SAS HACKATHON

END FORCED LABOR

HOPE FOR JUSTICE

SLAVE-FREE ALLIANCE
Working Towards a Slave-free Supply Chain

SAS HACKATHON

Team | End Forced Labor

HOPE FOR JUSTICE

SLAVE-FREE ALLIANCE
Working Towards a Slave-free Supply Chain

Marc Stanton

Tom Frost

Becky Lorig
University of Nevada

Zoraya Cruz-Bonilla
Binghamton University

Arpita Deb
Drexel University

THE PROBLEM

Marc to add in images of people/ humans

WHY BUSINESSES SHOULD TAKE ACTION?

Human
Business Case

Investment
Business Case

Customer's
Business Case

Talent Acquisition/ Retention
Business Case

Legislation
Requirement

SLAVE-FREE ALLIANCE
Working Towards a Slave-free Supply Chain

THE CHALLENGE

Verité

Strengthening Protections Against Trafficking in Persons in Federal and Corporate Supply Chains: Research on Risks in 34 Commodities Worldwide

Department of Labor

2022 List of Goods Produced by Child Labor or Forced Labor

U.S. Department of State

2020 Trafficking in Persons Report

HOPE FOR JUSTICE

SLAVE-FREE ALLIANCE
Working Towards a Slave-free Supply Chain

THEMATIC AREAS

IDENTIFY IF A BUSINESS HAS THE RISK OF

LABOR EXPLOITATION OR MODERN SLAVERY

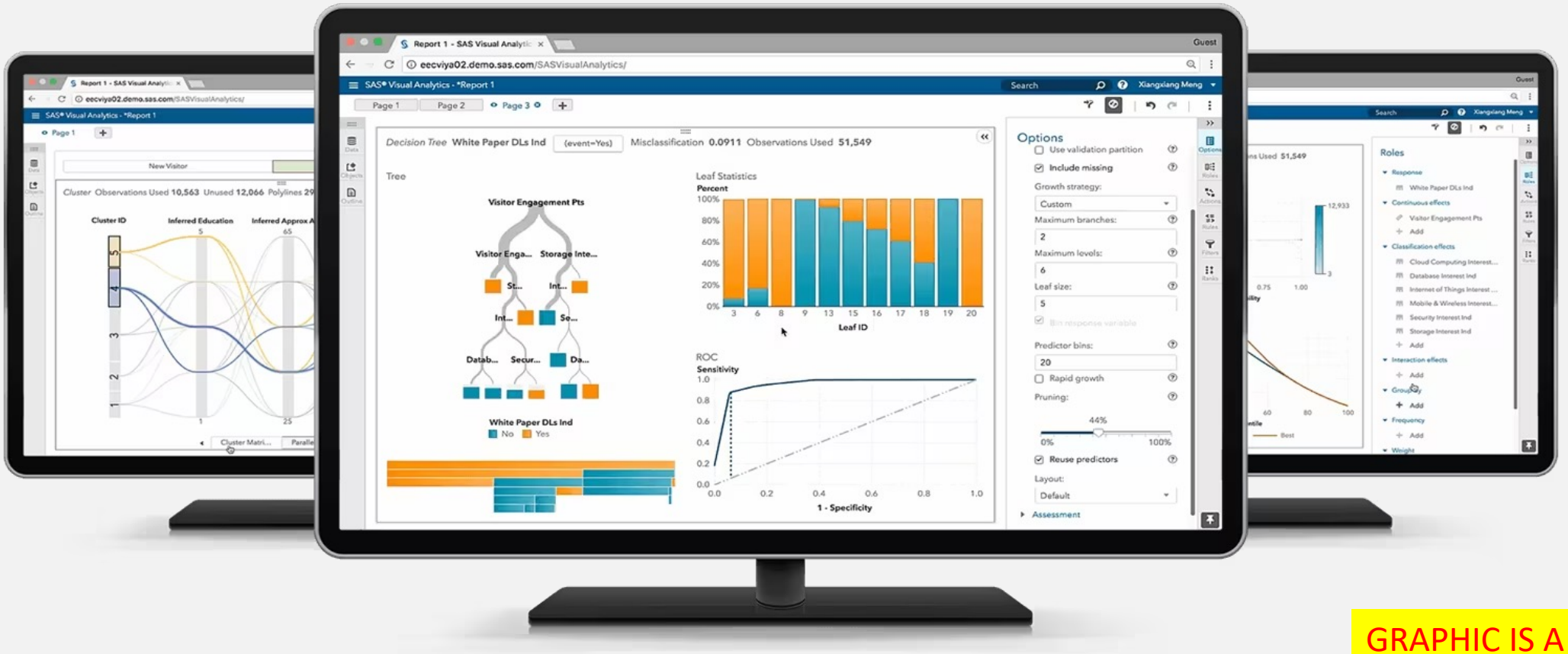
IN THEIR SUPPLY CHAIN VIA A REPORTING DASHBOARD.

- **L**ABOR EXPLOITATION VIOLATIONS IN EVERY COUNTRY
- **S**ECTOR/ PRODUCT ANALYSIS
- **C**ORE COMMODITIES AND ISSUES
- **A**NY POTENTIAL EXPOSURE TO XINJIANG / NORTH KOREA
- **S**ITES WHERE LABOR EXPLOITATION VIOLATIONS HAVE BEEN EXPOSED

THE INNOVATION

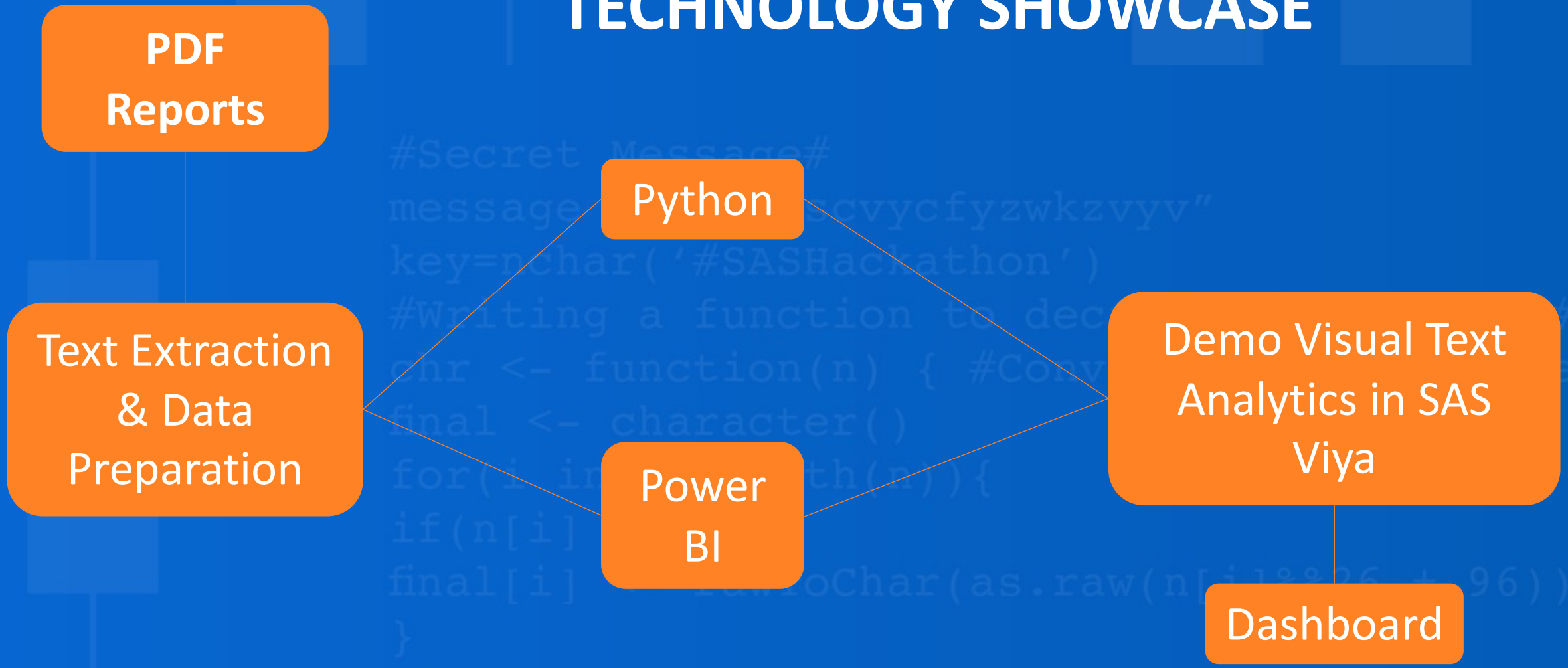
THE SOLUTION

Identify if a business has, or has the risk of, labor exploitation/ modern slavery in their supply chain via a reporting dashboard tool that RAGs a supply chain.



GRAPHIC IS A PLACEHOLDER

TECHNOLOGY SHOWCASE



HOPE FOR JUSTICE

SLAVE-FREE ALLIANCE
Working Towards a Slave-free Supply Chain

Python

verite_conversion.py

```python
#Converting Verite document into useable parsed data
#Written by Becky Lorig 23Mar2023
#Steps:
##Verite document converted from PDF to XML in Adobe
##Load XML document
##Use beautifulsoup to parse report into useful parts
##manual cleanup of the output


#import modules
import xml.etree.ElementTree as ET #didn't end up using for final output, but helpful in early stages
import lxml
import bs4
from bs4 import BeautifulSoup
import re
import requests
import pandas as pd


#take 20 - did numerous iterations, this was the best
#handled blank text in P and H4 tags
#stripped Links nested within the P tag text
#joined the P tag text after most page splits and Ptag splits
#split text across subheaders - worked 80% of the time, less success in Commodities with diff headers
#some sentences began with "-" in a list, stripped this dash
#handled line breaks
#had to do some manual processing of output, creating simple headings, joining paragraphs improperly split
#additional manual cleanup: sources were "text" and had to be deleted manually.  They were too hard to parse in the code

# read in the XML file using BeautifulSoup
with open('verite.xml', 'r', encoding='utf-8') as f:
    soup = BeautifulSoup(f, 'xml')

# create empty lists for each column in dataframe
h4_list = []
p_list = []

# loop through each Sect tag
for sect in soup.find_all('Sect'):

    # loop through each H4 tag within the Sect tag
    for h4 in sect.find_all('H4'):
```

Power BI

Bamboo is reportedly produced with forced labor (FL) and/or child labor (CL) in the following countries:	Top ten countries that export bamboo worldwide (UN Comtrade 2012):	Top ten countries from which the US imports bamboo (UN Comtrade 2012):
Burma (FL, CL) *Bamboo Goods:* Vietnam (FL)	1. Netherlands 2. China 3. Pakistan 4. Ethiopia 5. Thailand 6. Indonesia	1. China 2. Argentina 3. France 4. Hong Kong 5. Netherlands 6. Vietnam

Bananas are reportedly produced with forced labor (FL) and/or child labor (CL) in the following countries:	Top ten countries that produce bananas worldwide (FAOSTAT 2012):	Top ten countries that export bananas worldwide (UN Comtrade 2012):	Top ten countries from which the US imports bananas (UN Comtrade 2012):
Belize (CL) Ecuador (CL) Nicaragua (CL) The Philippines (CL)	1. India 2. China 3. The Philippines 4. Ecuador 5. Brazil 6. Indonesia 7. Angola 8. Guatemala 9. Tanzania 10. Mexico	1. Ecuador 2. The Philippines 3. Guatemala 4. Costa Rica 5. Colombia 6. Belgium 7. United States 8. Côte d'Ivoire 9. Germany 10. France	1. Guatemala 2. Ecuador 3. Costa Rica 4. Honduras 5. Colombia 6. Mexico 7. Panama 8. Nicaragua 9. Peru 10. Dominican Republic

Beans and pulses are reportedly produced with forced labor (FL) and/or child labor (CL) in the following countries:	Top ten countries that produce beans and pulses worldwide (FAOSTAT 2012):	Top ten countries that export beans and pulses worldwide (UN Comtrade 2012):	Top ten countries from which the US imports beans and pulses (UN Comtrade 2012):
Green Beans: Burma (FL, CL) Mexico (CL) *Soy Beans:* Burma (FL) *Yellow Beans:* Burma (FL) *Pulses (legumes):* Turkey (CL) *Beans:* Afghanistan (CL)	*Green Beans:* 1. China 2. Indonesia 3. India 4. Turkey 5. Thailand 6. Egypt 7. Spain 8. Italy 9. Morocco 10. Bangladesh *Soy Beans:* 1. United States 2. Brazil 3. Argentina 4. India 5. China 6. Canada 7. Paraguay 8. Uruguay 9. Ukraine 10. Bolivia	*Beans (including green):* 1. China 2. Australia 3. Thailand 4. Indonesia 5. Uganda 6. United States 7. Argentina 8. Dominican Republic 9. Egypt 10. Poland *Soy Beans:* 1. United States 2. Brazil 3. Argentina 4. Canada 5. Paraguay 6. Uruguay 7. Netherlands 8. Ukraine 9. China 10. Bolivia	*Beans (including green):* 1. China 2. Thailand 3. Australia 4. India 5. United Arab Emirates 6. Singapore 7. Malaysia 8. Peru 9. Argentina 10. Tanzania *Soy Beans:* 1. Canada 2. China 3. India 4. Argentina 5. Chile 6. Uruguay 7. Netherlands 8. Kazakhstan 9. Turkey 10. Other Asia (not elsewhere specified)

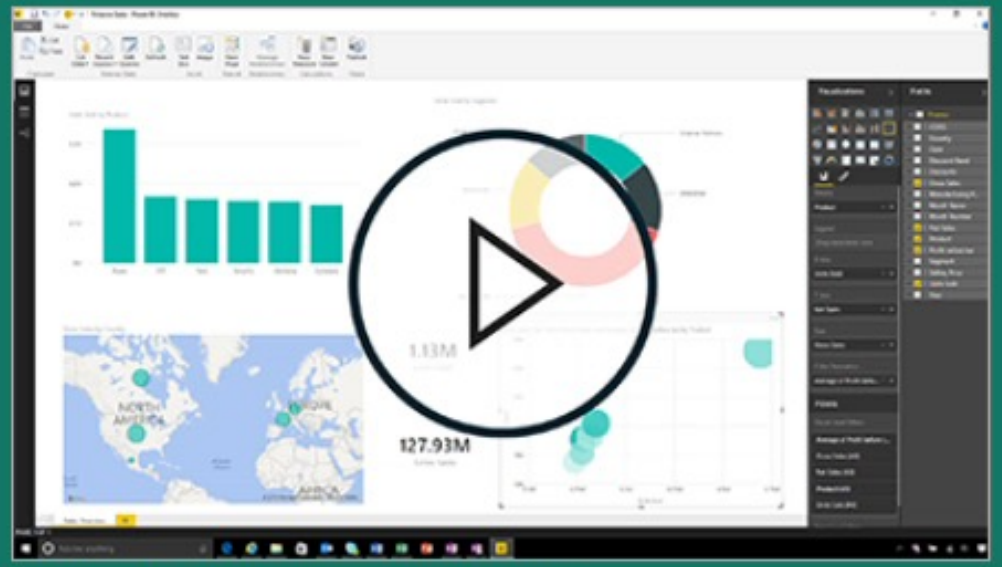
Power BI Desktop

Zoraya Cruz-Bonilla

- Get data
- Recent sources

- Tables from Verite Report.... — C: » Users » Zoray » OneDrive - Bi...
- FP_SankeyDiagram.pbix — C: » Users » Zoray » OneDrive - Bi...
- MyFirstPowerBIREport.pbix — C: » Users » Zoray » OneDrive - Bi...
- Lab 2 Solution.pbix — C: » Users » Zoray » OneDrive - Bi...

- Open other reports



Getting started with Power BI Desktop

Building reports

Query view concepts

Uploading your reports

Create a Phone report

VIEW ALL VIDEOS

Will need to edit the videos to showcase this step.
End video with final version of tables

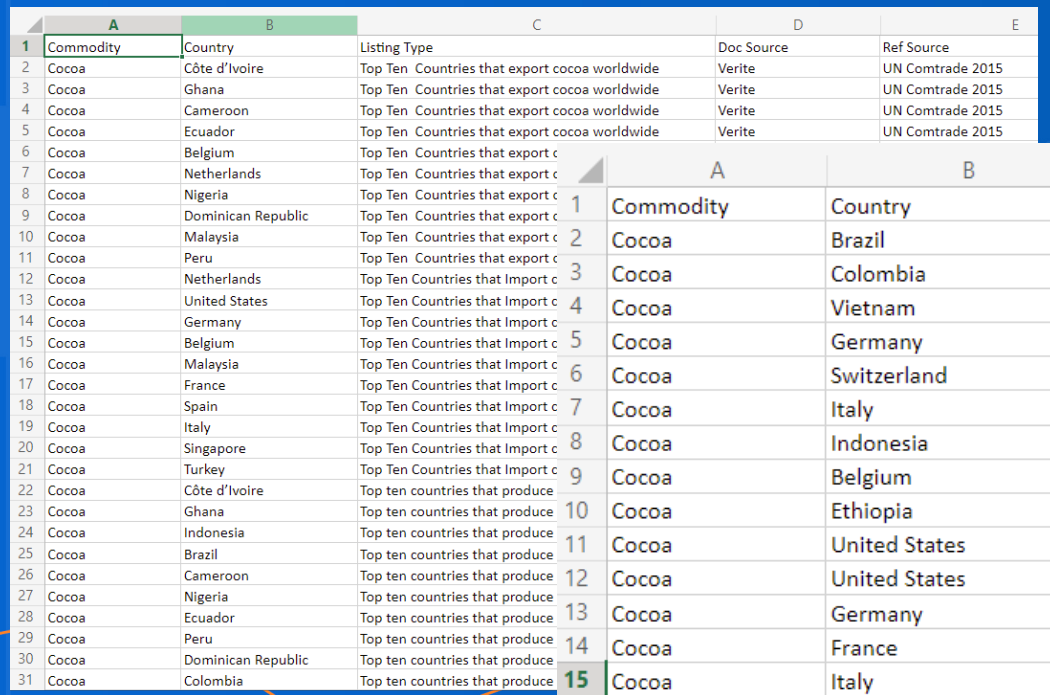
WHAT'S NEW

Take a look at what's new and improved in Power BI in this month's update.

FORUMS

Visit the Power BI Forum to ask questions or interact with other users in the Power BI community.

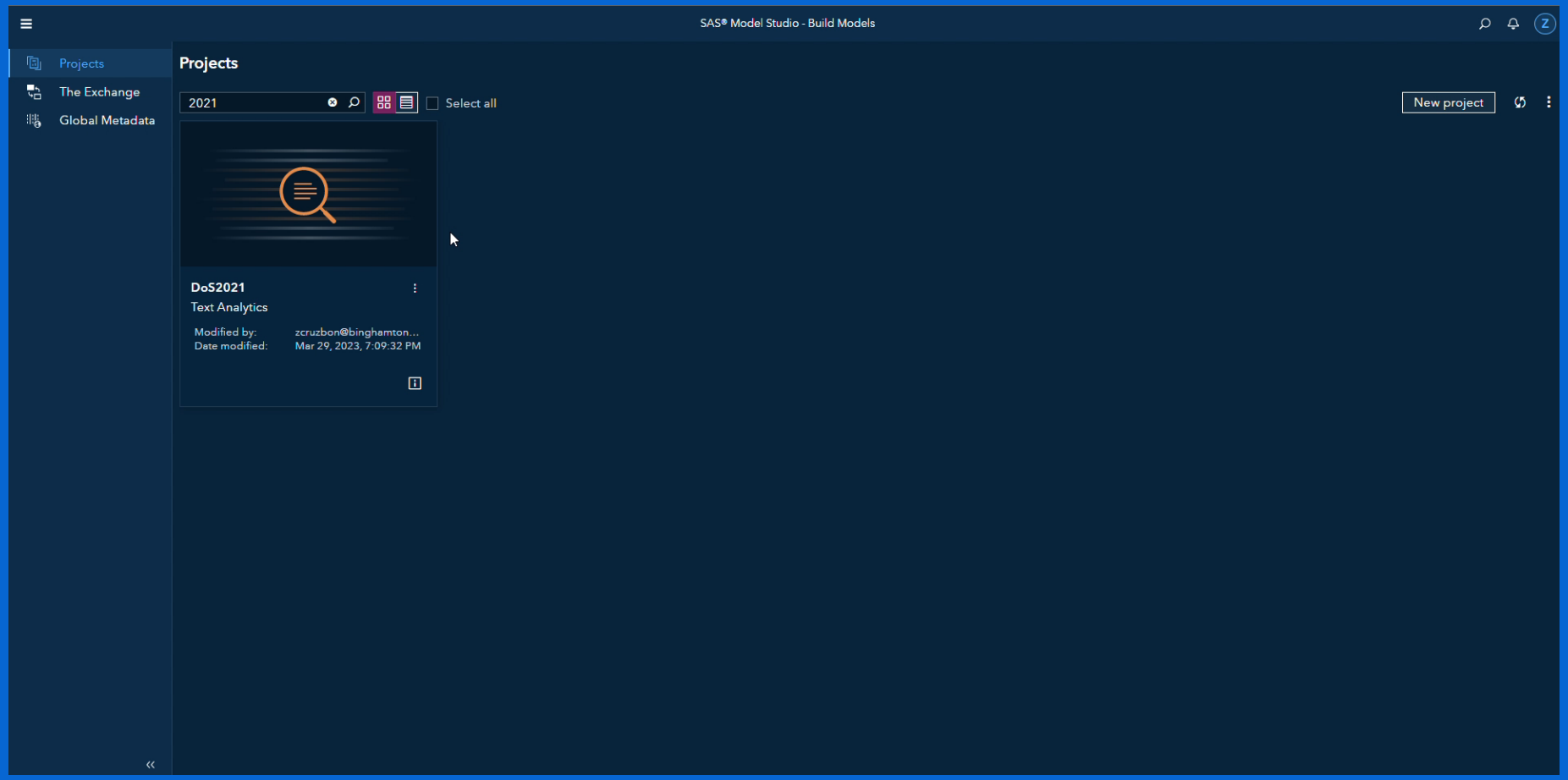
✓ Show this screen on startup



	A	B	C	D	E
1	Commodity	Country	Listing Type	Doc Source	Ref Source
2	Cocoa	Côte d'Ivoire	Top Ten Countries that export cocoa worldwide	Verite	UN Comtrade 2015
3	Cocoa	Ghana	Top Ten Countries that export cocoa worldwide	Verite	UN Comtrade 2015
4	Cocoa	Cameroon	Top Ten Countries that export cocoa worldwide	Verite	UN Comtrade 2015
5	Cocoa	Ecuador	Top Ten Countries that export cocoa worldwide	Verite	UN Comtrade 2015
6	Cocoa	Belgium	Top Ten Countries that export c		
7	Cocoa	Netherlands	Top Ten Countries that export c		
8	Cocoa	Nigeria	Top Ten Countries that export c		
9	Cocoa	Dominican Republic	Top Ten Countries that export c		
10	Cocoa	Malaysia	Top Ten Countries that export c		
11	Cocoa	Peru	Top Ten Countries that export c		
12	Cocoa	Netherlands	Top Ten Countries that Import c		
13	Cocoa	United States	Top Ten Countries that Import c		
14	Cocoa	Germany	Top Ten Countries that Import c		
15	Cocoa	Belgium	Top Ten Countries that Import c		
16	Cocoa	Malaysia	Top Ten Countries that Import c		
17	Cocoa	France	Top Ten Countries that Import c		
18	Cocoa	Spain	Top Ten Countries that Import c		
19	Cocoa	Italy	Top Ten Countries that Import c		
20	Cocoa	Singapore	Top Ten Countries that Import c		
21	Cocoa	Turkey	Top Ten Countries that Import c		
22	Cocoa	Côte d'Ivoire	Top ten countries that produce		
23	Cocoa	Ghana	Top ten countries that produce		
24	Cocoa	Indonesia	Top ten countries that produce		
25	Cocoa	Brazil	Top ten countries that produce		
26	Cocoa	Cameroon	Top ten countries that produce		
27	Cocoa	Nigeria	Top ten countries that produce		
28	Cocoa	Ecuador	Top ten countries that produce		
29	Cocoa	Peru	Top ten countries that produce		
30	Cocoa	Dominican Republic	Top ten countries that produce		
31	Cocoa	Colombia	Top ten countries that produce		

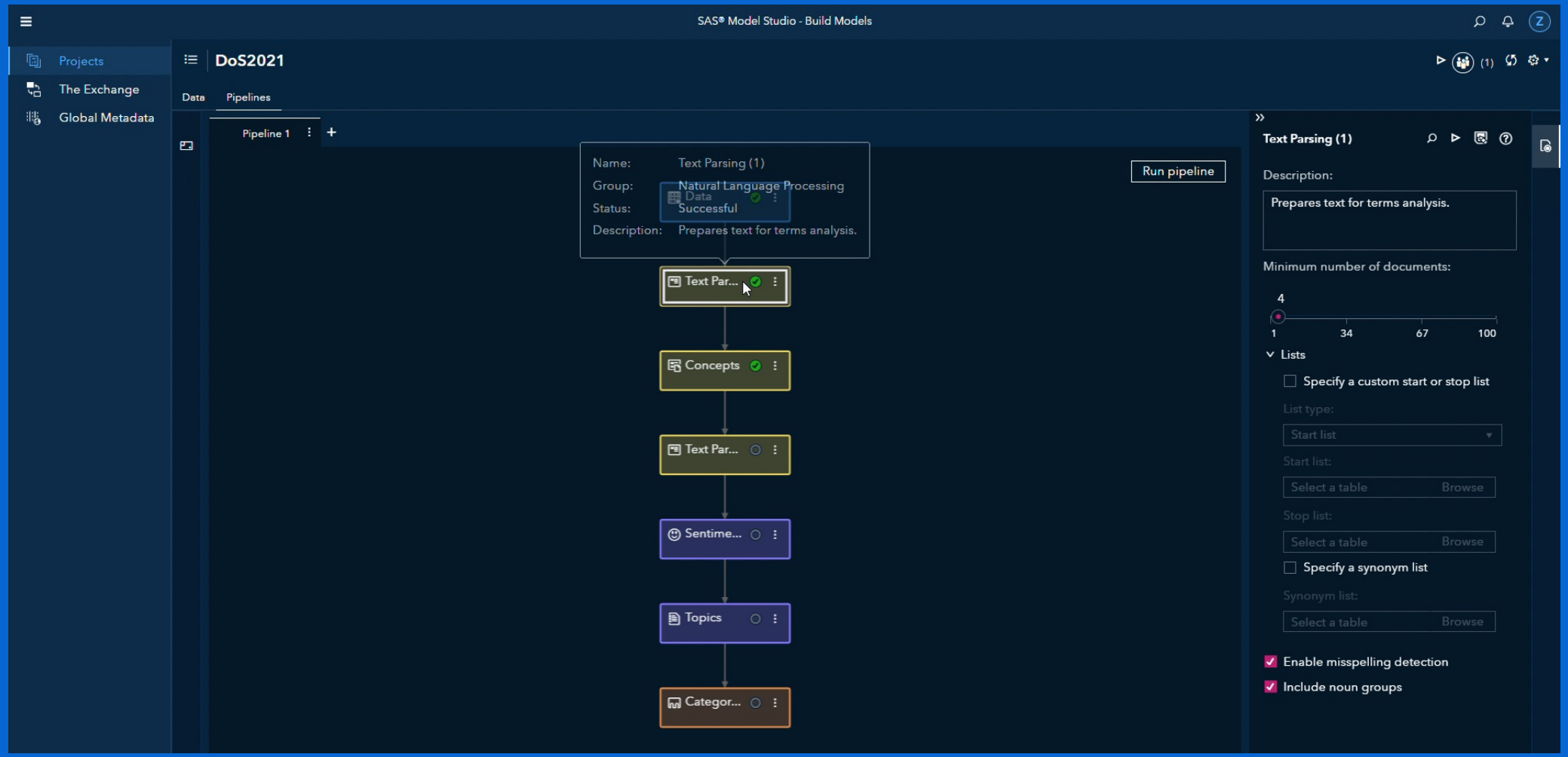
	A	B	C	D	E
1	Commodity	Country	Listing Type	Doc Source	Ref Source
2	Cocoa	Brazil	Top Ten Countries that export coffee worldwide	Verite	UN Comtrade 2015
3	Cocoa	Colombia	Top Ten Countries that export coffee worldwide	Verite	UN Comtrade 2015
4	Cocoa	Vietnam	Top Ten Countries that export coffee worldwide	Verite	UN Comtrade 2015
5	Cocoa	Germany	Top Ten Countries that export coffee worldwide	Verite	UN Comtrade 2015
6	Cocoa	Switzerland	Top Ten Countries that export coffee worldwide	Verite	UN Comtrade 2015
7	Cocoa	Italy	Top Ten Countries that export coffee worldwide	Verite	UN Comtrade 2015
8	Cocoa	Indonesia	Top Ten Countries that export coffee worldwide	Verite	UN Comtrade 2015
9	Cocoa	Belgium	Top Ten Countries that export coffee worldwide	Verite	UN Comtrade 2015
10	Cocoa	Ethiopia	Top Ten Countries that export coffee worldwide	Verite	UN Comtrade 2015
11	Cocoa	United States	Top Ten Countries that export coffee worldwide	Verite	UN Comtrade 2015
12	Cocoa	United States	Top Ten Countries that Import coffee worldwide	Verite	UN Comtrade 2015
13	Cocoa	Germany	Top Ten Countries that Import coffee worldwide	Verite	UN Comtrade 2015
14	Cocoa	France	Top Ten Countries that Import coffee worldwide	Verite	UN Comtrade 2015
15	Cocoa	Italy	Top Ten Countries that Import coffee worldwide	Verite	UN Comtrade 2015
16	Cocoa	Japan	Top Ten Countries that Import coffee worldwide	Verite	UN Comtrade 2015
17	Cocoa	Canada	Top Ten Countries that Import coffee worldwide	Verite	UN Comtrade 2015
18	Cocoa	Belgium	Top Ten Countries that Import coffee worldwide	Verite	UN Comtrade 2015
19	Cocoa	Netherlands	Top Ten Countries that Import coffee worldwide	Verite	UN Comtrade 2015
20	Cocoa	Spain	Top Ten Countries that Import coffee worldwide	Verite	UN Comtrade 2015
21	Cocoa	United Kingdom	Top Ten Countries that Import coffee worldwide	Verite	UN Comtrade 2015
22	Cocoa	Brazil	Top ten countries that produce coffee worldwide	Verite	FAOSTAT2014
23	Cocoa	Vietnam	Top ten countries that produce coffee worldwide	Verite	FAOSTAT2014
24	Cocoa	Colombia	Top ten countries that produce coffee worldwide	Verite	FAOSTAT2014
25	Cocoa	Indonesia	Top ten countries that produce coffee worldwide	Verite	FAOSTAT2014
26	Cocoa	Ethiopia	Top ten countries that produce coffee worldwide	Verite	FAOSTAT2014
27	Cocoa	India	Top ten countries that produce coffee worldwide	Verite	FAOSTAT2014
28	Cocoa	Honduras	Top ten countries that produce coffee worldwide	Verite	FAOSTAT2014
29	Cocoa	Guatemala	Top ten countries that produce coffee worldwide	Verite	FAOSTAT2014
30	Cocoa	Peru	Top ten countries that produce coffee worldwide	Verite	FAOSTAT2014
31	Cocoa	Uganda	Top ten countries that produce coffee worldwide	Verite	FAOSTAT2014

VISUAL TEXT ANALYTICS



VISUAL TEXT ANALYTICS

Show logic behind the scoring

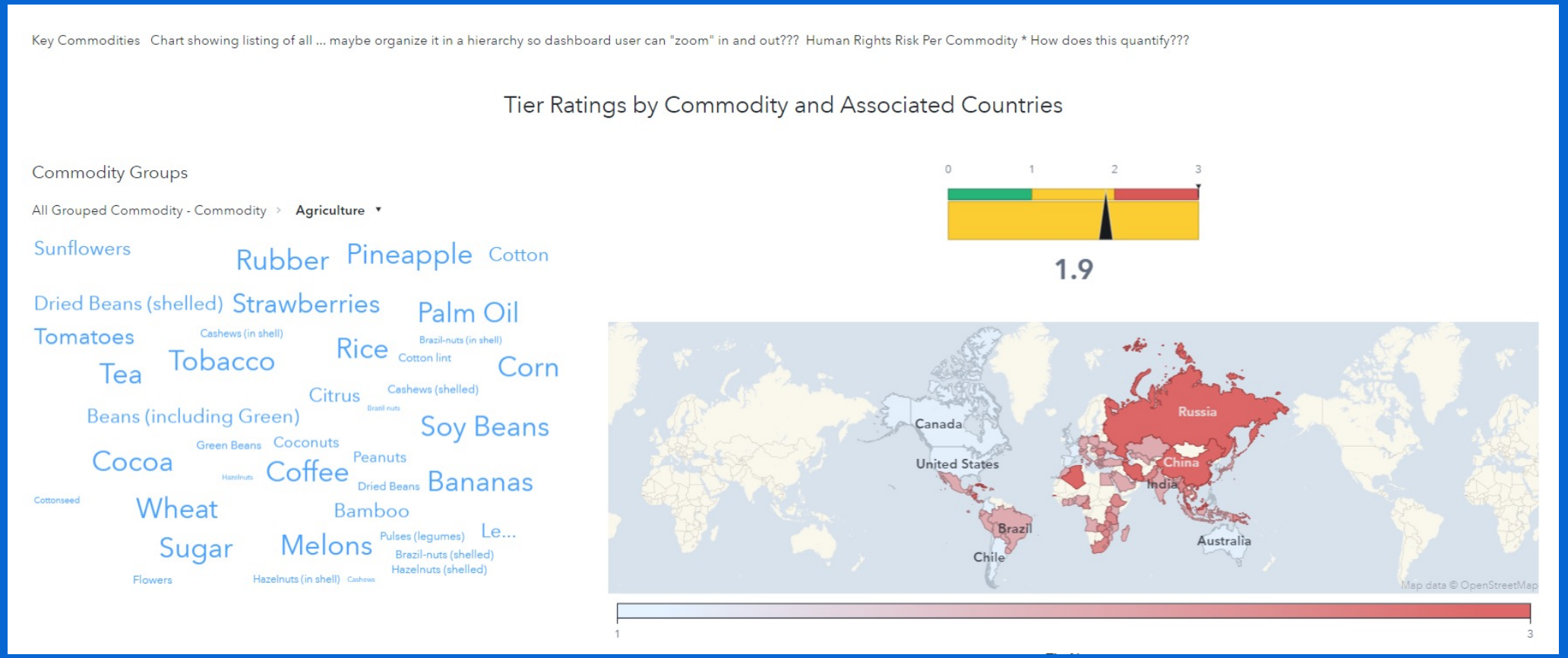


Dashboard

Commodities

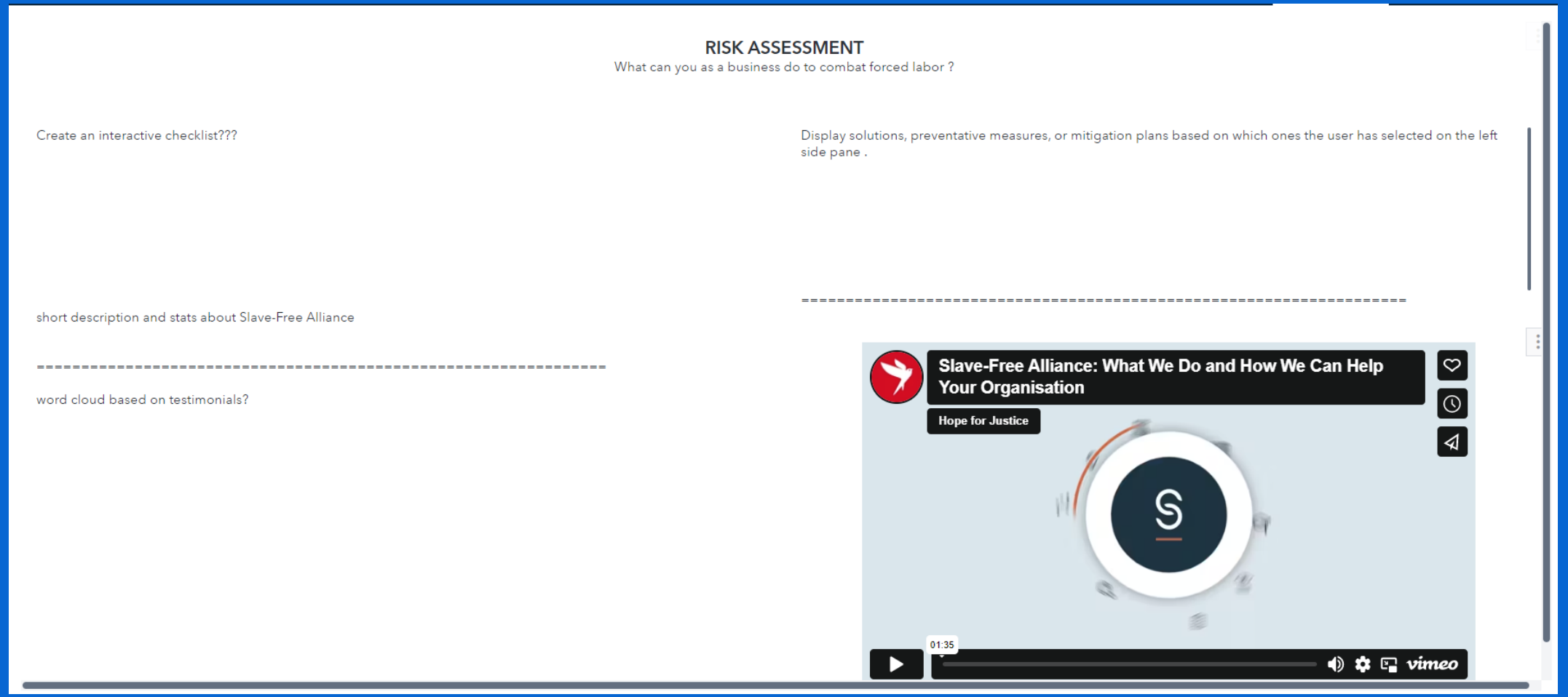
Facility Locations	Primary Commodity
COM00017.00	Aluminium
COM00025.00	Aluminium
COM00080.00	Aluminium
COM00106.00	Aluminium
COM00106.01	Aluminium
COM00106.02	Aluminium
COM00106.03	Aluminium
COM00150.00	Aluminium

Dashboard


Key Commodities Chart showing listing of all ... maybe organize it in a hierarchy so dashboard user can "zoom" in and out??? Human Rights Risk Per Commodity * How does this quantify???
Tier Ratings by Commodity and Associated Countries
Commodity Groups
All Grouped Commodity - Commodity
Agriculture
Sunflowers
Rubber
Pineapple
Cotton
Dried Beans (shelled)
Strawberries
Palm Oil
Tomatoes
Cashews (in shell)
Brazil-nuts (in shell)
Rice
Cotton lint
Tea
Tobacco
Corn
Citrus
Cashews (shelled)
Beans (including Green)
Soy Beans
Green Beans
Coconuts
Cocoa
Peanuts
Coffee
Dried Beans
Bananas
Cottonseed
Wheat
Bamboo
Sugar
Melons
Pulses (legumes)
Brazil-nuts (shelled)
Hazelnuts (shelled)
Flowers
Hazelnuts (in shell)
0
1
2
3
1.9
Canada
United States
Russia
China
India
Brazil
Chile
Australia
Map data © OpenStreetMap
1
3

Risk Assessment Tool

Prompts: What it is? What it's for? Who will benefit from it?




THE IMPACT

MANIFESTING A SLAVE-FREE SOCIETY

Using existing data to spotlight problems areas

Predicting Forced Labor

How can businesses use this technology to make informed decisions?

Outcomes and Future Potential

Units of measure of percentage change

Is there a way to quantify what a difference this work will make?

Spotlight success story

HOPE FOR JUSTICE

SLAVE-FREE ALLIANCE
Working Towards a Slave-free Supply Chain

Flexing my data science superpowers.

SAS HACKATHON

#SASHackathon

sas

HOPE FOR JUSTICE

SLAVE-FREE ALLIANCE
Working Towards a Slave-free Supply Chain

THANK YOU