SAND2019-8264D

Auto-Generated Materials Risk Reporting

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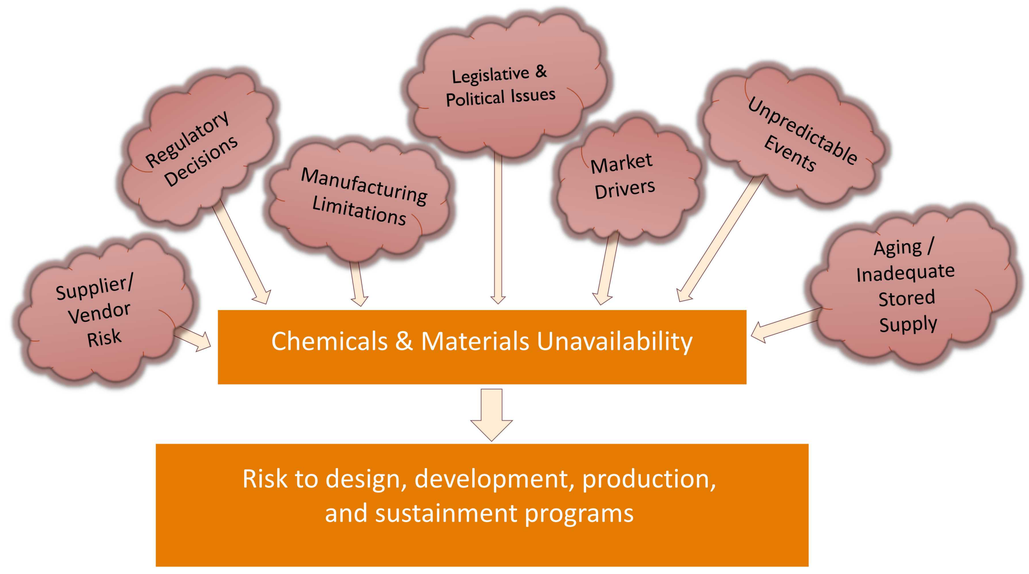
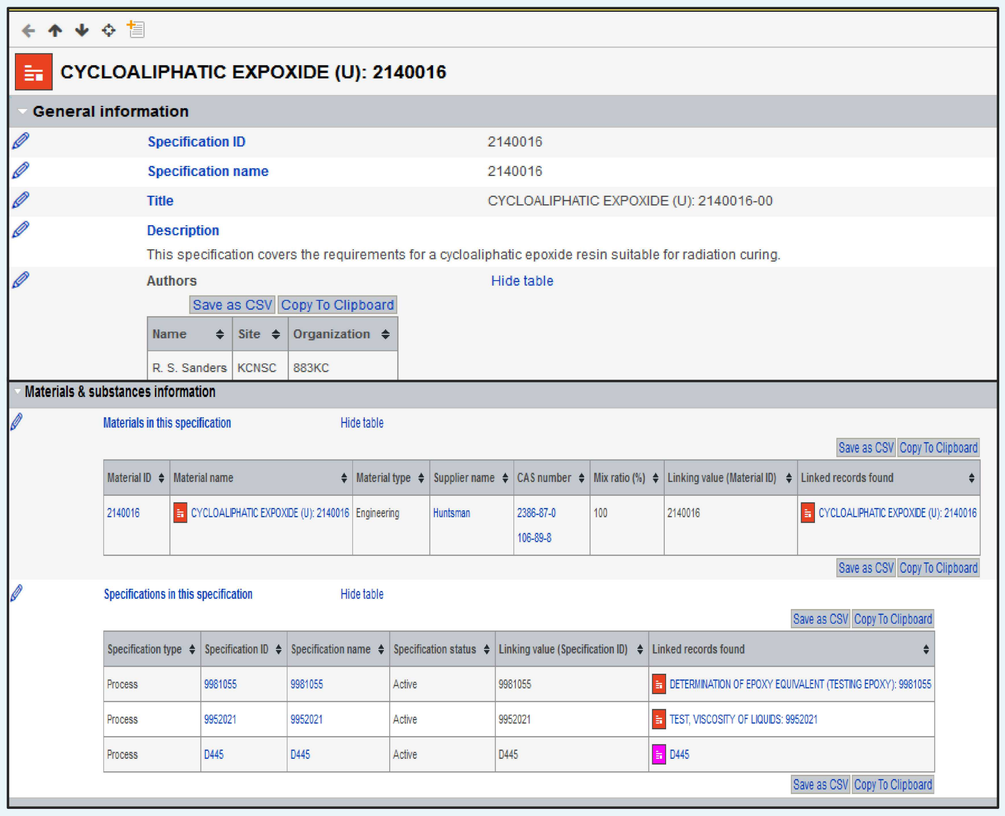
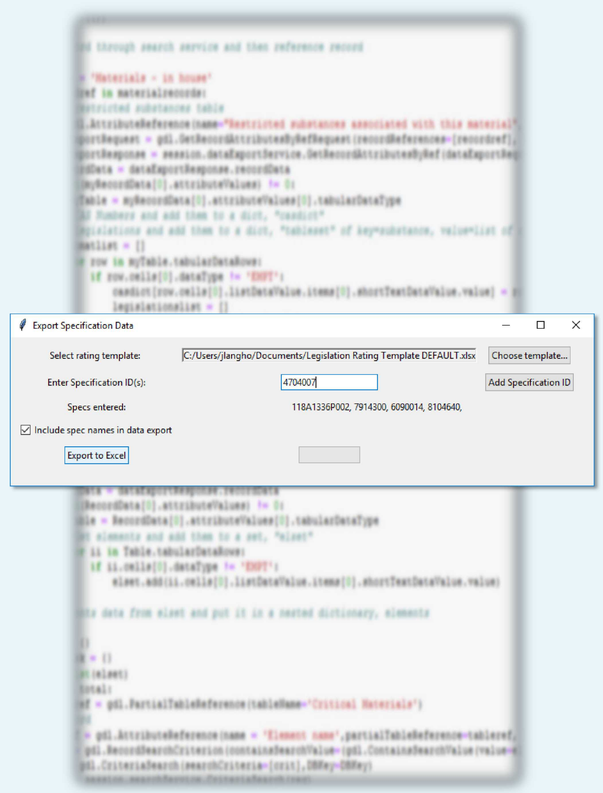
In this project, a script was written that deals with the "At-Risk Materials" database in Granta MI. Granta MI is a software and database that is used by materials engineers to record and reference all kinds of materials data. Granta does a good job handling data for each individual material, but in reality, every material and material specification is related to another. This can soon turn into a vast tree of hundreds of related records that are next to impossible to comprehend and analyze without automation. Using Python, this script traverses each branch and finds all of the related records for a given set of records. Then, it reports all of the relevant data within all of the records into an intuitive Excel spreadsheet.

The "risk" in "At-Risk Materials" refers to the risk of a material's availability. A material's unavailability can have countless sources. A certain substance may be at risk of being banned or heavily regulated in a country, or it may be sourced in an unsustainable way that leads to an unreliable supply. The At-Risk database quantifies and organizes a material's risk data and therefore allows us to anticipate the risk of using at-risk materials in products.

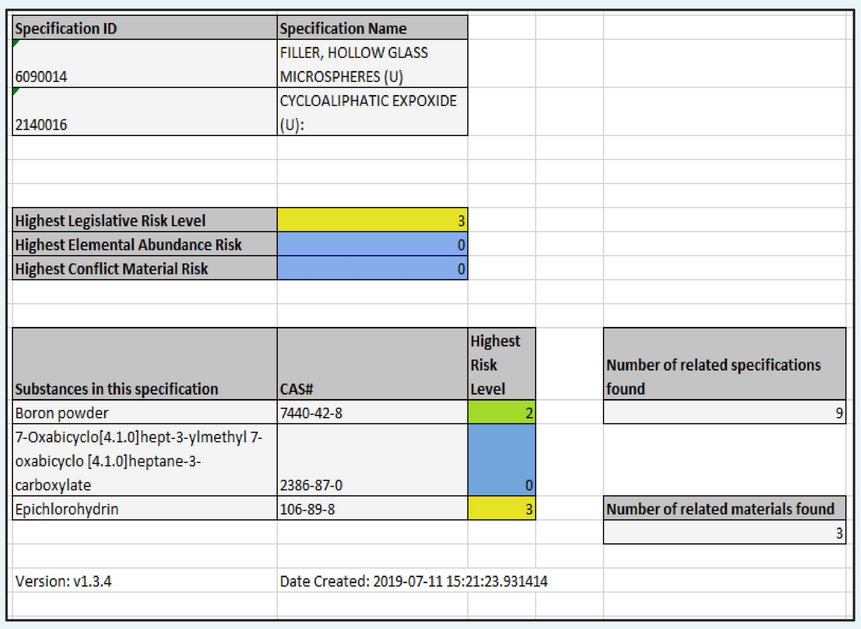




Typical Granta record and specifications table



Script UI



Specification ID	Specification Name
6090014	FILLER, HOLLOW GLASS MICROSPHERES (U)
2140016	CYCLOALIPHATIC EXPOXIDE (U):

Highest Legislative Risk Level	3
Highest Elemental Abundance Risk	0
Highest Conflict Material Risk	0

Substances in this specification	CAS#	Highest Risk Level
Boron powder	7440-42-8	2
7-Oxabicyclo[4.1.0]hept-3-ylmethyl 7-oxabicyclo [4.1.0]heptane-3-carboxylate	2386-87-0	0
Epichlorohydrin	106-89-8	3

Number of related specifications found
9

Number of related materials found
3

Version: v1.3.4 Date Created: 2019-07-11 15:21:23.931414

Example of auto-generated spreadsheet

Current Features

Legislative Data

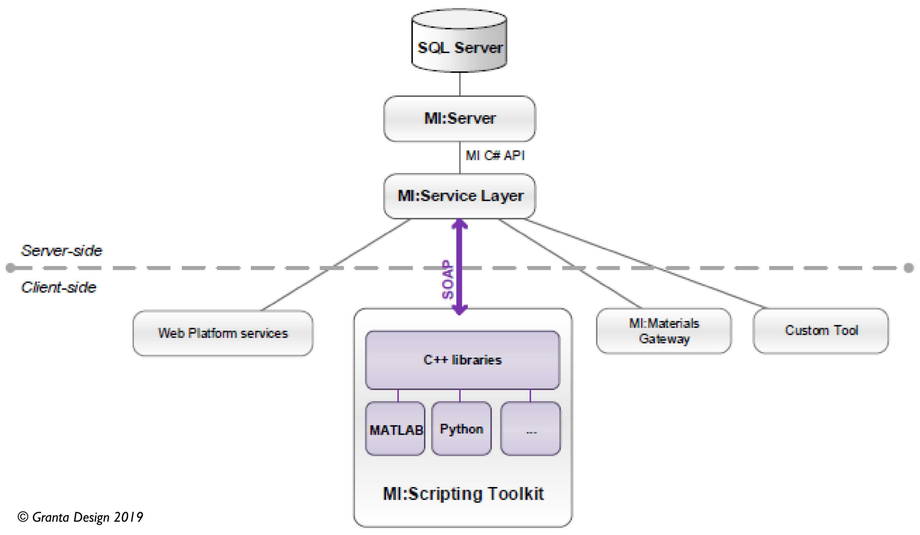
"At-risk" materials have legislation corresponding to them that restricts their usage. Granta organizes each piece of legislation to a risk rating, but it may be inaccurate or irrelevant. The script allows for users to customize the ranks of each legislation in a separate template. The template can be imported in through the UI and the final spreadsheet will be generated with respect to these custom ratings.

Supplier Data

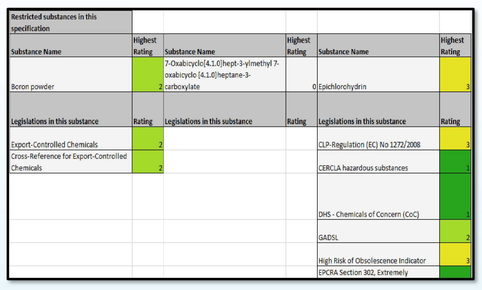
The suppliers of a material may also affect its availability. If a product is only made by one company, and that company is at risk for financial failure, for example, that is just one more factor to consider when assessing a material's risk. The script outputs all of the useful data regarding the suppliers of the materials in question.

Elemental Risk

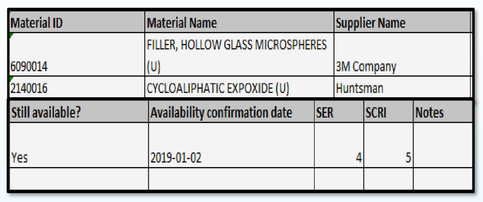
All materials are made of elements. However, these elements are not always abundant or sourced in a sustainable way. The script gathers a list of all of the elements listed for all of the materials in question, then outputs certain risk data associated with this data. These risk categories include the scarcity of an element, and the geopolitical effects of obtaining an element.



GRANTA MI MATERIAL INTELLIGENCE ⟷ python™

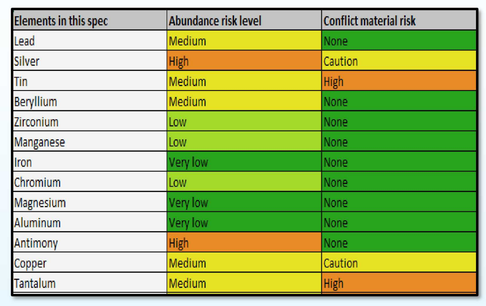


Restricted substances in this specification					
Substance Name	Highest Rating	Substance Name	Highest Rating	Substance Name	Highest Rating
Boron powder	2	7-Oxabicyclo[4.1.0]hept-3-ylmethyl 7-oxabicyclo [4.1.0]heptane-3-carboxylate	0	Epichlorohydrin	3
Legislations in this substance	Rating	Legislations in this substance	Rating	Legislations in this substance	Rating
Export-Controlled Chemicals	2			CLP-Regulation (EC) No 1272/2008	3
Cross-Reference for Export-Controlled Chemicals	2			CERCLA hazardous substances	1
				DHS - Chemicals of Concern (CoC)	1
				GADSL	2
				High Risk of Obsolescence Indicator	3
				EPCRA Section 302, Extremely	



Material ID	Material Name	Supplier Name
6090014	FILLER, HOLLOW GLASS MICROSPHERES (U)	3M Company
2140016	CYCLOALIPHATIC EXPOXIDE (U)	Huntsman

Still available?	Availability confirmation date	SER	SCRI	Notes
Yes	2019-01-02	4	5	



Elements in this spec	Abundance risk level	Conflict material risk
Lead	Medium	None
Silver	High	Caution
Tin	Medium	High
Beryllium	Medium	None
Zirconium	Low	None
Manganese	Low	None
Iron	Very low	None
Chromium	Low	None
Magnesium	Very low	None
Aluminum	Very low	None
Antimony	High	None
Copper	Medium	Caution
Tantalum	Medium	High

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NNSA National Nuclear Security Administration

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