[PharmaSUG SDE Japan 2022]

Role of Visualization in Supporting Efficient Workflows across the Life Cycle of Drug Development

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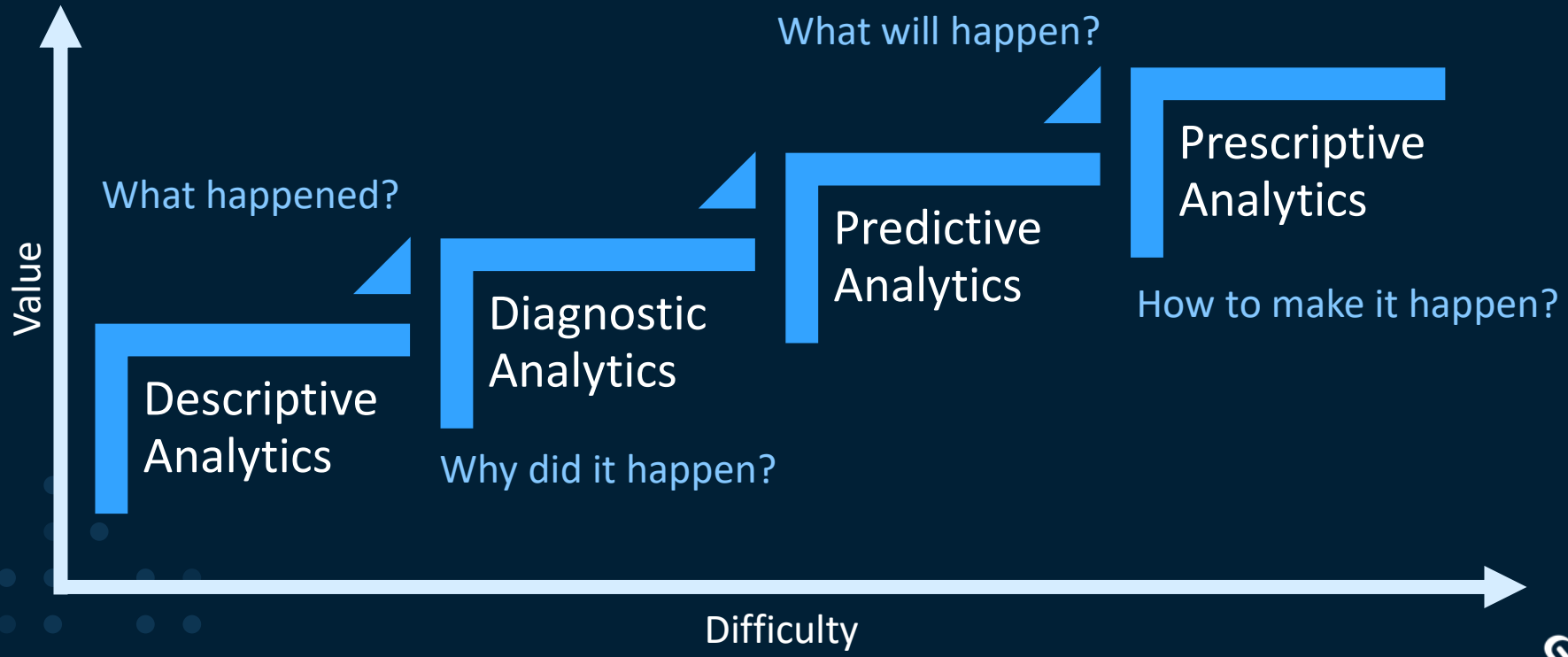
Introduction

Visualization is not only for Descriptive Analytics



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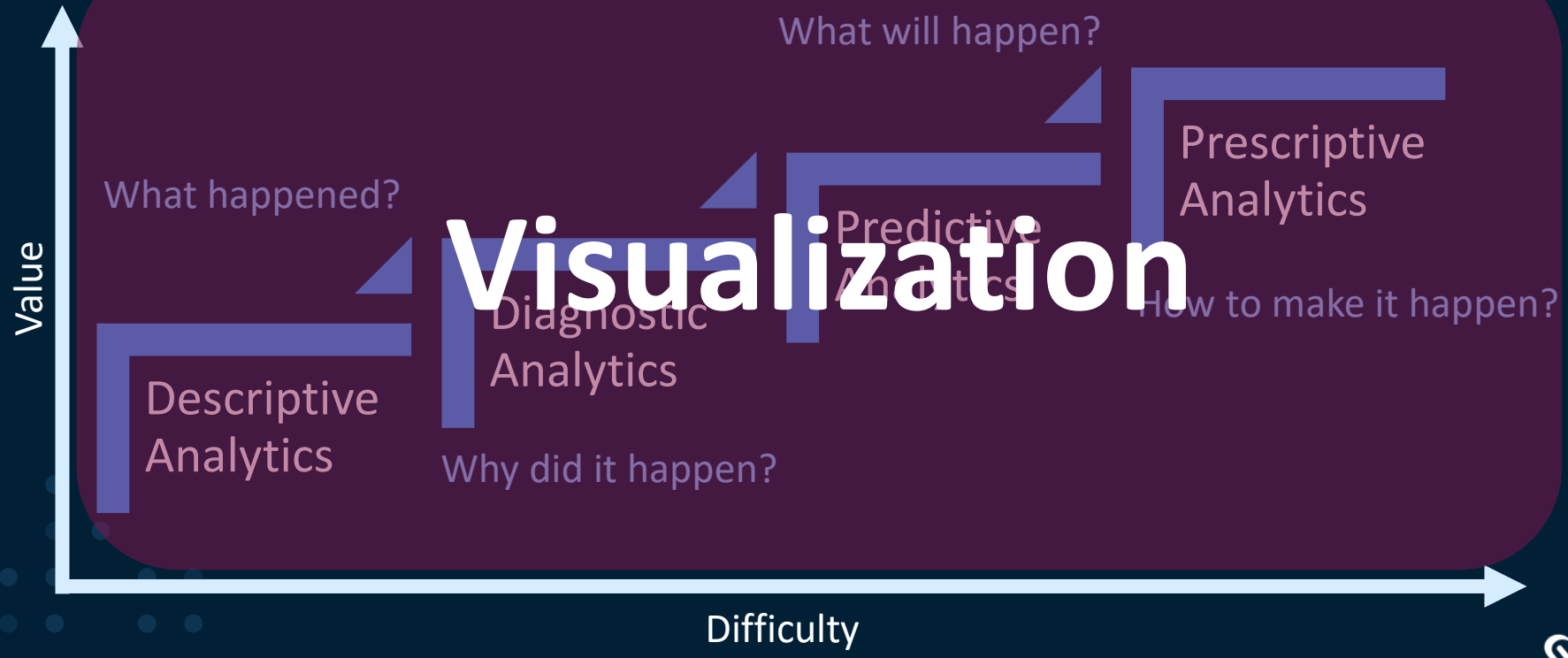
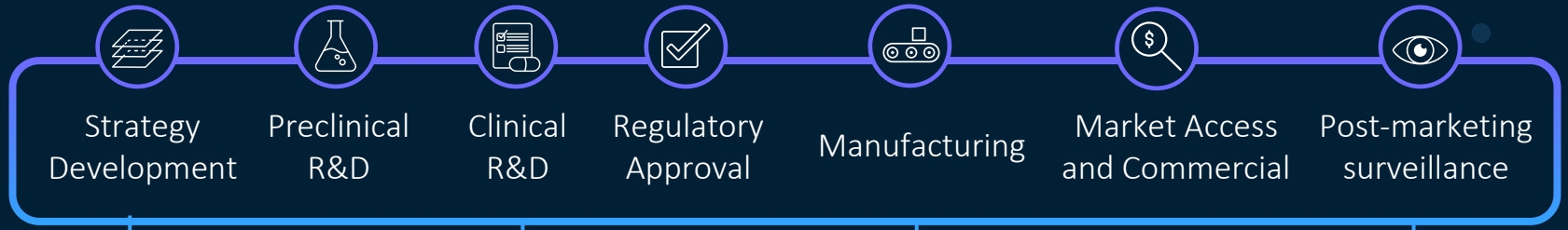


Visualization Across Life Cycle of Pharmaceutical Product



Improve speed in literature review

Save time in clinical trials

Evaluate clinical outcome objectively via digital biomarker

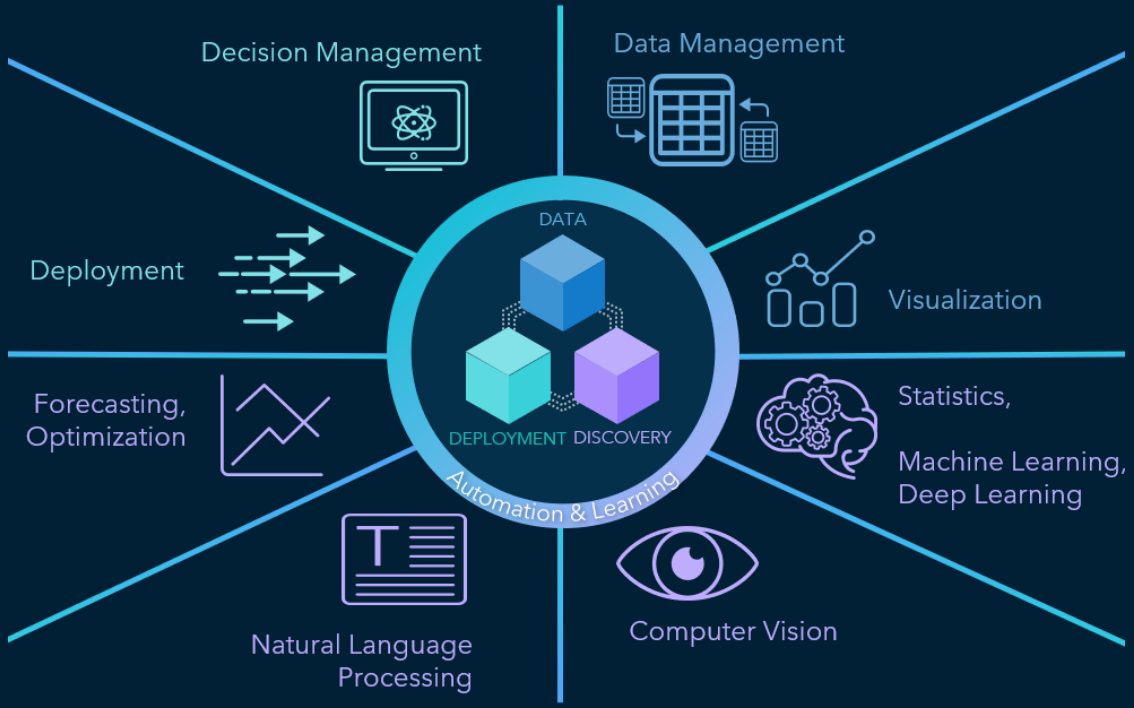
Support efficient use and review of clinical data in SDTM

Better visibility of production processes to maintain quality

Improve efficiency in analyzing adverse events report

SAS Viya – The hero behinds the scenes

SAS Viya is one single platform for all your analytical needs, allowing seamless transition in your analytical lifecycle



- Faster at processing the same workload
- Agile and scalable

SAS Viya

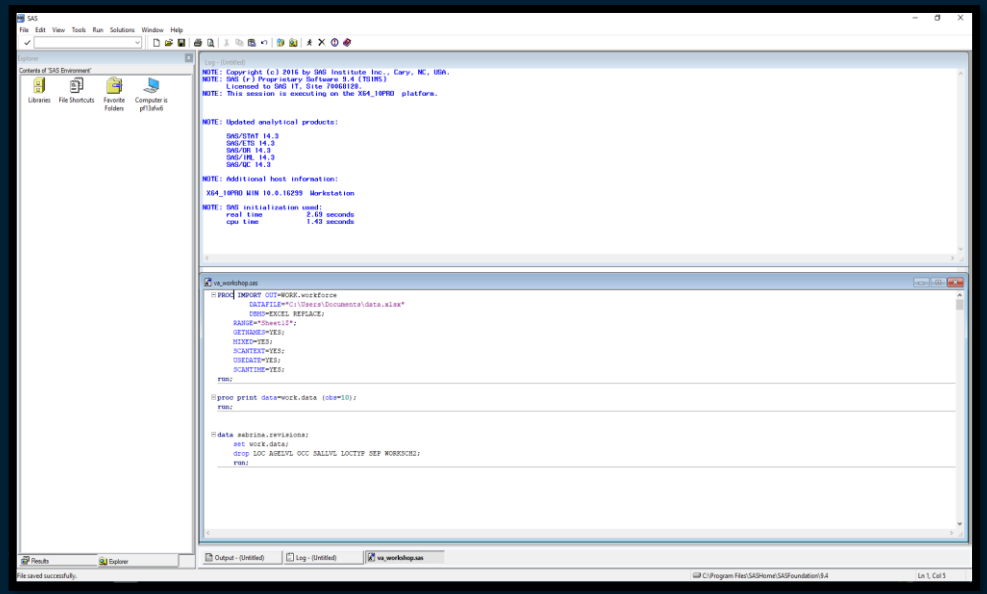
SAS 9 and SAS Viya

Main Differences

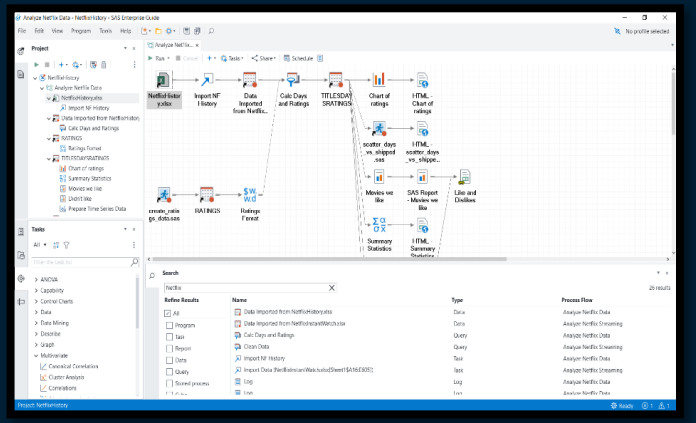
- *SAS Viya products are located centrally and accessed in one user interface (UI)* whereas SAS 9 has multiple UIs to access multiple products
- *SAS Viya is accessed securely through the web,* making it accessible on any device you are using
- The underlying architecture - analytics engine and microservices

SAS 9 and SAS Viya - User Interface (SAS 9)

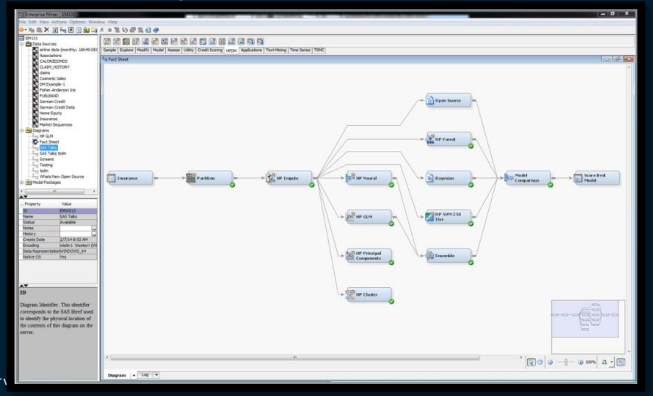
SAS Display Manager



SAS Enterprise Guide

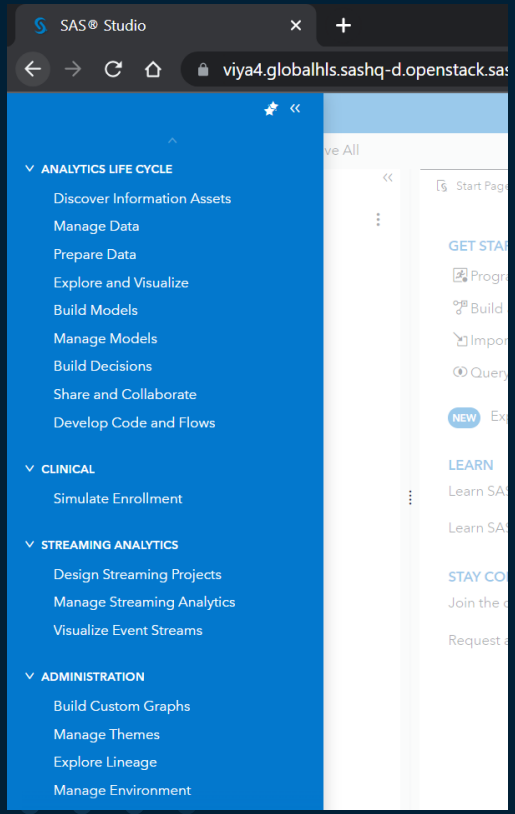


SAS Enterprise Miner, SAS Text Miner

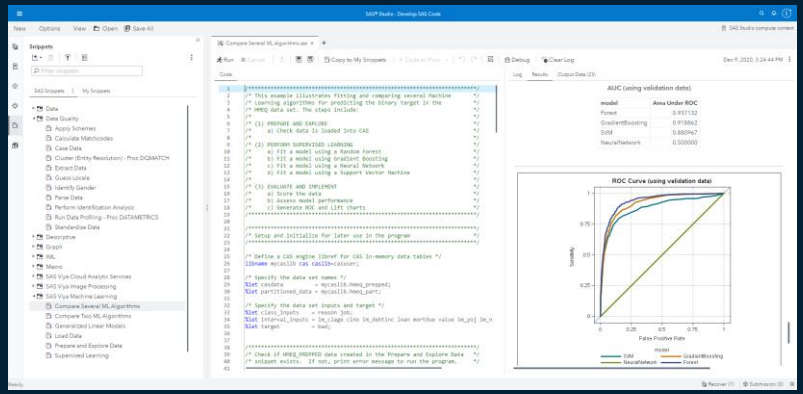


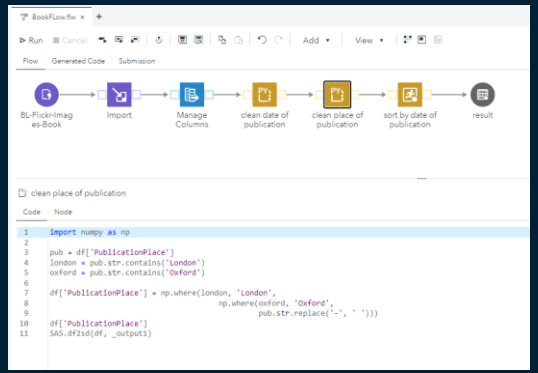
SAS 9 and SAS Viya - User Interface (SAS Viya)

Application Menu



SAS Studio





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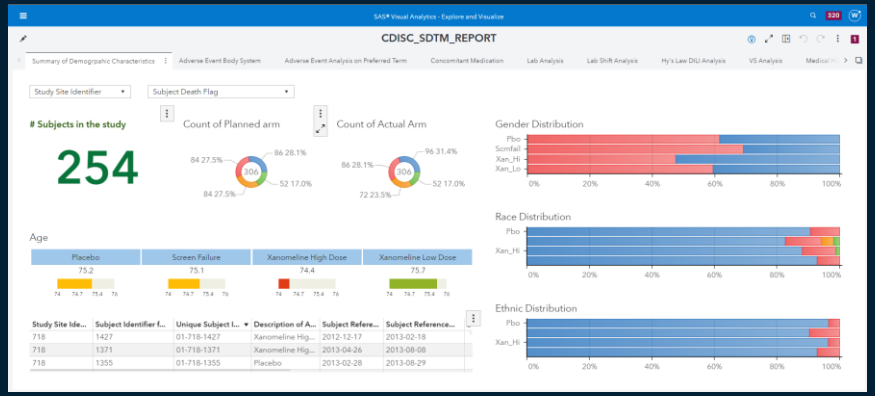
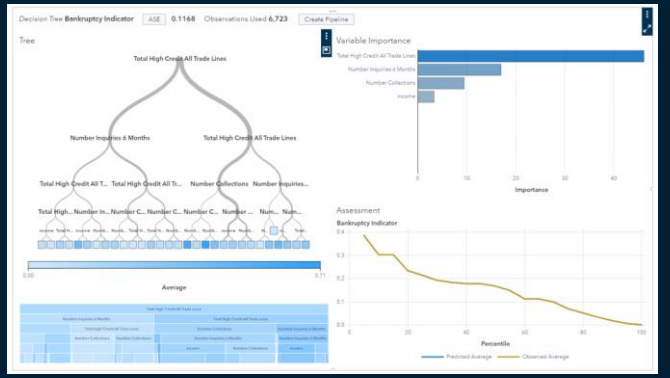
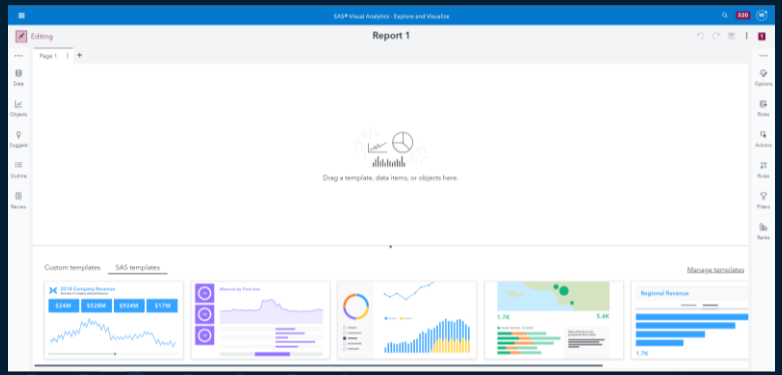
SAS Visual Analytics

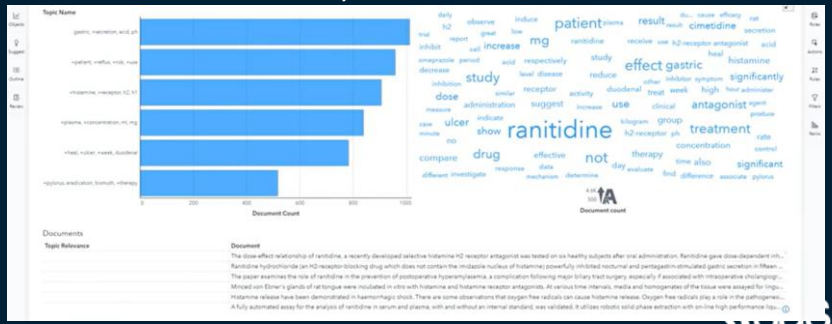


SAS Visual Data Mining and Machine Learning





SAS Visual Text Analytics



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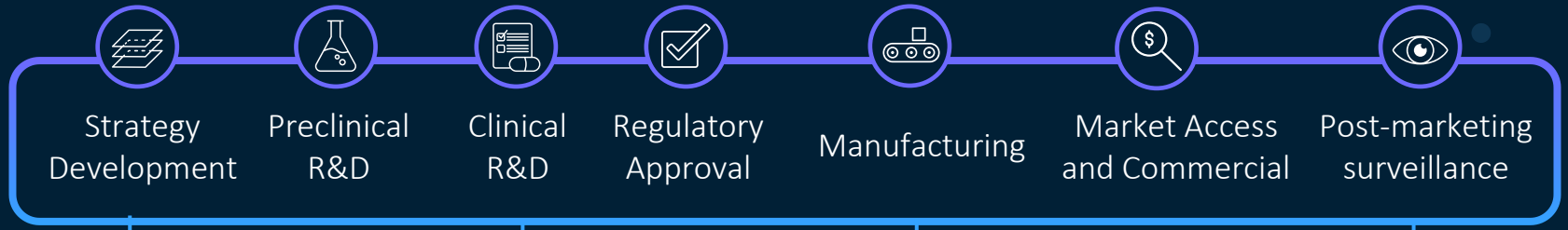

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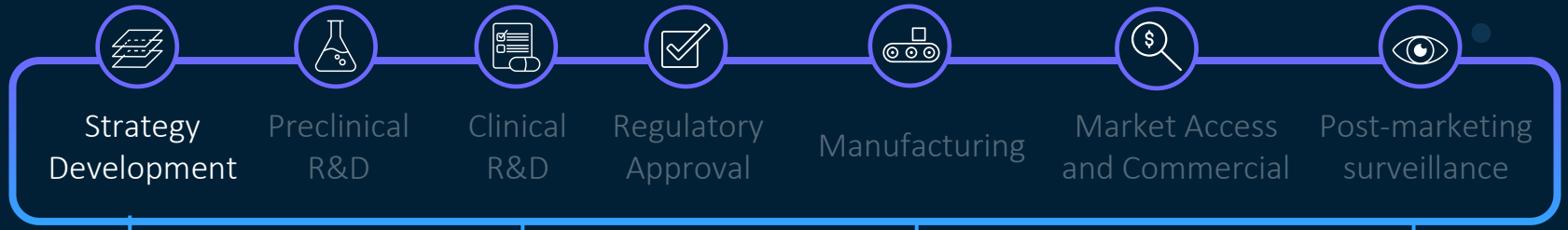

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Improve the Speed in Literature Review

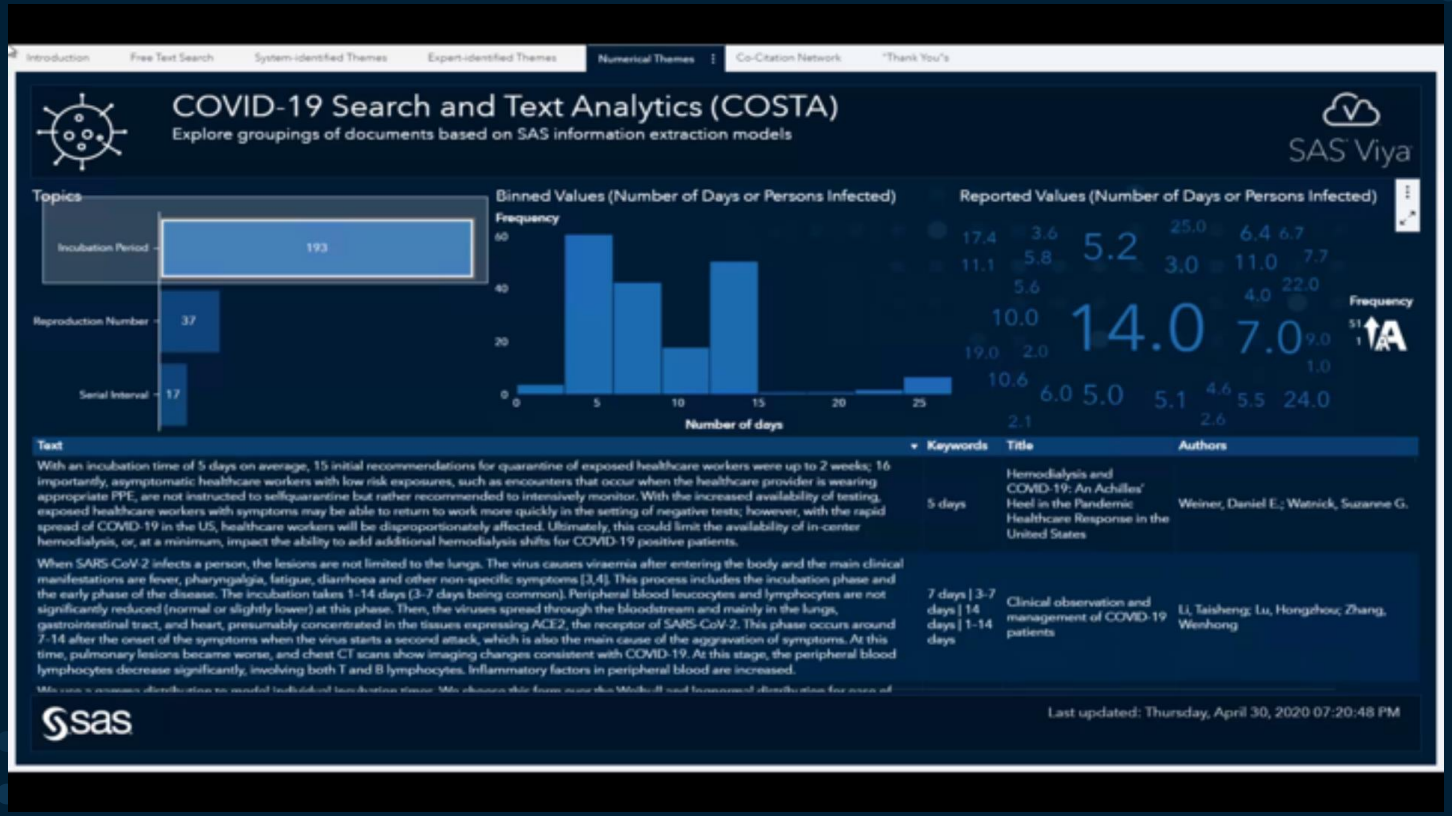
Use visual text analytics to mine COVID-19 research

- More than 50,000 full-text scientific research articles include studies on treatment effectiveness, vaccine development, mitigation efforts, genetic analysis, economic impact and more. It is impractical to analyze it all manually
- Effectively mining unstructured text from scientific literature can effectively categorize and determine relevancy of research findings
- Explore relevant research on coronavirus topics such as incubation period, genetic variations, risk assessment and more.
- Visualize extracted keywords and summarized quantitative data, quickly identify co-citations and the authority of papers using network analysis visualization, and search for key terms in free text

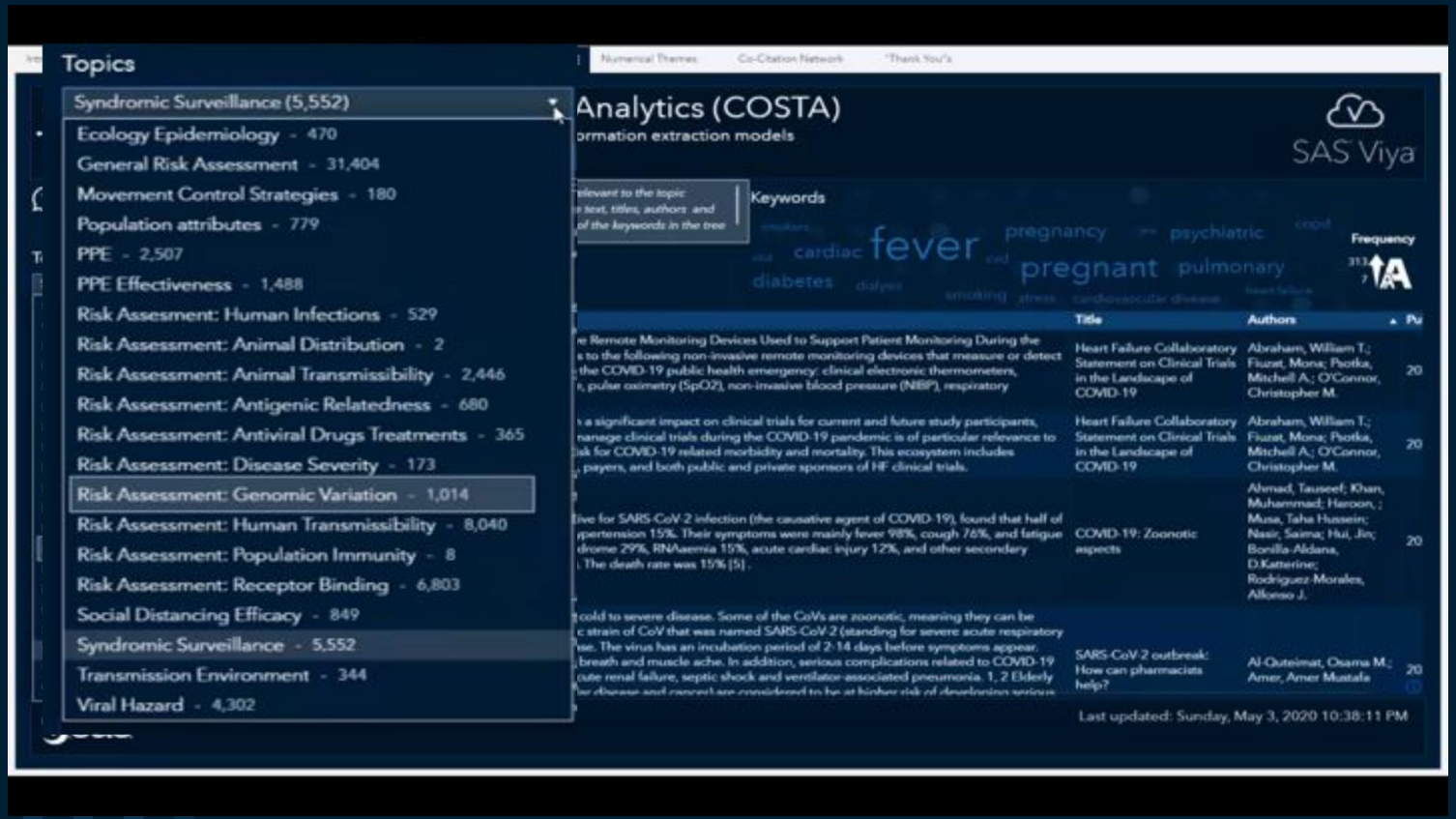
Powered by SAS Visual Text Analytics & SAS Visual Data Mining and Machine Learning in SAS® Viya

Fore more details: Text Analytics and AI in Government

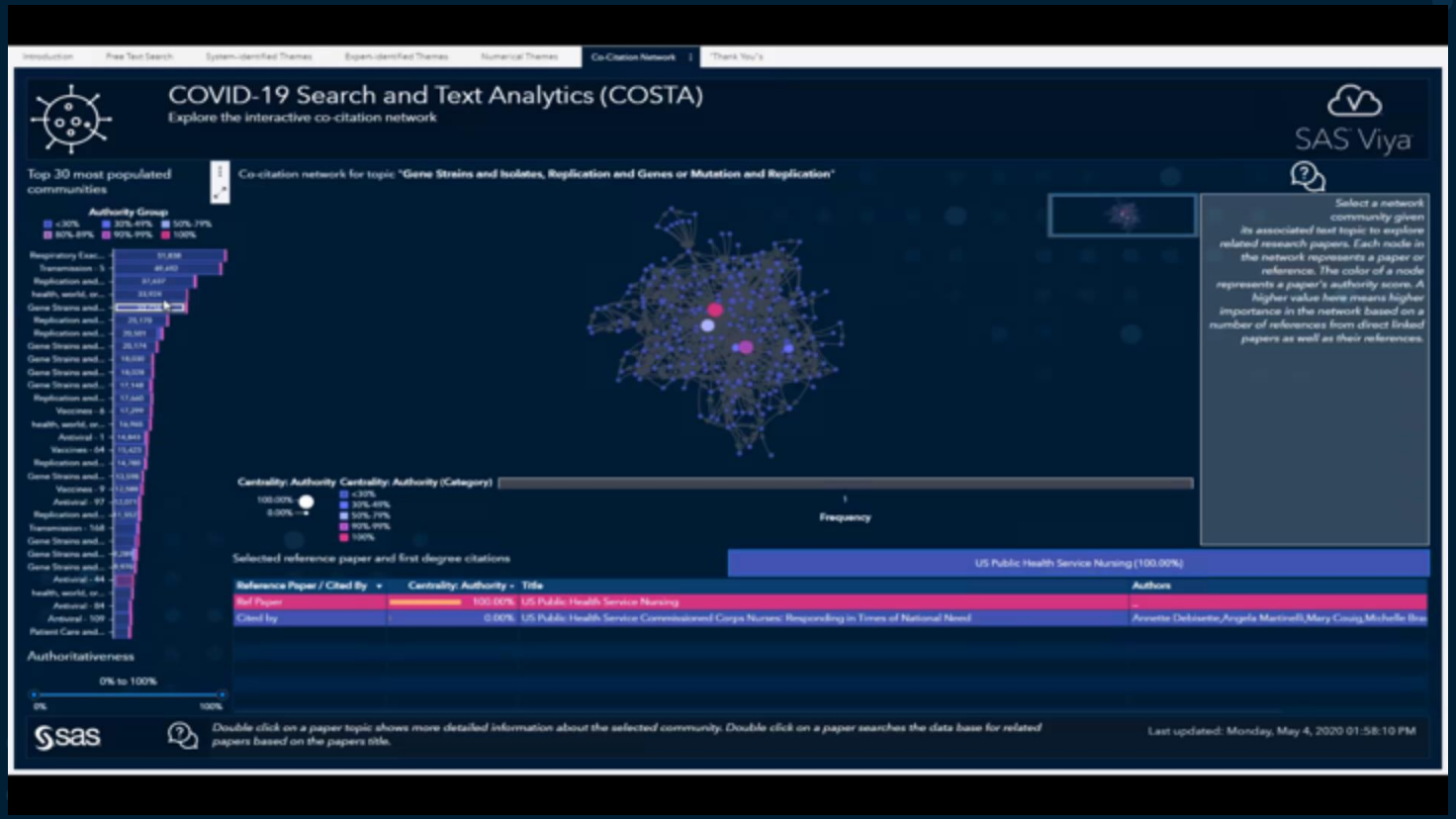
Visualize extracted keywords and summarized quantitative data



Explore relevant research on different topics



Identify co-citations and the authority of papers using network analysis visualization



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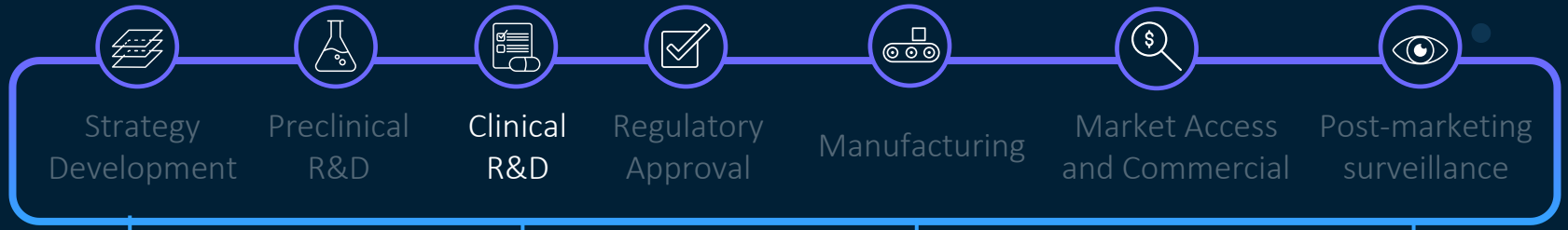

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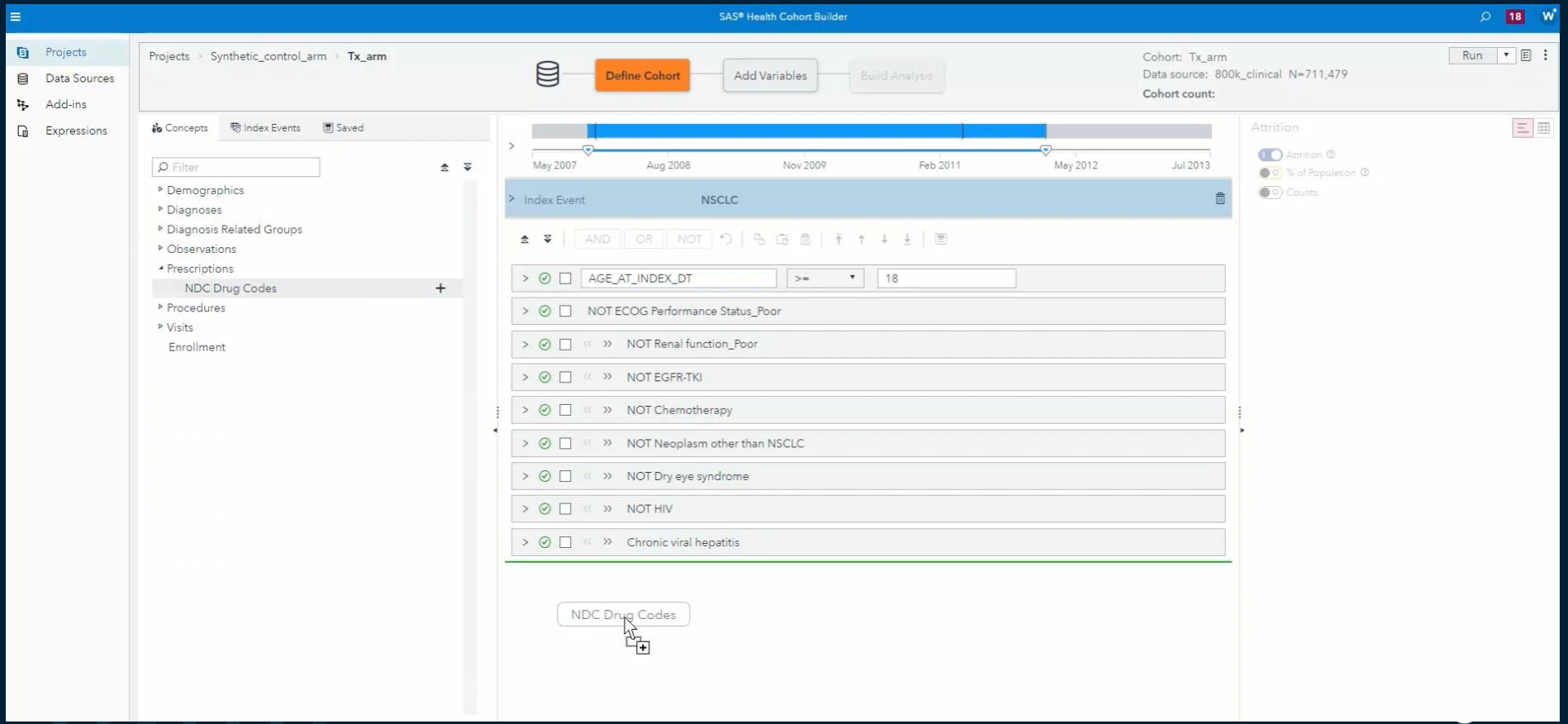
Save Time in Clinical Trials

Leverage Synthetic Control Arm

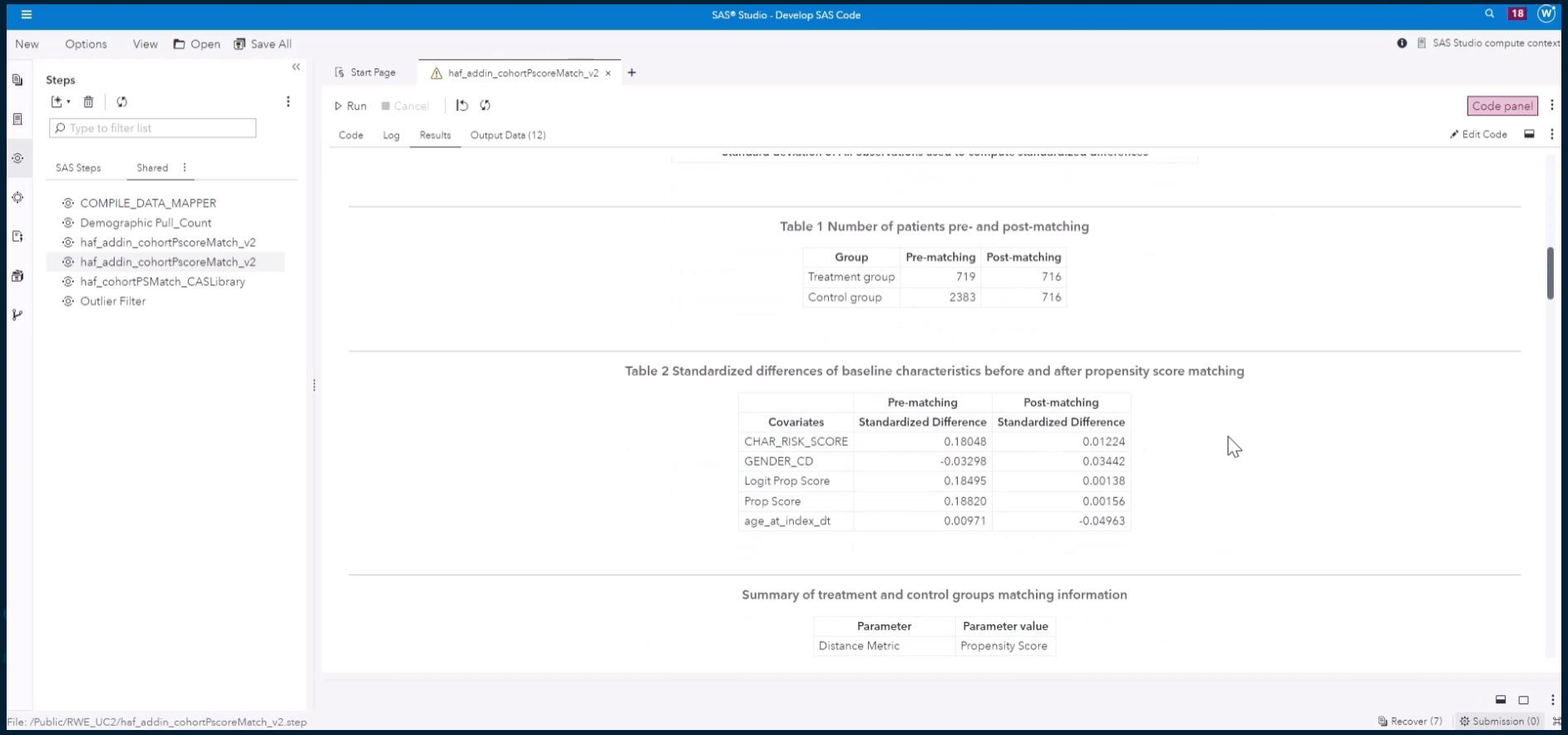
- In some circumstances, conducting traditional RCTs study design is unethical, impractical, or infeasible. (E.g., rare diseases)
- Provide researchers an interactive cohort building tool to identify external patient cohorts for comparison.
- Quickly identify appropriate synthetic control arms for the Tx arm in a single-arm trial.
- Reduce operation time or eliminate the need to enroll patients for control arms

Powered by SAS Health Cohort Builder & SAS Visual Analytics in SAS® Viya

Identify patient cohorts with easy drag-and-drop



Generate propensity score matched patient cohort with standardized analysis template



Visualize demographics & clinical characteristics in patient cohorts

Support efficient use and review of clinical data in SDTM

Clinical Data Dynamic Report

- Clinical data reviewers work with programmers to produce reports for monitoring data quality issues, reviewing safety signal, and identifying trends. However, the back-and-forth communication is often a resources intensive process
- Create an interactive, user-friendly dashboard for clinical data reviewing and monitoring task on an ongoing basis
- Reduce operational costs and save patient lives in time

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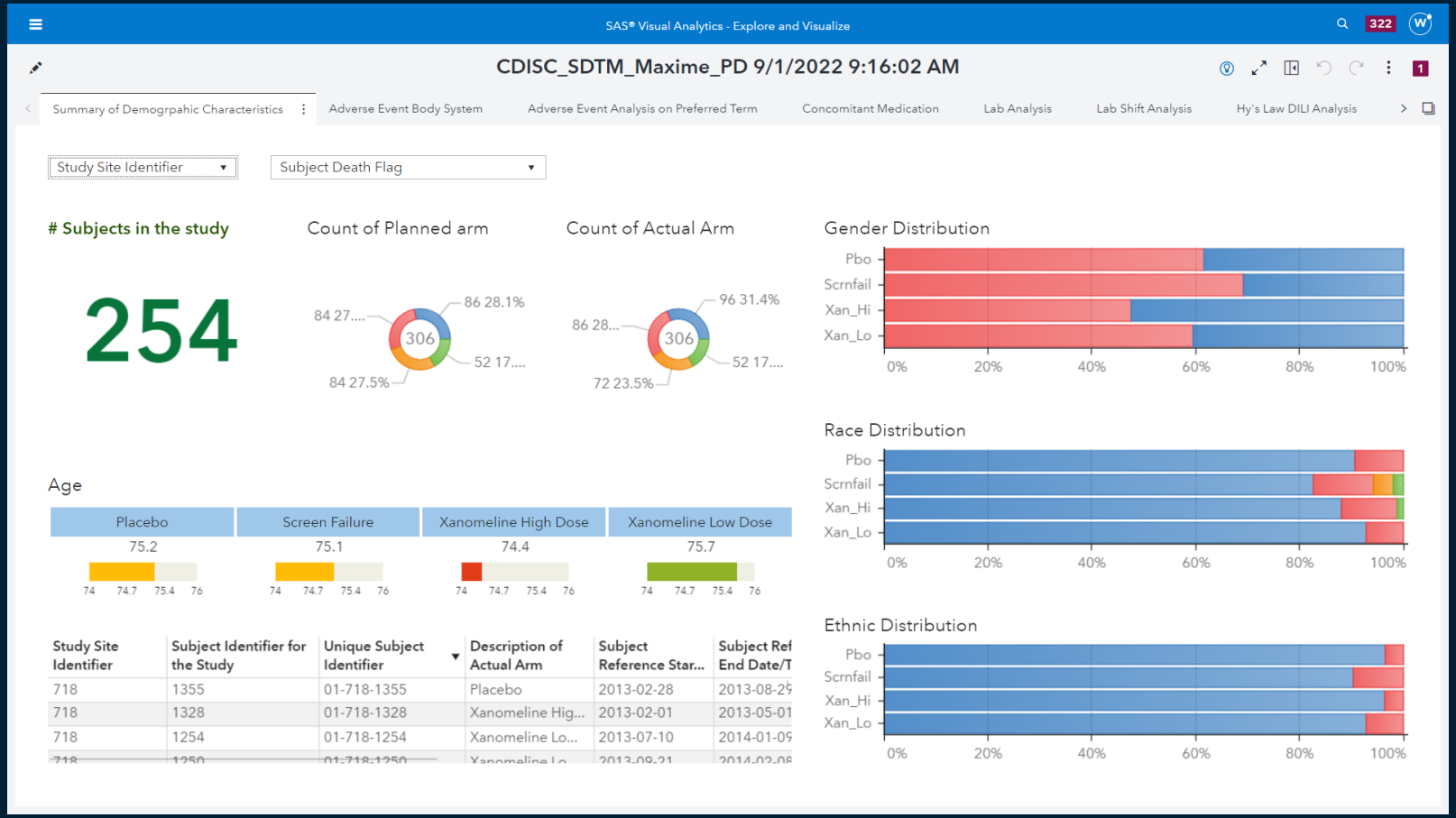
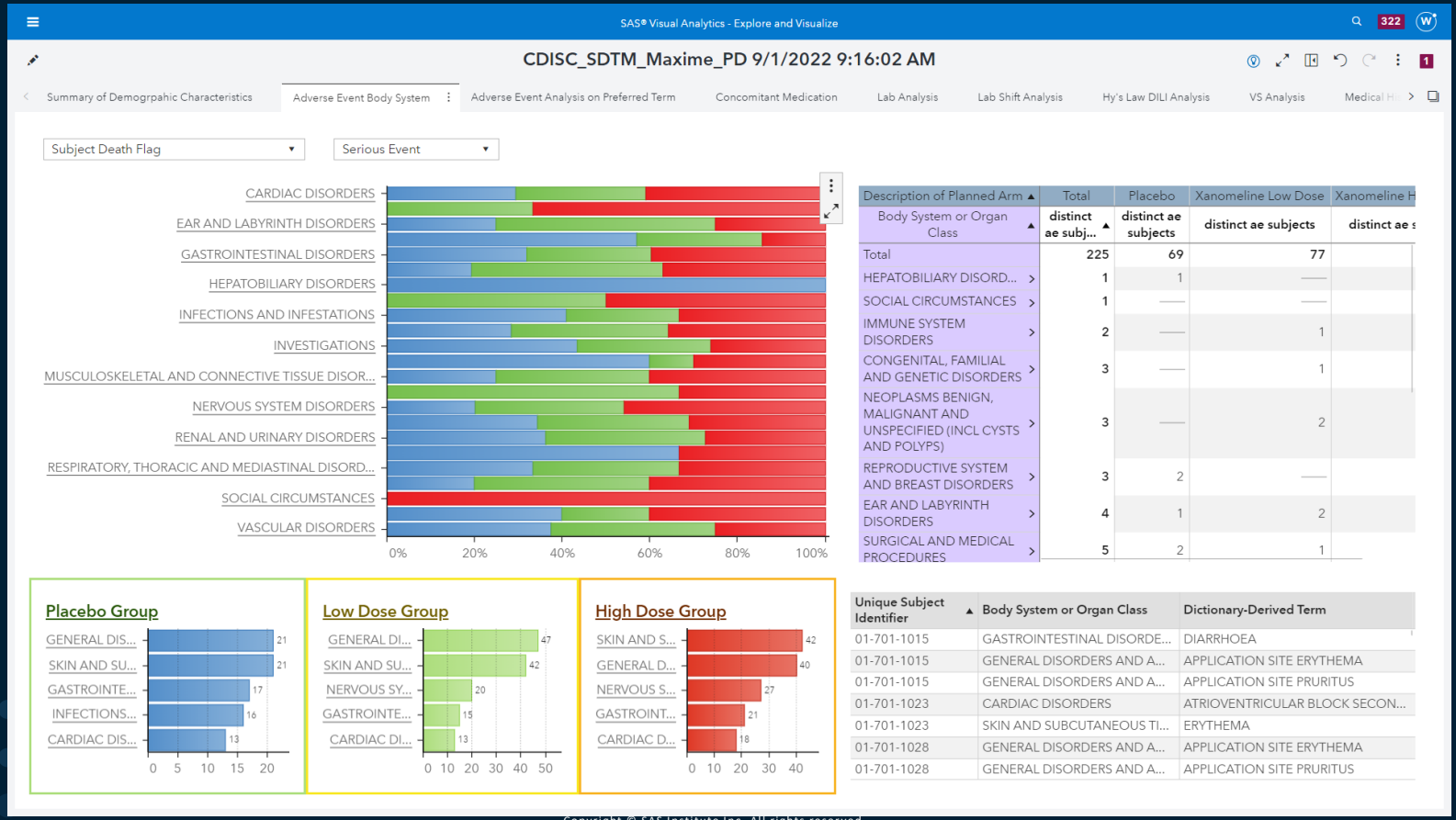
Visualize SDTM - Summary of Demographic Characteristics



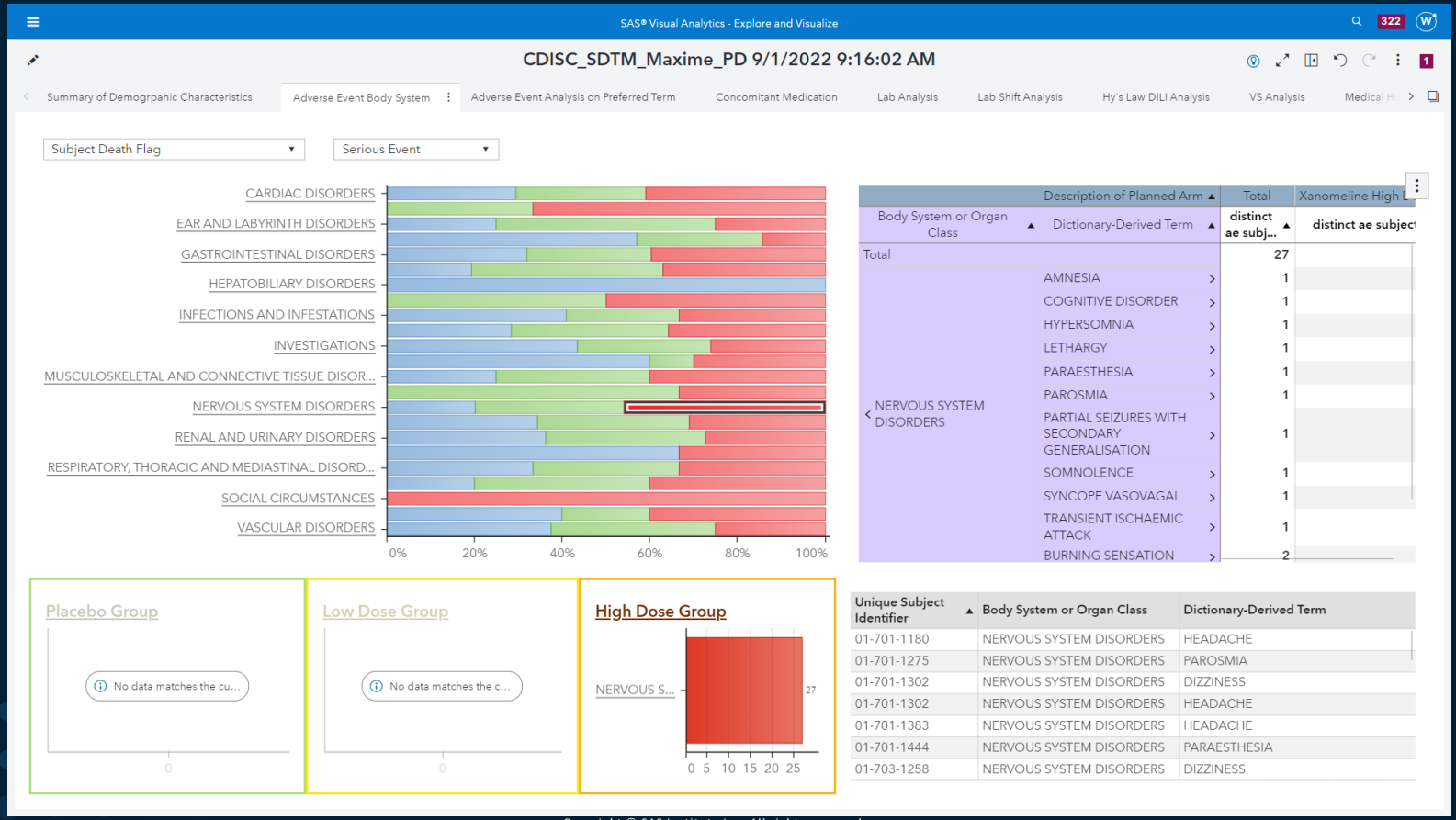
Visualize SDTM - Adverse Events



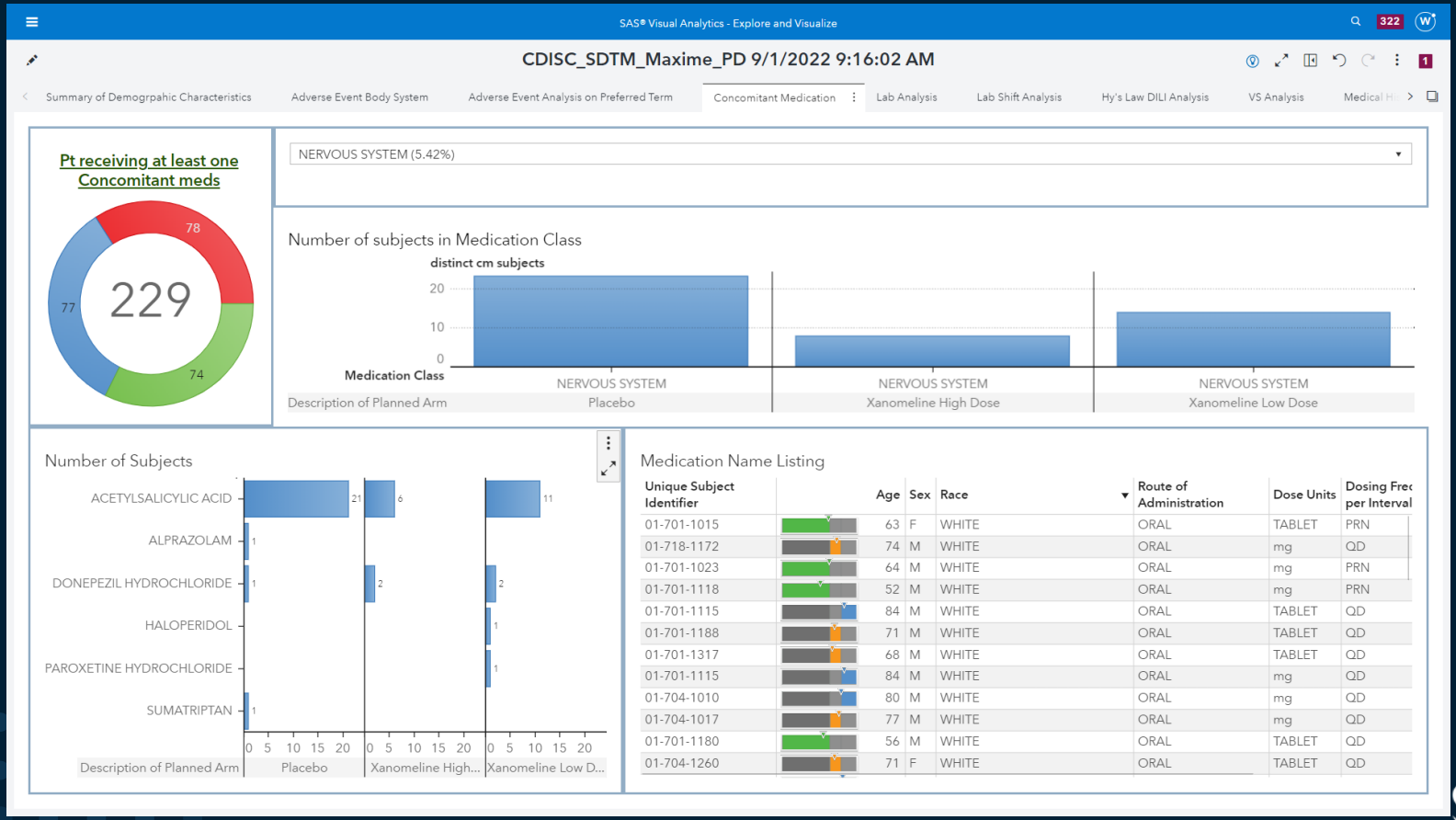
Description of Planned Arm	Total	Placebo	Xanomeline Low Dose	Xanomeline H
Body System or Organ Class	distinct ae subj...	distinct ae subjects	distinct ae subjects	distinct ae s
Total	225	69	77	
HEPATOBILIARY DISORD...	1	1	—	
SOCIAL CIRCUMSTANCES	1	—	—	
IMMUNE SYSTEM DISORDERS	2	—	1	
CONGENITAL, FAMILIAL AND GENETIC DISORDERS	3	—	1	
NEOPLASMS BENIGN, MALIGNANT AND UNSPECIFIED (INCL CYSTS AND POLYPS)	3	—	2	
REPRODUCTIVE SYSTEM AND BREAST DISORDERS	3	2	—	
EAR AND LABYRINTH DISORDERS	4	1	2	
SURGICAL AND MEDICAL PROCEDURES	5	2	1	

Unique Subject Identifier	Body System or Organ Class	Dictionary-Derived Term
01-701-1015	GASTROINTESTINAL DISORDE...	DIARRHOEA
01-701-1015	GENERAL DISORDERS AND A...	APPLICATION SITE ERYTHEMA
01-701-1015	GENERAL DISORDERS AND A...	APPLICATION SITE PRURITUS
01-701-1023	CARDIAC DISORDERS	ATRIOVENTRICULAR BLOCK SECON...
01-701-1023	SKIN AND SUBCUTANEOUS TI...	ERYTHEMA
01-701-1028	GENERAL DISORDERS AND A...	APPLICATION SITE ERYTHEMA
01-701-1028	GENERAL DISORDERS AND A...	APPLICATION SITE PRURITUS

Visualize SDTM - Adverse Events



Visualize SDTM – Concomitant Medication



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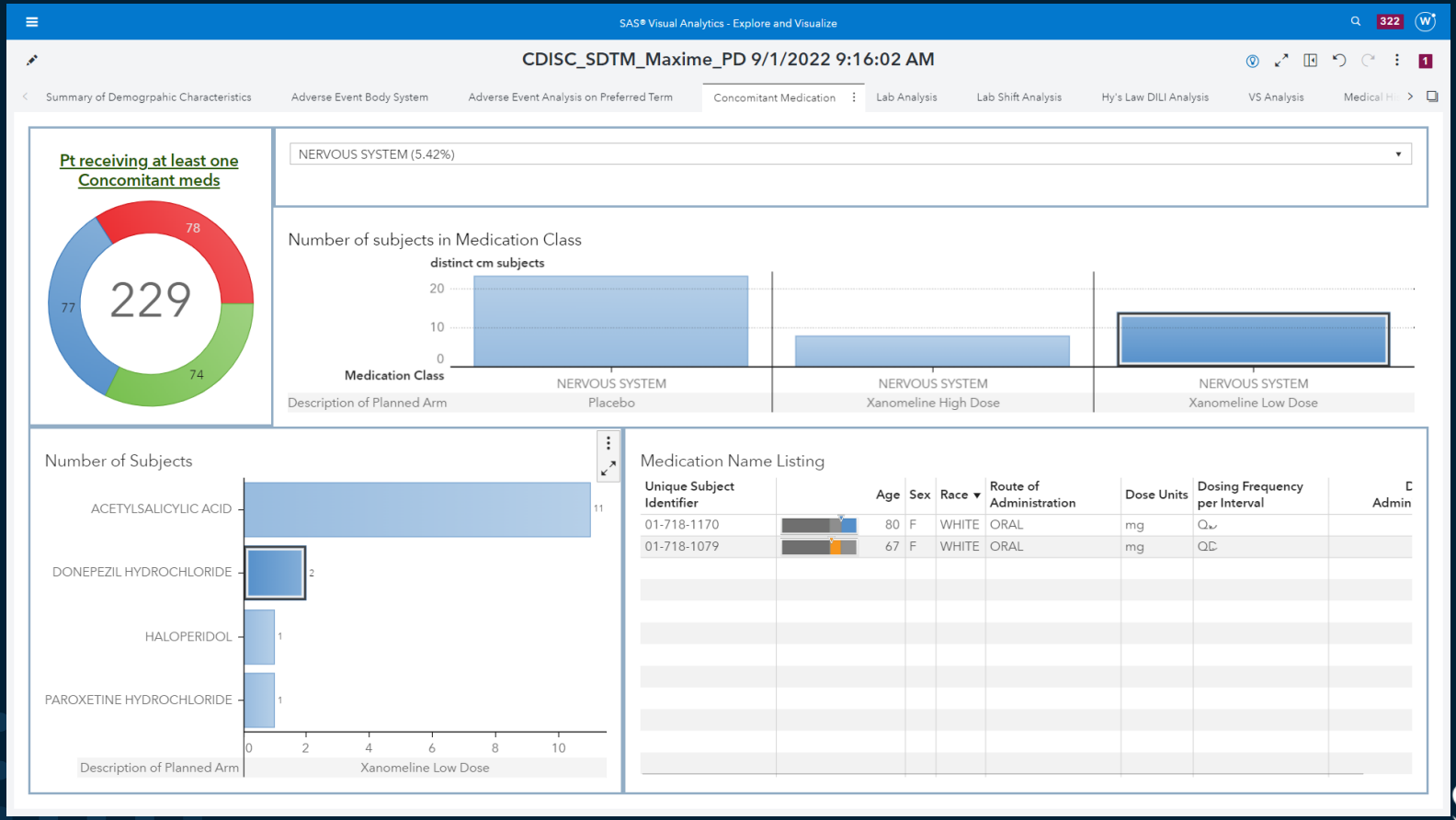
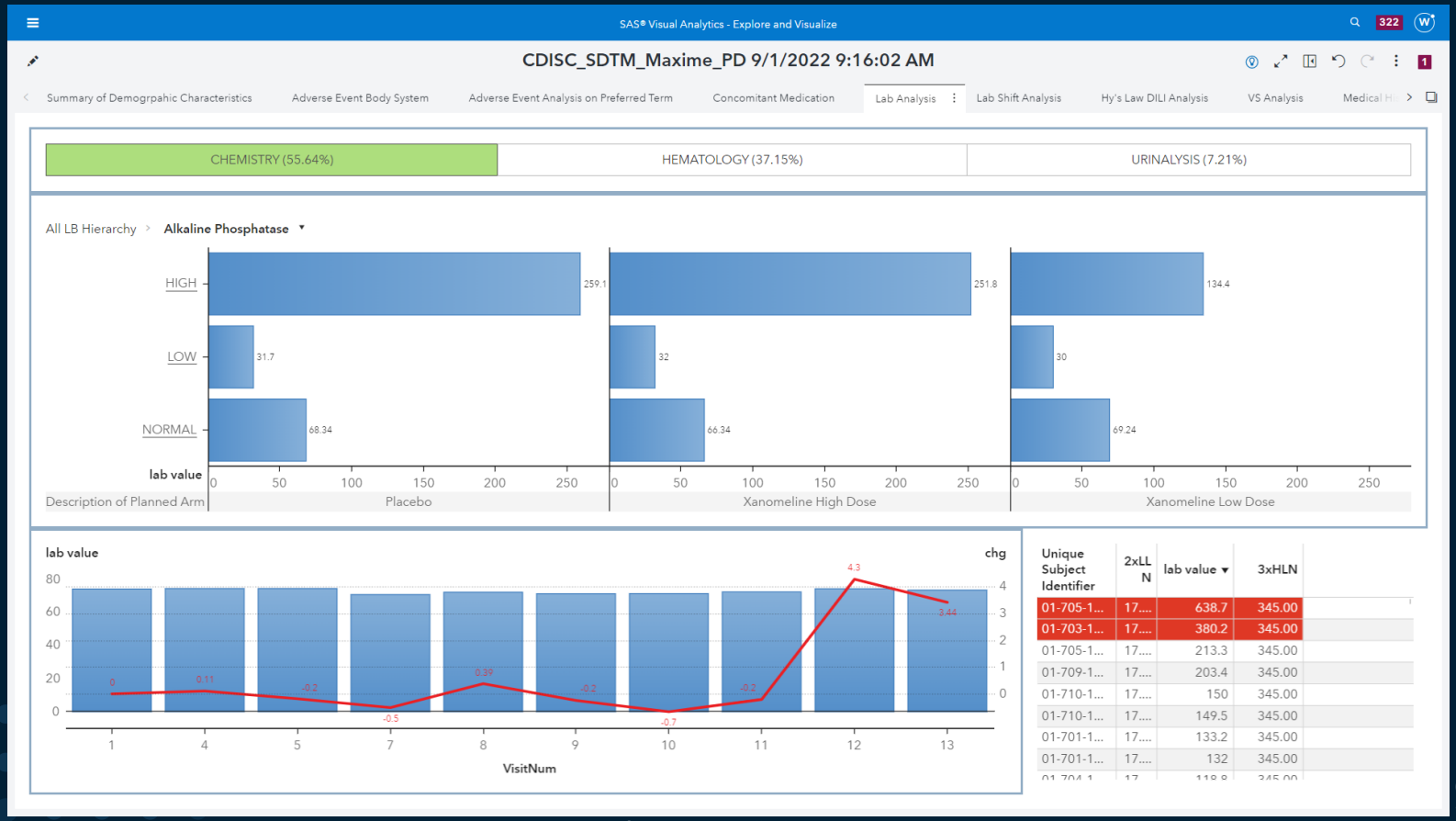
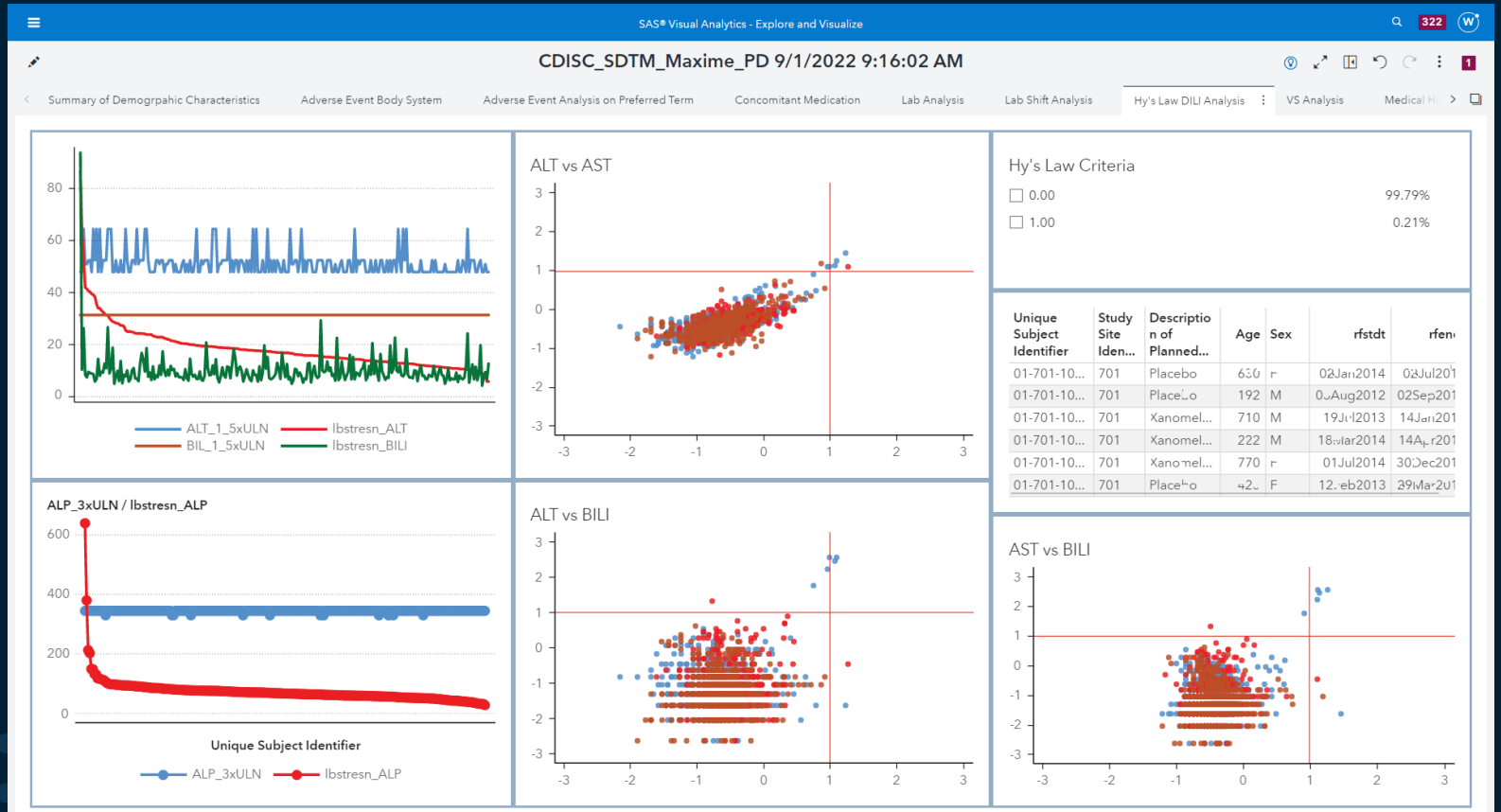


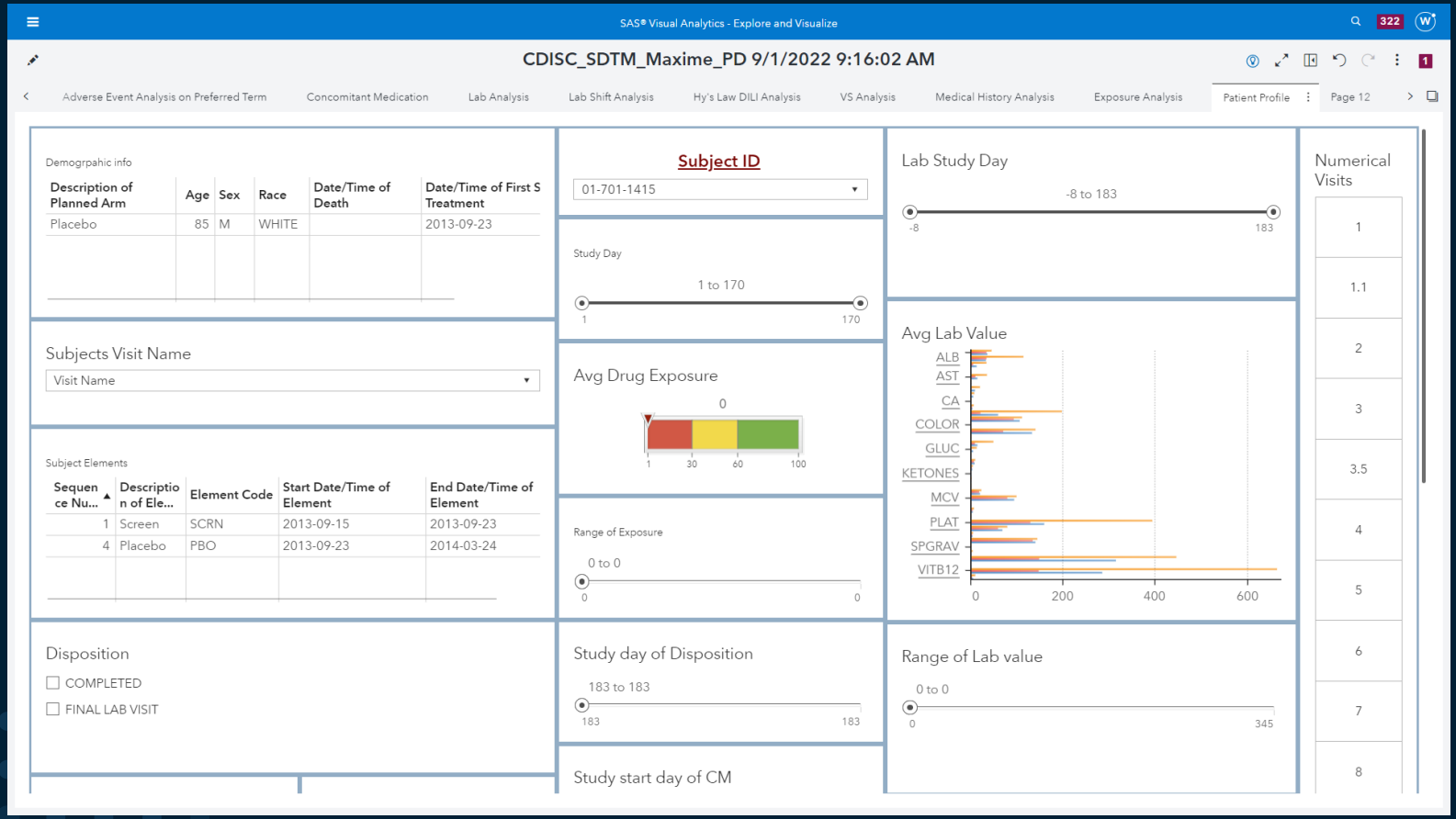
Visualize SDTM – Lab Analysis



Visualize SDTM – Hy's Law Analysis



Visualize SDTM – Patient Profile



Evaluate clinical outcome objectively via digital biomarker

Analyze Patient Motion with AI/Machine Learning

- Loss of balance can increase the risk of falling and impact the patient. Berg Balance Scale (BBS) is a paper-based clinical assessment tool to determine a patient's ability to balance. However, it takes clinicians up to 20 minutes to complete the evaluation
- Use cameras and sensors to capture movement data and build machine learning model to determine risk score for falling and assist early determination of progression of injury
- Clinicians can analyze patients' balance ability quickly, accurately and objectively

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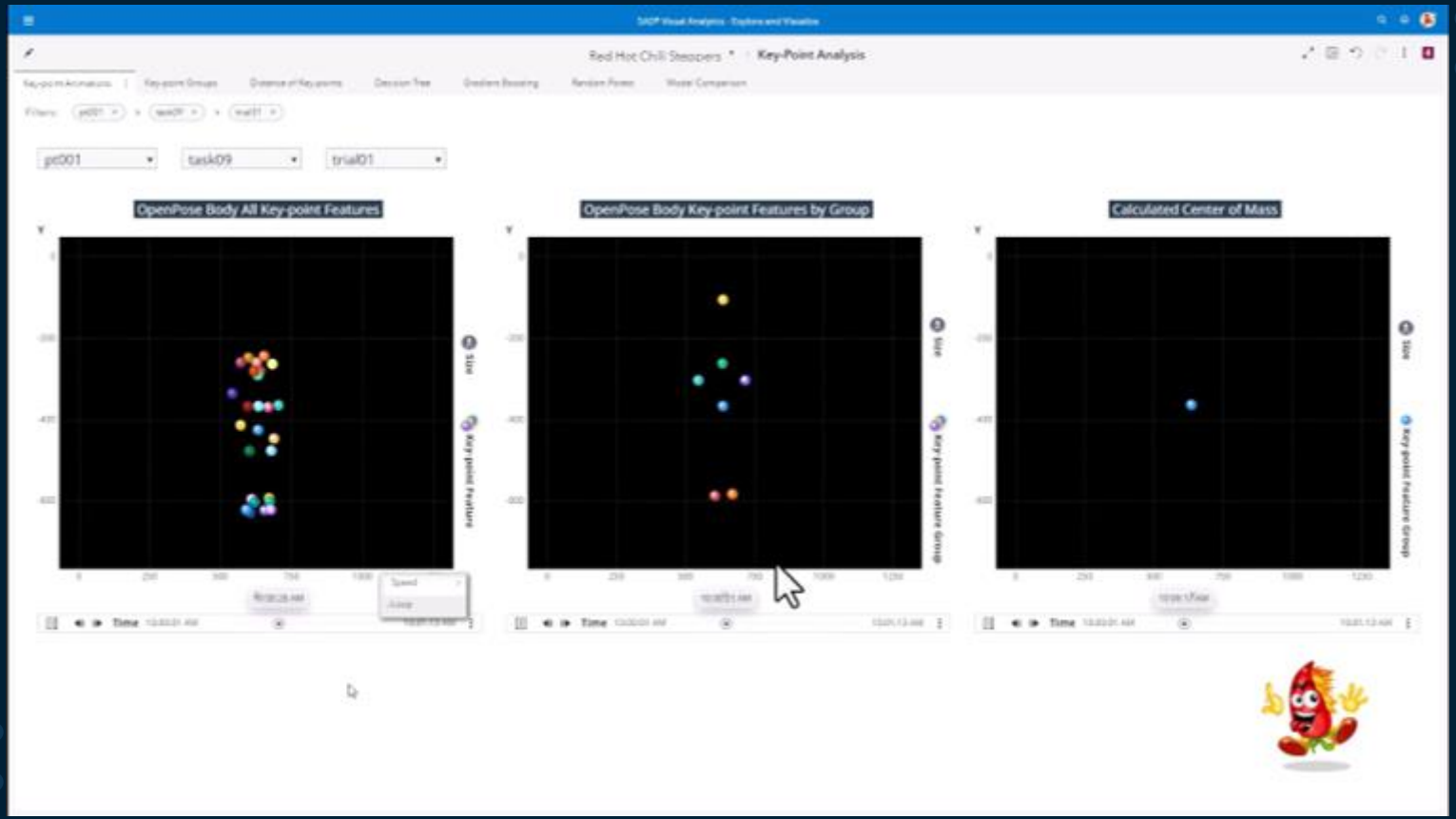
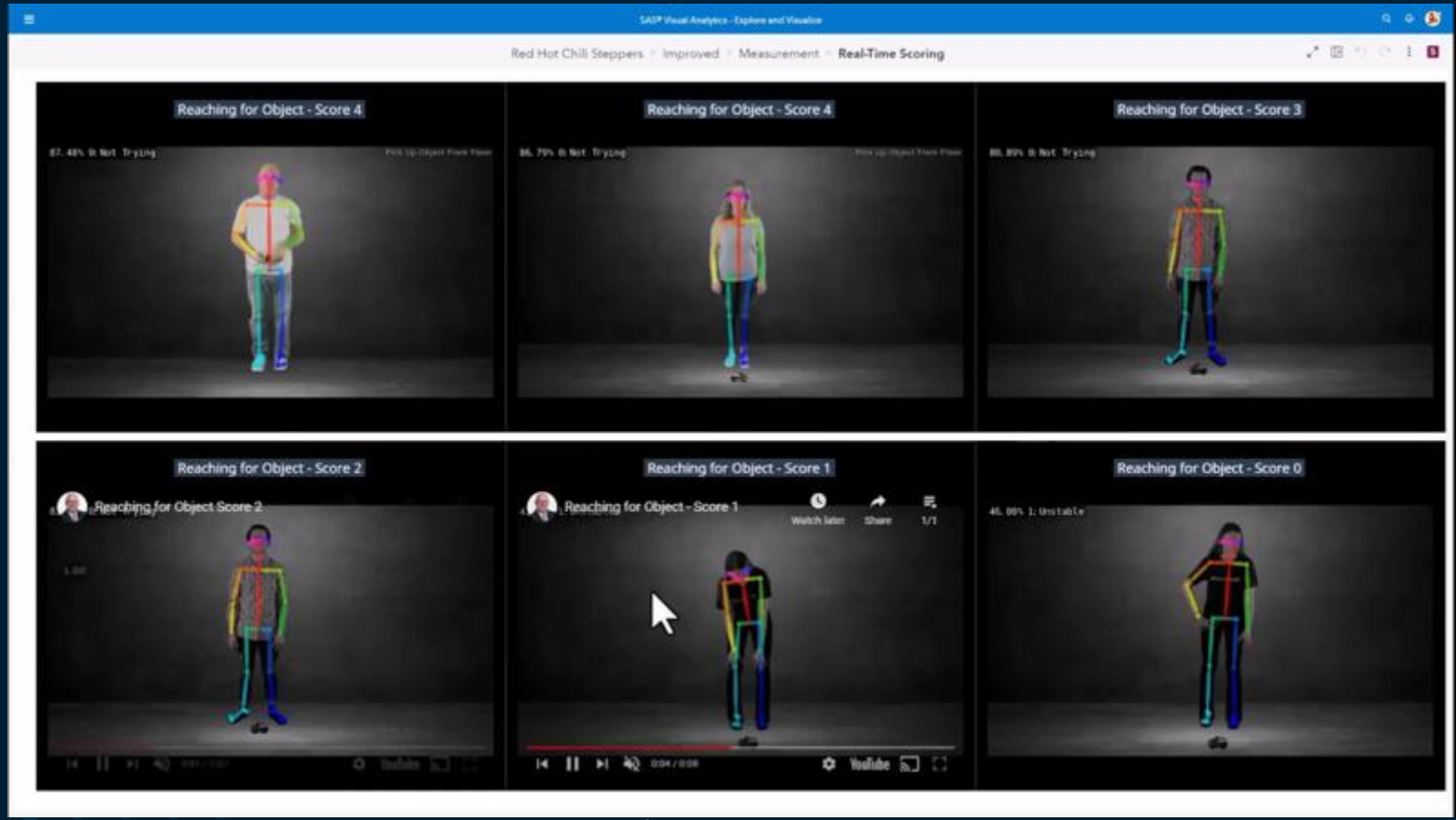
Fore more details: HackinSAS Red Hot Chili Steppers

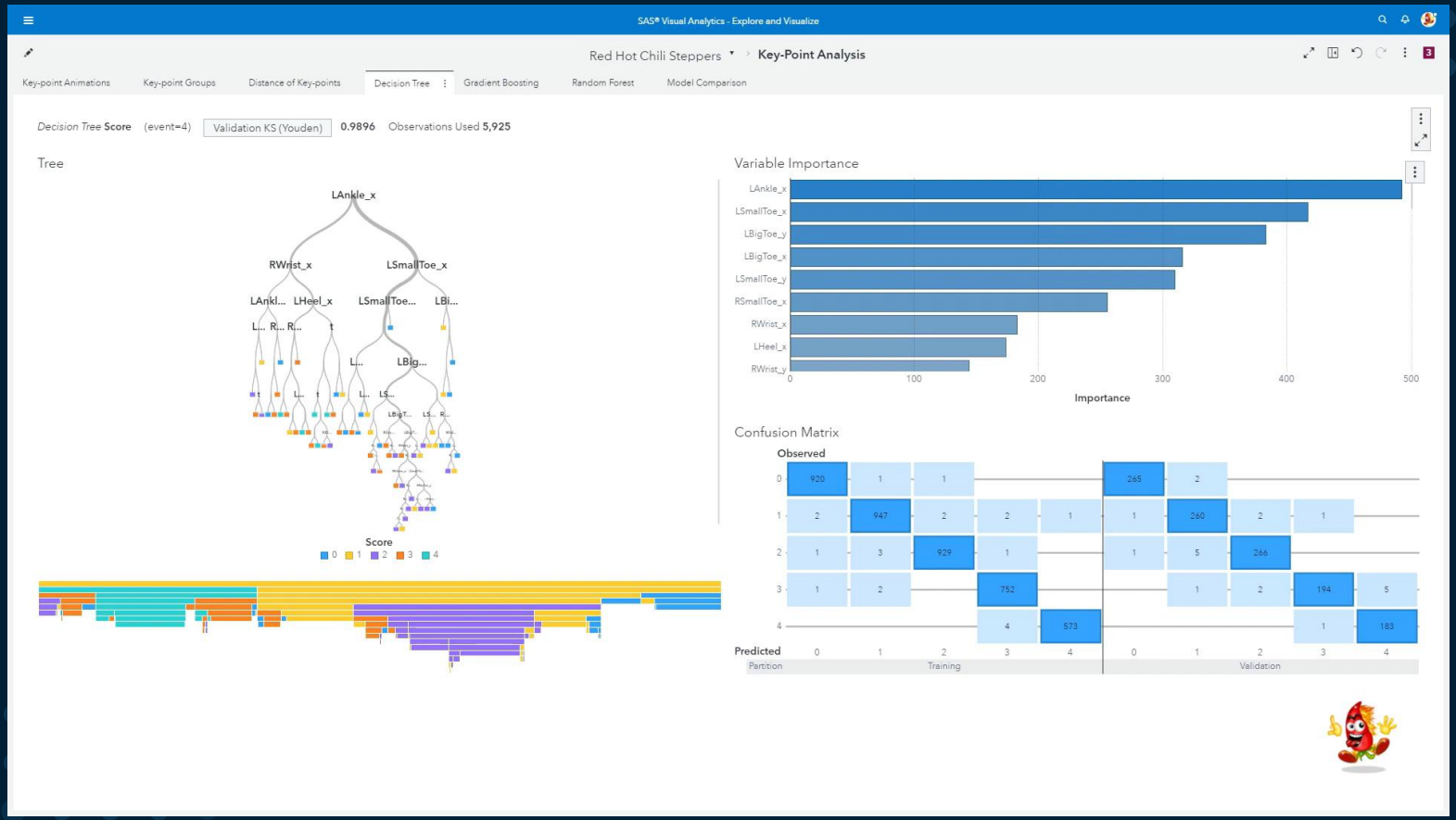
Collect patient movement data



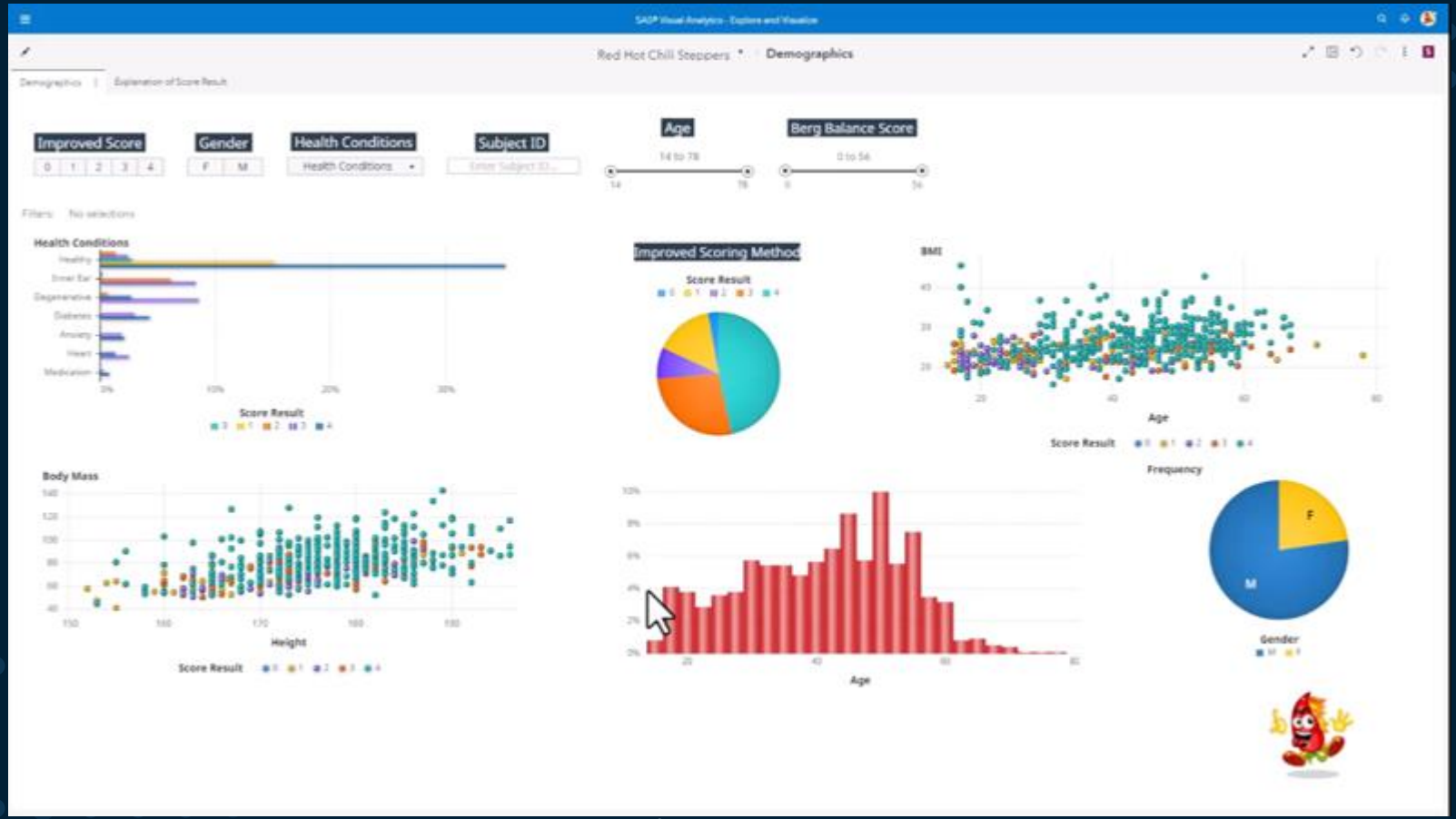
Determine risk scores in real-time



Build models to quantify variable importance related to risk scores



Visualize patient profiles by risk group



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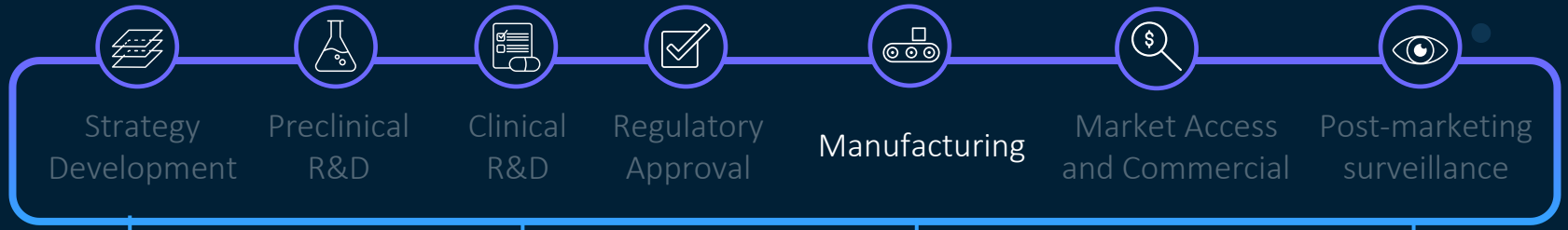

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Computer Vision on Product Quality

- Quality inspections are a key part of the manufacturing process. Some issues are still best identified via high-resolution images review by the human eye. This process is extremely time-consuming
- Apply computer vision techniques to analyze product images to provide a ranking score for each product image. The product image that differ most from a gold standard image is identified (i.e. likely to be a defective product)
- The system can assess product images within seconds
- Inspectors could prioritize batches for further manual review to save time

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Fore more details: Computer Vision and Image Analytics

Identify products with suspected defects

Enter Start Device ID

IPC Report

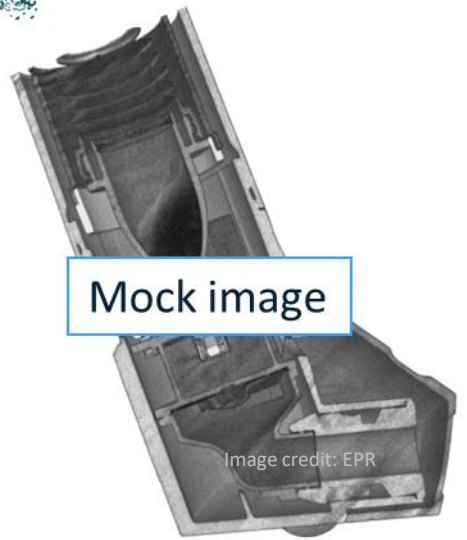
Total Images Processed

System is currently unavailable, please follow other instructions

Suspected Defects

2

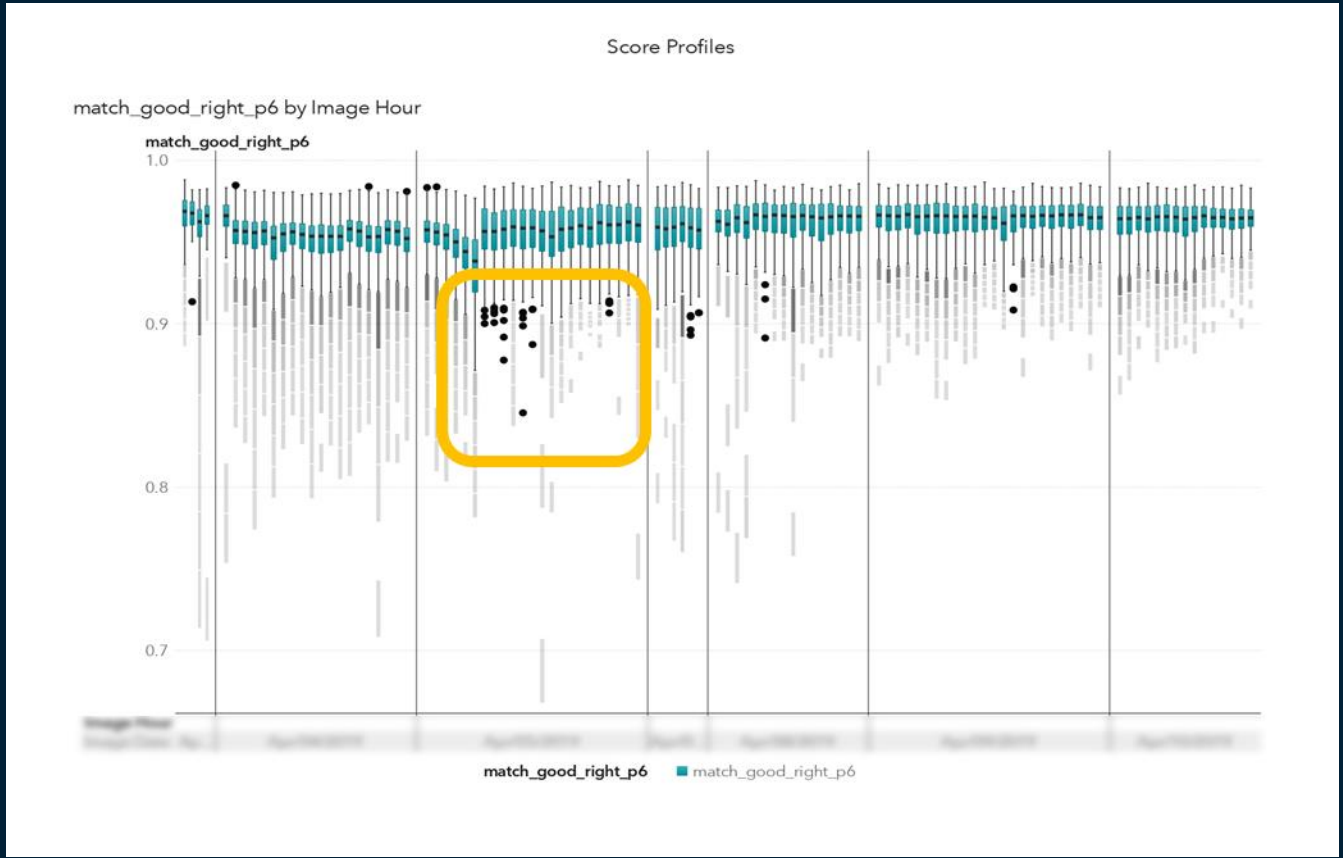
Device ID	Part	Image DateTime
8915102	Spigot	March 18, 2019 08:27:57 AM
8915130	Spigot	March 18, 2019 08:40:21 AM



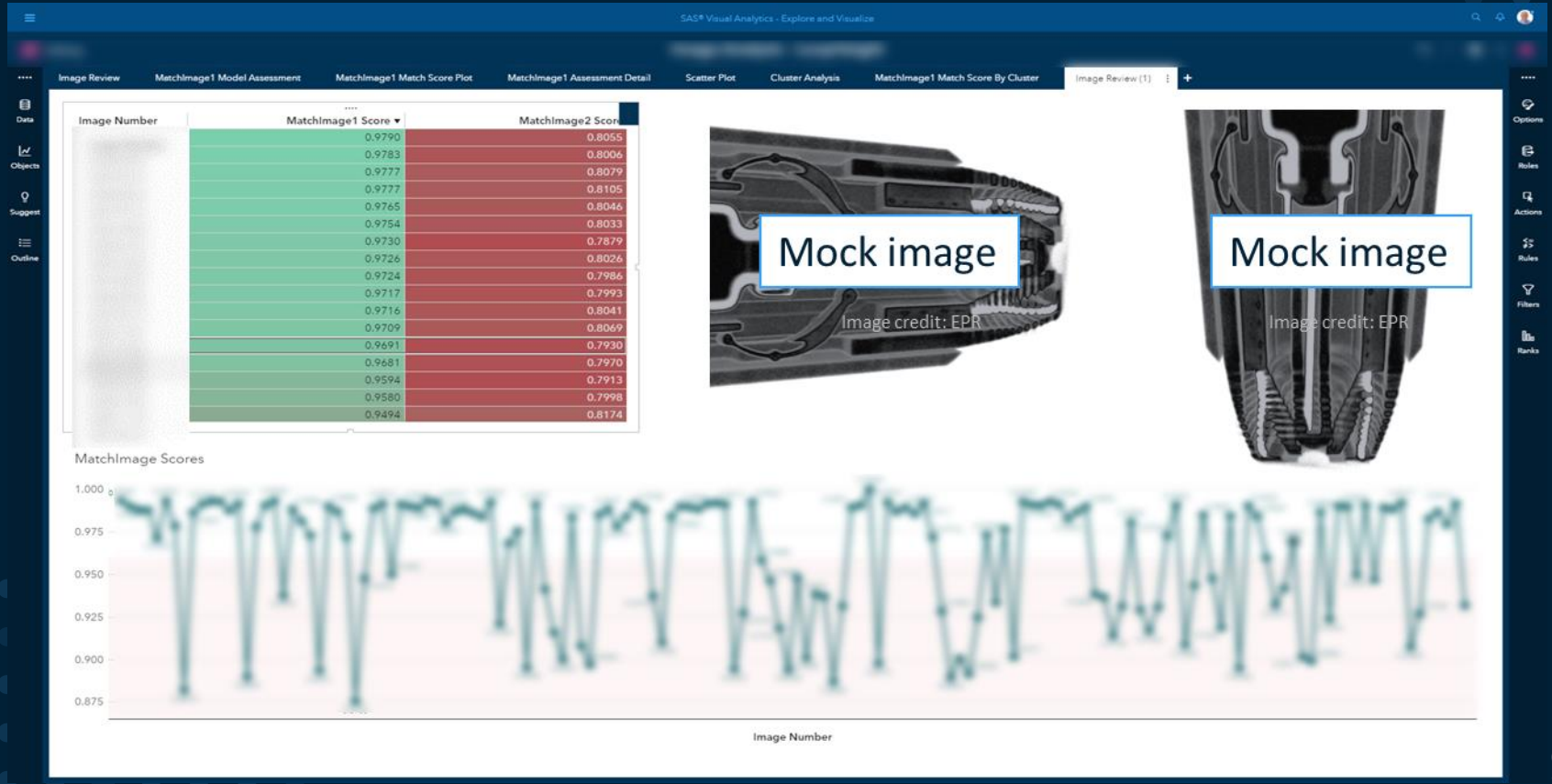
Good Device

Bad Device

Visualize the batch with suspected defects



Compare suspected product images with the gold standard



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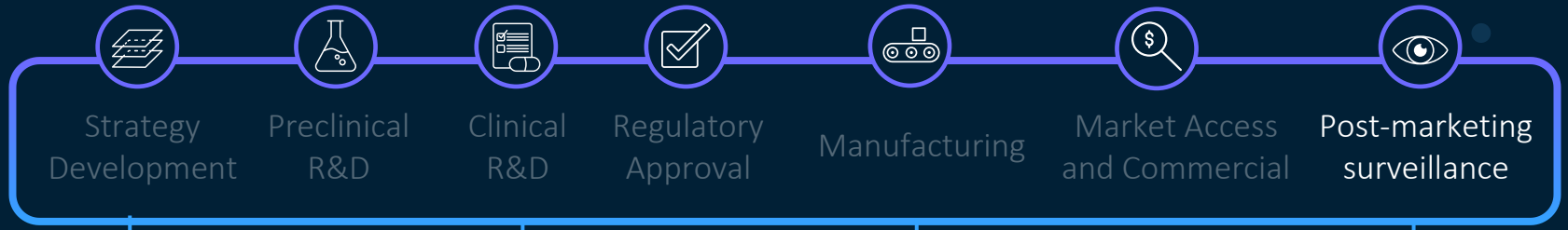

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Use text analytics and visualization techniques

- Analyze unstructured data (i.e., symptom text) from vaccine adverse event reports
- An analytic platform that can generate Topics and Terms from text data automatically
- Provide researchers quick insights on serious adverse events from 500+ reports

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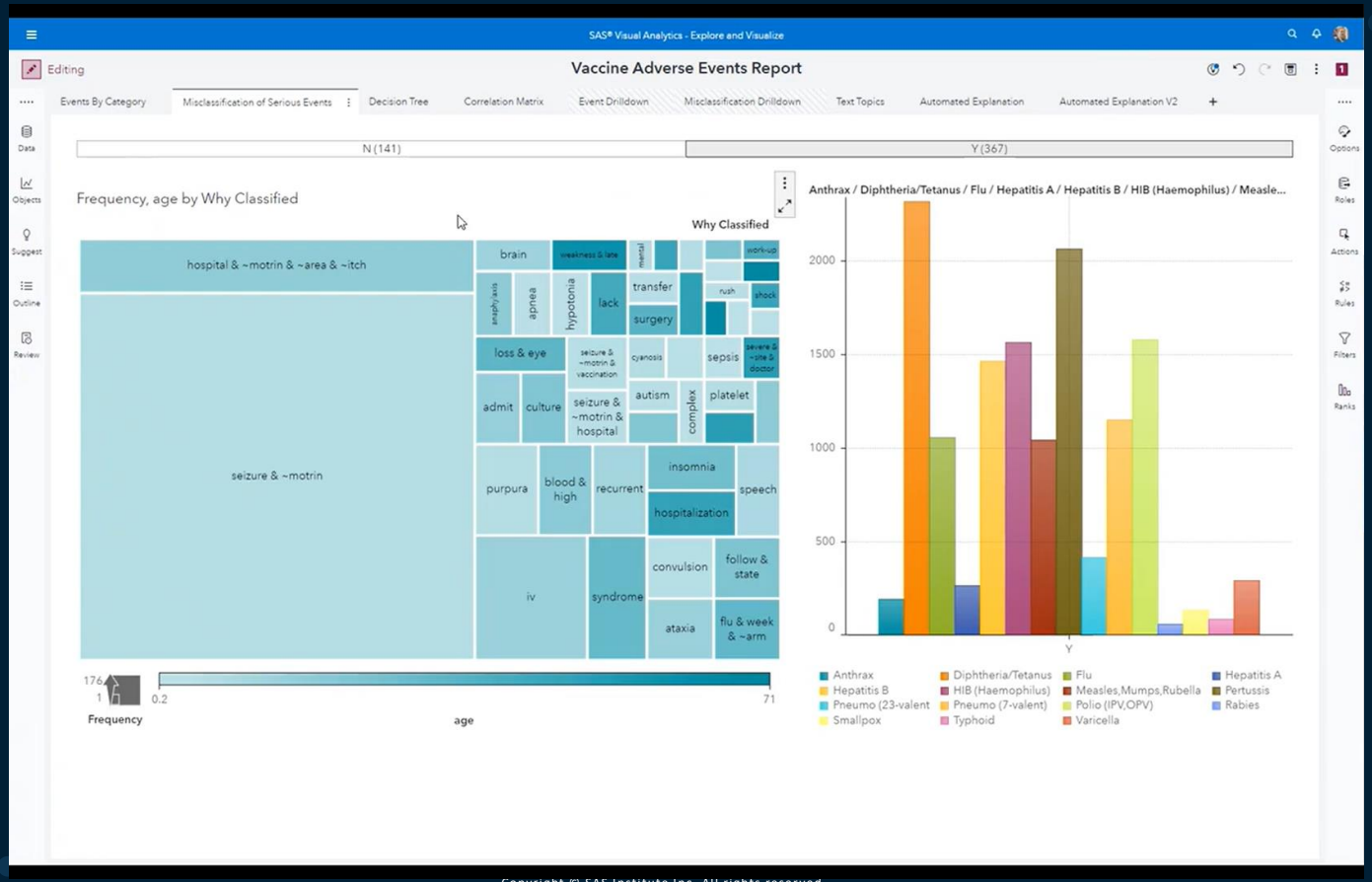
Visualize the relationship between vaccine types and key topics



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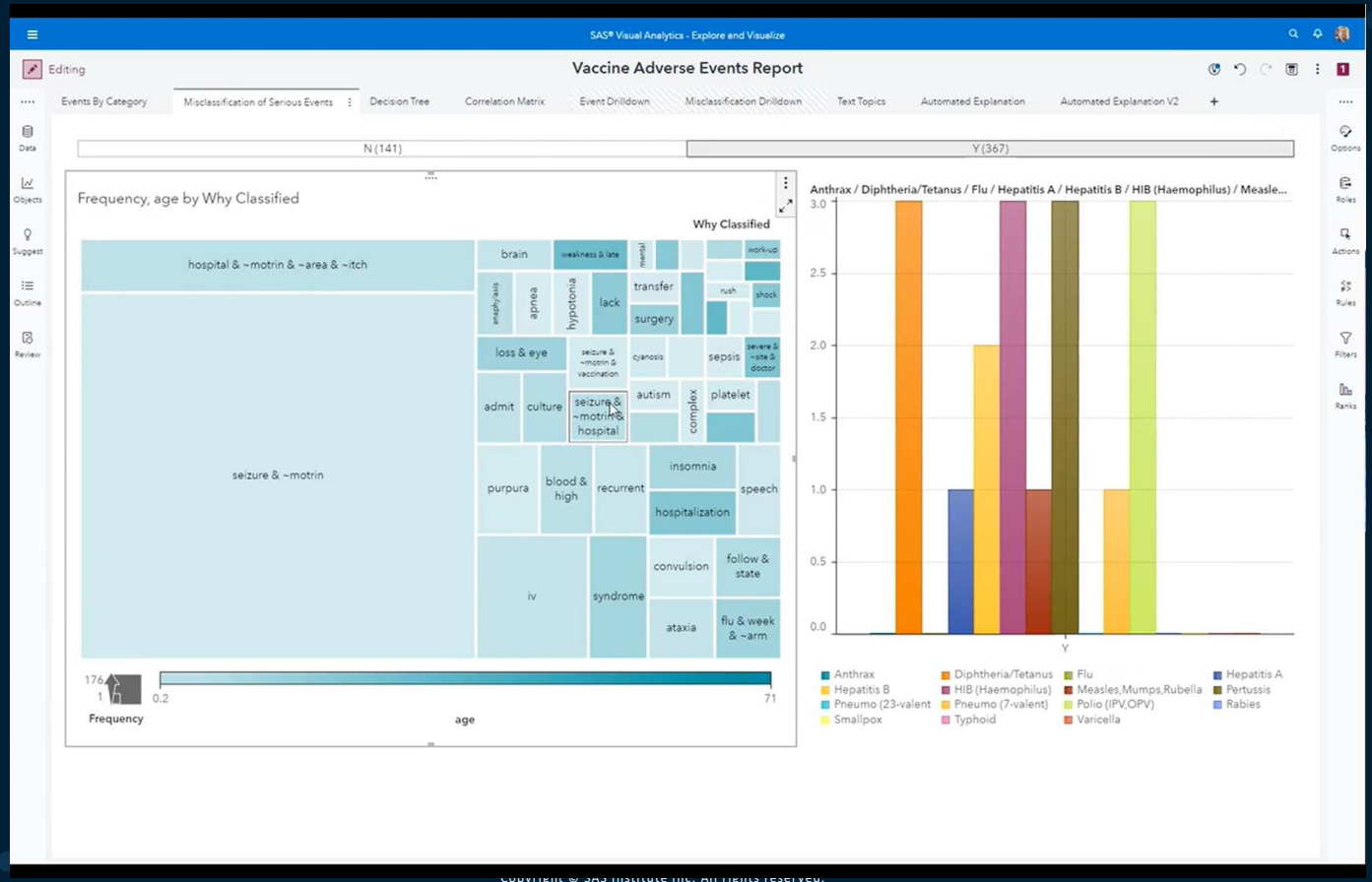
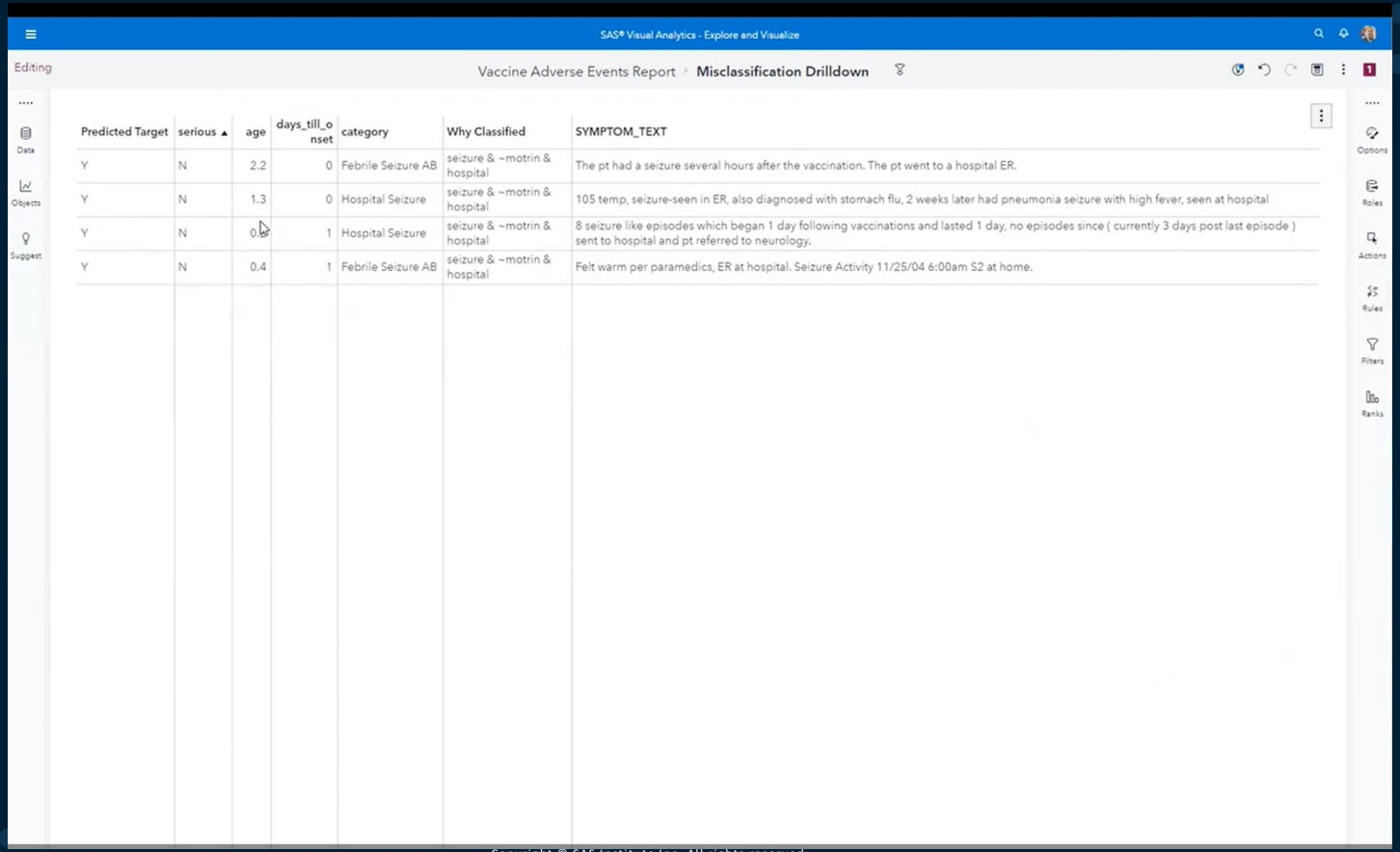
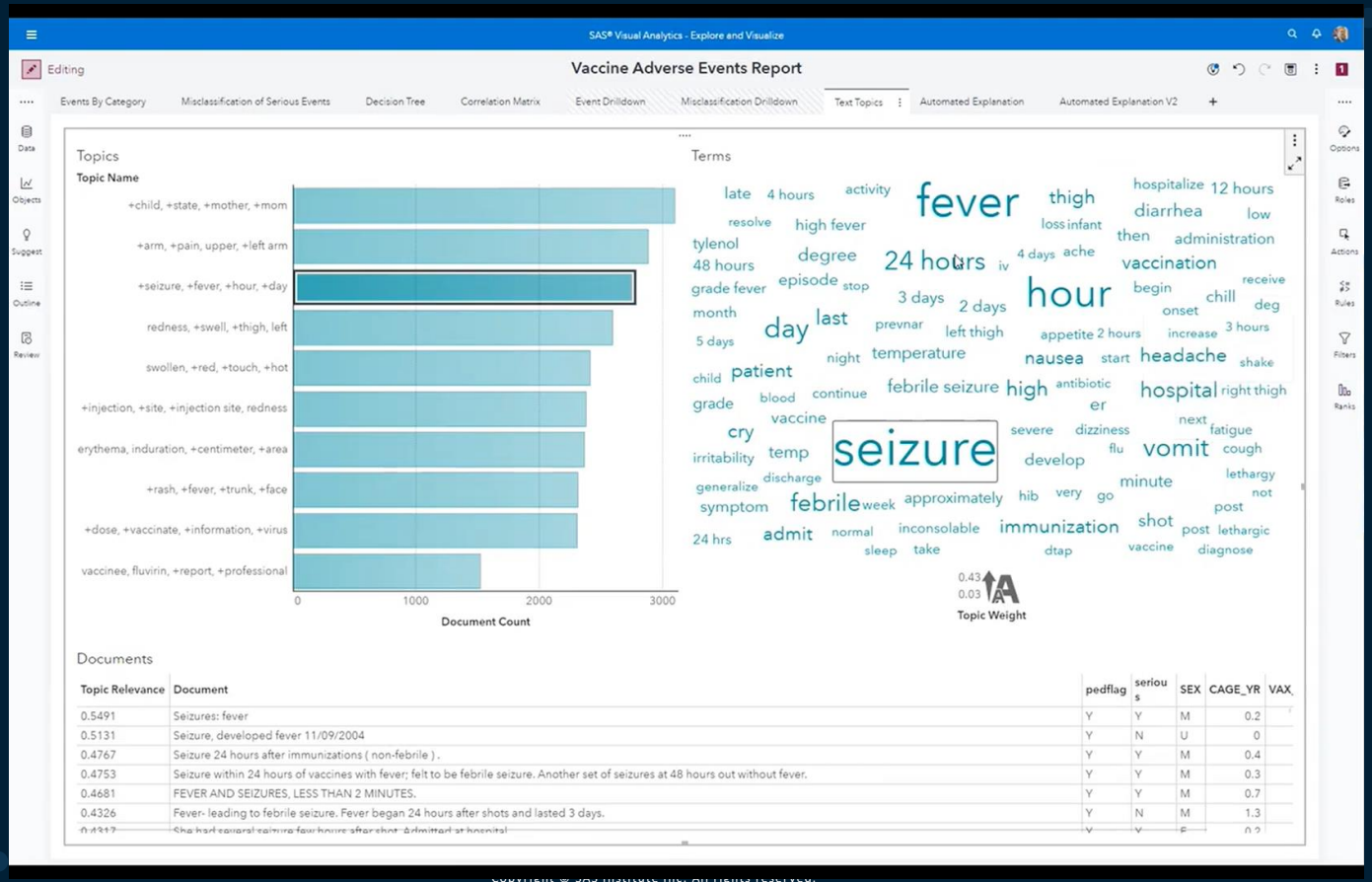


Drill down to the individual text data

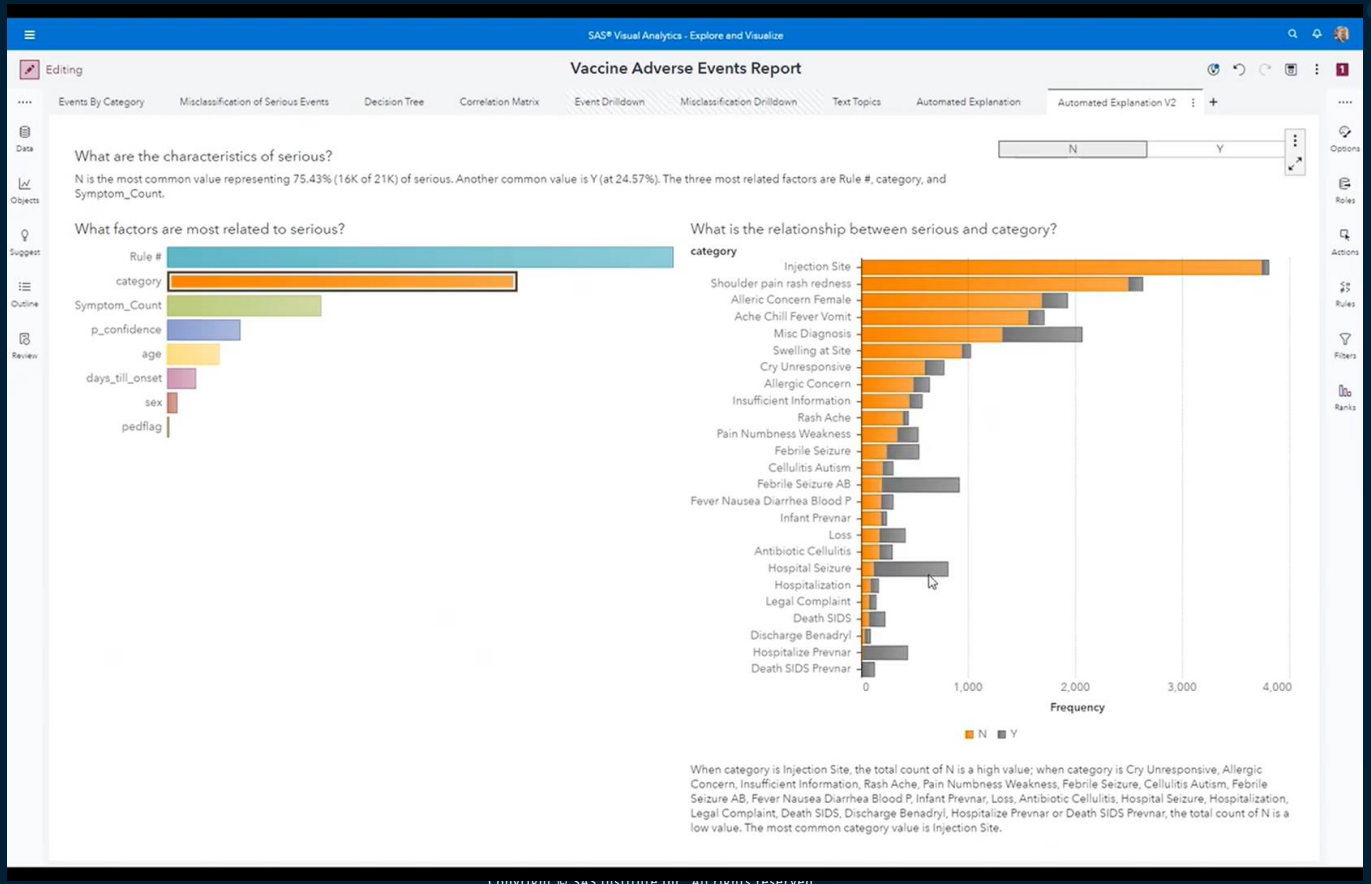


Predicted Target	serious ▲	age	days_till_onset	category	Why Classified	SYMPTOM_TEXT
Y	N	2.2	0	Febrile Seizure AB	seizure & ~motrin & hospital	The pt had a seizure several hours after the vaccination. The pt went to a hospital ER.
Y	N	1.3	0	Hospital Seizure	seizure & ~motrin & hospital	105 temp, seizure-seen in ER, also diagnosed with stomach flu, 2 weeks later had pneumonia seizure with high fever, seen at hospital
Y	N	0.6	1	Hospital Seizure	seizure & ~motrin & hospital	8 seizure like episodes which began 1 day following vaccinations and lasted 1 day, no episodes since (currently 3 days post last episode) sent to hospital and pt referred to neurology.
Y	N	0.4	1	Febrile Seizure AB	seizure & ~motrin & hospital	Felt warm per paramedics, ER at hospital. Seizure Activity 11/25/04 6:00am S2 at home.

Visualize the key topics and terms from text data



Visualize the relationship between seriousness and key topics



Takeaway Messages

- In addition to having all the powerful analytical techniques SAS is known for in SAS 9, ***SAS Viya*** also contains the latest machine learning, deep learning and visualization capabilities with friendly user interface
- SAS 9 and ***SAS Viya*** are integrated so you can still use what you've built. SAS code and SAS 9 is here to stay, as part of the ***SAS Viya*** environment
- Visualization helps people interact, understand and even analyze the data, especially for users with different level of analytical skills
- Visualization can support efficient workflows and data-driven decision across the life cycle of drug development
- Modernize the analytics platform can help organizations stay competitive in the market

Thank you!
Any Question?

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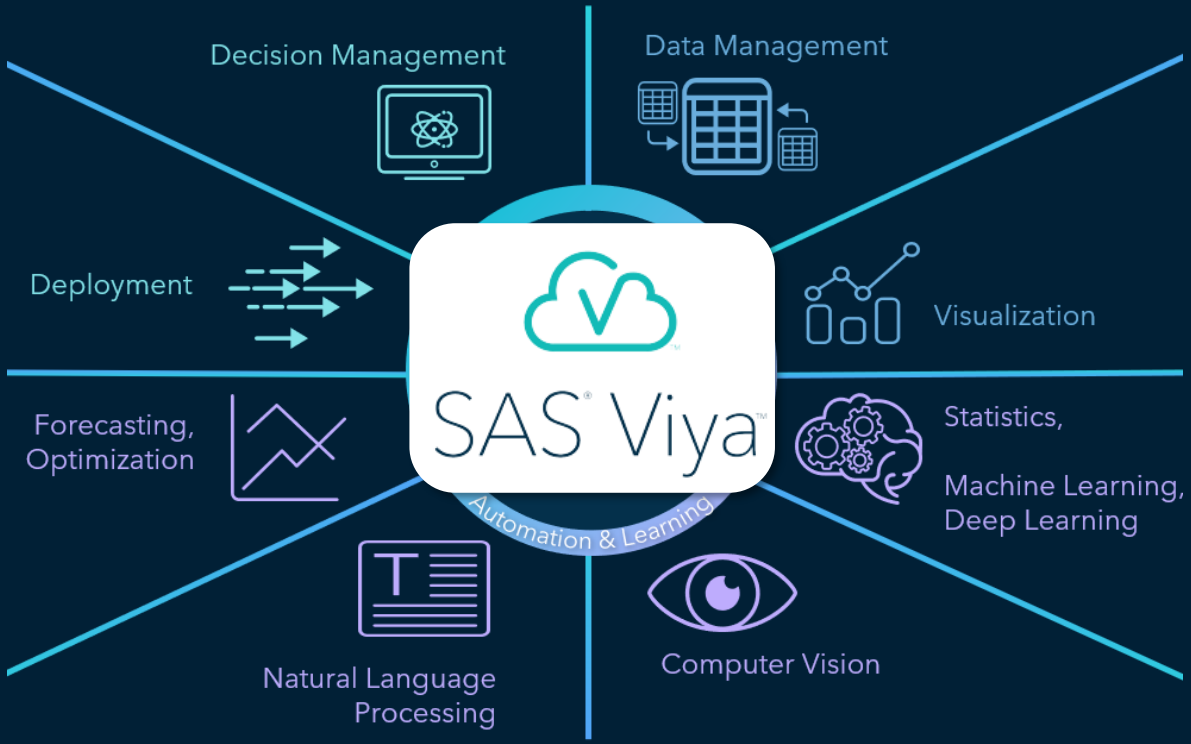

Confident decisions at every moment.