



A Munich Re company

# Opportunities for Internships & Employment at HSB & Munich Re for Graduate Students

11/16/2022

Nathan Lally: AVP Data Science

HSB: A Munich Re Company

# First a Little About Me



## Education:

- BA Political Science
- BA Mathematics/Statistics
- MS Mathematics

## Career:

- General Dynamics
- The Hartford Insurance
- Pratt & Whitney (Raytheon)
- HSB - Munich Re

## Volunteering:

- VP for Education @ NESS

# About HSB & Munich Re

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# Our Company – HSB & Munich Re

## HSB and Munich Re Group



### Munich Re

Well, that isn't the office building...

### HSB



### HSB- Hartford Steam Boiler:

- Founded on June 30, 1866, as one of the first companies dedicated to industrial safety.
- HSB offers insurance for equipment breakdown, cyber risk, data breach, identity recovery & employment practices liability.
- HSB's Applied Technology Solutions division leverages IoT to deliver unique risk management solutions

### Munich Re Group:

- World's largest reinsurance firm. Operates globally.

# Our Company – Munich Re

Strong business fields under one roof



Munich Re Group exists of well-known brands standing for extraordinary expertise in reinsurance, primary insurance and asset management.

## Group

### Reinsurance

Munich RE 

HSB 

 American  
MODERN™

**new/re**

DIGITAL  
PARTNERS™

 mednet

relayr.

Bell&Clements

**nmu**

GrovesJohnWestrup

### Primary insurance

**ERGO**



**DKV**

nexible

**ERGO**  
Reiseversicherung

 **ERV**

### Asset Management

**MEAG**



# Our Company – Munich Re

Creating value through its diversified business model and innovative strength

Munich Re Group is one of the world's leading risk carriers with more than **140 years** of unrivalled risk-related expertise.



... covers the entire value chain of **reinsurance, primary insurance, insurance related services** and **capital market solutions**.



... maintains with **47,000 employees** a global presence in **50+ countries**.



... plays a key role in addressing and insuring **climate risks** to make the world more resilient.



... provides coverage for extraordinary risks such as **rocket launches, renewable energies** or **cyberattacks**.

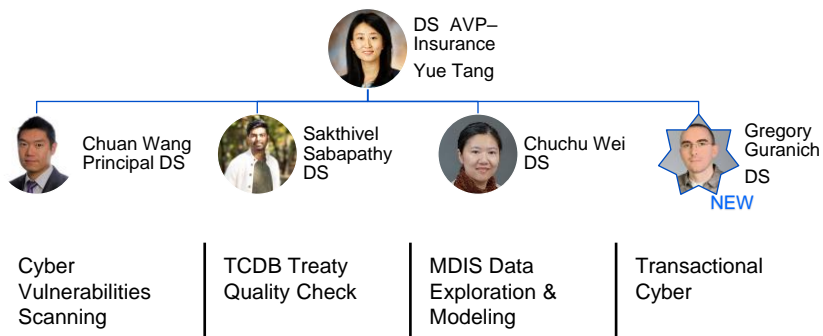


... drives the **digital transformation** of the insurance industry in order to push forward the boundaries of insurability.

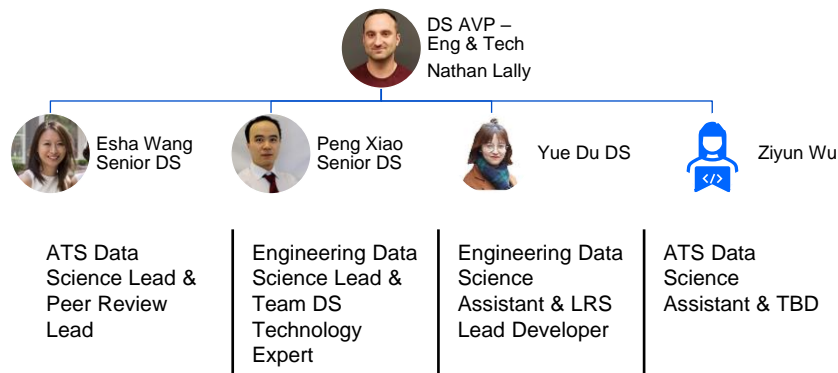


## HSB Data & Analytics Organization – Data Science Teams

### ■ Data Science – Insurance



### ■ Data Science – Engineering & Technology



+ interns & university co-ops

## Data Science Organization Details

- Team Composition:
  - 2 Managers
  - 8 Full Time Data Scientists
  - 4 Summer Interns (could be you!)
  - 2 PhD Candidate Co-ops
- Full-time Team Educational Background
  - PhD: CS (1), Econ (1), Statistics (3)
  - MS: Statistics (2), Math (1), Data Science (1), Engineering (1)
- Main Skillsets
  - Bayesian inference, statistical learning, deep learning, distributed computing, algorithms, software engineering, control systems and optimization

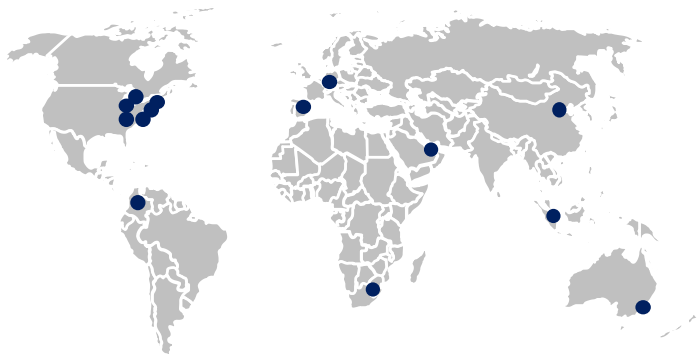
## Technology Stack





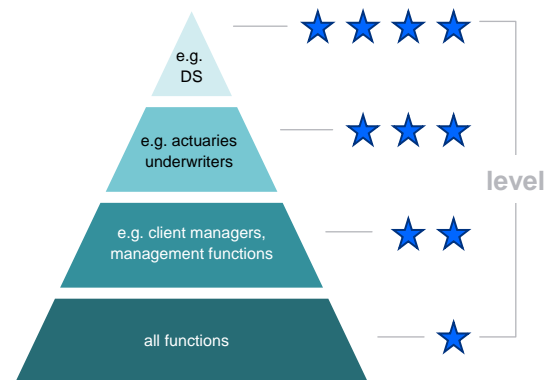
## Munich Re Data Analytics Community

### Global team structure



Global network of experts in data analytics, data engineering, AI and data hunting

### Data Analytics Curriculum



Comprehensive training of a large part of the staff in data analytics topics on a total of four levels

Munich Re has trained a significant proportion of the staff working on data analytics topics to ensure maximum business proximity

# What do Statisticians and Data Scientists do at HSB & Munich Re?

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# What do Statisticians and Data Scientists do at HSB & Munich Re?

## Major Business Areas Supported (Typical Company):

- **Underwriting:** evaluate and analyze the risks involved in insuring people and assets.
- **Actuarial:** analyze the financial costs of risks.
- **Catastrophe Modeling:** model large, simultaneous and often connected loss events (ex. natural catastrophe).
- **Claims:** determine how much the company should pay for a loss.
- **Finance & Risk Management:** optimally manage capital and ensure sufficient holdings to cover rare, adverse events.
- **Digital Marketing:** online marketing optimization.

## Unique to HSB – Munich Re:

- **Engineering Services:** perform inspections, research insurable assets, loss control, inform other business units.
- **Internet of Things (IoT):** objects embedded with sensors communicating with each other over networks.

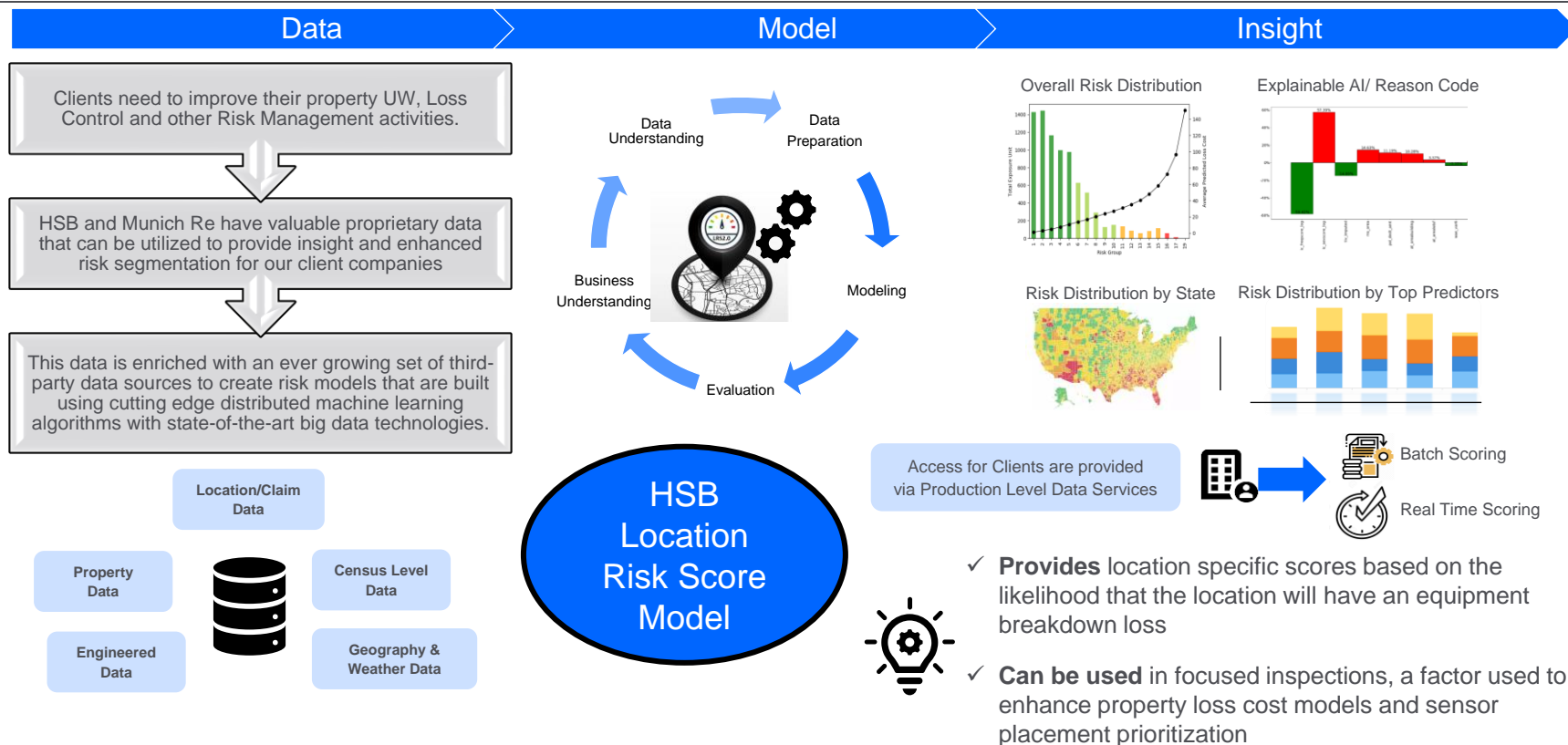
## A Consulting Model:

- Statisticians and data scientists generally do not develop or manage insurance products.
- We serve as consultants to business leads; enabling objective decision making based on sound empiricism.

## A Shift in Responsibility?:

- In today's business environment, insurance data scientists are now being asked to develop, monetizable data assets and IP.

# What do Statisticians and Data Scientists do at HSB & Munich Re? An Underwriting Example



# What do Statisticians and Data Scientists do at HSB & Munich Re? An IoT Example

## Problem:

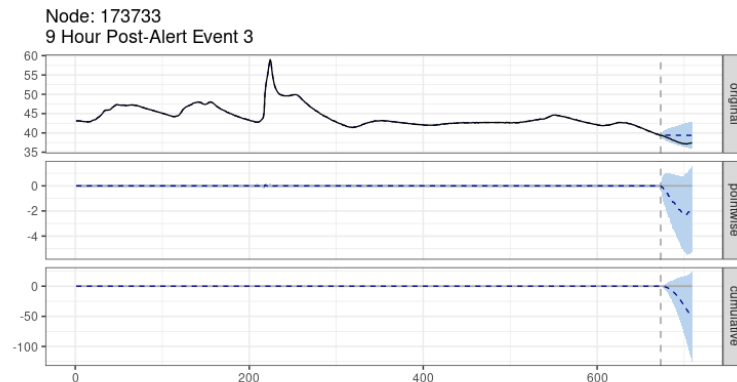
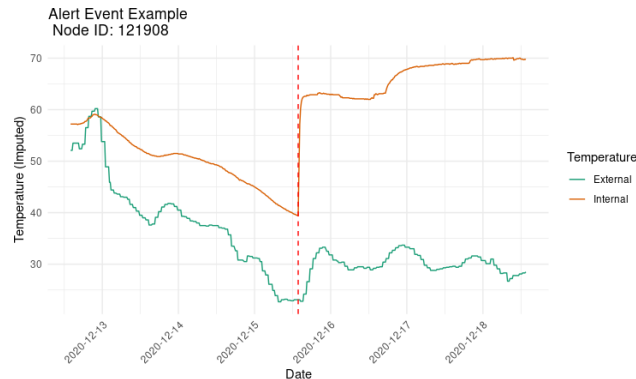
- For HSB's freeze loss monitoring program to add value to our clients, we need to prove we can motivate behavioral change among end insureds.
- However, customers sometimes fail to acknowledge alerts (respond to calls or texts) at all.

## Solution:

- Using sensor data and causal AI/ML methods, infer whether a customer took action from the data alone.

## Usage:

- Portfolio performance monitoring
- Outreach/intervention optimization
- Potential for derivative data products



# Opportunities for Graduate Students

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# What Skills do You Need to Succeed at HSB?

## Core Competencies

### Statistics & Machine Learning

- Mathematical Statistics
- GLM & GAM
- Time Series Analysis
- Statistical Learning
- Deep Learning
- Causal Inference

### Business Knowledge

- Product Design
- Principles of Underwriting
- Pricing
- Regulation
- Financial Management

## Growing Demand

### Data Engineering

- Relational DBs
- SQL
- Unstructured Data
- Big Data Technology (ex. Spark, Hive)
- Domain Knowledge

### DevOps/MLOps

- Model monitoring, management and deployment
- Code Versioning
- CI/CD Pipelines/Automation
- Containerization

**Insurance  
Data  
Science**

# Career Paths at HSB and Munich Re



## Associate Data Scientist

- Entry Level
- Undergraduate in Quantitative Field



## Data Scientist

- Entry Level – 2+ Years of Experience
- MS or PhD in Quantitative Field



## Senior Data Scientist

- 4+ Years of Experience
- MS in Quantitative Field or PhD



## Principal Data Scientist

- 6+ Years of Experience
- MS in Quantitative Field or PhD



## Data Science Lead

- 8+ Years of Experience
- MS in Quantitative Field or PhD

## Preferred Degree Programs:

- Statistics
- Computer Science
- Mathematics & Applied Mathematics
- Data Science (Non-Business Programs)

## Expectations:

- Associate – Data Scientist
  - Work on focused, well defined technical problems
- Senior – Principal Data Scientist
  - Guide technical direction of larger projects, mentor junior staff, collaborate closely with business partners
- Lead Data Scientist
  - Individual contributor managing a technical discipline

# Summer Internship Positions

## Hiring 3 Graduate Interns and 1 Undergraduate

<https://www.munichre.com/hsb/en/careers.html>

- Graduate Student Link

- [https://sjobs.brassring.com/TGnewUI/Search/Home/Home?partn\\_erid=26147&siteid=5588#jobDetails=726288\\_5588](https://sjobs.brassring.com/TGnewUI/Search/Home/Home?partn_erid=26147&siteid=5588#jobDetails=726288_5588)

- Undergraduate Student Link

- [https://sjobs.brassring.com/TGnewUI/Search/Home/Home?partn\\_erid=26147&siteid=5588#jobDetails=726289\\_5588](https://sjobs.brassring.com/TGnewUI/Search/Home/Home?partn_erid=26147&siteid=5588#jobDetails=726289_5588)

## Qualifications for Graduate Students

- MS or PhD Student in Data Science, Statistics, Computer Science, Mathematics, Physics, Electrical Engineering or a related applied science with a heavy quantitative emphasis. The ideal candidate is adept at using large data sets to find opportunities for product and process optimization.
- Strong programming experience with Python/R/SQL, with the ability to write well-documented production-level code
- Practical knowledge & experience with statistical methods
- Strong analytical and problem-solving skills; ability to work creatively in problem solving environment
- Basic software engineering skills (Git, API, Docker Container, DevOps best practices)
- Knowledge of insurance data models and pricing methods is a plus
- Experience with ML frameworks like PyTorch, TensorFlow or JAX is a plus
- Experience with Spark and distributed computing is a plus
- Experience with Azure cloud development is a plus
- Available to start the internship in May 2023 and work a hybrid schedule in the Hartford, CT Office.

Contact me directly at [nathan\\_lally@hsb.com](mailto:nathan_lally@hsb.com) when you apply!

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