September 2016

New Computational Strategies For Cancer Research

▲ J. Gormley ▲

Today's Topic

- Issues in Cancer Research
- Automating Cancer Analytics
- Use Case – TCGA Data Analysis
- Summary of Benefits
- Next Steps

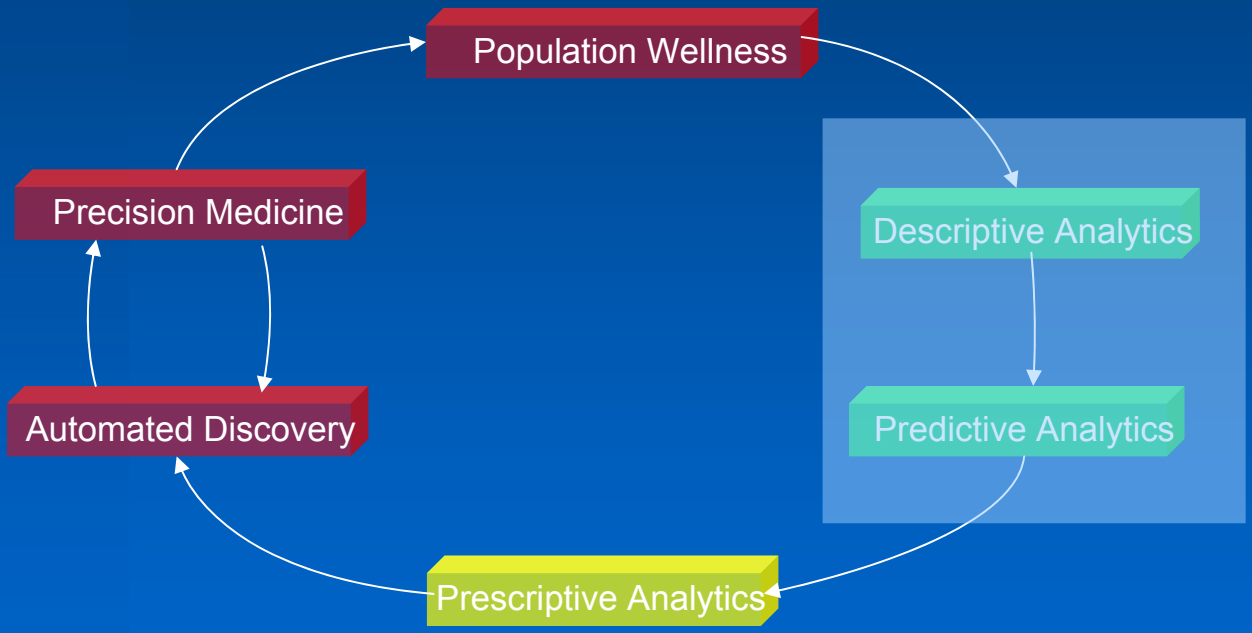
Challenges Ahead

Paradigm Shift Required?

- Cancer research is complex and error prone
- Broad range of tools do exist – complex and siloed
- Data staging remains a rate-limiting factor in discovery
- Shortage of data scientists will further stress research community forward
- To maintain progress we may need a transition to prescriptive analytics

Automating Discovery

Drive Precision Medicine



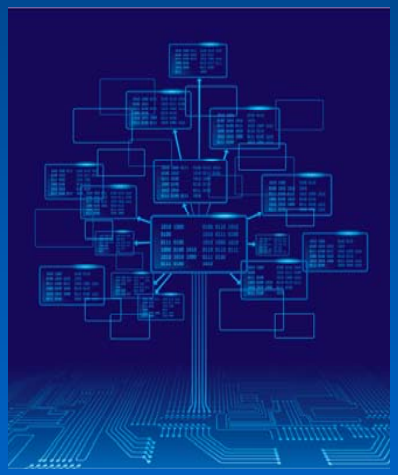
Previous

Next

Process Automation

Functionality Required

- Data Staging
- Feature Engineering
- Feature Selection
- Competitive Model Build
- Biological Assessment

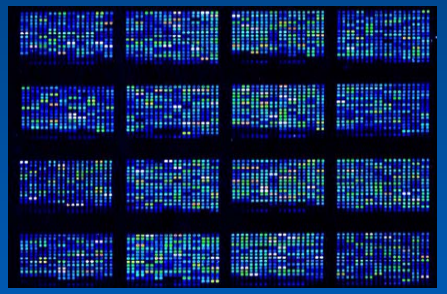


Previous Next

TCGA Project

$200M+ Taxpayer Funded

- Multiple Cancer Types
- Multiple Data Types
- Multiple Outcomes

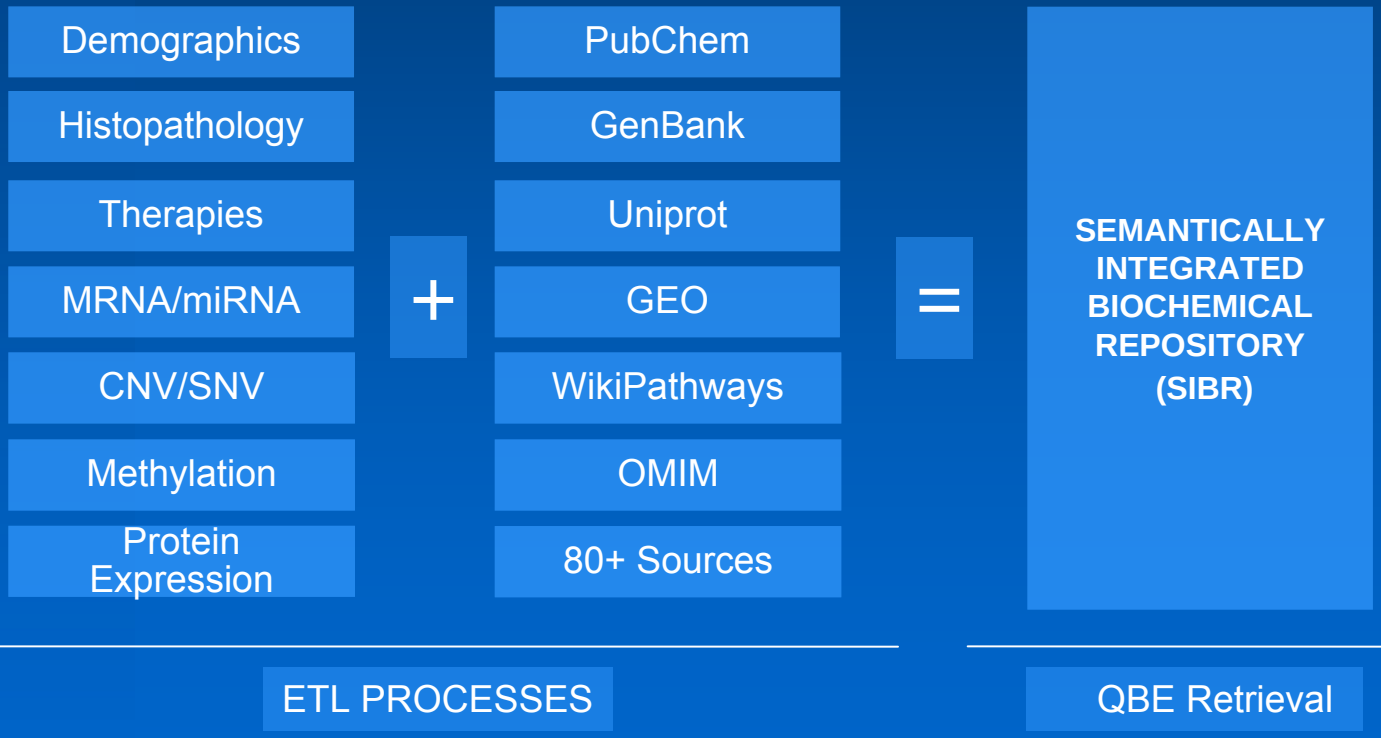


- 30+ Papers – numerous molecular phenotypes identified
- Can automated analytics reproduce key results

Previous Next

Data Staging

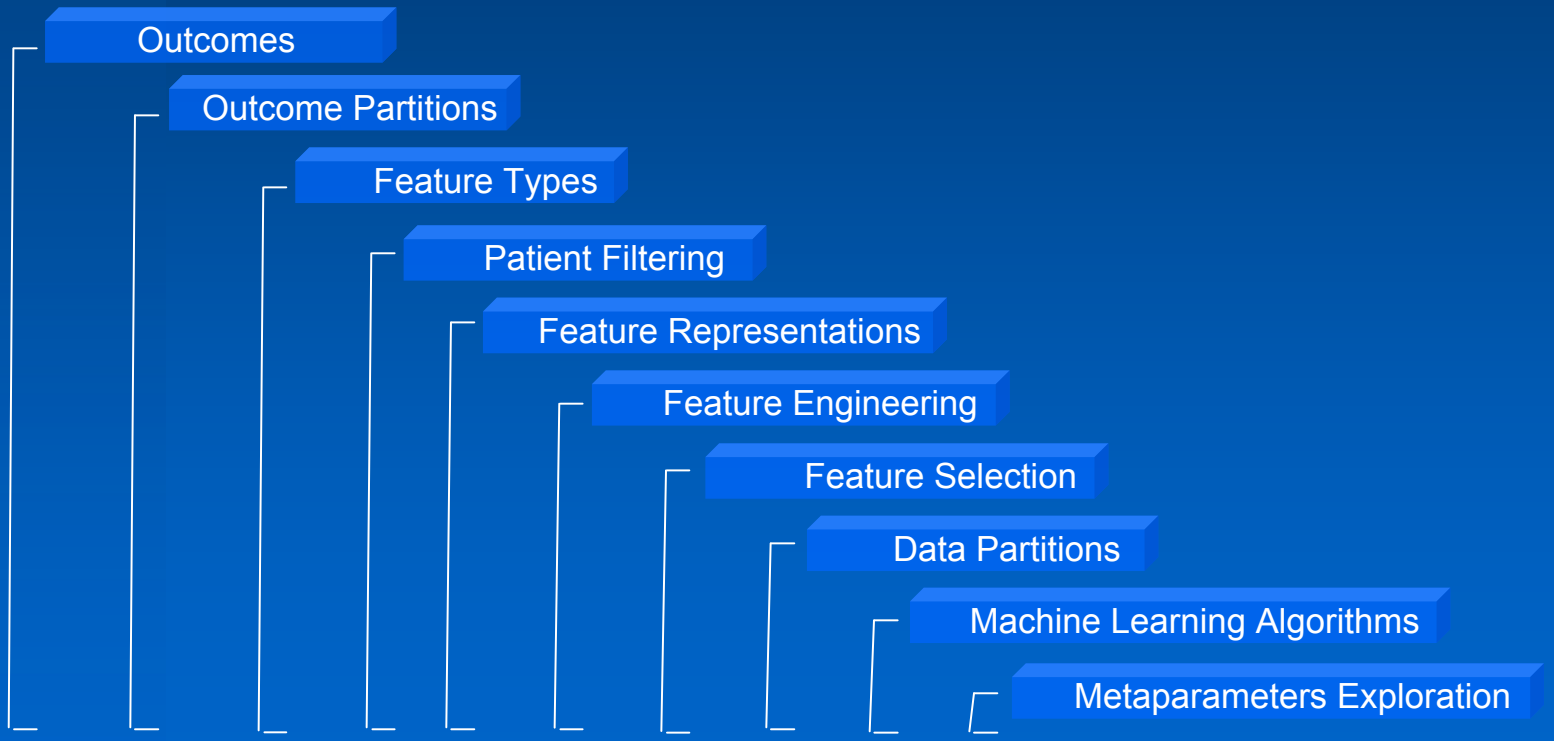
TCGA + Biochemical Reference Data



Previous Next

Model Building

Competitive Learning



Previous

Next

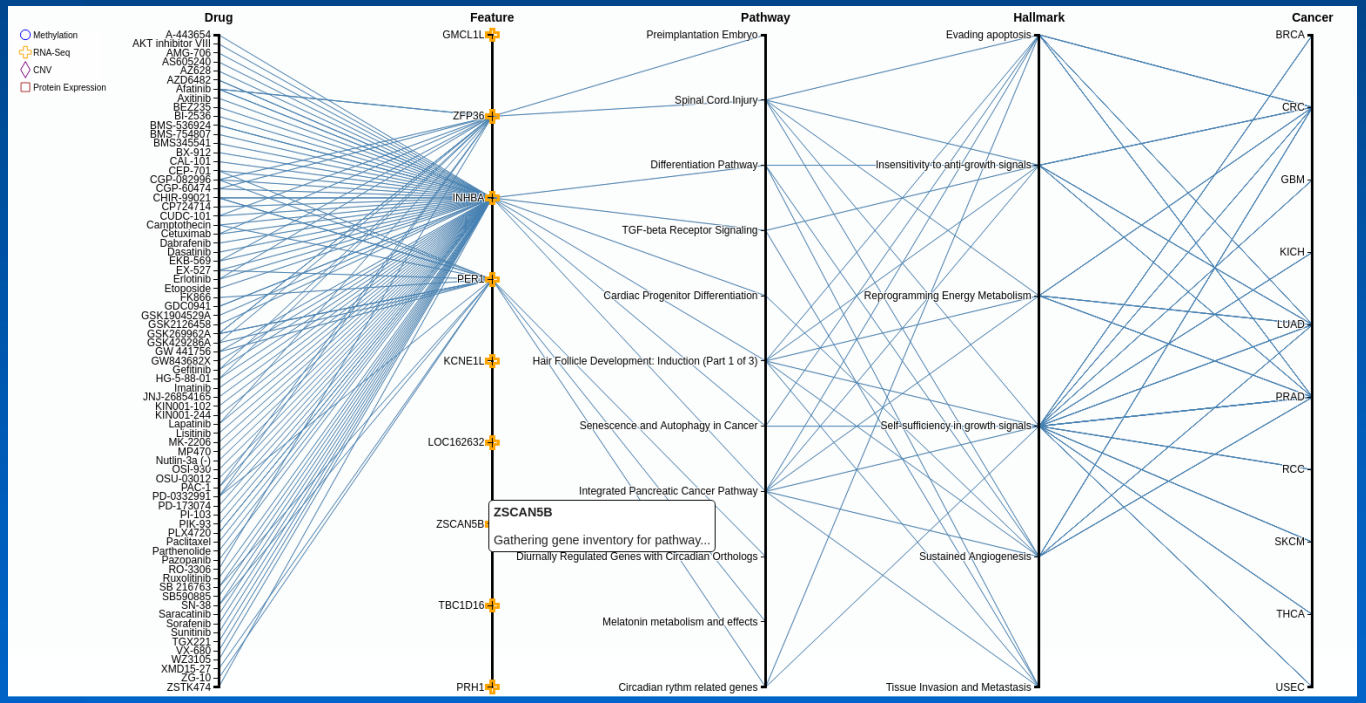
Assess The Biology

BHC + Weight-of-Evidence Approach

Strength	(effect size)
Consistency	(reproducibility)
Specificity	(no other likely explanation)
Temporality	(effect occurs after cause)
Biological Gradient	(higher exposure/greater effect)
Plausibility	(yes, however MLCK)
Coherence	(RWD and laboratory findings reinforce)
Experiment	(lean on experimental systems)
Analogy	(review similar system)

Complex Processes

Each Patient's Biology Will Tell A Story

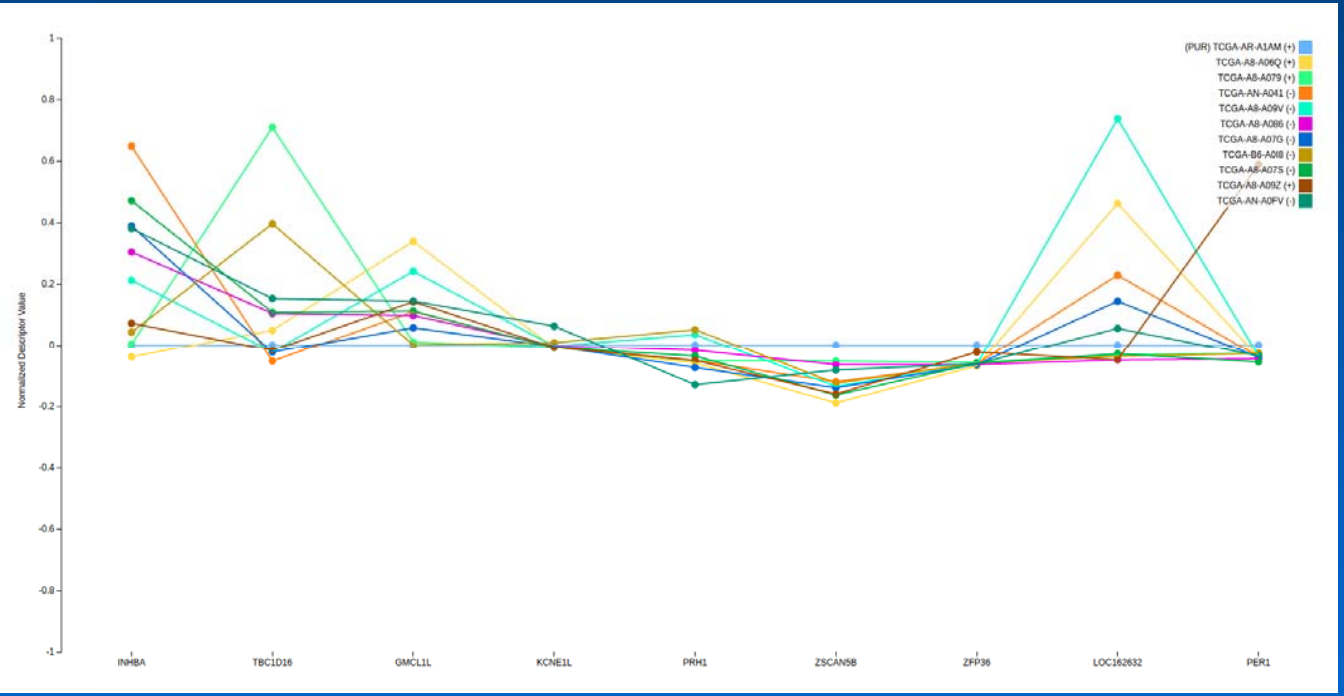


Previous

Next

Predictive Signatures

Patients Like Me?

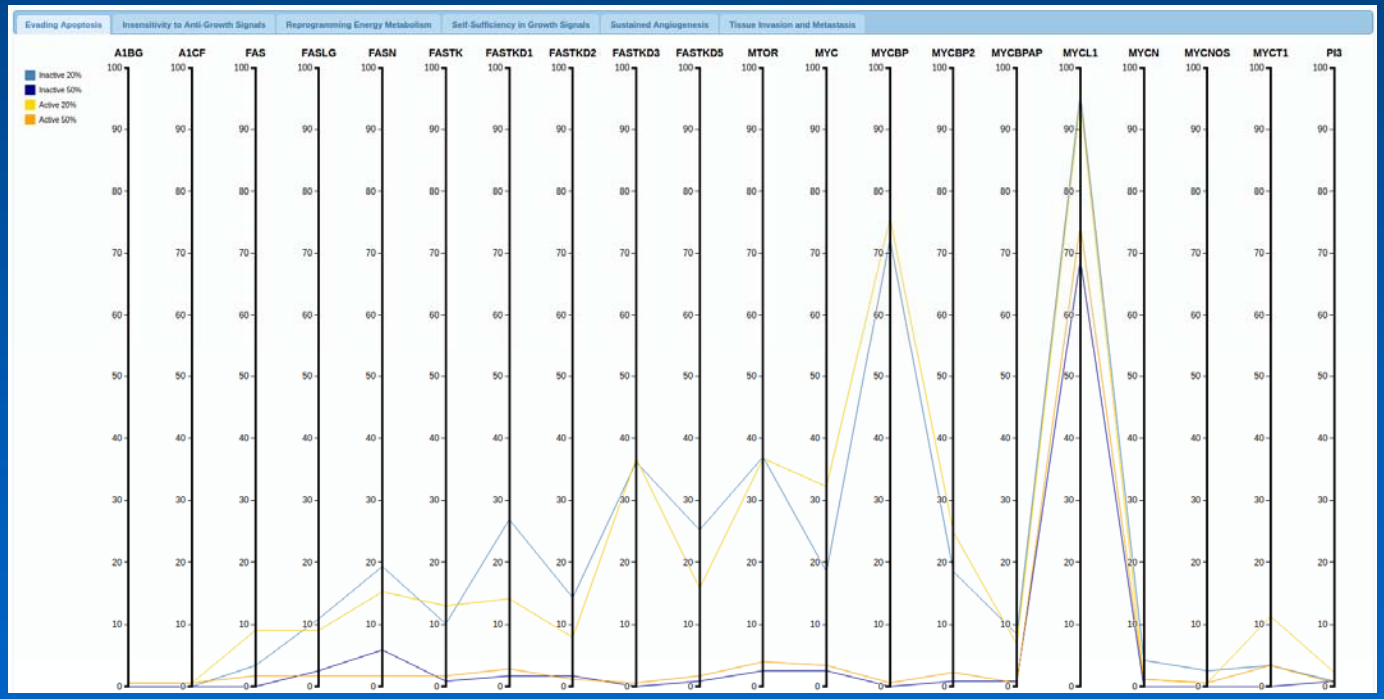


Previous

Next

Beyond The Model

Extracting Additional Context

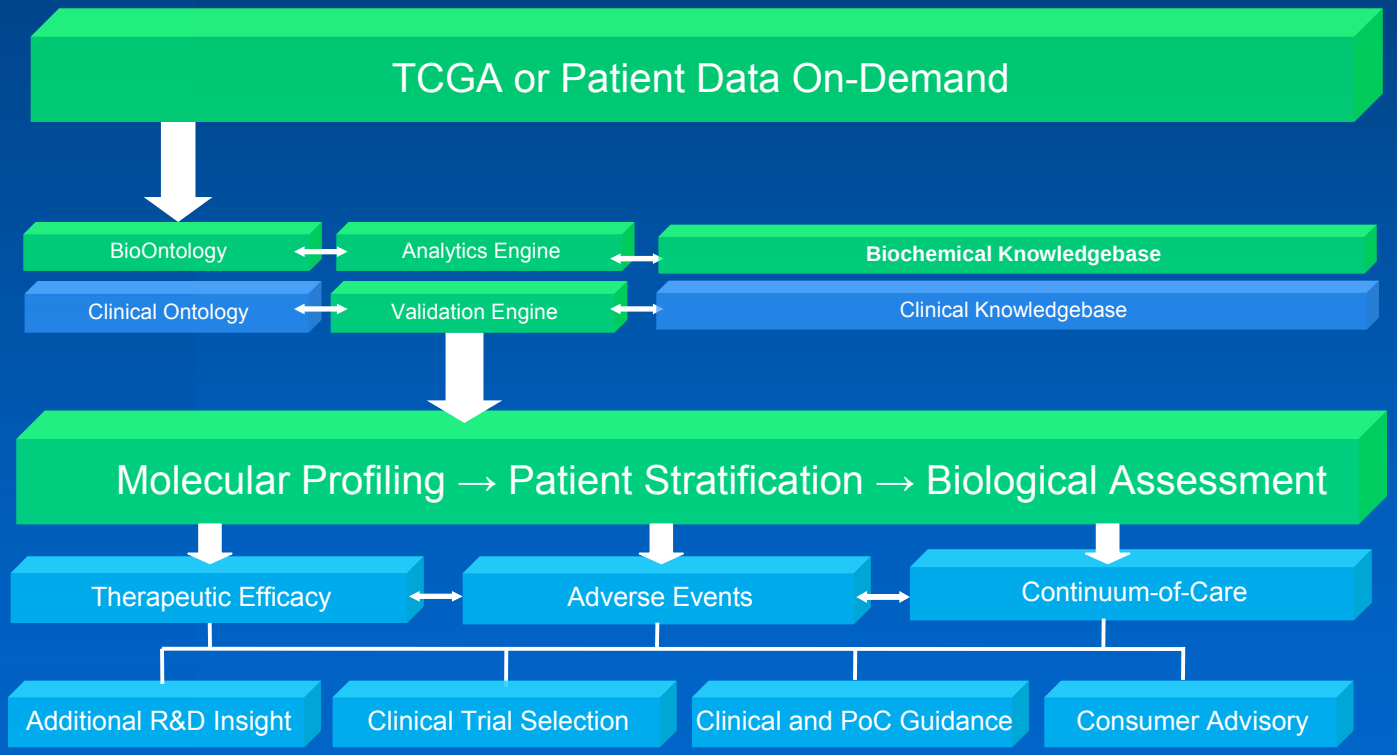


Previous

Next

Cancer Analytics

Minimum System Components



2M Features Per Patient

24/7 Mining Operations

20 High Performance Servers

800 CPU Cores

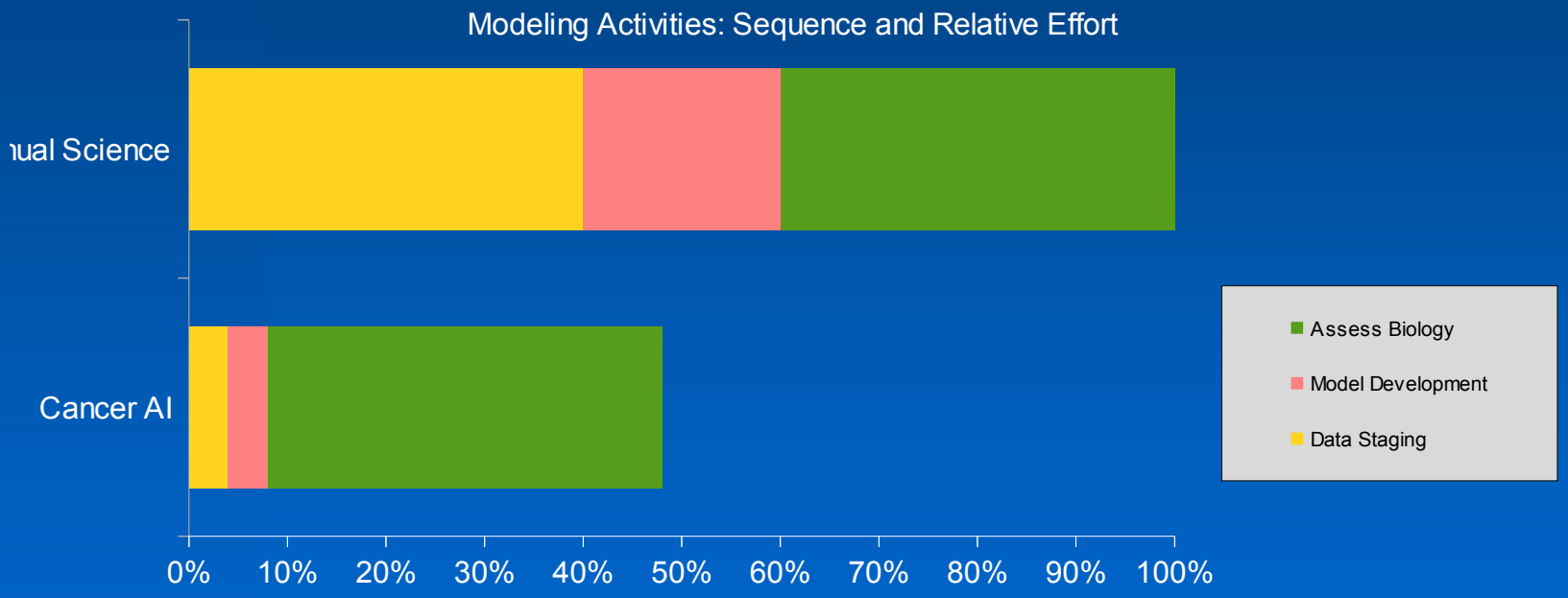
20 Tesla GPUs

100TB Data

Previous Next

Man vs Machine

Accelerating Discovery

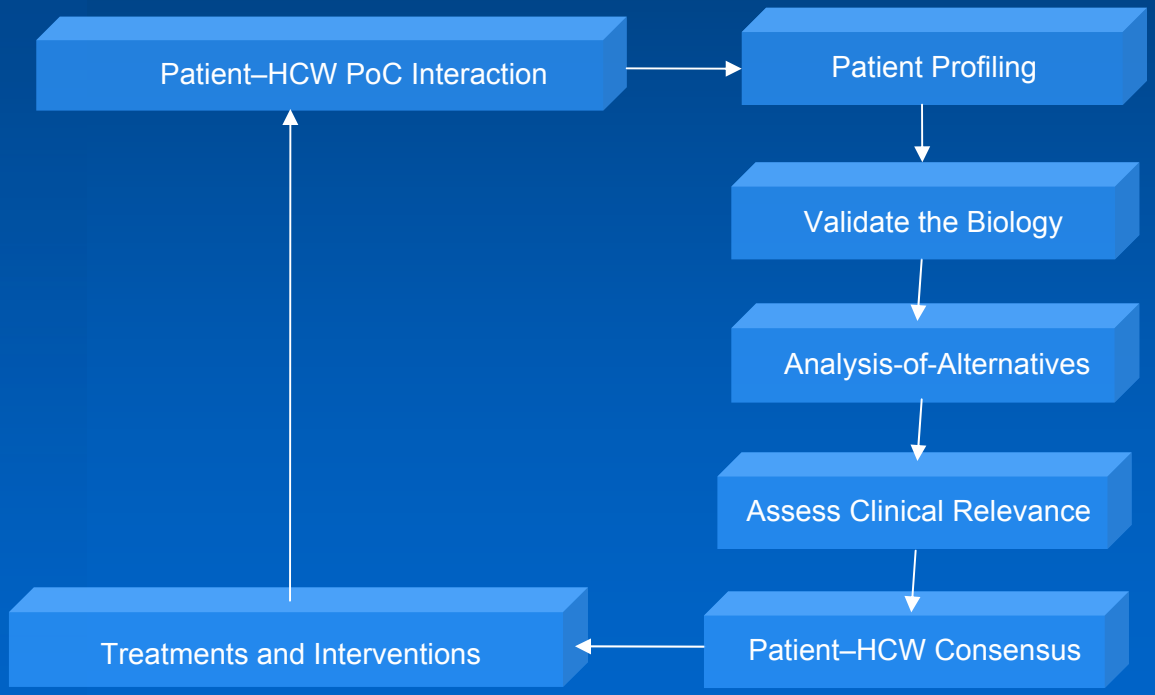


Previous

Next

Next Steps

In Silico Patient



Goal State

Unifying Discovery + Care

- Reduce complexity in cancer research
- Render the concept of siloed tools and data largely obsolete
- Minimize the talent shortage problem via automated analytics
- Redefine R&D and PoC as one iterative machine based activity

Eliminate the divide between R&D and PoC and you change everything.

Contact Information

Intelligent Analytics™

IOMICS CORPORATION

Kendall Square
245 First Street Suite 1800
Cambridge, MA 02142

TELEPHONE: 888-789-2197 x1

WEBSITE: www.iomics.us
EMAIL: sales@iomics.us

Gateway Park
60 Prescott Street
Worcester MA 01652
EMAIL: support@iomics.us