Image Labeler App

for Visualizing, Segmenting, and Labeling Medical Image Data





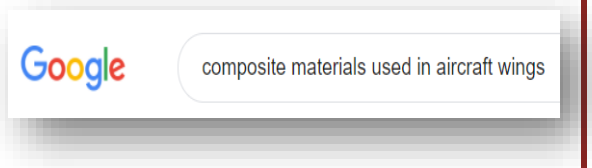
Segment Organs with MONAI Label



Segment Objects Using MedSAM

NLP, LLMs, and AI techniques can be used in different stages of scientific research and engineering

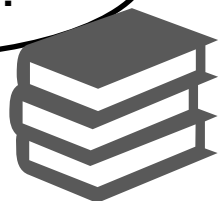
Research



What do these say?

Design

Does this meet guidelines?



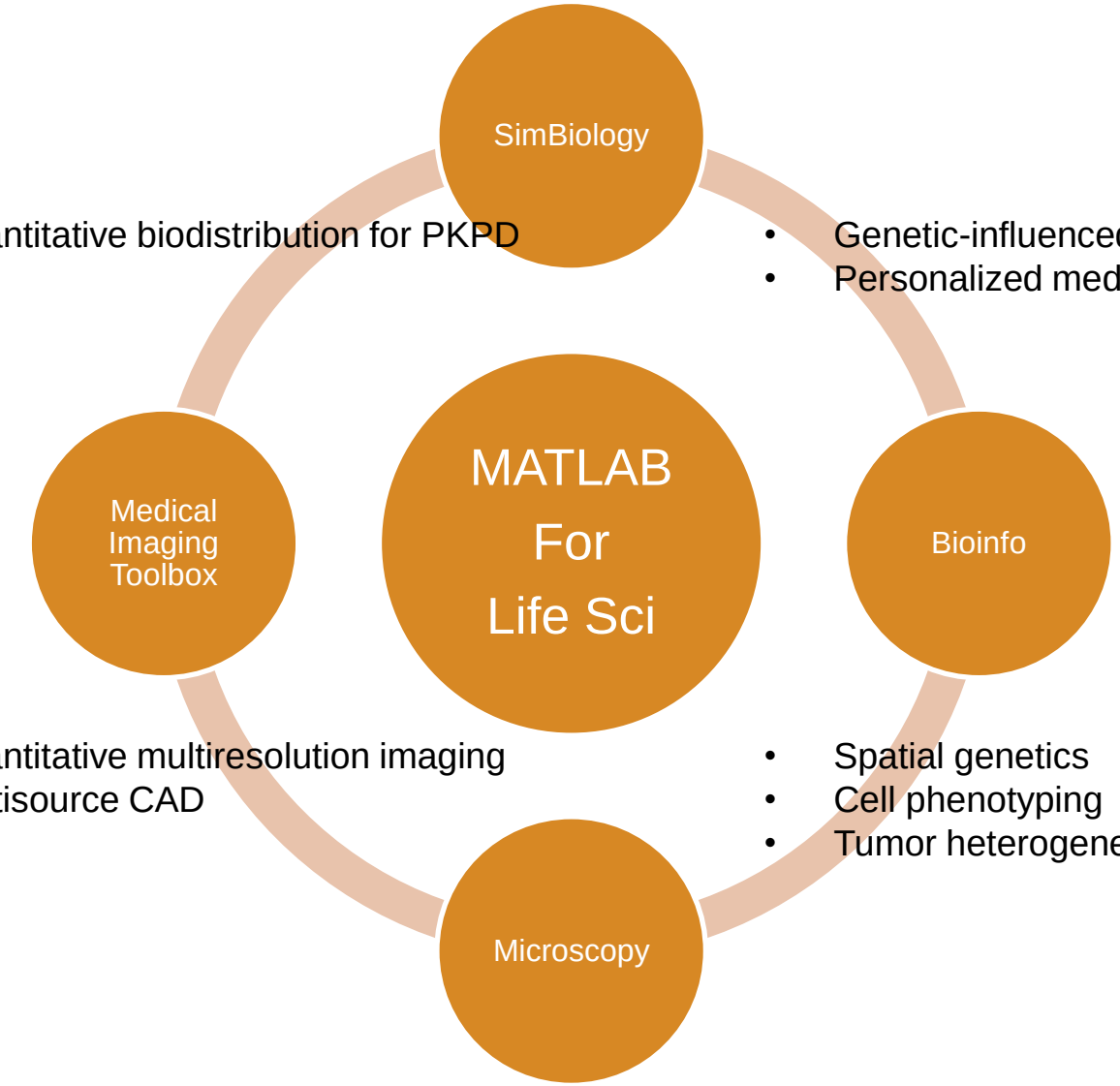
Manufacturing

Which batch may be defective?

Operations

When should we schedule repair?

Opportunities For Synthesis



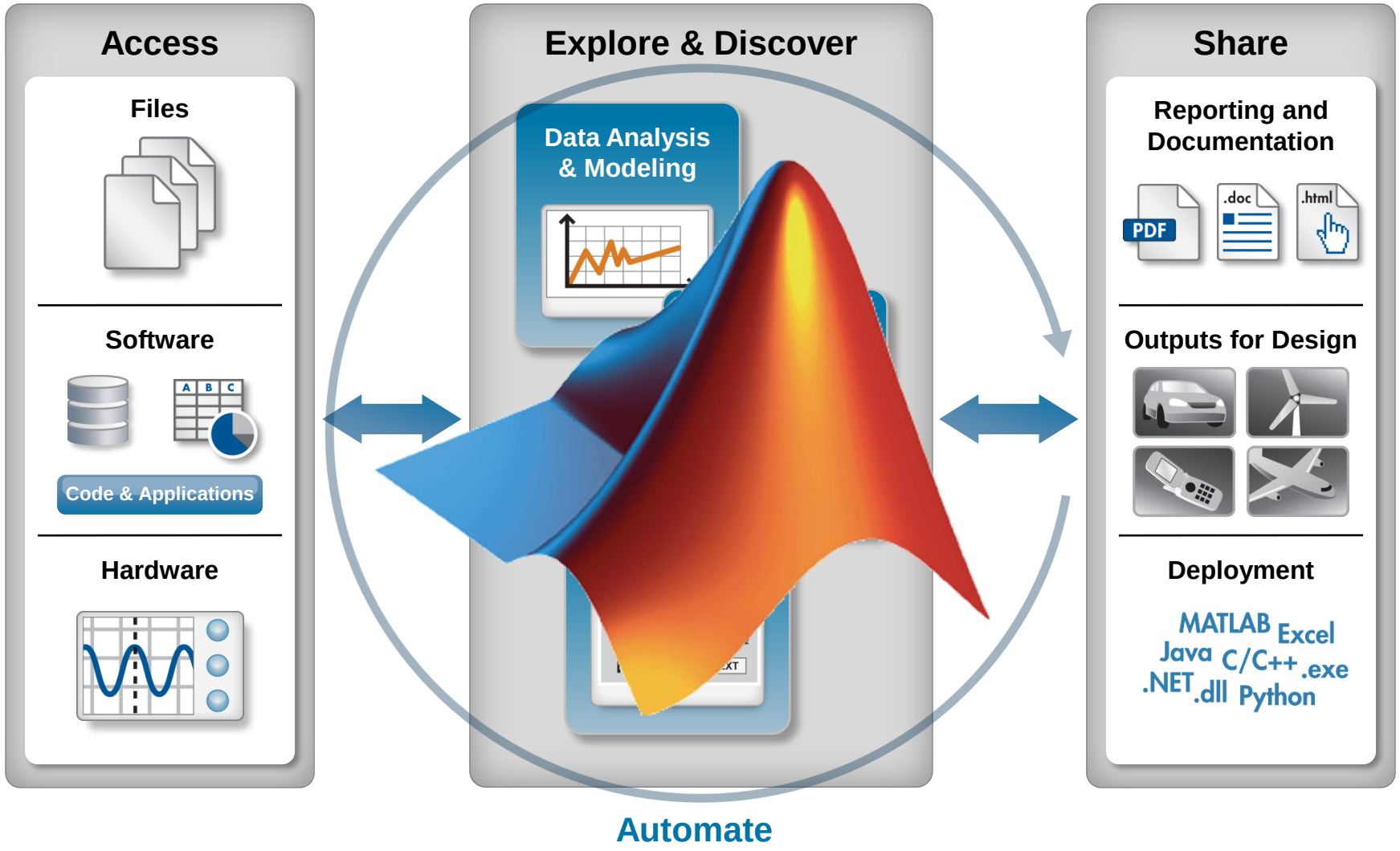
- Quantitative biodistribution for PKPD

- Genetic-influenced modeling
- Personalized medicine

- Quantitative multiresolution imaging
- Multisource CAD

- Spatial genetics
- Cell phenotyping
- Tumor heterogeneity

MATLAB simplifies the data analysis workflow with low-code tools



What are “low-code” tools?

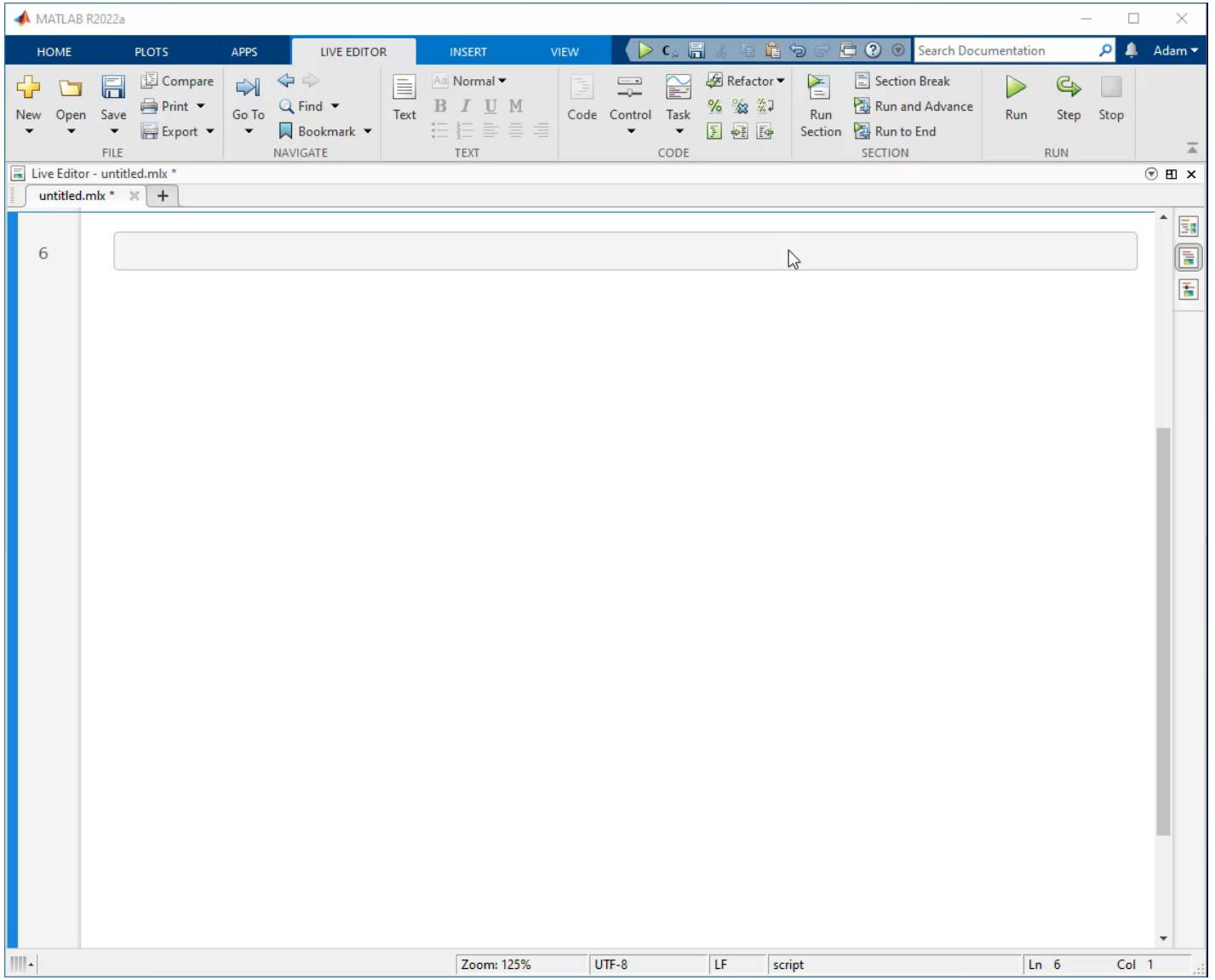
Low-code tools enable:

- rapid software development
- minimal manual coding

Benefits of low code tools:

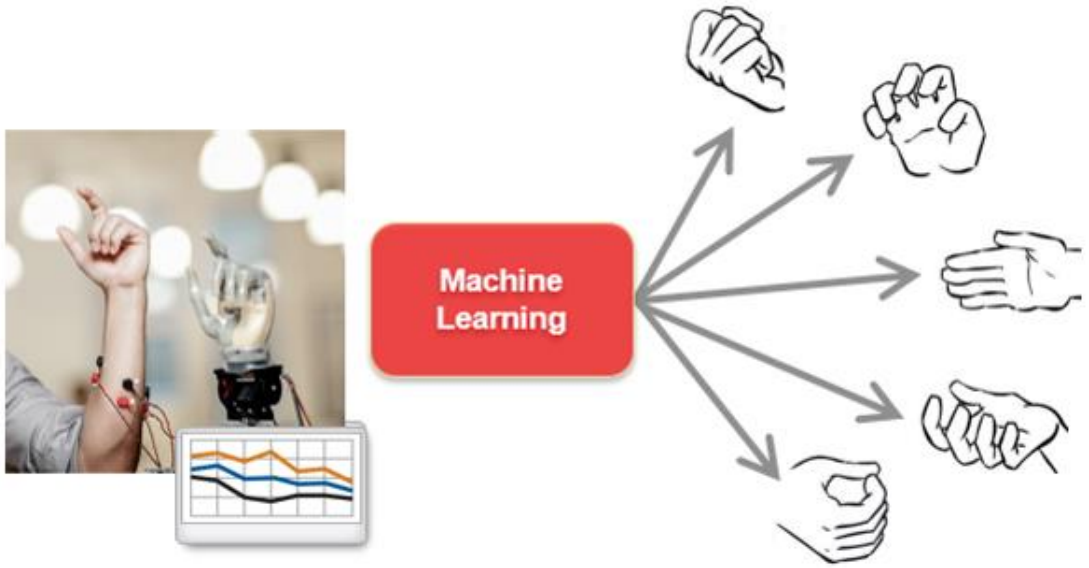
- Easier
- Teaches you *how* to code
- Solve task first, code later

Not just for beginners



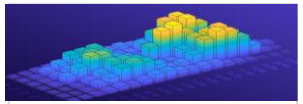
Demo: Signal processing for electrophysiology data

- **Objective:**
  - Train a classification model to predict limb movement from (electromyography) EMG data for prosthetic development
- **Inputs:**
  - Data from 8 EMG sensors
- **Approach:**
  - Import, visualize and preprocess data
  - Extraction features
  - Train classifier
  - Automate and report our work



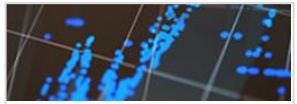
DEMO

100+ hours of Online Training

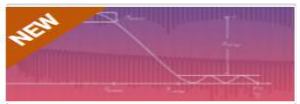


MATLAB Fundamentals

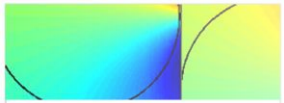
Simulink Fundamentals



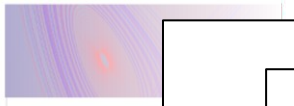
MATLAB for Data Processing and Visualization



Signal Processing with MATLAB



Solving Nonlinear Equations with MATLAB



Solving Or... Differen... Equations... MATL...

Deep Learning with MATLAB

Machine Learning with MATLAB

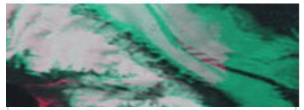
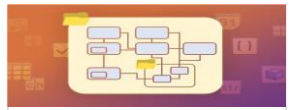


Image Processing with MATLAB



MATLAB Programming Techniques

Introduction to Statistical Methods with MATLAB

Introduct... Symbolic... with MA...

Contact Information

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This is the first of three seminar sessions