

Equivalence and interoperability of cross border ESG reporting

U-Reg



OS-C

FRAMEWORK FRAGMENTATION ACROSS JURISDICTIONS

1 Fund management industry is the first to be impacted with compulsory ESG reporting

Europe
SFDR
enforced 2021

United States
IFRS-ISSB / SEC
enforced 2023

Singapore
Circular CFC 02/2022
enforced 2023

2 Fragmentation across industries and jurisdictions calls for interoperability

Green Finance Task Force ('GFIT')

May 12, 2022
GFIT Taxonomy
Consultation Paper

In defining the environmental objectives for Singapore's green taxonomy, **we first considered the frameworks offered by existing, established taxonomies**, particularly the EU Taxonomy, which were then **adapted given the local and regional policy contexts** in Singapore and ASEAN [...].



Unifying sustainability reporting (ISSB)

The [ISSB] Trustees are seeking to provide a global foundation for consistent and comparable sustainability reporting. They recognize that **additional or different information may be required** to meet other reporting objectives. A 'building blocks' approach would **enable jurisdictions to layer local requirements onto the global baseline**.

3 Informed investment decisions require complex ESG data flows across jurisdictions

of all Funds managed in Singapore

78%
sourced from
outside Singapore

90%
invested into assets
outside Singapore

58%
managed with
ESG overlay

Singapore, a global hub for sustainable finance

- Green Finance Action Plan
- Sustainable Finance Developments
- Technical Skills and Competencies ('TSC')

Inbound reporting

To report to MAS, Singapore-based managers must disclose foreign assets ESG perf. in SG standards

Outbound reporting

To report to foreign regulators, Singapore-based managers must disclose ESG in foreign standards.

Public markets

Public companies typically disclose unstructured ESG data, leading to complex data pipelines.

Private markets

Private markets lack access to comparable, timely and consistent ESG data within and across market participants.

FRAMEWORK CHALLENGE



Goals

- **Produce an equivalence model across main ESG reporting frameworks**
- **Identify most-efficient methodology to create equivalence**
- **Analyze strength and limitations of existing equivalence**
- **Automate the equivalence - at least partially**



ESG equivalence model across jurisdictions

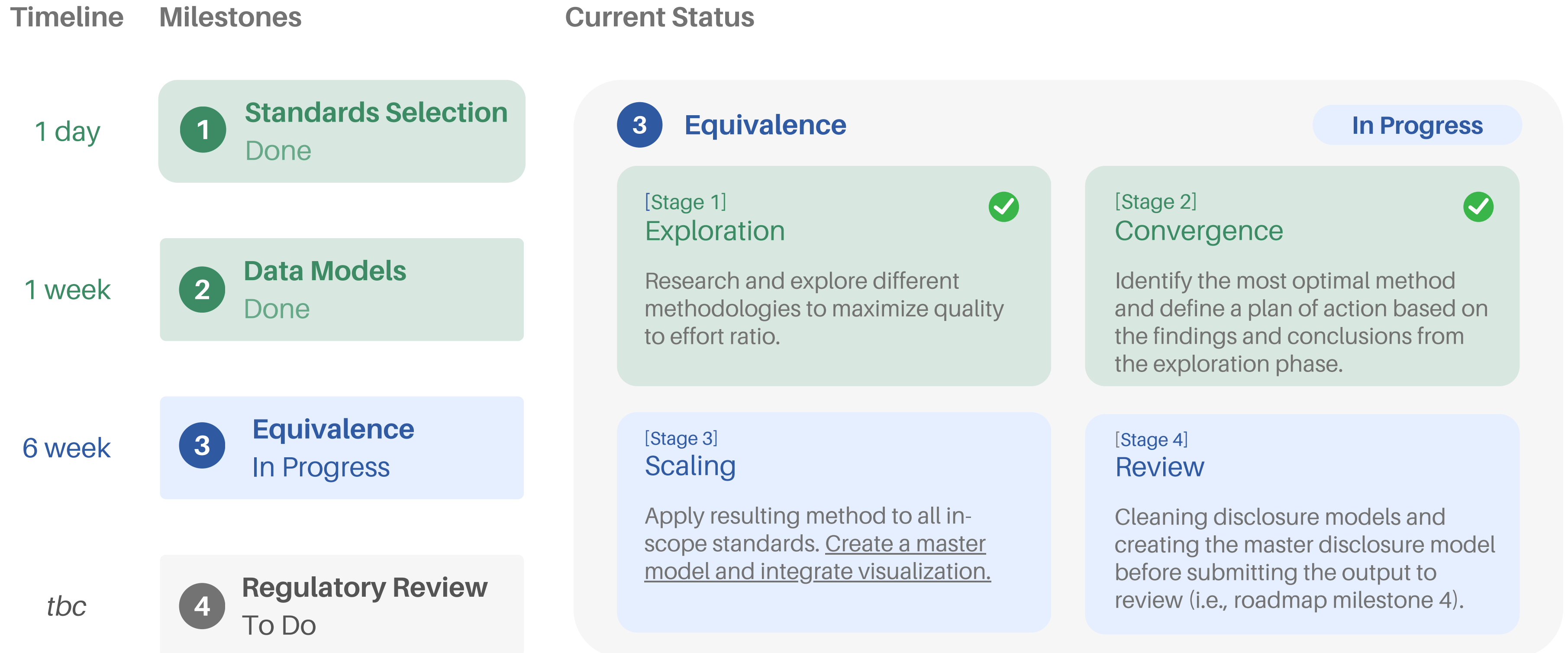
Equivalence model of ESG data and rules across global taxonomies or frameworks.

FRAMEWORK SCOPE

Global	Industry	Regulatory
<ul style="list-style-type: none">• SASB• GRI• TCFD• ISSB [new]	<ul style="list-style-type: none">• EDCI• SGX• ERQ	<ul style="list-style-type: none">• EU• SEC• Singapore• ASEAN
Recommended Additions by Shilpa Gulrajani (BNP)	<ul style="list-style-type: none">• ICMA (debt)• HKEX• LSE	<ul style="list-style-type: none">• China• Common Ground

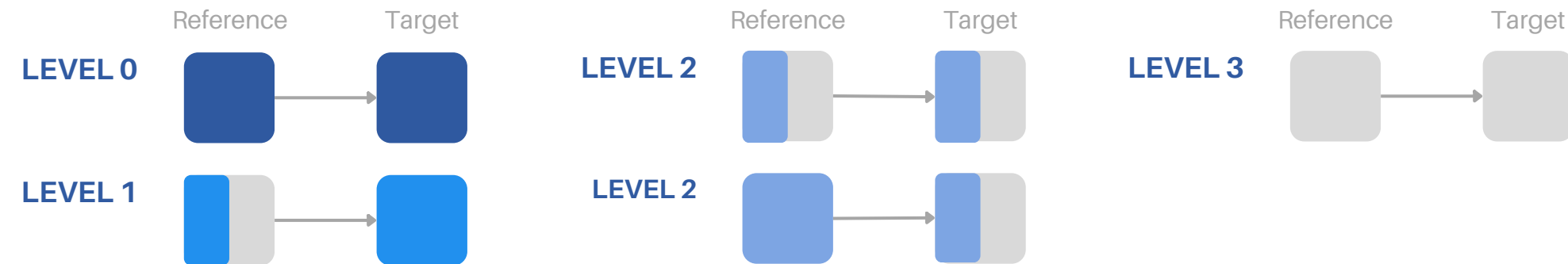
Will add more regulatory frameworks as we go.

PROJECT OVERVIEW



GENERAL EQUIVALENCE

Equivalence Classification



INITIALLY IDENTIFIED LIMITATIONS

- Splits
- Conversions
- Computations
- Wording
- Time
- Industry-specifics

Codified Frameworks

Potential Additions Done

- China
- Common Ground

- SASB
- GRI
- EDCI
- ERQ
- SGX
- EET (EU)
- ISSB
- HKEX
- Green Bond Principles
- TCFD

Equivalences Completed

GRI, SASB, EDCI, ERQ, SGX, HKEX

Coming soon:

ISSB, EET

Equivalence Pairs

Pairs with highest equivalence from both possible combinations

Pair	Equivalence 3	Equivalence 2	Equivalence 1	Equivalence 0
GRI - SGX	85.2%	81.5%	44.4%	33.3%
ERQ - GRI	64.3%	7.0%	6.9%	0.0%
HKEX - SASB	57.4%	35.2%	7.4%	1.9%
SASB - SGX	55.6%	51.9%	8.4%	3.7%
GRI - HKEX	53.7%	35.2%	13.0%	1.9%
EDCI - GRI	52.6%	52.6%	15.8%	15.8%
EDCI - SGX	52.6%	52.6%	21.1%	21.1%
HKEX - SGX	51.9%	48.1%	9.3%	0.0%
EDCI - SASB	47.4%	47.4%	5.3%	5.3%
ERQ - SASB	45.2%	9.8%	2.4%	0.0%
GRI - SASB	42.6%	36.0%	13.3%	1.3%
EDCI - HKEX	26.3%	26.3%	5.6%	0.0%
EDCI - ERQ	15.8%	15.8%	2.4%	0.0%
ERQ - HKEX	14.3%	9.3%	9.3%	0.0%
ERQ - SGX	7.4%	7.4%	7.4%	0.0%

OUTCOME

4 levels of equivalence

Equivalence relevance is largely confirmed. Among the 15 framework pair combinations, only 4 scored less than 40%, 9 fell within the range of 40% to 60%, while only 2 scored above 60%.

Besides, smaller frameworks require less information and tend to be more specialized, logically reducing the likelihood of identifying equivalences. From the data, it is evident that lower equivalence scores (less than 40%), only appear when two smaller frameworks are compared.

INDUSTRY-SPECIFICITY

SASB Exploration

Industry Family	1 FW	2 FW	3 FW	4 FW	5 FW
Resource Transformation	70.51%	42.31%	25.64%	11.54%	2.56%
Consumer Goods	69.86%	32.88%	13.70%	6.85%	0.00%
Food and Beverages	65.36%	32.03%	17.65%	10.46%	1.96%
Extractives and Minerals Processing	61.90%	38.69%	23.21%	10.12%	4.76%
Technology and Communications	54.95%	25.27%	17.58%	5.49%	1.10%
Renewable Resources and Alternative Energy	53.75%	33.75%	16.25%	7.50%	1.25%
Services	42.67%	16.00%	16.00%	6.67%	0.00%
Infrastructure	41.06%	20.53%	9.93%	5.96%	1.32%
Transportation	40.88%	29.93%	16.79%	12.41%	4.38%
Health Care	34.23%	10.81%	7.21%	3.60%	0.00%
Financials	31.18%	4.30%	3.23%	0.00%	0.00%

Industry Fam	Industry	1 FW	2 FW	3 FW	4 FW	5 FW
Financials	Commercial Banks	42.86%	0.00%	0.00%	0.00%	0.00%
Financials	Asset Management and Custody Activities	36.36%	9.09%	9.09%	0.00%	0.00%
Financials	Consumer Finance	33.33%	0.00%	0.00%	0.00%	0.00%
Financials	Investment Banking and Brokerage	27.78%	5.56%	5.56%	0.00%	0.00%
Financials	Security and Commodity Exchanges	27.27%	0.00%	0.00%	0.00%	0.00%
Financials	Insurance	26.67%	6.67%	0.00%	0.00%	0.00%
Financials	Mortgage Finance	25.00%	8.33%	8.33%	0.00%	0.00%

METHODOLOGY

The table compares the SASB framework to the five other frameworks. The first column indicates the percentage of disclosures within an industry that have an equivalence in at least one other framework. The second column represents those with equivalences in at least two other frameworks, and so on.

FW = framework

FINDINGS

It seems that the tertiary sector has fewer equivalents compared to the primary and secondary sectors. This observation does not constitute a universal rule.

Significantly beneficial to financial institutions, especially those investing in primary and secondary sectors.

VISUALIZATION

Framework from	Code from	Metric	Equivalence level	Framework to	Code to	Metric
SASB	FB-AB-130a.1	(1) Total energy consumed, (2) percentage grid electricity, (3) percentage renewable	1	GRI	302-1-c.i	In joules, watt-hours or multiples, the total electricity consumption
SASB	FB-AB-130a.1	(1) Total energy consumed, (2) percentage grid electricity, (3) percentage renewable	1	GRI	302-1-e	Total energy consumption within the organization, in joules or multiples.
SASB	FB-AB-140a.1	(1) Total water withdrawn, (2) total water consumed, percentage of each in regions with High or Extremely High Baseline Water Stress	1	GRI	303-5-a	Total water consumption from all areas in megaliters.
SASB	FB-AB-140a.1	(1) Total water withdrawn, (2) total water consumed, percentage of each in regions with High or Extremely High Baseline Water Stress	1	GRI	303-5-b	Total water consumption from all areas with water stress in megaliters.
SASB	FB-AB-140a.1	(1) Total water withdrawn, (2) total water consumed, percentage of each in regions with High or Extremely High Baseline Water Stress	2	GRI	303-3-a.i	Total water withdrawal from all areas in megaliters, and a breakdown of this total by the following sources, if applicable Surface water
SASB	FB-AB-140a.1	(1) Total water withdrawn, (2) total water consumed, percentage of each in regions with High or Extremely High Baseline Water Stress	2	GRI	303-3-a.ii	Total water withdrawal from all areas in megaliters, and a breakdown of this total by the following sources, if applicable Groundwater
SASB	FB-AB-140a.1	(1) Total water withdrawn, (2) total water consumed, percentage of each in regions with High or Extremely High Baseline Water Stress	2	GRI	303-3-a.iii	Total water withdrawal from all areas in megaliters, and a breakdown of this total by the following sources, if applicable Seawater
SASB	FB-AB-140a.1	(1) Total water withdrawn, (2) total water consumed, percentage of each in regions with High or Extremely High Baseline Water Stress	2	GRI	303-3-a.iv	Total water withdrawal from all areas in megaliters, and a breakdown of this total by the following sources, if applicable Produced water

Framework to EDCI ERQ GRI HKEX SGX

Equivalence level 0 1 2 3

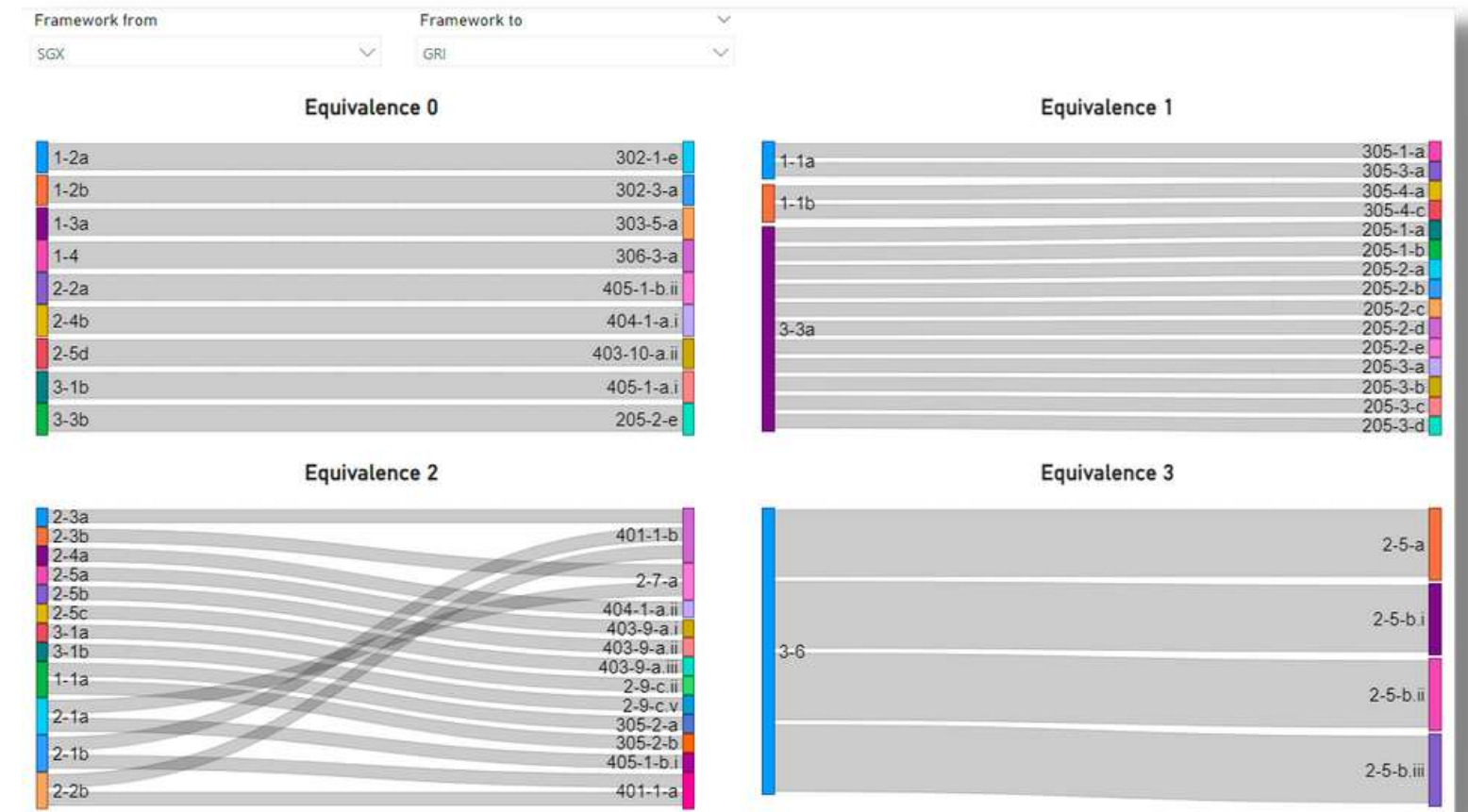
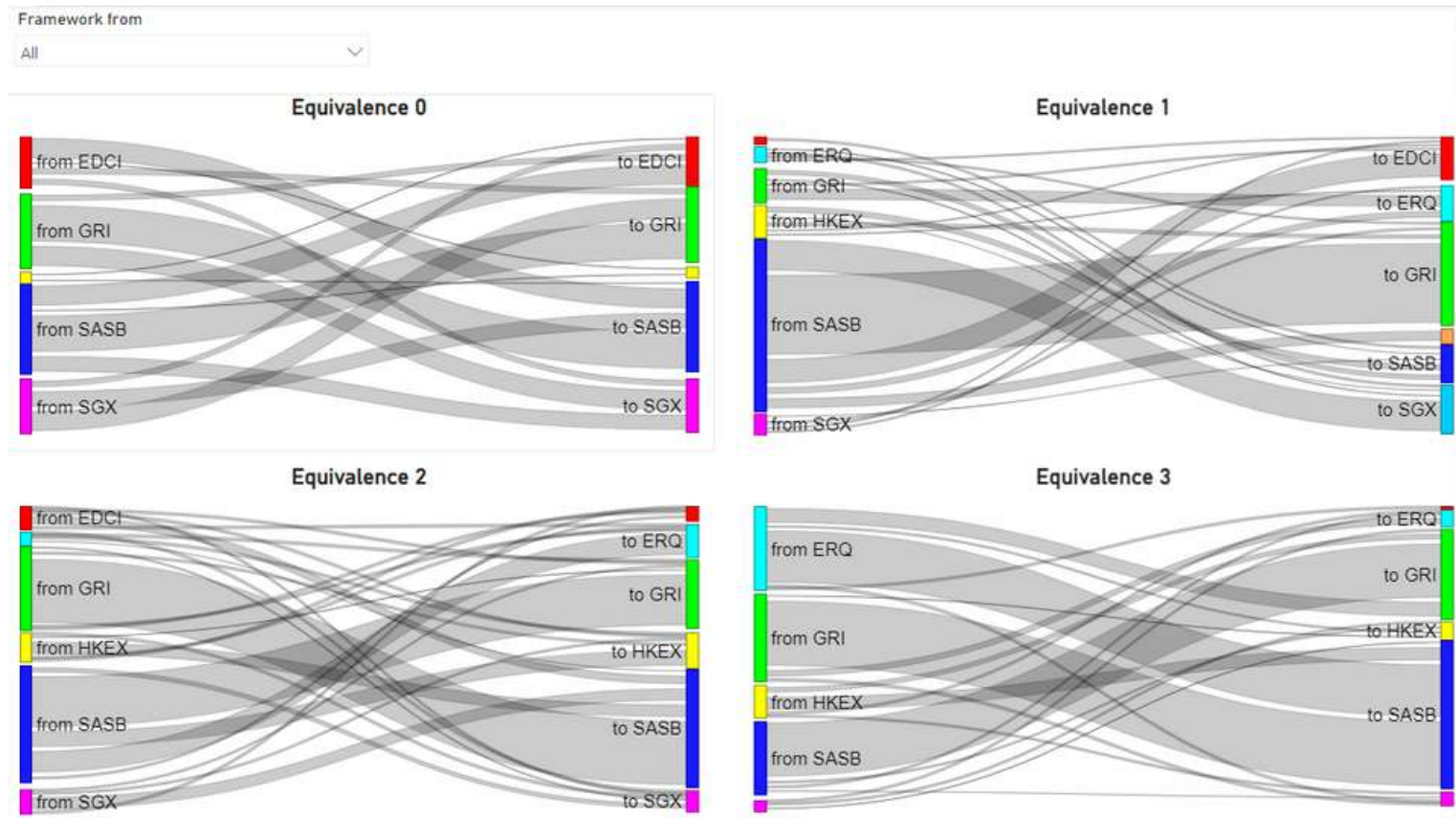
SASB Industry family, SASB Industry

- (Blank)
- Consumer Goods
- Extractives and Minerals Processing
- Financials
- Food and Beverages
 - Agricultural Products
 - Alcoholic Beverages
 - Food Retailers and Distributors
 - Meat, Poultry and Dairy
 - Non-Alcoholic Beverages
 - Processed Foods
 - Restaurants

BERT label

All

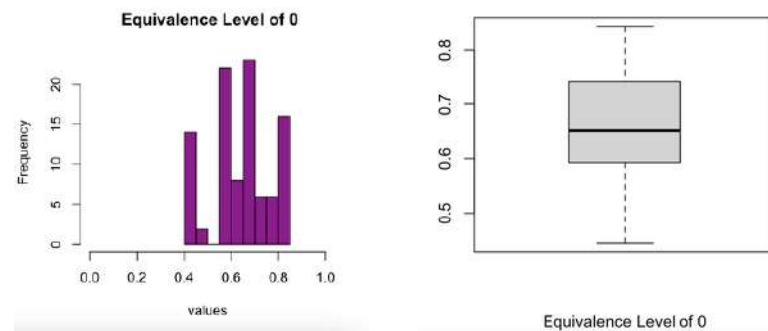
VISUALIZATION



EXPLORATION

Equivalence Level of 0

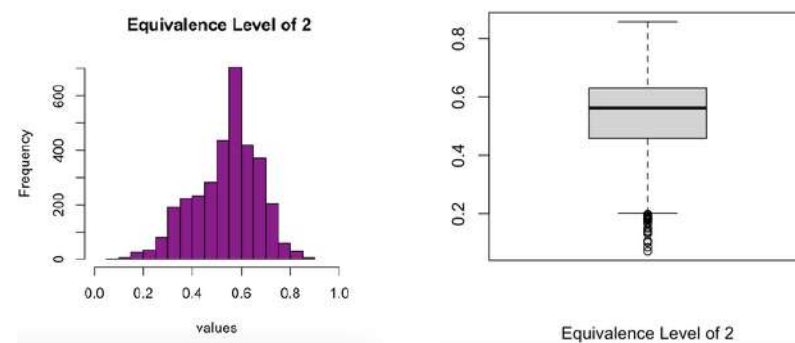
- Most values lied in optimal range
- SD = 0.117



Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
0.4437	0.5926	0.6511	0.6417	0.7427	0.8430

Equivalence Level of 2

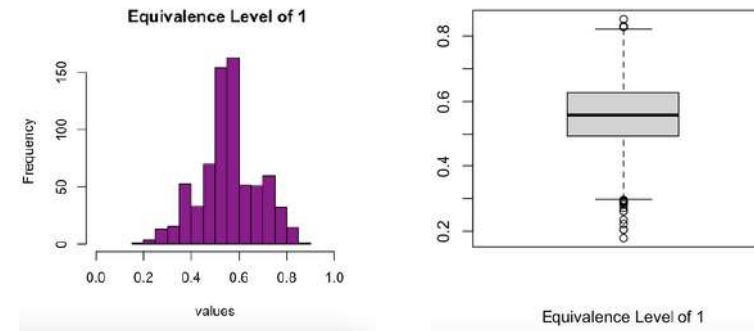
- Mean = 0.540, 25% of values > 0.6303
- Many outliers lie less than the lower quartile
- SD = 0.131



Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
0.0711	0.4578	0.5619	0.5396	0.6303	0.8573

Equivalence Level of 1

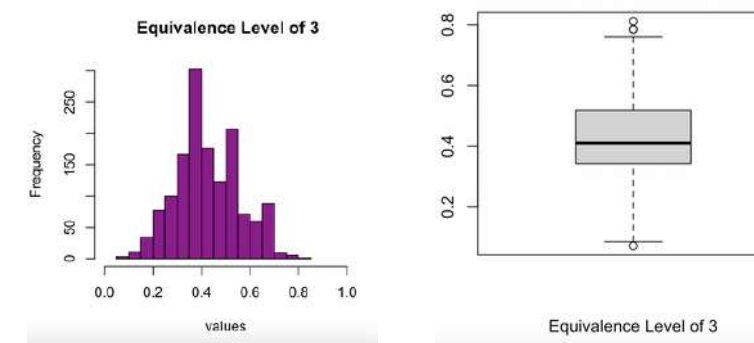
- Mean = 0.558, 25% of values > 0.6268
- Values range from 0.179 to 0.8514
- Large number of outliers
- SD = 0.123



Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
0.1790	0.4945	0.5586	0.5583	0.6268	0.8514

Equivalence Level of 3

- Mean = 0.426, 25% of values > 0.5183.
- SD = 0.131



Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
0.0711	0.3420	0.4099	0.4262	0.5183	0.8116

OBSERVATIONS

Statistical confirmation of our hypothesis

Test sentence similarity in R studio

- **Level 0:** high similarity
- **Level 1:** mean is only slightly lower but range is wider
- **Level 2:** mean is only slightly lower but range is wider
- **Level 3:** mean clearly much lower

STRONG POTENTIAL FOR AUTOMATION

Quality Checks: Pointers for possible errors

Mapping: Simplification of the equivalence process

Implementation

- Database engineering
- AI models
- Rule-based engines

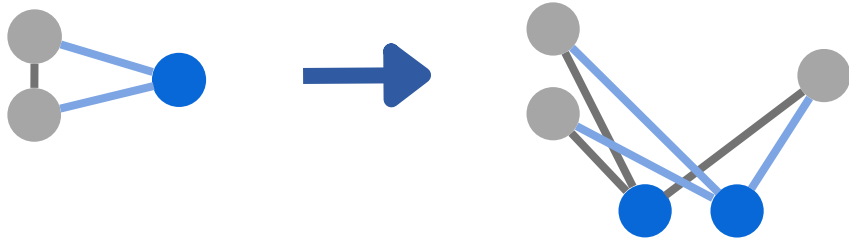
AUTOMATION

WHY?

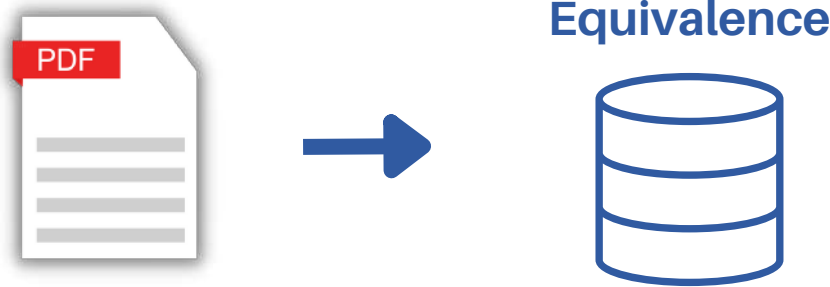
ACCURACY

SCALABILITY

Exponential Mapping Effort



Customer Data Extraction



all-MiniLM-L6-v2

Sentence Similarity

We ran Sentence Similarity tests using samples, our findings showed that when comparing :

- Pairs of equivalent disclosures (that we manually found), the median sentence similarity score is 0.54
- A sample of random disclosure pairs, the median score is around 0.15

BERT-ESG

Classification

We conducted a BERT classification for all disclosures from EDCI, ERQ, GBP, GRI, HKEX, ISSB, SASB, SGX. Our findings revealed that :

- 84% of these disclosures were classified with a confidence score exceeding 0.5
- 71% scored above 0.75
- 60% scored above 0.9
- 45% scored above 0.95

However, only 61% of pairs of equivalent disclosures have the same BERT label

In-House

Cross-checking

Cross-checking algorithm for equivalence verification

68 errors fixed

ChatGPT

Done

Data Extraction from Pdf

Not Conclusive

Done

Mapping of Semantic Data

Good Potential

Intiating

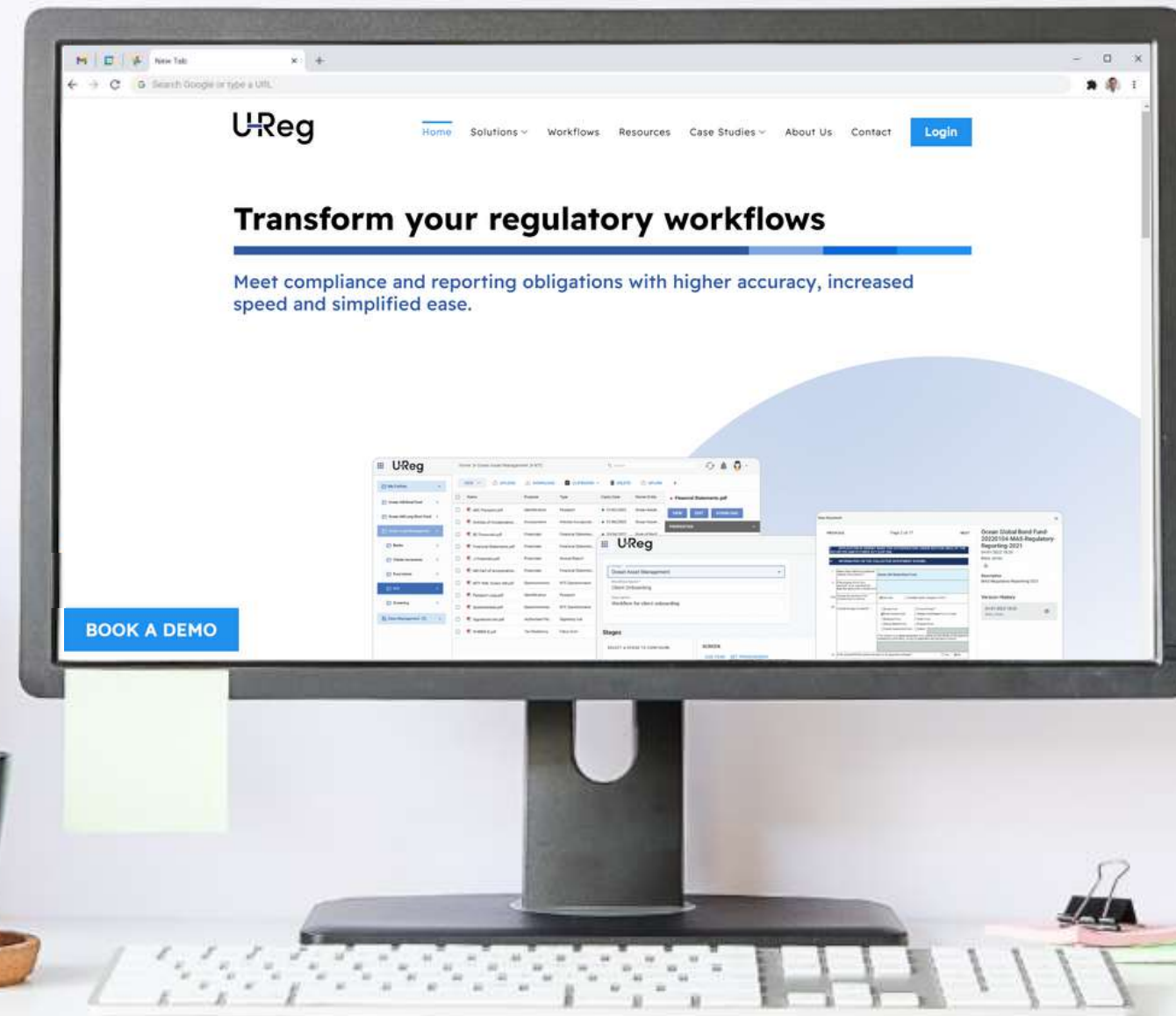
Rule-based engine

Good Potential

Starting Q3 2023

Specialized LLMS / AI to harmonize heterogeneous models

Good Potential



Interested in open-source collaboration?

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