



The Art of the Practical: Making AI Real

Tara Holland
SAS Ottawa

My Past Relationship with AI





SAS in Government

Analytics-driven Decisions
for Effective Government

Government was the first SAS use case and customer

Government is our second-largest industry footprint

SAS is used by **650+** Government Departments, Ministries,
Offices, and Agencies in **134 countries** around the world

The Art of the Practical: Making AI Real



Level Set on Understanding of AI



Examples & Key Consideration




Implementing AI: Practical Approaches



Best Practice Takeaways



Level Set on Understanding of AI

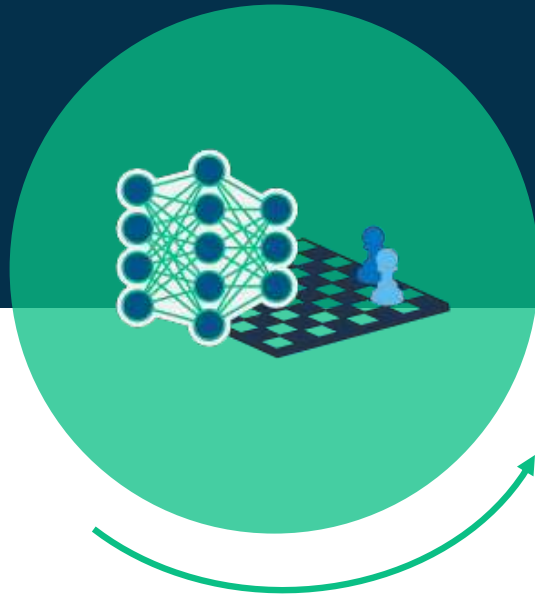


Artificial intelligence in the real world is making an impact.

We spoke with a few of the top AI thought leaders.

sas.

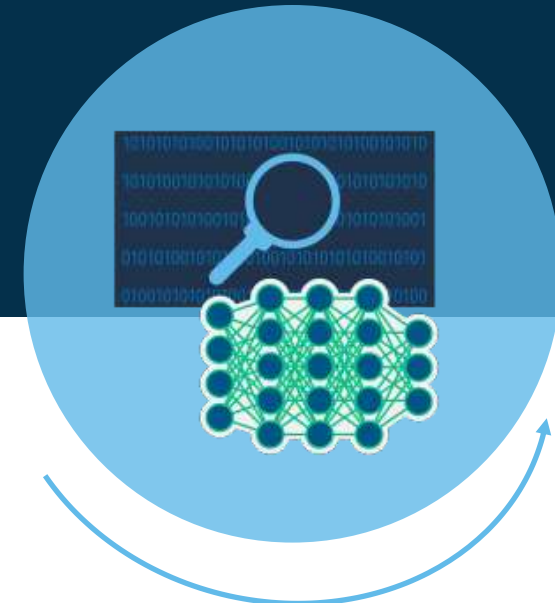
Evolution of Artificial Intelligence



1950s-1970s
Neural Networks



1980s-2010s
Machine Learning



Present Day
Deep Learning and
Cognitive Systems

What Artificial Intelligence is **NOT**

- Auto-magic
- A crystal ball
- Intelligent, autonomous robots
- Self-creating/correcting models
- “Out-of-the-box” everything
- Artificial general intelligence





Believe in Humans ^{AI}

Together the possibilities are exponential

Artificial Intelligence

is the science of training systems to emulate human tasks through Learning and Automation



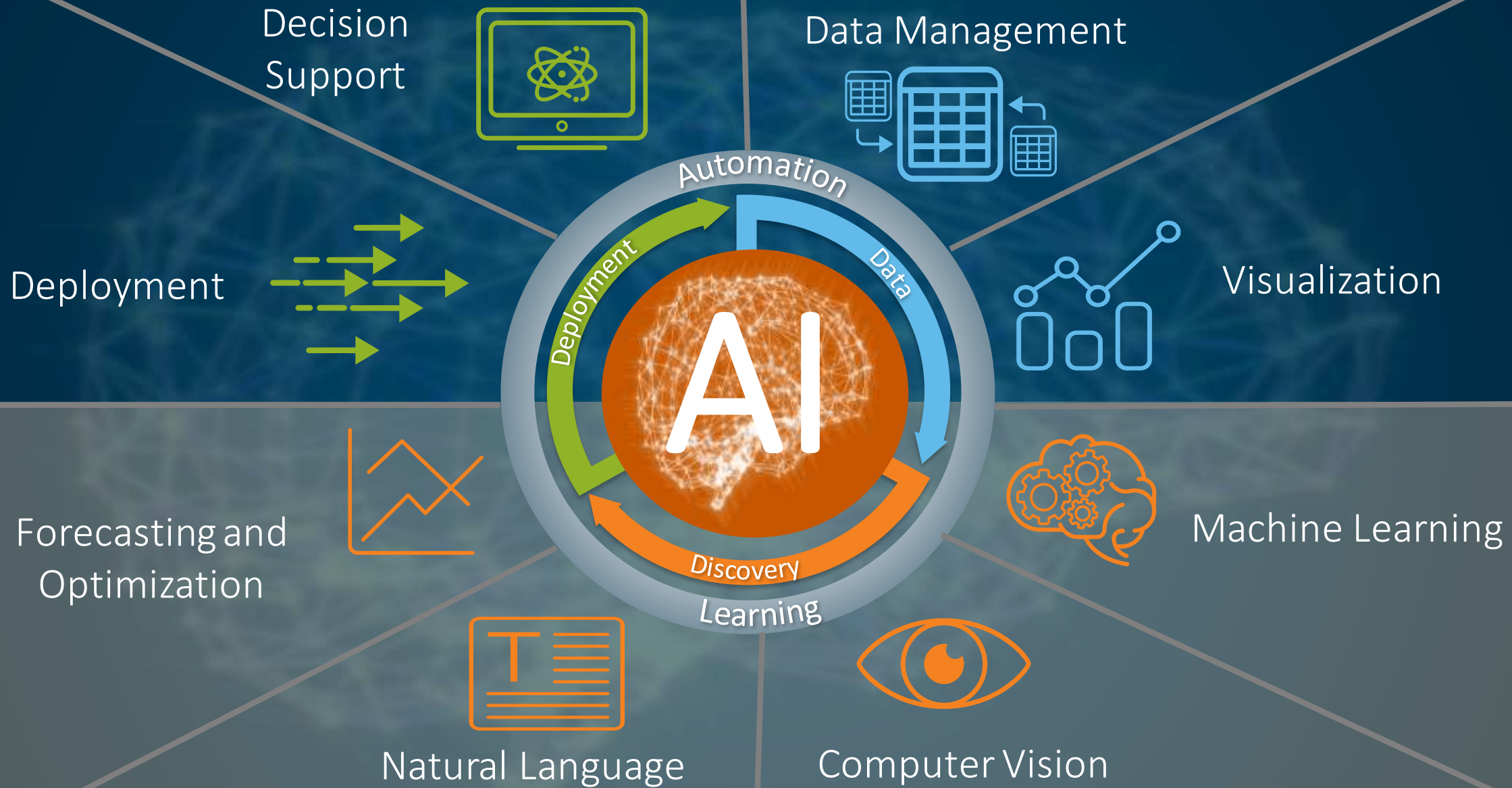
Understand
Context



Learn
Patterns



Recognize
Objects



Predictive
Power

Radiology image sync

Electronic health record history

Treatment assessment

Social determinants of health

Diagnostics, diagnosis &
patient outcome prediction

Complexity



Examples & Key Consideration

Practical AI: Examples



WildTrack

Data for Good

90%

accuracy for ID of
wildlife using tracks

Passport

Canada

Forecast demand
and service location
within

.01%

VUmc

Healthcare

Improved
liver & brain
tumor diagnosis with
image and text

Veterans

Government

Client records
requests
processed in
minutes not days

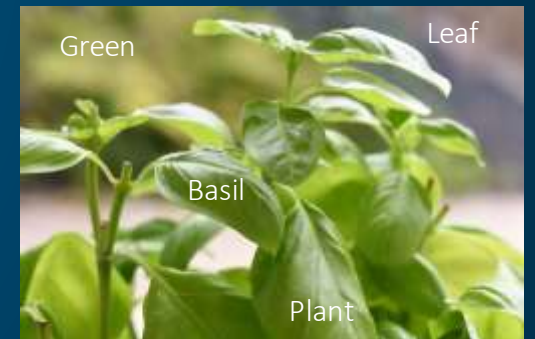
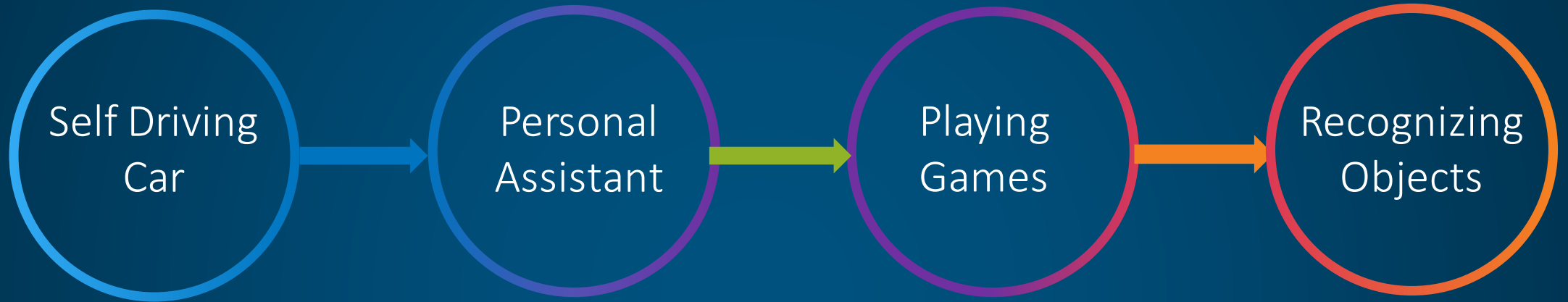
Wake County

Government

200%

Improvement in
taxation process

What's Your Business?



Bring the problem to AI, not the other way around

Economic growth

Migration

Terrorism and security threats

Demographics

Escalating benefits costs

Health care delivery

Housing/homelessness

Education

Unemployment

Inflation

Income disparities

More demanding citizens

Social and political change

Climate change, sustainability





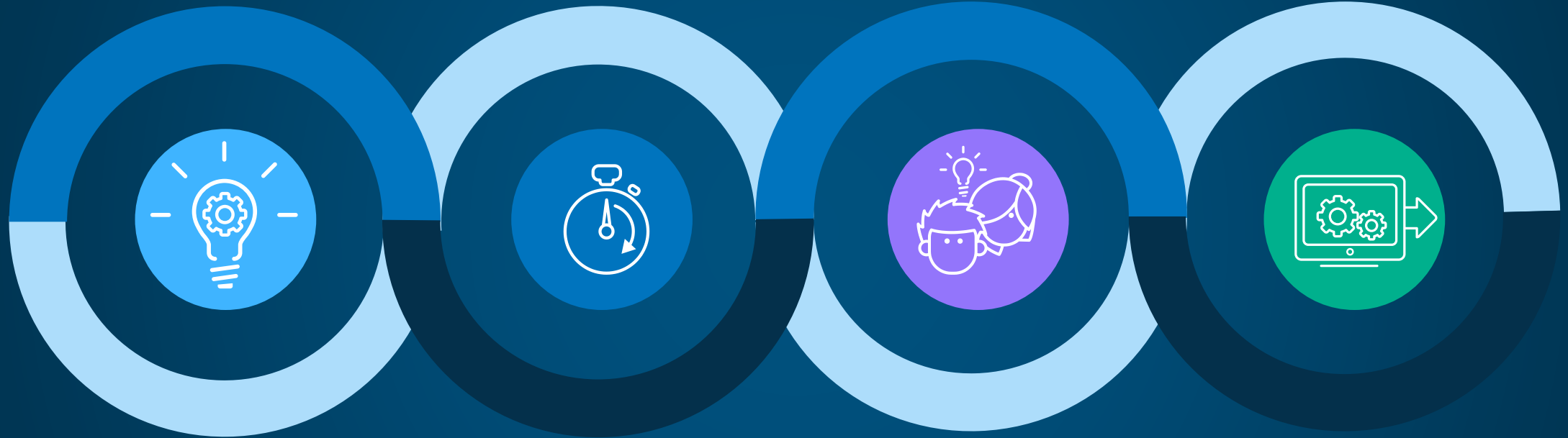




Implementing AI: Practical Approaches

Implementing Pragmatic AI

Built on a foundation of analytics



Build better models.

Be more productive.

Embrace all users.

Operationalize your results.

Build Better Models

Use all algorithms



Data Manipulation

- In-Memory Data Manipulation
- Frequency / Crosstab
- Data Transpose
- Variable Binning
- Variable Cardinality Analysis
- Variable Summary
- Sampling and Partitioning
- Missing Value Imputation
- Variable Selection
- Model Assessment
- SQL



Statistics

- Cox Proportional Hazards
- Decision Trees
- Design Matrix
- General Additive Models
- Generalized Linear Models
- K-means and K-modes Clustering
- Linear Regression
- Logistic Regression
- Nonlinear Regression
- Ordinary Least Squares Regression
- Partial Least Squares Regression
- Pearson Correlation
- Principal Component Analysis
- Quantile Regression
- Shewhart Control Chart Analysis



Machine Learning

- Bayesian Networks
- Boolean Rules
- Factorization Machines
- Frequent Item Set Mining
- Gradient Boosting
- K Nearest Neighbor
- Market Basket Analysis
- Moving Windows PCA
- Network Analytics/Community Detection
- Neural Networks
- Random Forest
- Robust PCA
- Support Vector Data Description
- Support Vector Machines
- Text Mining
- Variable Clustering



Deep Learning

- Deep Forward Neural Networks (DNNs)
- Convolutional Neural Networks (CNNs)
- Recurrent Neural Networks (RNNs)
- Autoencoders for neural networks
- Image processing extensions
- Augment image action
- Convert image table action
- Match images action
- 2D/3D image visualization

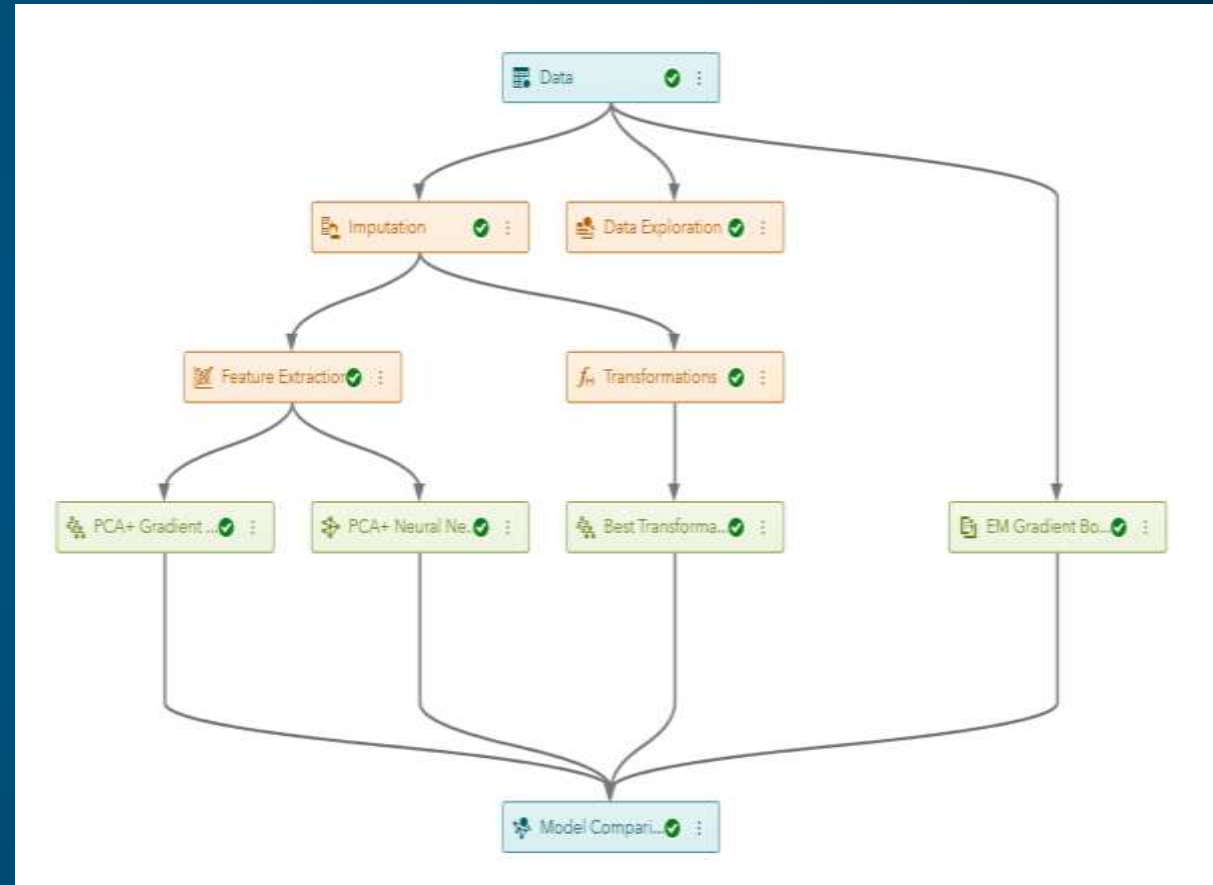
Be More Productive

Advanced Algorithms require Prototyping



AI Workbench & Templates

- Share best practices
- Collaboration between users
- Integrate multiple coding languages
- Run model tournaments & prototypes

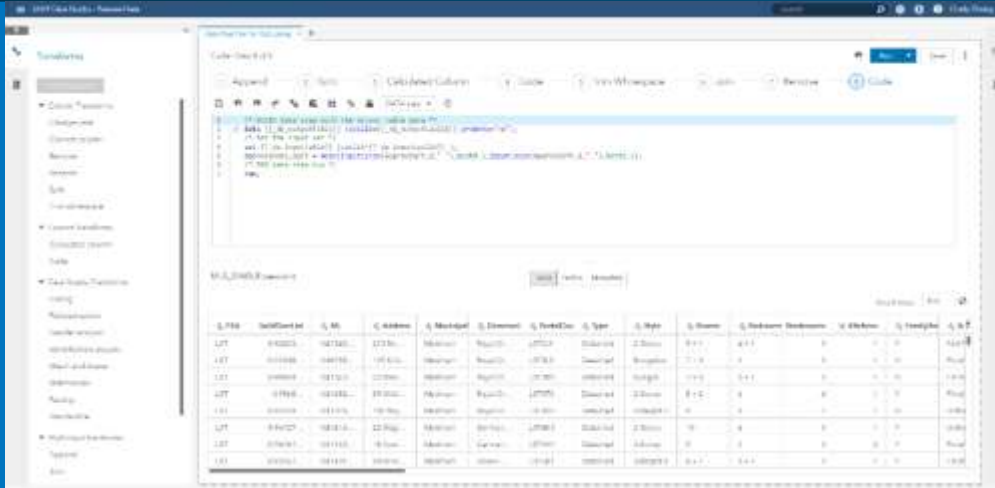


Embrace All Users

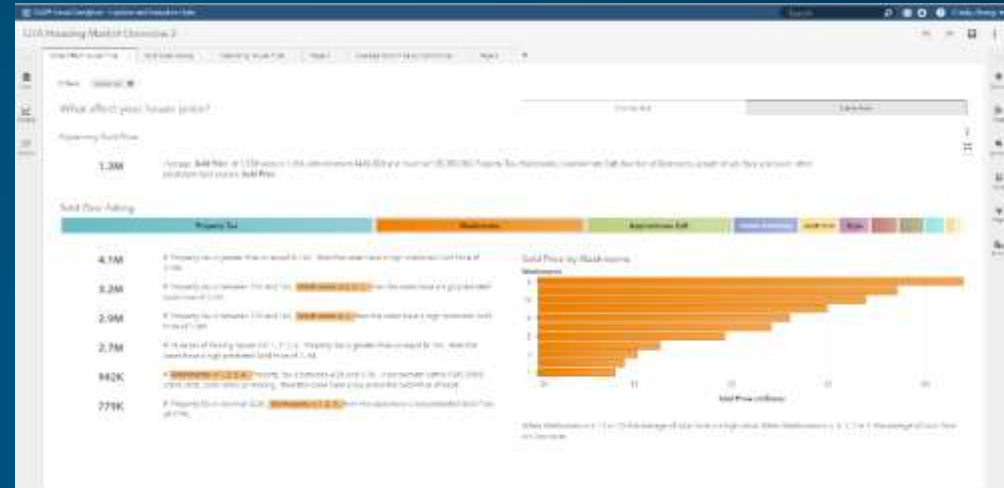
Support your entire AI pipeline.



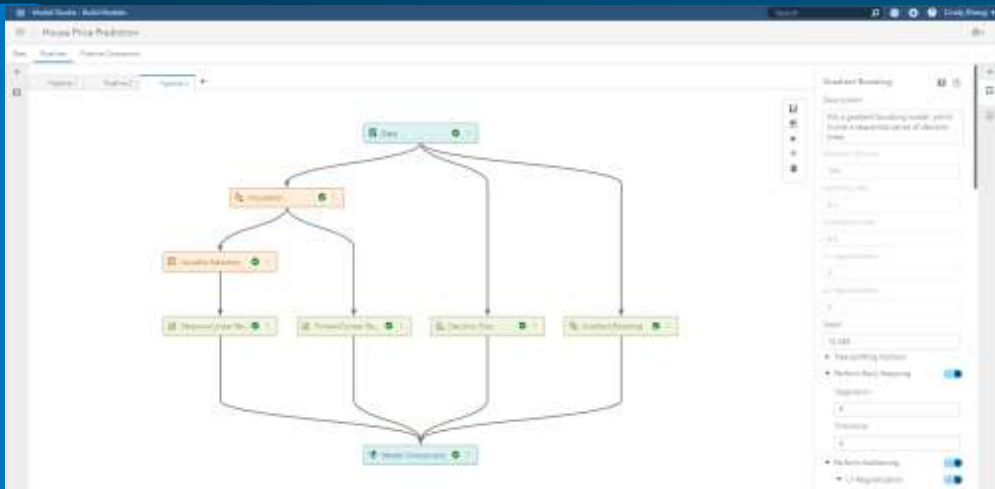
Prepare data.



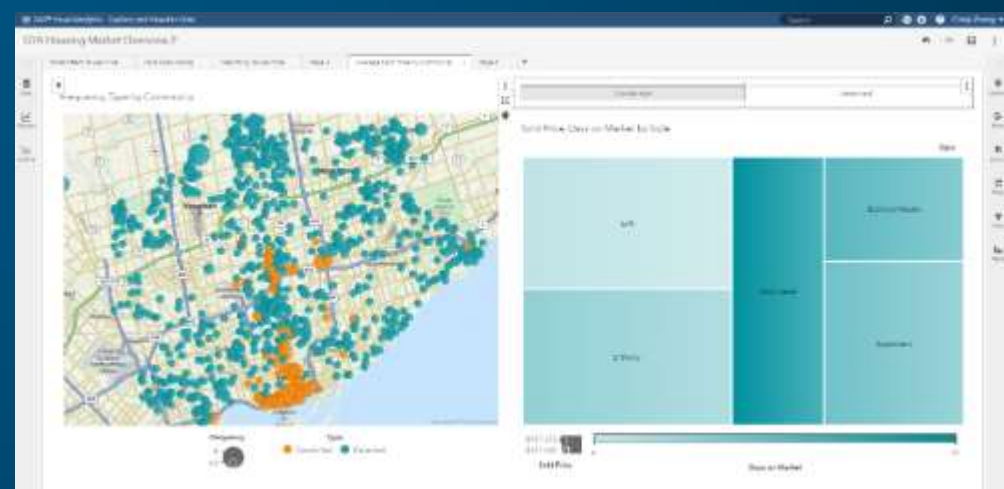
Explore variables.



Build models.



Share insights.



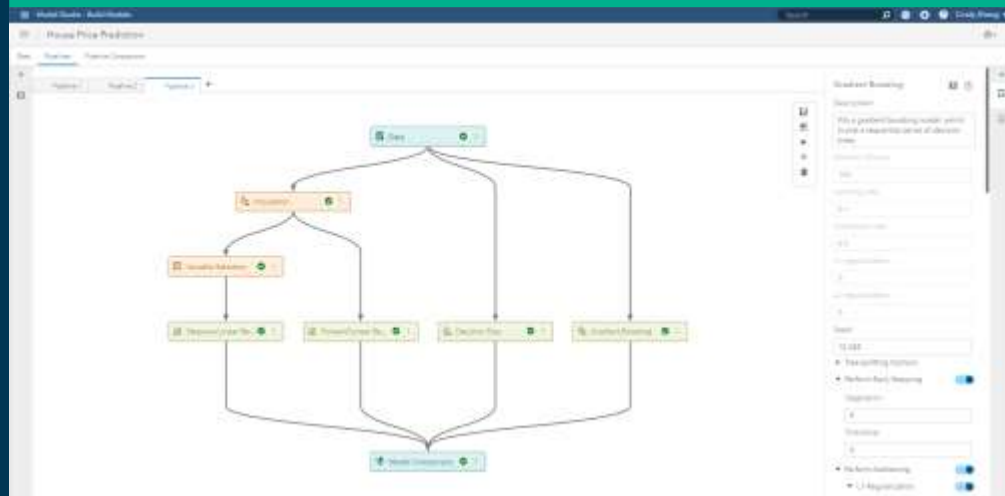
Operationalize AI

Embed AI in applications



Move from model ...

... to application



... with deployment capabilities.

1. GOVERN



Provide oversight and governed analytics.

2. EMBED



Embed and execute models, leverage compute platforms.

3. MONITOR



Gain visibility into analytic outcomes & approach.

4. AUTOMATE OPERATIONAL DECISIONS



Integrate analytical models with business rules & create decision flows.



Best Practice Takeaways

Making AI Real: Best Practices

1. Start small and grow



- AI doesn't need to be big bang
- You're likely doing it today
- Manage your expectations
- Create agility in processes and systems

Making AI Real: Best Practices

1. Start small and grow
2. Focus on the problem



- Bring the problem to AI, not the other way around
- Don't lead with technology
- AI needs to be deployed to matter

Making AI Real: Best Practices

1. Start small and grow
2. Focus on the problem
3. Connect to analytics



- Analytics and AI are connected
- Mature your current analytics programs and strategy
- Don't do AI in isolation

Making AI Real: Best Practices

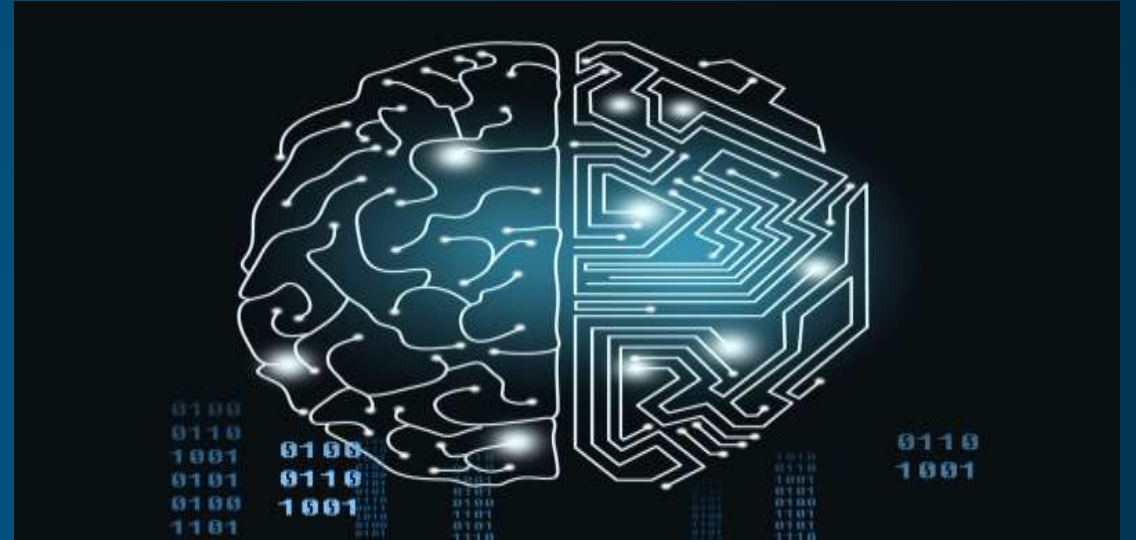
1. Start small and grow
2. Focus on the problem
3. Connect to analytics
4. Create Trust in AI



- Ethics and training are critical for success
- Don't use black box technology
- Strive for interpretable AI

Making AI Real: Best Practices

1. Start small and grow
2. Focus on the problem
3. Connect to analytics
4. Create Trust in AI
5. Believe in Humans



- Use AI to augment human experience
- Monitor results and be prepared to adapt
- Create transparency from the start



Believe in Humans ^{AI}

Together the possibilities are exponential