



Visualising CDISC SDTM for Monitoring and Review

Philip C. M. Bartle
Clinical Innovation, PPD

HELPING DELIVER LIFE
CHANGING THERAPIES

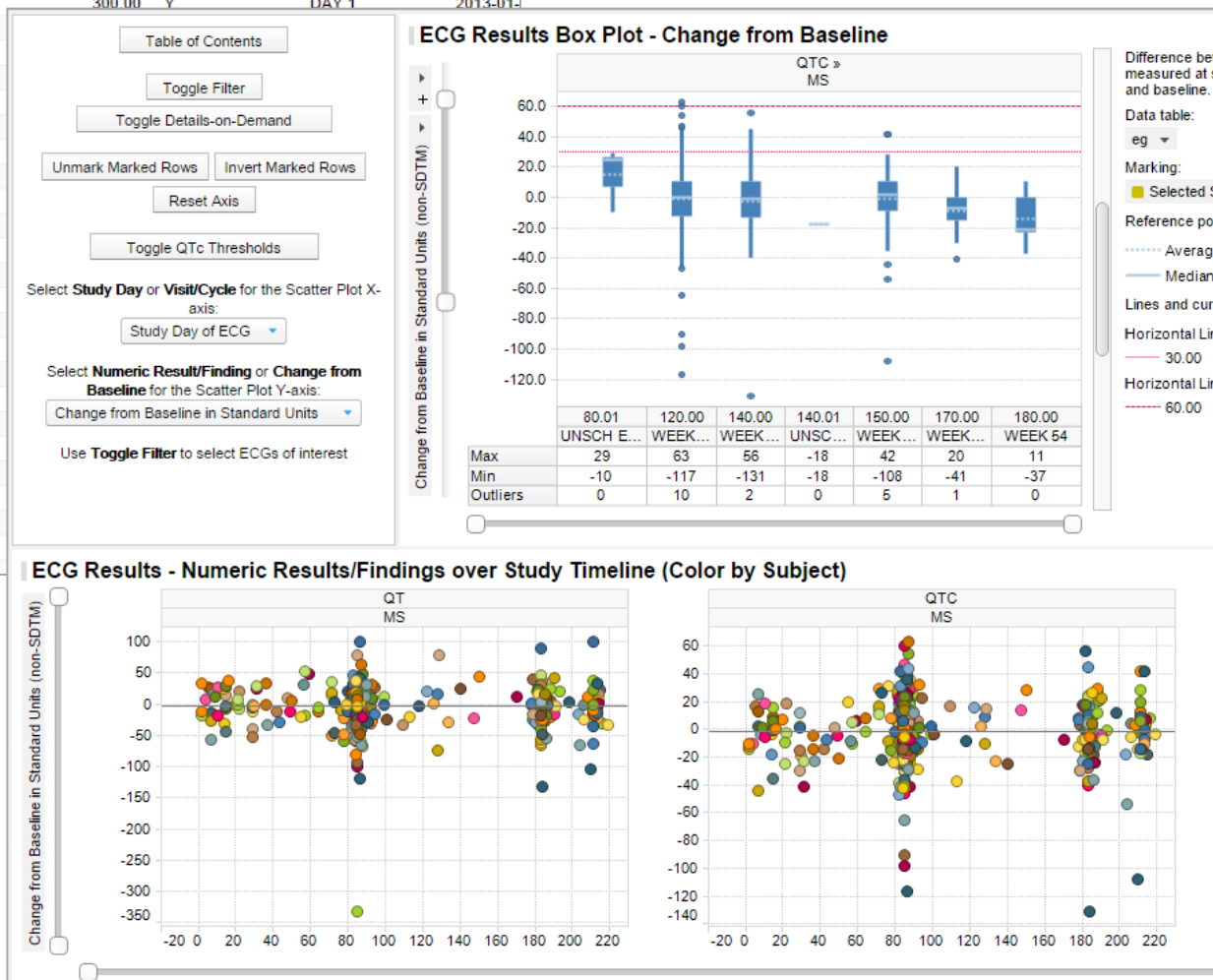
PPD[®]

Visualising CDISC SDTM for Monitoring and Review

- 1 Bringing CDISC SDTM Alive with Spotfire and SAS
- 2 Resolving an Industry Challenge
- 3 The Power of Standardisation
- 4 CDISC SDTM Based Visualizations
- 5 CFAST Therapeutic Area Support
- 6 CDISC SDTM Challenges Encountered
- 7 Questions

Bringing CDISC SDTM Alive with Spotfire and SAS

Study Identifier	Domain Abbreviation	Unique Subject Identifier	ECG Test or Examination Short Name	Numeric Result/Finding in Standard	Baseline Flag	Visit Name	Date/Time ECG
DEMO-DEMO	EG	DEMO-003-0012	QT	300.00	Y	DAY 1	2013-01-
DEMO-DEMO	EG	DEMO-003-0014	QT	300.00	Y	DAY 1	2013-01-
DEMO-DEMO	EG	DEMO-587-0005	QTC				
DEMO-DEMO	EG	DEMO-587-0005	QTC				
DEMO-DEMO	EG	DEMO-291-0008	QT				
DEMO-DEMO	EG	DEMO-686-0005	QTC				
DEMO-DEMO	EG	DEMO-686-0005	QTC				
DEMO-DEMO	EG	DEMO-686-0005	QT				
DEMO-DEMO	EG	DEMO-686-0005	QT				
DEMO-DEMO	EG	DEMO-686-0005	QTC				
DEMO-DEMO	EG	DEMO-686-0005	QT				
DEMO-DEMO	EG	DEMO-153-0010	QT				
DEMO-DEMO	EG	DEMO-670-0001	QT				
DEMO-DEMO	EG	DEMO-670-0001	QT				
DEMO-DEMO	EG	DEMO-670-0001	QT				
DEMO-DEMO	EG	DEMO-021-0004	QT				
DEMO-DEMO	EG	DEMO-021-0004	QT				
DEMO-DEMO	EG	DEMO-021-0004	QT				
DEMO-DEMO	EG	DEMO-036-0002	QT				
DEMO-DEMO	EG	DEMO-036-0002	QT				
DEMO-DEMO	EG	DEMO-036-0002	QT				
DEMO-DEMO	EG	DEMO-003-0012	QTC				
DEMO-DEMO	EG	DEMO-638-0001	QT				
DEMO-DEMO	EG	DEMO-638-0001	QT				



Resolving an Industry Challenge

- + How to deliver cost effective, timely and practical (e.g. intuitive, interactive and comprehensive) data review systems for any given clinical trial regardless of therapeutic area
- + This can be achieved through leveraging an existing and established industry standard (CDISC SDTM), TIBCO Spotfire and SAS
- + Our Preclarus® Patient Data Dashboard (PDD) is delivering results, for example:
 - + Identified an increase in infections which contributed to discussions towards a protocol amendment
 - + Subjects efficiently reviewed during dose escalation review meetings
 - + A reduction in study specific Patient Profile requests for medical review



The Power of Standardization

- + Through CDISC SDTM standards, comprehensive data review systems can be designed for any future clinical trial
 - + **Scalable:** The same platform is deployed on any study that has CDISC SDTM data
 - + **Comprehensive and Intuitive:** reproducibility means centralized and specialist investment that gets the system right
 - + **Cost effective:** There is no requirement for study specific customization, so it's effectively free where SDTM is available. Reduction in safety review listings
 - + **Quick to deploy:** The Preclarus PDD engine is built using TIBCO Spotfire, SAS and SDTM standards in advance, not designed off study data. Simply upload new SDTM data into the system



CDISC SDTM Visualizations – Adverse Events

1 - Dispositions
1 - Protocol Deviations
2 - AE Summary
2 - AE-Serious
2 - AE SMQ Review
2 - Con Meds
2 - AE/CM Relationships
2 - Medical History
2 - Procedures
2 - Clinical Events

Table of Contents
Toggle Filter
Toggle Size by Subject Count
Toggle Details-on-Demand
Toggle Data Limitation
(by Study Population marking)
Unmark Marked Rows
Invert Marked Rows
Reset Axis
Count Type:
Subject
Cumulative
Select Hierarchy for Frequency of AEs:
Action Taken with Study Treatment
Actual Arm Code
Age
Body System or Organ Class
Body System or Organ Class Code
Causality
Concomitant or Additional Trtmt Gl...
(CTRL-click to select multiple)
Select Summary Variables for Drill-Down: AE Subject Count by Term:
Reported Term for the Adverse Event
Dictionary-Derived Term
(CTRL-click to select both)
Select Summary Variable for Drill-Down: Adverse Events By Summary Variable:
Dictionary-Derived Term
Note
If the study is blinded, the treatment displayed is from a surrogate schedule rather than the real schedule.

Frequency of AEs

F			
BLOOD AND LYMPHATIC SYSTEM DISORDERS	CARDIAC DISORDERS	EAR AND LABYRINTH DISORDERS	
ENDOCRINE DISORDERS	EYE DISORDERS	GASTROINTESTINAL DISORDERS	GENERAL DISORDERS AND ADMINISTRATION RELATED DISORDERS
IMMUNE SYSTEM DISORDERS	INFECTIOUS AND INFESTATIONS	INJURY, POISONING AND PROCEDURAL COMPLICATIONS	INVESTIGATIONS
METABOLISM AND NUTRITION DISORDERS	NERVOUS SYSTEM DISORDERS	PSYCHIATRIC DISORDERS	RENAL AND URINARY DISORDERS
MUSCULOSKELETAL AND CONNECTIVE TISSUE DISORDERS	REPRODUCTIVE SYSTEM AND BREAST DISORDERS	SKIN AND SUBCUTANEOUS TISSUE DISORDERS	
NEOPLASMS BENIGN, MALIGNANT AND UNSPECIFIED	RESPIRATORY, THORACIC AND MEDIASTINAL DISORDERS	VASCULAR DISORDERS	
M			
BLOOD AND LYMPHATIC SYSTEM DISORDERS	CARDIAC DISORDERS	GASTROINTESTINAL DISORDERS	
GENERAL DISORDERS AND ADMINISTRATION RELATED DISORDERS	METABOLISM AND NUTRITION DISORDERS	MUSCULOSKELETAL AND CONNECTIVE TISSUE DISORDERS	NERVOUS SYSTEM DISORDERS
INFECTIONS AND INFESTATIONS	PSYCHIATRIC DISORDERS	REPRODUCTIVE SYSTEM AND BREAST DISORDERS	RESPIRATORY, THORACIC AND MEDIASTINAL DISORDERS
INJURY, POISONING AND PROCEDURAL COMPLICATIONS	RENAL AND URINARY DISORDERS	SKIN AND SUBCUTANEOUS TISSUE DISORDERS	VASCULAR DISORDERS
INVESTIGATIONS			

Drill-Down: AE Subject Count by Term

Dictionary-Derived Term	#Events	#Subjects	%Subjects	#Randomized	#Events Se...	#Subjects S...
ALANINE AMINOTRANSFERASE INCREASED	5	5	0.78 %	644	1	1
ASPARTATE AMINOTRANSFERASE INCREASED	3	3	0.47 %	644	1	1
BLOOD BILIRUBIN INCREASED	1	1	0.16 %	644	0	0
BLOOD CREATININE INCREASED	1	1	0.16 %	644	0	0
BLOOD GLUCOSE DECREASED	1	1	0.16 %	644	0	0
BLOOD GLUCOSE INCREASED	2	2	0.31 %	644	0	0
BLOOD PRESSURE INCREASED	2	2	0.31 %	644	0	0
C-REACTIVE PROTEIN INCREASED	1	1	0.16 %	644	0	0
HAEMATOCRIT INCREASED	1	1	0.16 %	644	0	0
HEPATIC ENZYME INCREASED	3	3	0.47 %	644	2	2
NEUTROPHIL COUNT INCREASED	1	1	0.16 %	644	0	0
WHITE BLOOD CELL COUNT INCREASED	2	2	0.31 %	644	0	0
Grand total	23	18	2.80 %	644	4	3

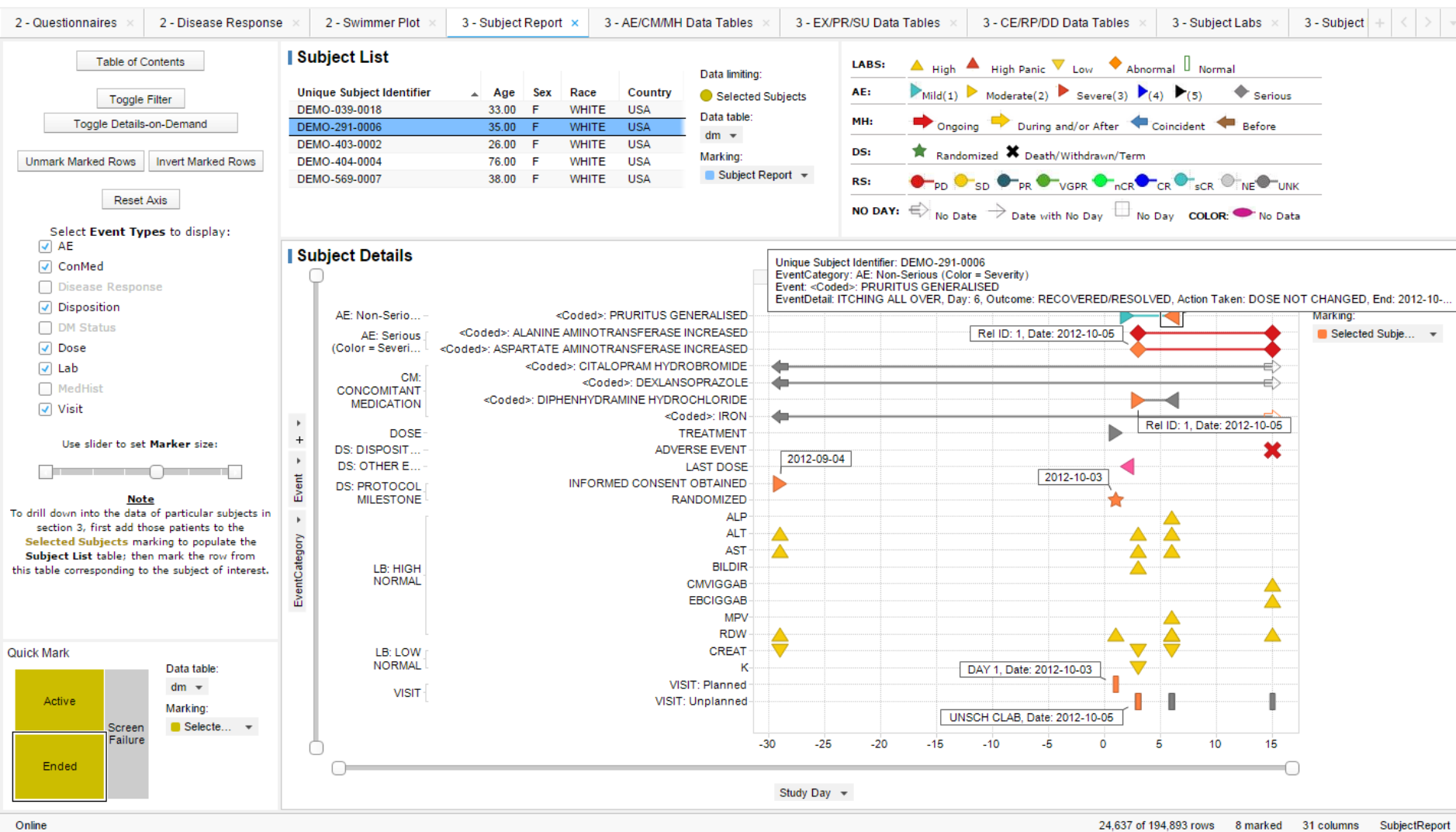
Drill-Down: Adverse Events by Summary Variable

Dictionary-Derived Term	#Subjects (UniqueCount)	Severity
ALANINE AMINOTRANSFERASE INCREASED	5	N
ASPARTATE AMINOTRANSFERASE INCREASED	3	N
HEPATIC ENZYME INCREASED	3	Y
BLOOD GLUCOSE INCREASED	2	N
BLOOD PRESSURE INCREASED	2	N
WHITE BLOOD CELL COUNT INCREASED	2	N
BLOOD BILIRUBIN INCREASED	1	N
BLOOD CREATININE INCREASED	1	N
BLOOD GLUCOSE DECREASED	1	N
C-REACTIVE PROTEIN INCREASED	1	N

Counts by AE term.
%Subjects: subject total count by term divided by total subjects randomized.
Limit #Subjects to only randomized subjects via Dispositions tab.
Data limiting:
Events/Interventions
Data table:
ae
Marking:
Selected Subject...
Color by:
Serious +
N
Y

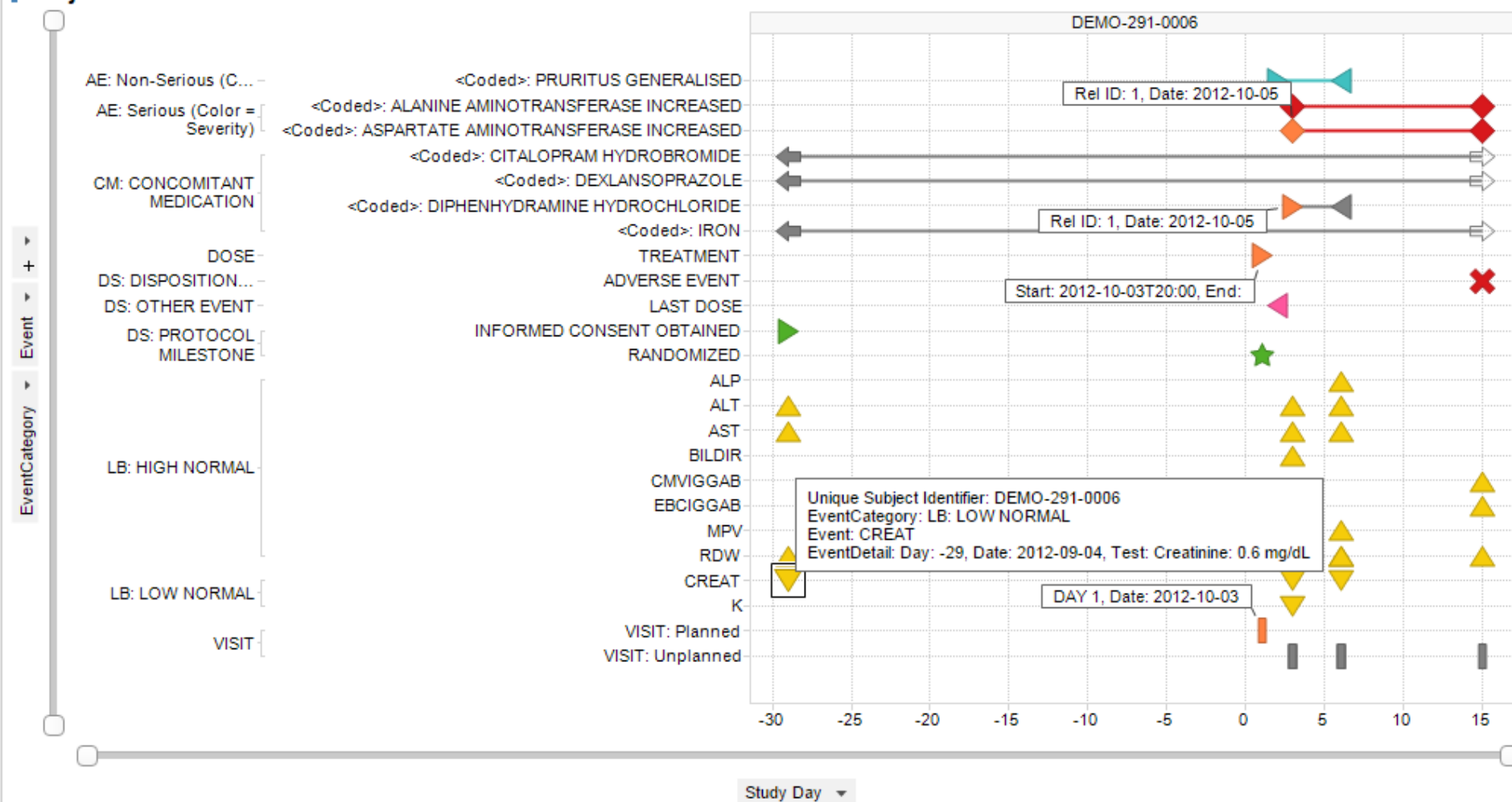
Online
688 of 2,388 rows
5 marked
58 columns
ae

CDISC SDTM Visualizations – Subject Report



CDISC SDTM Visualizations – Subject Report

Subject Details



CDISC SDTM Visualizations – Labs

3 - Subject Report

3 - AE/CM/MH Data Tables

3 - EX/PR/SU Data Tables

3 - CE/RF/DD Data Tables

3 - Subject Labs

3 - Subject ECG/Vitals

3 - Subject Morphology

3 - Subject Questionnaires

Filters

3 - Subject Labs

Type to search filters

dm

lb

Modified Flags

Study Identifier

DEMO-DEMO

ONC-ONCDEM01

Lab Test or Examination Short...

Type to search in list

(All) 43 values

ALB

ALP

ALT

AMYLASE

AST

BASOLE

Numeric Result/Finding in Sta...

0.00

120.00

Include empty values

Category/Test

Results

Test Dates

5 filters changed

Some filters are hidden.

Show all

Table of Contents

Toggle Filter

Toggle Details-on-Demand

Unmark Marked Rows

Invert Marked Rows

Reset Axis

Toggle Reference Ranges

Overlay selected Subjects or Tests or plot across multiple axes:

Overlay Subjects

Select Study Day or Visit/Cycle for the X-axis:

Visit/Cycle Number and Name

Select Numeric Result/Finding or Change from Baseline for the Y-axis:

Change from Baseline with Base Value

Use slider to set Marker size:

Use Toggle Filter to select labs of interest.

Note

To drill down into the data of particular subjects in section 3, first add those patients to the **Selected Subjects** marking to populate the **Subject List** table; then mark the row from this table corresponding to the subject of interest.

Subject List

Unique Subject Identifier	Age	Sex	Race	Country	Subject Reference Start Date/Time ...
DEMO-001-0010	68...	F	BLA...	USA	25/07/2012
DEMO-039-0018	33...	F	WHITE	USA	26/12/2012
DEMO-089-0008	42...	F	BLA...	USA	15/10/2012
DEMO-145-0004	49...	F	WHITE	USA	30/01/2013
DEMO-183-0002	47...	F	WHITE	United ...	17/01/2013
DEMO-191-0002	70...	F	WHITE	USA	03/08/2012
DEMO-219-0002	46...	F	WHITE	USA	13/09/2012
DEMO-291-0006	35...	F	WHITE	USA	03/10/2012
DEMO-403-0002	26...	F	WHITE	USA	04/09/2012
DEMO-404-0004	76...	F	WHITE	USA	26/11/2012
DEMO-523-0001	50...	F	WHITE	USA	13/08/2012

Max xULN Lab Values - Selected Subjects

Unique Subject...	ALT(U/L)...	BILI(mg/dL)...	DILI Category
DEMO-001-0010	1.30	0.32	Below CLC
DEMO-089-0008	1.30	0.46	Below CLC
DEMO-183-0002	1.15	0.21	Below CLC
DEMO-191-0002	0.42	0.25	Below CLC
DEMO-403-0002	1.67	0.35	Below CLC
DEMO-404-0004	2.48	0.66	Below CLC
DEMO-523-0001	2.94	0.67	Below CLC
DEMO-569-0007	1.85	0.35	Below CLC
DEMO-580-0003	0.67	0.29	Below CLC
DEMO-727-0019	0.64	0.44	Below CLC
DEMO-767-0005	0.94	0.21	Below CLC

Lab Results - Selected Subjects

ALT

BILI

Lab Results Details - Selected Subjects

Unique Subject Identifier	Date/Time of Specimen...	Lab Test or Examination Name	Lab Test or Examination Short Name	Numeric Result/Finding in Stand...	Reference Range Lower Limit-Std Units	Reference Range Upper Limit-Std Units	Reference Range Indicator
DEMO-183-0002	2012-12-19	Alanine Aminotransferase	ALT	27.00	10.00	33.00	NORMAL
DEMO-183-0002	2012-12-19	Bilirubin	BILI	0.16	0.10	1.10	NORMAL
DEMO-403-0002	2012-08-07	Alanine Aminotransferase	ALT	41.00	10.00	33.00	HIGH NORMAL
DEMO-727-0019	2012-08-23	Alanine Aminotransferase	ALT	21.00	10.00	33.00	NORMAL
DEMO-844-0001	2012-08-10	Alanine Aminotransferase	ALT	19.00	10.00	33.00	NORMAL
DEMO-403-0002	2012-08-07	Bilirubin	BILI	0.39	0.10	1.10	NORMAL
DEMO-727-0019	2012-08-23	Bilirubin	BILI	0.18	0.10	1.10	NORMAL

Data limiting:

Subject Report

Marking:

(None)

Data limiting:

Subject Report

Marking:

Labs

Color by:

Overlay

DEMO-001-0010

DEMO-089-0008

DEMO-183-0002

DEMO-191-0002

DEMO-403-0002

DEMO-404-0004

DEMO-523-0001

DEMO-569-0007

DEMO-580-0003

Data limiting:

Subject R...

Data table:

lb

Marking:

Labs

5,985 of 153,937 rows

0 marked

59 columns

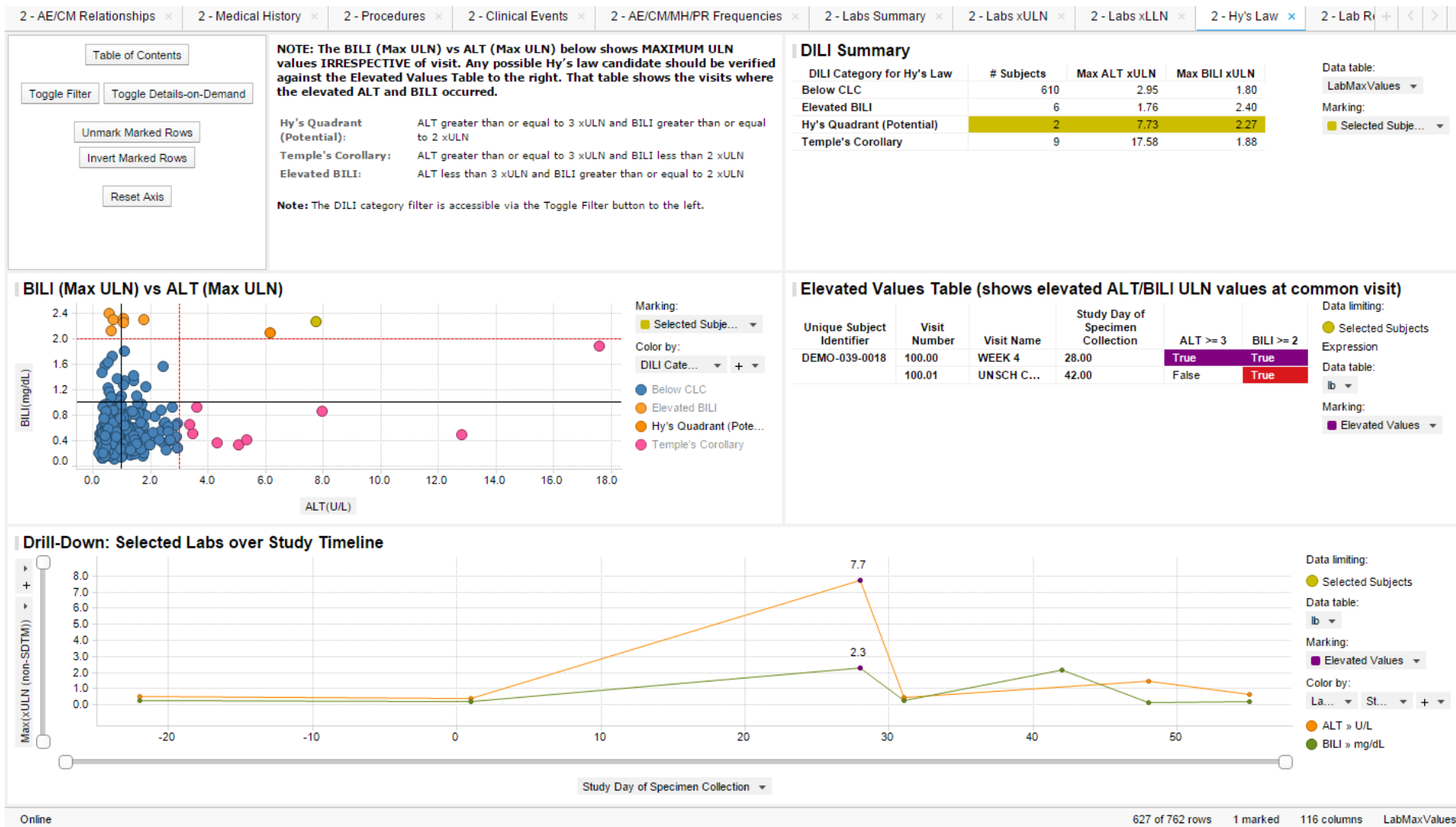
lb

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HELPING DELIVER LIFE-CHANGING THERAPIES

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CDISC SDTM Visualizations – Hy's Law



CDISC SDTM Visualizations – Accessing Risk



CFAST Therapeutic Area Support

“CFAST is an initiative formed to accelerate clinical research and medical product development by creating and maintaining data standards, tools and methods for conducting research in therapeutic areas that are important to public health. CFAST was initiated as a partnership between CDISC and the Critical Path Institute (C-Path).”¹

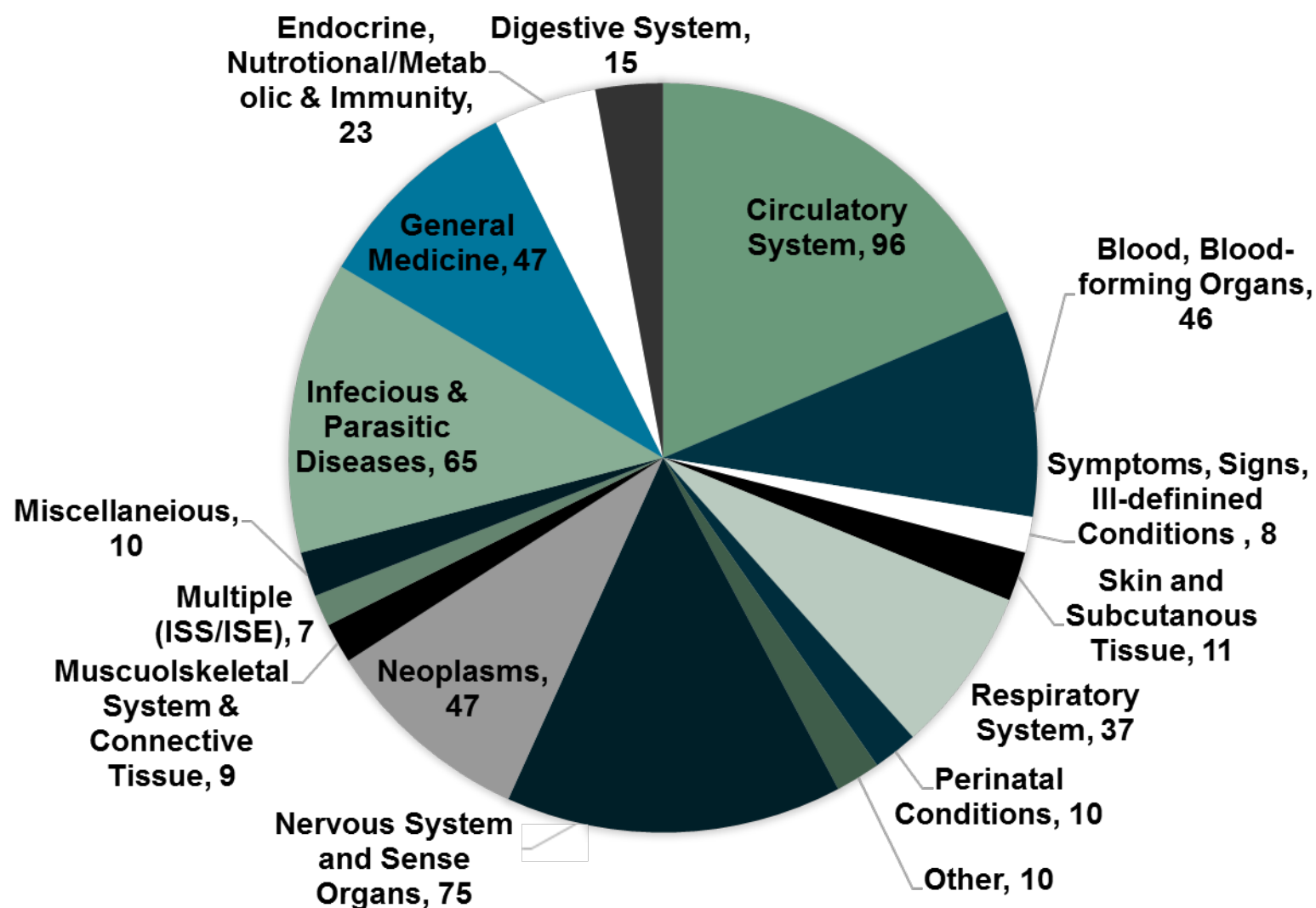
Project	Publication Date
Alzheimer's Disease v1	September 9, 2011
Tuberculosis v1	June 29, 2012
Pain v1	August 7, 2012
Virology v1	December 6, 2012
Parkinson's Disease v1	December 18, 2012
Polycystic Kidney Disease v1	February 26, 2013
Asthma v1	November 26, 2013
Alzheimer's Disease v2	December 16, 2013
Multiple Sclerosis v1	May 2, 2014
Diabetes v1 (ADaM Supplement)	September 11, 2014 (December 18, 2015)
Cardiovascular Endpoints v1	October 17, 2014
Influenza v1	November 25, 2014
QT Studies v1	December 12, 2014
Chronic Hepatitis C Virus v1	May 8, 2015
Schizophrenia v1	June 9, 2015

Project	Publication Date
Dyslipidemia v1	June 19, 2015
Virology v2	September 30, 2015
Traumatic Brain Injury v1	December 14, 2015
COPD v1	January 26, 2016
Tuberculosis v2	February 26, 2016
Breast Cancer v1	May 16, 2016
Rheumatoid Arthritis v1	November 14, 2016
Kidney Transplant	October 31, 2016
Major Depressive Disorder v1	December 5, 2016
Diabetic Kidney Disease v1	December 13, 2016
Pain v1.1 (update)	December 13, 2016
Ebola v1	December 19, 2016
Malaria v1	January 9, 2017
Schizophrenia v1.1	May 3, 2017
Prostate Cancer v1.0	July 10, 2017

¹ Source: www.cdisc.org/cfast-0

PPD CDISC SDTM Experience

By therapeutic area, 516 studies as of March 2017

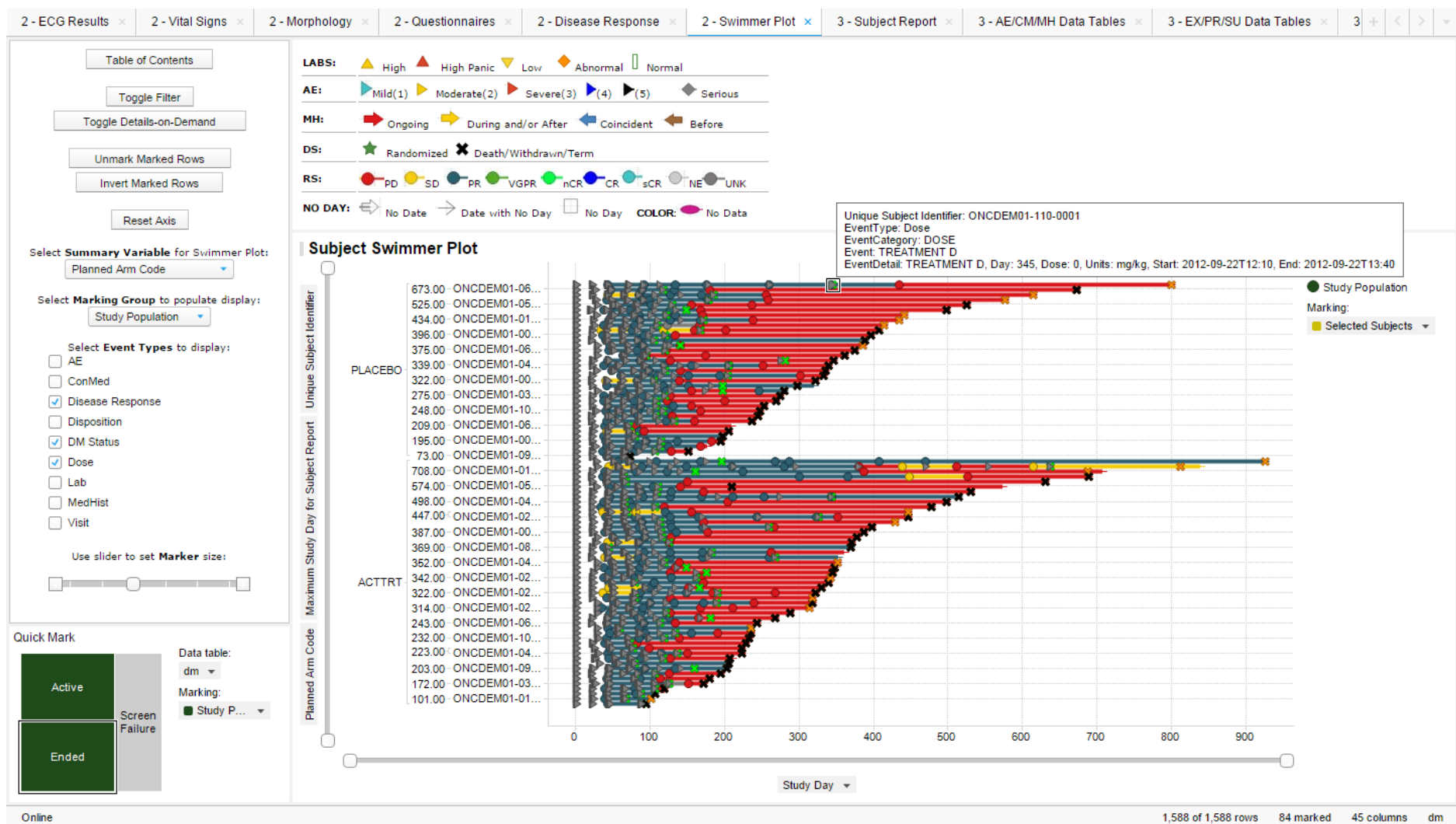


Enhanced Therapeutic Area Support

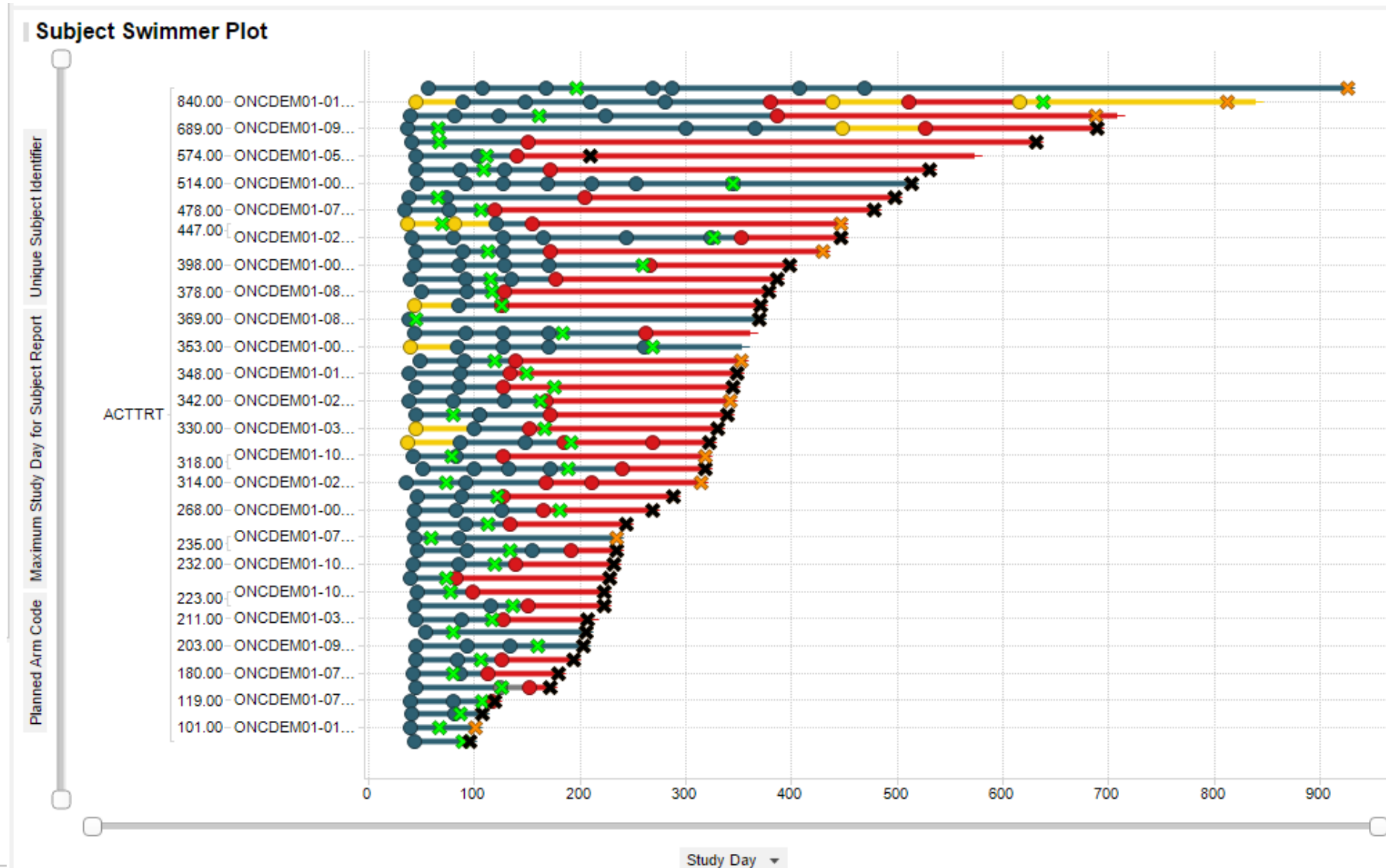
- + We established Therapeutic Area (TA) working groups to enhance the Preclarus® PDD specifically for TAs based on the CFAST therapeutic area user guides (TAUGs), for example:
- + **Oncology** – Disease response assessments and CTCAE
- + **Cardiovascular** – Identification of MACE events
- + **Neurology** – Enhanced questionnaire support
- + **Vaccines** – Solicited AEs and reactogenicity
- + **Ophthalmology** – Recognition of study and non-study eye



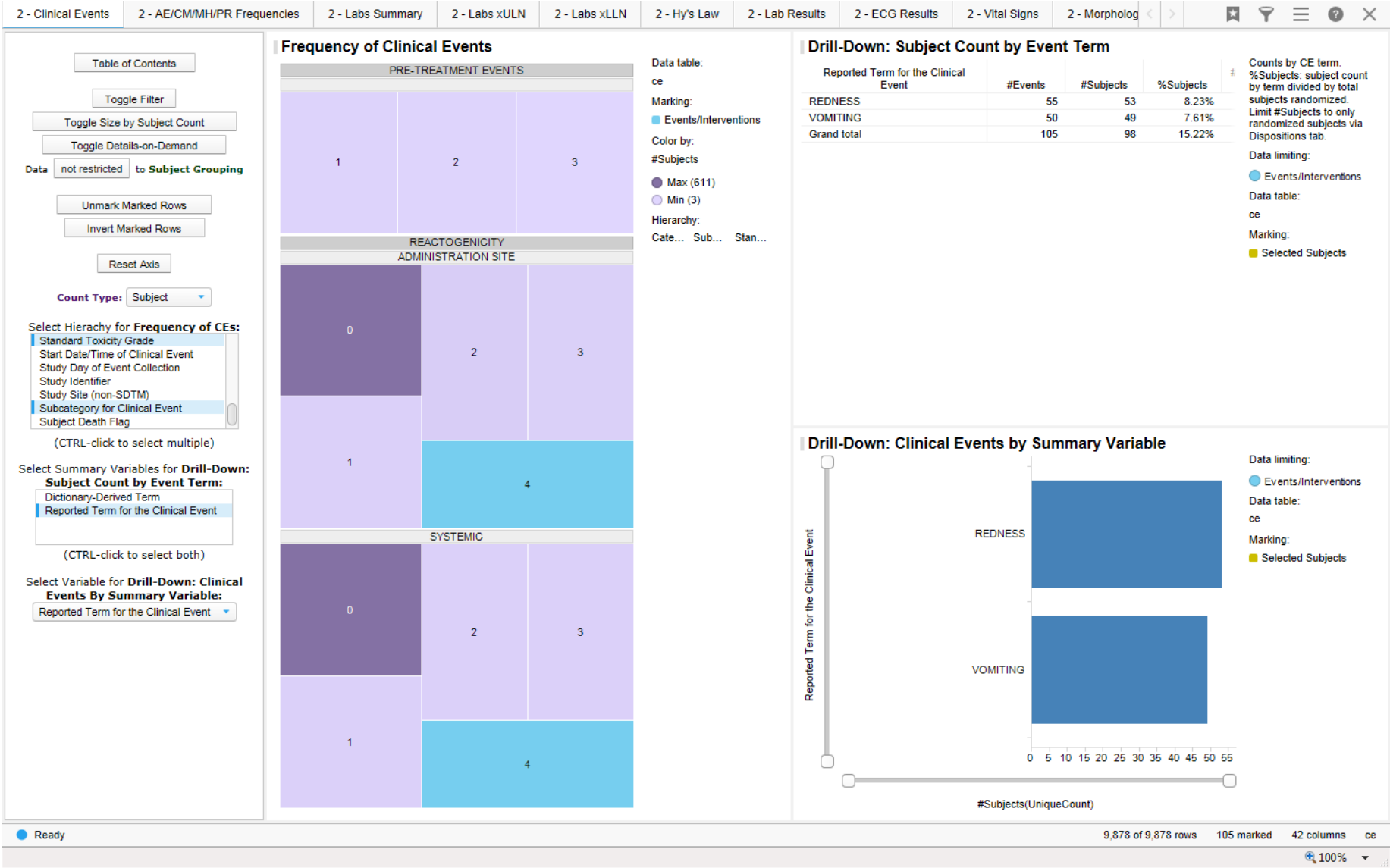
Delivering Visualizations – Oncology



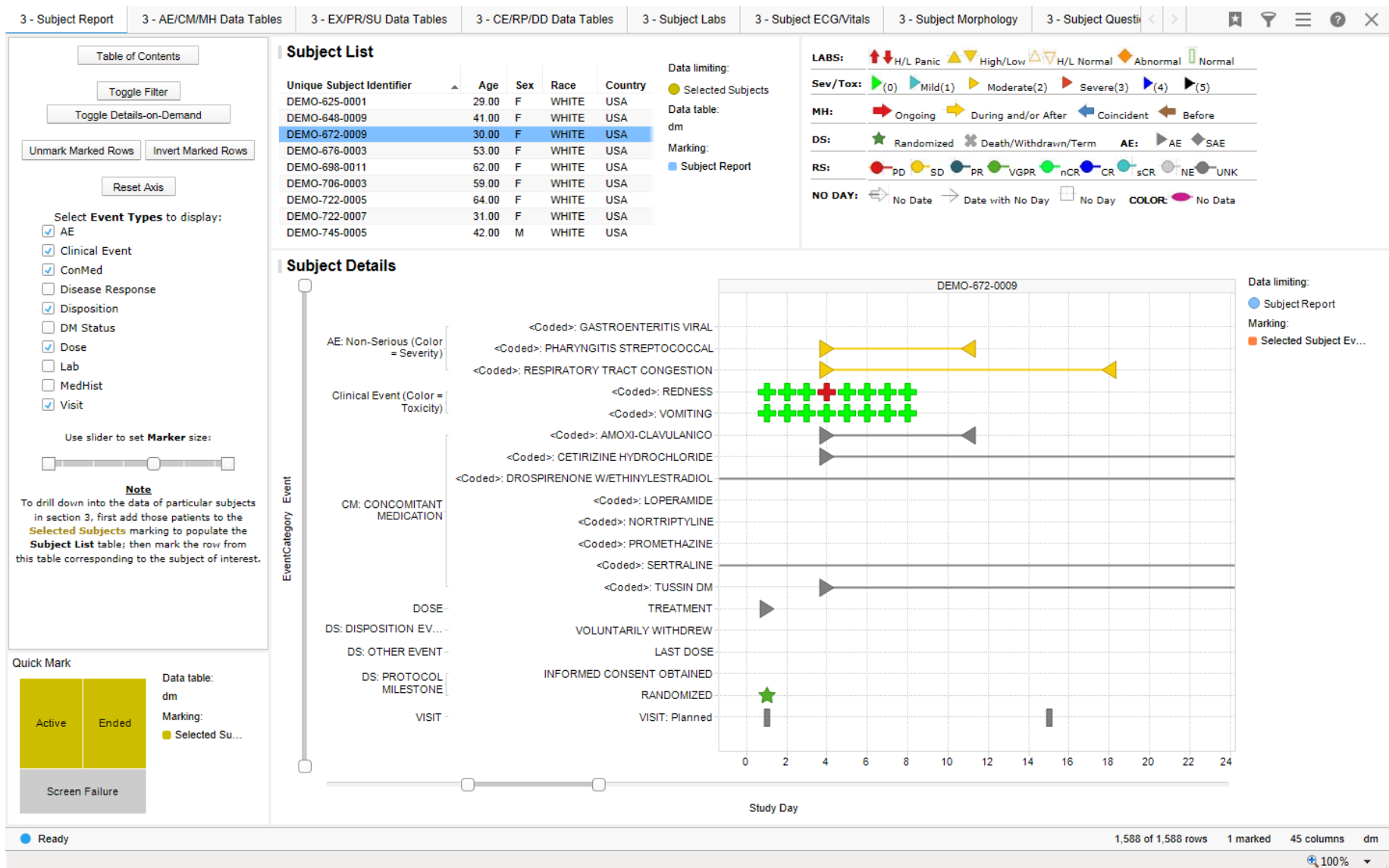
Delivering Visualizations – Oncology



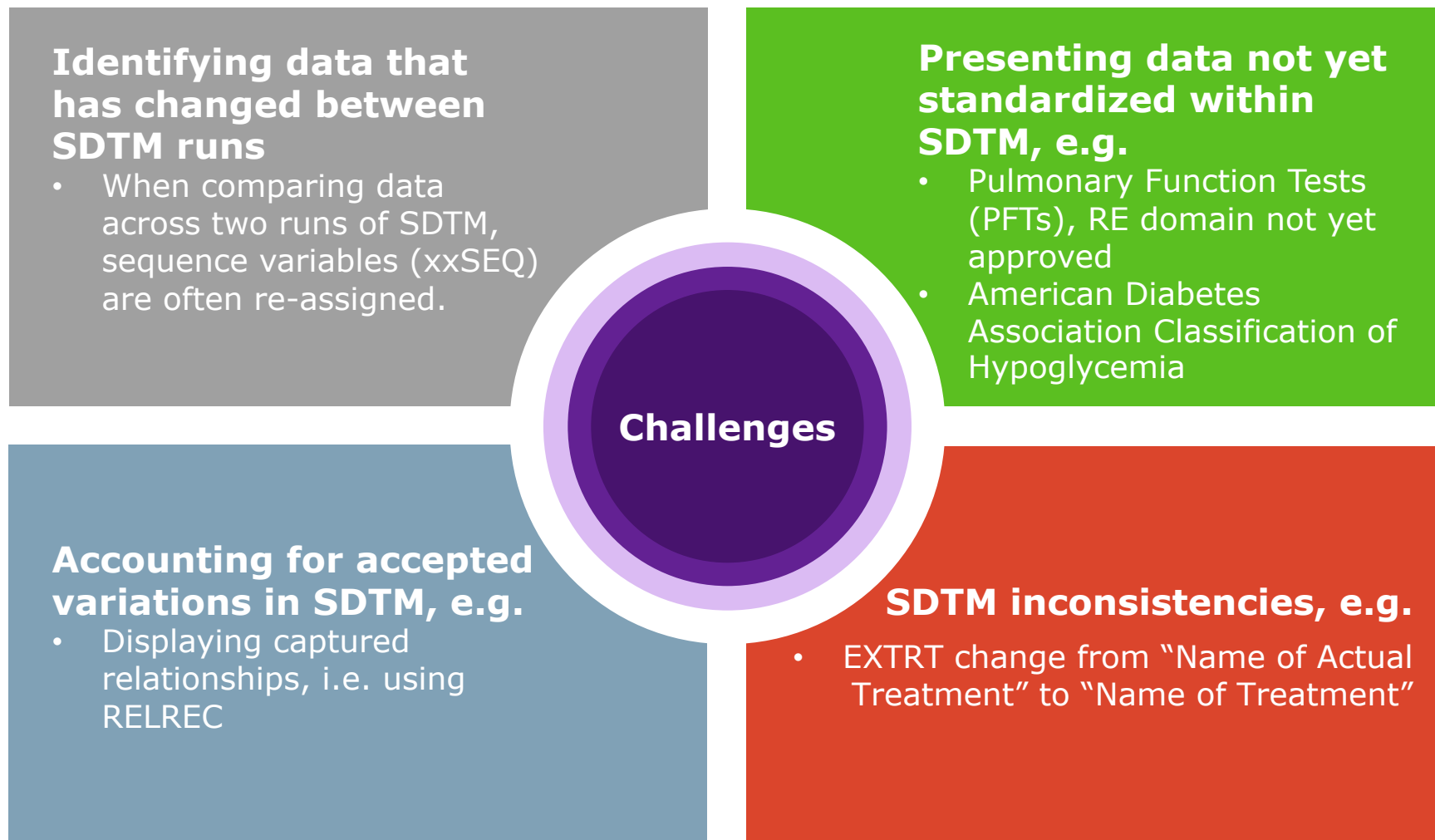
Delivering Visualizations – Vaccines



Delivering Visualizations – Vaccines



CDISC SDTM Challenges Encountered



Delivering CDISC SDTM Visualizations

- + PPD's Preclarus® Patient Data Dashboard (PDD) is a dynamic and visualization based view of CDISC SDTM data for ongoing review and monitoring.
 - + **Scalable:** Out-of-the-box data review tool for any SDTM study
 - + **Comprehensive and Intuitive:** Centrally developed by experts
 - + **Cost effective:** No study specific customisation required
 - + **Quick to deploy:** Simply upload SDTM into the system
- + Using SDTM Standards we have successfully deployed:
 - + Interactive visualisations across over 30 SDTM domains so far:
 - + AE, CE, CM, DD, DM, DS, DV, EG, EX, FA, IE, LB, MB, MH, MO, MS, OE, PE, PR, QS, RELREC, RP, RS, SU, SV, TA, TE, TI, TR, TS, TU, TV, VS
 - + 120 visualisations across over 40 individual pages
 - + Implement on over 70 studies across 10 clients and rising, for example:
 - + Deployed for safety review/ trending
 - + Deployed for dose escalation support
 - + Deployed for identifying data issues

Contact Information

Philip Bartle



philip.bartle@ppdi.com



www.ppdi.com

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