Benefits of a Rapidly Growing Library of Clinically Relevant Visualization Templates/Patterns

Eric S. Herbel
President
Integrated Clinical Systems, Inc.

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Topics

- Trends toward data standardization
- Typical ongoing study – clinical data review
- Continually evolving ways of visualizing clinical data
- Importance of quick use patterns/templates
- Rapid addition of clinically relevant visualization patterns/templates

Data Standardization

- Trends toward data standardization (CDISC)

FDA: Studies started after Dec 17, 2016 must use standards in the data catalog (SDTM, ADaM, SEND, define.xml)

That means – when submitting data – for those studies – data must be in standards based format.

https://www.fda.gov/forindustry/datastandards/studydatastandards/default.htm

Study Data Collection

- Significant adoption of EDC/eSource

  Many sponsors have standardized on use of EDC or eSource

  Medidata Rave
  Oracle Inform
  Omnicomm Trialmaster
  NexTrials
  Clinical Ink
  … more vendors emerging every day

Study Data Collection & Export

- EDC/eSource data structures

  Typically not SDTM or standards based
  -> ‘EDC Raw Data Format’

- Data export format (‘SAS on demand’, etc.)

  Typically not SDTM or standards based
  -> ‘EDC Raw Data Format’

Study Data Export

- Option to transform to SDTM on export

  Many EDC vendors offer that – but most charge $$$

- So – we're seeing:

  - sponsors converting to standard format in-house

  or

  - reviewing ongoing studies in 'EDC raw data format'

    then converting to SDTM later in the process

Data Visualization of ongoing study data

- Challenge of using a ‘standard approach’ to reviewing data on ongoing studies

- Standard Safety Review Library
  based on FDA Safety Review Guidance

  2 options:

  1. spend time/resources developing data transformation to SDTM upfront for each study

  - or –

  2. spend time defining/developing data visualizations for each study

Ways of Visualizing Study Data

- Working with many FDA medical reviewers and sponsors

  we see continually evolving ways of

  visualizing clinical data

- How do we accommodate this?

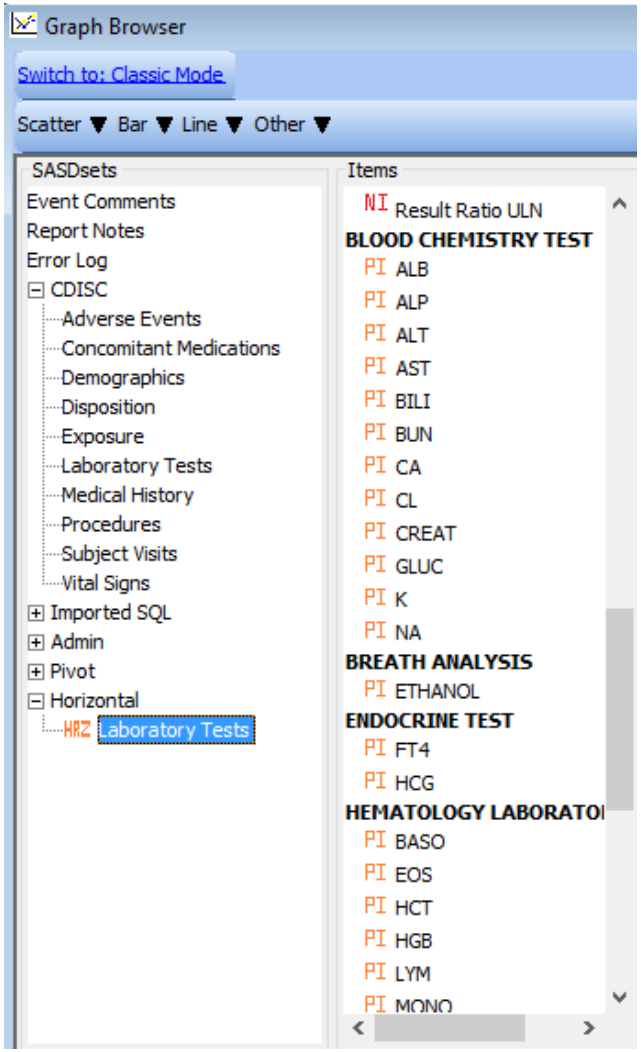
Quick use patterns/templates

- Design a system that presents a wide selection of clinically relevant visualization templates/patterns
- Build in complex algorithms in the templates
- Keep the user interface quick, easy, simple to use.
- Facilitate reusability by storing definitions at higher ‘scope’/’level’ (project or ‘StudyGroup’)

Facilitate use of common data shapes

- Many types of data/domains are vertical
  Labs, ECGs, Vitals, etc.
- Very flexible for adding content
  -> but really tough for reporting and graphing
- Define ‘Vertical to Horizontal’ transformation
  once – per vertical dataset/domain & scope
- Use as ‘virtual horizontal’ structure thereafter

Vertical to Horizontal 'Virtual Panel'



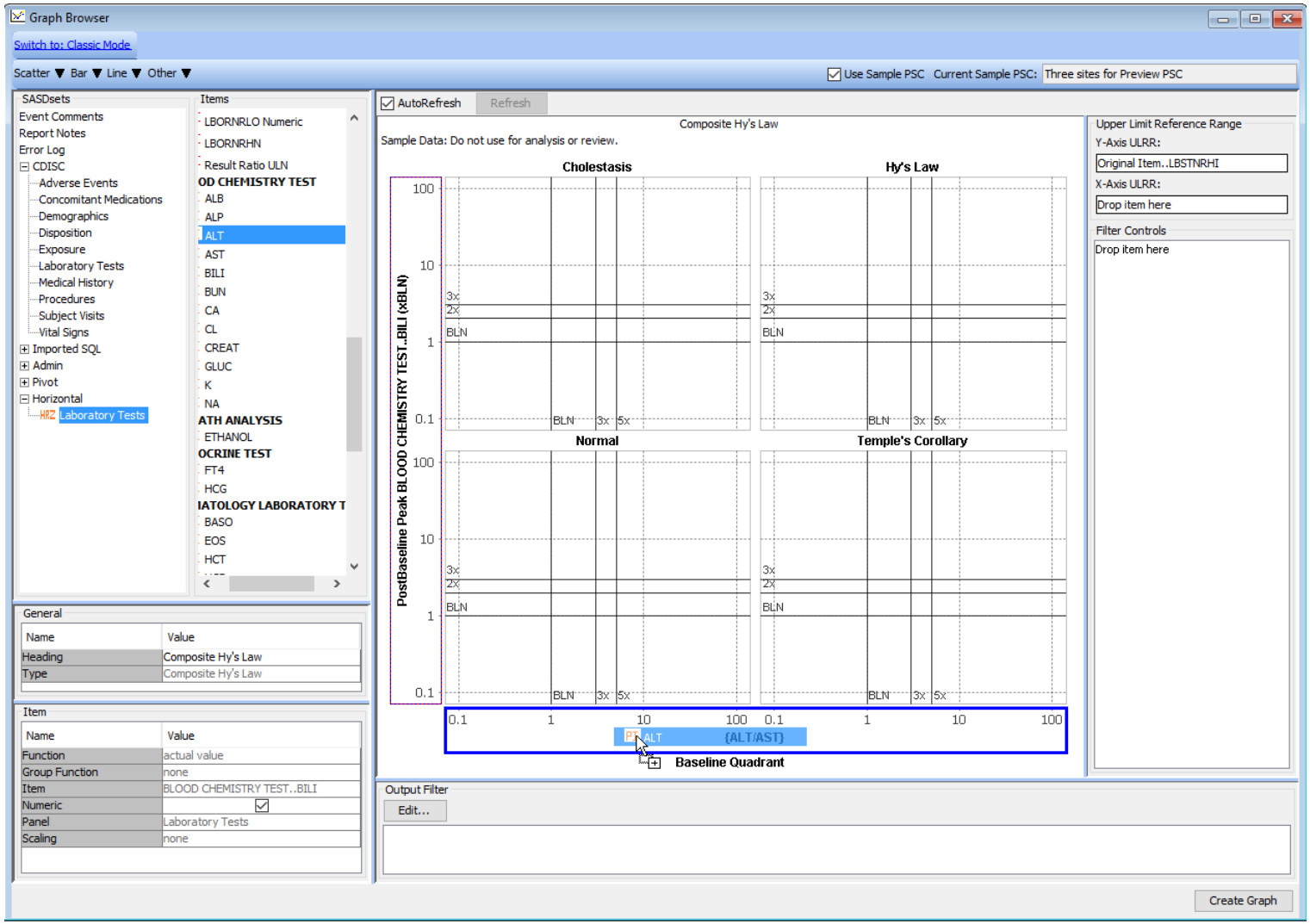
Rapid addition to clinically relevant templates

- Continually evolving ways of visualizing clinical data to pick up trends, outliers, signals
- Recent example – a few months ago
  FDA – 'composite Hy's Law chart'
- Last year - FDA Cardio-Renal div – histogram for data distribution, cumulative count by time, exposure by dose, disposition percent
- Earlier – Napoleon's March, Benefit/Risk, Volcano Plot, AE Risk Assessment, Spaghetti Plot, Tree map/Heat map
- Original set – baseline vs min/max or endpoint, box whiskers, bar chart freq, pareto plot, line chart over time, bubble chart, Kaplan Meier, Timeline Trellis

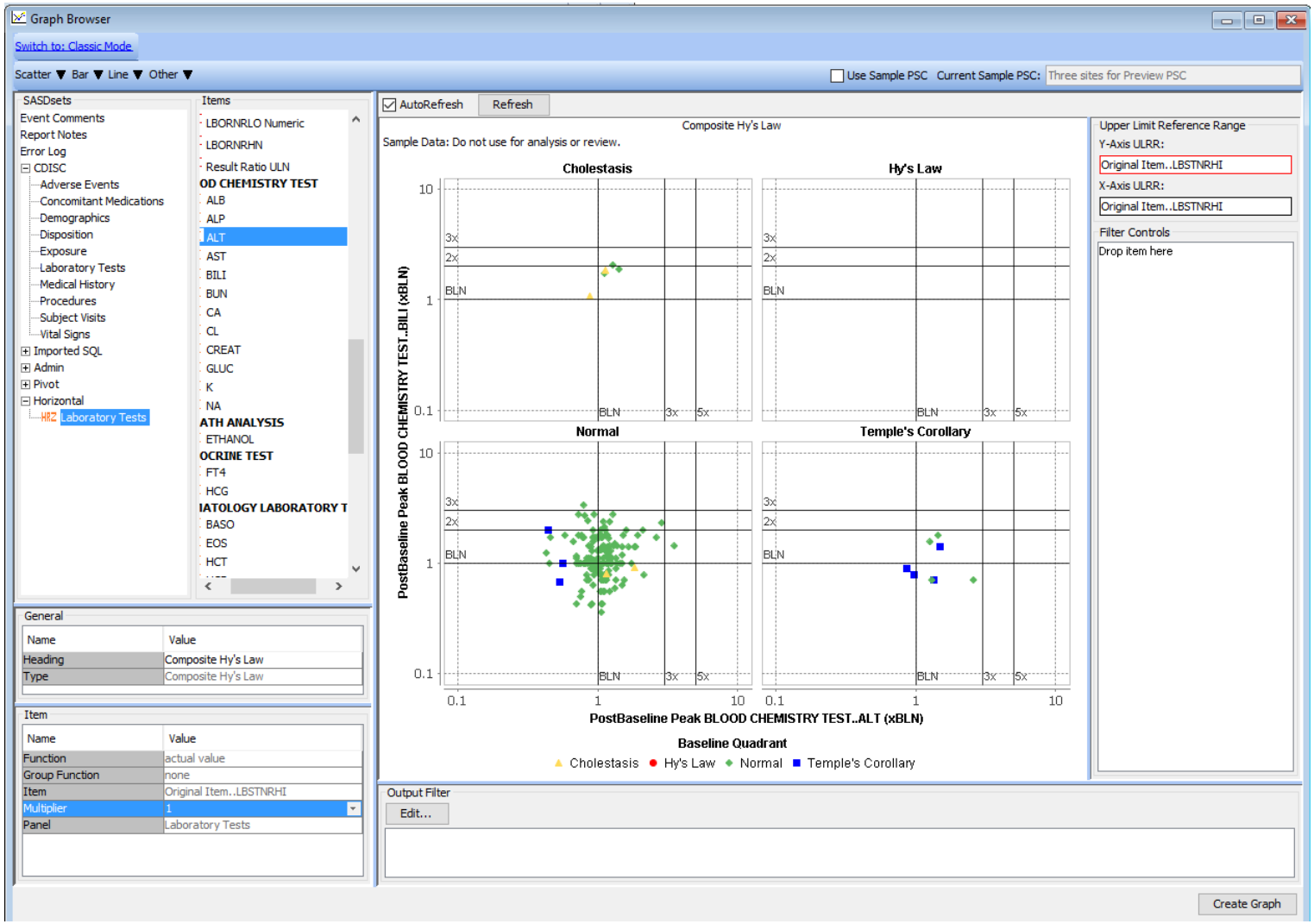
Characteristics of clinically relevant templates

- Not just – scatter plot, bar chart, line chart, etc.
- Graph type defined, but then clinically relevant definitions embedded in the template, i.e., baseline or endpoint or ratio of peak value to ULNR, etc.
- Automatically handle data shape transformations – to be able to easily work with vertically shaped data.
- Easy to use user interface – drag and drop – to select which variables to use in the template.
- Build in the complexities necessary for the visualization – but keep it simple for the user!

Composite Hy's Law Chart – drag & drop UI



Composite Hy's Law Chart

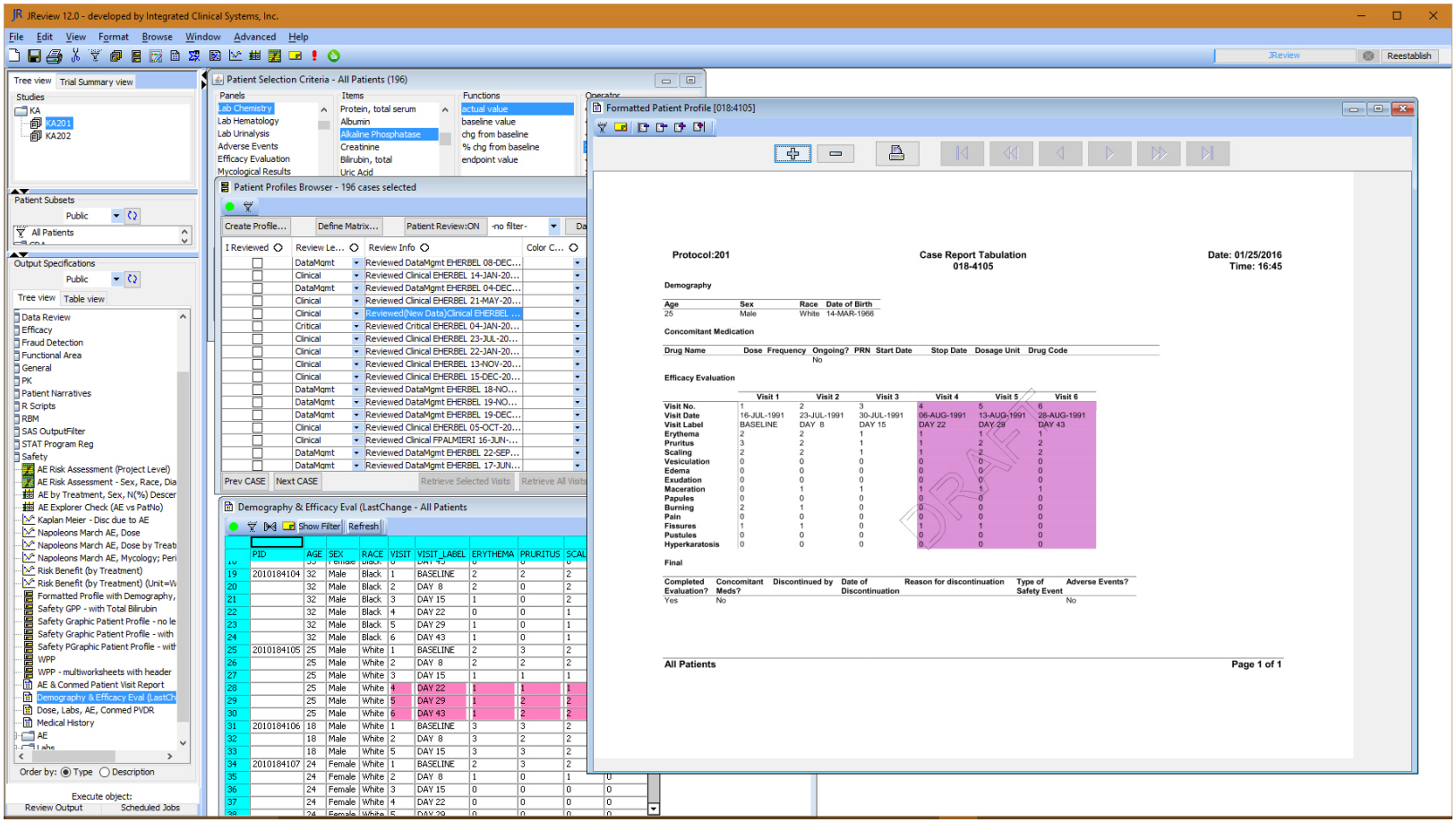


Other Important Considerations

- Integrate with many clinical data sources
- Dynamic multi-study pooling
- Built-in ‘patient identification/drill down’
- Patient review tracking & report review notes
- Many clinically relevant graphics, tabulations, patient profiles, risk assessments, etc. including defining critical data
- Graph Patient Profiles – directly access study data (no need for external data setup) – run-time day calculations
- Built in codelist/sas format awareness
- SAS/R program integration
- Patient Narratives

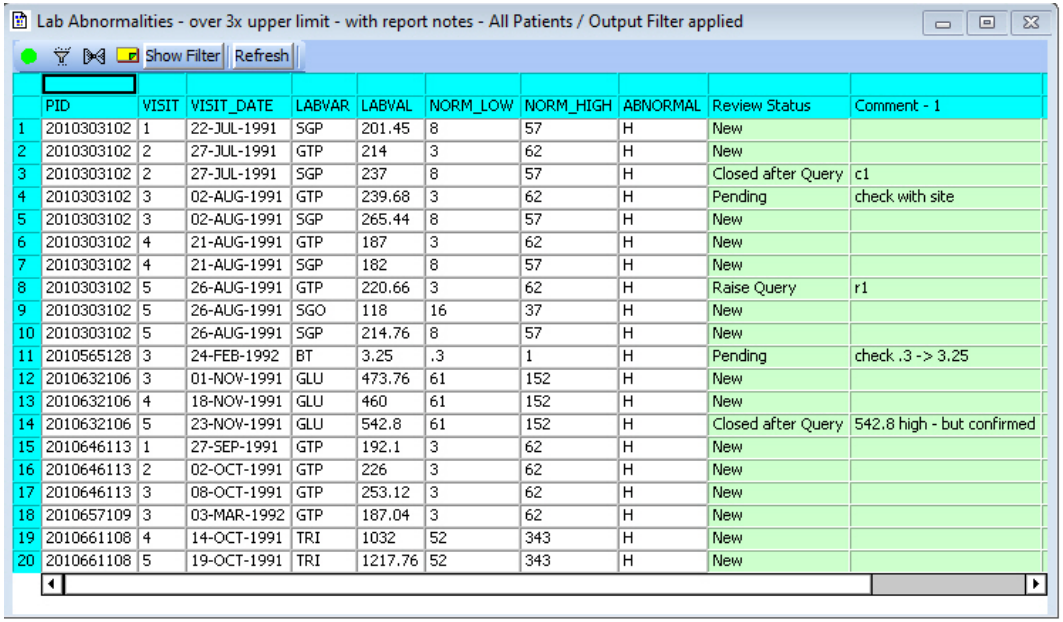
Dashboard Views in JReview

Dashboard Views in JReview



Report Reviewer Notes

- Report Notes – review exception listings – editable review status, action, comments – stored separately
- When data updates (typically nightly) – notes are retained – unless have option to reset status when any data changes on the report line.



Lab Abnormalities - over 3x upper limit - with report notes - All Patients / Output Filter applied

Show Filter | Refresh

	PID	VISIT	VISIT_DATE	LABVAR	LABVAL	NORM_LOW	NORM_HIGH	ABNORMAL	Review Status	Comment - 1
1	2010303102	1	22-JUL-1991	SGP	201.45	8	57	H	New	
2	2010303102	2	27-JUL-1991	GTP	214	3	62	H	New	
3	2010303102	2	27-JUL-1991	SGP	237	8	57	H	Closed after Query	c1
4	2010303102	3	02-AUG-1991	GTP	239.68	3	62	H	Pending	check with site
5	2010303102	3	02-AUG-1991	SGP	265.44	8	57	H	New	
6	2010303102	4	21-AUG-1991	GTP	187	3	62	H	New	
7	2010303102	4	21-AUG-1991	SGP	182	8	57	H	New	
8	2010303102	5	26-AUG-1991	GTP	220.66	3	62	H	Raise Query	r1
9	2010303102	5	26-AUG-1991	SGO	118	16	37	H	New	
10	2010303102	5	26-AUG-1991	SGP	214.76	8	57	H	New	
11	2010565128	3	24-FEB-1992	BT	3.25	.3	1	H	Pending	check .3 -> 3.25
12	2010632106	3	01-NOV-1991	GLU	473.76	61	152	H	New	
13	2010632106	4	18-NOV-1991	GLU	460	61	152	H	New	
14	2010632106	5	23-NOV-1991	GLU	542.8	61	152	H	Closed after Query	542.8 high - but confirmed
15	2010646113	1	27-SEP-1991	GTP	192.1	3	62	H	New	
16	2010646113	2	02-OCT-1991	GTP	226	3	62	H	New	
17	2010646113	3	08-OCT-1991	GTP	253.12	3	62	H	New	
18	2010657109	3	03-MAR-1992	GTP	187.04	3	62	H	New	
19	2010661108	4	14-OCT-1991	TRI	1032	52	343	H	New	
20	2010661108	5	19-OCT-1991	TRI	1217.76	52	343	H	New	

Standard Library of Definitions

- Use of these clinically relevant templates – with specified graph type, variables, filters
  -> saved definition
    -> library (at study, project or studyGroup)

- As quick as it is to use a quick use template – selecting variables of interest & filters

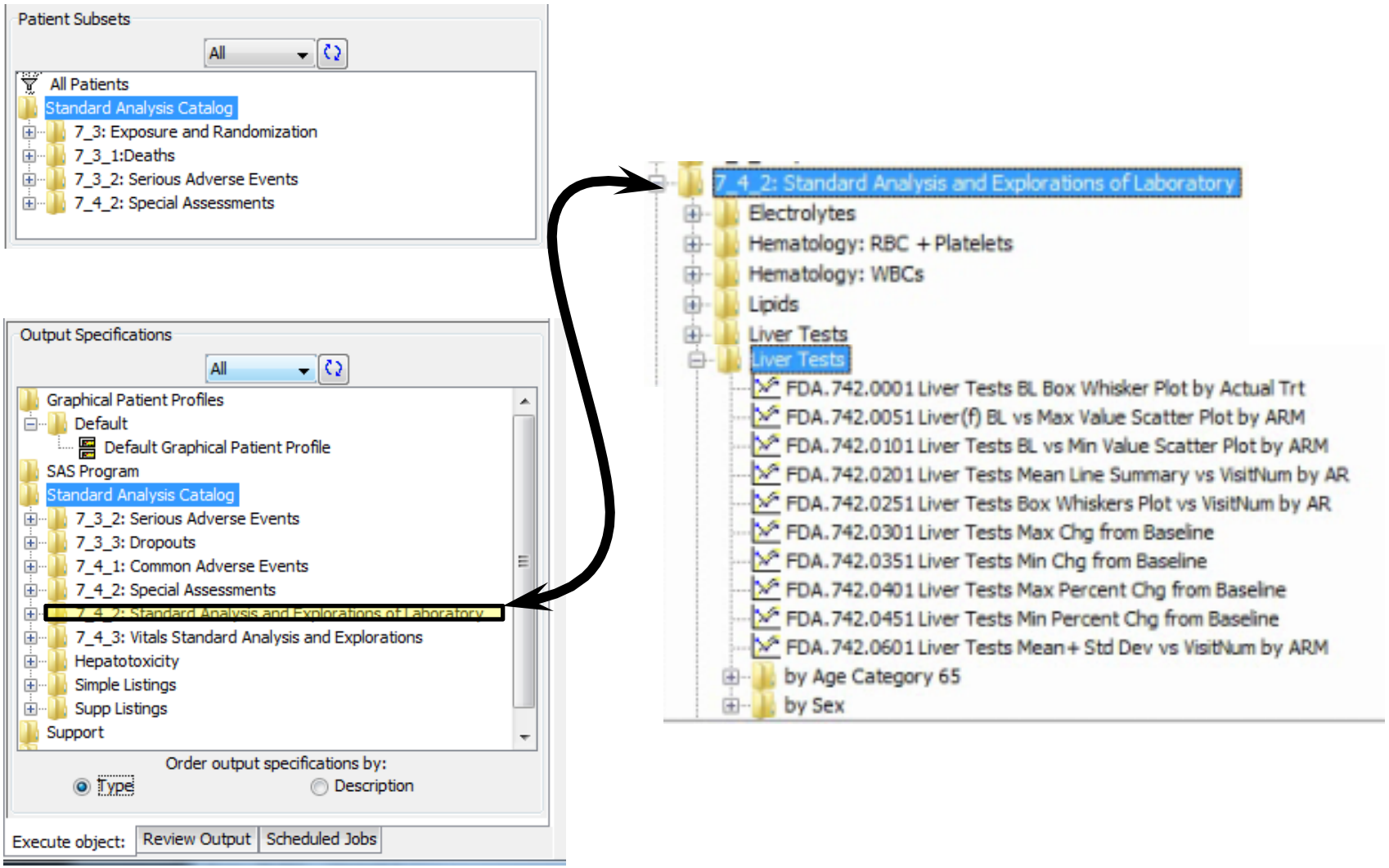
  -> it's quicker to re-execute a saved definition!

  -> and published to a dashboard view.

FDA Standard Analysis Catalog

Table of Contents

The standard analysis catalog

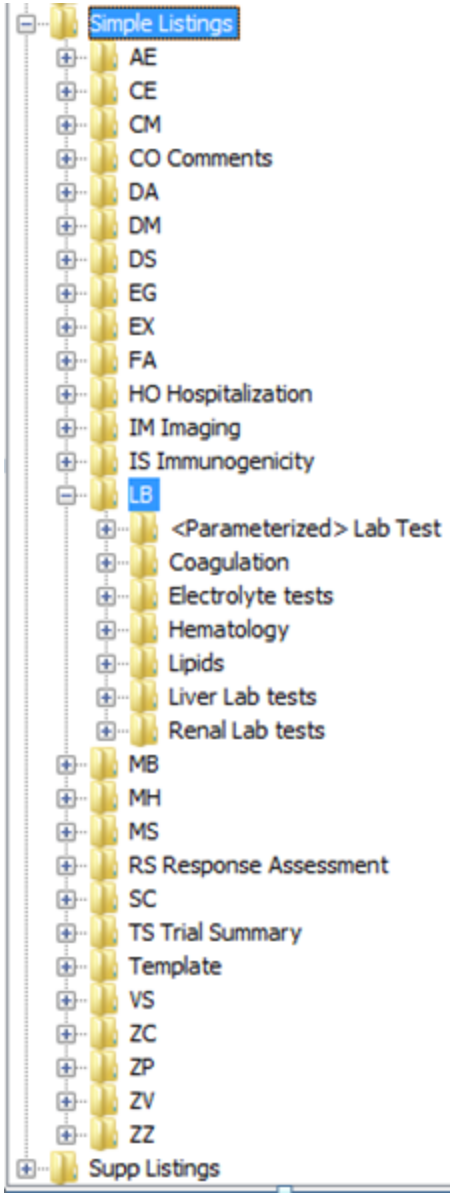


The standard analysis catalog includes a repository of simple domain detail subject listings.

Laboratory Liver function tests Subject Simple Lisiting - All Patients / Output Filter applied

Show Filter | Refresh

Study ID	Description of Actual Arm	Study Site ID	Unique Subject ID	Study Day of Specimen Collection	Visit Number	Visit Name	Lab Test	Numeric Result Std Units	Std Units	Ref Range Indicator	Baseline Flag
			Subject0001	-3	1	SCREENING	ALT	75	U/L	HIGH	Y
				-3	1	SCREENING	ALP	105	U/L	NORMAL	Y
				-3	1	SCREENING	AST	23	U/L	NORMAL	Y
				-3	1	SCREENING	GGT	136	U/L	HIGH	Y
				-3	1	SCREENING	BILI	11.97	umol/L	NORMAL	Y
				3	4	DAY 3	AST	15	U/L	NORMAL	
				3	4	DAY 3	BILI	8.55	umol/L	NORMAL	
				3	4	DAY 3	ALP	91	U/L	NORMAL	
				3	4	DAY 3	ALT	26	U/L	NORMAL	
				3	4	DAY 3	GGT	136	U/L	HIGH	
				4	11	END OF TREATMENT	BILI	8.55	umol/L	NORMAL	
				4	11	END OF TREATMENT	AST	19	U/L	NORMAL	
				4	11	END OF TREATMENT	ALT	25	U/L	NORMAL	
				4	11	END OF TREATMENT	ALP	90	U/L	NORMAL	
				4	11	END OF TREATMENT	GGT	126	U/L	HIGH	
			Subject0002	-1	1	SCREENING	AST	12	U/L	NORMAL	Y
				-1	1	SCREENING	GGT	68	U/L	HIGH	Y
				-1	1	SCREENING	ALP	95	U/L	NORMAL	Y
				-1	1	SCREENING	ALT	26	U/L	NORMAL	Y



Typical Process

- Either access data directly in clinical data source
  - or –
  Register SAS Datasets (with SAS Share)
  - or –
  Load SAS datasets or ODM-XML -> database

  -> register or load new study – loading
  study meta data automatically – about 10 minutes
  -> data to db tables (if applicable) depends on data volume

- If totally new study/data structures
  ->define new set of standard library objects
  ->about 2-3 hours for about 100 object definitions

- If a new study, but based on previous non-standard definitions – inherit from project or studygroup

Thank You!

Any questions or comments?

Eric S. Herbel
Integrated Clinical Systems, Inc.
eherbel@i-review.com
(908) 996-3312