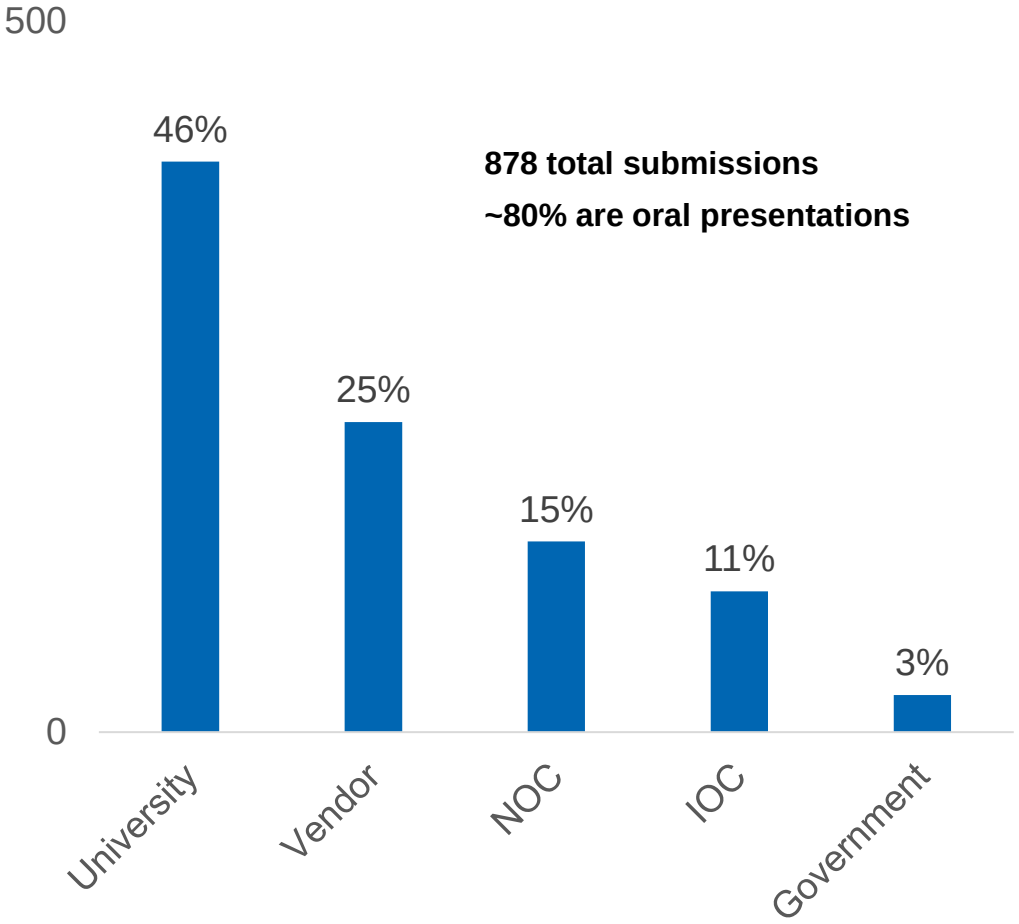
2023 Hackathon “Abstracters”

Steve Braun

Sergey Fomel

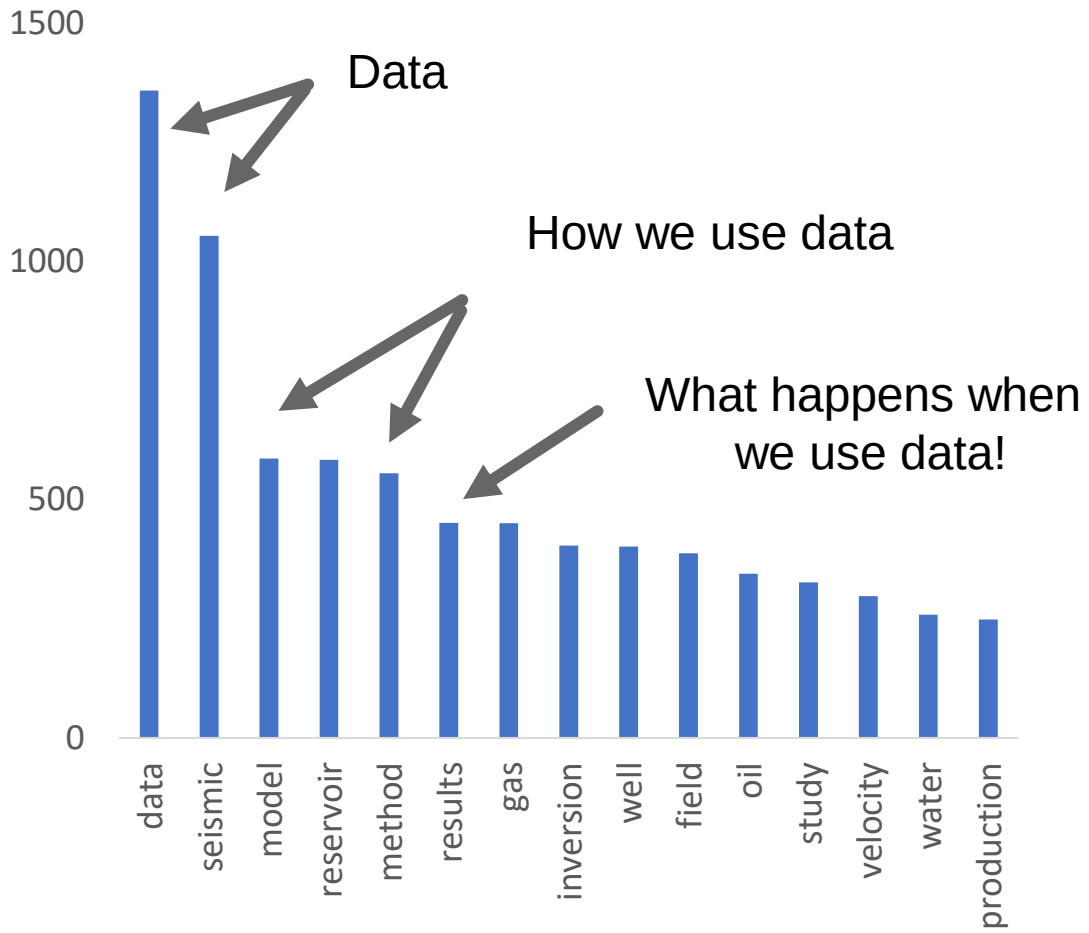
Preliminary data analysis: Who is presenting and about what?

Abstract count by organization type and presentation type*



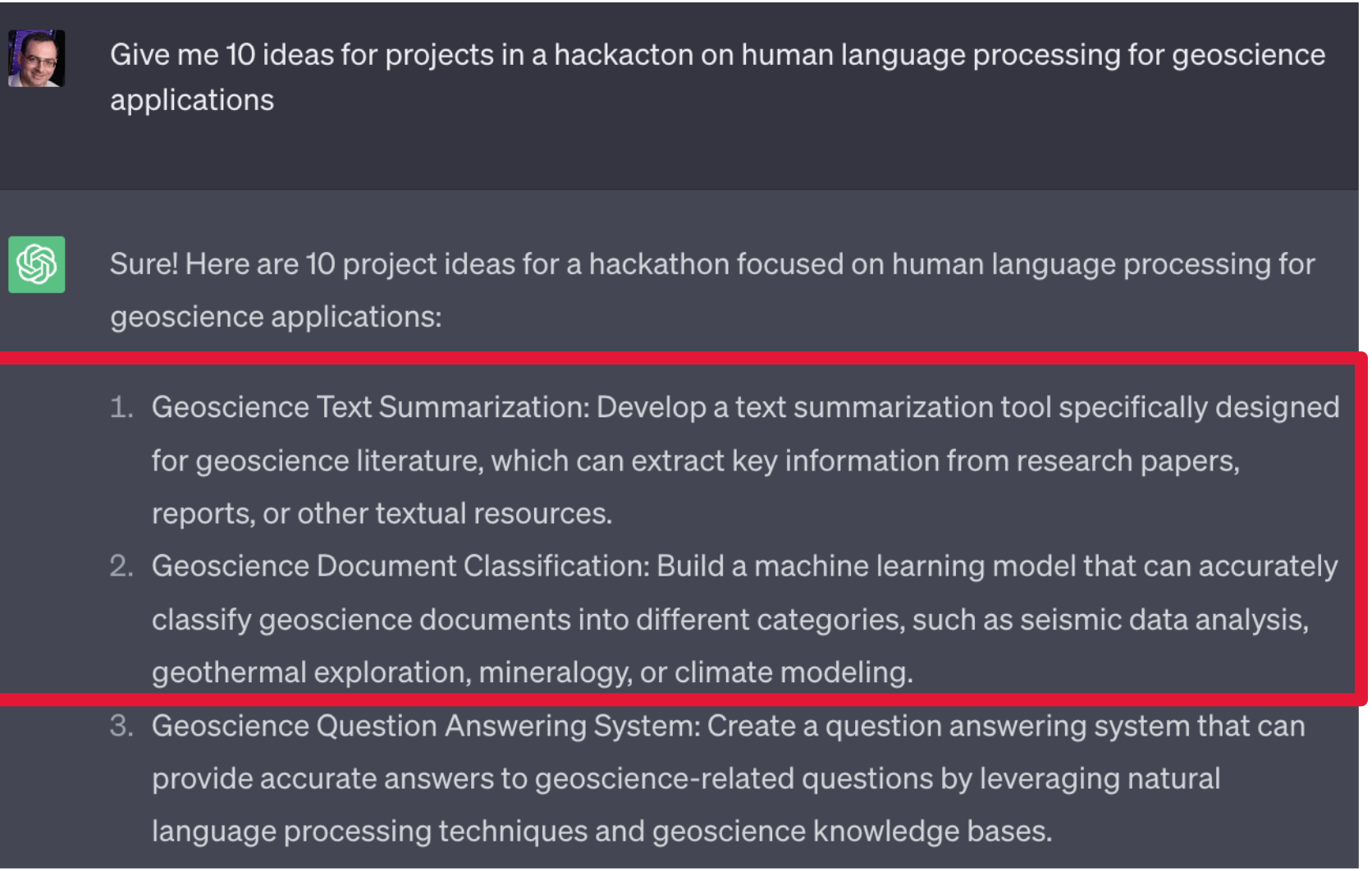
*Organization typed by first author on best effort basis

Top 15 words mentioned in abstract summaries



If ChatGPT is so smart maybe it should do the hackathon too?

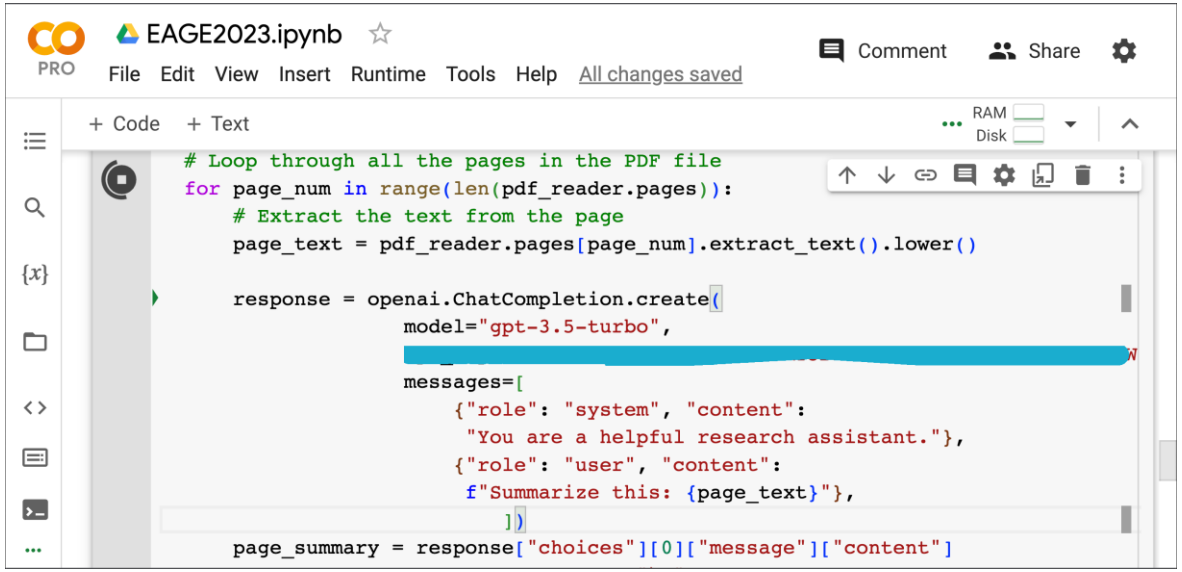
We decided to try these, with differing levels of success



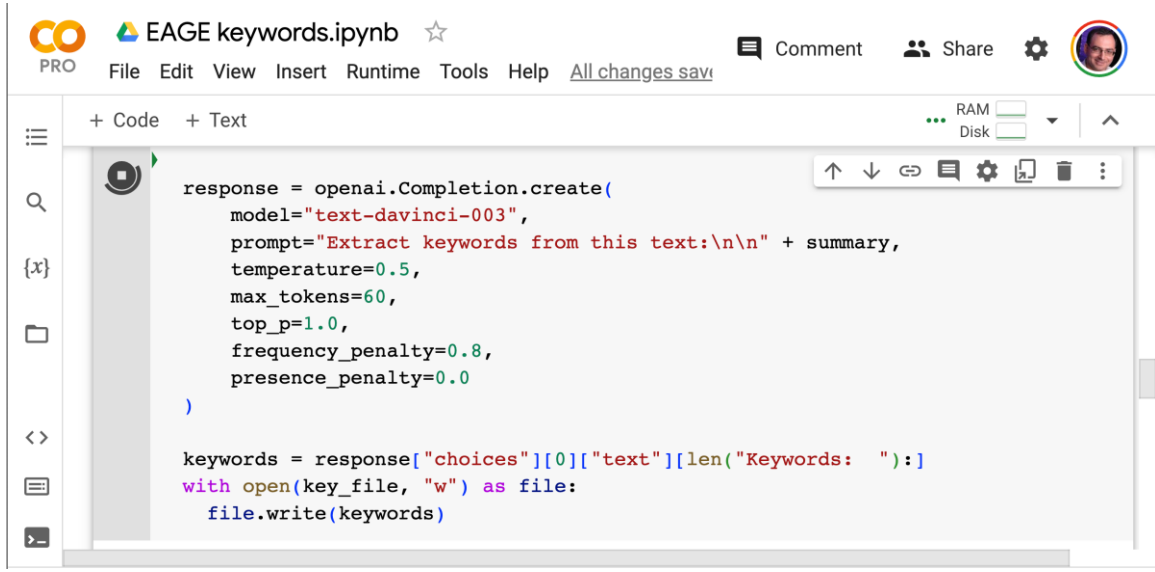
NRCAN, NPD have both released tools doing this in the last year

Followed templates from openAI for working with ChatGPT

Automating GPT3.5 summaries



Automating GPT3.5 key words



The code openAI gave us usually didn't work out of the box. However, light troubleshooting usually fixed the issues

Creating a text summary

What went into GPT3.5 summarization

L. Zhuo, W. Fei, L. Wei, J. Bergeron, G. Hennenfent

2023 EAGE ANNUAL 84TH CONFERENCE & EXHIBITION VIENNA | AUSTRIA

Evaluating 4D DAS VSP Acquisition at the Big Foot Field Gulf of Mexico

Introduction

The Big Foot field is located in the Walker Ridge area of the U.S. Gulf of Mexico, approximately 225 miles (360 km) south of New Orleans, La., in a water depth of approximately 5,200 feet (1,584 m) **(Figure 1a)**. The reservoir is a three-way closure sealed by the salt with the Miocene sand as the main reservoir **(Figure 1b)**. The Big Foot field production started in 2018. Field development plan includes a multi-well drilling program. 4D seismic imaging is considered for enhanced field development.

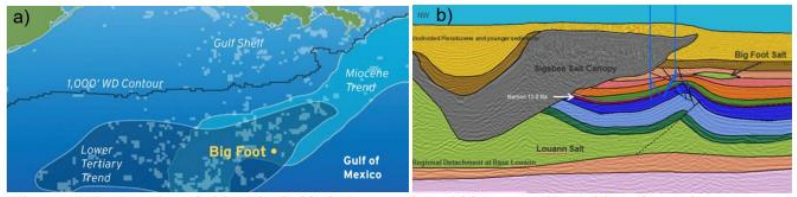


Figure 1 *The Big Foot field, U.S. Gulf of Mexico. a) Field location; b) Field geological section.*

Vertical Seismic Profiling (VSP) acquistion with Distributed Acoustic Sensing (DAS) technology is emerging as an attractive alternative for deep water fields in addressing challenges for 3D seismic imaging and 4D reservoir monitoring due to the lower cost, less interruption to production and the recent industry success (Zhan and Nahm, 2022, Kiyashchenko et al., 2019, Mateeva et al., 2017).

4D DAS VSP is considered as a potential solution for reservoir monitoring at the Big Foot field to further enhance oil recovery. There are critical questions to be answered for making the decision, including: 1) What is the chance of success for 4D DAS VSP at this field? 2) How frequently should the monitor survey be conducted? 3) What is the impact of the field noise to 4D signal? 4) Can we reduce the acquisition time and cost?

We performed a FD (Finite Difference) modeling study in 2022 to assess the feasibility of 4D DAS VSP acquisition at the Big Foot field to improve decisions for field development.

Method

FD modeling is a proven technology that has routinely demonstrated its value for Front-End-Loading (FEL) phase of evaluating seismic acquisition design to reduce cost and improve decision quality

What GPT3.5 came up with as a summary

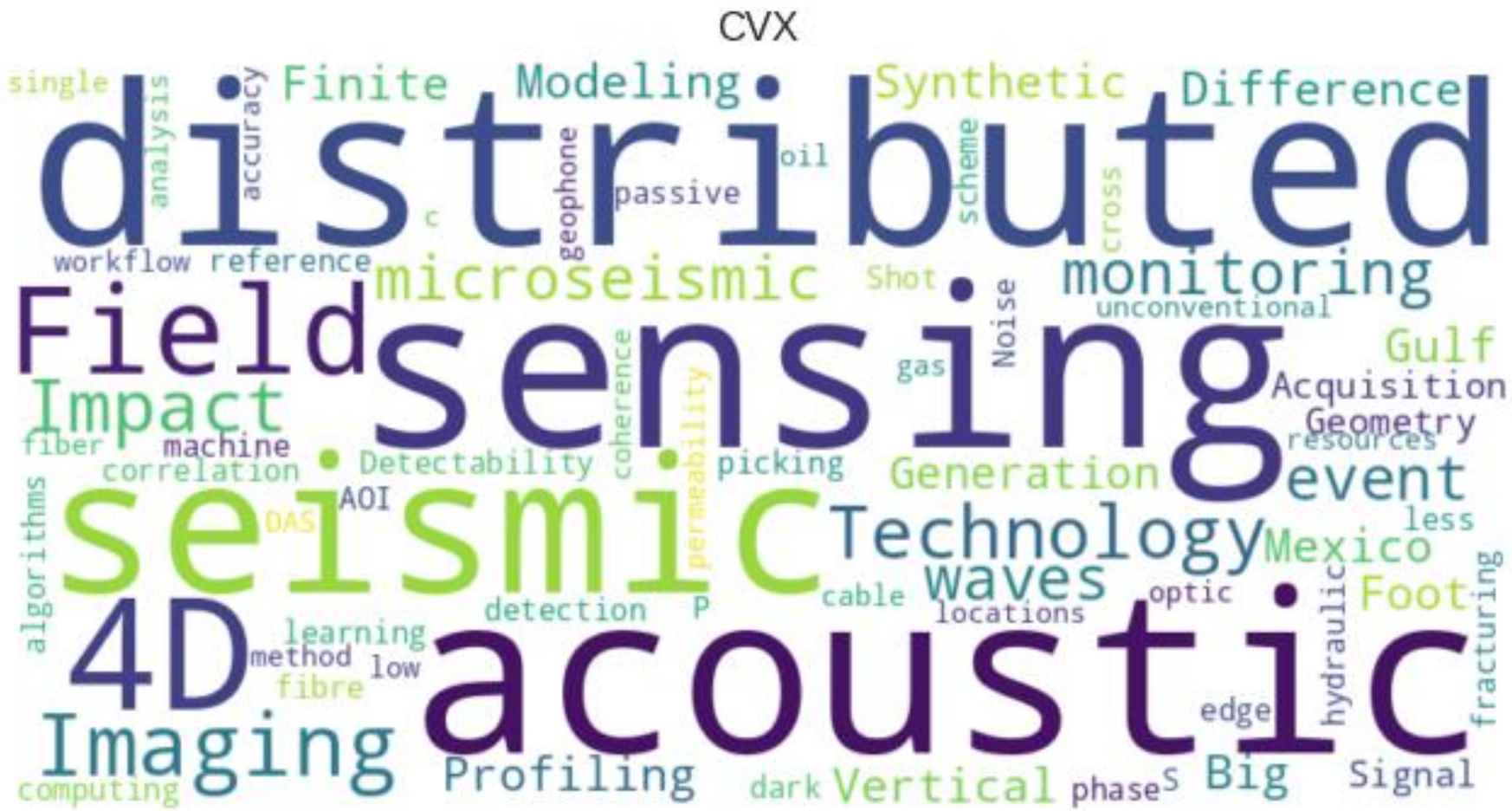
We performed a FD (Finite Difference) modeling study to evaluate the feasibility of DAS VSP acquisition for 4D reservoir monitoring at the Big Foot field, U.S. Gulf of Mexico.

The study demonstrates that: 1) DAS VSP acquisition has high chance of success for detecting 4D signal and effectively monitoring reservoir changes at this field. 2) Shot AOI at one well can be reduced without jeopardizing the 4D objective, which could save time and cost for field acquisition. However, the larger shot AOI is still needed for the other two wells. 3) Field shut-in noise and natural flow noise substantially reduced the S/N of the 3D gather. However, noise sensitivity test shows the shut-in noise is negligible, and natural flow only adds 1-2% of noise to 4D signal.

The learnings from this study significantly contributed to the decisions on planning DAS VSP acquisitions at the Big Foot field.

How did it do? Could be a good way to determine which presentations to go to

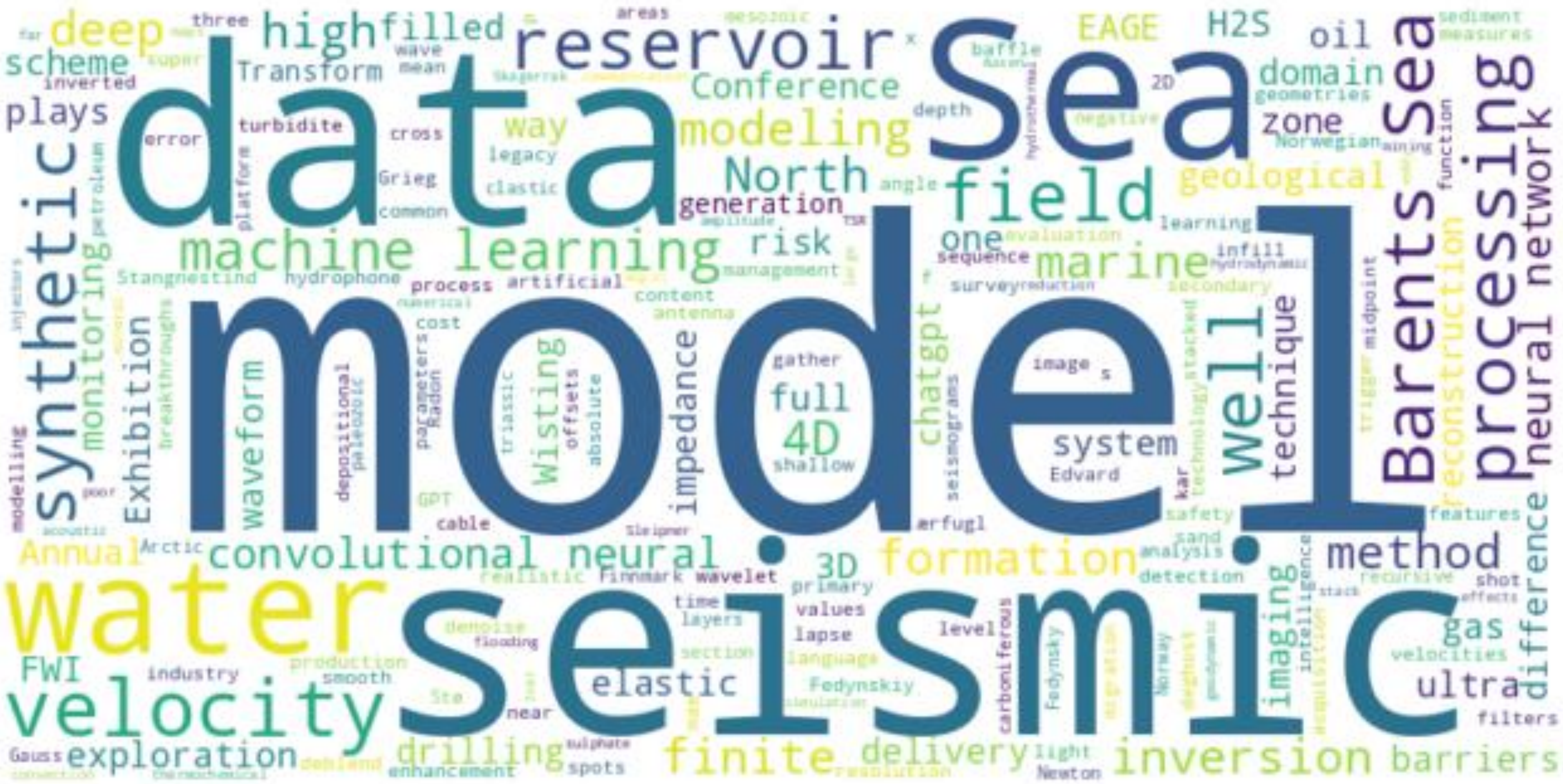
Using key words to understand what IOCs are sharing



We also tried with document summaries, but non-industry terms made the clouds less useful
We created these word clouds for all companies

Is the next step to use these kinds of systems to *predict* what future research opportunities could be?

AkerBP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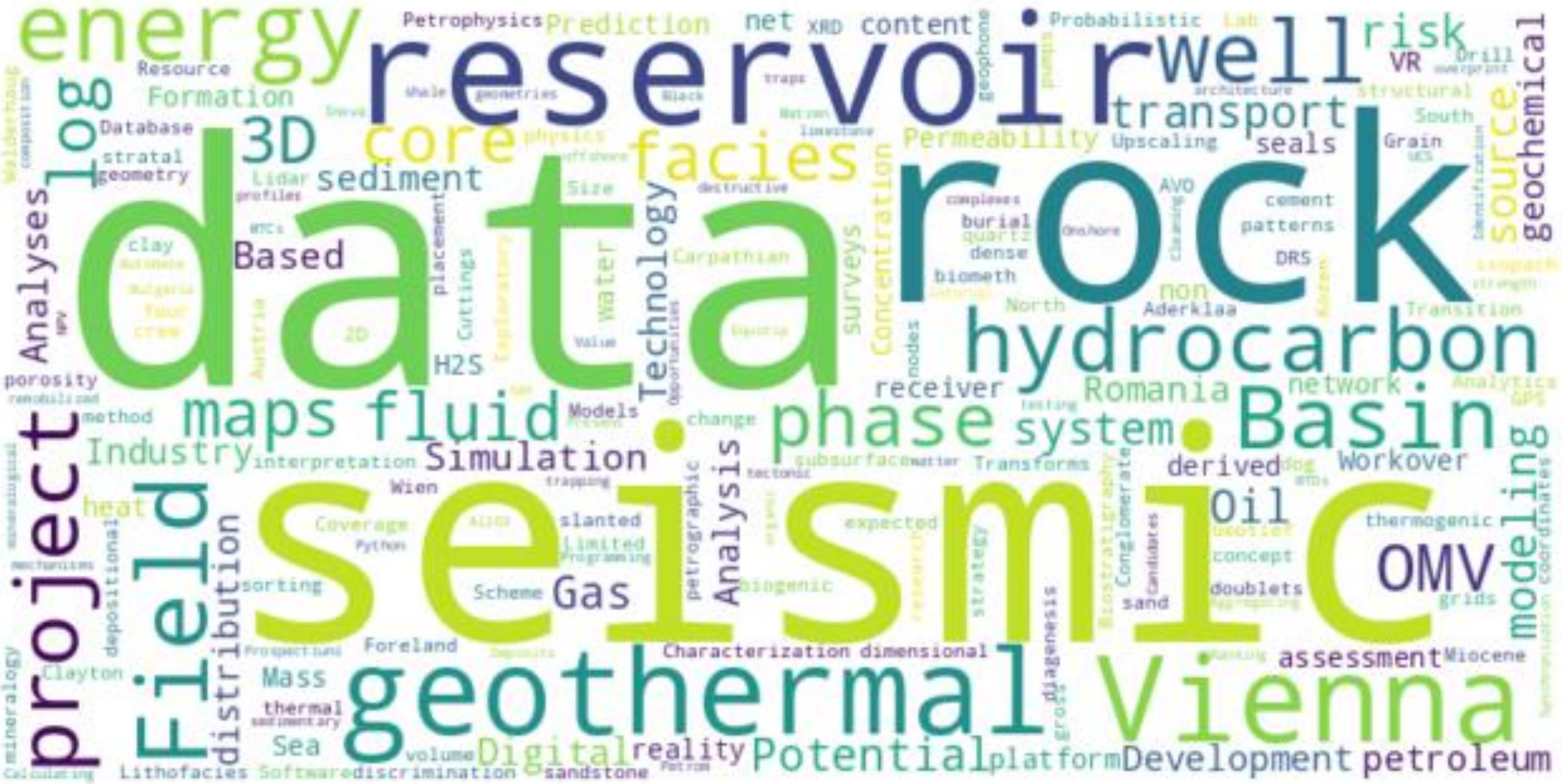

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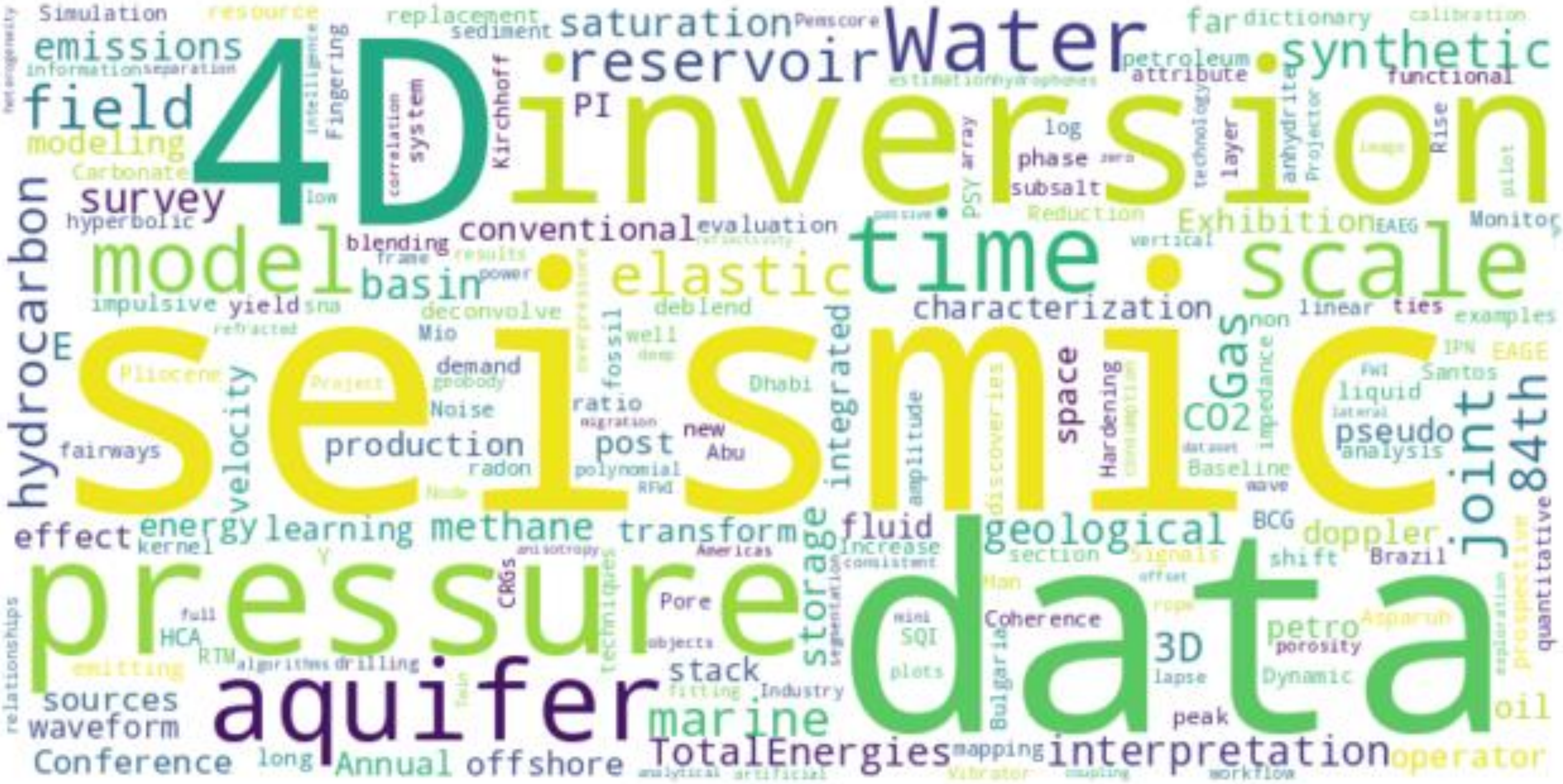

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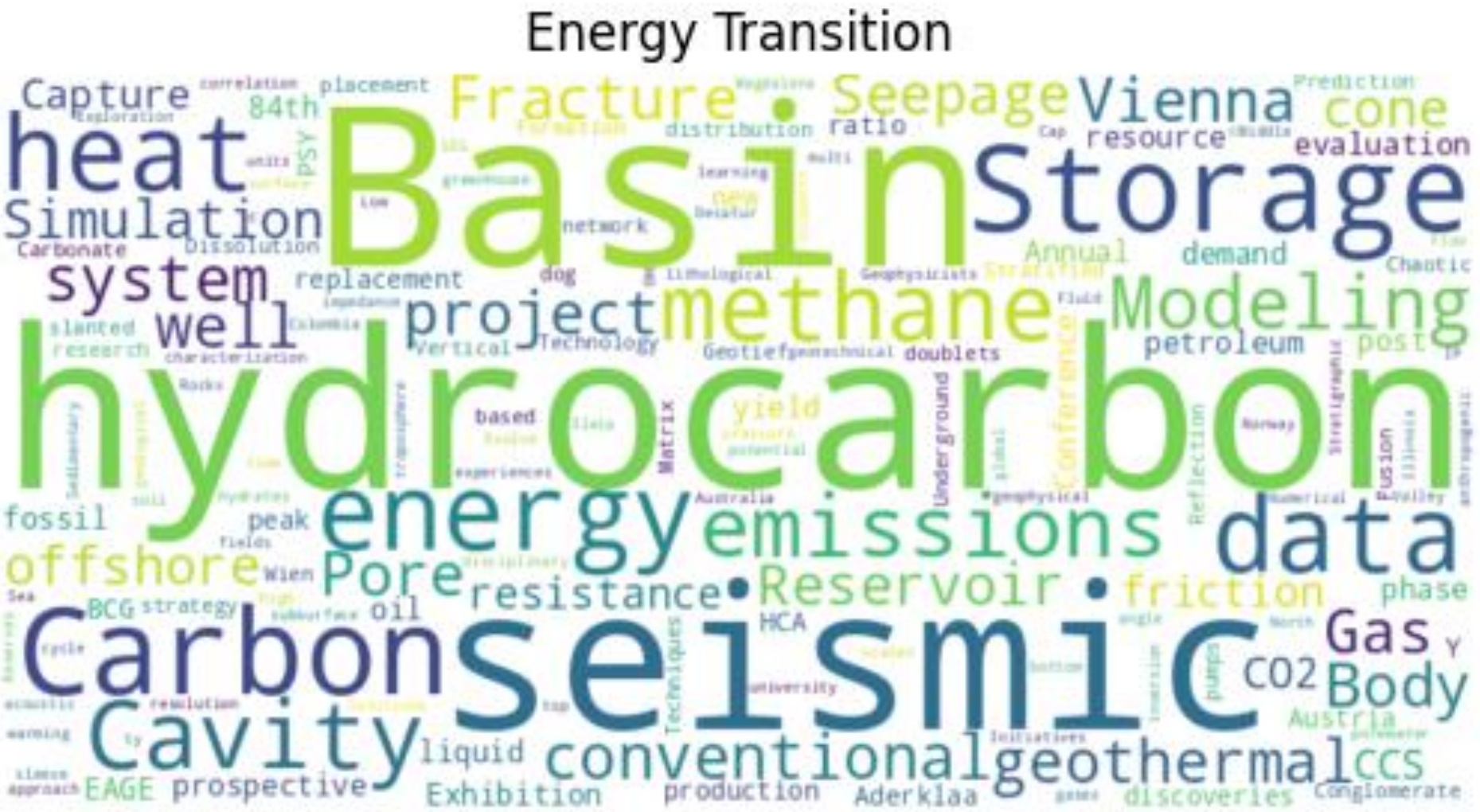
Securing a sustainable future together



We also did this for all other session themes: geology, geophysics, petroleum engineering, mining, etc

Which companies are presenting the most similar content?

Cluster analysis enables visual interrogation of company abstracts

EAGE Companies.ipynb

File Edit View Insert Runtime Tools Help

Comment

+ Code + Text

```
from sklearn.feature_extraction.text import TfidfVectorizer

objects = []
for company in companies:
  # extract keywords
  keywords = keytext[company].replace(',','')
  objects.append(keywords)

# vectorize using TF-IDF
vectorizer = TfidfVectorizer()
tfidf_matrix = vectorizer.fit_transform(objects)
```

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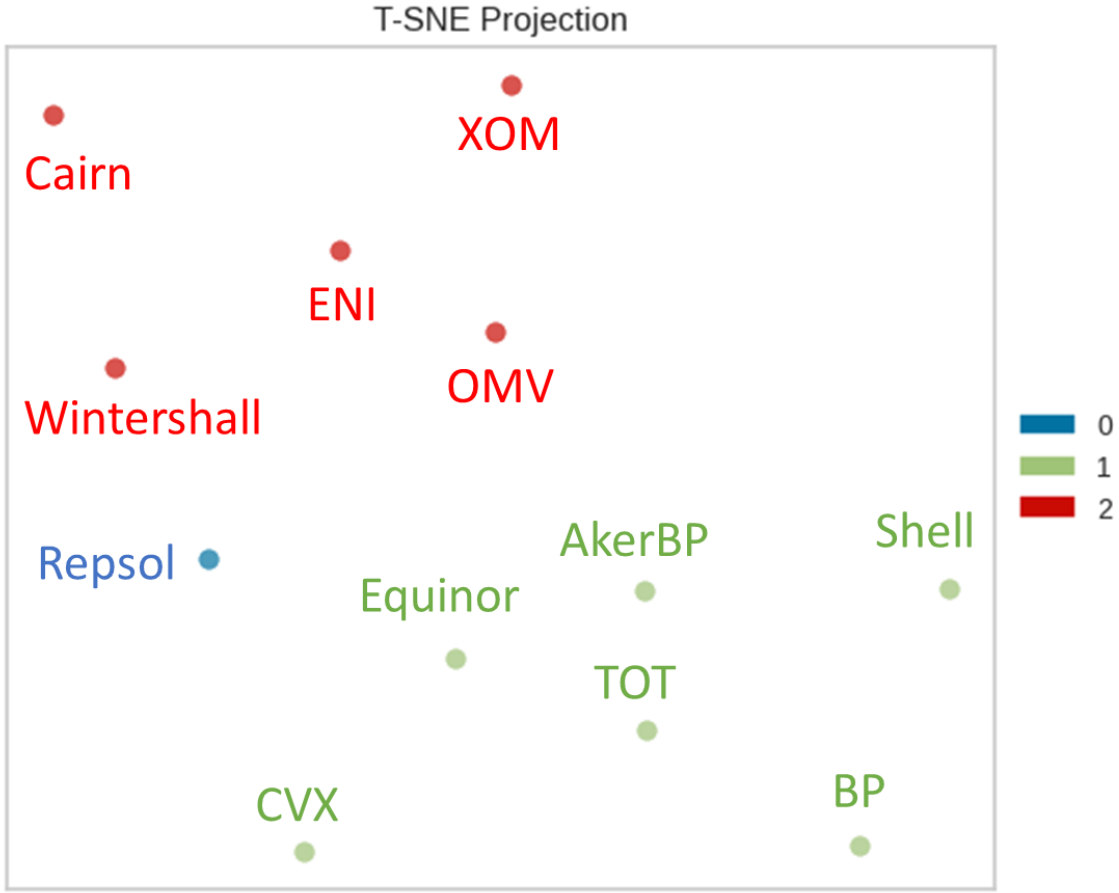
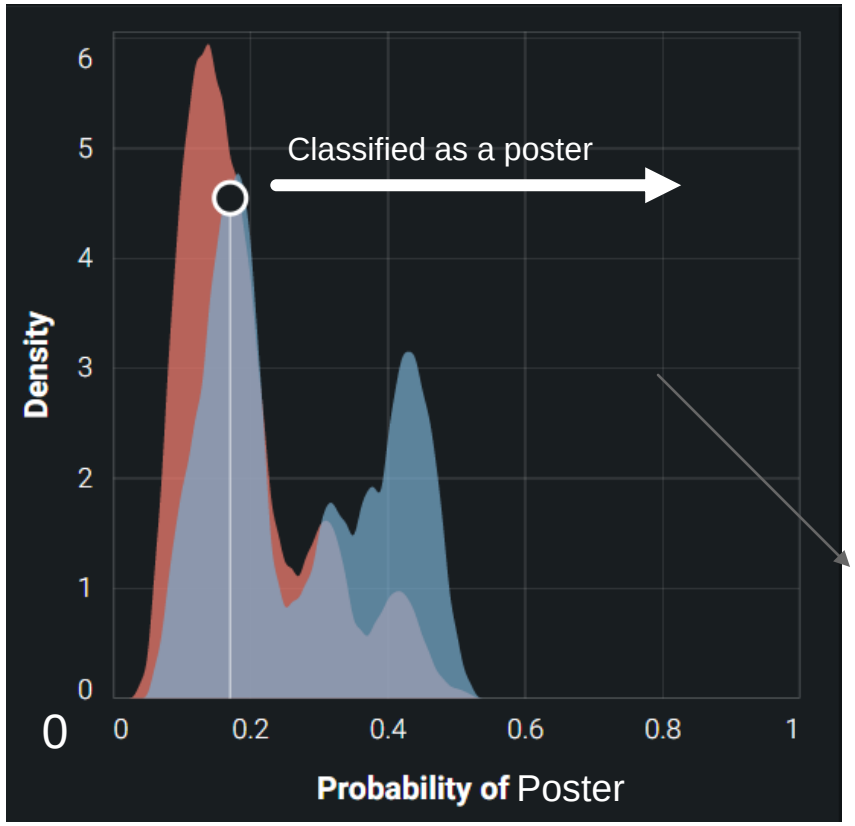


Could become the basis of a recommendation engine or to identify folks publishing anomalous work

Building a classifier to understand who gets a Poster Presentation

Results from holdout sample using a K-nearest neighbors classifier of document summaries

Look at the overlap between classes



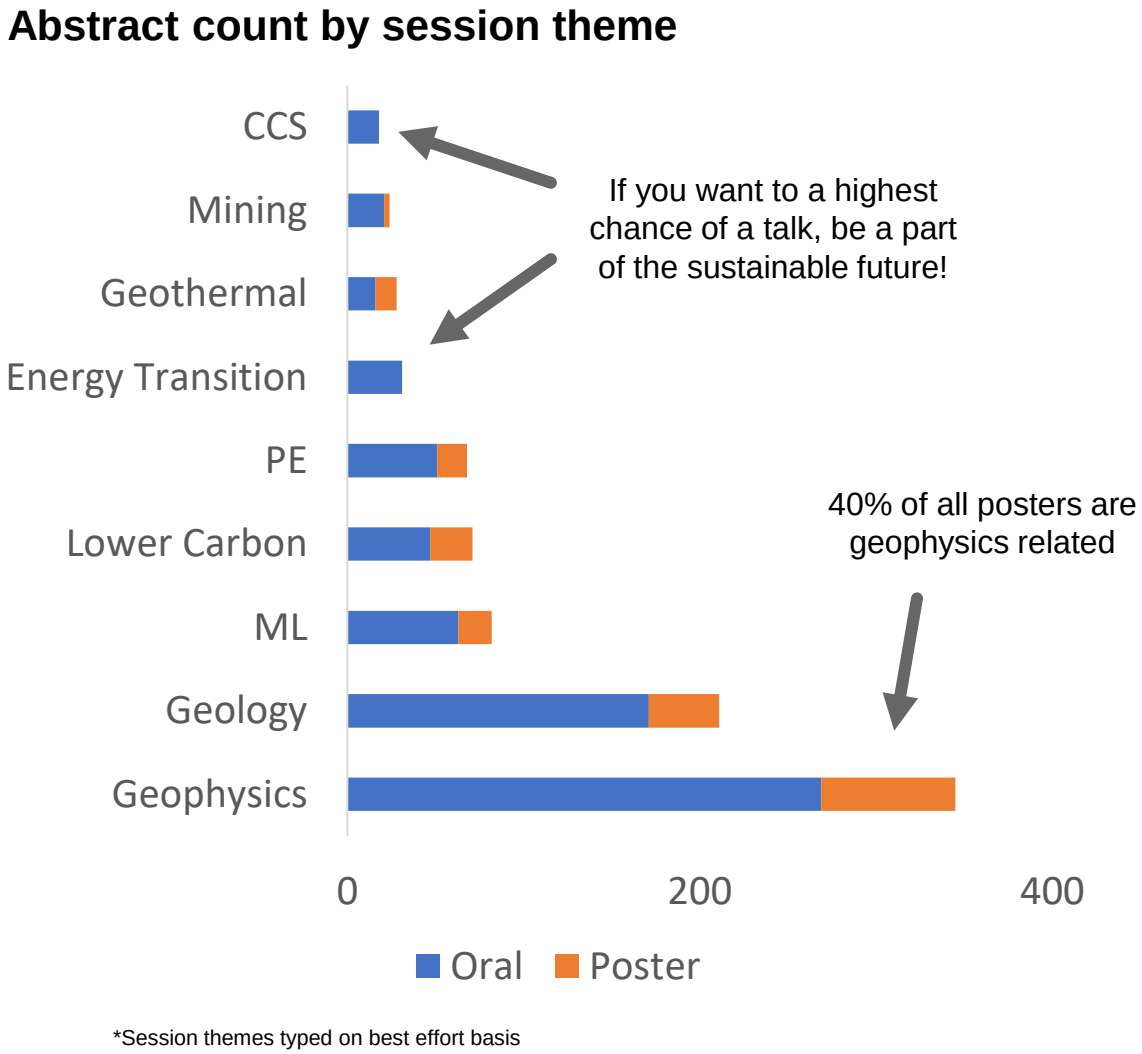
Confusion matrix shows low predictive power of model

Actual \ Predicted	Oral	Poster	
Oral	74 (TN)	64 (FP)	138
Poster	12 (FN)	26 (TP)	38
	86	90	176

While this is clearly not a production worthy model, there are still insights to be gained

Building a classifier to understand who gets a Poster Presentation

- Important to remember **predictions don't tell you reasons**
- For example, we examined the papers with the highest probability of being posters, many of them mentioned geophysics topics
- This could indicate, recalling back to our first data analysis that there were just more geophysics abstracts submitted than spaces for talks



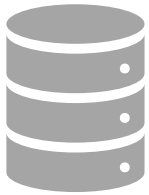
*Session themes typed on best effort basis

Conclusions

Large language models like ChatGPT are effective in working with human texts

Extracting summaries

Extracting keywords



Keywords enable data analysis on EAGE expanded abstracts

Word clouds

Clustering

Ideas for additional projects

Classification using supervised machine learning

- Predict oral vs poster
- Predict organization type