

Design and Development of Data-Driven Risk Assessment through the Integration of Federal Acquisition Data with Open, Internet Sources

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Research Motivation

- A wealth of information is collected and available
- They could be used for
 - assessing, enhancing, and enriching our data
 - supporting effective acquisition planning and management
- Could we identify possible weak links in a supply chain and mitigate their risks?
 - Natural disasters can disable production and cause significant loss to service providers

Research Agenda

- Identify critical contractors based on
 - › the natural disaster risk of their location, and
 - › the uniqueness of their business types
- Provide a visualization framework to enable an acquisition expert to
 - › Assess risk for critical contractors
 - › Find alternatives in low risk areas

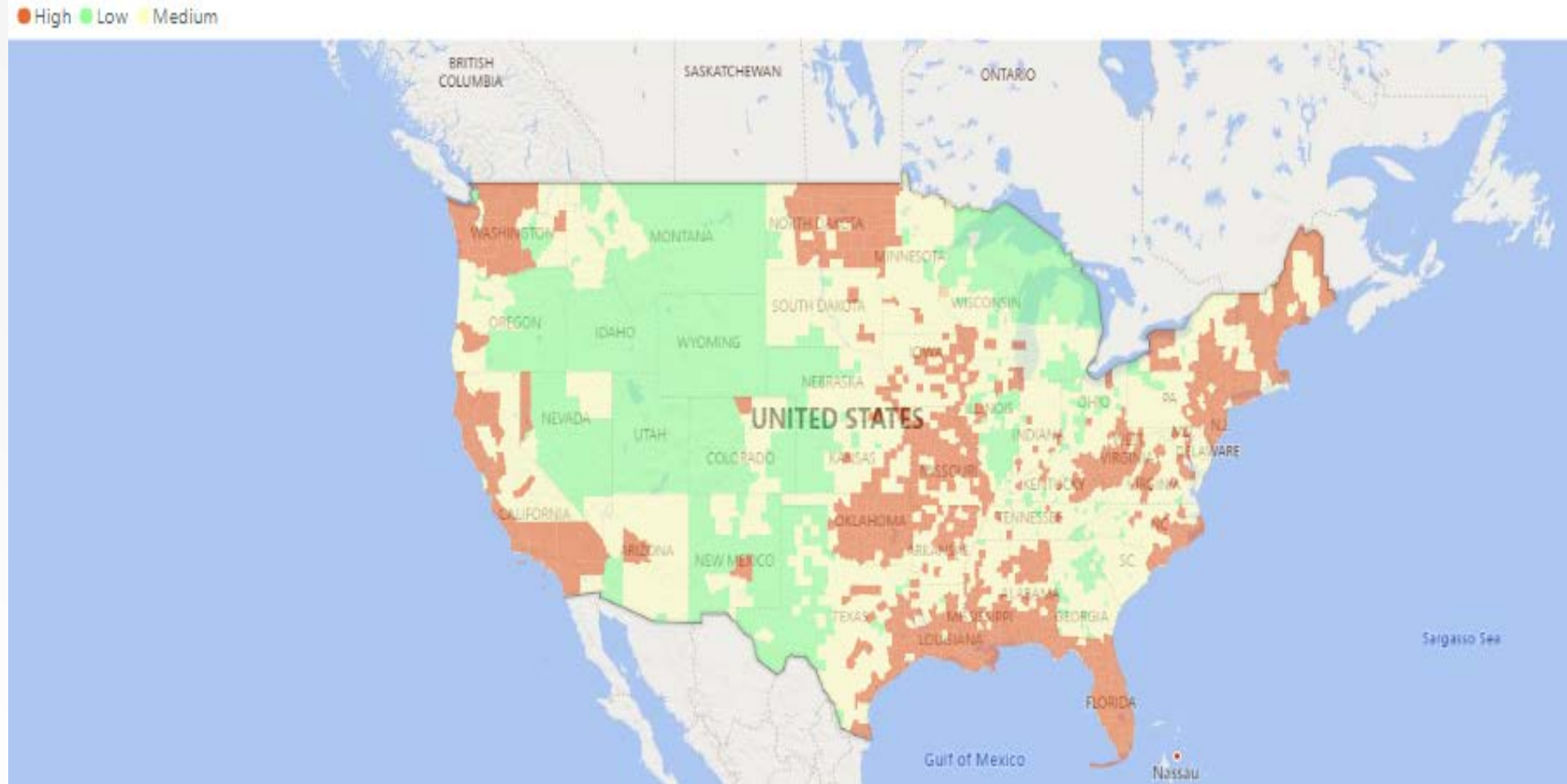
Our Previous Work-- Natural Disaster Risk Assessment for US Counties

- ◉ Integrated for each US county
 - › Natural disaster data from National Centers for Environmental Information 1950 – 2018
 - › FEMA Emergency assistance data 1953 – 2020
- ◉ Defined a new metric, Weighted Disaster Score (WDS)

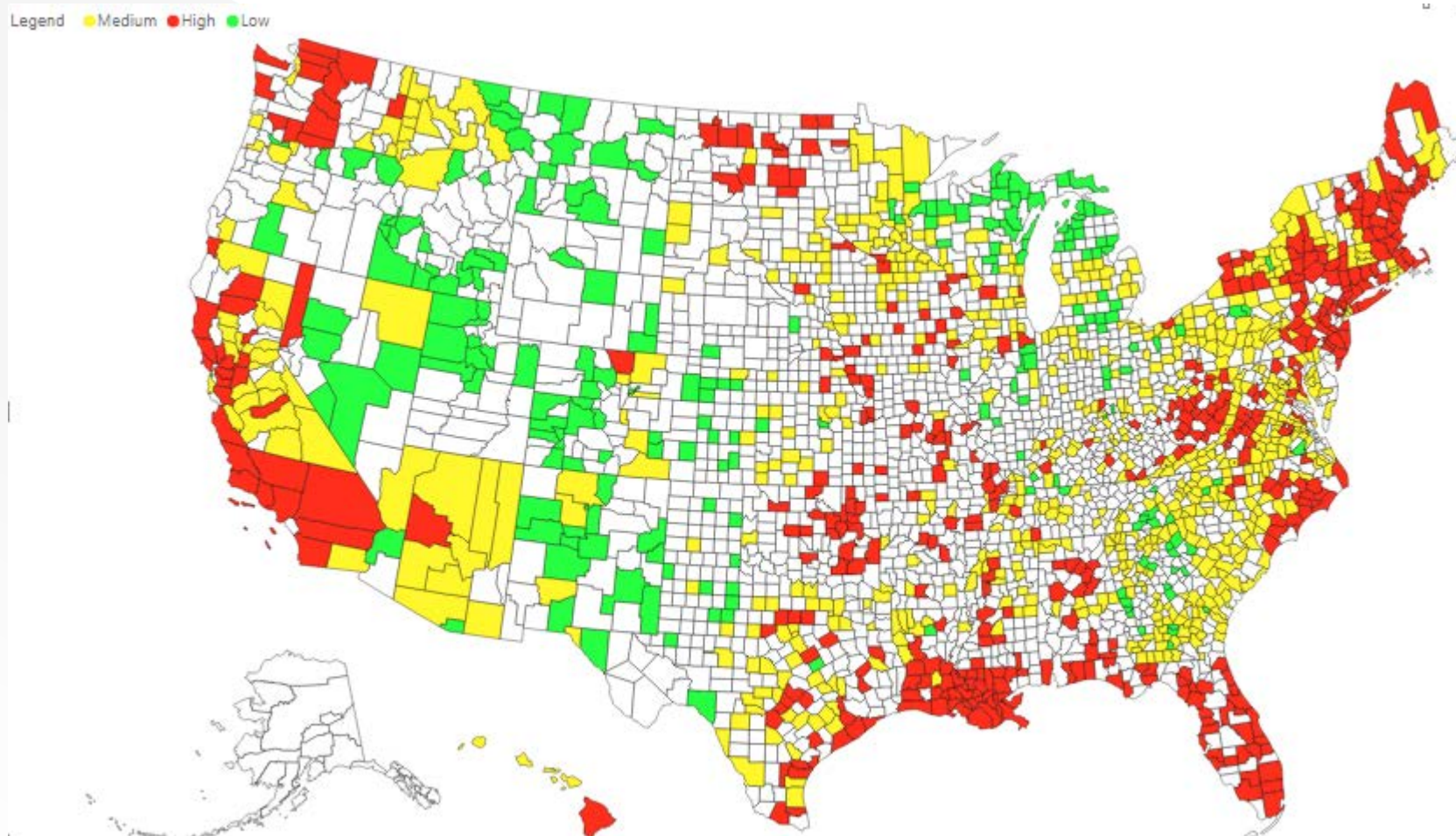
$$s = \sum_{i=1}^4 w_i * n_i$$

Natural Disaster Risk Map for U.S. Counties

WDS is clustered into three easy to interpret levels: high, medium, and low risk of natural disaster



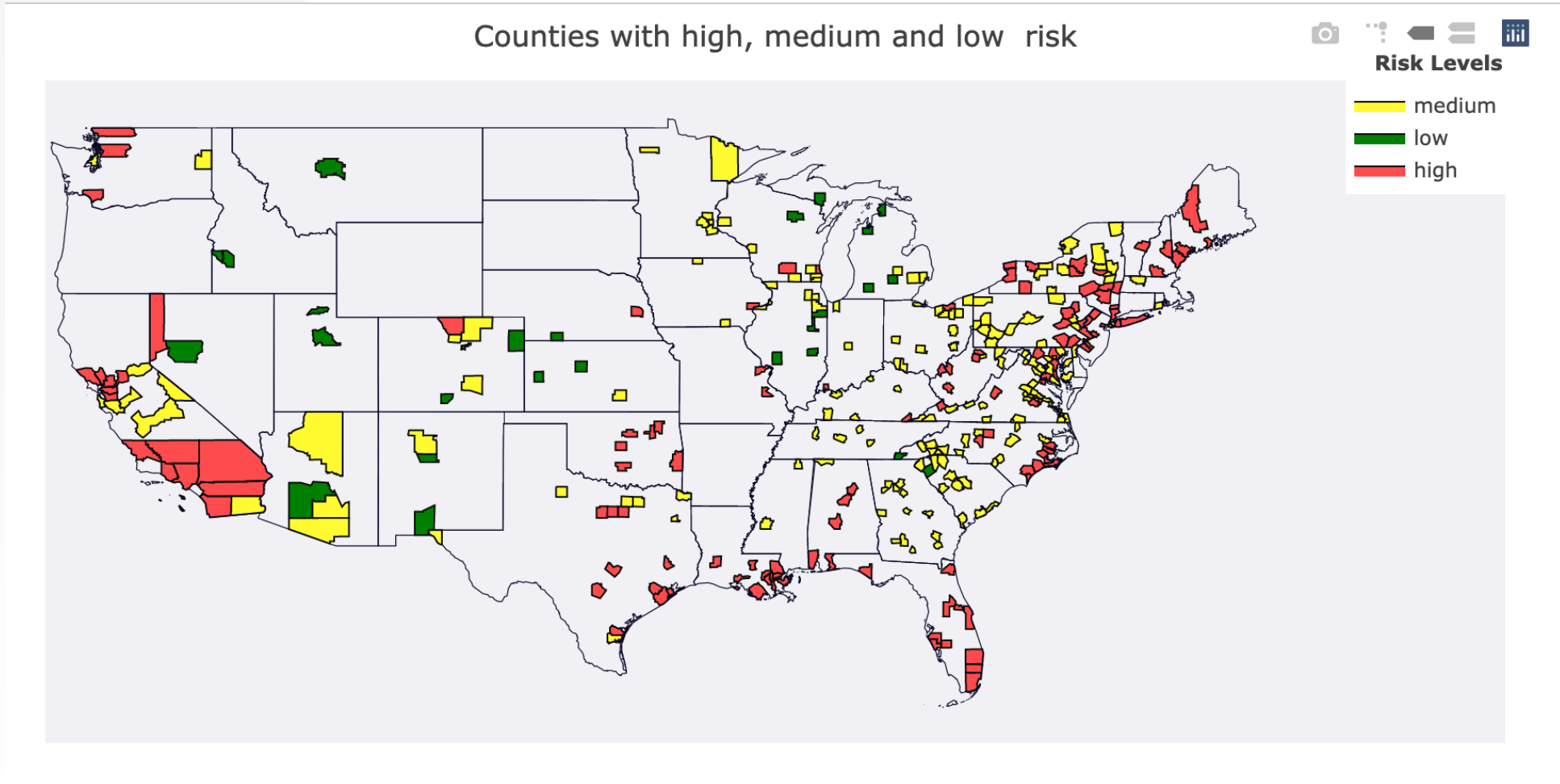
Natural Disaster Risk Level by Locations of Federal Contractors



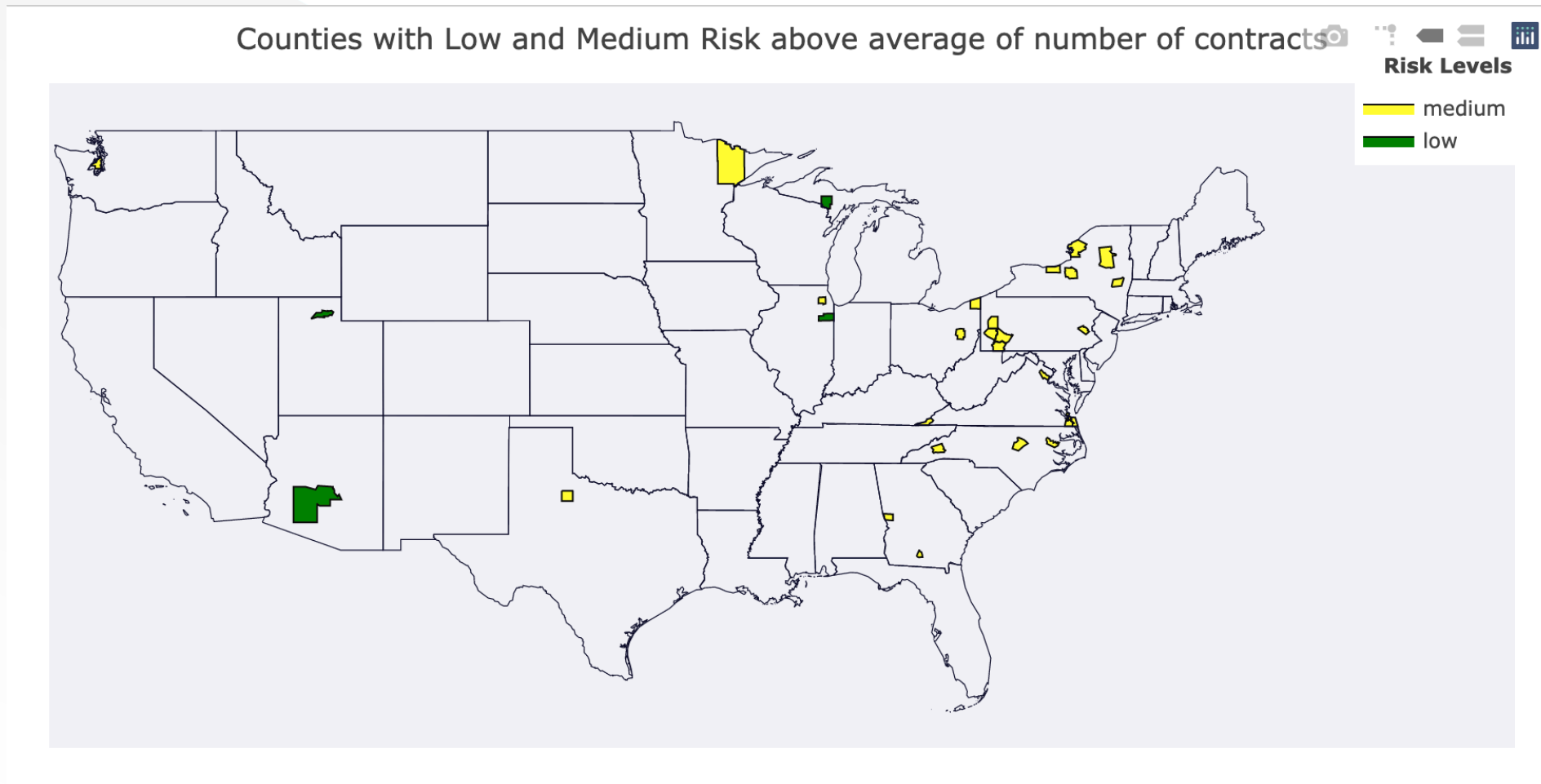
Visualization Framework

- Identify the distribution of contractors of different risk levels for a specific industry or project
- Identify the distribution of contractors with an above/below average of past federal contracts
- Recommend potential alternative contractors for some high-risk contractors

Geographical Areas for an Industry Type

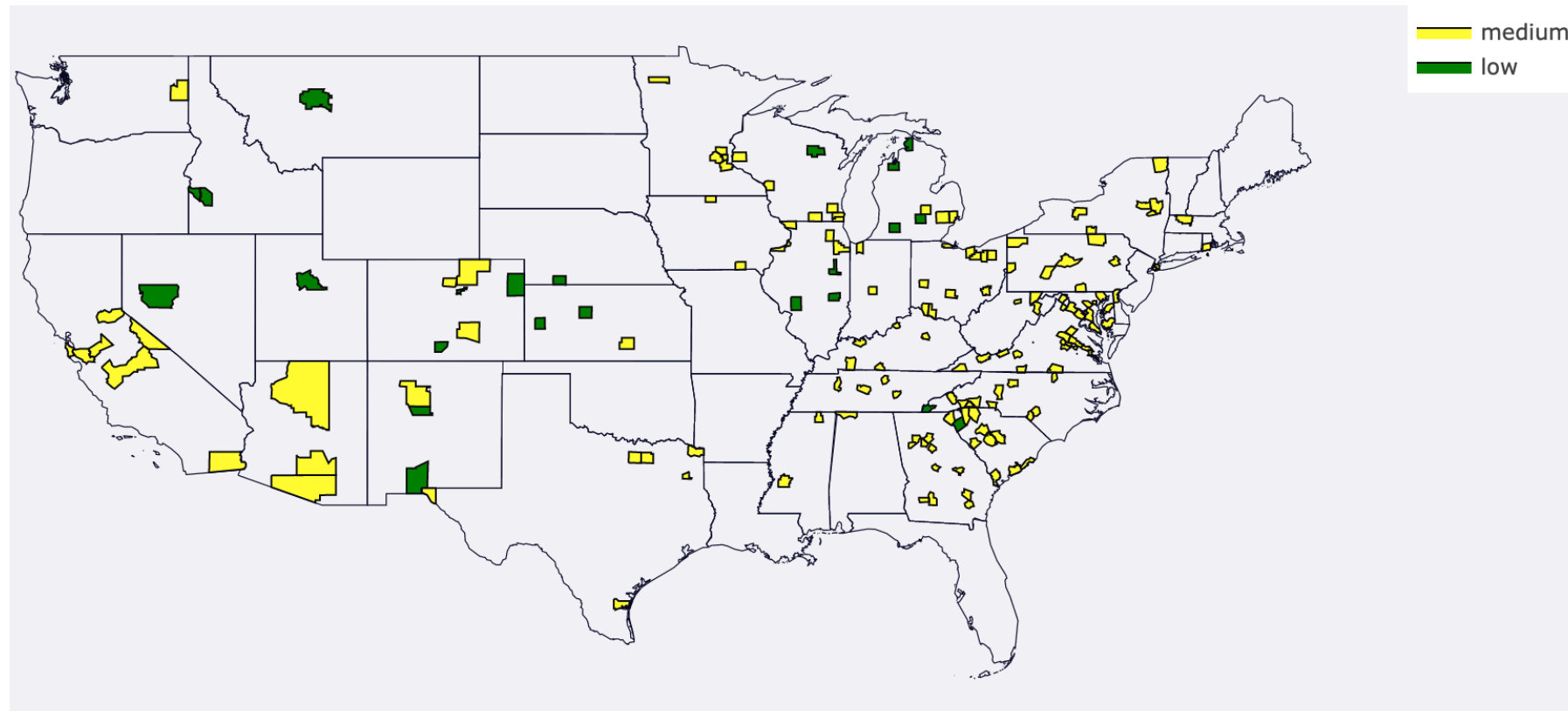


Low Risk Regions with an Above Average of Past Federal Contracts



Low Risk Regions with an Below Average of Past Federal Contracts

Counties with Low and Medium Risk below average of number of contracts



Distribution of Contractors for Selected Projects

Sheet 1



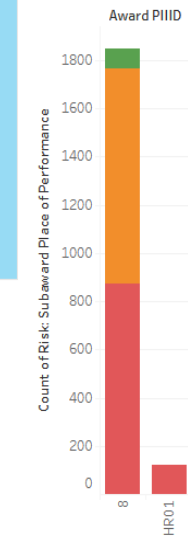
Award PIID

- (All)
- 8
- 9
- 14
- 33
- 41
- 81
- 151
- 165
- HR01
- HR02
- M6785416C0007
- N6945013C0754
- W912HP11C0002

Risk: Subaward Place of ...

- Low
- Medium
- High

Sheet 3



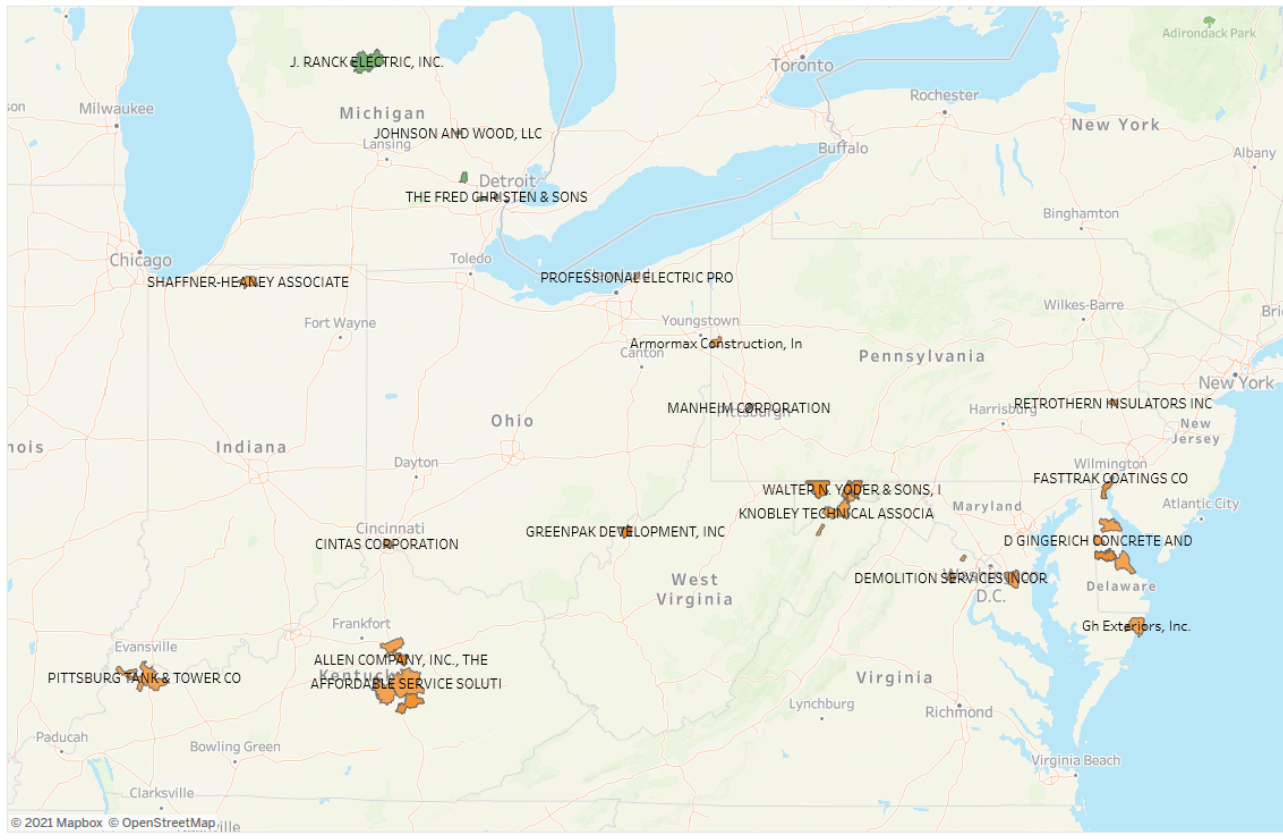
Sheet 2

Award PIID	Subawardee Name	Subawrd Place of Performanc..	
8	2 CIRCLE INC	22203	■
	5 Point Building & Constr	98431	■
	5-D SYSTEMS, INC.	35898	■
	A CONNECTED PLANET	22102	■
	A-T SOLUTIONS, INC.	22408	■
	A-TEK MECHANICAL INC.	93043	■
	A.E.L. CONSTRUCTION, INC.	93043	■
	A&D FIRE SPRINKLERS, INC.	93043	■

Identifying Alternative Low Risk Contractors by Name, NAICS Codes, or Locations

Name of contractor	ZIP: Subcontractor	ZIP: Place of Performance	
Armormax Construction, In	26726	16116	Medium
BACCO CONSTRUCTION COMPAN	49783	49801	Low
BEITZEL CORPORATION	26726	21536	Medium
BLACK EAGLE CONSTRUCTION	83705	83642	Low
Brown Sprinkler Corporati	40475	40509	Medium

Sheet 1



Risk: Place of Performance
■ Low
■ Medium

Naics

- (All)
- 213112
- 221121
- 221122
- 221310
- 221320
- 221330
- 236210
- 236220
- 237110
- 237120
- 237130
- 237310
- 237990
- 238110
- 238160
- 238210
- 238220
- 238290
- 238310
- 238320
- 238330
- 238340
- 238390
- 238910
- 238990
- 314994
- 314999
- 315210
- 315211
- 315221
- 315225
- 315228
- 315299
- 315990
- 315999
- 316213
- 316991
- 322221

Concluding Thoughts

- The Web provides a valuable source of information that can help enhance the data capabilities of acquisition management and research
- Driven by data science techniques, a visualization tool enables a project manager to quickly assess and mitigate the risks in a supply chain
- More risk factors will be considered in our risk assessment framework
- Effective data science techniques to help find alternate contractors will be researched