

# *Leveraging Industrial Statistics in the Data Revolution*

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Miami University  
October 4, 2018

## *Industrial Revolution/Machine Age*

## *Data Revolution/Information Age*



*Industrial Revolution/Machine Age*

*Data Revolution/Information Age*

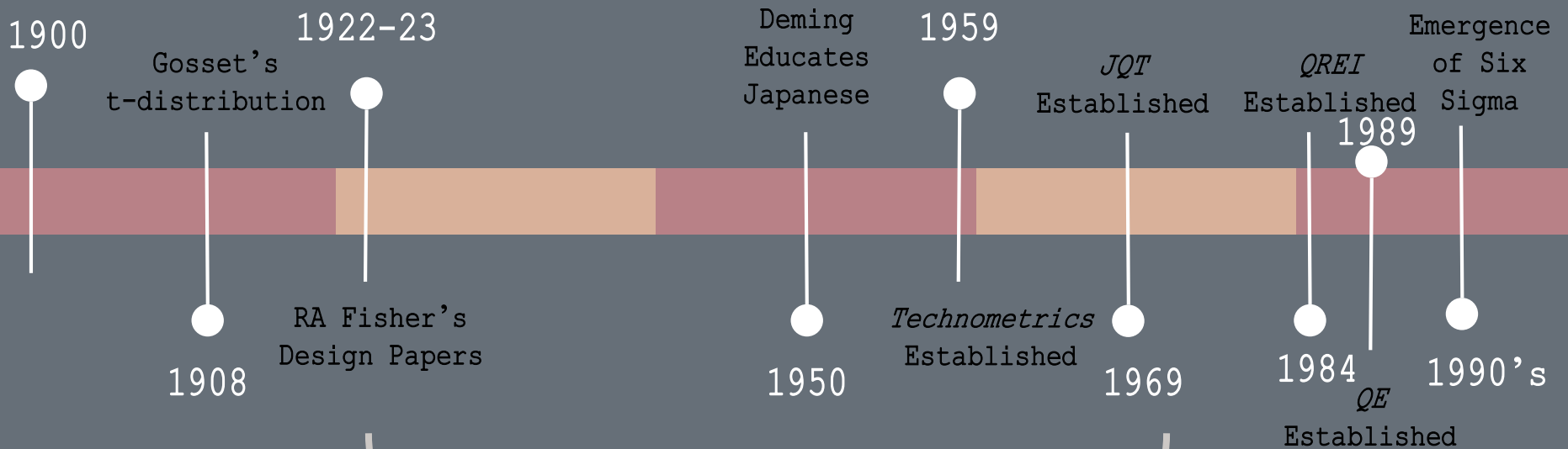
**“We are currently preparing students for jobs and technologies that don’t exist in order to solve problems we don’t even know are a problem.”**

Industrial  
Statistics

Industrial  
Statisticians

Data Science

Data Scientists



## Jack Youden's Career

*Industrial  
Statistics*

*Industrial  
Statisticians*

*Data Science*

*Data Scientists*



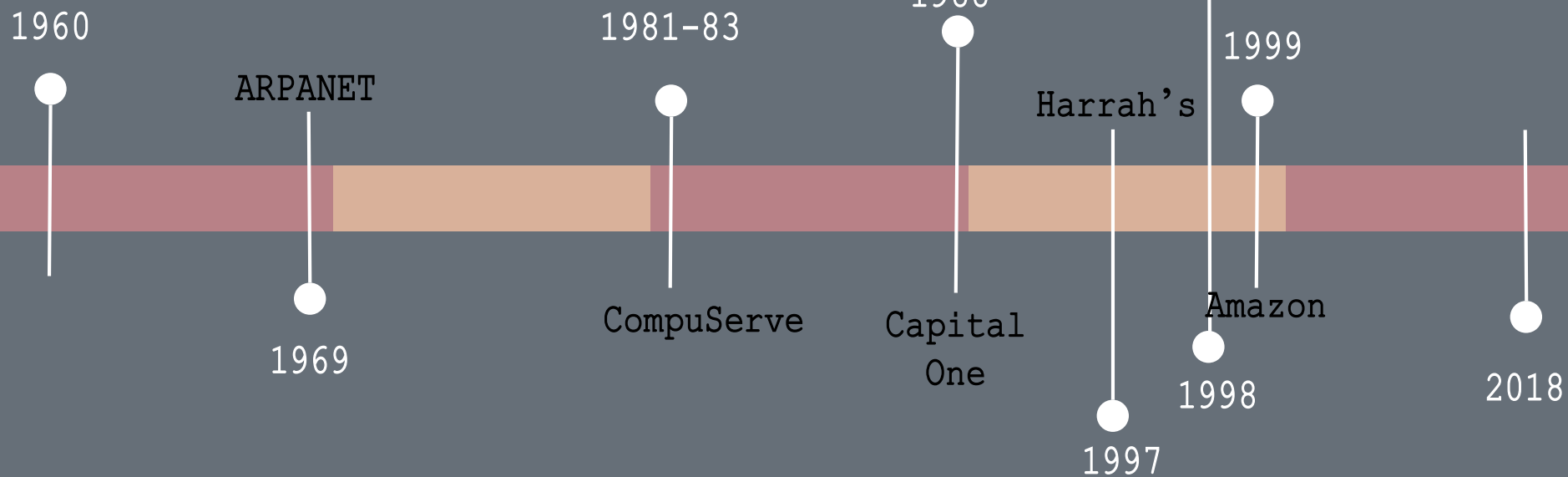
- 1. Self Taught, Life-long Learner**
- 2. Innovative Problem Solver**
- 3. Clear Communicator**
- 4. Open Sharer of Knowledge**
- 5. Emphasized Upfront Study Design**

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1969

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The screenshot shows a web browser window titled "Internet". The main content area features the "COMPUERVE Internet Services" logo on the left and a globe icon on the right. Below the logo is a list of links: "About the Internet", "About Internet Mail", "About the Internet Forums", "Internet New Users Forum +", "Internet Resources Forum +", "Internet Publishing Forum +", "Internet Feedback", and "Special Pricing - The Internet Club". At the bottom of this list is "Direct Internet Access (Dial PPP)". To the right of the list are two icons: "USENET Newsgroups" and "Internet World Magazine Forum +". At the bottom of the browser window are two icons: "Telnet: Remote Login" and "FTP: File Transfer".



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- Wall Street Journal July 2018

## **3 Differentiators in Information Age**

1. Build new technology
2. Own proprietary data
3. Leverage data for effective decision making

**“A person employed to analyze and interpret complex digital data such as the usage statistics of a website, especially in order to assist a business in its decision making.”**

**—Google Dictionary Entry**

“A new breed of analytical data experts who have the technical skills to solve complex problems and the curiosity to explore what problems need to be solved. They’re part mathematician, part computer scientist, and part trend spotter.”

—SAS

“The Data Scientist’s most basic, universal skill is the ability to write code...the dominant trait among data scientists is an intense curiosity—a desire to go beneath the surface of a problem, find the questions at its heart, and distill them into a very clear set of hypotheses that can be tested.”

—Tom Davenport and D.J. Patil,  
“Data scientist: the sexiest job of the 21<sup>st</sup> Century”

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**DECISION SCIENCES**  
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**EMPIRICAL RESEARCH**

**Knowledge, Skills, and Abilities for  
Entry-Level Business Analytics Positions:  
A Multi-Method Study**

***Software & Coding*** ***Professional***

- 1. Excel**
- 2. SAS**
- 3. SQL**
- 4. Independently learn**
- 5. Oracle**

***Analytical***

- 6. Integrate analyses from multiple sources into a solution**
- 7. Use Graphical Tools/Data Visualization to interpret data**
- 8. Frame a problem or question analytically**
- 9. Solve pre-framed problems or questions analytically**
- 10. Interpret analytical results**



“The Data Scientist’s most basic, universal skill is the ability to **write code**...the dominant trait among data scientists is an **intense curiosity**—a desire to go beneath the surface of a problem, find the questions at its hear, and **distill** them into **a very clear set of hypotheses that can be tested.**”

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## **3 Differentiators in Information Age**

1. Build new technology
2. Own proprietary data
3. Leverage data for effective decision making

## **INFORMS Certified Analytics Professional (CAP) Job Domains**

1. **Business Problem (Question) Framing:** Identifying, refining problem statement
2. **Analytics Problem Framing:** Reformulating problem into an analytics problem
3. **Data:** Prioritizing, acquiring, preparing data
4. **Methodology:** Selecting methodology to answer question
5. **Model Building:** Development and calibration of model
6. **Deployment:** Delivery of solution into practice
7. **Model Life Cycle Management:** Monitoring of solution in practice.

## Industrial Statisticians

- Self taught, lifelong learners
- Innovative problem solvers
- Good communicators
- Open sharers of knowledge
- Emphasize good study design

## Knowledge, Skills, Abilities

- Domain specific problem framing
- Analytical problem framing
- Data acquisition and cleaning
- Model development
- Communication/deployment of results
- Solution/Life cycle management

## Industrial Statisticians

- Self taught, lifelong learners
- Innovative problem solvers
- Good communicators
- Open sharers of knowledge
- Emphasize good study design

## Data Science KSAs

- Domain specific problem framing

## Upfront Study Design

## Inferential Validity

- Analytical problem framing
- Data acquiring and cleaning
- Model development
- Communication/deployment of results
- Solution/Life cycle management

# *Leveraging Industrial Statistics*

## **3 Differentiators in Information Age**

1. Ability to build new technology
2. Owning proprietary data
3. Leveraging data for effective decision making

## **Transforming Data Science**

1. Be part of the **DEVELOPMENT**
2. Be part of the **DATA**
3. Be part of the **SOLUTION**

# Educating Our Future

## Traits

- Self taught, lifelong learners
- Innovative problem solvers
- Good communicators
- Open sharers of knowledge
- Emphasize good study design

## Knowledge Skills Abilities

- Domain specific problem framing
- **Upfront Study Design**
- **Inferential Validity**
- Analytical problem framing
- Data acquiring and cleaning
- Model development
- Communication/deployment of results
- Solution/Life cycle management

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