



**15<sup>TH</sup> NATIONAL  
CONVENTION  
ON STATISTICS**

03-05 OCTOBER 2022

*Organized by the Philippine Statistical System  
Spearheaded by the Philippine Statistics Authority*



**Emerging roles for statisticians in advanced analytics as data culture builders:  
Insights from a comparison of hiring trends in high demand markets**

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Careers in Statistics  
Crowne Plaza Manila Galleria  
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## Title

**Emerging roles for statisticians in advanced analytics as data culture builders: Insights from a comparison of hiring trends in high demand markets**

# Statisticians for better lives



## *Statistician*

Organized by the Philippine Statistical System  
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The International Standards for Classification of Occupations (ISCO) :

Someone who “collects, tabulates, and, most importantly, analyzes quantitative information coming from a varied array of fields. Statisticians interpret and analyze statistical studies on fields such as health, demographics, finance, business, etc. and advise based on patterns and drawn analysis.

Optionally, they advise as forecast experts, inference, and modelers so decisions regarding financial matters, policy, business, and management that require domain expertise are made with acceptable precision. [ISCO]

## The “Why” of statisticians

**Better inputs → better insights →  
better options → better decisions →  
better lives**

## Counting people : Not always to improve better lives

### 1<sup>st</sup> human census : 2nd CE Han Dynasty



### EMPIRE → WELFARE

1086 - William taxes colonized England

1400 – Incas counted workers in empire

1700s - Europe nobles avoided censuses

1790- 1<sup>st</sup> CENSUS done in US to represent Congress

1864 – Census data used to quicken end to Civil War

1920 – Census data used to discriminate ‘ideal’ immigrants from Europe

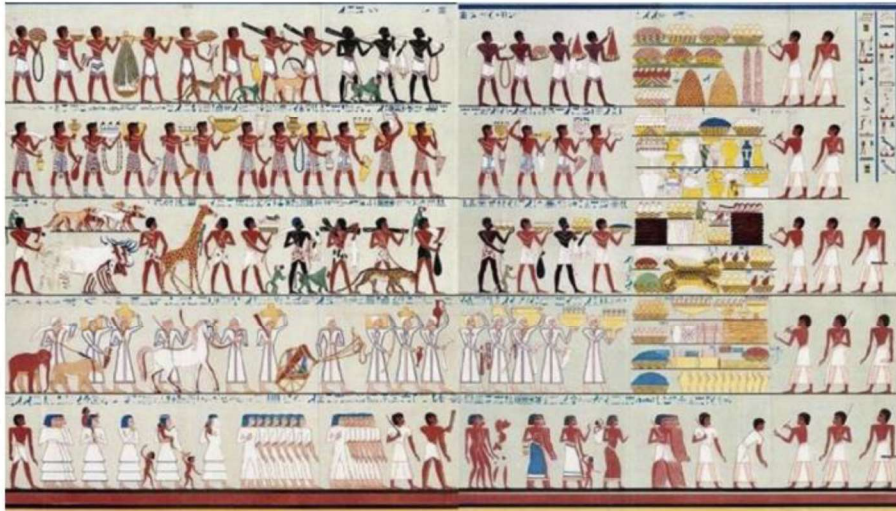
1958 – UN recommends censuses for better housing

1983 – Census used to estimate unified Germany

2001 – Self-identification : 390,000 JEDI followers in UK



## Data-driven: Not necessarily improves lives



3100 BC  
anywhere with a tablet, Ancient Egypt



Great Hack | Official Trailer | Netflix ...

2020s  
Any screen Netflix, Earth or ISS 😊

# Professional statisticians abide by CODE OF ETHICS

AMSTAT exhorts statistical practitioners to abide by eight principles the most important of which is the ethical principle for the “purpose of promoting accountability” and integrity to sustain stakeholder trust in the context of decision making in organizations in any domain Ethical Guidelines for Statistical Practice ([https:// www amstat.org](https://www.amstat.org))

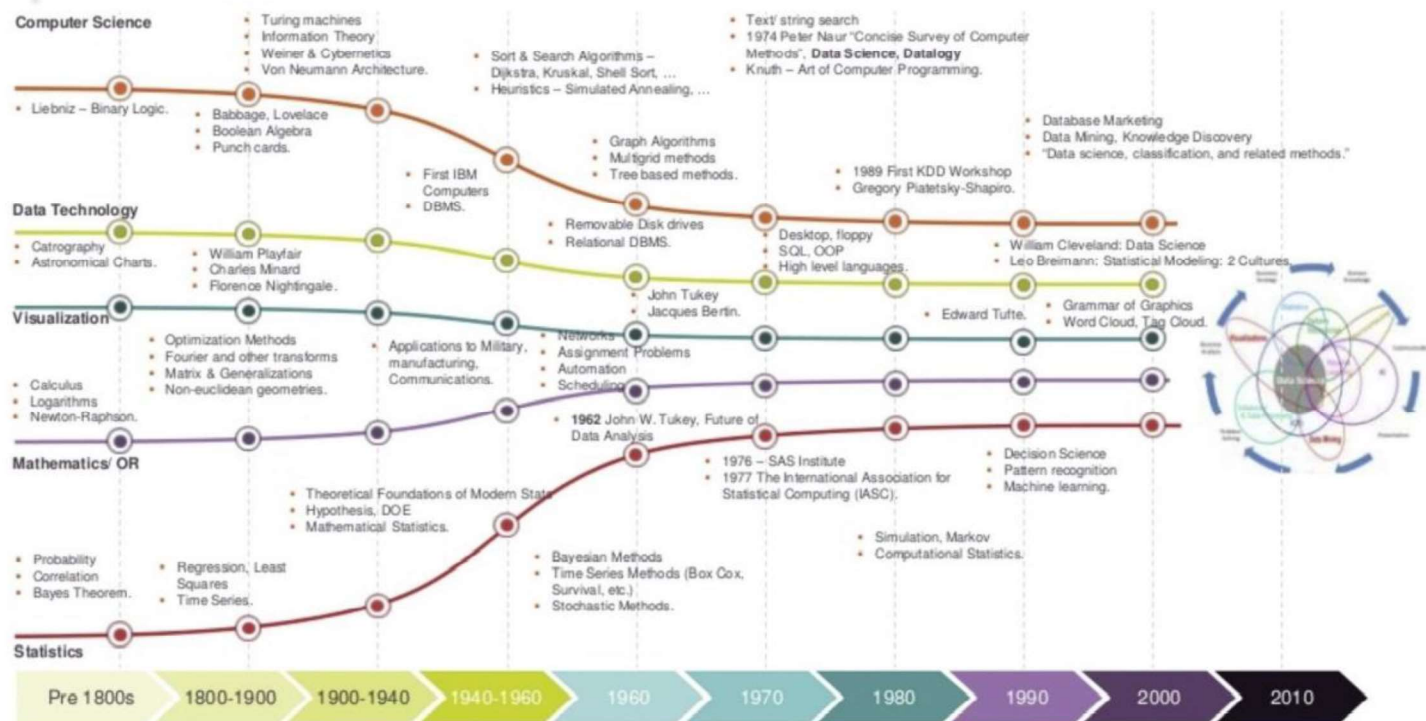


**Statisticians are primarily decision support advisors**

Technology and big business  
accelerated demand for data  
professionals

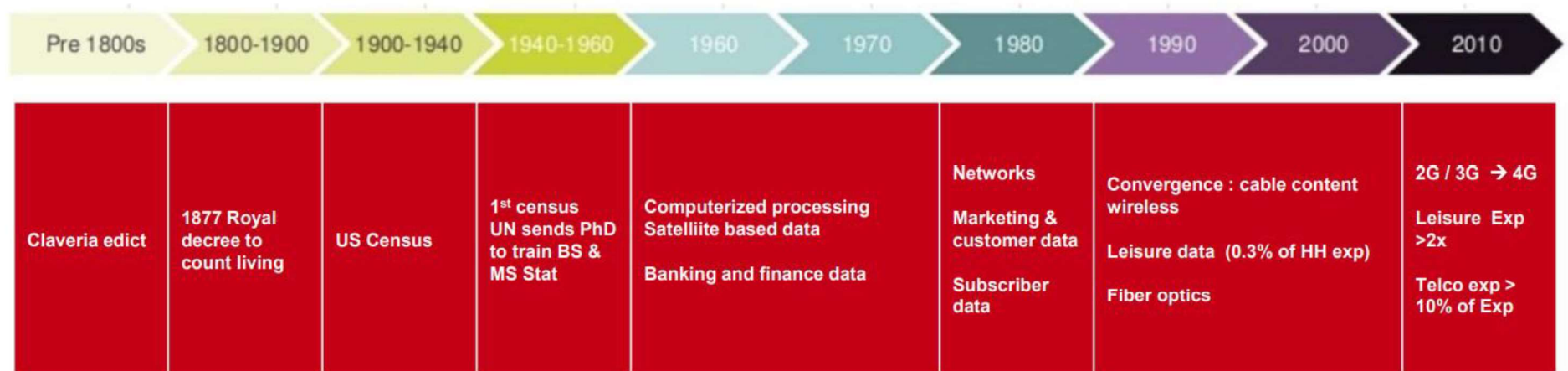
# Value of statistics + math + visual + technology → DATA SCIENCE

Statistics (state data) + probability (risk science) + visual (buy in) + computing power (chips)

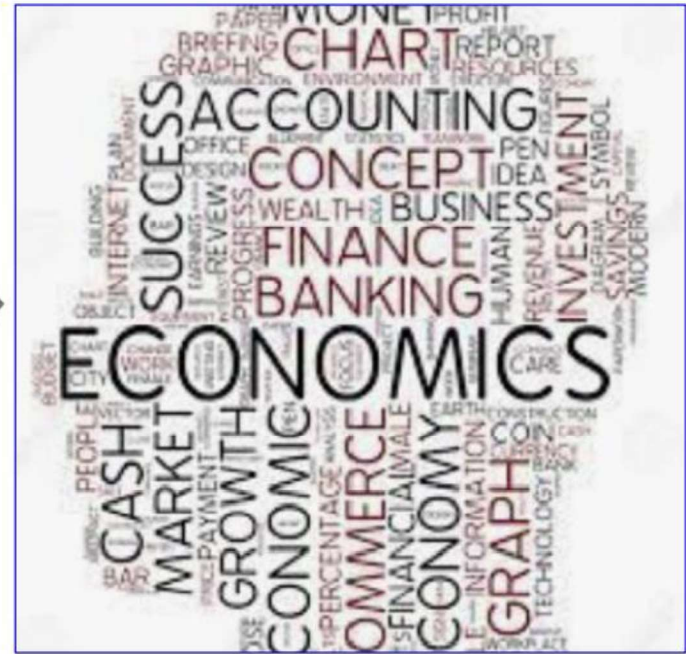


## Data science in PH

Statistics (state data) + probability (risk science) + visual (buy in) + computing power (chips)



# DATA for better lives has exploded in the past 100+ years



INTERNAL



## Data 'explosion' : 1.7 MB of data per second in 2020

By the 2025, 200+ zettabytes of data will be in cloud storage → 200 Trillion 2-hour 2hour Netflix movies

Categorical : 1/0	Interval: 5 pt Likert
Ordinal: 1 <sup>st</sup> 2 <sup>nd</sup> ...	Continuous: P/\$

## **Data originally means relaying or giving**

DATA – plural of ‘datum’, (thing) given” neuter past participle of DARE “ to give” [1640s]

DATA – as “transmissible and storable computer information” 1946

## Today, data is about capture

Count	Statistical	Scientific
Census	Bio	Geographic
Images	Physical	Digital
Sensory	Historical	Manuscripts
Modeled	Projections	Video
Stored	Domain	Commercial
Music	Business	Robotic
Symbols	Vital	Financial
Language	Official	Climate
Terrain	Luminosity	Political
Space	Satellite	Legal



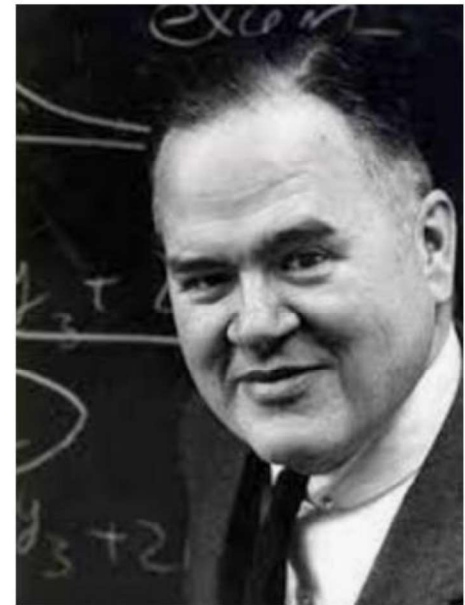
## Data science - catching the trend

Data Analytics : “... **data analysis** is intrinsically an empirical science.”

Data cleaning : Chambers called for more emphasis on data preparation and presentation rather than statistical modeling

Breiman : Prediction rather than inference

Data science =capture, clean, prepare, data analysis, modeling, inference, visualization and communication ... and everything else to make it happen science” for this envisioned field.



John Tukey in *The Future of Data Analysis* , 1962

Impetus for data-related careers :  
Rise of data scientists and new  
generation statisticians



# Data scientist

**a popular catch-all occupation for professionals whose expertise spans computing and computer science, statistics, mathematics, coding (programming) and domain or business understanding.**

# Snapshot demand for statisticians and data scientist (LinkedIn)

LinkedIn Jobs Posted for Statistician and Data Scientist, Past Month Vs "New", Selected regions, as of Sept. 29, 2022

	Statistician		Data Scientist		Ratio of DS to Stat		New Job Posting / Jobs Posted Past Month	
	Past Month	New	Past Month	New	Past Month	New	Stat	DS
Philippines	334	19	4,000	287	12.0	15.1	6%	7%
Asia	2,675	164	115,630	8,425	43.2	51.4	6%	7%
Central and South America	444	28	17,000	2,235	38.3	79.8	6%	13%
Europe	4,925	316	113,979	11,311	23.1	35.8	6%	10%
North America	13,967	933	253,000	19,827	18.1	21.3	7%	8%
Oceania	474	25	5,575	552	11.8	22.1	5%	10%
Africa	86	4	1272	182	14.8	45.5	5%	14%
Middle East	109	2	677	63	6.2	31.5	2%	9%

# Ramping up data science professionals

- Automated learning**
- App development without coding**
- Pre-trained AI**
- Self-serve data analytics**
- Accelerated learning**

# Call for co-creators in new tech disciplines

## New technology disciplines redefine technology roles

Traditional IT Disciplines	New Technology Disciplines*	(Net) New Roles
Agile approach and mindset	Business co-creation	Digital strategist
	Value realization and measurement	Agile portfolio manager
	Product management	Product owner
Adaptive, multidisciplinary execution	Experience and design	Customer experience designer
	Technology architecture	Cloud architect
	Data and insights	Data scientist
	Product delivery	DevOps Engineer
Ongoing, resilient ecosystem engagement	Talent continuum	Open talent coordinator
	Third-party ecosystem	Ecosystem partner manager
	Security, risk, and resilience	Product security managers

Source: Deloitte analysis

# New roles for statisticians as tech co-creators

Emerging roles for statisticians in new technology disciplines

Traditional IT Disciplines	New Technology Disciplines*	(Net) New Roles	New roles for statisticians in Tech Driven World
Agile approach and mindset	Business co-creation	Digital strategist	Metadata for strategic insights; Data capture quality (methodology and process modeling)
	Value realization and measurement	Agile portfolio manager	Value forecasting and benchmarking consultant
	Product management	Product owner	Product performance analyst
Adaptive, multidisciplinary execution	Experience and design	Customer experience designer	Statistical learning consultant
	Technology architecture	Cloud architect	Computational statistician
	Data and insights	Data scientist	Data scientist and domain insights consultant
	Product delivery	DevOps Engineer	Statistical analytics <u>engineer</u> ; New product response modeler
Ongoing, resilient ecosystem engagement	Talent continuum	Open talent coordinator/ Talent data analyst	HR Talent modeling
	Third-party ecosystem	Ecosystem partner manager	Business response modeling
	Security, risk, and resilience	Product security managers	Data forensics, Risk modeling

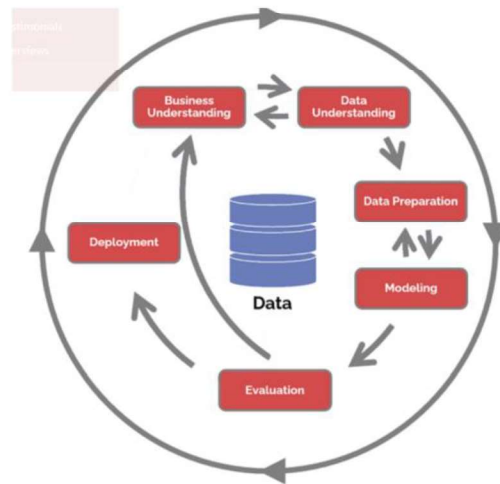
Source: Deloitte analysis and author



# Emerging roles for statisticians in new technology

## Co-creators

Benchmarking consultant  
Product performance analyst  
Data scientist  
Statistical analytics engineer  
HR talent modeler  
Data forensics  
Data risk modeling



## Data Stewards Professionals

Data governance  
Data capture specialists  
Data analytics

# LinkedIn Posts:

Statistician Vs Data Scientist

Role : DIRECTOR / HEAD

## Responsibilities and basic qualifications

Data scientist = Stat rigor + ML deployment + coding savvy

### Statistician



#### Communication Of Results And Inferences

- Collaborate with team members to write reports and communicate results
- Assist with, or be responsible for, communicating study results via internal governance, manuscripts, or oral presentations in group settings, as well as for communicating one-on-one with key customers and presenting at scientific meetings
- Respond to regulatory queries and interact with regulators

#### Therapeutic Area Knowledge

- Understand disease states, competitive landscapes, and the foundational science in order to enhance the level of patient focus and collaboration and be seen as a strong scientific contributor

#### Regulatory Compliance

- Perform work in full compliance with assigned curriculum(s) and will be responsible for following applicable Corporate, Medical, local, and departmental policies, procedures, processes, and training as well as ensuring legal, regulatory and data protection requirements are met in all activities

#### Statistical Leadership And Teamwork

- Introduce and apply innovative methodology and tools to solve critical problems
- Merge scientific thinking and business knowledge to identify issues, evaluate options and implement solutions
- Lead projects independently and work effectively across functions. Apply technical expertise to influence business decisions

#### Basic Qualifications

- Ph.D. in Statistics, Biostatistics or related field

### Data scientist



#### Responsibilities

- Partner with business/research teams to identify, scope, and execute analytics efforts that answer business/scientific questions, solve business/scientific needs, and add value
- Maintain a broad understanding of the pharmaceutical business and be fully engaged with business/research teams, bringing an objective voice to the table, and facilitating decisions grounded in data
- Collaborate with other analytics team members to review and provide feedback on the analytics being done, and be willing to seek feedback from other team members about your own work
- Stay current with respect to statistical/mathematical/informatics modeling methodology, to maintain proficiency in applying new and varied methods, and to be competent in justifying methods selected
- Collaborate with others to design, develop and deploy enterprise-level analytics capabilities/solutions
- Perform cutting edge research in an area of data science such as forecasting, machine learning, optimization, or natural language processing

#### Basic Qualifications

- Ph.D. in Statistics, Econometrics, Operations Research, Computer Science, Engineering, Mathematics or closely related field with at least 7 years of experience
- Deep and broad knowledge of statistical modeling and data mining methods and/or optimization methods
- Proficiency with relevant programming languages (such as R, Python, SQL, SAS, Java, C++, etc...)

## Responsibilities and basic qualifications

# Data scientist = Statistics + Informatics/AIML

## Statistician



### Responsibilities

The Project Statistician at the Principal Research Scientist level provides statistical leadership in multiple dimensions including:

- Provides technical leadership and expertise in initiating and carrying out multi-disciplinary or cross functional projects that impact the Lilly Research Laboratory and the Statistical Sciences organization
- Leads the assessment and introduction of new statistical technology and methodology, including both frequentist and Bayesian techniques, to apply to broader practice
- Leads the design and analysis of in-vitro and in-vivo experiments to advance the discovery portfolio in multiple therapeutic areas, innovative study designs, and statistical analysis plans in collaboration with biologists and other researchers
- Provides consultation for specialized biomarker analyses including genomic analysis of RNA expression data and analysis of other biomarker data (single cell RNA, NGS, protein, imaging) in conjunction with pre-clinical and clinical data
- Establish novel visualizations to explain complex results and interactions
- Provides consulting and statistical direction on priority discovery projects

### Basic Qualifications

- Ph.D. in Statistics, Biostatistics or related field
- At least 7 years of proven experience in research and development

## Data scientist



### Responsibilities

- Partner with business/research teams to identify, scope, and execute analytics efforts that answer business/scientific questions, solve business/scientific needs, and add value
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## Additional preferences

# Leadership, methods, agility, curiosity and self-management, creativity

## Statistician



**Statistics Leader**  
Eli Lilly and Company  
Cambridge, MA (On-site)  
1 company alumnus works here  
2 weeks ago • 2 applicants

## Data scientist



**Data Scientist - Director**  
Eli Lilly and Company  
Indianapolis, IN (On-site)  
20 alumni work here  
2 weeks ago • 5 applicants

### Additional Preferences

- Expertise and experience in study design, mixed models, multivariate analysis, design of experiments, multiplicity control, and analysis of variance
- Significant experience with pre-clinical, biomarker, and/or discovery research
- Experience manipulating large data sets and working with them computationally
- Strength in Bayesian methods a plus, but not required
- Knowledge or education in Biology or a related area a plus, but not required
- Skills in biological pathway/network analysis a plus, but not required
- Skills in predictive modeling and machine learning a plus, but not required
- An established track record of developing and maintaining an area of statistical or collaborative research
- Proficient in statistical programming languages/software such as SAS®, JMP®, R, Spotfire, etc.
- Experience in data extraction and manipulation (e.g. SQL, GraphQL and Cypher)
- Experience working statistical software in High-Performance Computing environments (e.g. SAS-Grid)
- Demonstrated problem solving ability and critical thinking
- Teamwork and leadership skills; ability to provide statistical leadership and technical expertise to influence business decisions
- Interpersonal communication skills for effective customer consultation and collaboration
- Creativity and innovation

### Additional Skills/Preferences

- Strong leadership and communication skills
- Publications in leading journals or conferences
- Advanced knowledge of machine learning methods in processing unstructured data
- Experience in deep learning frameworks
- Agility and flexibility to work with very diverse problems and business partners
- Ability to work with diverse data sources and data types
- Self-management skills with a focus on results for timely and accurate completion of competing deliverables



# Top companies need statisticians as a **data culture leader**

- **Competence plus computational excellence**
- **Domain expertise**
- **Collaborative expertise**
- **Problem solving**
- **Leadership & communication**
- **Ability to influence**
- **Consulting**
- **Creativity**

Trend to democratize data demands  
leadership in good data culture ---  
statistician/data science alike

Rise of  
data co-  
creators & data  
steward roles  
in trend to  
democratize  
GOOD data

- Citizen science is a growing movement
- Companies building communities of practice
- 'Sandbox' platforms for simulation
- Digital world data
- Data culture champions
- Adopt consistent messaging : **“Good data for better decisions for better lives”**





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## Thank you!



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