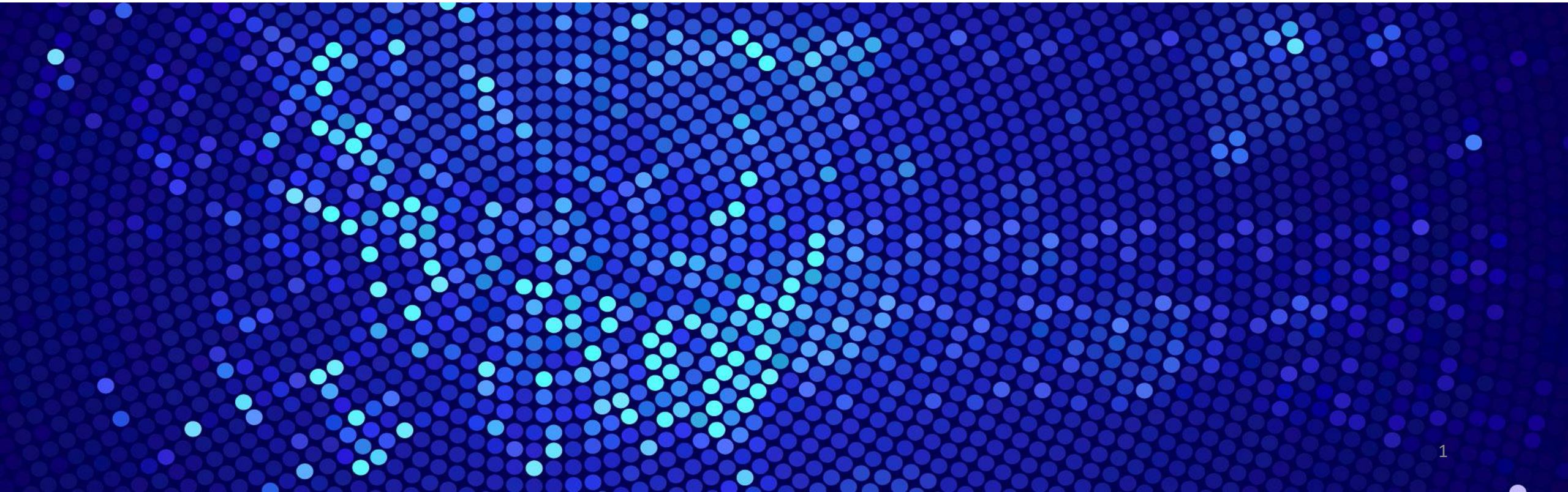
The Future of Data Science in Biotech–Pharma

Jeff Helterbrand
Genentech
BBSW Innovation & Leadership, November 2019



Key Takeaways

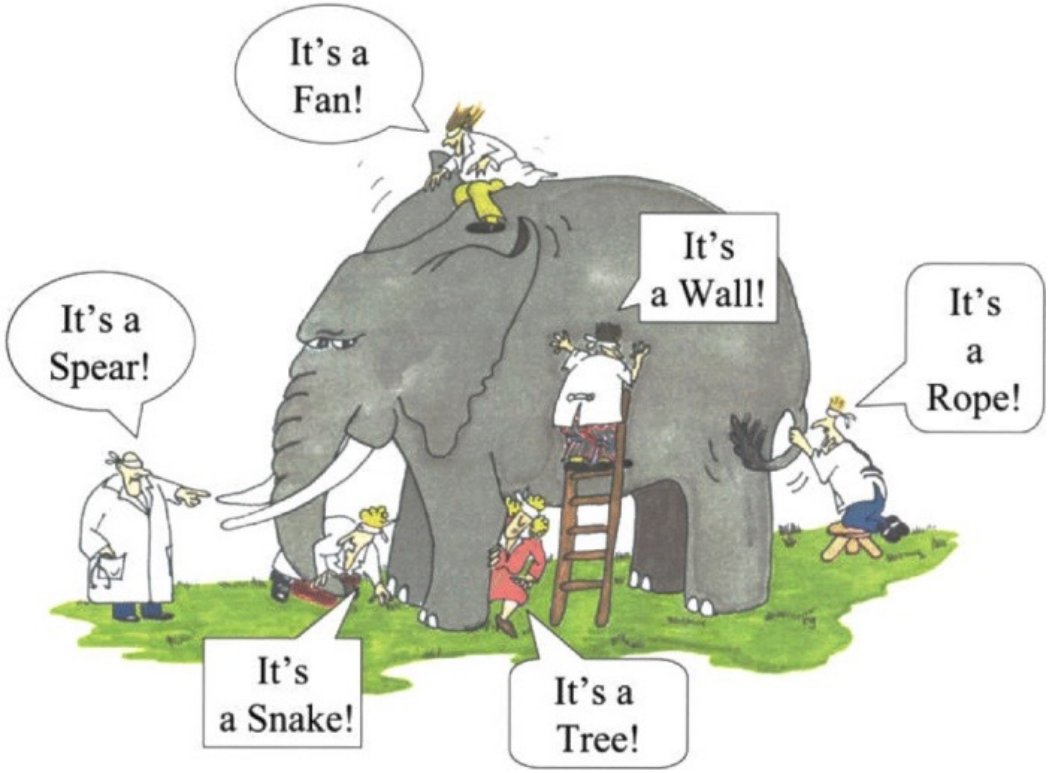
- Innovation: Data Scientists continue to expand our value - ultimately translating and accelerating scientific advances to benefit patients

- Data: Quality FAIR data is the fuel for future new healthcare solutions. Will accelerate the continued ascendency of Data Science.

- Leadership: In digital era, excellence in Data Science is now essential – activating Data Science leadership will become even more important going forward (are we ready?)

Data Science

A field that aims to extract knowledge and insights from structured and unstructured data



Kefauver-Harris Drug Amendments (1962)

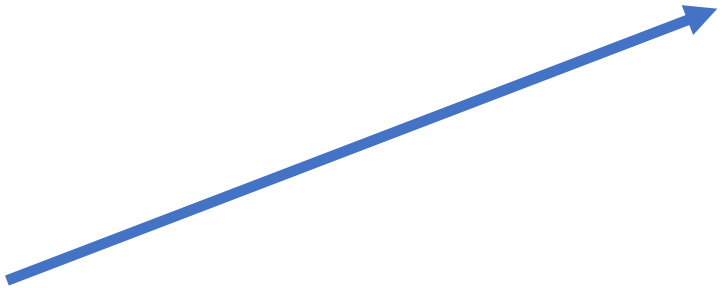
Sen. Estes Kefauver

Rep. Oren Harris

For the first time, established a framework that required drug manufacturers to prove scientifically that a medication was not only safe, but effective

Data Science

Contributions to Biotech-Pharma



Manufacturing

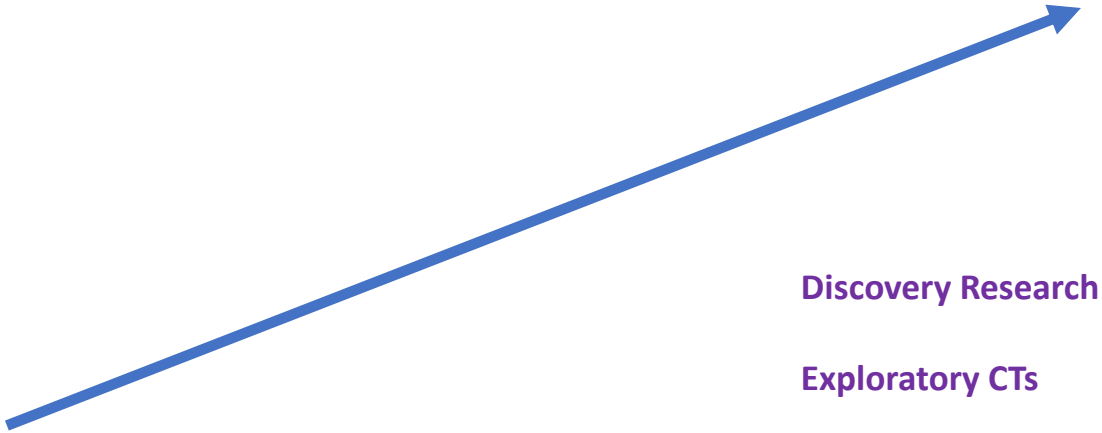
Confirmatory Clinical Trials (CTs)

Clinical Pharmacology

1960s **1970s** **1980s** **1990s** **2000s** **2010s** **2020s**

Data Science

Contributions to Biotech-Pharma



Discovery Research

Exploratory CTs

Clinical Practice-Relevant Data

Health Economics

Portfolio

Manufacturing

Clinical Pharmacology

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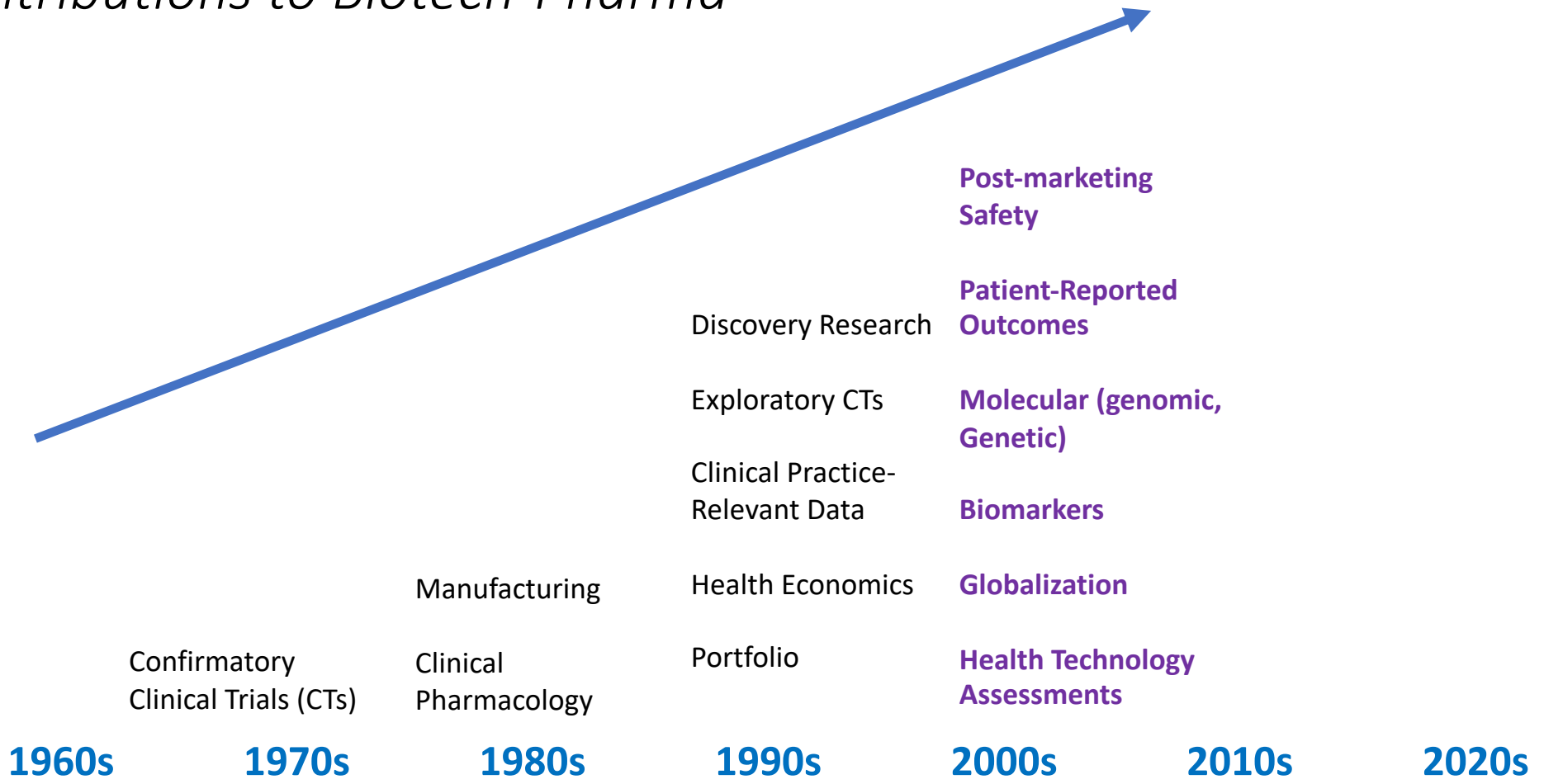
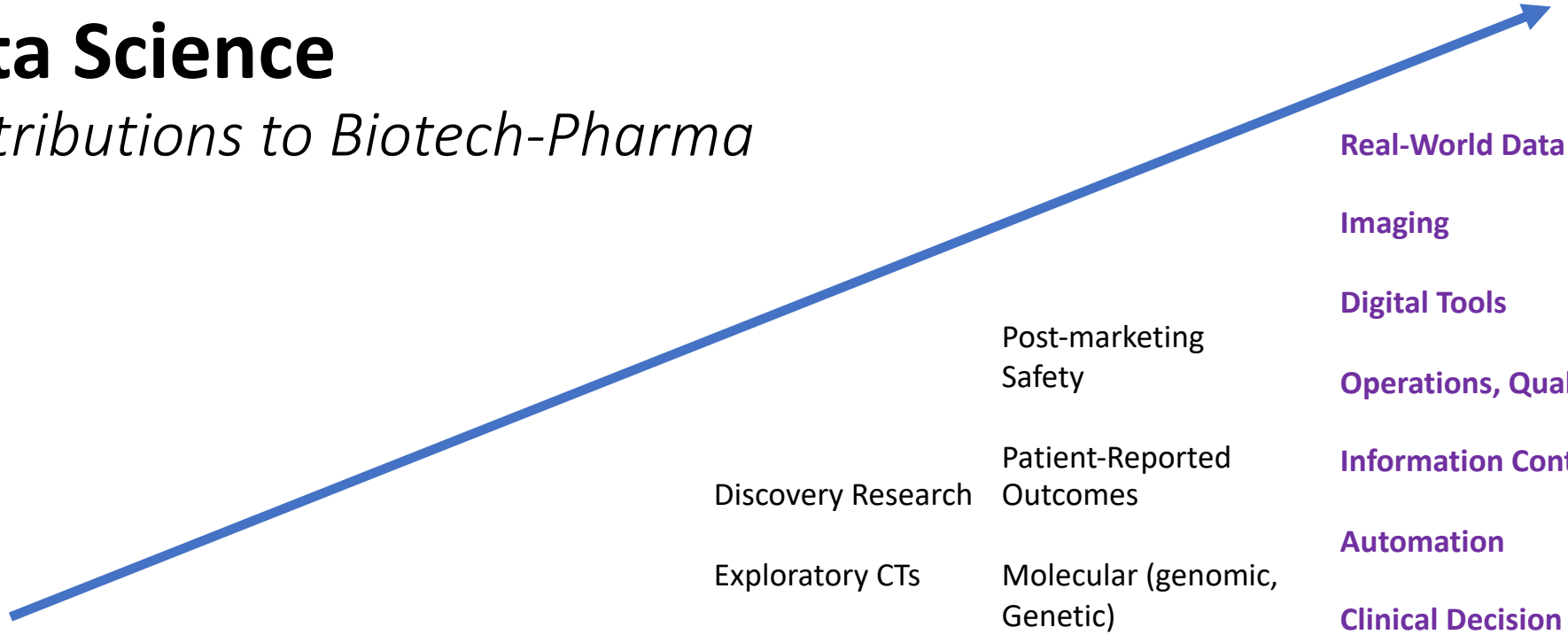


Data Science

Contributions to Biotech-Pharma



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1970s

Confirmatory Clinical Trials (CTs)

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Discovery Research

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Clinical Practice-Relevant Data

Health Economics

Portfolio

2000s

Post-marketing Safety

Patient-Reported Outcomes

Molecular (genomic, Genetic)

Biomarkers

Globalization

Health Technology Assessments

2010s

Real-World Data

Imaging

Digital Tools

Operations, Quality, HR Data

Information Content

Automation

Clinical Decision Support

Integrated Data Marts

Data Sharing

Data Privacy

2020s

The Digital Era

Our healthcare landscape is rapidly transforming with a **huge growth in scientific and medical data**, which is **changing how scientists work.**

There are new types of data that are more complex and in higher volumes than ever before.

Patient Level Dataset Types

Clinical datasets

Mix of e-CRF and non-CRF data (e.g. biosample results from protocolled test)

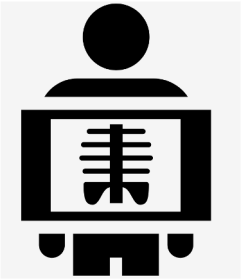
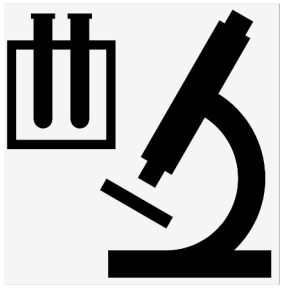


Image Files

e.g. retinal photograph, MRI scan of brain, histopathology

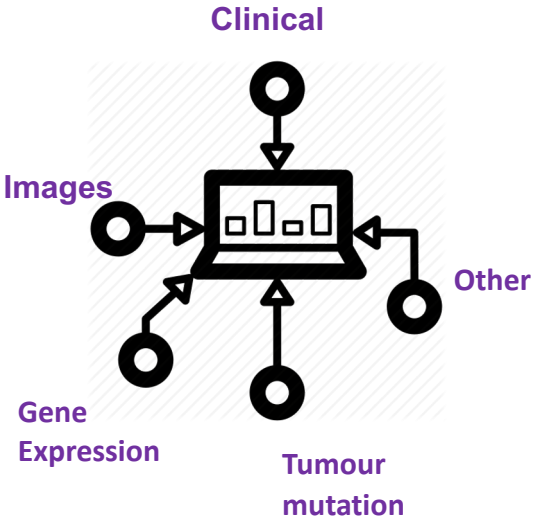


Results generated from biosamples

Samples be stored for many years. New results can be generated years after study has closed.

Integrated Data Mart

Data from different sources and studies harmonized and integrated



Patient Centered Outcomes

QoL instruments

Digital Device Data

Data generated and results derived from smartphone or smartwatch apps to monitor the patient experience

Omics results

RNA seq, expression data, WES, WGS, FMI Panel etc.

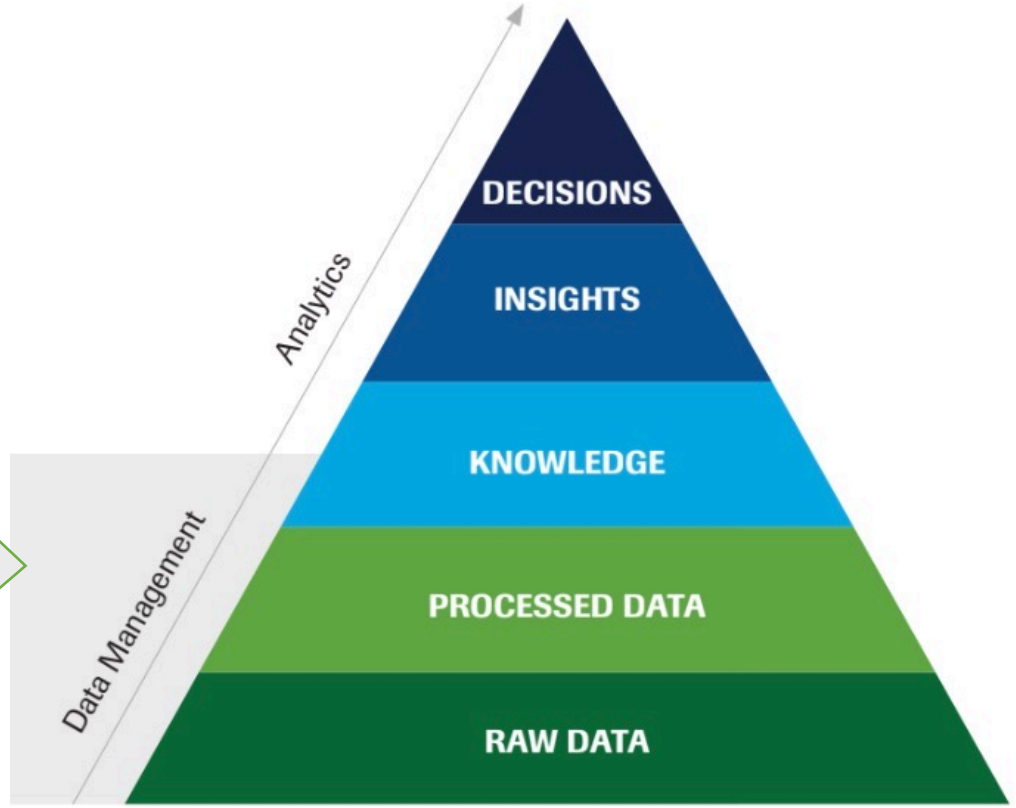
It all starts with FAIR …

Findable

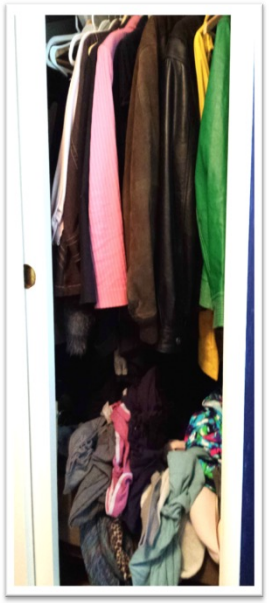
Accessible

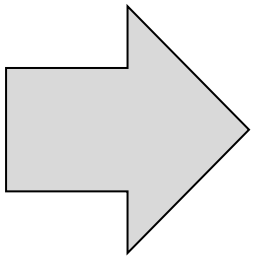
Interoperable

Reusable



Why should we be FAIR?




Organized data offers new opportunities

Leveraging potential from new scale and diversity of data types

Personalizing care based on deeper understanding

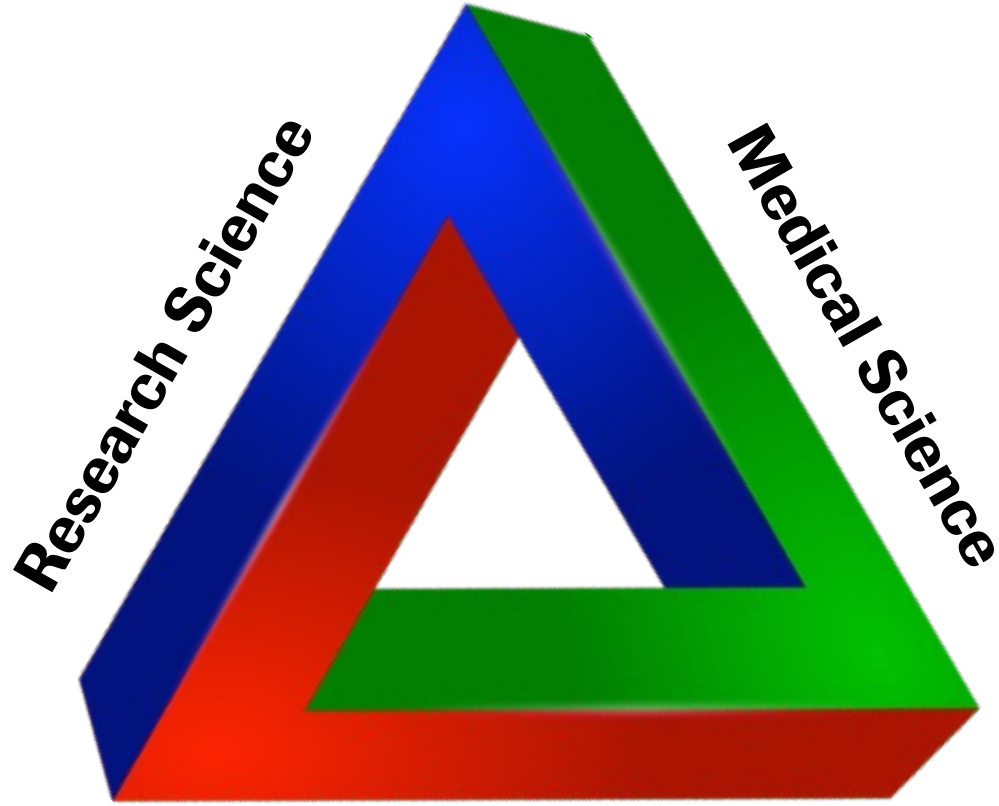
Expanding data access and findability to generate insights

Enables enhanced

- Reverse translation: deepening understanding of diseases
- Translational research: developing biomarkers and new endpoints
- Predictive modeling: access to new indications, and personalized healthcare solutions

The Reign of Data is Beginning

*where rapid data-driven insights and automating manual processes becomes essential**



* Deloitte (2018), Unlocking R&D Productivity, Measuring the return from pharmaceutical innovation 2018

Being Ready to Step Up to Lead

- Data Science Leadership
  - Quality data sources
  - Platforms
  - Data and Information Pipelines
  - Analytical methods
  - Technology

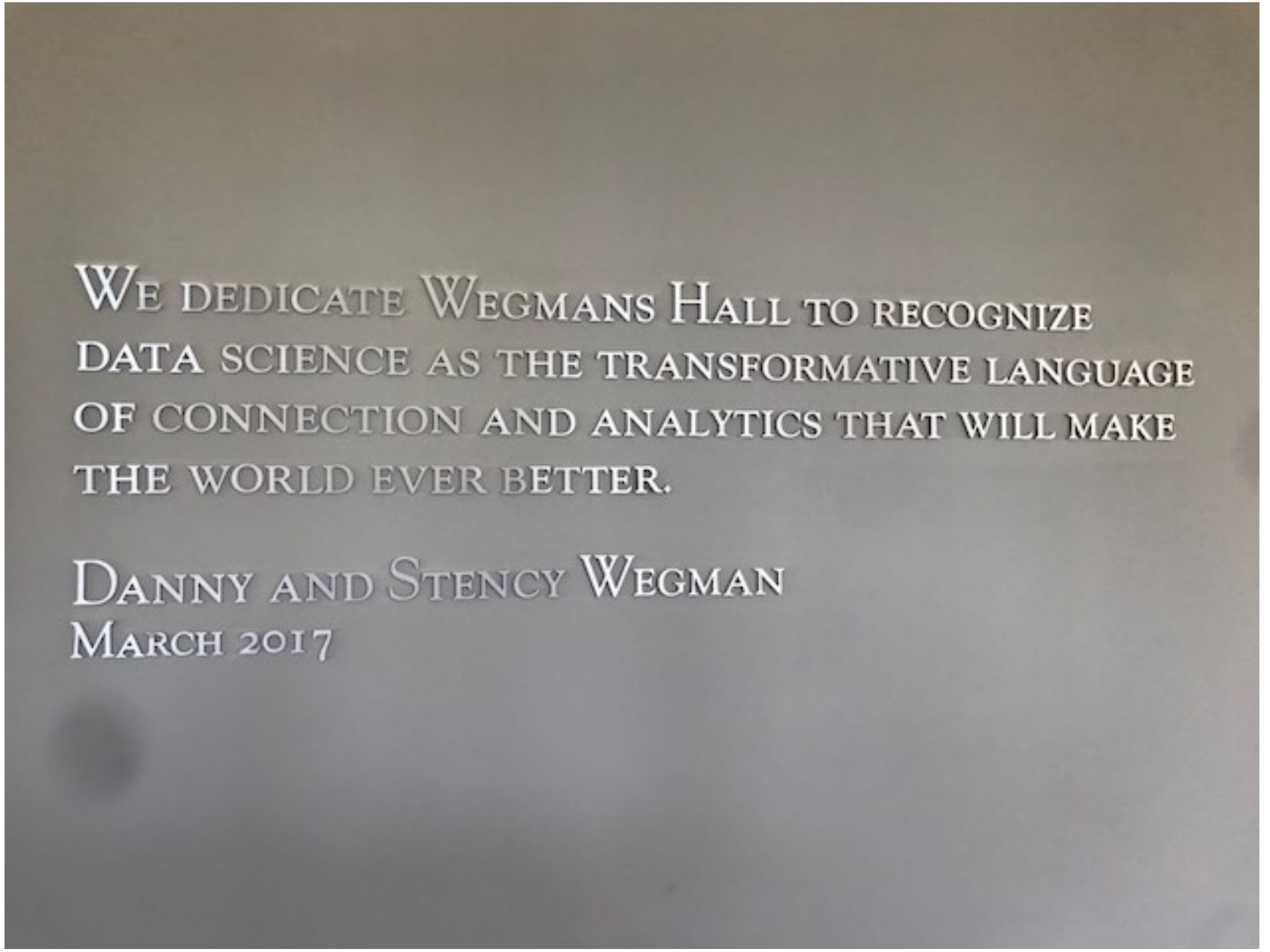
- Drug Development Leadership
  - Molecule Team Leaders
  - Disease Area Leaders
  - Enterprise Leaders

Essential Ingredients for the Future

1. **Effective and Flexible Drug Development Data Ecosystem** – from data creation/acquisition through interpretation/communication; from infrastructure/tools/automation through security/data lifecycle management

2. **Creating environments where Data Scientists will thrive** – in high demand in many industries, academia, government

3. **Enable Data Scientists to best work with rest of business for maximal value** – requires data scientists to be more influential; requires increasing "data knowledge" of non data scientists


We dedicate Wegmans Hall to recognize
data science as the transformative language
of connection and analytics that will make
the world ever better.
Danny and Stency Wegman
March 2017

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Doing now what patients need next

What is “Success”?

- Maximizing impact you can have on company and our constituents

- Increasing breadth and diversity of experiences you can choose to have in your career

Keys to Success

All tips focus on the following must-haves:

- Personal motivation (sense of purpose)
- Developing and maintaining credibility
- Building capabilities to influence

10 Tips for Success

1. Act as if you are running your own business
2. Demonstrate intellectual curiosity of a scientist
3. Build trust and open lines of communication
4. Demonstrate ability to consider multiple options and recognize trade-offs (seek context/think broadly)
5. Get comfortable with ambiguity and change (and adapt)
6. Make (realistic) commitments on your terms & then follow through
7. Know routinely asked questions during internal/external reviews
8. Think in terms of your audience & present your headline responses at the right level (Influence)
9. Do not misrepresent your certainty
10. Leverage your manager/look for mentors