

# From Principles to Practice: Responsible Innovation

Pre-Conference Faculty Workshop

# Who We Are

Global Academic Programs

# Global Academic Programs

Our Mission: Empowering Analytics for Academics



[www.sas.com/academics](http://www.sas.com/academics)

We support the next generation by providing **free software and resources** for academia.

Our “customers” are students, educators, independent learners, and academic researchers.

# Resources for Teaching and Learning



## SOFTWARE

- SAS® Viya® for Learners
- SAS® OnDemand for Academics
- SAS® Viya® Workbench for Learners



## TRAINING

- e-Learning
- How-to videos
- Onsite & virtual training



## EDUCATIONAL RESOURCES

- Teaching materials
- Curriculum consulting
- Academic specializations
- SAS Educator Portal
- SAS Skill Builder for Students

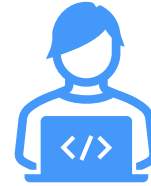
# Agenda



*Responsible and  
Ethical Data Use*



*SAS Viya for  
Learners*



*Ethical Data  
Analysis*

# Responsible and Ethical Data Use



Our vision is a world where data empowers people to thrive. We pursue that vision through trustworthy and responsible innovation.

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Reggie Townsend, Vice President of the Data Ethics Practice, SAS



# Responsible Innovation in Academia



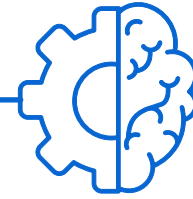
## RESPONSIBLE

- data scientists
- citizens



## CAREER READY

- future of industry
- implications of solutions

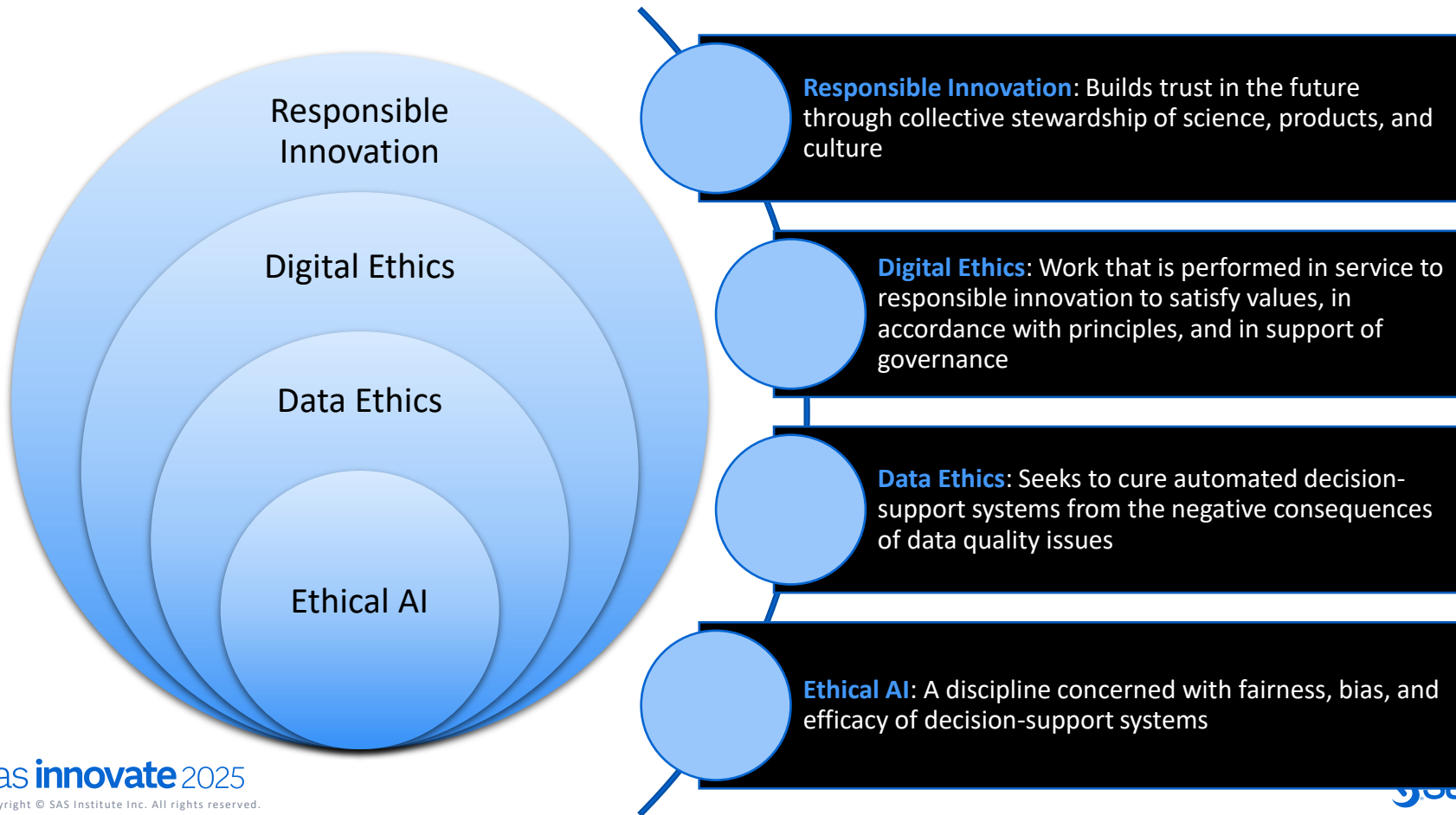


## THOUGHT-LEADERS

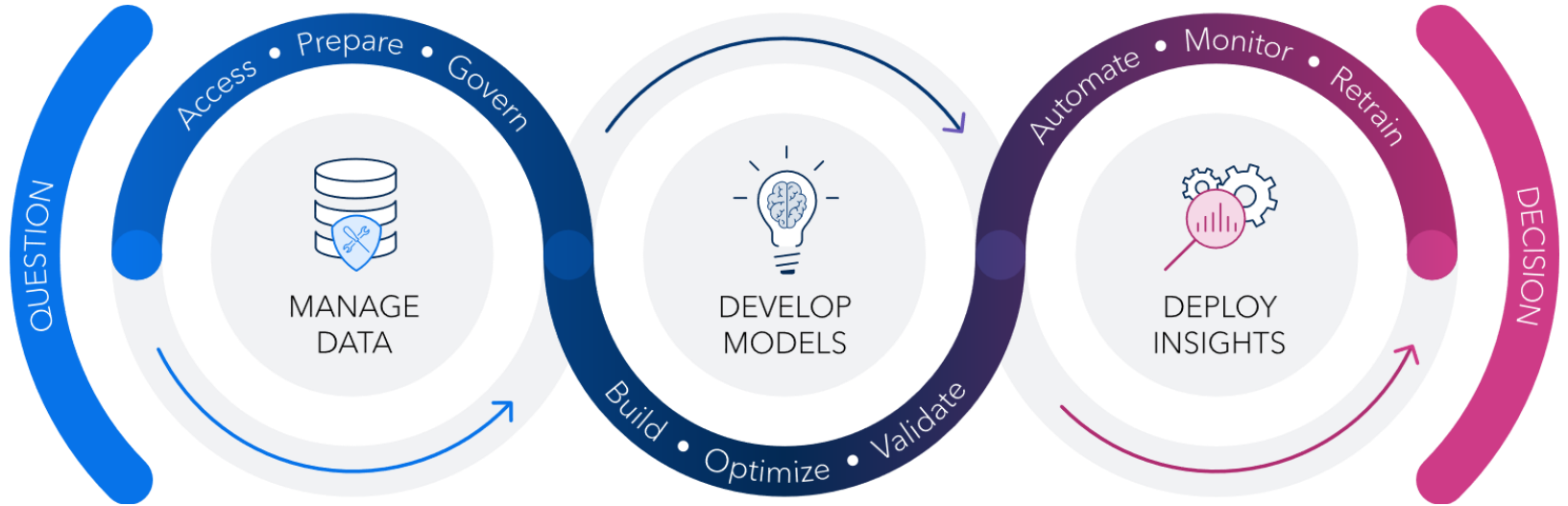
- critical thinking
- ignite curiosity



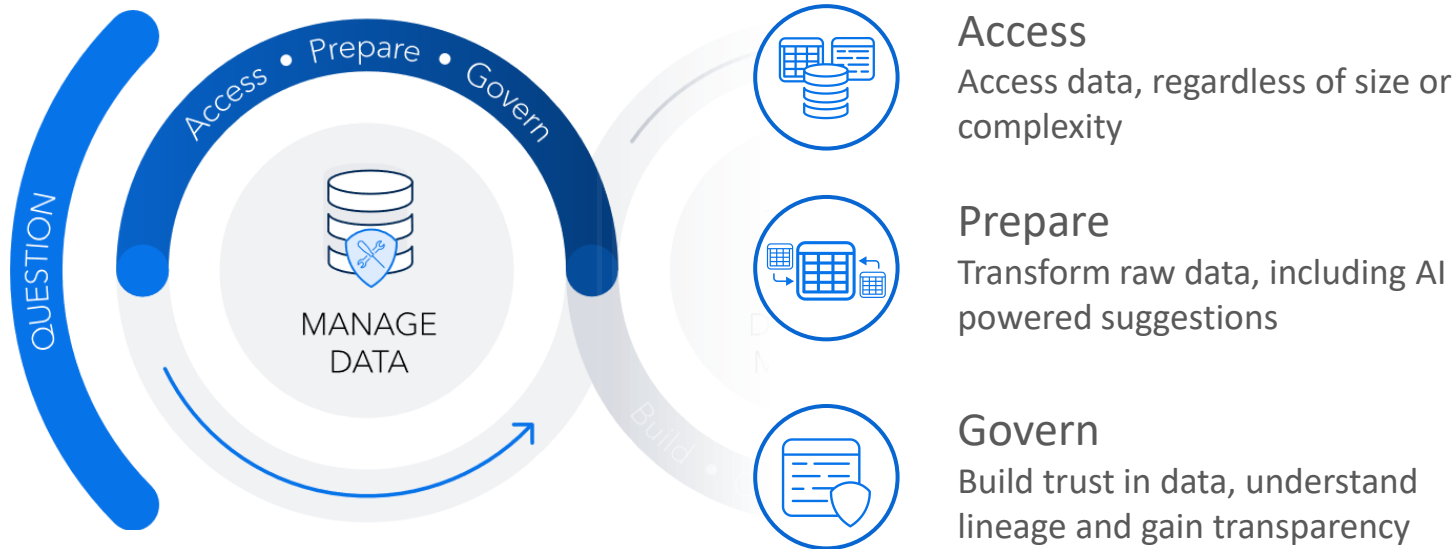
# The Responsible Innovation Journey



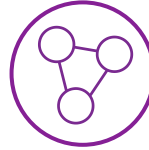
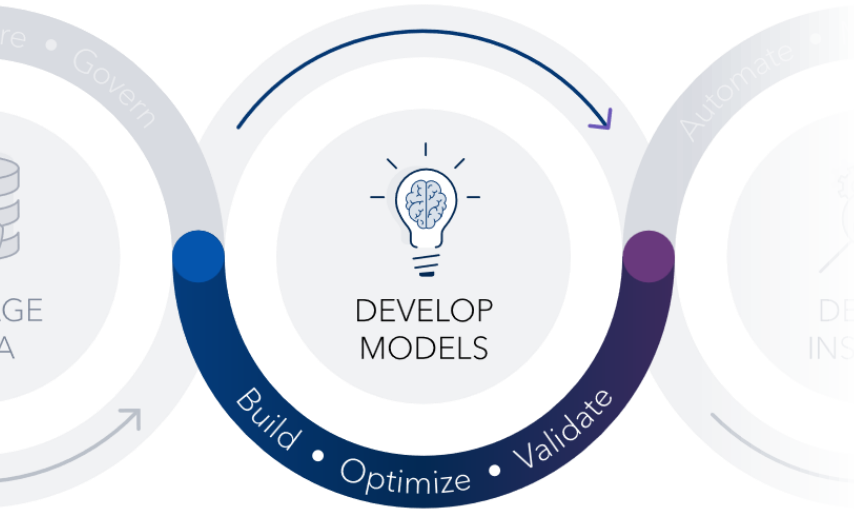
# AI and Analytics Life Cycle



# Manage Data



# Develop Models



## Build

Build models with multiple AI techniques to solve real world problems



## Optimize

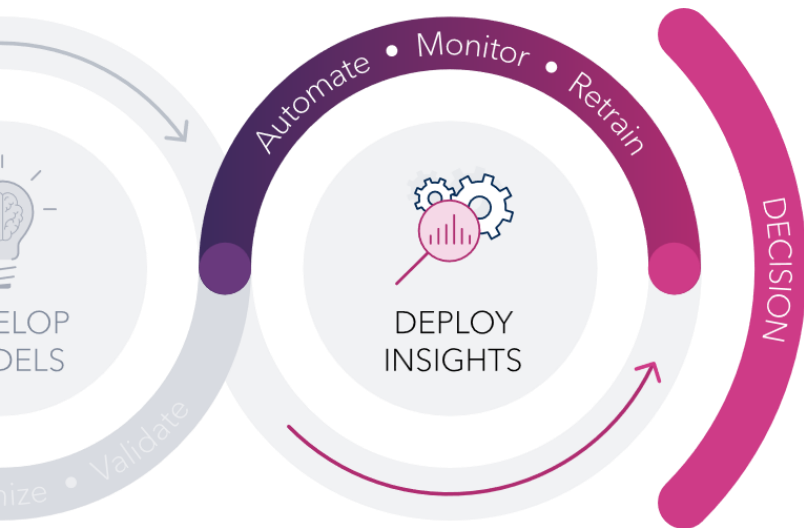
Embed models into operational systems and monitor them



## Validate

Ensure model's input and output variables align with business' expectations

# Deploy Insights



## Automate

Automate manual tasks for feature engineering and model tuning



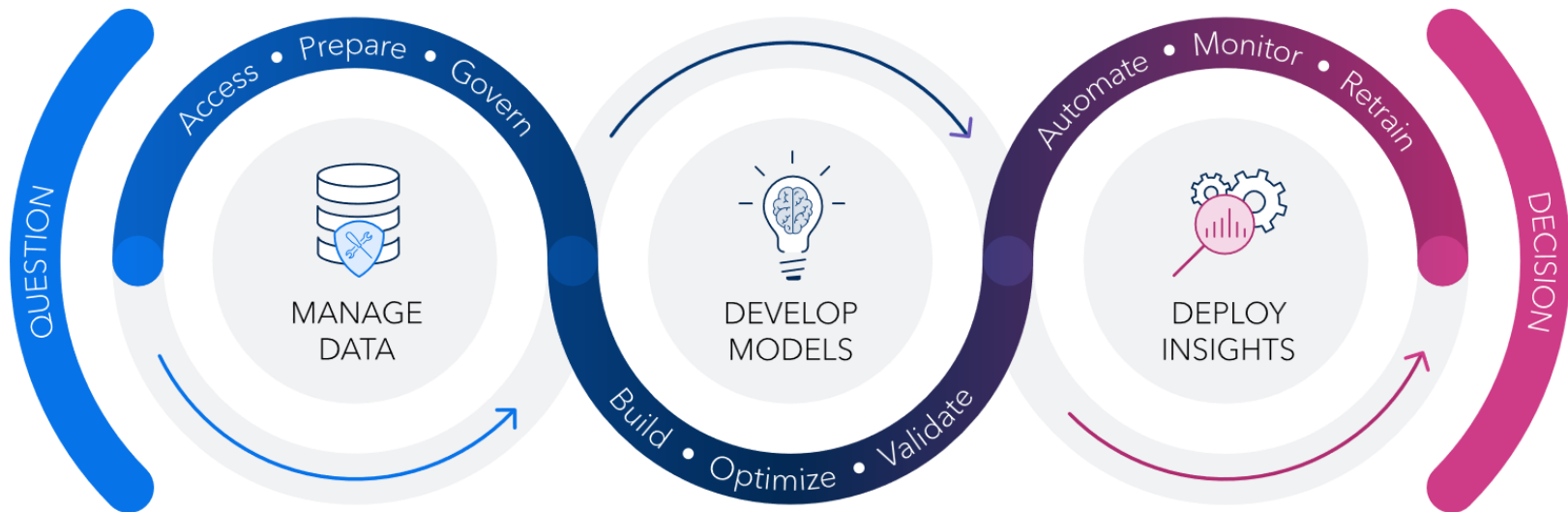
## Monitor

Monitor model's inputs, output and performance over time, leveraging built-in alerts

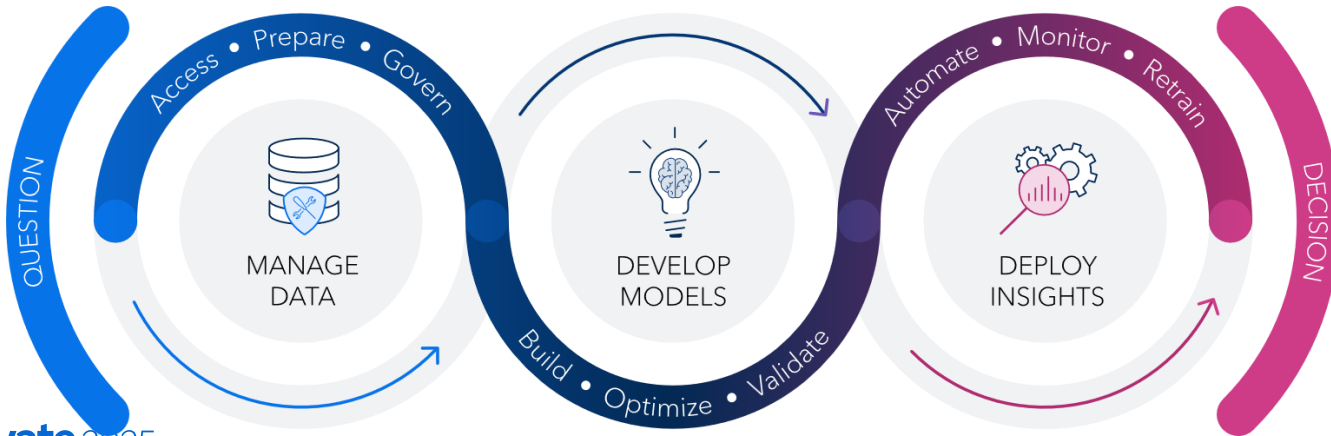
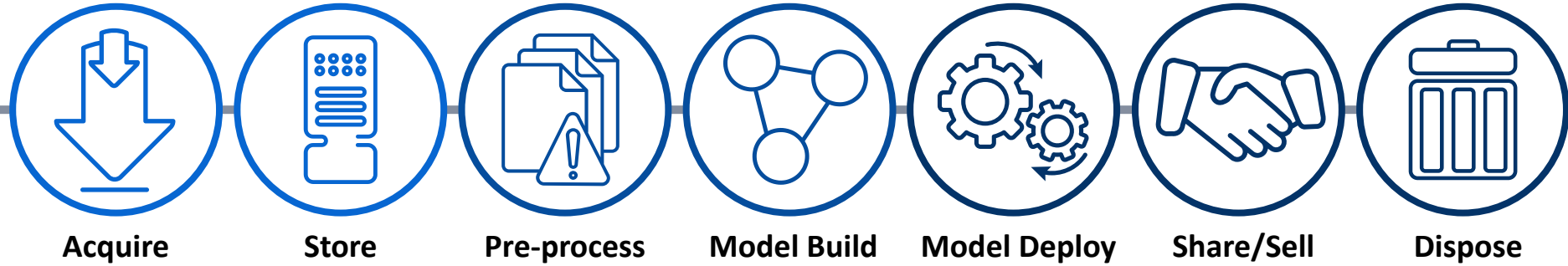


## Retrain

Revise, retrain or replace models leveraging built-in pipelines to ensure optimal performance



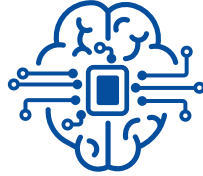
# Responsible Innovation Across the Data Supply Chain



# Responsible Innovation Across the Data Supply Chain



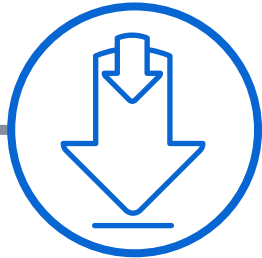
Obtain Data



Manage, Prepare,  
and Model



Deploy and Consume



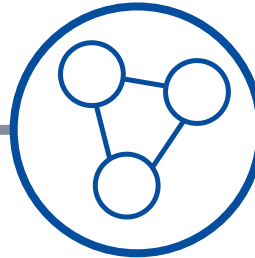
Acquire



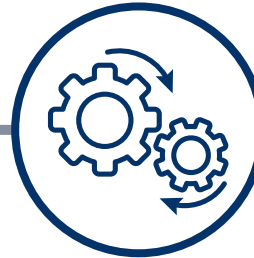
Store



Pre-process



Model Build



Model Deploy



Share/Sell



Dispose





bias is universal

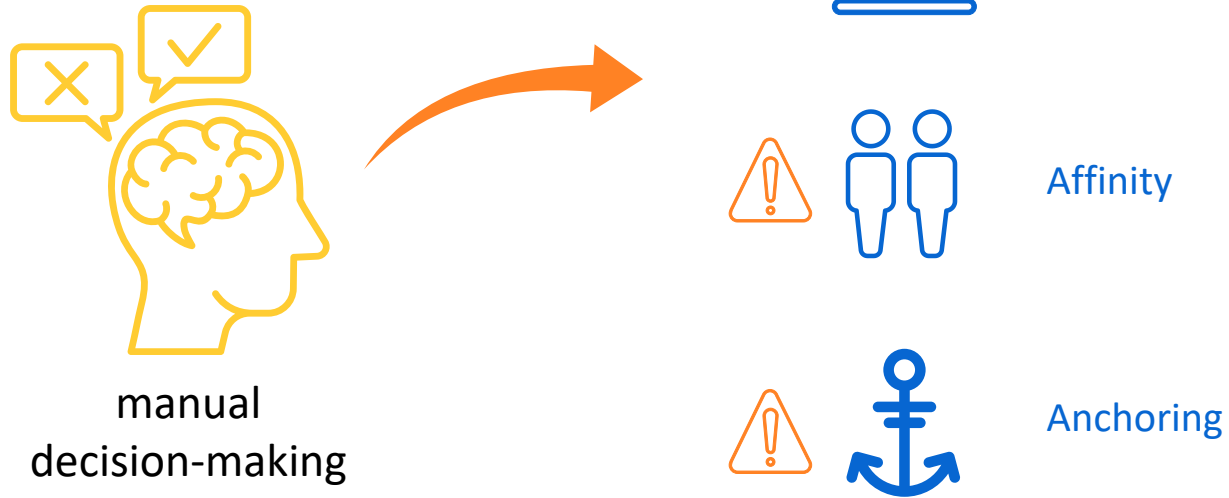


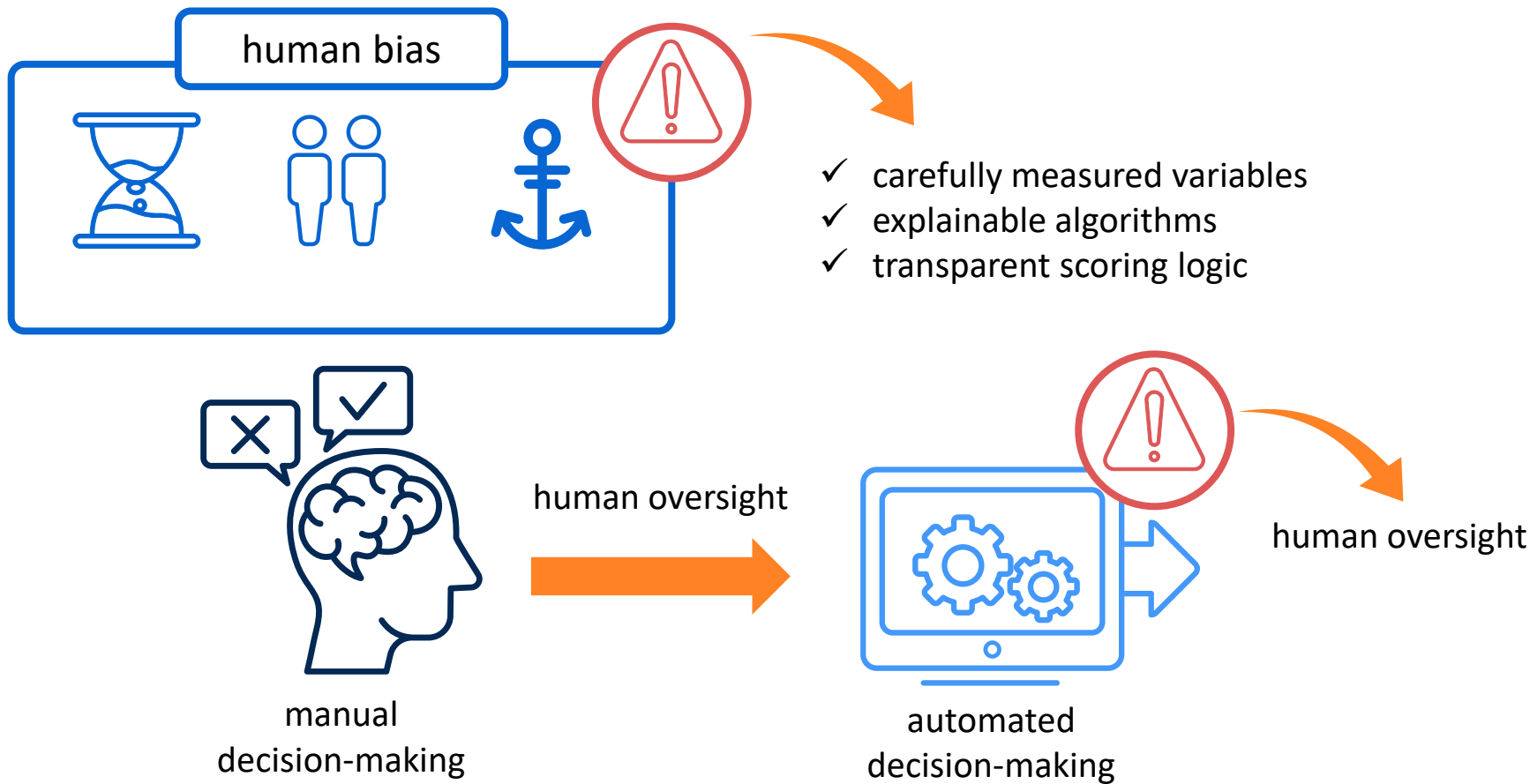
process information more  
efficiently

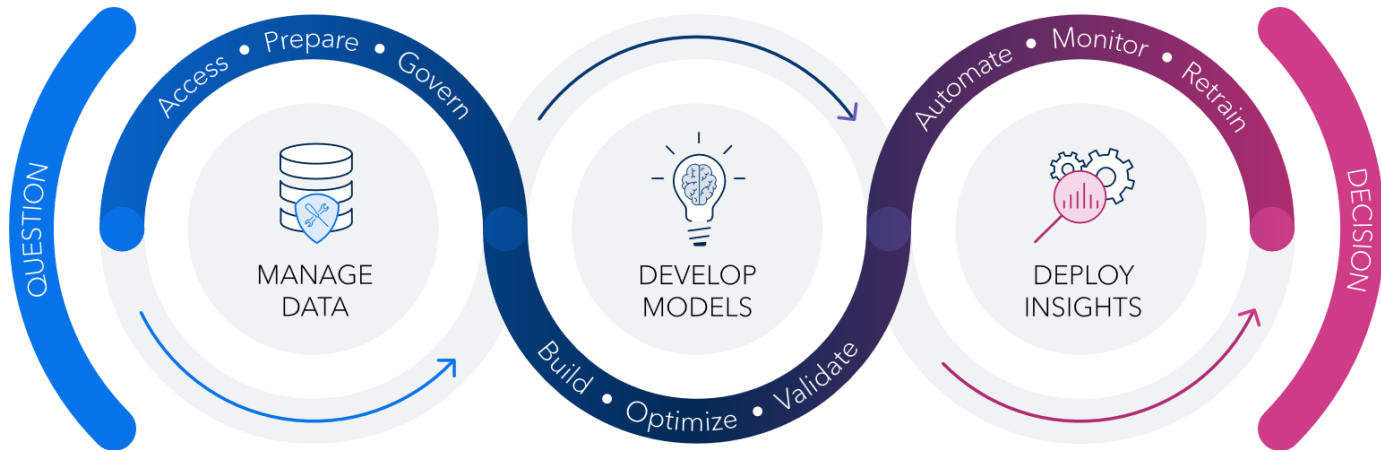
### **Bias** (*noun*)

- : prejudice in favor of or against one thing, person, or group compared with another, usually in a way considered to be unfair
- : **(statistics)** a systematic distortion of a statistical result due to a factor not allowed for in its derivation
- : **(machine learning)** a systematic error that occurs in the machine learning model itself due to incorrect assumptions in the machine learning process

# Human Bias



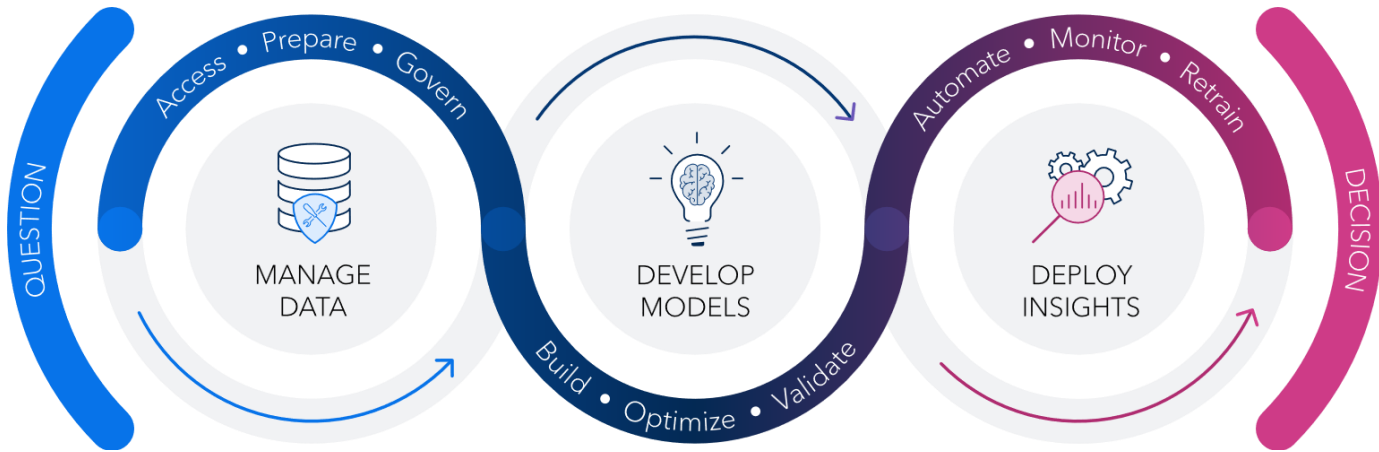




 gender  
age  
ethnic origin

I can reduce bias against vulnerable groups by excluding information about group membership in my model.





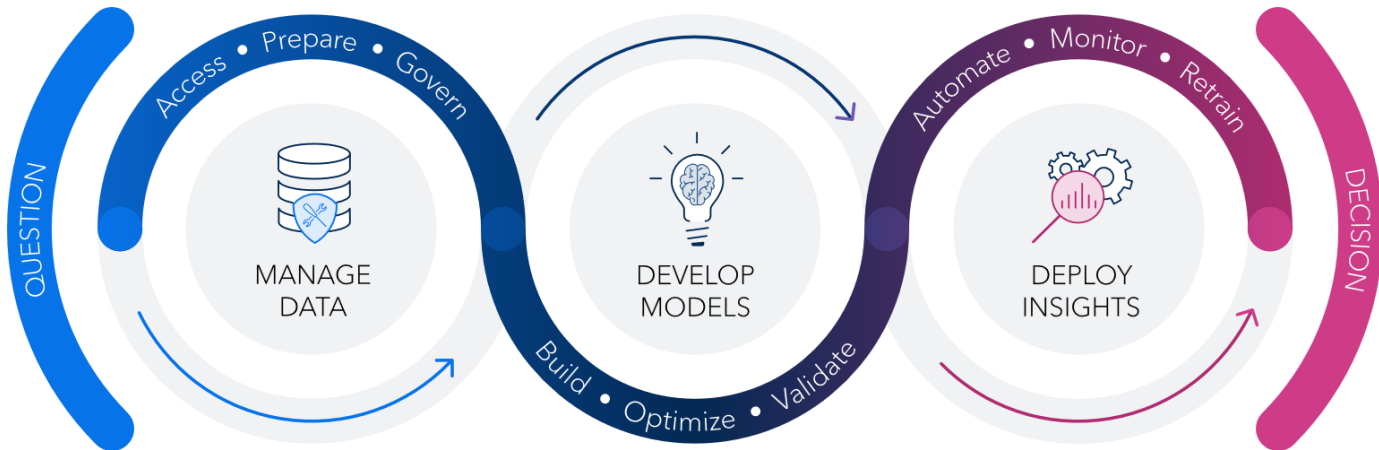
proxies → discrimination



Mitigating bias is an  
**active** and **intentional**  
part of data analysis.

It is not sufficient  
to identify and  
remove sensitive  
variables from  
models.





Mitigating bias is an **active** and **intentional** part of data analysis.

It's important to understand the types of bias that lead to discrimination

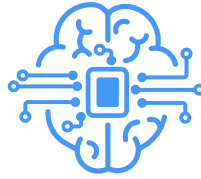
Lack of awareness about bias is worse.



# The Data Supply Chain, or the Data Chain of Custody



Obtain Data



Manage, Prepare, and Model



Deploy and Consume



Acquire



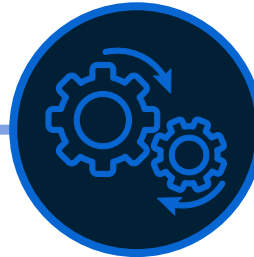
Store



Pre-process



Model Build



Model Deploy



Share/Sell

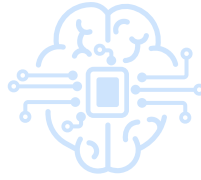


Dispose

# Bias Across The Data Supply Chain



Obtain Data



Manage, Prepare, and Model



Deploy and Consume



Acquire

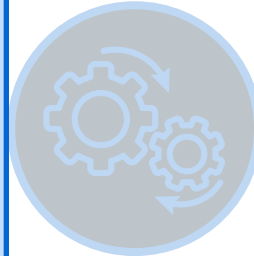


Store

- Availability Bias
- Confirmation Bias
- Recall Bias
- Selection Bias

Pre-process

Model Build



Model Deploy



Share/Sell



Dispose



## Unwanted Bias in Obtaining Data

Availability Bias

Confirmation Bias

Recall Bias

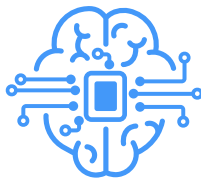
Selection Bias

# Bias Across The Data Supply Chain



Obtain Data

- Aggregation Bias
- Attrition Bias
- Cause/Effect Bias
- Confounding Bias
- Exclusion Bias



Manage, Prepare, and Model



Pre-process

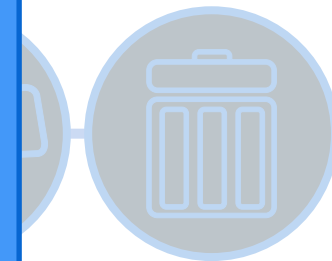


Model Build



Deploy and Consume

- Hindsight Bias
- Historical Bias
- Performance Bias
- Prediction Bias
- Proxy Bias
- Survivorship Bias
- Time-Interval Bias



Dispose

# Unwanted Biases in Manage, Prepare, and Model

Aggregation Bias

Attrition Bias

Cause/Effect Bias

Confounding Bias

# Unwanted Biases in Manage, Prepare, and Model

Exclusion Bias

Hindsight Bias

Historical Bias

Performance Bias

# Unwanted Biases in Manage, Prepare, and Model

Prediction Bias

Proxy Bias

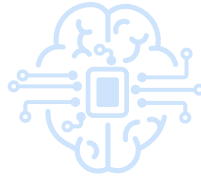
Survivorship Bias

Time-Interval Bias

# Bias Across The Data Supply Chain



Obtain Data



Manage, Prepare, and Model



Deploy and Consume



Acquire



Store



P

- Automation Bias
- Deployment Bias
- Drift Bias
- Reporting Bias



Model Deploy



Share/Sell



Dispose

# Unwanted Biases in Deploy and Consume

Automation Bias

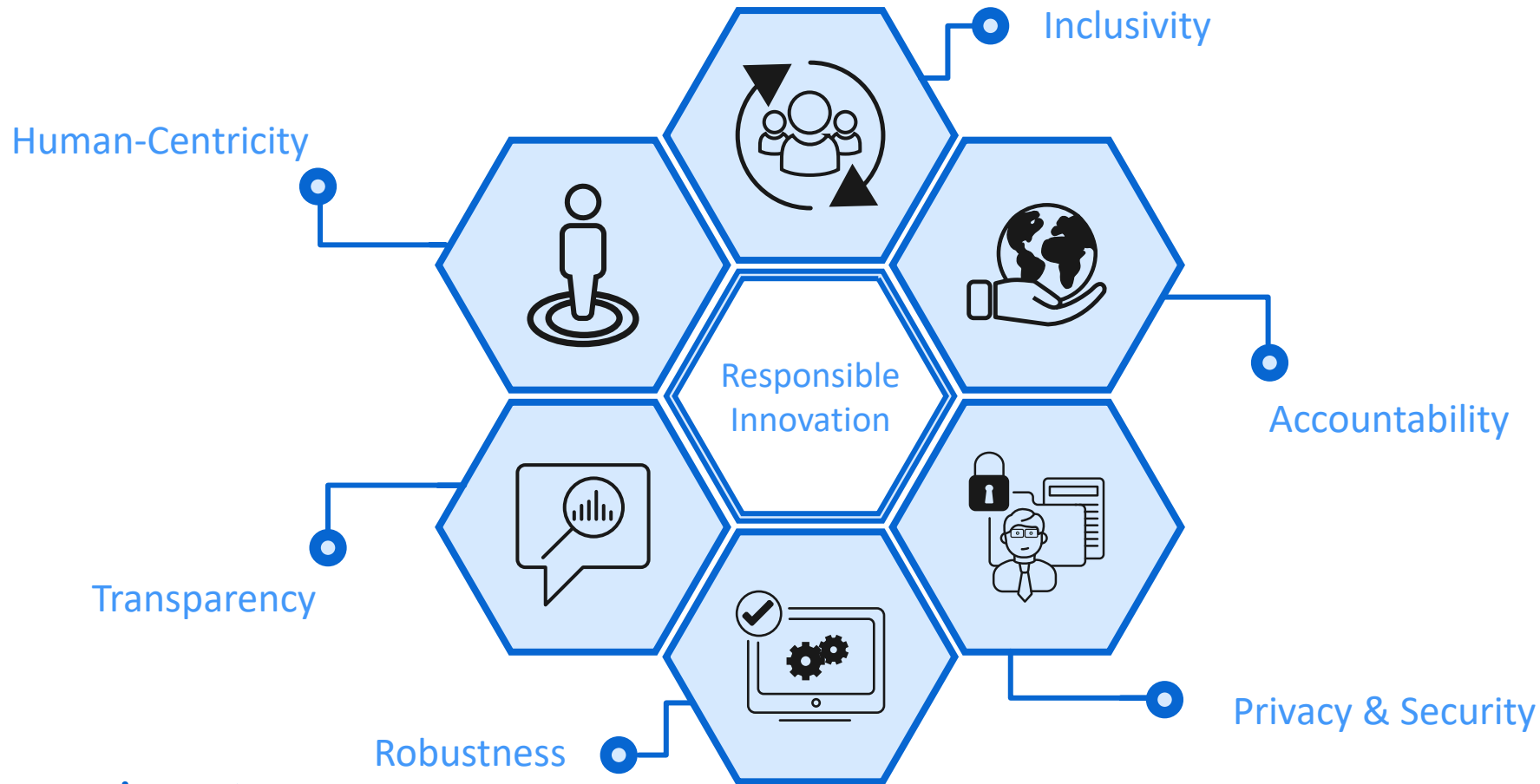
Deployment Bias

Model Drift

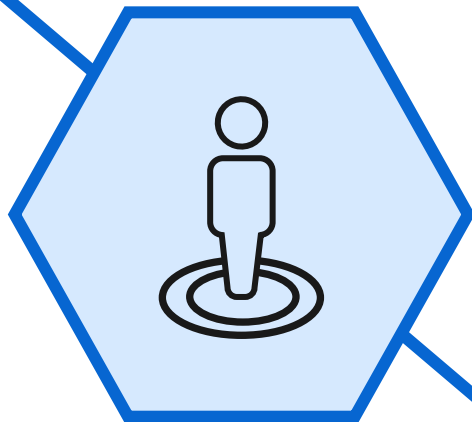
Reporting Bias

# Principles of Responsible Innovation





## Human-Centricity



**Promote human well-being,  
human agency, and equity.**

## Inclusivity



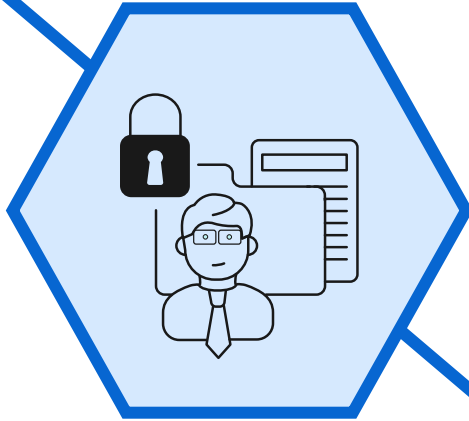
Ensure **accessibility**  
and include **diverse**  
**perspectives** and  
**experiences.**

## Accountability



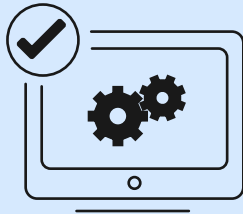
**Proactively** identify and mitigate adverse impacts.

## Privacy & Security



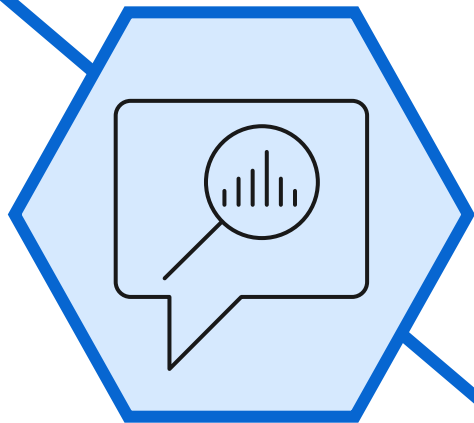
**Respect** the privacy of data subjects and the security of data products.

## Robustness



Operate **reliably** and **safely** while enabling mechanisms that assess and manage potential risks throughout a system's life cycle.

## Transparency



**Explain and instruct** on usage openly, including at minimum potential risks and how decisions are made.

# Striving for Excellence across the AI and Analytics Life Cycle



We want AI to improve the world.



Responsible innovation is intentional.



Ethical and legal are not the same.



We aim to protect vulnerable groups.

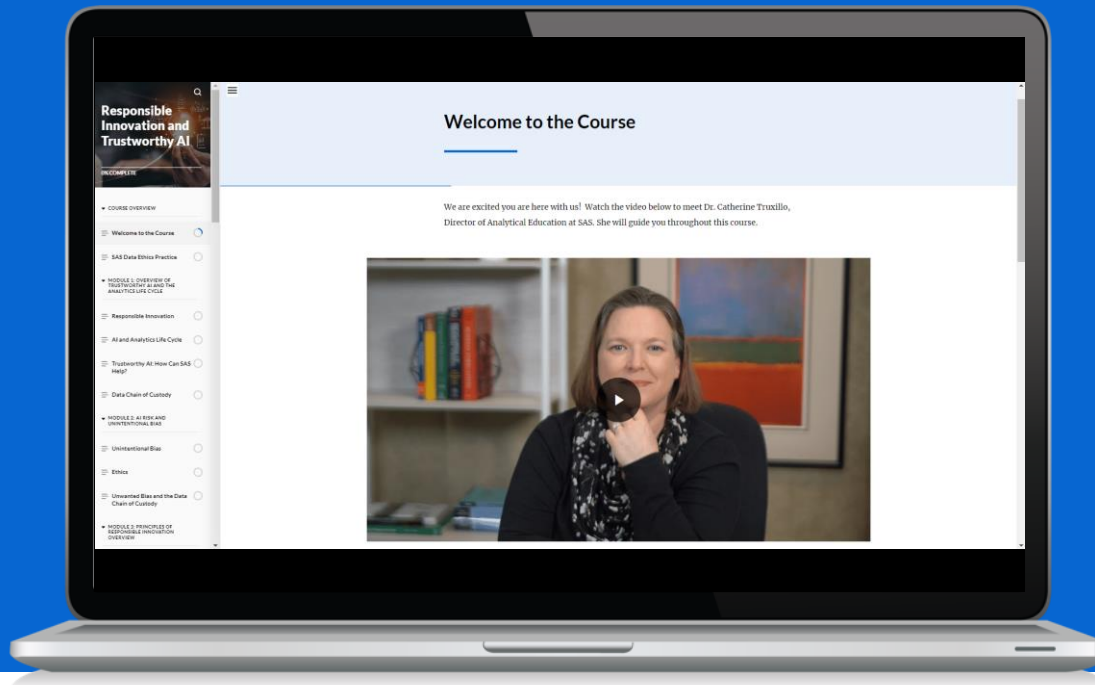


AI practitioners seek to do no harm and to address injustice.





# Responsible Innovation and Trustworthy AI



<https://learn.sas.com/course/view.php?id=6443>

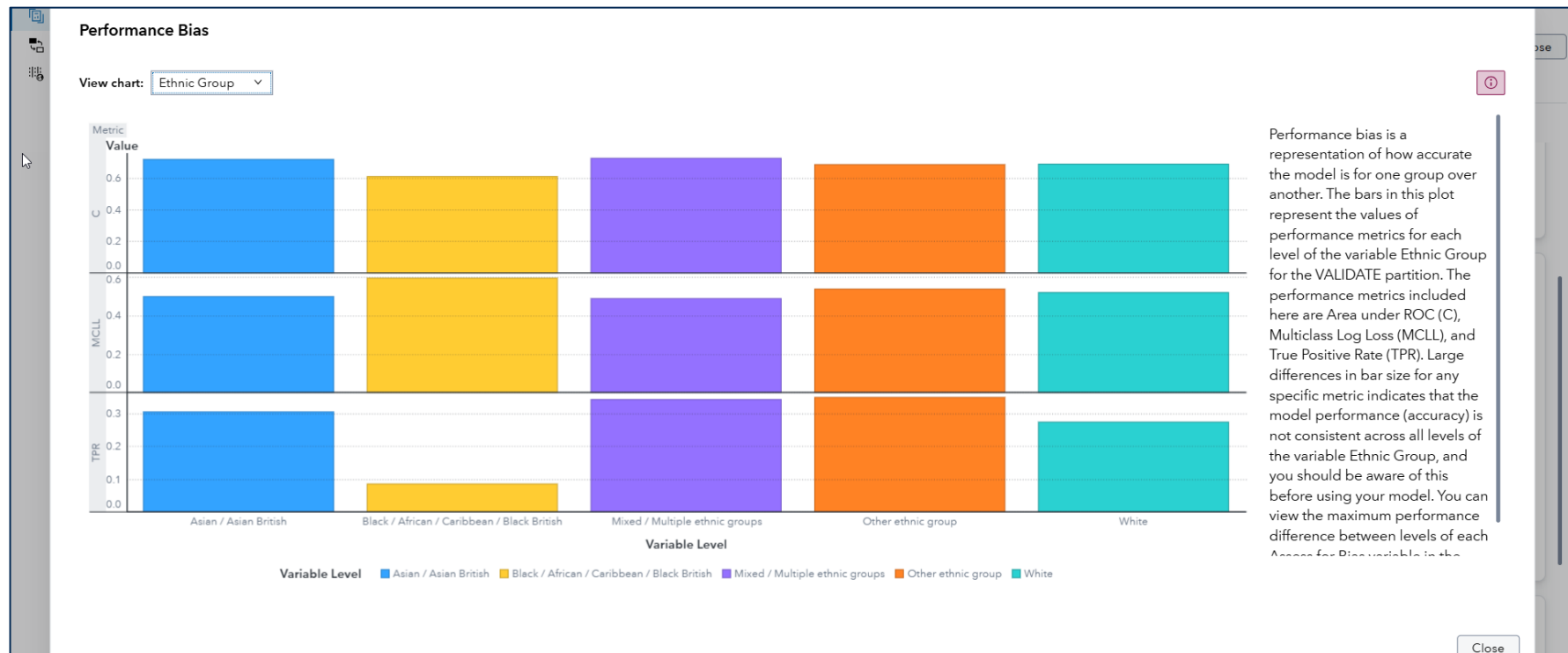
# Responsible Innovation and Trustworthy AI

## Modules:

1. Overview of Trustworthy AI and the Analytics Lifecycle
2. Welcome to the Course
3. AI Risk and Unintentional Bias
4. Principles of Responsible Innovation Overview
5. Focus on Inclusivity
6. Focus on Accountability
7. Focus on Privacy and Security
8. Focus on Robustness
9. Focus on Transparency
10. SAS Technology for Responsible Model Management
11. SAS Technology for Responsible Model Development
12. SAS Technology for Responsible Model Deployment

<https://learn.sas.com/course/view.php?id=6443>

# Identifying and Addressing Bias in SAS



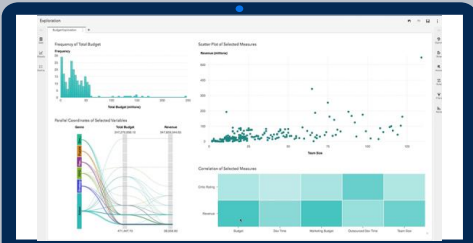
# SAS Viya for Learners

# Software for Teaching and Learning

## Free Academic Software

VFL

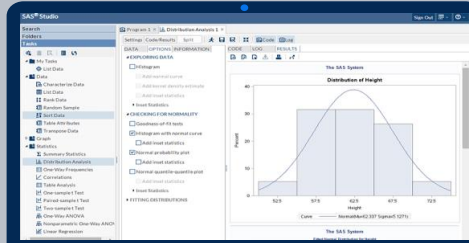
SAS® Viya® for Learners



[www.sas.com/viyaforlearners](http://www.sas.com/viyaforlearners)

ODA

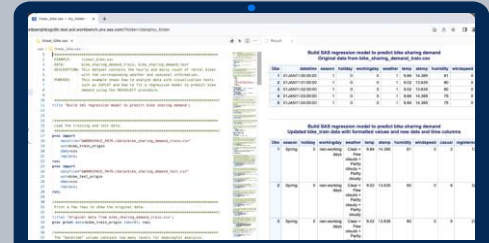
SAS® OnDemand for Academics



[www.sas.com/ondemand](http://www.sas.com/ondemand)

WFL

SAS® Viya® Workbench for Learners



[www.sas.com/wfl](http://www.sas.com/wfl)

Teach and learn leading-edge data science skills

To access this product, please sign in with your university email.

Access for educators

Access for students

```
R code
1 #-----
2 # Language: R
3 #-----
4 # Set R work to note-book directory
5 de_notebook <- "/opt/hadoop/conf/igmar/hadoop/
6   sited/00_notebook"
7
8 # Variable declarations
9 de_notebook_target <- "00_notebook"
10 de_partitioner <- "00_Parallel_0000"
11 de_partitioner_base <- "00_Parallel_0000"
12
13 de_class_input <- c("00_Parallel_0000", "00_Parallel_0000")
14 de_class_output <- c("00_Parallel_0000", "00_Parallel_0000")
15 de_class <- c("00_Parallel_0000", "00_Parallel_0000")
16
```

# SAS Viya for Learners

## Free Software

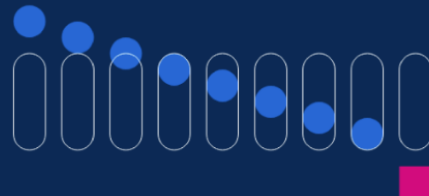
- Free to students and faculty
- Cloud environment
- Use .edu email when registering
- Works best with Chrome browser
- Programming, visualization, modeling, and more!

[www.sas.com/viyaforlearners](http://www.sas.com/viyaforlearners)

# SAS Viya for Learners Launch Page

## SAS® Viya® for Learners

Build a complete advanced analytics program - from entry-level to doctorate - with a single software environment.



### SAS Viya for Learners 4

[Launch Software](#)[Access JupyterLab](#)

Viya for Learners 4 has replaced Viya for Learners 3.5. Viya for Learners 3.5 is no longer available, as of August 28, 2024.

#### Helpful Tips

- Use Chrome, Firefox, or Safari to access SAS Viya for Learners.
- SAS Viya for Learners is a shared resource.
  - Inactive accounts and files may be deleted to ensure maximum performance.
  - Users are limited to 5 GB of data in memory and 100 MB per uploaded data file.
- Autotuning is disabled in SAS Viya for Learners. The software will return an error when a user requests autotuning.
- SAS Viya for Learners may be unavailable every 3rd weekend of the month from Friday at 8pm ET to Sunday at 2pm ET while we apply enhancements

#### Additional Information

- Get up and running quickly with [SAS Viya Quickstart Videos](#).
- Find documentation on existing shared data sets in the [SAS Viya for Learners Data Repository](#).



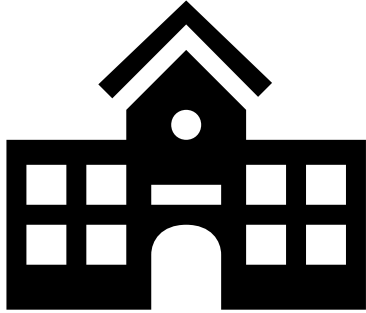
<https://learn.sas.com/vfl>

# Ethical Data Analysis

Your turn!



# Welcome to iLink University!



As a new Predictive Modeler in our Admissions Department, your role will involve shaping the fall 2025 M.S. in Analytics Program class. On your first day, you'll explore Visual Data Mining and Machine Learning tools in SAS Model Studio.

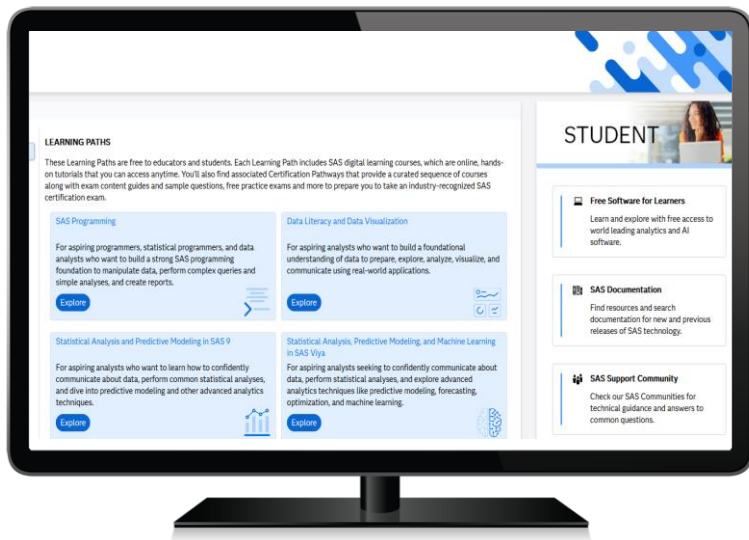
In Part 1, you'll use historical data to identify successful applicants based on the 'Admissions' variable—a 0/1 indicator showing whether a student was admitted.

In Part 2, you'll discover the Fairness and Bias assessment tools, which allow us to evaluate whether a model should be used and ensure the admissions process is as fair as possible.

# Portals

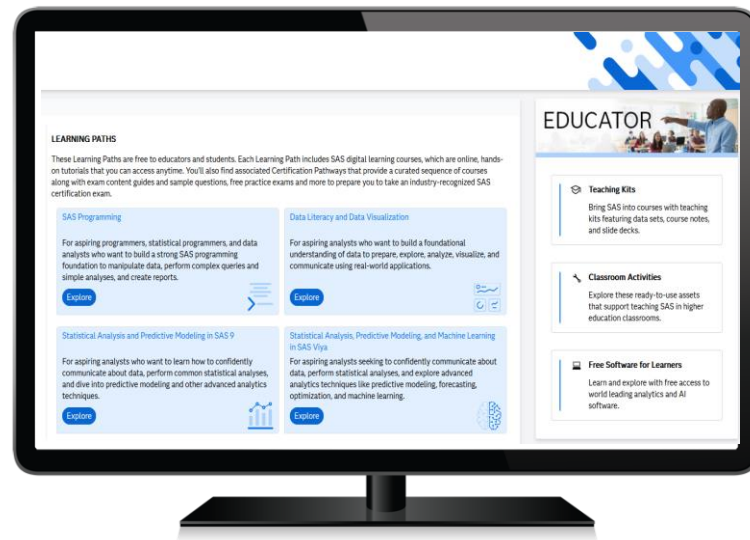
# Free Learning Portals for Academics

## SAS Skill Builder for Students



[sas.com/skillbuilder](https://sas.com/skillbuilder)

## SAS Educator Portal

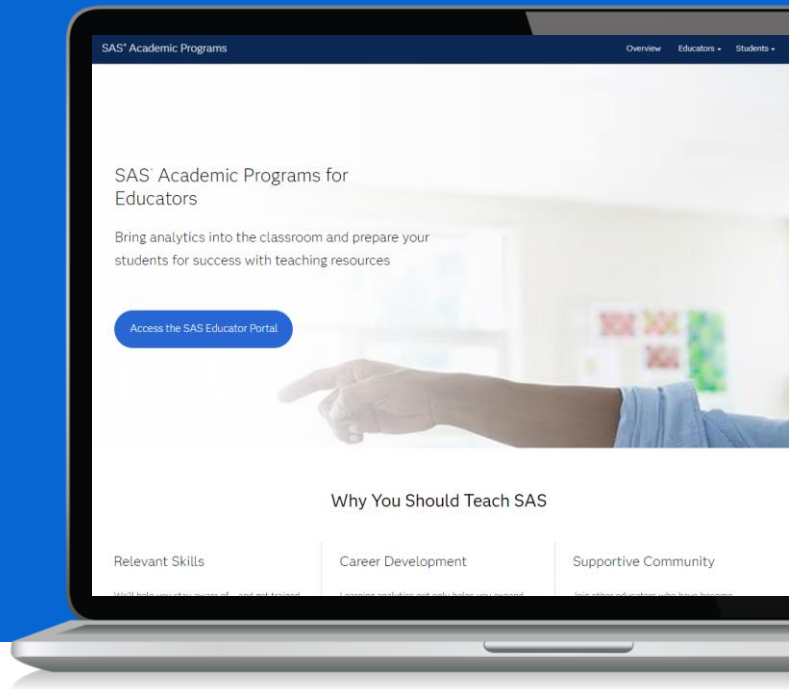


[sas.com/educatorportal](https://sas.com/educatorportal)

# Educator Portal

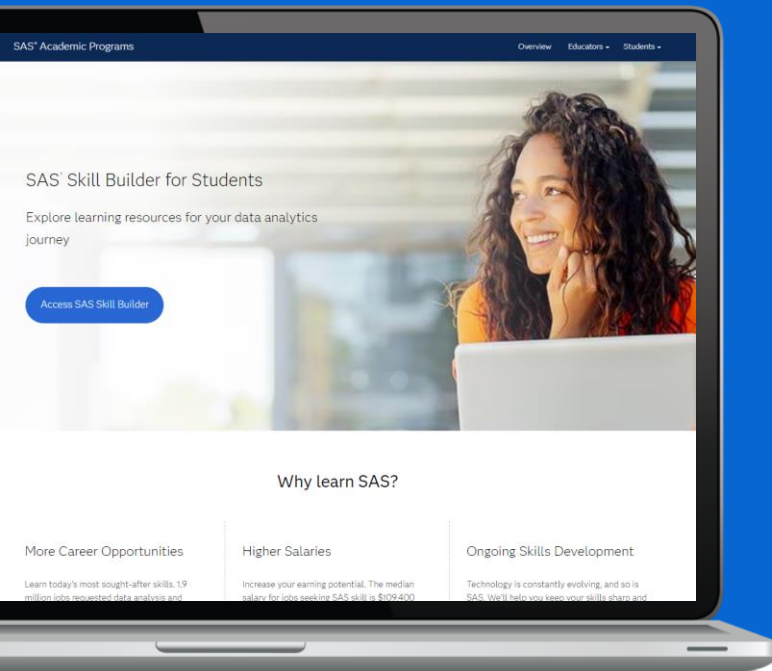
All-in-One Resource Center

- Free e-learning and software
- Certification paths and preparation materials
- Teaching materials
- Educator focused workshops & training
- Discounts & promotions



# SAS Skill Builder for Students

Your future starts here



- Learn on your time
  - Free e-learning courses
  - Certification prep materials and exam discounts
- Free software
  - Three cloud-based options
- Stay motivated!
  - Early career resources
  - Discover why data analytics is a rewarding career path
  - Learn about what it means to be a data analytics professional
  - Connect with employers
- Cross-industry access
  - Analytical skills for any discipline

[www.sas.com/skillbuilder](https://www.sas.com/skillbuilder)

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# Portals

Let's have a look!

# Free e-Learning Courses

**MY LIBRARY**


- In Progress
- Learning Paths**
- Certification
- Live Classes
- Resources

**LEARNING PATHS**

These Learning Paths are free to educators and students. Each Learning Path includes SAS digital learning courses, which are online, hands-on tutorials that you can access anytime. You'll also find associated Certification Pathways that provide a curated sequence of courses along with exam content guides and sample questions, free practice exams and more to prepare you to take an industry-recognized SAS certification exam.


**SAS Programming**

For aspiring programmers, statistical programmers, and data analysts who want to build a strong SAS programming foundation to manipulate data, perform complex queries and simple analyses, and create reports.

[Explore](#)


**Data Literacy and Data Visualization**

For aspiring analysts who want to build a foundational understanding of data to prepare, explore, analyze, visualize, and communicate using real-world applications.

[Explore](#)


**Statistical Analysis and Predictive Modeling in SAS 9**

For aspiring analysts who want to learn how to confidently communicate about data, perform common statistical analyses, and dive into predictive modeling and other advanced analytics techniques.

[Explore](#)

**Statistical Analysis, Predictive Modeling, and Machine Learning in SAS Viya**

For aspiring analysts seeking to confidently communicate about data, perform statistical analyses, and explore advanced analytics techniques like predictive modeling, forecasting, optimization, and machine learning.

[Explore](#)

# Learn More!

## Data Literacy and SAS Visual Analytics Courses

1

### COURSE

Data Literacy Essentials

SHOW MORE ▾

### COURSE

Data Literacy in Practice

START

SHOW MORE ▾

### COURSE

Responsible Innovation and Trustworthy AI

START

SHOW MORE ▾

### COURSE

SAS Visual Analytics 1 for SAS® Viya: Basics

START

SHOW MORE ▾

### COURSE

SAS® Visual Analytics 2 for SAS® Viya®: Advanced

START

SHOW MORE ▾



# SAS Educate 2025

July 21–24, 2025 | Virtual

Ready to level up your approach to teaching AI & Analytics? Join us for **SAS Educate 2025**, a dynamic virtual learning week designed exclusively for faculty. From July 21–24, connect with fellow educators, industry leaders, and SAS experts as we explore the innovations shaping the future of education and the workforce.

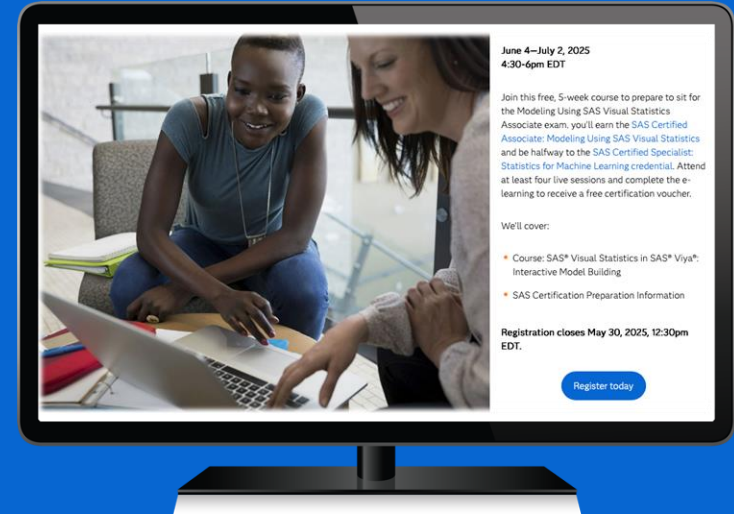
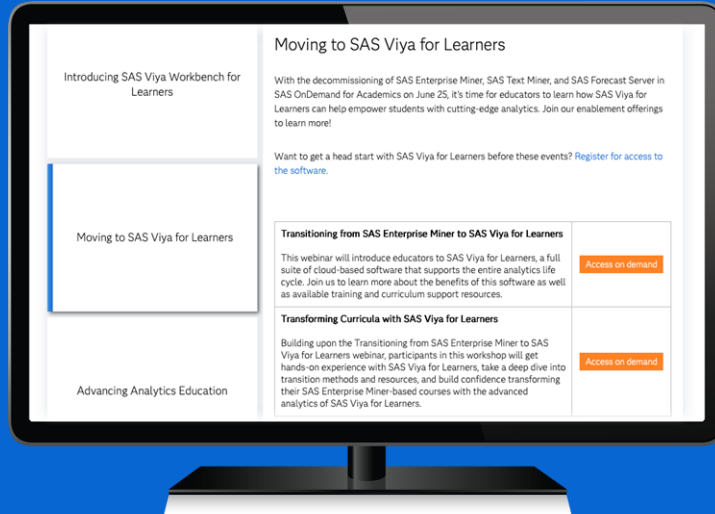
## What's in store?

Get inspired, gain practical insights, and bring fresh ideas to your classroom with sessions covering:

- A **week-long Cortex Simulation Game** that will challenge your strategic thinking skills
- **Best practices and success stories** in curriculum development
- **Emerging topics in generative AI** and **ethical innovation**
- **Talent connections and industry partnerships** to help bridge the gap between education and careers
- The **value of SAS certification** for students and professionals
- ...And much more!

# More Resources

# Free Academic Workshops



[www.sas.com/academicworkshops](http://www.sas.com/academicworkshops)

sas innovate 2025

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# SAS Communities

[www.sas.com/communities](http://www.sas.com/communities)

Get SAS tips, share your knowledge, and find out about upcoming events.

Global community of users for 24/7 support.

Case studies, documents, blogs, webinars, and more.

SAS Communities gives you **immediate access** to **thousands of SAS users** across the globe.

From learners to data professionals, the platform provides valuable connections and insights into **real world problems** and **processes**.

There is no data problem too obscure!

# Why Get SAS Certified?



## Prove your credibility.

SAS certifications are globally recognized, so having them on your résumé proves you've received in-depth training from industry experts.



## Gain a career advantage.

SAS skills are highly in demand among today's employers. Learning – and validating – those skills can lead to new opportunities.



## Earn a SAS digital badge.

Getting certified earns you a digital badge to share on social media sites. Your peers and potential employers will know what you've accomplished.



## Take advantage of academic discounts.

Students and educators not only get special pricing on certification exams, they also have access to free e-learning to build their skill sets.

# 84%

said a SAS® certification improved their performance and advanced their careers.

*Coursera Survey conducted by SAS, 2020*

[https://www.sas.com/en\\_us/certification/why-get-certified](https://www.sas.com/en_us/certification/why-get-certified)

# SAS® Digital Badges



## CERTIFIED

Awarded to those who show proficiency by passing one or more SAS certification exams.



## LEARN

Awarded to those who take and pass a training course from SAS, in most formats.



## CHALLENGE

Awarded to those who compete in a SAS competition, such as the SAS-sponsored hackathons.



## ACADEMIC

Awarded to college and university students and educators for completion of joint academic programs and initiatives.

# SAS® Digital Badges



- Allows employers to **verify SAS skill** attainment
- Creates a **distinction** between you and students from other programs without the certification
- Shows **commitment to learning** and advanced knowledge
- Makes you more **competitive** in the current job market
- **Increases** resume/CV **visibility** provided to prospective employers

**Thank you!**

**sas innovate** 2025