

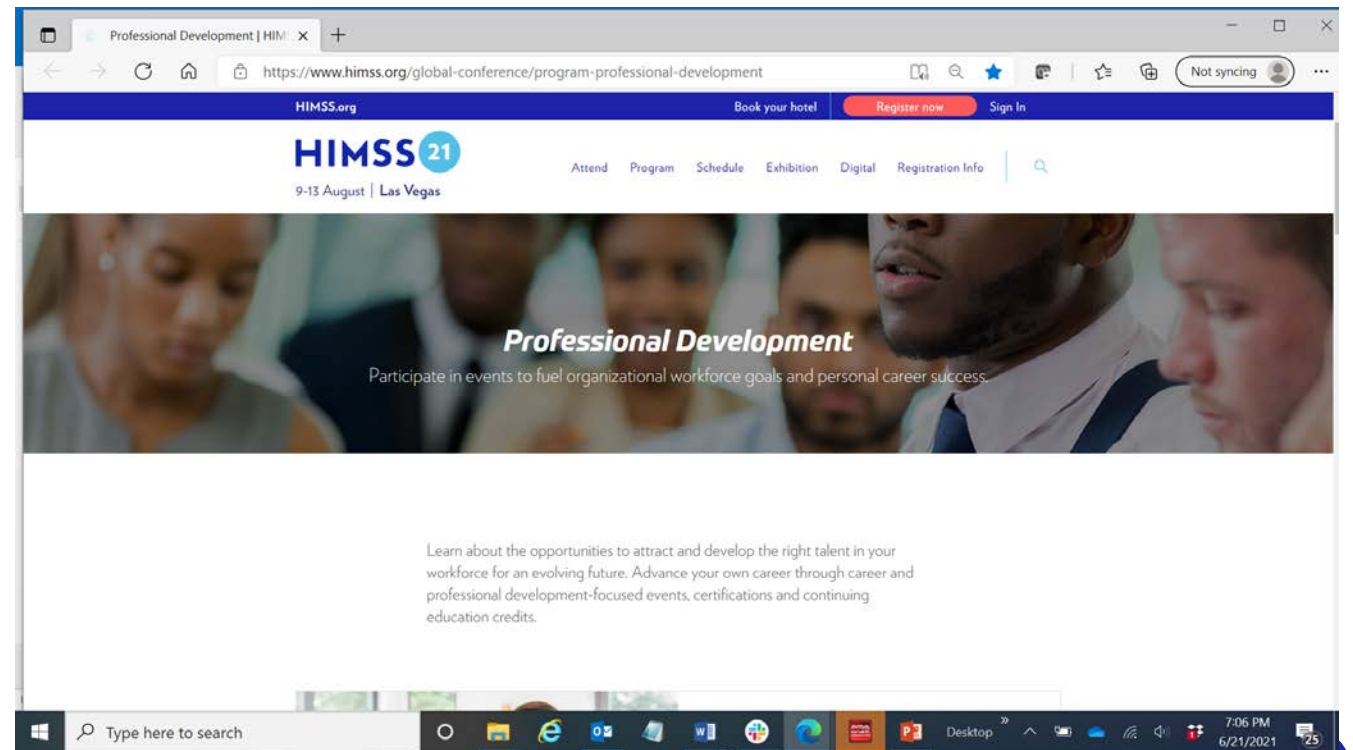
# *Skills for Healthcare Data Analytics and Career Opportunities*

Karen Walsh, DHSC, MS, MBA

ASSISTANT PROFESSOR, POPULATION HEALTH  
PROGRAM DIRECTOR, HEALTH DATA SCIENCE

# Upcoming Events

- **HIMSS21 Professional Development Opportunities**
  - Career Fair August 10-11
  - Professional Development Symposium August 9
  - CAHIMS/CPHIMS Review and Exams



THE PRESENTATION TITLE GOES HERE

*Welcome*

*Dr. Karen Walsh, DHSc,  
MS, MBA*

*ASSISTANT PROFESSOR, POPULATION HEALTH  
PROGRAM DIRECTOR, HEALTH DATA SCIENCE*



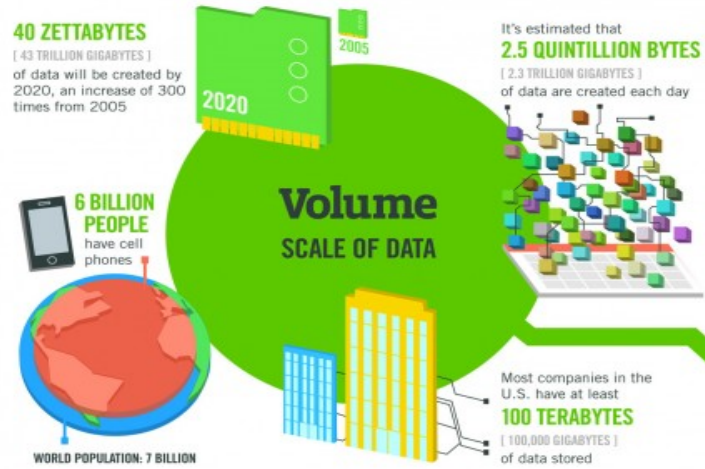
# *Learning Objectives*

- Describe technical skills needed for a career in healthcare data analytics
- Understand the importance of soft skills for career success
- Discuss different career opportunities today and those coming in the future

# Data Is Everywhere!!



# What is Big Data?



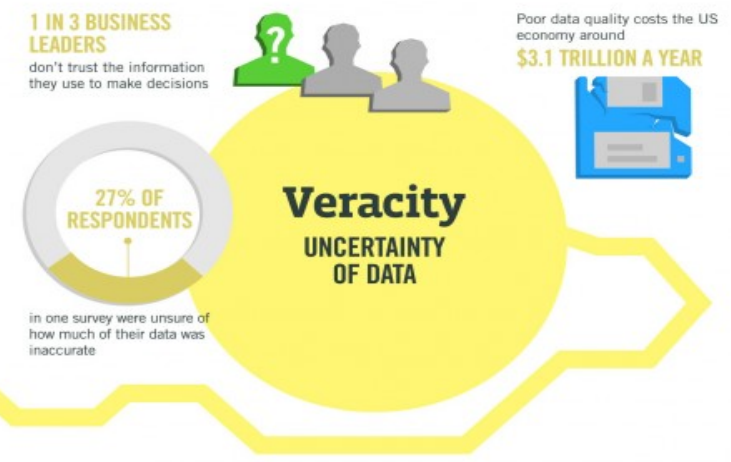
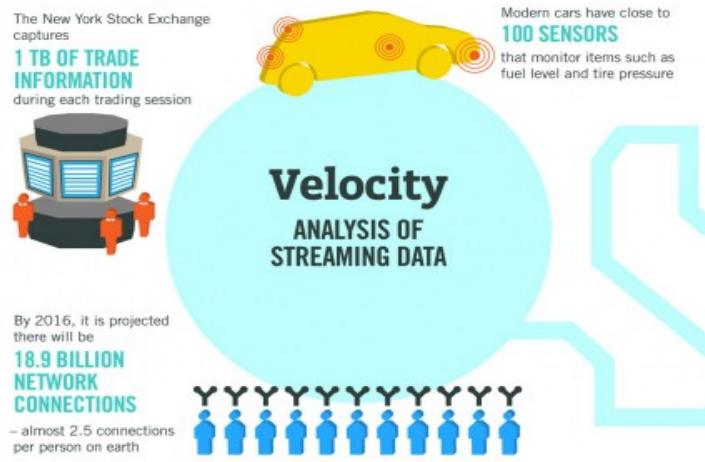
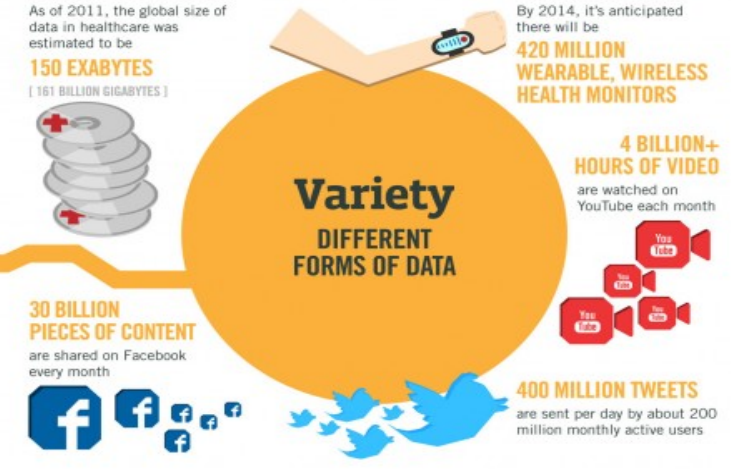
## The FOUR V's of Big Data

From traffic patterns and music downloads to web history and medical records, data is recorded, stored, and analyzed to enable the technology and services that the world relies on every day. But what exactly is big data, and how can these massive amounts of data be used?

As a leader in the sector, IBM data scientists break big data into four dimensions: **Volume, Velocity, Variety and Veracity**

Depending on the industry and organization, big data encompasses information from multiple internal and external sources such as transactions, social media, enterprise content, sensors and mobile devices. Companies can leverage data to adapt their products and services to better meet customer needs, optimize operations and infrastructure, and find new sources of revenue.

By 2015 **4.4 MILLION IT JOBS** will be created globally to support big data, with 1.9 million in the United States



Sources: McKinsey Global Institute, Twitter, Cisco, Gartner, EMC, SAS, IBM, MEPEEC, QAS



# *Volume & Velocity of big data in healthcare*

- **Since 2016, there has been an 878% growth in healthcare data** -- more than manufacturing, final services or media industries
- There is an exponential growth of healthcare data each year
- Healthcare organizations must develop techniques to protect, store, manage, and process these data



Resource: [https://www.dellemc.com/sl-si/collaterals/unauth/briefs-handouts/solutions/h17823\\_solution\\_brief\\_driving\\_real\\_clinical\\_business\\_outcomes\\_with\\_a\\_modern\\_it.pdf](https://www.dellemc.com/sl-si/collaterals/unauth/briefs-handouts/solutions/h17823_solution_brief_driving_real_clinical_business_outcomes_with_a_modern_it.pdf)  
Resource: <https://healthitanalytics.com/news/understanding-the-many-vs-of-healthcare-big-data-analytics>

# *Value of big data in healthcare*

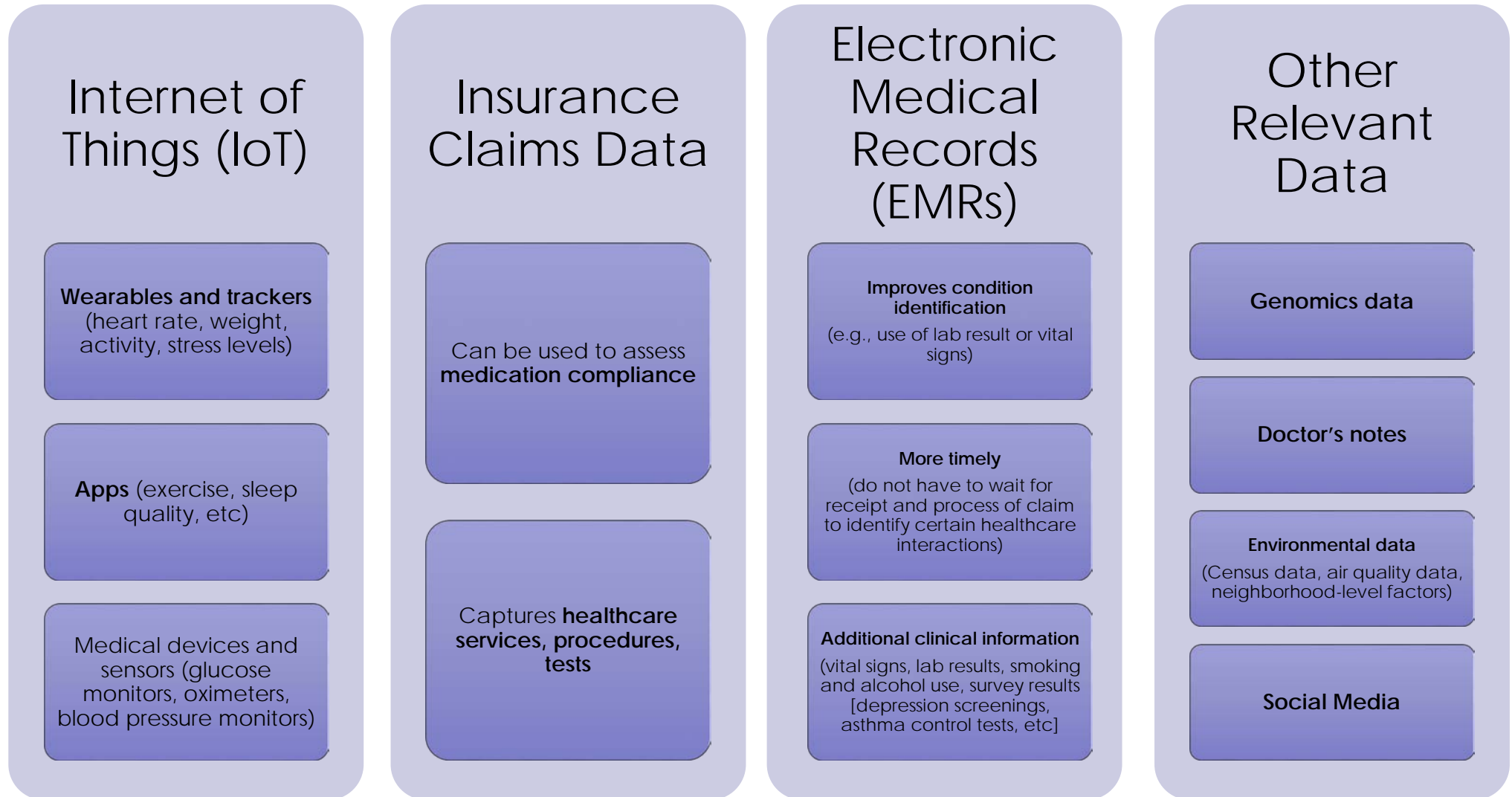
- The application of big data in healthcare can:
  - Reduce healthcare cost
  - Improve patient outcomes
  - Aid in novel drug discovery
  - Prevent progression of disease
  - Accelerate personalized medicine in cancer treatment
  - Reduce fraud and enhance security
  - Enhance accuracy of image diagnostics



Resource: <https://www.datapine.com/blog/big-data-examples-in-healthcare/>

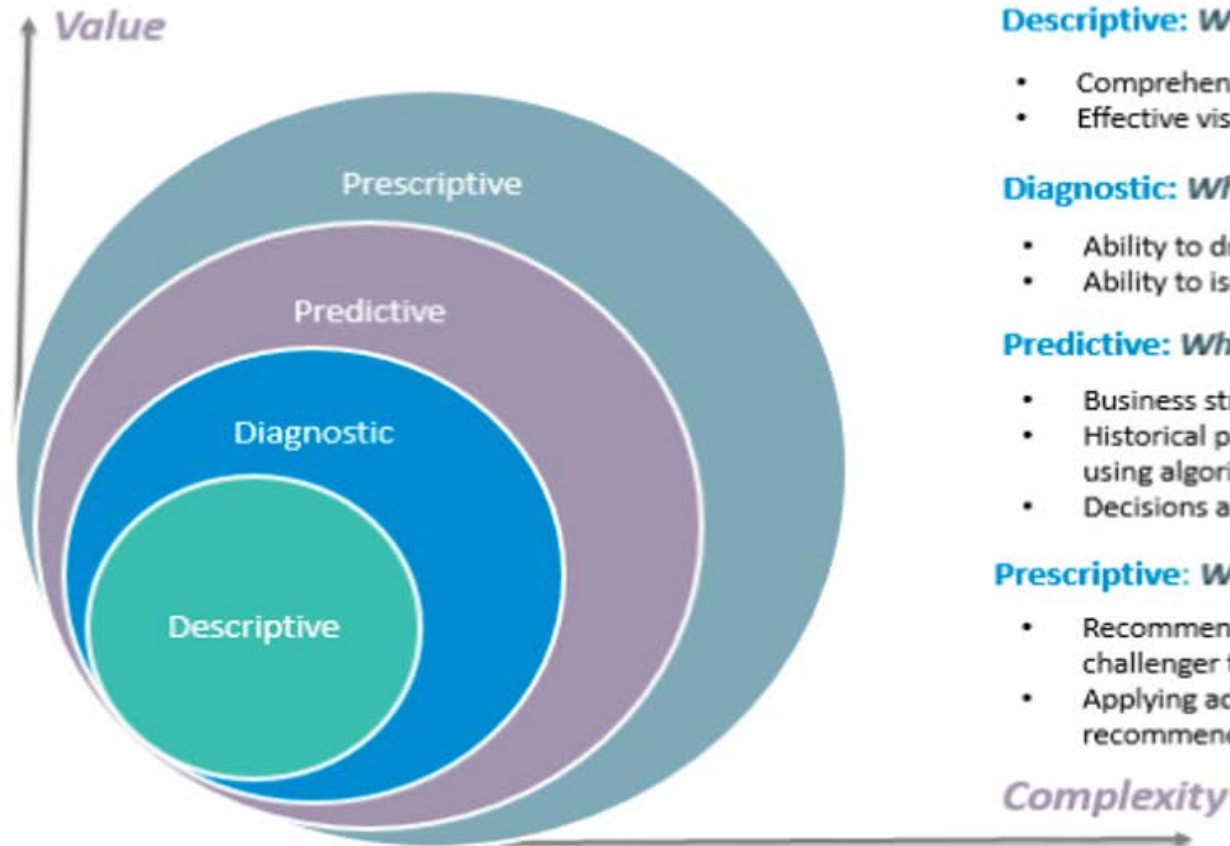


# Variety of big data in healthcare



# What is Data Analytics?

## 4 types of Data Analytics



### What is the data telling you?

#### **Descriptive:** *What's happening in my business?*

- Comprehensive, accurate and live data
- Effective visualisation

#### **Diagnostic:** *Why is it happening?*

- Ability to drill down to the root-cause
- Ability to isolate all confounding information

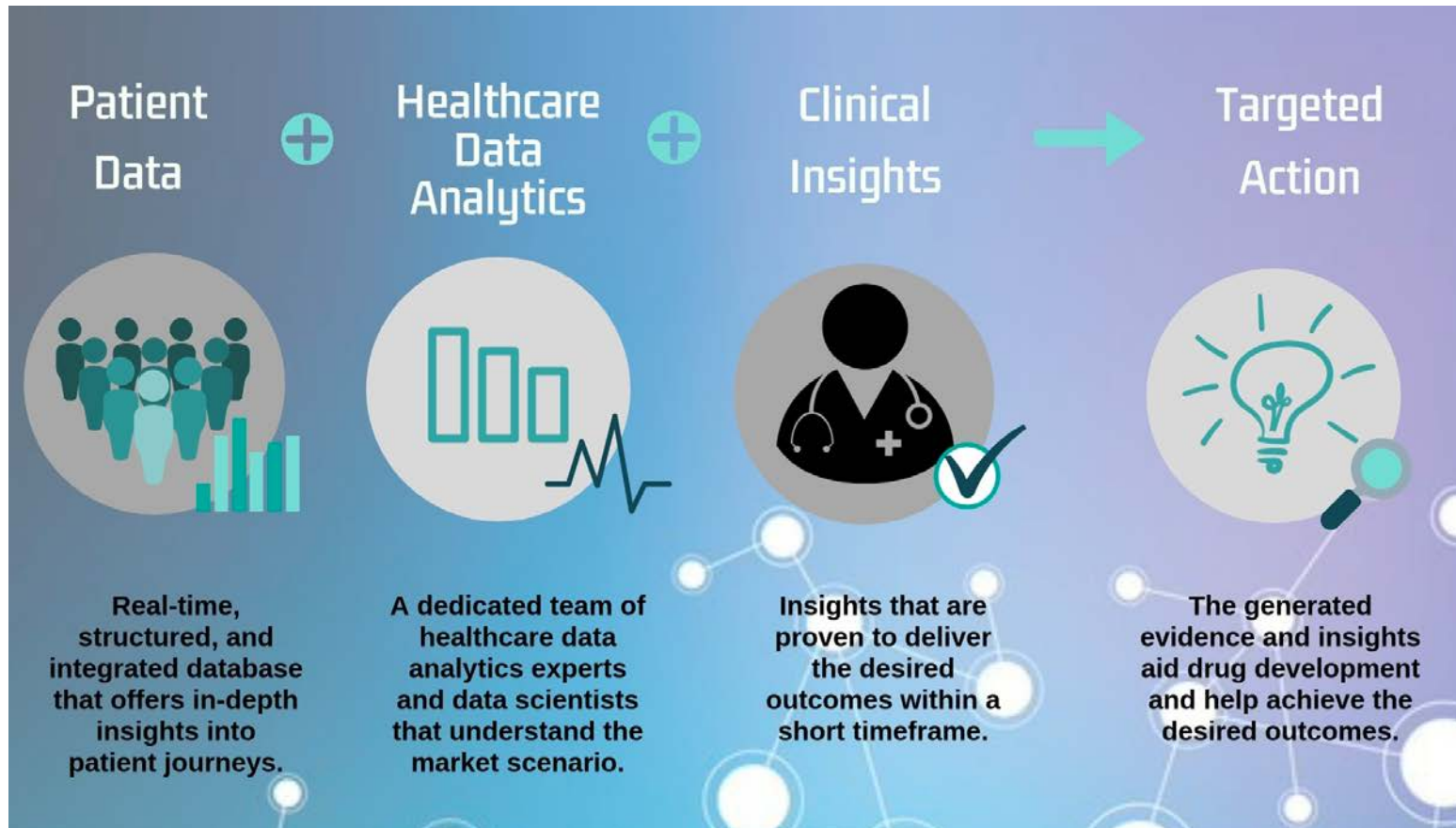
#### **Predictive:** *What's likely to happen?*

- Business strategies have remained fairly consistent over time
- Historical patterns being used to predict specific outcomes using algorithms
- Decisions are automated using algorithms and technology

#### **Prescriptive:** *What do I need to do?*

- Recommended actions and strategies based on champion / challenger testing strategy outcomes
- Applying advanced analytical techniques to make specific recommendations

# What is Healthcare Data Analytics?

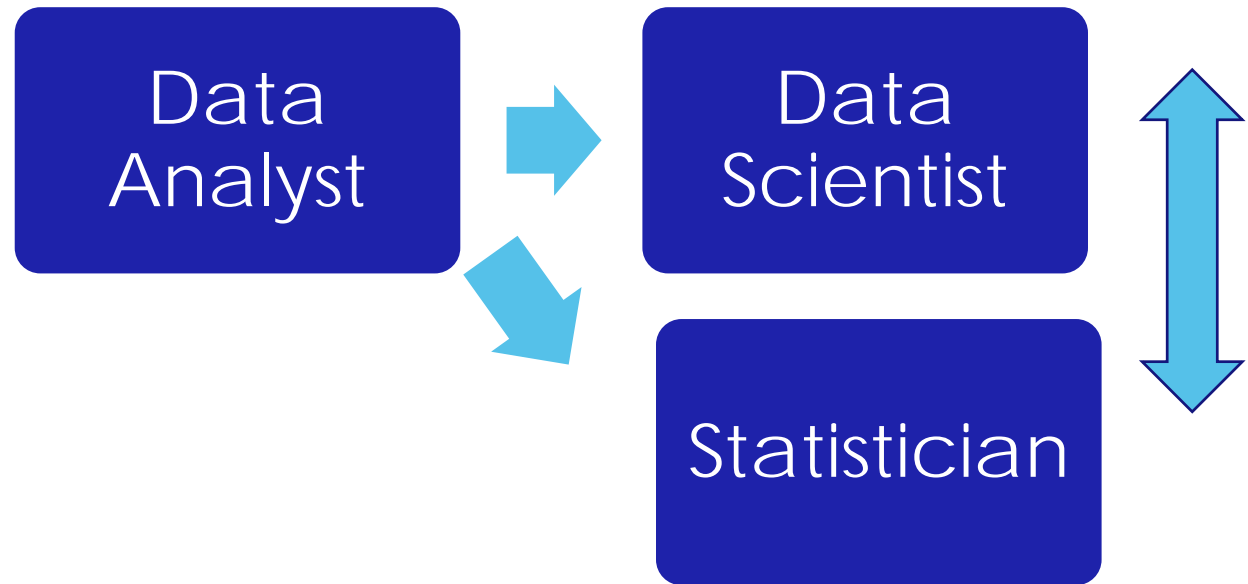


<https://www.businesswire.com/news/home/20200805005554/en/Healthcare-Analytics-Quantzig-Presents-Three-Success-Stories-on-How-Healthcare-Industry-Leaders-are-Capitalizing-on-Emerging-Opportunities>

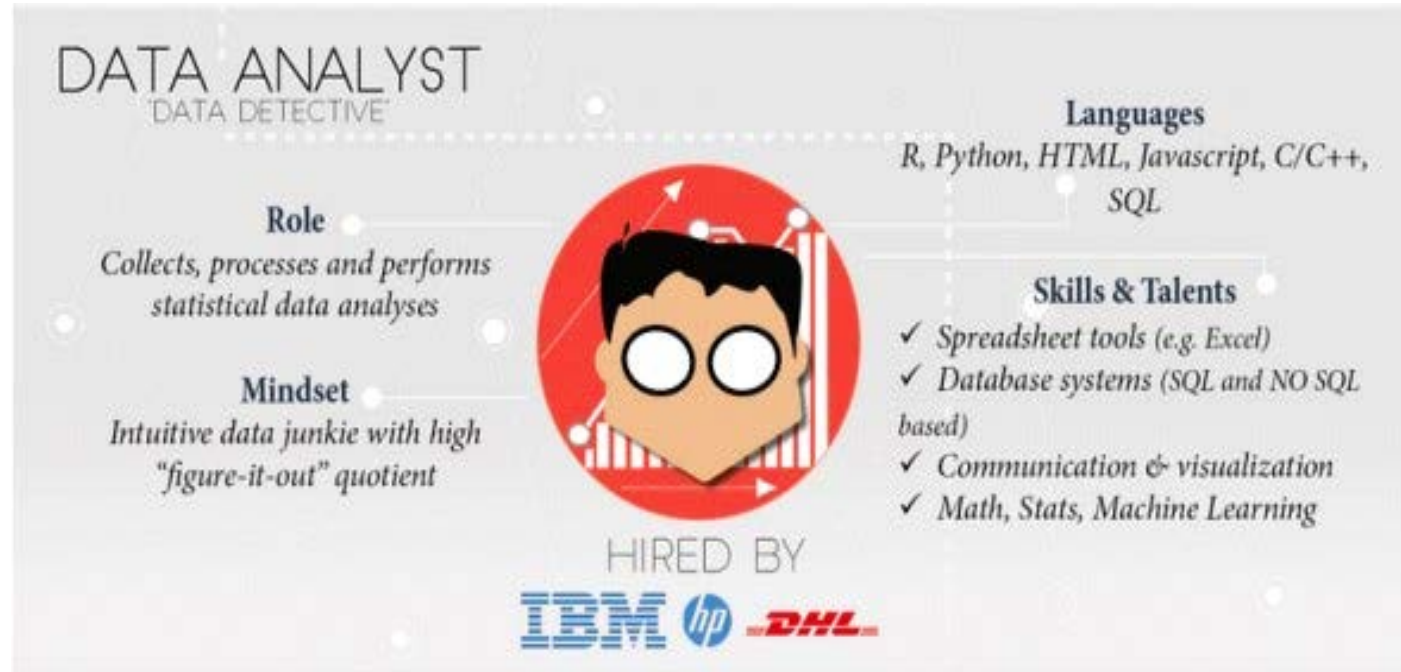
# Careers in Healthcare Data Analytics

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- Data Analyst
- Data Scientist
- Statistician

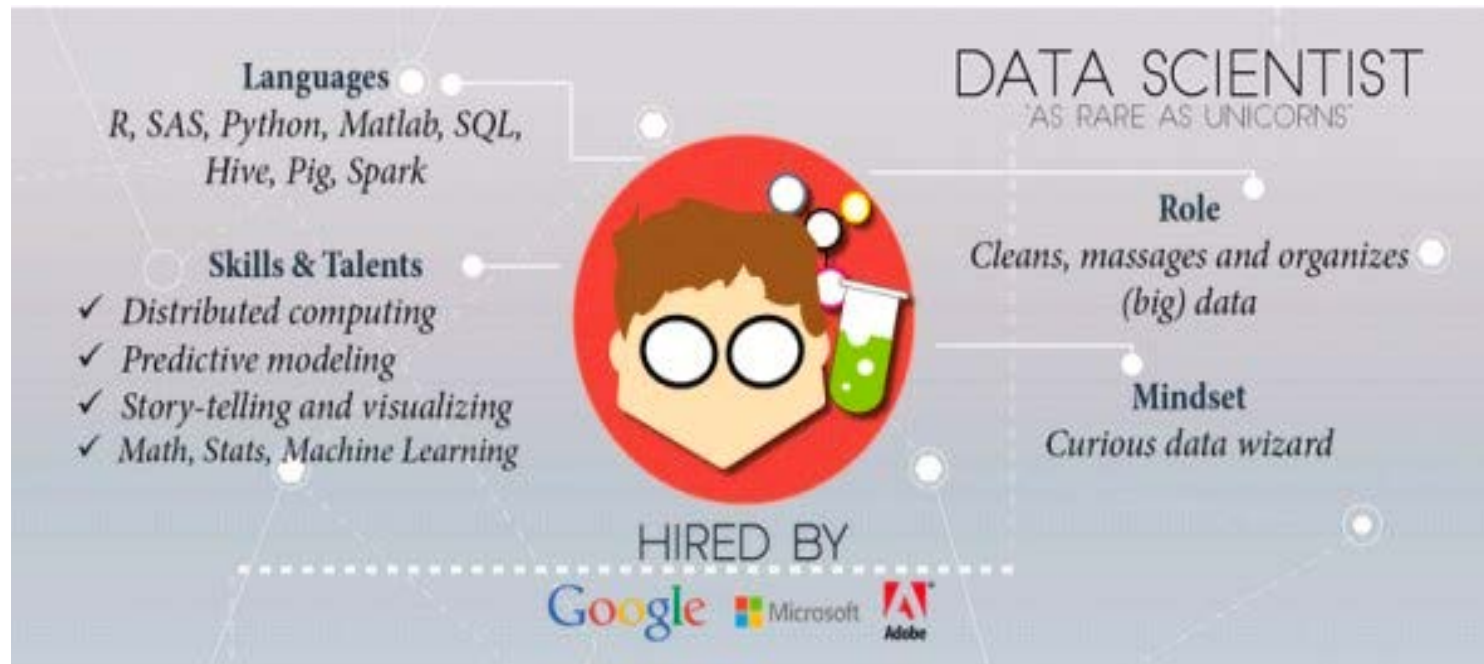


# Data Analyst



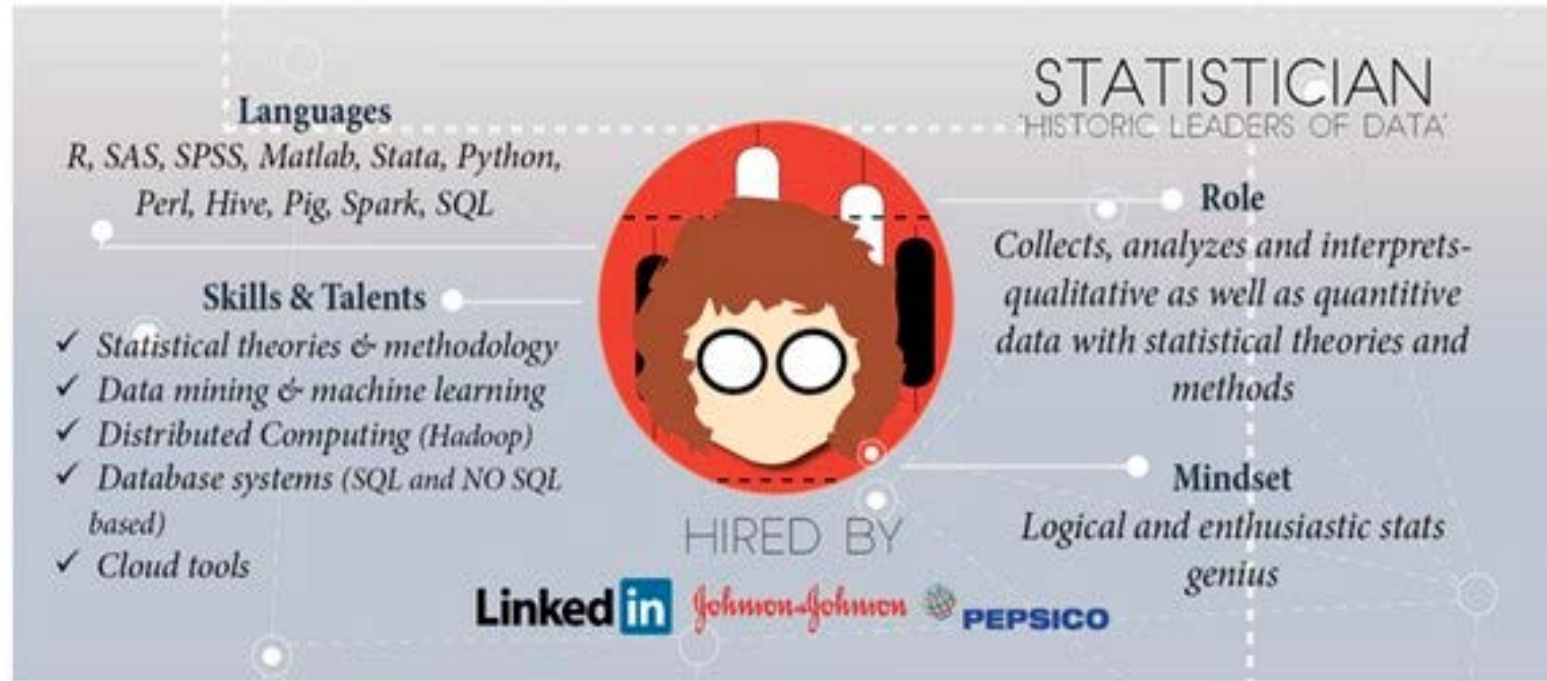
<https://www.kdnuggets.com/2015/11/different-data-science-roles-industry.html#comments>

# Data Scientist

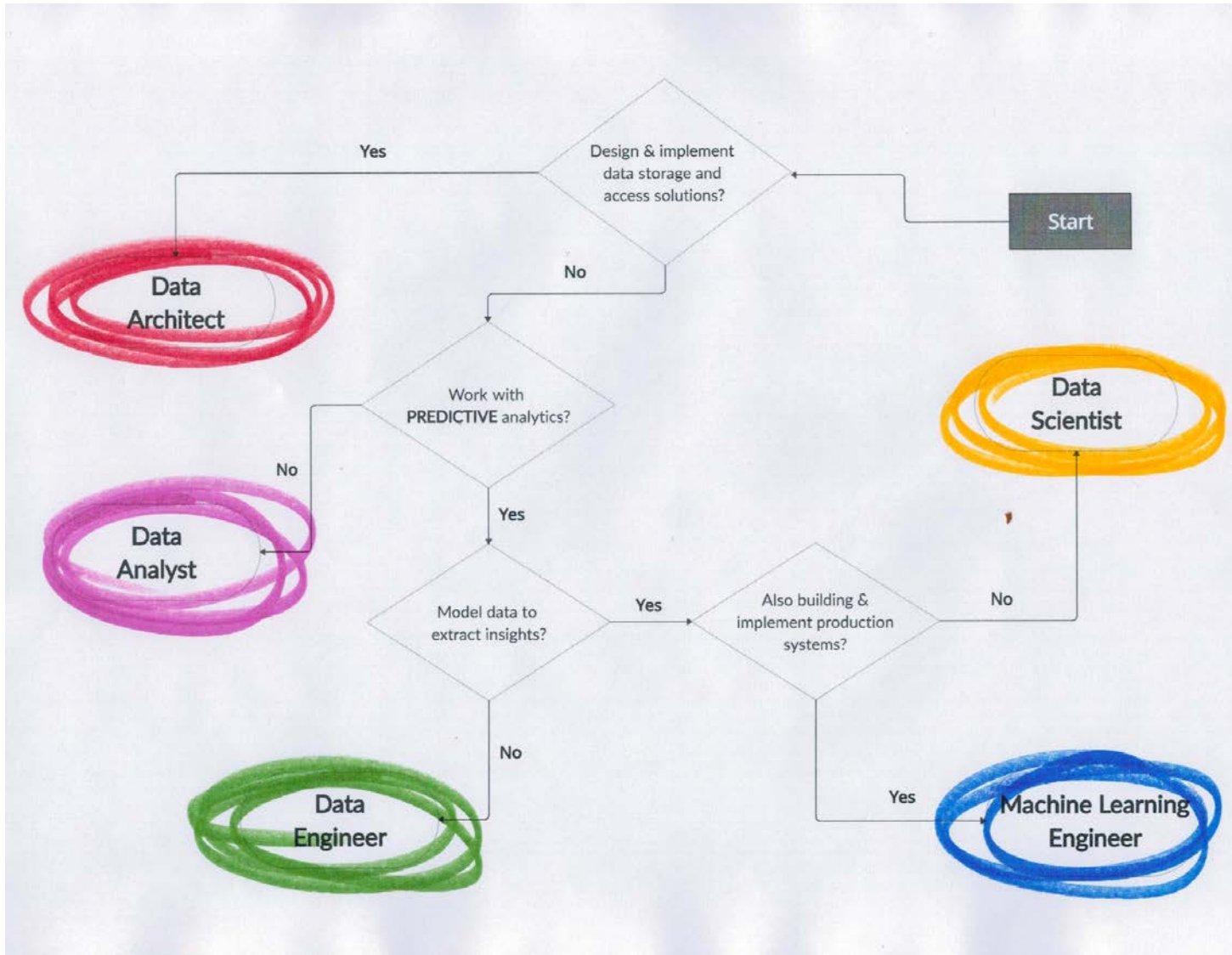


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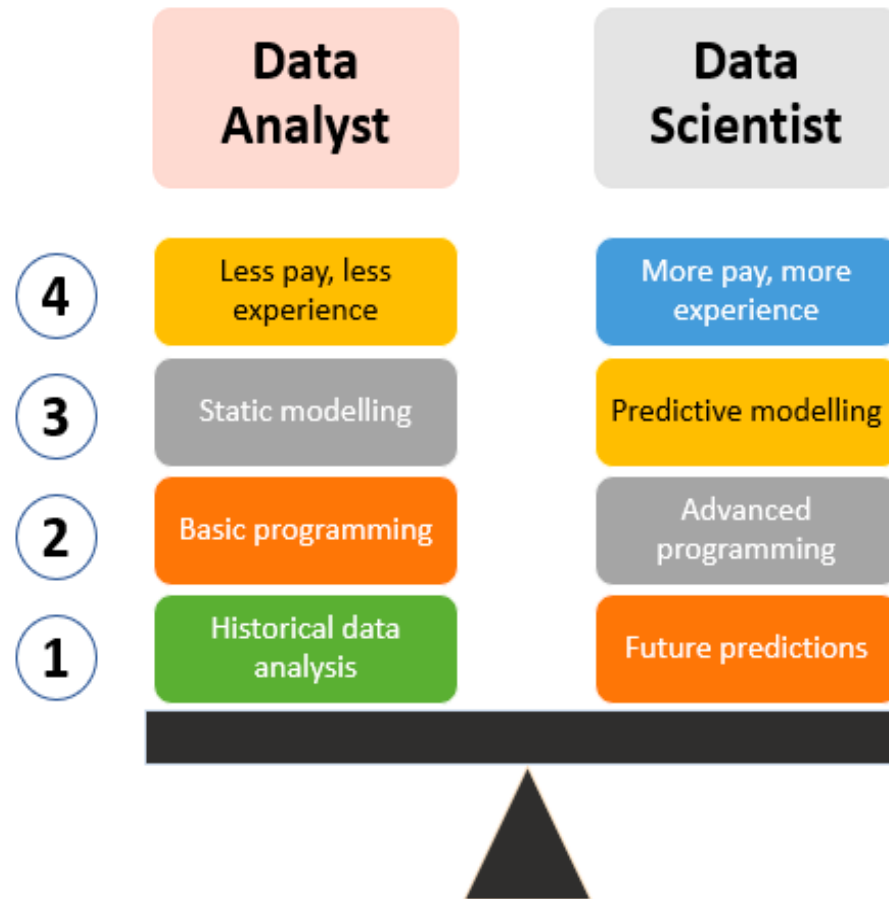
# Statistician







# *Difference between a Data Analyst and Data Scientist?*



# *Difference Between a Statistician and Data Scientist?*

	Statistician	Data Scientist
<b>Image</b>	Baseball (Cricket)	HBR Sexiest Job of 21 <sup>st</sup> Century
<b>Mode</b>	Reactive	Consultative
<b>Works</b>	Solo	In a team
<b>Inputs</b>	Data File, Hypothesis	A Business Problem
<b>Data</b>	Pre-prepared, clean	Distributed, messy, unstructured
<b>Data Size</b>	Kilobytes	Gigabytes
<b>Tools</b>	SAS, Mainframe	R, Python, awk, Hadoop, Linux, ...
<b>Nouns</b>	Tables	Data Visualizations
<b>Focus</b>	Inference (why)	Prediction (what)
<b>Output</b>	Report	Data App / Data Product
<b>Latency</b>	Weeks	Seconds
<b>Stars</b>	G.E.P Box Trevor Hastie	Hilary Mason Nate Silver

<https://blog.revolutionanalytics.com/2013/05/statistics-vs-data-science-vs-bi.html>

# Skills and Education: Data Analyst vs. Data Scientist/Statistician

	Data Analyst	Data Scientist/Statistician
Mathematics	Foundational math, statistics	Advanced statistics, predictive analytics
Programming	Not required or minimal SQL or basic programming skills	Advanced Programming Skills-R, Python, SAS
Software and tools	Excel, business intelligence software	Hadoop, MySQL, TensorFlow, Spark
Other skills	Analytical thinking, data visualization	Statistical modeling, Predictive Modeling, Machine learning,
Education	Bachelor's Degree	Master's or Doctoral Degree

# *Careers In Health Data Analytics*

Since 2016, there has been an 878% growth in healthcare data -- more than manufacturing, financial services or media industries. Healthcare has a need for people with skills in predictive and statistical modeling, and who can wrangle data.

According to the Robert Half Salary Guide 2020, data analysts in the US make between \$83,750 and \$142,500, depending on skills and experience. Data scientists earn even more — \$105,750 to \$180,250.

<https://healthitanalytics.com/news/understanding-the-many-vs-of-healthcare-big-data-analytics>

<https://www.coursera.org/articles/data-analyst-vs-data-scientist-whats-the-difference>

# *Professional Associations*

- **American Statistical Association (ASA)**
  - ASA's membership exceeds 19,000 professionals in academia, government, research, and business in statistics and data science. It consists of more than 70 chapters, nearly 30 sections, 17 journals, and six yearly conferences. The ASA aims to facilitate collaboration between statisticians and data scientists and enable them to achieve more than they could on their own.
- **Healthcare Information and Management Systems Society (HIMSS)**
  - Healthcare Information and Management Systems Society, Inc. (HIMSS) is a global advisor and thought leader supporting the transformation of the health ecosystem through information and technology.
- **AcademyHealth**
  - AcademyHealth improves health and health care for all by advancing evidence to inform policy and practice.

# *Recent Graduates: Getting a Job in Analytics*

- Internships/Externships
- Networking
  - ✓ Professional Organizations (Get Involved!)
  - ✓ LinkedIn
- Larger corporations with programs or entry level positions specifically for recent graduates
- Additional Training/Certifications

# *Transitioning Your Existing Career to Analytics*

- Additional Education
- Networking (External and Internal)
- Internal Analytical Projects at our Company
- Professional Organizations
  - ✓ Conferences
  - ✓ Work Groups
  - ✓ Webinars



# Soft Skills in Healthcare

## Data Analytics

# MODERN DATA SCIENTIST

Data Scientist, the sexiest job of the 21st century, requires a mixture of multidisciplinary skills ranging from an intersection of mathematics, statistics, computer science, communication and business. Finding a data scientist is hard. Finding people who understand who a data scientist is, is equally hard. So here is a little cheat sheet on who the modern data scientist really is.

## MATH & STATISTICS

- ☆ Machine learning
- ☆ Statistical modeling
- ☆ Experiment design
- ☆ Bayesian inference
- ☆ Supervised learning: decision trees, random forests, logistic regression
- ☆ Unsupervised learning: clustering, dimensionality reduction
- ☆ Optimization: gradient descent and variants

## PROGRAMMING & DATABASE

- ☆ Computer science fundamentals
- ☆ Scripting language e.g. Python
- ☆ Statistical computing packages, e.g., R
- ☆ Databases: SQL and NoSQL
- ☆ Relational algebra
- ☆ Parallel databases and parallel query processing
- ☆ MapReduce concepts
- ☆ Hadoop and Hive/Pig
- ☆ Custom reducers
- ☆ Experience with xaaS like AWS

## DOMAIN KNOWLEDGE & SOFT SKILLS

- ☆ Passionate about the business
- ☆ Curious about data
- ☆ Influence without authority
- ☆ Hacker mindset
- ☆ Problem solver
- ☆ Strategic, proactive, creative, innovative and collaborative

## COMMUNICATION & VISUALIZATION

- ☆ Able to engage with senior management
- ☆ Story telling skills
- ☆ Translate data-driven insights into decisions and actions
- ☆ Visual art design
- ☆ R packages like ggplot or lattice
- ☆ Knowledge of any of visualization tools e.g. Flare, D3.js, Tableau



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# *Domain Knowledge and Soft Skills*

- Passionate about the Business
- Curiosity
- Influence without Authority
- Collaborator

# *Domain Knowledge and Soft Skills*

- Problem Solver
- Innovative & Creative
- Strategic
- Proactive

# *Communication and Visualization*

- Storyteller
- Able to engage with all levels of management
- Distill complex analyses into data visualizations for broad audiences
- Translate insight into action

# *Thomas Jefferson College of Population Health: Master's Degree in Health Data Science*

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# Q & A