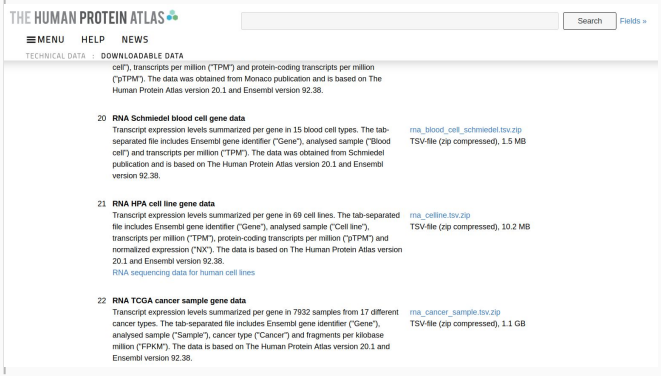
Gene Expression - Drug Relationship
Datasets

Martina Betti
Stefania Sferragatta

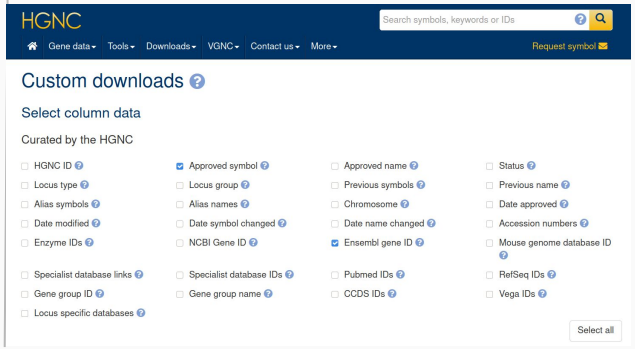
Human Protein Atlas

link to RNA expression level table



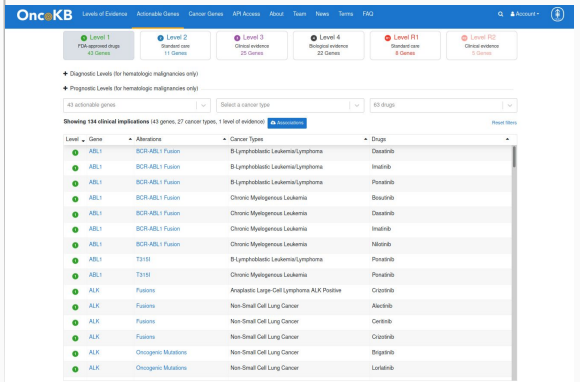
HGNC

link to converter



OncoKB

link to actionability
link to oncogenes



Gene Expression - Drug Relationship
Rationale

Martina Betti
Stefania Sferragatta

SQL

- **Continuous values for Gene expression.**
  FPKM column specify level of expression from which thresholds are calculated specifically for each gene.

- **Alteration type is treated as any other column in the table.**
  From the data structure one cannot infer that the alteration type is defines the relationship between gene and drug.

NEO4J

- **Binary information on Gene expression.**
  No quantification is provided: a relation is established between a Gene ID and a Sample ID if a given gene is overexpressed in a given sample.

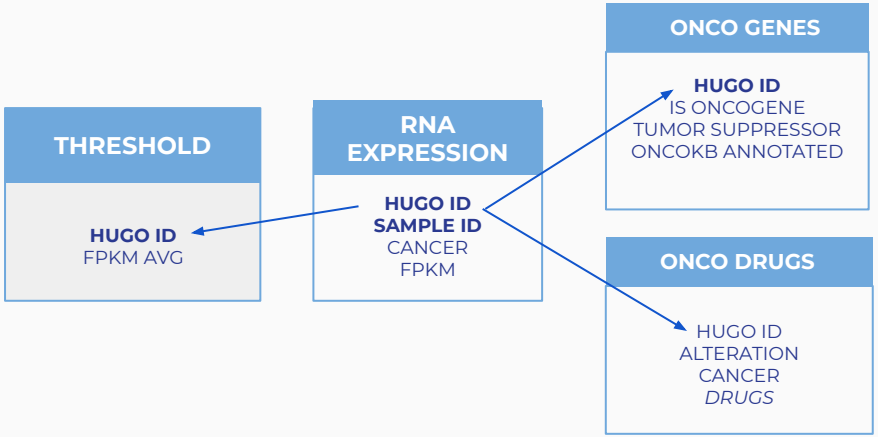
- **Alteration type is described by a relation property.**
  The type of alteration for a given gene and a given drug is neither an attribute of the first or the second, rather it is what the determines their relationship.

Gene Expression - Drug Relationship

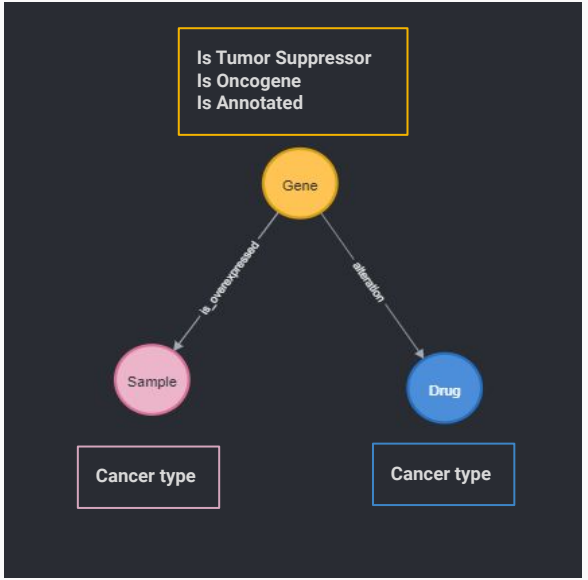
Schema vs. Graph

Martina Betti
Stefania Sferragatta

SQL



NEO4J



Gene Expression - Drug Relationship

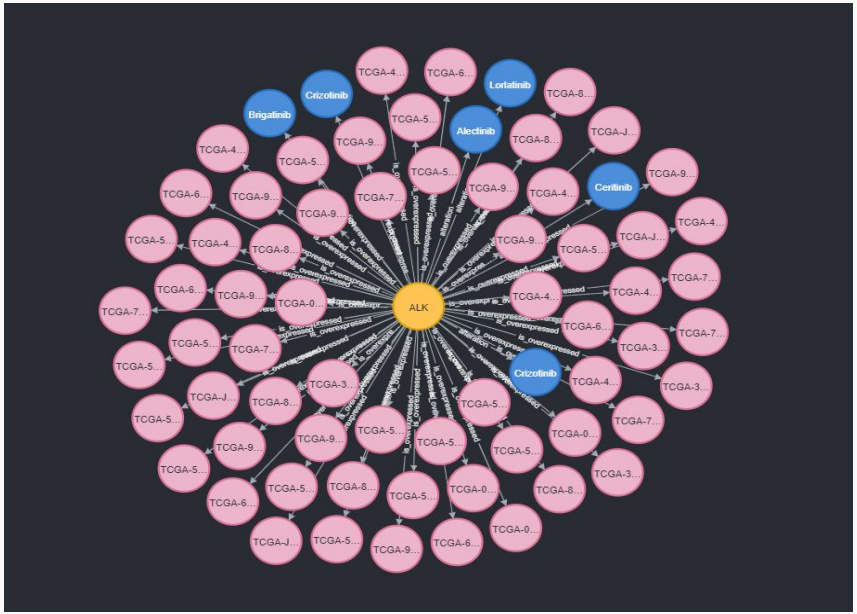
Query Representation

Martina Betti
Stefania Sferragatta

Example of ALK gene graph

Yellow nodes: Genes
Pink nodes: Samples ID
Blue nodes: Drugs

Each edge between the Gene and the Sample ID specifies the relationship “Is Overexpressed”, while each relationship between Gene and Drug specifies the alteration type.



Gene Expression - Drug Relationship
Conclusions

Martina Betti
Stefania Sferragatta

	SQL	NEO4J
PRO	- Suitable for storing quantitative data and measurements	- Better describes relationship types - Fast and flexible data loading - Allows for visualization
CONS	- Time consuming, especially on data loading. - Demanding requirements on input data format. - Obscure relationship types.	- Hard to use on quantified measurements.