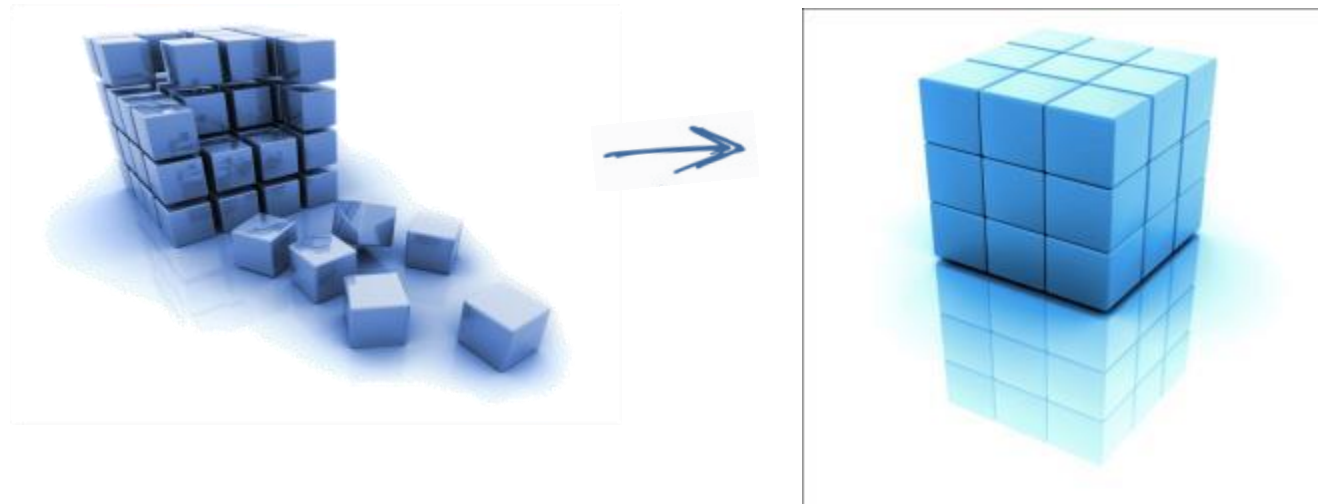


Importance of semantic integration and data service layers for interactive data visualization

PhUSE CSS, London

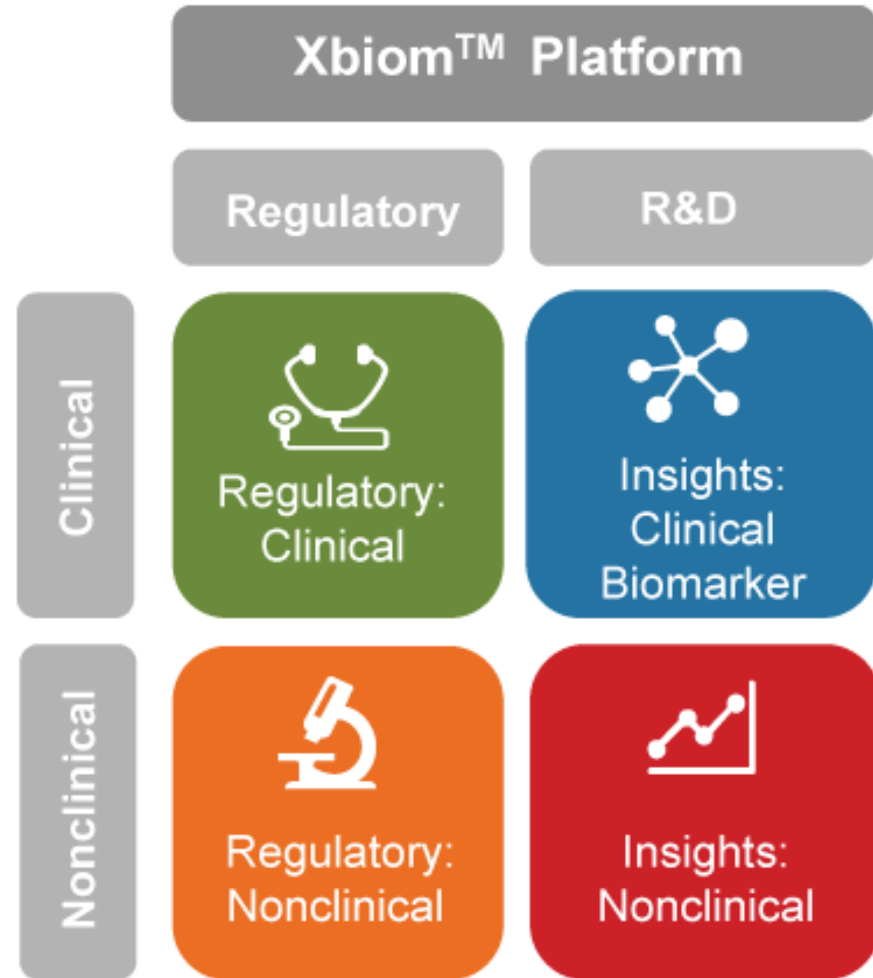
Nicolas Philippe
June 19, 2017



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PointCross Life Sciences

- Provides Regulatory Review solutions for Clinical and Nonclinical Data
- Provides Clinical and Nonclinical Research with search, analytics and insights from nonclinical, clinical, and genomic biomarker data across studies
- Xbiom Suite – built on a big-data technology stack:
 - ✓ ExtJS for GUI , R for Analysis
 - ✓ D3 for embedded data visualization
 - ✓ OpenData (Apache Olingo) Data Service Layer for data access to external applications, data visualization tools (SpotFire, Tableau, Clikview, Micro Strategy)
- SEND Data Services
- Desktop downloadable **SEND data fit validator and browser**



PhUSE Nonclinical Working Group – Histopathology Visualizations

- PointCross is member of PhUse CSS since 2011
- Participating in Various Working Groups
- PointCross is a member of the PhUSE working group set up to propose new visualization concepts for histopathology data under the leadership of Phil Drew and Alan Brown
- The results of the work done by over 30 participants from the industry and FDA over two years have resulted in publication of two posters and a paper

Data Visualization needs are different for Regulatory Analysis for Nonclinical vs Clinical

Clinical

- Statistical Analysis Plans drive the regulatory analysis of a clinical trial study – clinical scientists are supported by programmers, bio-statisticians and data managers
- Data visualization through tabulations and figures is about presenting the results of SAP analysis – not much free form navigation through data
- Visualization is for data within a clinical study, and rarely across multiple studies

Nonclinical

- Nonclinical SEND datasets are organized in standard domains (about 43) making the data instantly consumable by a machine and presentable –
 - ✓ No need to run scripts to generate cohorts
 - ✓ No need to analyze analyzable data sets to generate viewable data - WYSIWYG
- Cross domain plotting is needed (e.g. Body Weight to Lab Parameters across visit days)
- Observational data (MA, MI, CL, TF) can be hierarchical and complex to see in a static view – interactive immersive navigation is necessary to understand the response to exposure

Opportunities and Challenges of Using SEND Datasets for Visualization

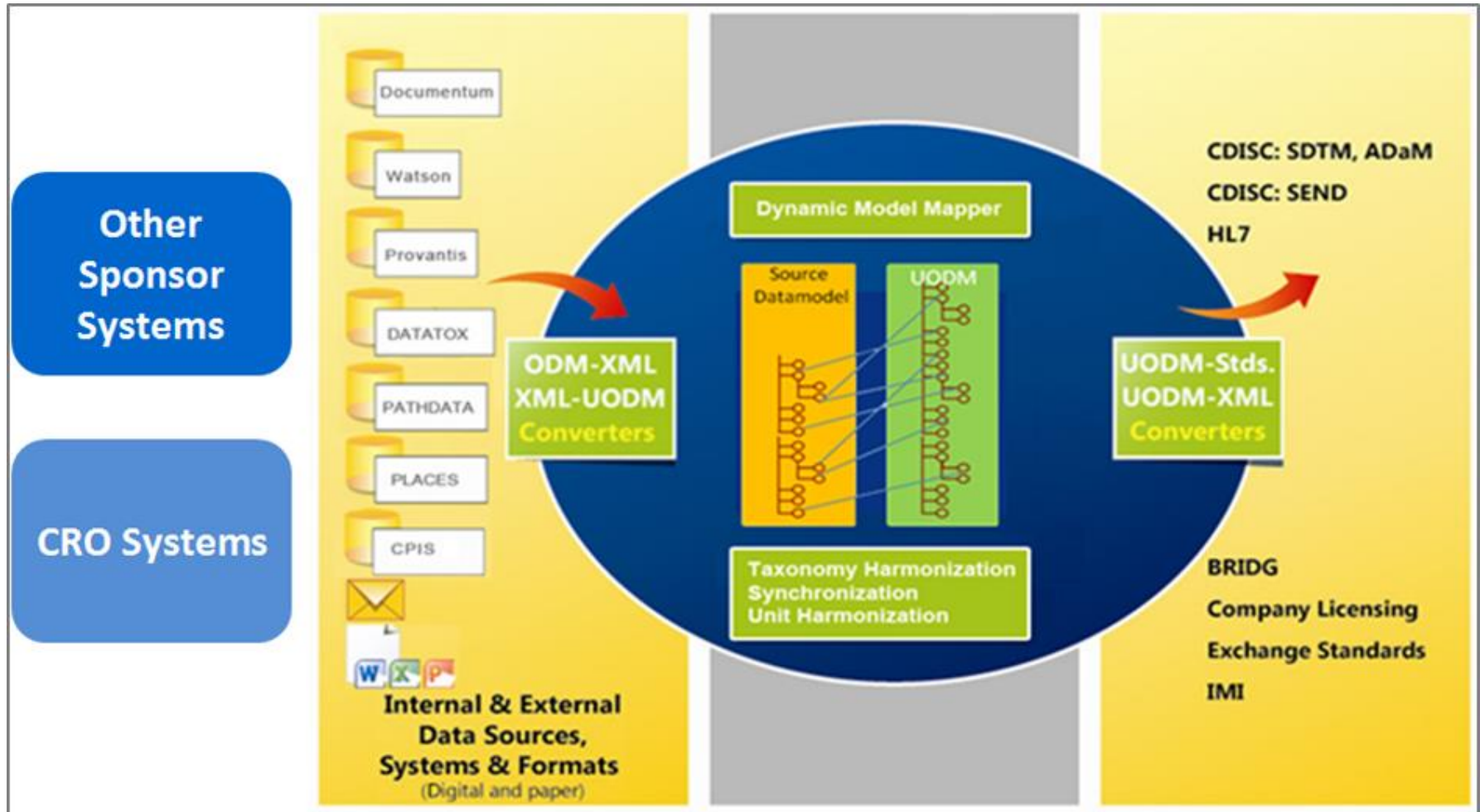
➤ Opportunities

- ✓ Subjects are neatly organized into Trial Sets under Trial Arms and their Trial Elements for ready use by automated review software
- ✓ The Control Terminology versions and the IG standards used are clear in dataset (in TS)
- ✓ Easily organize quantitative parameters into biomarker panels for easy comparisons
- ✓ Trial sets are granular – therefore it is easy to create new clubbed groups by combining sets and excluding subjects to form special cohorts whose group summary data can be instantly viewed

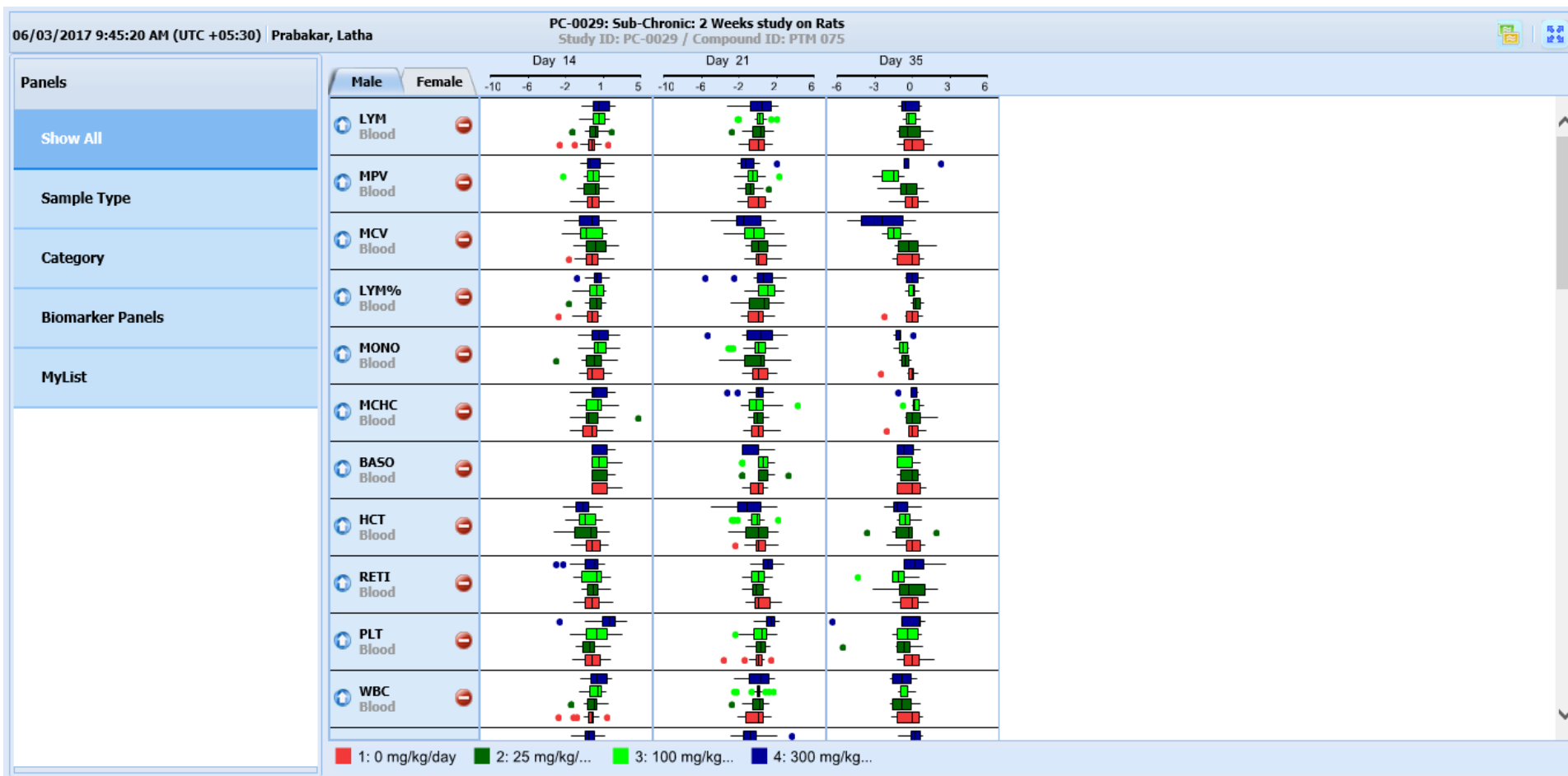
➤ Challenges

- ✓ Control Terminology or IG versions used can vary from study to study making it difficult to do instant comparisons across disparate studies
- ✓ Units can be different across studies for the same laboratory parameters (LB)
- ✓ Semantic harmonization and unit normalization with a ontology engine is necessary for any cross study search and analysis
- ✓ Control terminology is not standardized for certain terms such as Base Findings and Modifiers in MA and MI domain. (INHAND is work in progress)

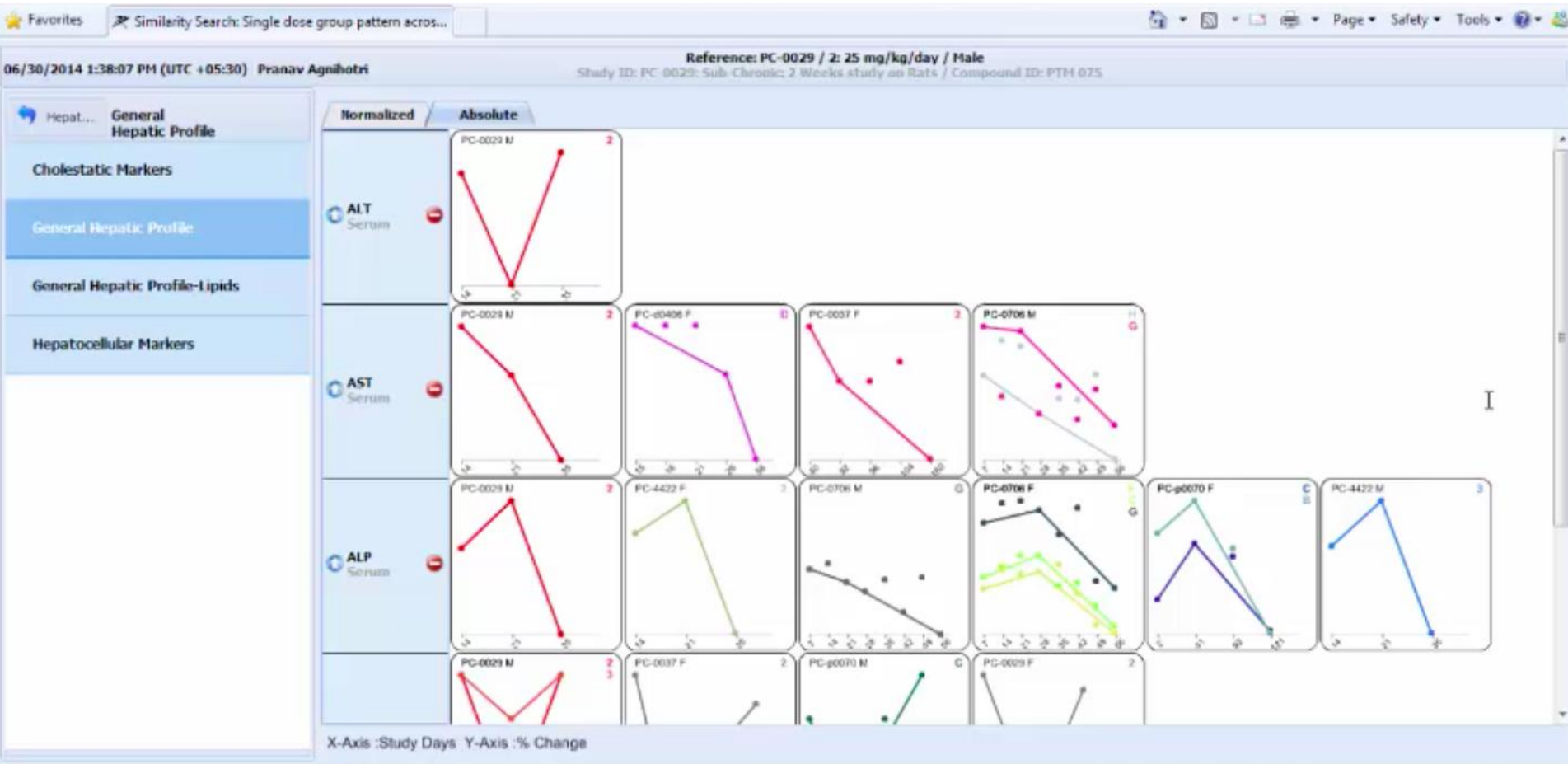
Semantic Integration of SEND Datasets



Z- Transforms for dose dependent response across multiple parameters and visit-days



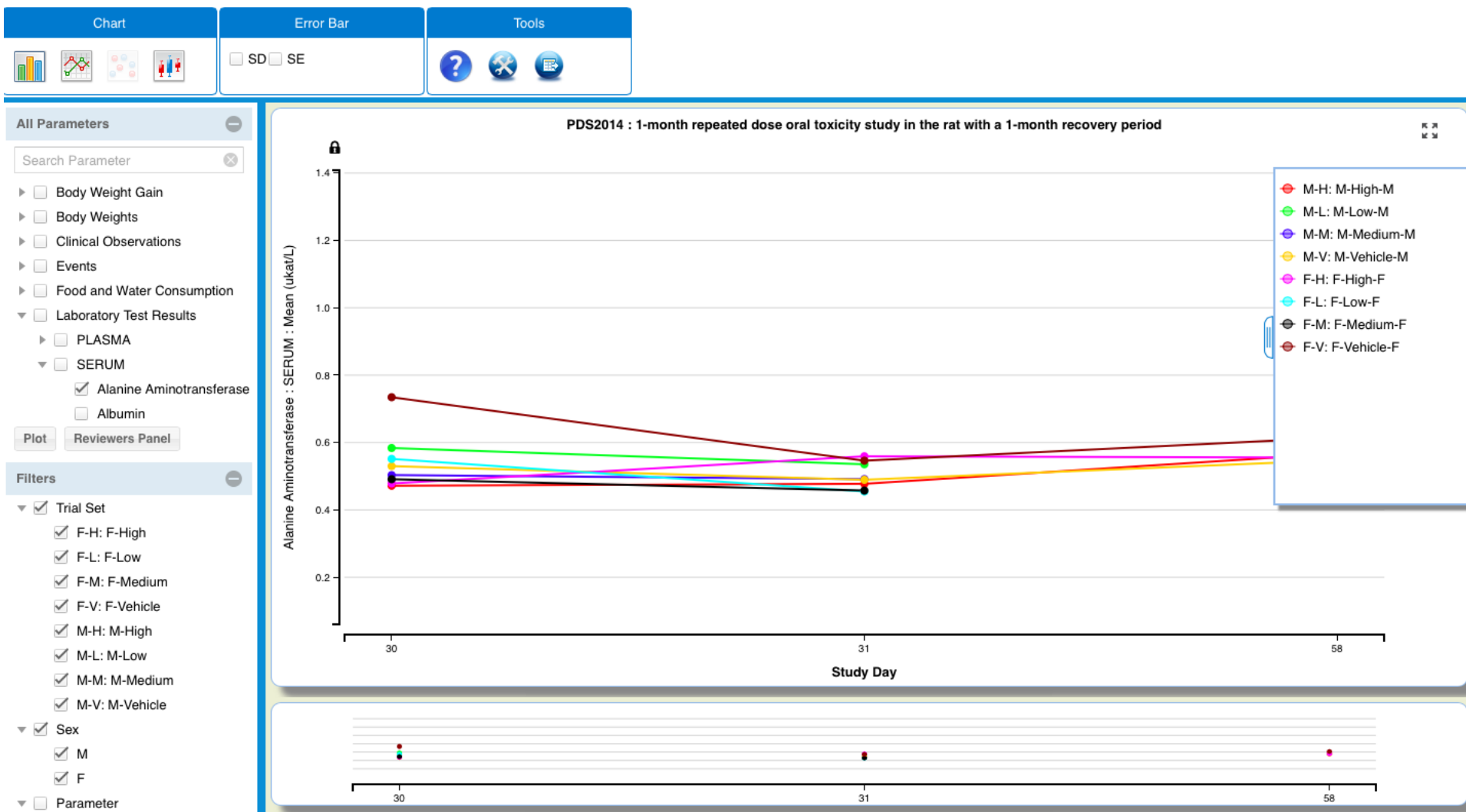
Find studies with similar patterns in a biomarker signal



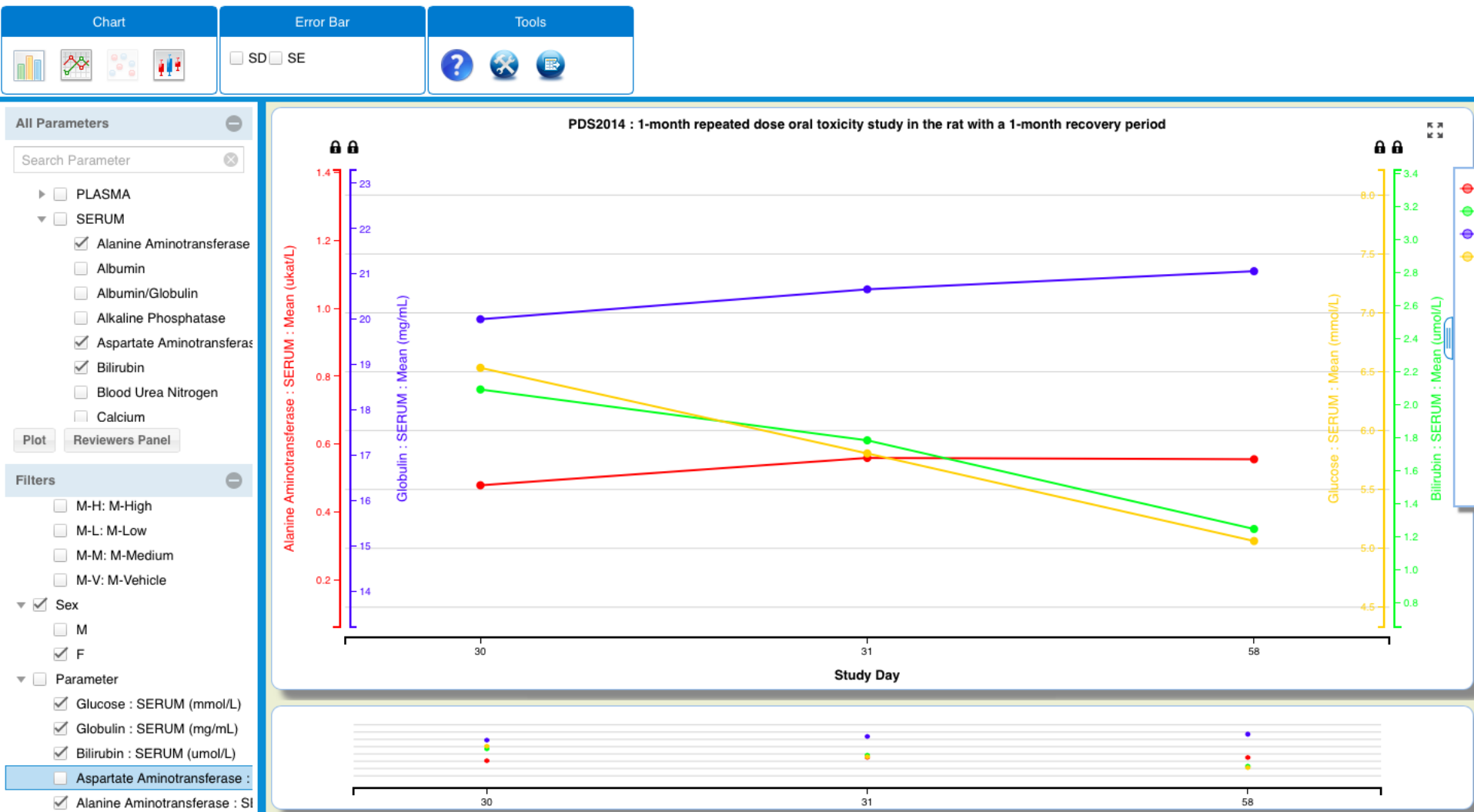
IGOs and it's use for Data Visualization

- IGO are Immersive, Interactive Graphic Objects:
 - ✓ They are self standing and modular
 - ✓ They access the search engines and access data (through **Data Service Layer**) that can be visualized using **remote access and APIs**
 - ✓ They manage the entire scope of data to be visualized **in-memory** – for speed and rapid pivoting
- IGOs can support standard line, box, whisker, bar, scatter and other plots
- IGOs support special purpose plots such as hierarchical histopathology plots
 - ✓ Navigator
 - ✓ Sunburst
 - ✓ Magnifier

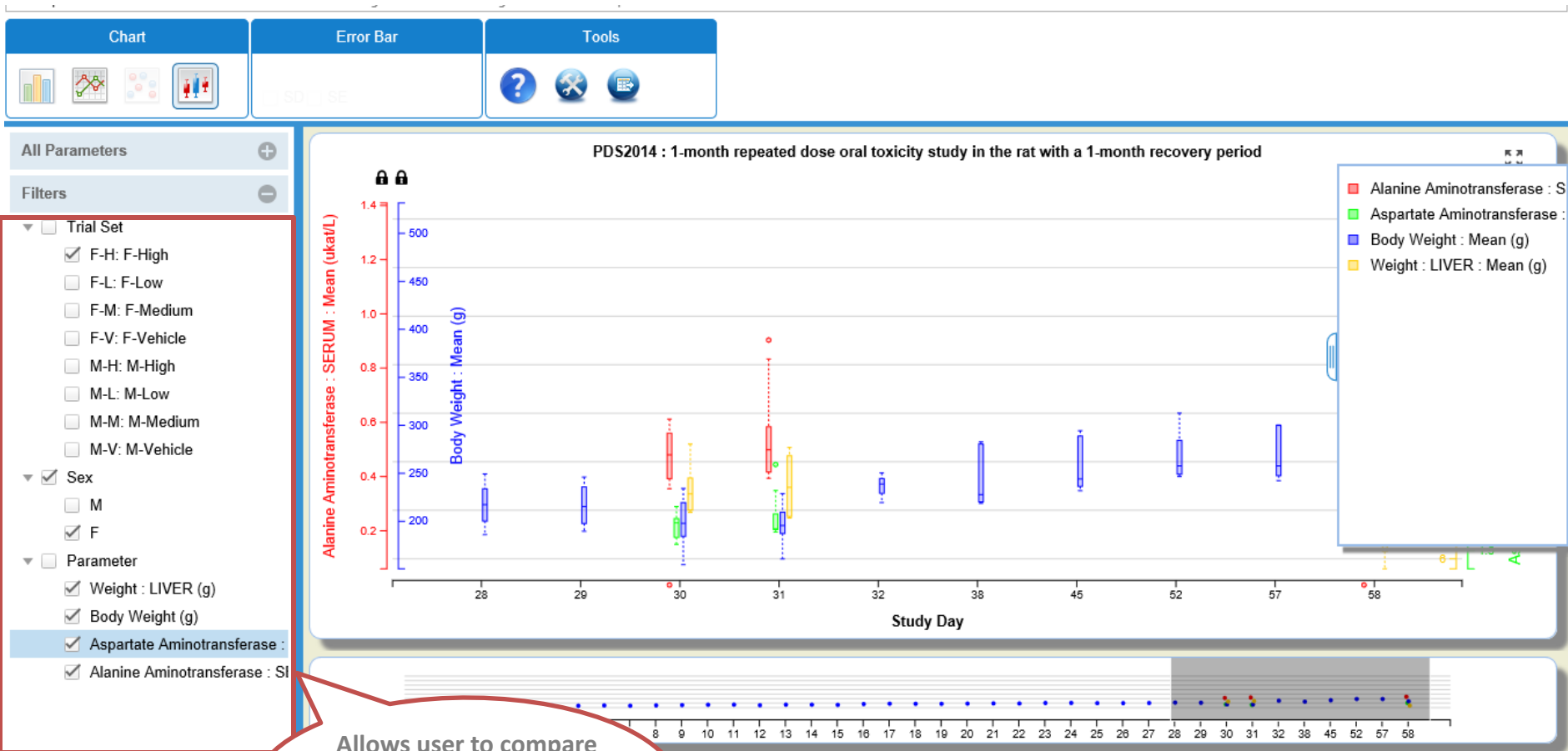
Immersive Interactive Graphics Objects



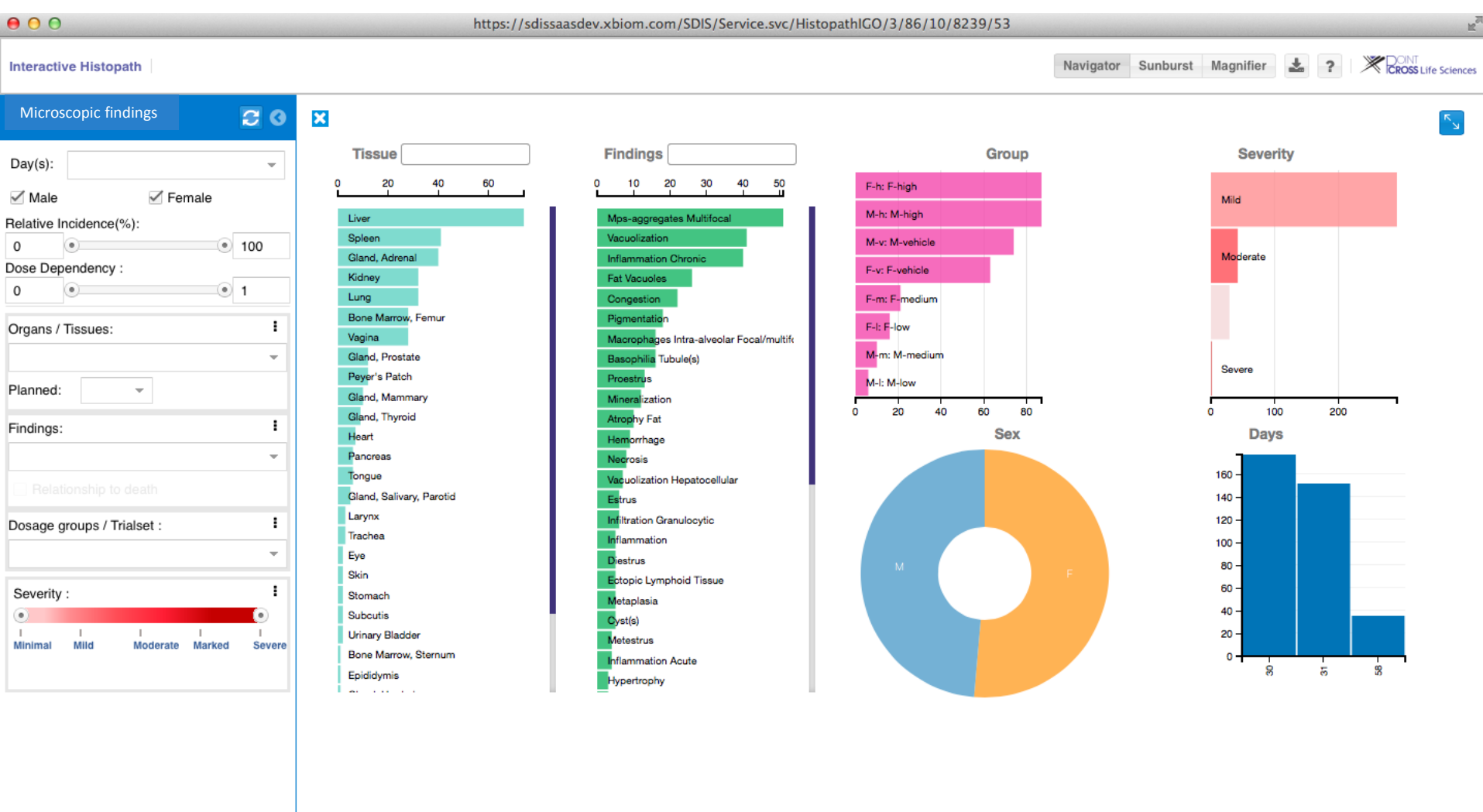
Dynamic selection and Multi-Parameter Cross Plots



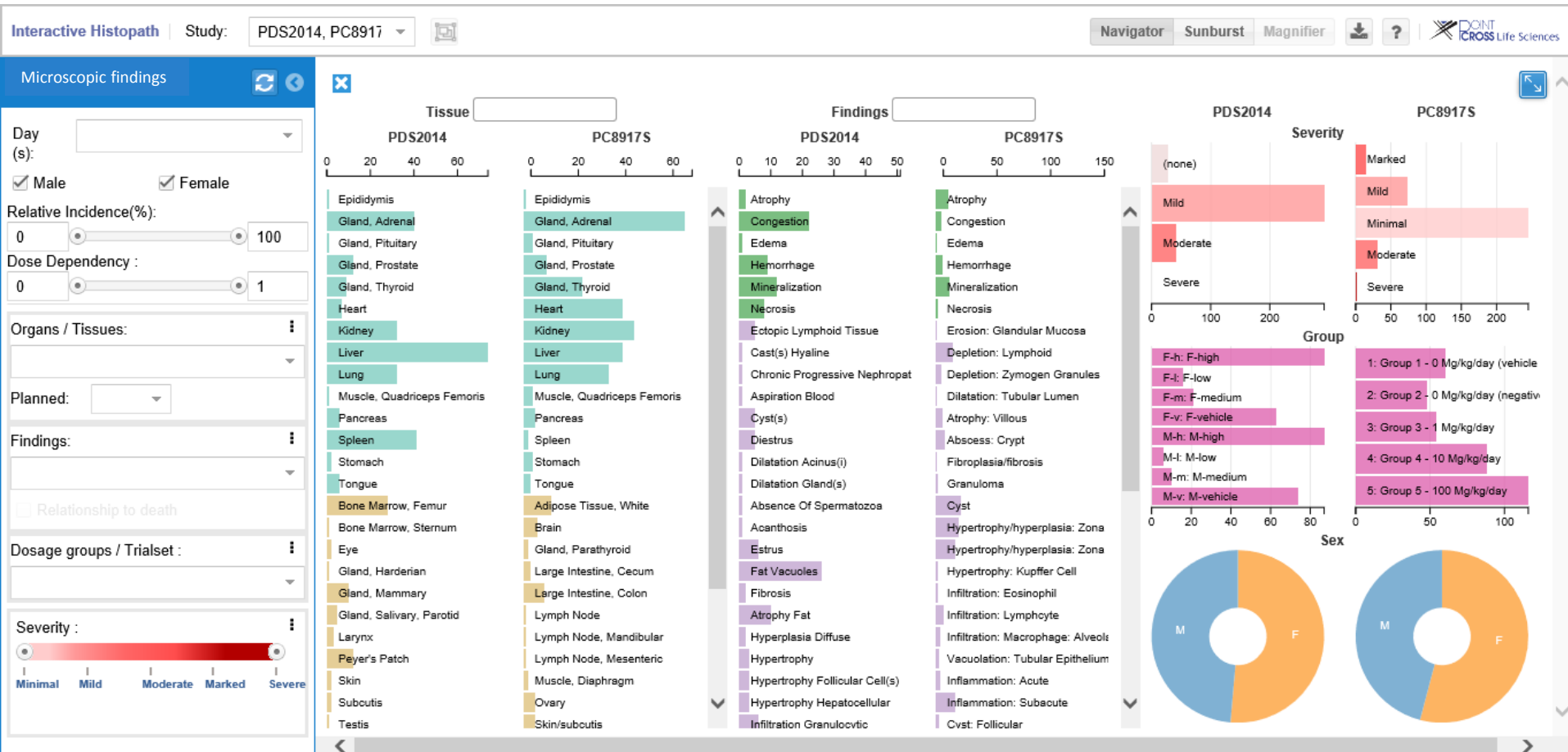
IGO- Cross Domain Visualization



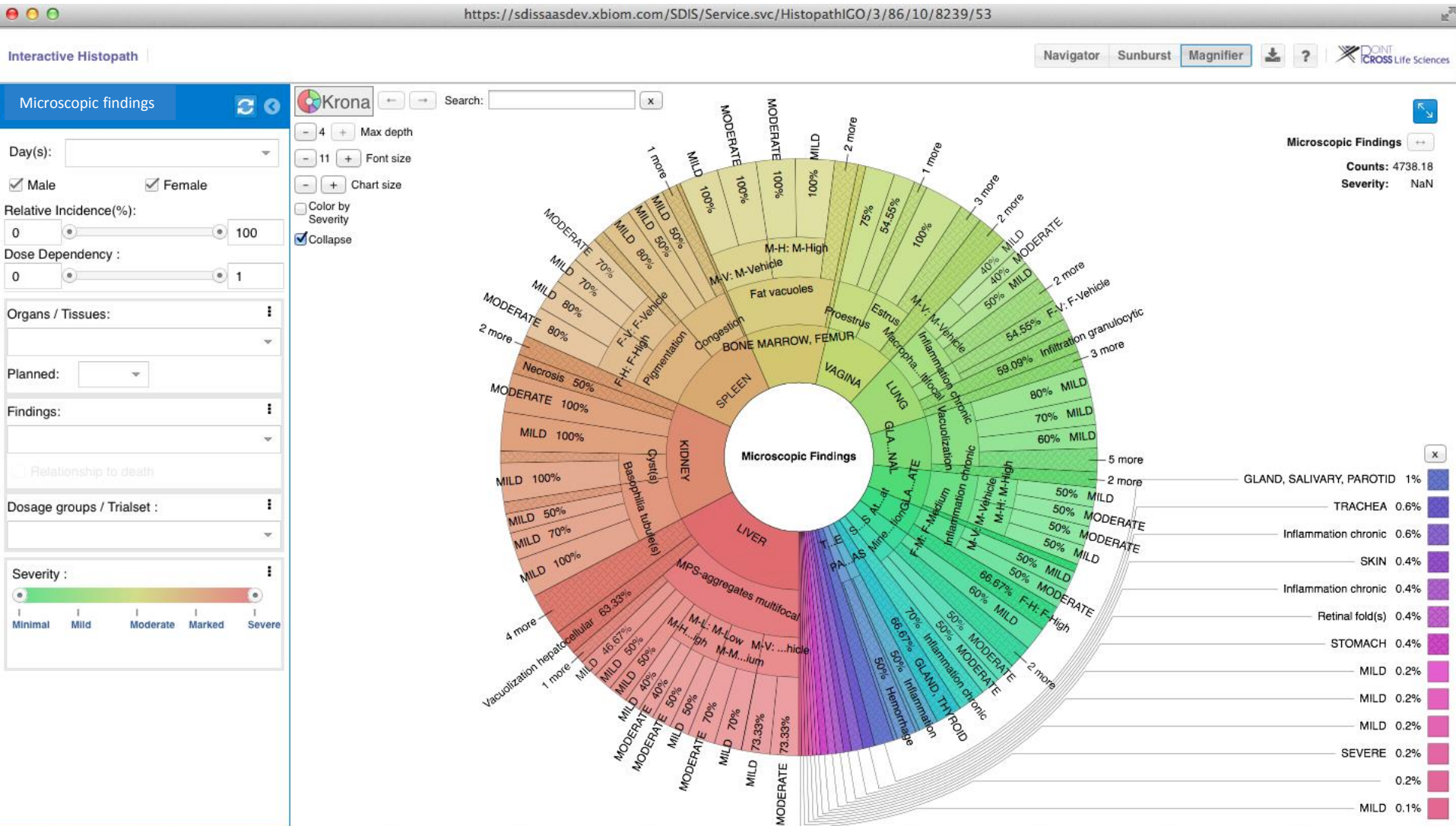
Interactive Histopathology Data (PhUSE CSS WG)



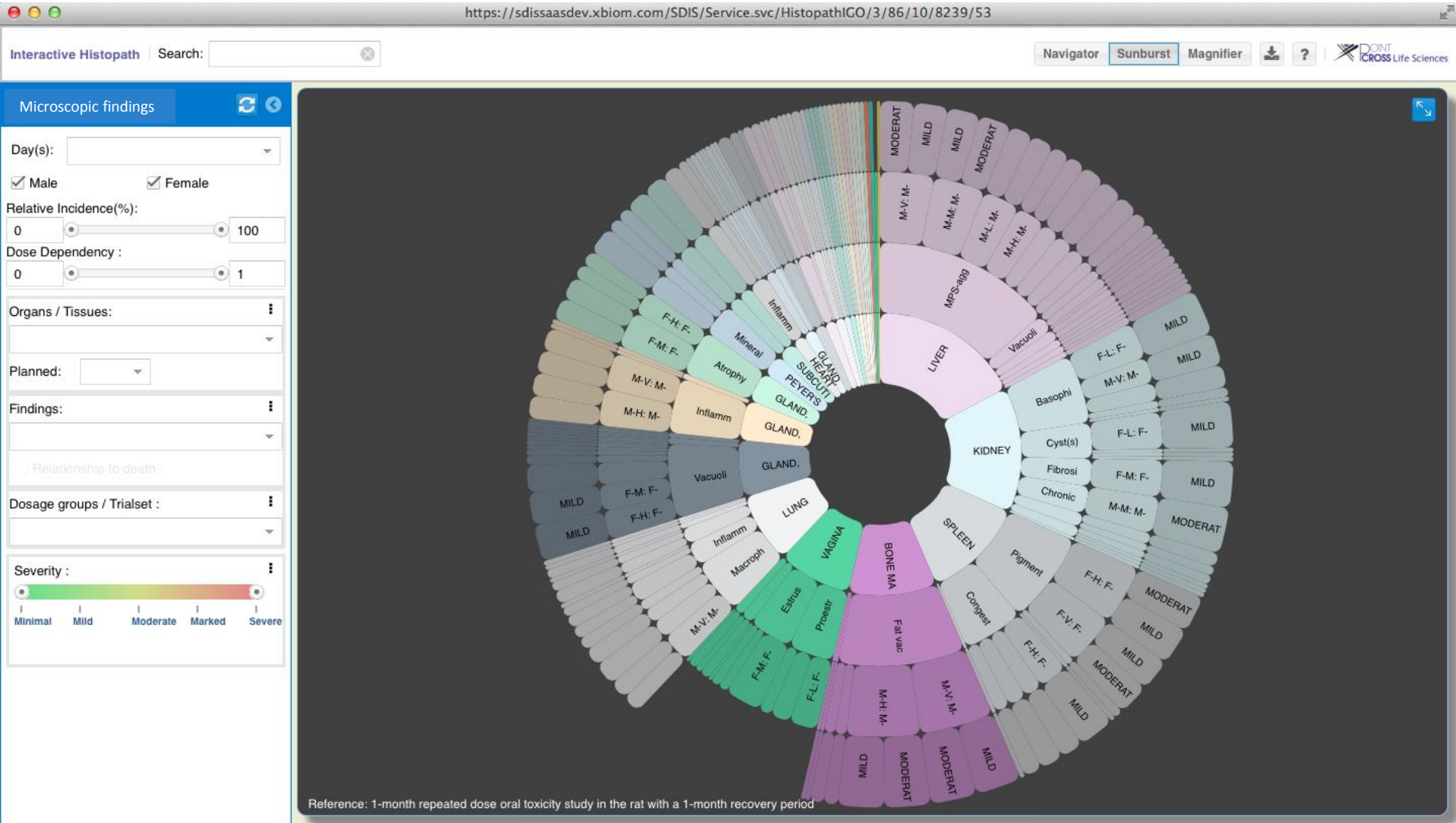
Histopathology Data-Cross study Visualization



Magnifier View for Histopathology data (PhUSE CSS WG)



Sunburst view for Histopathology (PhUSE CSS WG)



A Short Video

<https://youtu.be/INePNiMzkN4>

Thank you

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