Design of a Complex Geopolitical System: A Systems Approach

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Problem. Solved.

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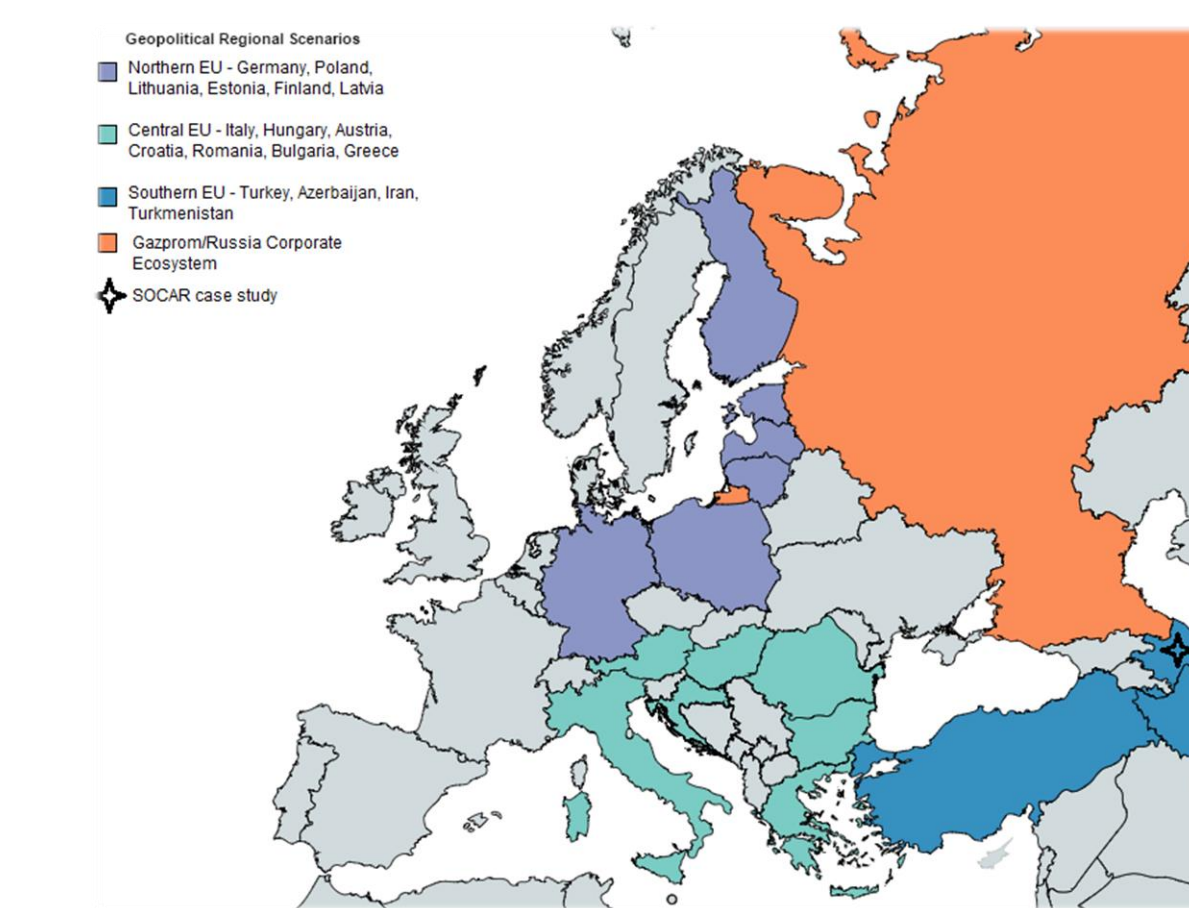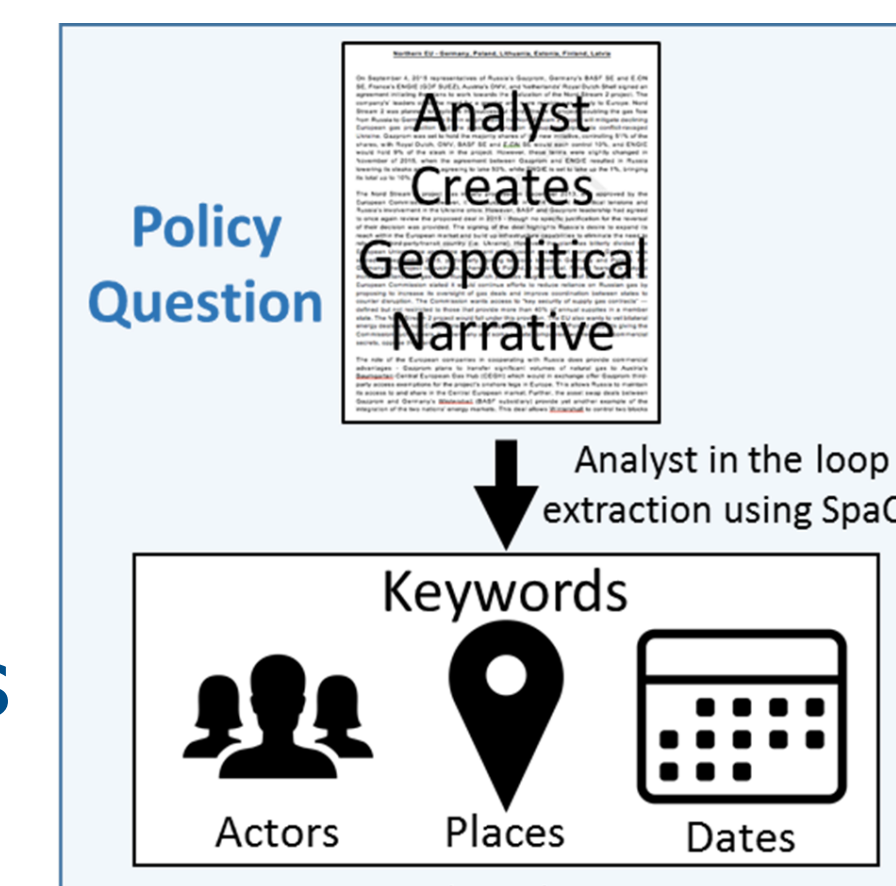
TECHNICAL APPROACH

The project **links disparate data sets** associated with **corporate ties** (using Thomson Reuters SDC Platinum database of strategic alliances, inter-firm networks, and social capital) with data representing **geopolitical ties** (coded from the GDELT global event repository) into interactive network analytics and visualization tools.

- Convergence of facilitation, modeling, & data analytics using modern software tools and methods:
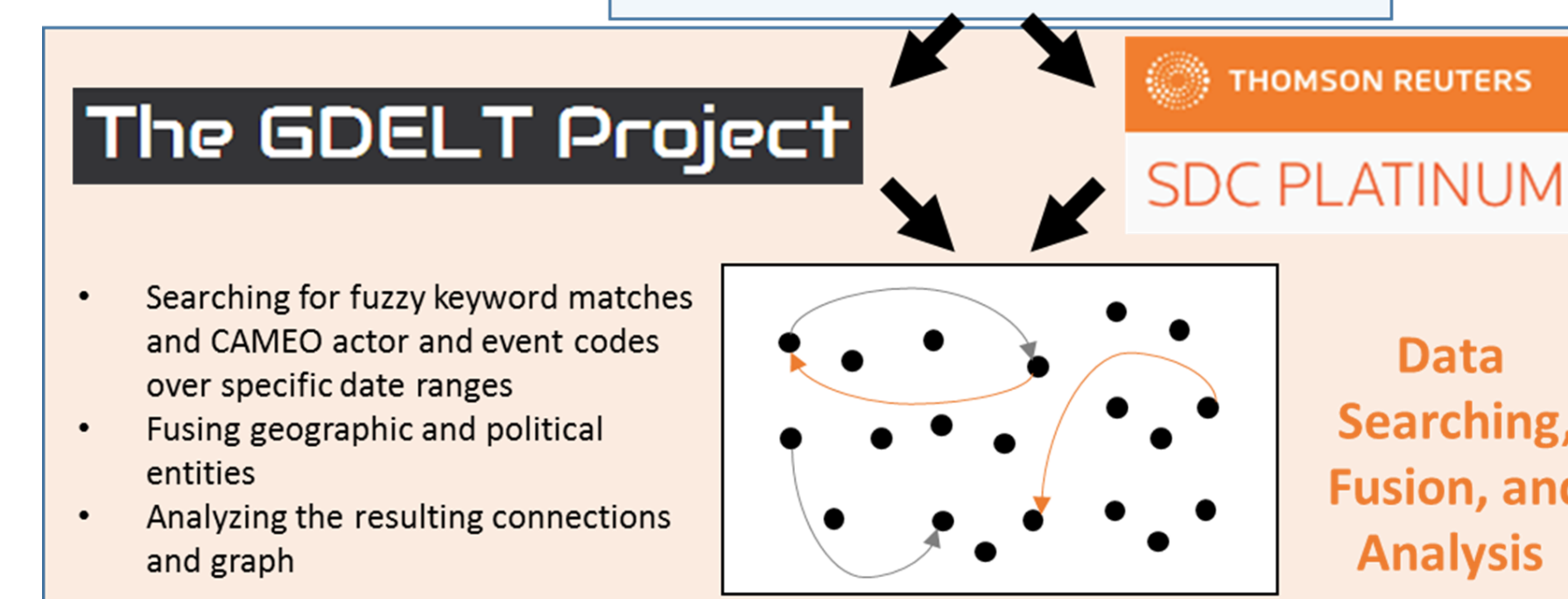

Model-based Enterprise Analysis
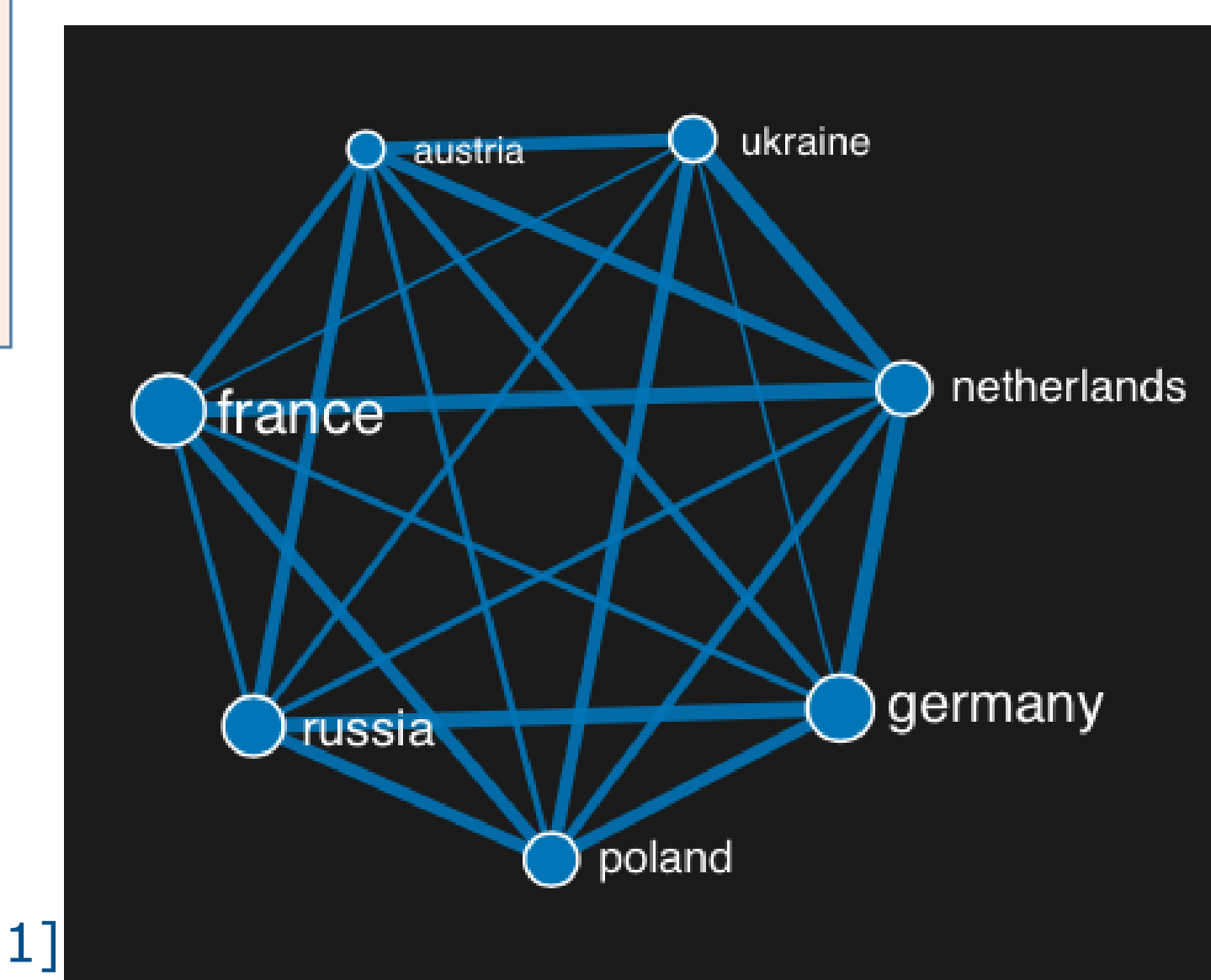- Identify Multi-layer Effects (socio-technical analysis)
- Identify Trends and Events (transitions)
- Develop Knowledge Schema
- Select appropriate Models

Data Curation
- Curate Massive Datasets (availability)
- Combine Open & Closed Data
- Exploit Machine Learning (search, insight)
- Identify Gaps & Uncertainties (decision making)

Complex Systems Models
- Explore Emergence (narratives)
- Explore Adaptation (agent-based models)
- Explore Policy & Regulation (system dynamics)
- Model Patterns (flows, clustering, etc.)

Visual Analytics
- System Analytics for Pattern Recognition
- Machine-aided Search & Inquiry
- Predictive Trend Analysis
- Multi-attribute Tools for Trade-off Analysis & Decision-making

REGIONAL SCENARIOS & NETWORK ANALYTICS

Geopolitical-corporate regional narratives are written to drive the data analysis process.

The regional scenarios are parsed automatically to obtain actor, place, and date keywords that will inform queries on the data.

Policy Question → Analyst Creates Geopolitical Narrative → Analyst in the loop extraction using SpaCy → Keywords (Actors, Places, Dates)

The GDELT Project / THOMSON REUTERS SDC PLATINUM
- Searching for fuzzy keyword matches and CAMEO actor and event codes over specific date ranges
- Fusing geographic and political entities
- Analyzing the resulting connections and graph

Data Searching, Fusion, and Analysis → Policy Conclusion

[1]

The combined data is visualized in terms of SDC and GDELT connections between countries as well as the changes over time.

For a given narrative, improving geopolitical sentiment correlates with venture growth during a time frame that ends with a successful venture.

TECHNICAL CHALLENGE

- Obstacles exist in **relating data of multiple types**, identifying relevant **phenomena** in the data, changing the data as events evolve, and **visually representing** the data in forms that create insight.
- Tools that automatically extract references and schema are helpful but cannot yet **construct accurate relationship models in complex domains** with changing structure.
  - This is still a data curation activity that involves a human team.
- Currently, there is **no robust analytical technique** to assess the connection between geopolitical events and corporate social ties.
- The **large amount of data** in this space presents a challenge and opportunity in itself, both for analysis and visualization – and a challenge for socio-technical analysis.
  - New approaches are needed to understand the hidden and often non-linear relationships and uncertainty characteristics of these problems.

RESULTS

- Allowed **identification and exploration of networks and relationships** in a manner that's not typically available.
- Explored the **role of the human analyst** in successfully employing data driven approaches.
- Provided a means to **assess gaps in causal data** sets for future event documentation efforts.
  - While rich in social or political world events, the GDELT data seems to be highly lacking in corporate world events due to the fact that many prominent companies in the oil and gas domain were completely missing.
- Developed a **methodology** that can be applied to similar sized and oriented data sets – successfully structuring unstructured data.
- **Geopolitical models representing observed phenomena** can be used for insight into future behaviors, strategy, & decision analysis.

[1] ecoxight courtesy of:
Basole, R.C., Srinivasan, A., Park, H., Patel, S. (2016) ecoxight: Interactive Visualization Software for Complex Ecosystems, Computational Enterprise Science Lab, Georgia Institute of Technology.