IMPACT MANAGEMENT PROJECT

Digitisation of sustainability information: A study to assess the feasibility and value of a registry for digital taxonomies

Prepared by the Sustainability Digitisation Working Group (SDWG), an initiative hosted by the Impact Management Project (IMP)

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1. Foreword: Letter from Jane Diplock AO

We are living through an unprecedented and exciting opportunity. For the first time, there exists a global confluence of aspirations, initiatives, and cross-jurisdictional support to develop a global set of digital, comparable, sustainability standards and frameworks. This is the digital century when every aspect of life is being transformed by digitisation. A global digital ecosystem of corporate reporting is an essential part of the transformation.

In September 2020, five global organisations – CDP, Climate Disclosure Standards Board (CDSB), Global Reporting Initiative (GRI), International Integrated Reporting Council (IIRC) and Sustainability Accounting Standards Board (SASB) now the Value Reporting Foundation (VRF) – whose frameworks, standards and platforms guide most sustainability and integrated reporting, announced a shared vision of what is needed for progress towards comprehensive corporate reporting – and the intent to work together to achieve it. Their paper is a contribution to that progress.

The Corporate Reporting Dialogue (CRD) coordinated by the IIRC was another ground-breaking project focused on driving better alignment in the corporate reporting landscape, to make it easier for companies to prepare effective and coherent disclosures that meet the information needs of capital markets and society. And, more recently in June (2021), the International Organization of Securities (IOSCO) and the International Financial Reporting Standards Foundation (IFRS) collaborated and published its joint report sharpening focus on sustainability related disclosures.

This TELOS feasibility assessment extends all of this work by considering how digitisation can enable and accelerate the interoperability, discoverability and alignment of sustainability standards. It calls for digitisation to now be at the core of the sustainability ecosystem from standard setting through to disclosure to audit. This outcome would be realised by incorporating relevant technology from the start of the standard setting process.

I am therefore honoured to submit this taxonomy registry assessment to these stakeholders, and the wider sustainability stakeholder community. This assessment confirms that a taxonomy registry is technically feasible.

This work is the very first step on the digital journey towards realising a totally coherent, globally comprehensive, digital system of corporate disclosures. Such an ecosystem is critical to ensure markets can fully comprehend the risks and opportunities related to financial, social, governance and environmental issues, allowing informed decision making.

The technology currently exists to facilitate a global digital reporting framework. This global framework will mean that whatever sustainability standard-setting process an entity chooses to use to formulate its framework or standards, decision-making by users will be transformed. Using comparable digital data, calculations, comparisons and assessments will be feasible. These will facilitate value creation decisions and investment options and will significantly improve management, governance, impact and risk assessment and investment decision making. At the same time, they will still adhere to domestic regulatory reporting requirements where necessary. Of course, this is one aspect of the total reporting ecosystem which entities will consider and address.

There are several steps needed to be taken to bring this vision to life.

Firstly, we need a globally accepted digital sustainability compatibility framework. Business reporting remains fragmented as the findings in Digital Transformation Brief: Business Reporting in The Fourth Industrial Revolution, demonstrates. Many of the open-source information technical standards supporting the underlying digital disclosures (such as XBRL, SDMX, FIBO, DPM and others) are also fragmented, however the defacto standard for external regulatory reporting (that is the output level of the data lifecycle) is dominated by XBRL.

This TELOS feasibility assessment clarifies the importance of integrating human and machine capabilities. By integrating these capabilities, we can begin to fully understand different definitions and the underlying fundamental assumptions. We can then document what can be compared and what cannot be into an intelligent digital dictionary. Identifying what is the same, what is different or what is similar. Going so far as identifying at what level they are similar, or different.

This means leveraging technologies like knowledge graphs to visualise the use case and the value proposition to embed the standards, directives, regulation, and controlled vocabularies into a digital blueprint.

Once we have that blueprint, we can then look at how the standards will fit into the taxonomy and a reporting schema that can be embedded easily into software solutions without misinterpretations. These developments, along with alignment, will enhance the measurement of value creation and enable business model sustainability comparisons, which are currently difficult to achieve.

As the drive toward a global system for digital sustainability-related reporting continues, investors, regulators and policymakers are also turning their attention to the important role of assurance in promoting high-quality reporting. With the growing importance of and reliance on sustainability information, this information needs to have the same credibility, comparability and rigour in disclosure as financial information, to enable reasonable assurance to be given. The global audit standards and ethics standards for the accounting profession should also be digitised from the commencement of the standard setting process.

Current financial Reporting Standards, Audit standards, Tax requirements and Legal literature are actively being digitised, meaning sustainability and sustainability digital reporting standards will need to do some catching up.

There is a need for global principles and standards on digitisation to be agreed by the market to ensure that there is consistency in the governance of digitisation and its market application.

Achieving consensus on a digital ecosystem will allow us to deliver on the promise of a lower cost compliance solution which is interoperable, discoverable and scalable. This important assessment is an exciting solutions-based first step in that journey, as well as an important contribution to the discussion on how technology consensus could be achieved and actioned.

The future is now upon us. In this report, we have taken the initial steps for a comprehensive global interoperable digitised sustainability ecosystem which will drive the economies of this century.

2. Executive summary

Fragmentation and the lack of interoperability are pronounced sustainability digitisation challenges for disclosure, reporting and auditing. The same term can hold different meanings for different regulatory bodies. Due to differing market needs and regulatory priorities, siloed digital taxonomies are under development around the world. This increases the risk of a lack of global interoperability and misaligned data definitions and taxonomy structures. The current result is an alphabet soup of digital taxonomies not easily embedded into software for multi-taxonomy reporting. Sustainability disclosures can only be sufficiently addressed through an unprecedented digital collaboration!

In this paper, we demonstrate how a digital taxonomy registry is a fundamentally critical building element towards the ultimate vision of achieving end to end digitisation of sustainability related information. A registry of taxonomies would be a technological reflection of a human agreement on how to best develop and maintain interoperable digital taxonomies for sustainability standards. This feasibility study assesses the technical feasibility of developing a public registry concept to house, manage, access and link taxonomies for sustainability frameworks and standards.

There is a compelling case to show that standard setters should embed digitisation of sustainability reporting within its standard setting activities from the outset to ensure swift and efficient digitisation of sustainability taxonomies.

The purpose of which is multidimensional, including to:

- Improve the efficiency and effectiveness of sustainability reporting processes through digitisation.
- Facilitate data comparability of sustainability reporting through digitisation and machine-readable techniques.
- Facilitate a collaborative taxonomy development environment to support greater coordination among sustainability standards setters and regulatory authorities.
- Assess governance and establish an oversight committee governing taxonomies developed from standards and frameworks.
- Disseminated standards are consistently ingested without any loss of interpretation.

Where possible the SDWG looked at this assessment with a view to achieving global interoperability and reducing the cost of compliance.

This Feasibility Study confirms that a Taxonomy Registry is technically feasible. It also confirmed several immediate pre-building activities that we recommend completing. Since completing this report, we've identified two key pre-build deliverables to further the global digitisation vision:

1. Human agreement on a common digital translation mechanism to build a bridge between standards, frameworks, regulations, and best practices.
2. A prototype to demonstrate the technical possibilities for digitisation using Climate First and Digital-from-Start as a practical commonly agreed example.

The mission of the Sustainability Digitisation Working Group (SDWG) is to provide recommendations and guidance to the IMP structured network on whether to implement a registry of taxonomies.

They fundamental questions that we set out to answer were:

- How could SDWG bring global consensus to digitise sustainability related disclosures that are fit for purpose?
- Is technical consensus for a digitised registry of sustainability standard taxonomies achievable?
- What are the viable options for achieving such a digitised solution?

- What are the prerequisite building blocks and foundations necessary to achieve a digitised solution that is fit for purpose?
- What are the key factors to consider in the analysis (i.e., technical, economic, legal, operational, and scheduling) that could impact the ability to implement and maintain a taxonomy registry)?

Leveraging the unprecedented sustainability disclosure moment, we are fortunate to have the participation of a multi-stakeholder SDWG team, utilizing a mix of skills and expertise, consulting across disciplines and geographies when completing the methodology of this study.

This report acknowledges there are several viable options that could lead to achieving the stated objectives. Key aspects like resources, costs or necessary investments for authorities and institutions need to be further analysed once the key decisions and scenarios are mutually agreed by the SDWG Steering Committee.

This report assesses the technical feasibility of developing a public registry concept to house, manage, access and link taxonomies for sustainability frameworks and standards.
The SDWG used several structured models to perform its assessment, including:

- TELOS (Technical, Economic, Legal, Operational, Scheduling) model commonly used for feasibility assessments of potential new programs
- A status quo radar, user journeys, and a shortlist methodology using Desirability, Viability and Feasibility criteria for the Registry development
- A program evaluation and review technique (PERT) and Critical path method (CPM)

We find ourselves with an unprecedented opportunity to leverage the global sustainability momentum and support for digitisation to bring the key open-source technical players into a room to identify how various initiatives relate to and complement one another. This momentum will enable us to take a giant step towards interoperability of global sustainability standards and reporting as well as reducing the cost of compliance for all stakeholders in the ecosystem for public good!

Overview and key findings

This Feasibility Study confirms that a taxonomy registry is expected to have a favourable impact by generating value to stakeholders, in particular achieving interoperability and potentially lowering the cost of compliance.

- Developing a registry of taxonomy requires active stakeholder involvement and active sponsorship/support given that sustainability reporting and disclosure has a direct impact on them. Stakeholder consensus is a critical element to ensure a successful outcome of the digital taxonomy registry project.
- It is probable that the greatest benefits will be gained more readily if the registry of taxonomies were made available as a public good, unless embedded in commercial products where licencing arrangements could be appropriate.

In our approach, we considered several aspects:

- The feasibility of a design of a unique and common controlled digital data dictionary that facilitates data comparability and removes overlaps (following the ‘define once’ principle).
- The desirability, feasibility and viability of existing technologies to house, manage, access and link taxonomies for sustainability frameworks and standards
- Possible economic options, costs and considerations for bringing to life the digital registry of taxonomies.
- Legal considerations surrounding the digital registry, IP structure options, governance alternatives or unique legal risks attached with a global registry.

- Resource needs, timelines, risks and mitigations around the resources needed to bring the registry to life.

The Registry will support the evolution of entity reporting in several ways. It promotes and standardizes a shared digital vocabulary for sustainability/ESG standards which addresses current confusion and ambiguity and will enable organizations to create both financial and sustainability/ESG disclosures using XBRL technologies. The taxonomy registry will facilitate digital, discoverable, timely, and credible sustainability and financial data and help elevate sustainability disclosures to the level of financial disclosures. The registry's purpose is to enhance taxonomies, it will not collect or hold user data.

The report includes the findings on the feasibility of developing the registry from a technological, economic, legal, operational, and scheduling lens. Furthermore, assessing key factors (i.e., **t**echnical, **e**conomic, **l**egal, **o**perational, and **s**cheduling) that could impact the Structured Network's ability to implement and maintain a registry of taxonomies as the first step towards an end-to-end digital ecosystem.

The **T**echnical assessment found that a Taxonomy Registry is technically feasible. There are significant benefits accruing to all the stakeholders of the sustainability reporting ecosystem by way of increased efficiency, clarity, consistency, and usability. Having maximum taxonomies in the Taxonomy Registry with data points defined in the same format will ensure a common and unambiguous understanding to all stakeholders of the data requirements, avoid overlaps and facilitate further smooth communication across stakeholders. The next technology steps depend on broad agreement being reached amongst the stakeholders with respect to the preferred Technical Option(s) to be adopted for building the Taxonomy Registry.

The **E**conomic assessment concludes that the alternative of developing the technology in-house versus outsourcing, from an economic point of view, is not deemed materially different in the fullness of time at a mark-up of 20-30% and a build cost in the region of U$4.13M (3.5M€). The decision is optimally informed by access to market resources, when and where needed, as well as the desired timeline to bring the digitized taxonomy registry online. The decision to build a data centre versus purchase a Cloud Platform service is more economically straightforward. The most viable option is using a commercial Cloud platform service provider which can flexibly scale as needed without the need for capital investments or the risk of technological obsolescence. The option of a fully outsourced commercial SaaS solution is very attractive, as expected, with a 5-year outlay of U$1.435M (1.215M€). Using only an economic quantitative lens, the optimal choice would be to proceed with a full suite SaaS service provider which has a 5-year spend of U$1.435M (1.215M€) versus any variation of the self-build alternatives being northward of U$16.53M (14.1M€) once Cloud service provider and development licence needs are factored in. However, it is strongly advisable to consider qualitative factors to reach a risk-balanced decision.

The **L**egal conclusion is that taxonomy adoption by regulatory bodies is a key enabler to ensuring well-functioning markets and attainment of the full-vision. Additionally, it is important to safeguard taxonomies against any future issues by requiring all participants in the development process to sign intellectual property (IP) agreements, stating that these participants are freely contributing all work product and comments. The governance structure may vary, the key is to structure it such that stakeholder engagement is effective and high. In effect, there are no insurmountable legal obstacles that cannot be mitigated or managed.

The **O**perations assessment notes that a steering committee recommendation is needed on the technological option preferred for the Taxonomy Registry, to create a detailed operational road map. The operational plan development will follow the principles and methodology outlined in its section of the report.

Within **Scheduling,** the project to develop a registry of taxonomies should follow a life cycle model implementation that includes three-key phases:

- Build/Purchase Phase**:** *Estimated Timing:* Depending upon the technology option and decision to build or purchase (as defined in the economic section) is estimated to take between 12 to 24 months.
- Manage Phase: *Estimated Timing:* Depending upon the scope and availability of various stakeholders, human and economic resources, this phase will take anywhere up to 24 months.
- Update Phase**:** *Estimated Timing:* The timeline of this phase depends on the manner and execution of the project. The operating manual detailing the step-by-step manner of maintaining the technology will be prepared while building the taxonomy registry.

Dependencies

The Structured Network members should consider several key dependencies, as they impact decisions about the strategic approach to designing a registry of taxonomies.

Program adoption will have dependencies on multi-stakeholder willingness and ability to include and require their sustainability reporting to be digitised from the start.

Success of the registry of taxonomies depends on stakeholder consensus (including Standard Setters, Professional Bodies, Global and National Government Regulators) in deciding the most beneficial way forward to decrease the of duplication of efforts, redundancies, and inefficiencies within the ESG reporting and disclosure ecosystem.

The Structured Network itself will likely have internal dependencies upon the incorporation of a taxonomy development process into their existing standards development process. The registry of taxonomies depends on alignment of the users (of information), policy makers and tool/ solution providers with respect to the infrastructure, capabilities, features and functionalities that need to be included in the digital offerings.

Risks

- Multiple taxonomy or other digitisation approaches/ initiatives by various standard setters and international professional bodies confuse ecosystem stakeholders and lead to unintended consequences hindering integration of financial and sustainability reporting.
- Stakeholder objectives of the ESG Ecosystem across different sectors, regions and regulators make it challenging to objectify and harmonise the ESG Data Flow Framework.
- Lack of clear mandates, rules and regulations across the sectoral and regional regulatory bodies make adoption and governance of digital transformation to the desired level of effectiveness uncertain.
- Set-up costs to create, disseminate and use integrated digital platforms may dissuade some stakeholders from adopting the recommended initiatives.
- Product/ Software/ Solution Providers may not be in sync with the intended requirements leading to the creation of tools that may be suboptimal in the fullest sense of the purpose.
- Siloed taxonomy processes risk adding to the technical fragmentation and lack of interoperability and cost of compliance.

Recommendation

Support by the SDWG Steering Committee of these findings would be welcome. In particular, **support for further exploration of a registry of taxonomies.**

With this support, the next steps in this process could be:

- Global market engagement to establish a technical framework to achieve interoperability

    - Establish a transparent governance mechanism to define and bring together a credible global market engagement to develop an interoperability ready technical solution for public good
    - Establish the go-forward model around governance, funding, and operations of the technical solution.

- Technical solution for the public good:

    - Market assessment of relevant IT player contributions to the digital transformation of ESG disclosure.
    - Define a technical scope to create a public good digital harmonised data model of words, terms, metrics, and other data points for sustainability.

- Build a Climate prototype and develop a best practice toolbox for standard setters, users, and practitioners of digital ESG guidance.

While a registry of taxonomies is an optimal step, it is primarily important that there be a foundation laid for interoperability to reduce the cost of compliance and facilitate ESG reporting, through a structured and controlled digital governance mechanism.

We would like to acknowledge that without the exceptional assistance of SDWG members, the Review Committee and the Structured Network members volunteering their time and effort, this level of understanding and progress towards achieving global digital interoperability and standardisation could not have been reached. Supporting the recommendation will launch the next important steps in the digitisation journey which will benefit the markets globally as part of the entire sustainability ecosystem, and which will ensure standard setting and information technology are suitable for the 21st century and beyond.

3. Context

"The Bank's management and analysis of data is critical to our effectiveness as regulators and to the City's competitiveness. "The Bank now receives 65 billion data points each year of firm-related information. To put that into context, reviewing it all would be the equivalent of each supervisor reading the complete works of Shakespeare twice a week, every week of the year.… For firms, while the Cloud and AI have reduced the costs of storage and analysis, producing regulatory submissions is still labour intensive and costs the industry an estimated £2-4.5 billion per year. This is the new frontier of regulatory efficiency and effectiveness."

Mark Carney, Governor of the Bank of England, 20 June 2019

In fiscal year 2016, the U.S. Securities and Exchange Commission estimated (in its Congressional budget justification, page 16) it would spend over half its budget to "foster and enforce compliance.

Recent years have seen a growing and urgent demand to improve the quality, comparability and auditability of sustainability information, particularly from investors with cross-border portfolios and companies with global value chains, but also from civil society and regulators.

According to the International Federation of Accountants (IFAC) and Business at the OECD (BIAC), the cost of regulatory divergence (defined as inconsistent financial sector regulation between different jurisdictions) is estimated to cost the global economy US $780 billion a year[1]. Further, a study commissioned by the EC[2], the incremental compliance costs for the financial sector cross 11 EU Member states between 2009 and 2017. Annual compliance costs of €4 billion constituted an average of 2%-4% of an organisation's total operating costs, representing an increase of up to 610% during the eight-year period. And duplicate data is expensive. According to research from the Data Warehouse Institute, data quality problems cost U.S. businesses more than $600 billion every year.

The costs of regulatory reporting and compliance have ballooned over the last decade. This is because the regulatory agencies that sit across a variety of business management aspects - including tax, securities, banking, insurance, statistics, workforce, water usage and environment etc. - all need to separately collect information from regulated entities, as well as impose restrictions. These input, throughput and output costs will only grow as ESG transitions from voluntary to mandatory and regulated disclosure.

These reporting area differences and overlaps or gaps increase complexity and challenge the usefulness of a compliance ecosystem as reflected in the following diagram "Figure 1: Regulatory Reporting and Compliance Fragmented Ecosystem".

We need to leverage this unprecedented opportunity to transition away from the current state towards one where data is fit for purpose in a digital and sustainable economy.

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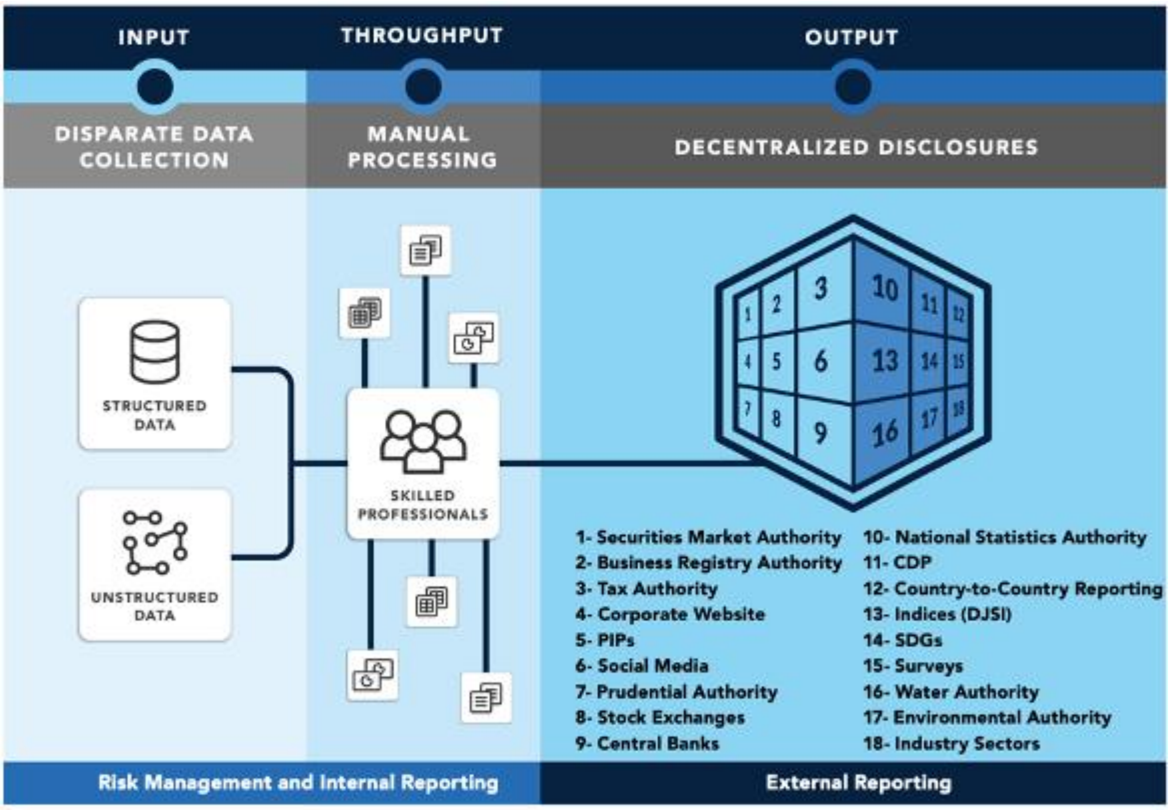
[1] IFAC, BIAC (2018), Regulatory Divergence: Costs, Risks and Impacts IFAC, BIAC (2018), Regulatory Divergence: Costs, Risks and Impacts IFAC, BIAC (2018), Regulatory Divergence: Costs, Risks and Impacts

[2] European Commission (2019), Study on the costs of compliance for the financial sector Study on the costs of compliance for the financial sector European Commission (2019), Study on the costs of compliance for the financial sector Study on the costs of compliance for the financial sector European Commission (2019), Study on the costs of compliance for the financial sector Study on the costs of compliance for the financial sector

Figure 1: Regulatory reporting and compliance fragmented ecosystem.



Source: A Digital Transformation Brief: Business Reporting in The Fourth Industrial Revolution

We now need to consider how this wider ecosystem issue manifests itself on the ground in terms of sustainability reporting and disclosures through some key questions.

1. **What exactly is the issue we're facing today with disclosures?**

	Standard Setters	Preparers	Data Users
Current State	ESG standard setters develop and disseminate standards (some with digital reporting taxonomies, and some without).	Preparers store and create their required disclosures in a variety of data formats (PDF, JSON, HTML, xHTML, XML, XBRL, SDMX, XLS, etc).	Stakeholders consume the data in the fragmented formats, usefulness is limited, and discoverability is poor. Or those with deep pockets buy data from data aggregators.
Software vendors incur significant development costs to embed unique data formats and taxonomies into their disclosure management products – they strategically select which ones they support (many are not supported due to the prohibitive costs), Information Technology fragmentation of data formats is a real issue.			

2. **How has a standard setter that is developing its own taxonomy impacted the ecosystem?**

	Standard Setters	Preparers	Data Users
Individual standard setters are developing their own standards' taxonomies in a siloed manner.	Standard setters are individually setting their own digital taxonomies, with their own architecture, structure, and format.	Preparers use the commercially available disclosure management products (or develop their own); it is limited as no SaaS solution includes all taxonomies required by the marketplace.	Stakeholders consume the data in a combination of digital and non-digital formats, decision usefulness is improved but remains limited. Or alternatively could purchase it from data aggregators.
The lack of cohesion in standards and (digital) interoperable taxonomies drives up preparer and regulatory costs, both in terms of time and resources. It also weakens the auditability of information, which increases risk from interpretation differences, misinformation, and inadvertent partial compliance or non-compliance. Additionally, the assembling, dismantling, and repackaging of data in the required format may cause compliance issues through unintentional information errors.			

3. **How is the marketplace adapting to existing structured taxonomies?**

	Standard Setters	Preparers	Data Users
Adapting to existing taxonomies & how market actors are playing a role	Standard setters maintain and update their taxonomies to reflect their standard requirements. Whereas, regulators may allow extensions which preparers can use in telling their story within a defined digital format.	Preparers use extensions to tell their digital story.	Decision usefulness is improved further through extensions; however, fragmentation remains a data consumption challenge and cost. Some comparability is lost because of extension usage.
Within the context of digitalisation, the more structured the data, the more it lends itself to digitisation. A key consideration in the standard setting process is how to balance the use of a more structured or rigid required approach versus an open or more flexible approach for preparers to tell their own story.			

4. **How could we start to address the growing fragmentation issue?**

	Standard Setters	Preparers	Data Users
An information technology solution and a human agreement that consistently structures taxonomies developed.	Standard setters start developing taxonomies using a consistent best practices framework. Common controlled vocabularies (glossaries) are used. Standards are housed in a worldwide registry	Preparers use commercially available reporting products (or develop their own); it now meets all the taxonomies required by the marketplace. Cost of compliance	Stakeholders can fully consume the digitised data; decision usefulness is high as is data quality and discoverability. Consumption costs are significantly reduced.

<table>
<tr><td></td><td>of well-defined taxonomies.</td><td>costs are significantly reduced.</td><td></td></tr>
<tr><td colspan="4">The fragmentation issue really starts to be solved through a human agreement on a joint digitisation strategy. In fact, the taxonomy registry would be the technical reflection of a human agreement on how to best develop and maintain interoperable digital taxonomies for sustainability standards.</td></tr>
</table>

5. **How can we build on a registry of taxonomies to further improve the ecosystem?**

<table>
<tr><th></th><th>Standard Setters</th><th>Preparers</th><th>Data Users</th></tr>
<tr><td>Create an innovation layer where ecosystem players can engage, provide feedback, and help clarify best practices that feed in standard setting, metrics, regulation, and more.</td><td>Standard setters receive real-time and meaningful feedback from standard users. Issues are more quickly identified. Taxonomy dissemination is consistently interpreted and embedded into software products, no misinterpretations, or delays.</td><td>Preparers use the commercially available best practice reporting products, which are fully compatible with market needs. Cost of compliance costs are at the lowest level possible.</td><td>Stakeholders consume the data in a digital format, decision usefulness is high as is data quality and discoverability. Consumption costs at the lowest level possible.</td></tr>
<tr><td colspan="4">Software vendors seamlessly integrate all registry standard taxonomies, metrics, frameworks, regulation, and updates into their digital reporting products to support market needs. Interoperability is a reality, and their development costs are much lower.

An innovation layer therefore improves efficiencies in the preparation, collection, extraction, and analysis of the data.</td></tr>
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Comparing digitisation in sustainability reporting to financial reporting

The digitisation of financial information is more mature than sustainability information, but challenges remain

Financial information as an area of electronic business reporting is more than a decade ahead of sustainability information. Whilst the digitisation of financial information has been a long and complex process, regulators have grown increasingly familiar with the benefits of digital taxonomies and therefore mandated their use. XBRL has played a crucial role in the widespread adoption of taxonomies. Established in 1998 as a non-profit consortium, XBRL's technical specification for electronic business reporting has been mandated by over 180 financial and capital markets regulators, business registries and tax authorities across 60 countries[3].

In summary, when defining a digital format, the following aspects require consideration:

- Standards need to be consistently structured and written with clarity to facilitate the digitalization of the reported data.
- Standards need to consider the expected use of the disclosures when defining the granularity and types of disclosures requirements (numerical and non-numerical disclosures).
- Useful data is digital, machine-readable, and structured with a semantic meaning (e.g.: A method of organizing and structuring data that reflects the basic meaning of data items and the relationships among them).

[3] XBRL Project Directory

- The human-readable information is identical to the machine-readable equivalent information.

Some variations in digital taxonomies are natural and to be expected, as is the case when countries or jurisdictions onboard *non-digital* versions of a standard. However, siloed processes for digital taxonomy development result in taxonomies that, despite mostly using the same format, are not always as readily compatible as they could be.

Better coordination between the standard-setters and regulators that produce taxonomies, and improved visibility regarding their respective taxonomy management processes, would help to resolve this needless incompatibility, leading to more consistently structured, comparable information for preparers and users.

4. Future state: What a registry of taxonomies could enable

Structured taxonomy development is one side of the equation in creating a digital sustainability solution. The second side is codification of the standards themselves, so that their content can be digitally discovered and understood by users. The experience of digitising financial information has made two things clear:

- Taxonomies are increasingly the preferred method of exchange for regulated financial information and are therefore likely to be the preferred option for regulated sustainability information.
- Even when taxonomies are mandated in regulation, appropriate governance and controls are needed to guide the development of the taxonomies and to ensure their potential benefits are fully realised.

A registry of taxonomies could be part of the infrastructure[4]. It would offer an environment where standard-setters and regulators can collaboratively produce digital taxonomies and provide an efficient means to disseminate them to users.

When applied to the specific case of digital taxonomies for sustainability standards, a registry of this kind would provide a range of uses and benefits to different stakeholders, as illustrated in Table 1.

Table 1: Uses of registry of taxonomies

	Develop taxonomies	Disseminate taxonomies	Receive feedback on taxonomies	Access taxonomies to embed into software	Download taxonomies for use	Provide feedback on taxonomy usability	Review and compare data definitions
Standard-setters	X	X	X				X
Govt. and Regulators	X	X	X				X
Software providers				X	X	X	X
Reporters					X	X	X
Auditors				X	X	X	X
Data providers				X	X	X	X
Analytics platforms				X	X	X	X
Investors					X	X	X
Civil society	X	X			X	X	X

Appendix 1 expands further on the uses of a registry of taxonomies to consider the benefits of a well-governed taxonomy development process, which could be enabled by a registry of digital taxonomies.

This conceptual agreement is represented in Figure 2 below, as a foundational layer from which to build the technology itself (corresponding to layer 2 in the diagram).

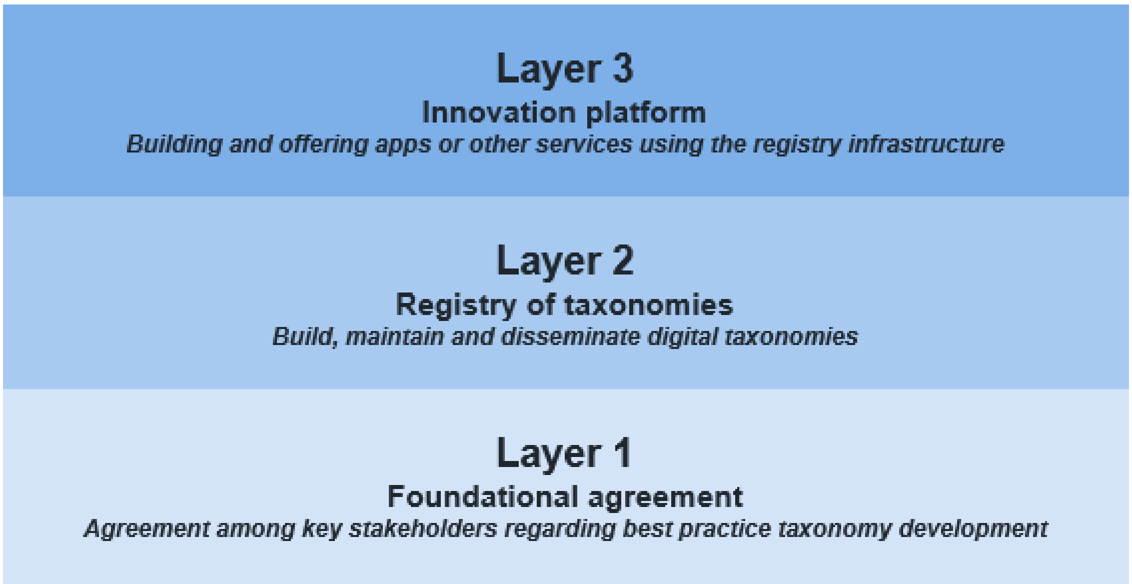
If a registry is built and taxonomies are successfully being disseminated to users, it is likely that further layers could be introduced to build on this infrastructure. This third layer would facilitate the creation of new and innovative services that use the registry.

Whilst the first two layers would need to be maintained as a public good, ensuring fair and equal access to digital taxonomies, the third layer could allow for some degree of commercialisation and the

[4] This concept has already been explored in a paper by the Institute of Management Accountants (IMA®) (2020), A digital transformation brief: Business reporting in the fourth industrial revolution....A digital transformation brief: Business reporting in the fourth industrial revolution.A digital transformation brief: Business reporting in the fourth industrial revolution.

emergence of new market players (such as new consulting services, assurance services, etc). The illustrative audit firm may wish to develop its consistency check algorithm into an app and licence it to other software vendors.

Figure 2: Layers of ecosystem for taxonomy development



5. TELOS assessment

Scope

These workstreams are outlined according to a framework developed by James A. Hall, which serves as business management tool for assessing the feasibility and viability of a new product or service across the following areas:

Technological: The technological infrastructure for the registry as guided by stakeholder requirements
Economic: The different business models for the implementation and maintenance of the registry
Legal: An assessment of any regulatory or legislative factors that could support or hinder the establishment of the registry, as well as key considerations related to its potential governance
Operational: The required steps for building, maintaining and updating a registry
Scheduling: Estimated times for developing a registry

Technological

Overview of workstream scope and assessment

The purpose of this workstream is to understand the key features of the technological infrastructure that would support the registry. This includes an analysis of the already available technology solutions in the market (or, if inadequate, what type of technology would need to be developed). It also analyses how this solution would be accessed and used by stakeholders.

The primary deliverable of the Technological workstream was to shortlist a set of technology options that would inform the research and analysis of the other workstreams. As such, this workstream was the first of five to begin its research activities, with the purpose of developing:

1. *A status quo radar:* Research was conducted to develop a long list of the existing technologies that would be considered as options for developing and maintaining the registry. Whilst all could be used in isolation, the workstream also explored if and how some of the options could be used in combination.
2. *Persona and user journey analysis:* A series of workshops were carried out to ascertain the primary users of the registry, along with an analysis of their day-to-day tasks and challenges that may be affected by the digitisation of sustainability information.
3. *Functional requirements specification:* A summary of the technical and functional requirements that are informed by the needs of the key stakeholders.
4. *Technology options shortlist:* The functional requirements were used as reference points for a set of criteria (see below) that were used to assess a long list of technology options:
    - *Desirability* ensures that the outcome meets the expectations of users as they experience the technology.
    - *Viability* considers the long-term potential of the registry to deliver value and remain operationally and strategically fit-for-purpose.
    - *Feasibility* assesses the likelihood of being able to implement, maintain and use the registry.
5. *Solicit feedback from the Review Advisors*: The provisional list of shortlisted technology options was shared with the SDWG's group of advisors to cross-check findings and amend the list accordingly.

These activities are elaborated on throughout this section so as to answer the questions presented through the TELOS framework.

Questions

T1. What are the primary requirements that a registry of taxonomies needs to meet?

Through analysis of the user journeys, as well as tasks and challenges of the personas that were considered as key stakeholders of the registry, the Technological workstream agreed that users must be able to:

- Contribute taxonomies to the registry through a defined approval process.
- Enable ongoing management of taxonomies with versioning history.
- Have the functionality to present all the technical properties within the taxonomies.
- Download taxonomies from the registry in common technical formats.
- Understand whether taxonomy data definitions are linked to jurisdictional regulations.
- Identify data definitions according to a defined query (e.g. by sustainability topic or industry).
- Discover individual taxonomy items or data definitions to improve taxonomy development.
- Provide feedback on the taxonomies and their data definitions.

The workstream also agreed that, from a usability perspective, the registry of taxonomies should:

- Be user-friendly, as validated by user acceptance tests performed by business experts.
- Cater for multiple languages to the extent possible at interface level and at the level of taxonomies stored within the registry.

To meet the requirements of the targeted stakeholders, the registry should incorporate the following provisional technical specifications:

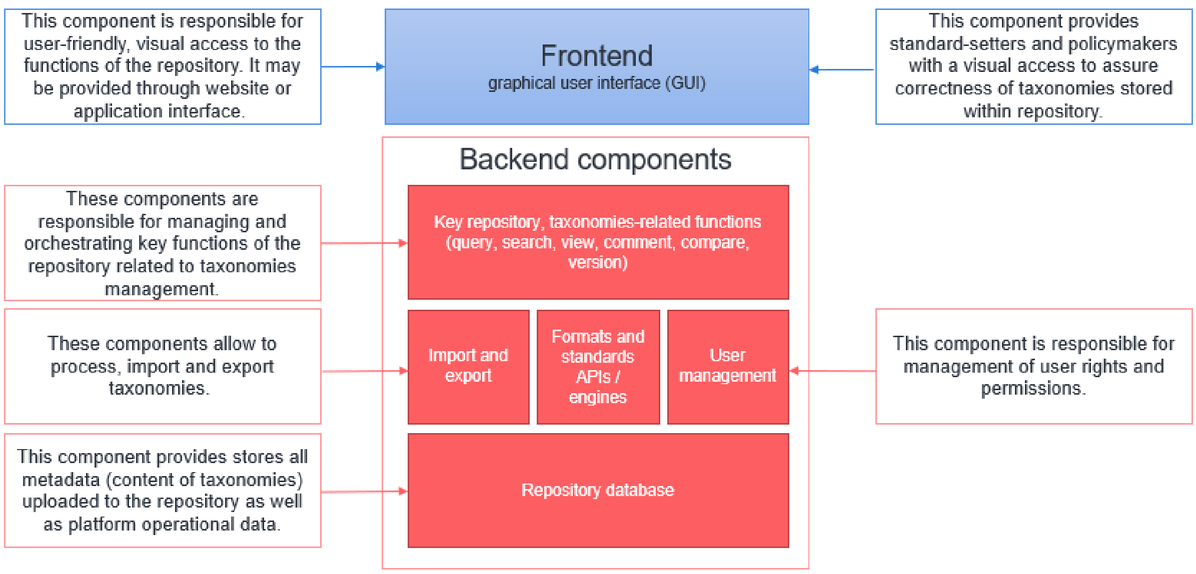
- The registry should be supported by a scalable architecture, allowing for sufficient processing power for the number of users accessing the registry and volumes of taxonomies being processed.
- The registry should, to the extent feasible, facilitate the importation of existing taxonomies from international standards (such as XBRL and SDMX).
- Users shall preferably interact with the registry through commonly accessible user interfaces (browsers).
- The registry should facilitate API-access to the content stored within its repository to allow for interoperability between the registry and different users of taxonomies, such as software vendors.

The user and functional requirements were used as reference points for the feasibility, desirability, and viability criteria, which were used to score each technology option using a Likert scale.

T2. What is a potential architecture for a registry of digital taxonomies?

Figure 2 provides a high-level architecture for a registry of digital taxonomies and the main components required to deliver the functional requirements. This architecture would be common across all shortlisted technology options.

Figure 2: Architecture of registry of taxonomies



T3. What technology options could be used to deliver a registry of taxonomies, and which options are preferable from a feasibility, desirability, and viability perspective?

The Technological workstream analysed a longlist of 13 technology options (see below) before assessing them against the feasibility, desirability, and viability of each.

- **SVN platform:** A software versioning and revision control system that allows users to upload and maintain historical versions of source code.
- **Meta models:** A methodology that separates the value of a data point from its definition. The definition is broken down, enabling flexible translation between definitions based on the same atomised “building blocks”.
- **Ontologies:** An approach to data modelling which describes a domain of knowledge using formal logic. This enables powerful reasoning over information when is it stored in the defined format.

- **Linked / open data**: Technologies that facilitate the creation or sharing / exchange of information, characterised by user generated content.
- **Distributed Ledger Technology (DLT)-based network**: A peer-to-peer network in which data is stored on each network node and synchronised through a consensus-based algorithm.
- **Interplanetary File System (IPFS)**: A decentralised system of user-operators who hold a portion of the overall data, creating a resilient system of file storage and sharing.
- **Social media**: Technologies that facilitate the creation or sharing / exchange of information, characterised by user generated content
- **World Wide Web Consortium (W3C)**: The main international standards organisation for the World Wide Web.
- **API-driven**: Software interface that defines interactions between multiple software programmes. It specifies what kind of requests can be made and what format such requests should adhere to.
- **Relational database**: Data stored in set of tables with columns and rows. Relationships between tables pre-defined using unique identifiers called primary keys.
- **Network database:** A variation of the relational database approach that facilitates more advanced linking between multiple owner files (many to many relations).
- **Object-oriented database**: This approach is a variation of the relational database approach. Object-oriented databases use small, recyclable, separated from software objects. The objects themselves are stored in the object-oriented database.
- **Digital standard:** A technical specification that provides the means, using agreed syntax, to represent a Sustainability standard digitally.

Table 2 lists out each option and how they were scored based on these criteria.

Table 2: Assessment of longlisted technology options

Option	Desirability	Feasibility	Viability
Meta-models	4	4	4
Digital standard	4	4	2
Network/graph database	3	4	2
Ontologies	3	4	2
SVN platform	2	4	3
Social media	4	3	2
Linked data/ open data	3	3	2
Relational database	1	3	4
World Wide Web standards	3	3	2
API-driven	3	3	1
Object oriented DB	1	2	2
DLT-based network	1	1	2
Interplanetary File System (IPFS)	1	1	1

The options in the grey cells illustrate the five that were shortlisted based on how they scored on the scale (of 1, strongly disagree, through 5, strongly agree). Appendix 2 presents a summary of each shortlisted option and the benefits and challenges associated with each (these summaries were used to inform how each option was scored).

Economic

Overview of workstream scope and assessment

The Economic workstream provides an assessment of the estimated cost (or range of costs) to establish and maintain a registry for digital taxonomies, as well as some analysis to explain how the registry could support compliance cost reduction or revenue-generating activities. This includes potential revenue-generating opportunities by working with third-party ecosystem actors, such as software vendors. By nature of this feasibility study, this report does not seek to prescribe how the registry should be built. Thus, the build and running costs of the registry are simply presented according to three alternative scenarios (building and maintaining the registry internally, via a third-party software developer or by using an off-the-shelf solution).

Questions

Initial investments:

- a. *What elements of this digital transformation will attract investment expenditure and what is the investment range stakeholders should reasonably expect to make?*
- b. *How could the ROI on this investment be assessed: by the ecosystem? Stakeholder group? Individual entities? Sustainability measures? Or something else?*

Ongoing operating expenditures:

- a. *Once implemented, what are the ongoing key budget, costs and resources requirements?*
- b. *How will the ecosystem running costs and future enhancements be funded on a sustainable basis?*

Stakeholder monetisation opportunities:

- a. *Are there new revenue generating opportunities for key stakeholders during or after significant digital transformation has been achieved? Are there additional cost-positive benefits available to key stakeholders?*
- b. *Digital Transformation often results in the use of existing intellectual property (IP) or the creation of a new IP. Could such IP be further monetised for the benefit of IP rights owners under a fair remuneration model considering the public's good vision?*

Initial investments

When assessing the initial investment envelope, we considered three alternatives for the digital registry of taxonomies platform:

1. The registry is developed using a bespoke software development solution
2. The registry is outsourced to a third-party software developer to construct
3. A registry service (which includes the software licence and hosting) is purchased from a third-party using commercial solutions

We further assessed the hosting options once the digital registry was live, in particular where the entity owning the platform could:

1. Build/Buy a data centre within which to host the registry platform
2. Purchase hosting services from a commercial web hosting service provider

Data centre evaluation

The data centre build and maintenance costs, assuming a small 5 to 10 rack data centres with Cooling, Power (UPS + Generator), Fire Suppression and Security at a Tier 1 level, in a colocation data centre are between U$8883 (7.5K€) and U$14,665 (12.4K€) per month.

Choosing a cloud platform service provider (akin to Azure or AWS), for a comparably sized and secure hosted environment, runs approximately U$29.5K (25K€) per annum. Additional annual price discounts are expected to be offered upon contract negotiation.

The cost of building and maintaining a data centre is higher than necessary to achieve the desired outcome, it is more economically feasible to use a Cloud Platform service provider to host the registry itself. This choice provides the further additional benefit of a flexible and scalable solution in future years.

Technology solution evaluation

The registry build, assuming an in-house customised solution, is expected to run for 24 months and minimally requires solution architects (2), front and back-end developers (2 each), product and UX developer (1), testers (2). The total IT cost for this build option is estimated at close to U$3.5M (2.968M€).

The platform requires additional resources from inception and on an ongoing operational basis to manage operations (such as onboarding new taxonomies, taxonomy change maintenance, etc). These resources include business experts (4) and technical maintenance support staff (2) from inception and technical support staff (2) onboarded in quarter seven to prepare for platform user support needs. The costs for business experts and technical maintenance staff is estimated at U$892K (756K€) per annum, and for technical support staff is estimated at U$297.5K (252€) per annum.

In addition to the labour cost, we must consider the software tool licences necessary to build the solution (in-house or outsourced) which include Jiria, Github, Fujitsu, Corefiling and Confluence. This annual spend is estimated between U$122K-712K (103K-603K€) - the wide range is due to the inability to secure reliable pricing for Fujitsu and Corefiling without soliciting a direct quotation. The proxy used for the pricing is the xBRL API - note it should be used as a directional indicator, specific RFI/RFP quotes should be obtained for decision-making purposes.

The second option to outsource the registry build to a third-party, would see base costs uplifted to include a reasonable profit margin for the third-party vendor. An average margin uplift expected would be in the range of 20-30% over the costs adding approximately U$700K-1M (594K-890K€) to the IT development cost of U$3.5M (2.968M€). This option may be more attractive if the development timeline could be reduced or if there is a shortage of the necessary skills at a reasonable rate in the chosen geographies. The licence costs are the same for an in-house versus outsourcing circumstance.

The third option to select a commercially available SaaS solution is also viable, with some trade-offs expected on functionality. The annual cost of this option is estimated (based on ATOME list pricing) to run approximately U$287K (243K€) per annum, which is a package for up to 3 administrators, up to 20 data architects and up to 100 readers/reviewers with export options included for XLS, XBRL, SQL and API. This option, while the most economically feasible, also needs consideration from a qualitative characteristics point of view during the decision-making process. The qualitative characteristics that require consideration include business continuity, intersect of public good with commercial use solutions, software sunsetting, financial stability and viability of a commercial SaaS provider, software code held in escrow (to protect against supplier insolvency), flexibility and cost effectiveness of future development or change needs, and the SaaS solution's ability to embed other taxonomies (i.e.: financial taxonomies).

Infrastructure evaluation

In addition to the platform build itself, the entity housing the platform requires infrastructure support. Office costs have been built into the model for 2000 sq. ft. at 90€/sq. ft. and general operating expenses of 5K€ per person per year to cover office supplies, utilities, and cleaning services. The extended annual cost is estimated to run in the region of 291K€ per annum.

Back-office resources, which could be leveraged from an existing entity that would host/own and manage the registry platform, include finance, HR, legal and admin. The cost for these resources is estimated at U$489K (415K€) per annum.

Access devices, such as laptops, monitors and related accessories, need to be purchased immediately. The technology cost per person budgeted is U$10.6K (9K€) requiring an initial outlay of U$215K (182K€), followed by a three-year recycle refresh.

Outreach is a critical element to include in the budget, as it is a key component of the platform's long-term success and acceptance. Outreach includes travel and accommodation costs, marketing activities such as webinars, printed materials, and the like. The first-year budget is U$290K (250K€) adjusted for inflation thereafter.

Projected outlays

Total funding needed for year one is U$4.110M (3.506M€) plus an uncertain upside cost risk of an additional U$590K (500K€). The funding needs could be satisfied in cash or with in kind contributions.

First Year Funding by Quarter			Year 1			
			1	**2**	**3**	**4**
Business experts			(126,000)	(126,000)	(126,000)	(126,000)
Operating costs	Staff costs	Front	(434,000)	(434,000)	(434,000)	(434,000)
		Back	(103,688)	(103,688)	(103,688)	(103,688)
	Office costs		(72,813)	(72,813)	(72,813)	(72,813)
	Outreach costs		(62,500)	(62,500)	(62,500)	(62,500)
	Licencing costs		(25,750)	(25,750)	(25,750)	(25,750)
	Cloud service provider costs		(6,250)	(6,250)	(6,250)	(6,250)
Total operating costs			**(831,000)**	**(831,000)**	**(831,000)**	**(831,000)**
Capital purchases			(182,250)			
Funding Needed (baseline excl. cost risk)			**(1,013,250)**	**(831,000)**	**(831,000)**	**(831,000)**
Fujitsu/Corefiling upside cost risk (500,000/year for both)			(125,000)	(125,000)	(125,000)	(125,000)
Funding Needed (including cost risk)			**(1,138,250)**	**(956,000)**	**(956,000)**	**(956,000)**

Total funding needed for the first two years is U$8.274M (7.057M€) plus an uncertain upside cost risk of an additional U$1.19M (1.015M€). The funding needs could be satisfied in cash or with in kind contributions.

First Two-Year Funding Model			Year 1				Year 2			
			1	2	3	4	5	6	7	8
Business experts			(126,000)	(126,000)	(126,000)	(126,000)	(129,780)	(129,780)	(129,780)	(129,780)
Operating costs	Staff costs	Front	(434,000)	(434,000)	(434,000)	(434,000)	(447,020)	(447,020)	(511,910)	(511,910)
		Back	(103,688)	(103,688)	(103,688)	(103,688)	(103,688)	(106,798)	(106,798)	(106,798)
	Office costs		(72,813)	(72,813)	(72,813)	(72,813)	(74,997)	(74,997)	(74,997)	(74,997)

	Outreach costs		(62,500)	(62,500)	(62,500)	(62,500)	(64,375)	(64,375)	(64,375)	(64,375)
	Licencing costs		(25,750)	(25,750)	(25,750)	(25,750)	(26,523)	(26,523)	(26,523)	(26,523)
	Cloud service provider costs		(6,250)	(6,250)	(6,250)	(6,250)	(6,438)	(6,438)	(6,438)	(6,438)
Total operating costs			**(831,000)**	**(831,000)**	**(831,000)**	**(831,000)**	**(852,819)**	**(855,930)**	**(920,820)**	**(920,820)**
Capital purchases			(182,250)							
Funding Needed (baseline excl. cost risk)			**(1,013,250)**	**(831,000)**	**(831,000)**	**(831,000)**	**(852,819)**	**(855,930)**	**(920,820)**	**(920,820)**
Fujitsu/Corefiling upside cost risk (500,000/year for both)			(125,000)	(125,000)	(125,000)	(125,000)	(128,750)	(128,750)	(128,750)	(128,750)
Funding Needed (including cost risk)			**(1,138,250)**	**(956,000)**	**(956,000)**	**(956,000)**	**(981,569)**	**(984,680)**	**(1,049,570)**	**(1,049,570)**

A five-year budget has been estimated for an in-house built platform (we build, own, and run), the expected costs are circa U$16.53M (14.10M€) plus an uncertain upside cost risk of an additional U$3.11M (2.65M€). The funding needs could be satisfied in cash or in kind.

The comparable budget if the platform solution is built by an out-sourced contractor (TP built, we own and run) rises by U$1M (890K€), a one-time incremental cost over the first two-years as previously noted.

And finally, the comparable budget if the platform registry resides in an existing commercially available SaaS solution (SP build, own and run) is U$1.435M (1.215M€).
Assumptions

All salary estimates are based on London (UK) equivalent roles in Glassdoor. These will vary between jurisdictions, where specialist IT skills may be in higher or lower demand. Salary assumptions have been uplifted to include benefits, pensions, and payroll related taxes (the salary uplift for these additional costs is 40%, which varies between jurisdictions). The budget costs are adjusted for inflation, at a rate of 3% per annum. The budget funding needs for the platform may be filled through both cash and in-kind contributions. The model uses 2021 market cost-based pricing estimates and includes a range where it may be more representative of labour or foreign currency arbitrage, for example.

Projected budget expenditures are estimates within +/- 10% to capture minor geographic cost arbitrage and estimate variations.

The technology chosen is not expected to materially change the projected budget.

Monetisation opportunities

Monetization opportunities are limited to layer 3 (innovation layer), Value added insights which stem from an ecosystem of structured information, given the objective of the registry being a public good. Opportunities for monetization could lie in extended taxonomies, search definitions, data definition analysis, and taxonomy comparisons.

The opportunities may be akin to an example with the FASB standards, which themselves are a public good in their raw and unformatted structure. The digitized FASB standards, however, are available as a commercial offering.

Why monetize? Monetization offers a source of funding to support innovation, harmonization and integration initiatives. It often offers a viable path to support the public side of the organization's activities, i.e.: availability of public good standards.

The economics, therefore, show:

The alternative of developing the technology in-house versus outsourcing, from an economic point of view, is not materially different in the fullness of time at a mark-up of 20-30% and a build cost in the region of U$4.13M (3.5M€). The decision is optimally informed by access to market resources, when and where needed, as well as the desired timeline to bring the digitized taxonomy registry online.

The decision to build a data centre versus purchase a Cloud Platform service is more economically straightforward. The most viable option is using a commercial Cloud platform service provider which can flexibly scale as needed without the need for capital investments or the risk of technological obsolescence.

The option of a fully outsourced commercial SaaS solution is very attractive, and to be expected, with a 5-year outlay of U$1.435M (1.215M€)

Using only an economic quantitative lens, the optimal choice would be to proceed with a full suite SaaS service provider which has a 5-year spend of U$1.435M (1.215M€) versus any variation of the self-build alternatives being northward of U$16.53M (14.1M€) once Cloud service provider and development licence needs are factored in.

Legal

Overview of workstream scope and assessment

This workstream aims to provide a brief overview of the potential governance and intellectual property models of the registry, as well as the legislative and regulatory environment that may affect the development and maintenance of the taxonomies listed within it. The decisions made by the host organisation(s) off the back of these summaries will significantly influence the strategy of the entity, including how it engages with stakeholders throughout its development.

Questions

L1. What legal form could a registry of taxonomies take?

A registry of digital taxonomies could either be incorporated as a part of an existing body (for instance, a standard setter such as the IFRS Foundation), or it could exist separately as a newly established legal structure.

Should a newly established body be considered, the preferred legal form should be chosen according to three main factors:

- **Governance**: What structures could be put in place to represent the registry's members and users as well as guide the ongoing strategy of the entity?
- **Stakeholders' engagement**: What legal structure would encourage the engagement and participation of various members and stakeholders?
- **Funding**: What kind of financing could be used to maintain the taxonomy registry?

As outlined in Figure 1 within the Context section, the first two "layers" for digitising the sustainability information ecosystem – including the registry – would be carried out as a public interest initiative. As such, this workstream recommends establishing any new entity as a non-profit entity. Several structures fall within this category, with three typical structures described below.

<u>Foundation</u>

Although the legal nature of the foundation varies from jurisdiction to jurisdiction, one of the most widely adopted legal forms of a non-profit entity is the foundation. Unlike a commercial company, foundations have no shareholders (although they may have a board, an assembly and voting members). A foundation may hold assets in its own name for the purposes set out in its articles of association, and its administration and operation are carried out in accordance with its statutes or articles of association. Those properties ensure the foundation as an effective structure for obtaining and managing the funds and resources to maintain the registry. The flexibility of the governance structure enables high level stakeholder participation.

<u>Consortium</u>

As a Latin word for the "partnership", a consortium is an association of two or more individuals or organisations participating in a common activity. Currently, there are several standard-setting bodies functioning as consortiums such as ISO or XBRL International.

Various jurisdictions perceive a consortium as either a sub-type of a joint venture, or without a separate legal definition. As a result, consortiums offer a high degree of flexibility when defining the rules of engagements, terms and conditions in its constitutive documents. This characteristic offers several advantages in the context of the registry: the ability to define its own rules typically results in high levels of stakeholder engagement.

A consortium arrangement could establish the host organisations as equal parties, granting them equal rights in deciding the form and direction of the registry. The parties would also have full flexibility to define the board of directors, advisory and technical consortium bodies that could safeguard the quality and independence of each body.

Non-profit holding company

A non-profit holding company is a structure recognised by some, but not all jurisdictions. It is designed to maintain smaller non-profit companies. As a structure like a regular holding company, it has the advantage of acting in its own capacity, entitling it to enter commercial activities and to benefit from tax exemptions – whilst also providing a familiar governance structure. This however presents limitations to the flexibility in defining a governance structure and, as such, may only lead to medium levels of stakeholder engagement. Some large and globally recognised sustainability organisations, such as CDP, currently exist in the form of a non-profit holding company. This structure is particularly well-defined in the United Kingdom, therefore if the registry took this legal form, it is advisable to incorporate the company within this jurisdiction.

The legal structures described above constitute an example, but not an exhaustive list of the legal forms available for the registry of digital taxonomies. Given that high levels of stakeholder engagement are widely recognised to contribute to the success of non-profit organisations, this workstream recommends that the decision-makers carefully weigh its importance against the different funding and governance options.

L2. Are there any significant policy, legislation, or regulation that will affect the development of a registry for digital taxonomies?

From this workstream's preliminary research, there does not seem to be any policy, legislation, or regulation that would specifically prevent the development of a registry for digital taxonomies. Nevertheless, policy and regulation related to sustainability information is a fast-evolving landscape and so, to gain support, a registry would need to be built in a manner which serves the broad direction of travel of these changes. The main developments to be considered are:

- **EU update to NFRD (now known as the CSRD)**: The EC is establishing a new European standard-setter to set EU standards for reporting of sustainability information. Companies reporting under the CSRD will need to digitally tag their disclosures according to a digital taxonomy that is under development within EFRAG.
- **EU Capital Markets Union Action Plan:** The EU proposes to set up an EU-wide platform (ESAP) that provides investors with seamless access to financial and sustainability related company information.
- **IFRS Foundation's potential establishment of an ISSB:** When the IFRS Foundation Trustees decide to establish an ISSB, they will set new standards for reporting sustainability information related to enterprise value. If the Foundation follows a digital strategy for these standards like that of their financial reporting standards, a digital taxonomy will be created for the new standards
.

Both the EC and the IFRS Foundation have communicated that they intend to draw from and build upon work already completed by existing standard-setters for sustainability information. They have also both signalled, through current or parallel initiatives, the importance of digitisation of standard-setting. There remains a risk that digitisation - and the need for collaboration - is not prominent enough in discussions between policymakers, regulators and standard-setters as new legislation and standards for sustainability information are set. This could result in siloed processes, needless incompatibilities and duplication of efforts occur, thus limiting the potential benefits of the taxonomies as well as the existing work of the sustainability standard-setters.

Despite this risk, the fact that digitisation of sustainability information is largely a new territory for regulation presents its own opportunities. With a collaborative approach between standard-setters and regulators, an optimal process for creating digital taxonomies for both existing and forthcoming sustainability standards could be established. To maximise this opportunity, this workstream recommends that the existing and the new sustainability standard-setters explicitly build digitisation into their current collaborative efforts to clarify the system of impact management standards and guidance. This could be achieved, for example, by developing a joint strategy for digitising their sustainability standards, and to engage the regulators and policymakers on the topic, that have an interest in drawing from their work.

L3. What are the considerations for the intellectual property rights of private individuals / entities or public or regulatory organisations which may use a registry of taxonomies?

IP considerations can be split between the IP related to the registry itself as technology infrastructure and the IP related to digital taxonomies developed, maintained, and disseminated from the registry.

The IP rights that arise from developing the registry itself would depend on which of the scenarios outlined in the Economics section is chosen and the legal form that houses the registry. Scenario 1 would result in and 2 result in developed software that would need to be housed by an appropriate legal form, whereas in Scenario 3 the service provider would maintain IP rights over the registry software.

Organisations that develop, maintain, and disseminate their digital taxonomies using the registry would need comfort that their IP would be protected. Thus, the registry of taxonomies would need to disseminate digital taxonomies to users with appropriate terms and conditions. Table 4 provides an example of the types of terms and conditions that would need to be reflected in the registry. It provides a summary of the commonalities and differences in the IP rules of the IFRS Taxonomy and US GAAP Financial Reporting Taxonomy.

Table 4: Overview of the IP characteristics for IFRS and GAAP taxonomies

<table>
<tr><th></th><th>IFRS Taxonomy</th><th>US GAAP Financial Reporting Taxonomy</th></tr>
<tr><td rowspan="2">Access</td><td colspan="2">Digital taxonomy packages are freely available on respective websites.</td></tr>
<tr><td>IFRS Taxonomy layered onto digital IFRS Standards included as part of a paid subscription.</td><td>Subscription service does not specifically mention taxonomy.</td></tr>
<tr><td>IP rights allow…</td><td colspan="2">Retention of materials for personal use and/or professional use.
Extension/additions to the taxonomy for purposes of reporting.</td></tr>
<tr><td>IP rights forbid…</td><td colspan="2">Redistribution of taxonomy without permission of some kind or a license from the provider.
The taxonomy to be used for commercial purposes.
Modification or amendments to the taxonomy.</td></tr>
</table>

Operational

Overview of workstream scope and assessment

This part of the assessment focuses on *how* a registry would be built, maintained and updated. As such, the Operational workstream provides a roadmap to operationalise these processes. This section also considers the potential implications for the stakeholders that are internal to the project, and recommends how to monitor progress.

Questions

O1. What are the required phases to operationalise the taxonomy registry?

The three elements of building, maintenance and updating are categorised into three phases, and then broken down into individual sub-phases. These phases and subphases are described in further detail in the table below. It is advised that an operational plan should only be finalised after having determined several key factors related to the other TELOS workstreams, including choice of technology, business model and governance and estimated personnel.

Table 5: A high-level operational plan for the build and ongoing maintenance of a registry

Phase	Sub-Phase	Sub-phase components
Build	Conceptualising / planning	● Establish the mission and vision of the project ● Define objectives ● Mobilise resources
	Development	● Choose the appropriate model to build the registry (see the different scenarios in the Technology workstream section) ● Set up the entity's legal structure ● Conduct workflow analysis ● Develop registry
Maintenance	Implementation	● Pilot and test following the build of the registry ● Implement the technology structure
	Monitoring	● Understand and manage risks ● Monitor and benchmark progress
Update	Ongoing maintenance and improvements	● Carry out quality controls and update according to social-economic changes in the sustainability ecosystem

O2. What if any training will be required to ensure that staff are fully equipped to build, maintain, and update the registry?

The decision to provide staff training is largely dependent on the host organisation's decision to either build the registry in-house, or to outsource these capabilities. Should the host decide to build in-house, it must first assess the technical capabilities of its staff before exploring required training for the group as well as individual persons responsible for specific aspects of the registry.

Nonetheless, the host organisation should consider a provisional budget for any upfront costs associated with the registry's build, as well as additional on-going funds for onboarding new staff members and/or ensuring that relevant technology updates are communicated across the team.

Training should additionally be considered for staff within the organisations that use the registry. Given that digital tagging is a new process for most organisations, this workstream advises on the consideration of training and educational materials for external stakeholders, which could be factored into the maintenance and update phases of the project.

Scheduling

Overview of workstream scope and assessment

The Scheduling workstream has used the information generated from the other workstreams to devise a provisional project timeline for the registry, from its conceptualisation to maintenance. A timeline can dramatically impact budgets, resources and outcomes if incorrectly scoped. But, when scoped according to close analysis of the various aspects involved with the registry, this workstream can provide reasonably accurate estimated timelines to help ensure timely project completion within the agreed budget.

Questions

S1. How much time is needed to develop the taxonomy registry?

This question assumes that the registry would be developed in-house, allowing any host organisations to weigh up the longest timeline possible with the trade-offs that may be associated with an out-sourced solution.

Third-party service providers of any potential registry solutions were not consulted for the purposes of this assessment. Therefore, whilst the Project Team believes that significant time would be saved by engaging with external parties, an estimate of timings should be gathered to suitably inform the host organisation(s).

The different steps to develop a registry are based on the phases and subphases that are presented in question O1 of the Operational section. Overall, the development of a registry could take up to four years. This includes the product's build as well as initial maintenance processes that are outlined in Table 5 above.

The provisional timelines include an estimation of up to 24 months for the build. It also allows another 24 months for the maintenance phase, which would include piloting the usage of the registry. The quality controls and technical updates to the registry, as referenced in the Update phase in Table 5 above, has not been allocated any specific timings given the on-going nature of this work to ensure that the registry remains fit for purpose.

Whilst two years have been allocated for the first two phases of the registry's development, there may be an opportunity to overlap elements of each, thus having the potential to somewhat reduce the overall timeline.

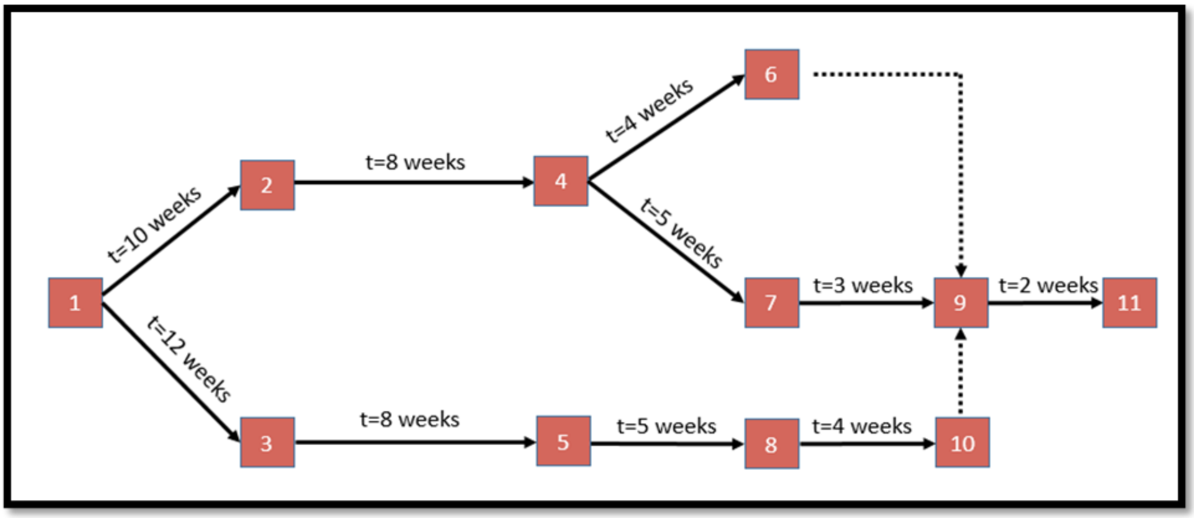
S2. Which project scheduling tools and techniques could be used to aid the development of the registry?

The use of project scheduling tools and techniques can help ensure communication and coordination between internal and external stakeholders throughout the development of the registry. Such techniques allow for the creation of dynamic timelines, help the host organisations to identify appropriate milestones, and understand and avoid potential blockers to development.

The Scheduling workstream recommends the potential usage of two project scheduling techniques:

1. A Program Evaluation and Review Technique (PERT), which is used to create realistic schedules by estimating time durations for a project. To do this, the PERT outlines various scheduling scenarios based on the likelihood of completing required activities throughout the different phases of the project. This technique helpfully illustrates where tasks can be completed concurrently if necessary.

Figure 3: A high-level operational plan for the build and ongoing maintenance of a registry



2. The Critical Path Method (CPM) is a scheduling technique that uses a network diagram to depict a project phase and the sequences of tasks required under each project phase. Once the phases or paths are agreed, the duration of each path is calculated to identify the critical pathway. Determining the critical path, ideally using software, efficiently helps to identify milestones and ensure that the delivery of the project is kept to time.

S3. Is there anything that could delay the build of a registry of digital taxonomies?

Several foundational pre-build data activities should be considered before developing the registry of taxonomies. These five activities form the steps that could lead to the controlled vocabularies that would inform interoperable taxonomies. The pre-build activities are:

1. **Concept harmonisation,** which starts by grouping data (such as standards, frameworks, guidance, etc.) into common categories and glossaries. This might include grouping identical elements into one bucket, items that are closely matched into another, and items that are broadly matched into a third, etc. The categories are defined by humans, but machine learning and natural language processing could be leveraged to automate and accelerate this categorisation over time.

2. **Metadata definition and exchange:** Preparing data for machine reading (via metadata) enables its dissemination and discovery, repurposing, collection and merging across the globally connected digital environment of the semantic web.

3. **Translation (languages)**: The data is then translated into multiple languages, facilitated by controlled vocabularies and digital taxonomies.

4. **Digital taxonomies:** Following concept harmonisation, metadata definitions and translations can the taxonomies themselves be developed. Taxonomies relate to the systematic setting up and grouping of relationships of standards and frameworks.

5. **Ontology development:** The data is further enhanced using ontologies. Ontologies, data point models and knowledge graphs illustrate the properties, concepts, and categories of a subject, and how they are related to other properties within the same subject area. Ontologies thus establish a common understanding of how data is structured.

The five activities are an essential precursor to developing the digital registry of taxonomies. As such, it is advised that the scheduling around these efforts is included in the overall timelines of the project. As such, these steps will have a significant impact on when the development of the registry could be carried out.

6. SWOT Analysis

The Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis scope has been done on relative to the digital registry of sustainability standards and frameworks taxonomies aspects.

Strengths

The principal strengths are in reducing reporting and compliance costs and increasing compatibility and interoperability. More specific strengths include:

- Optimising the cost of generating, using and analysing sustainability and enterprise value reported data.
- Sustainability and enterprise value reporting information becomes adaptive, discoverable, structured, and actionable for informed decisions.
- Greater availability of decision-oriented sustainability and enterprise value disclosures for all stakeholders
- Harmonisation reduces overlaps, duplication, and redundancies of data definitions as controlled vocabularies.
- A digitised taxonomy registry enables open, collaborative, and trusted information flows.
- Information production and consumption becomes more efficient.
- Opportunities for assurance of sustainability and enterprise value reported data improved through better access to structured and digitised standards and frameworks.
- Higher adoption and usage of sustainability standards, taxonomies, and data
- Consistency, discoverability, and comparability of sustainability data across regulators, regions, and industry sectors
- Regulators could fulfil a proactive role in the sustainability reporting of their regulated/facilitated entities.
- Stakeholder constituency cross-communication extends and deepens.
- Quicker dissemination of new sustainability standards as they can easily be integrated into software programs.
- Creation of an iterative efficient cross-stakeholder feedback loop linking the taxonomies (layer 2) and the value-add extensions for customisations (layer 3) which become embedded into the core taxonomy or common practices.

Weaknesses

The primary weakness is the existing divergence in stakeholder consensus and readiness, more specifically:

- Today we do not have consensus on how to approach the digitisation of sustainability related reporting processes, including the taxonomy structure.
- Initial set-up costs to set-up of the electronic and digital infrastructure and integration within existing systems, processes, and frameworks
- Costs to create, disseminate and use integrated digital platforms may dissuade some stakeholders from adopting the recommended initiative, slowing uptake.
- Divergent stakeholder objectives across sectors, regions and regulators increase the complexity and challenge of harmonising the sustainability ecosystem framework
- Unclear mandates, rules and regulations across the sectoral and regional regulatory bodies make comprehensive digital adoption and alignment to the desired level uncertain
- Product/ Software/ Solution Providers may not be prepared to invest in developing tools to achieve the digital vision in the fullest sense without a regulatory mandate.
- Owing to uniformity and standardisation, entities may be unable to effectively communicate their desired message(s).

Opportunities

The opportunities are an acceleration of attainment and transparency of impact measurement, reporting and actions. More specific opportunities could include:

- Development of an integrated system to further reduce data management costs for sustainability and financial information.
- Bring the technical standards setters together that can support the sustainability digital reporting eco-system together and align technologies for interoperability.
- Investor access to curated, structured, harmonious, assured, and timely sustainability data
- Earlier and easier detection of sustainability risks and deviations, through improved access to reliable data (including double materiality)
- Adoption and usage of sustainability information is more prevalent in the decision-making processes of stakeholders.
- The transformation and digitisation of the sustainability ecosystem leveraging a taxonomy registry mechanism (and related digital and hardware infrastructure) dramatically reduces compliance costs, resources, and time for the sustainability reporting cycle.
- An increase in better tools and mechanisms will encourage more regulators (and other stakeholders) to mandate entity sustainability reporting.
- Greater innovation in the eco-financial system and acceleration towards integrated reporting.
- A better understanding of the impact of an investment because of more informed sustainability decision making resulting from greater access to relevant and high-quality trusted information.

Threats

The threats are primarily around apathetic stakeholder willingness or a shortage of the expert resources necessary to achieve the vision, more specifically:

- A lack of stakeholder consensus (including standard setters, professional bodies, global and domestic regulators) in agreeing the best way forward.
- A lack of executive sponsorship for the digital taxonomy registry
- A funding shortfall prevents full realisation of the desired eco-system solution.
- Insufficient skilled professionals, experts, and cross-stakeholder personnel to implement the digitisation initiatives.
- The rejection of the proposed digital initiatives by regulators and sustainability standards boards.
- Preparer and assurer resistance to new ways of preparing, assuring, and disseminating sustainability information.
- Low (or a lack of) stakeholder willingness or readiness to embrace the digitisation initiatives.
- Lack of alignment between the users (of information), policy makers and tools/ solution providers around the necessary capabilities, features, and functionalities in software solutions

7. Concluding remarks and recommendations

The TELOS assessment in this paper outlines the feasibility of a registry based on five key areas of consideration concerning its potential governance, infrastructure and implementation. Whilst the Technology section confirms the possibility of developing such a solution, its features and ongoing management hinge on decisions related to the desired timings, costs and functionality of the registry, which could only be determined by those responsible for hosting the solution. For example, if the host(s)' objectives were to respond quickly to the growing demand for digitised sustainability information, the shorter timeframes may affect the level of functionality that can be developed. Such a decision would also affect the upfront and maintenance costs of the registry itself. Governance arrangements are also key to securing the ongoing upkeep of the registry and to ensuring that it remains a public good initiative.

Through the Project Team's exploration of a registry, the SDWG has had the opportunity to engage with – and receive feedback from – a variety of experts related to business and sustainability reporting. This has included individuals from the organisations that provide sustainability standards and guidance, to technology standard-setters, data preparers, regulators, and users of data such as software vendors and investors. The level of interest and support for a registry from across these stakeholders, at a time when global regulation is increasingly recognising the role of sustainability reporting, points to encouraging signs of momentum.

Interactions with these different stakeholders have also highlighted the importance of interoperability between sustainability standards, and how a desired future state can only be achieved by digitising in a collaborative way with a neutral facilitator (XBRL International, a non-profit public good consortium could be such a facilitator). In other words, whilst a registry has proven to be possible, a former step is needed to secure a collaborative process to digitising these standards. Such a strategy could lead to a foundational set of taxonomies for sustainability standards upon which others benefit. Regulators could, for example, use the strategy as a foundation on which to develop their own taxonomies, all the while allowing preparers and users of data to exchange readily available, machine-readable sustainability information.

Recommendation

Support by the SDWG Steering Committee of these findings would be welcome. In particular, **support for further exploration of a registry of taxonomies.**

With this support, the next steps in this process could be:

- Global market engagement to establish a technical framework to achieve interoperability
    - Establish a transparent governance mechanism to define and bring together a credible global market engagement to develop an interoperability ready technical solution for public good
    - Establish the go-forward model around governance, funding, and operations of the technical solution.

- Technical solution for the public good:
    - Market assessment of relevant IT player contributions to the digital transformation of ESG disclosure.
    - Define a technical scope to create a public good digital harmonised data model of words, terms, metrics, and other data points for sustainability.

- Build a Climate prototype and develop a best practice toolbox for standard setters, users, practitioners of digital ESG guidance.

While a registry of taxonomies is an optimal step, it is primarily important that there be a foundation laid for interoperability to reduce the cost of compliance and facilitate ESG reporting, through a structured and controlled digital governance mechanism.

We would like to acknowledge that without the exceptional assistance of NWDG members, the Review Committee and the Structured Network members volunteering their time and effort, this level of understanding and progress towards achieving global digital interoperability and structure could not have been reached. Supporting the recommendation will launch the next important steps in the digitisation journey which will benefit the entire global market financial and sustainability ecosystem, and which will ensure standard setting and information technology are suitable for the 21st century and beyond.

Supporting these recommendations would enable the members of the Structured network who served on the Steering Committee to champion active digitisation efforts around the world.

By moving towards the creation of a strategy, in coordination with technology standard-setters, we will collectively help to strengthen the current sustainability ecosystem and serve the public interest by providing the interoperable and machine-readable assets that support creation of high quality, reliable and more accessible sustainability information**.**

8. About the project

The Sustainability Digitisation Working Group (SDWG) was established in autumn 2020 to assess the feasibility of establishing a public good registry of digital taxonomies, as a mechanism to develop and maintain digitised versions of sustainability standards and – by consequence – to achieve more decision useful sustainability information between preparer and users.

The SDWG consists of three sub-groups:

- **Project Team:** A team of technical experts who conducted the feasibility study. Five workstream chairs were appointed from within the Project Team to lead the different TELOS areas, which inform the structure of the assessment section of this report.

  The Project Team is led by Liv Watson, Chair of the SDWG.

- **Review Advisory Group:** An extended group of experts who provided feedback to the Project Team monthly throughout the assessment and are responsible for providing additional comments and detailed feedback on the report itself.

  This group is chaired by Richard Soley, Chairman and CEO of the Object Management Group, Inc. (OMG).

- **Steering Committee:** The CEOs (or equivalents) from Members of the IMP Structured Network that expressed interest in participating in the SDWG. The Project Team has created this report for the purposes of providing recommendations to this group. Members of the Steering Committee have also provided strategic direction and feedback to the Project Team as they carry out their analysis.

  The Steering Committee is chaired by Jane Diplock AO, an advisor to the IMP and, among other roles, is the former Executive Committee Chair for the International Organisation of Securities Commissions (IOSCO).

The SDWG is hosted by the Impact Management Project (IMP), a forum for building global consensus on measuring, managing, and reporting impacts on sustainability. Part of the IMP's work is to facilitate standard-setting organisations that are coordinating efforts to provide comprehensive standards to the market.

The IMP's hypothesis is that a global system to manage impacts on sustainability, which meets the needs of all constituencies and markets, will require the leading standard-setters to speak with a unified and authoritative voice. Both bi-laterally and with the support of the IMP, there is strong momentum among sustainability standard setters to collaborate, with already demonstrable efforts to achieve convergence.

For the benefits of this harmonisation work to be fully realised, it needs to be complemented by appropriate levels of collaboration among those who provide the technology infrastructure for exchanging sustainability information.

The SDWG aims to assist progress towards a global system by accelerating connectivity between efforts made by sustainability standard-setters and broader innovations in digitisation and electronic business reporting.

Appendix 1: Benefits of a well-governed digital taxonomy development process, enabled by a registry

	Common benefits								Unique benefits
Stakeholder	Ability to disseminate taxonomy updates to users in real-time (via an API connection or similar)	Ability to assert linkages between their own digital taxonomies and others	Receive real-time feedback on taxonomies from users	Provide real-time feedback on taxonomies (including usability) through a single interface	Download taxonomies in multiple file formats (e.g. XBRL, XML, XLS etc.)	Access to an accreditation process, providing confidence that the taxonomies are vetted and worth embedding into software	Access to digital taxonomies - and linkages between them - in one place	Access to design principles for developing the taxonomies, making it cheaper to embed multiple taxonomies into software	
Standard-setters	X	X	X				X		• Full view of existing data definitions across all digital taxonomies, which would support how future standards are developed
Governments and regulators	X	X	X				X		• Development of regulated digital taxonomies, which could draw from the data definitions across existing standards • The Identification of opportunities for harmonising data definitions
Software providers				X	X	X	X	X	
Reporters				X	X		X		• Single interface to review data definitions for disclosure requirements across different jurisdictions

									● Interoperability between taxonomies, meaning collect data once and report according to multiple standards ● Increased availability of software (with taxonomies embedded) which support data collection, report preparation, and filing according to multiple standards ● Overtime, rationalization of regulatory reporting requirements
Auditors				X	X		X		● Conduct research regarding disclosure requirements and offer advisory services to preparers ● Increased audit efficiency as preparer's increase their usage of digital taxonomies with embedded quality tests ● Data definitions ensure disclosures are coupled with adequate context, which aids audit process ● Linkages between digital taxonomies enable consistency checks across different reports ● Process automation through machine-readable disclosures
Data providers				X	X	X	X	X	● Less ambiguity in published company disclosures ● Less data cleansing required ● Machine-readable disclosures are more discoverable by

									algorithms which scrape publicly available sources. ● Data sets from multiple sources more easily combined
Analytics platforms				X	X	X	X	X	● Data sets from multiple sources are more easily combined ● Data is prepared in machine-readable form, making it easier to develop algorithms to conduct data-heavy analysis ● Accredited taxonomies follow consistent design principles, making it cheaper to embed multiple taxonomies into software
Investors				X	X		X		● Comparable and timely data, with less errors ● Less time on data management, more time on analysis and decision-making ● Increased availability of sophisticated analysis from analytics platforms
Civil society				X	X		X		● Review data definitions across multiple standards and prioritise specific disclosures for research ● Increased use of taxonomies in publicly accessible data platforms would mean data can be sourced in more usable format ● Less time on data management, more time on analysis of reporting organisations, as part of social change objectives.

Appendix 2: Summary of the shortlisted technology options

	Meta models	Digital standard	Network / graph database	Ontologies	SVN platform
What it is	A methodology that separates the value of a data point from its definition. The definition is broken down, enabling flexible translation between definitions based on the same atomised "building blocks".	A technical specification that provides the means, using agreed syntax, to represent a Sustainability standard digitally.	A variation of the relational database approach that facilitates more advanced linking between multiple owner files (many to many relationship).	An approach to data modelling which describes a domain of knowledge using formal logic. This enables powerful reasoning over information when is it stored in the defined format.	A software versioning and revision control system that allows users to upload and maintain historical versions of source code
How it could work	• Via a platform based on a high-level, generic meta-model or methodology, such as an open Data Point Model (DPM) ISO standard that stores all definitions across a variety of models. • The platform would allow users to export models to a set of technologies. • The methodology may provide a variety of functionalities, such as references to underlying standards, multiple labels, links between concepts, mathematical	• With this approach, it is assumed that all taxonomies would be represented using one, selected technical standard (such as XML, XBRL or other). • An overarching taxonomy would likely need to be created in order to link definitions from all NFD taxonomies to the core one. Software that would be able to process XBRL syntax can assist users in discovering connections between definitions, search across taxonomies or compare them.	• Network databases are hierarchical databases, but unlike hierarchical databases where one node can have a single parent only, a network node can have a relationship with multiple entities. This facilitates more advanced linking between taxonomy definitions. Network databases use a graph structure for semantic queries. The data is stored in the form of nodes, edges, and properties.	• An overarching generic ontology is created to cover the meta-definition, linking definitions from various standards. RDF/OWL is likely used as a syntax expressing the ontology. All taxonomies are linked or mapped to the generic ontology. • Ontologies provide for semantically-rich definitions, meaning that it is possible to account for multiple aspects of data. • Reasoning engines and advanced analytical mechanisms can be	• All Sustainability reporting taxonomies (files representing these taxonomies) are uploaded to and maintained on a designated folder structure on a GitHub-like repository • Users can employ search, version, compare and author using mechanisms available on the platform • The approach does not require any overlay on top of taxonomies • SVN platform is a generic solution that would facilitate different technological

	relations and other relevant artefacts. • The platform could provide a variety of user-friendly functions such as definition-level search, compare or analysis. Depending on the platform's interoperability, users may be able to export to a choice of technologies. • Various technological solutions can be applied jointly to a meta model. For instance, a DPM meta-model can work simultaneously with SQL, XBRL, RDF/OWL or other technical syntax solutions.			used to derive non-linear conclusions and dependencies between definitions. Using specialised software users shall be able to transform ontological representation to a choice of technologies however such translation may require advanced technical knowledge.	file types and approaches for taxonomies Users are able to download files as originally uploaded to the repository without any cross-application (for instance combination of definitions)
Example of use	The European Banking AuthorityEuropean Banking AuthorityEuropean Banking Authority uses DPM to translate regulatory amendments and store in a DPM repository.	XBRLXBRLXBRL is a technical standard which is highly prevalent taxonomies for financial information.	A common network database is Neo4j https://neo4j.com/ https://neo4j.com/https://neo4j.com/	Schema.orgSchema.org Schema.org is a repository containing a variety of ontologies.	GitHubGitHubGitHub is a well-known example used by many companies and software developers build and maintain software.
Strengths	**Desirability**: • Well-structured and atomic definitions	**Desirability:** • Some digital taxonomies are	**Desirability:** • Databases are components of	**Desirability:** • Ontologies provide more context	**Desirability:** • Good search performance

	• Allows combinations of definitions • Powerful search and comparability functionality • Advanced versioning at definition level **Feasibility**: • Existing platforms prove to be very advanced • Availability of tech-neutral APIs • DPM ISO standard appears fit-for-purpose and is already used in finance **Viability**: • Allows for customised governance approach • Platform may allow for advanced business models (access control)	expressed in a single standard like SDMX, evidencing demand. • Standards like XBRL were designed for structuring business information and linking definitions, which are key requirements **Feasibility:** • Similar overarching taxonomies already exist and mapping between these and other taxonomies have already been tested. **Viability:** • Major international digital standards (XBRL, ISO 20022) exist and are widely applied in finance, corporate reporting and supervision. Expansion of these standards to include sustainability information would build on what exists.	the backend of the repository. • It must be complemented by user interfaces or business intelligence tools. **Feasibility:** • Definitions within digital taxonomies are linked, therefore network databases may reflect these connections well. • Advanced network analysis may be possible on taxonomy definitions. **Viability:** • Open source network database software already exists, which gives precedent to the approach. • Network databases benefit from the same governance and business model advantages as other database models.	• Ontologies attempt to provide whole-world description therefore linking to other definitions, outside sustainability information, may be possible **Feasibility:** • Ontologies allow for indirect linking between definitions • There exist advanced ontologies • Expression of taxonomies using an ontology allows for semantically-rich description of definitions **Viability:** Ontologies put definitions in a broader context	• Ability to compare files • Protects ownership • Operates at files and unstructured content level **Feasibility:** • Tested and established • Flexible – caters for different types of files • Low configuration requirements • The platform can accommodate any taxonomy file format (is file content neutral) **Viability:** Likely ready and usable in a short timeframe
Weaknesses	**Desirability**: • Detailed functionality depends on the platform and meta-model **Feasibility**:	**Desirability:** • Users need to know the particular standard or language, which can require specialist knowledge, otherwise they would	**Desirability:** • This technology requires a separate interface, so is not a complete solution. • Using graphs in network databases	**Desirability:** • User interfaces require specialised knowledge, unusable to common users • Ontologies are expressed using	**Desirability:** • Many different file types mean that it's difficult to create an interface that usefully represents content beyond versioning

	• Limited choice of platforms and meta-models • Requires effort to upload definitions in line with meta-model requirements and define sufficiently atomic properties **Viability:** • This approach does not seem to render viability threats	need to be offered interfaces that hide complexity of the standard. **Feasibility:** • Taxonomies that are not available may need to be created in XBRL in order to be loaded into the repository. **Viability:** • The overarching taxonomy may be perceived as a new standard. • Business model and governance is yet to be determined.	may require users to learn new languages. **Feasibility:** • Graph models that underly information stored in network databases may require extension to capture additional semantics **Viability:** Network databases were replaced by relational databases in 1980s, suggesting relational databases were more viable in many cases. (However, network databases are gaining in popularity again).	highly technical syntax (RDF/OWL, which use abstract-level high-profile coding with a specific syntax). **Feasibility:** • All digital taxonomies would need to be mapped to the generic ontology • Creation of an ontology that is representative for all taxonomies would be a substantial effort **Viability:** • Adoption among stakeholders may be at risk due to highly technical approach • Viable governance and business model would require a platform that would provide access to repository based on an ontology	• Folder structure is searchable, but wouldn't necessarily show data definitions in a comparable way. **Feasibility:** • Very generic • May not allow to analyse beyond files and unstructured content • Basic interface, difficult to customise **Viability:** • Governance is a challenge • May render difficulty for business model

Contributors

The initial phase of the SDWG, which has culminated in this report, would have been unable to operate without the voluntary commitments of those involved. The IMP would therefore like to thank the following individuals for their participation:

Project Team

Tanuj Agarwal (Scheduling Chair), Bon Conseil
Jo Fackler (Project Manager), IMP
Nathan Felsenfeld, World Benchmarking Alliance
James Hicks (Project Manager), IMP
Judy Howarth, CDP
Natalia Kaleta-Schraa (Legal Chair), Workiva, Inc
Elina Koskentalo, Business Reporting – Advisory Group
Marta Kuczyńska, Business Reporting – Advisory Group
Madhu Mathew, Sustainability Accounting Standards Board (SASB)
Urmish Mehta (Operational Chair), Bon Conseil
Maria Mora, Fujitsu Labs
Michal Piechocki (Technology Chair), Business Reporting – Advisory Group
Bronagh Ward, KKS Advisors
Liv Watson (Project Chair), IMP
David Wray (Economic Chair), DFCG International Group (www.dfcg.fr)
Michael Zimonyi, Climate Disclosure Standards Board (CDSB)

Review Advisory Group: Participants and observers

Careen Abb, United Nations Environment Programme – Finance Initiative (UNEP FI)
Marjella Alma, Datamaran
Pablo Almendral, ClarityAI
Paloma Baena, NextGenerationEU
Helle Bank Jørgensen, Competent Board
Camen Boulet, ClarityAI
Margot Brandenburg, Ford Foundation
Harry Brown, ReGenerate
Charles Calovich, Workiva, Inc
Anshula Chowdhury, Sametrica
Renato Coelho, ClarityAI
Olivia Dixon, Impact Investing Institute
Christian Dreyer CFA
Bryan Foss
Sarah Gordon, Impact Investing Institute
Mark Gough, Capitals Coalition
Franki Hackett, EngineB
Bob Herz
Alexander Hume, Claridei Laboratories, Inc
Benjamin Joannou, Bastion Group
Rob Krugman, Broadridge
Bella Landymore, Impact Investing Institute
Tauni Lanier, World Wide Generation (WWG)
Manjula Lee, World Wide Generation (WWG)
Maciej Lewandowski, NatWest Markets
Shari Littan, Institute of Management Accountants (IMA)
Ian Mackintosh, Corporate Reporting Dialogue
Esha Mufti, Coalition for Inclusive Capitalism
Dermot Murray, Independent consultant
Jeremy Osborn, International Integrated Reporting Council (IIRC)
Anne Randmael Jones, Deloitte AS
Karl Richter, EngagedX
Kate Ruff, Carleton University

Diya Sawhny, Moody's
Richard Soley (Chair), Object Management Group
Richard Spencer, Institute of Chartered Accountants in England and Wales (ICAEW)
John Turner, XBRL
Miklos Vasaarhelyi, Rutgers
Rob Zochowski, Impact Weighted Accounts Initiative (IWAI)

Steering Committee

Clara Barby (Facilitator), IMP
Amit Bouri, Global Impact Investing Network (GIIN)
Ben Carpenter, Social Value International
Jane Diplock (Chair), IMP
Kathy Dubansky (Observer), Workiva Inc.
Janine Guillot, Sustainability Accounting Standards Board (SASB)
Gerbrand Haverkamp, World Benchmarking Alliance (WBA)
Simon Horner, City of London Corporation
Bart Houlahan, B Lab
Lila Karbassi, United Nations Global Compact
Conor Kehoe, International Integrated Reporting Council (IIRC)
Kelly McCarthy (Observer), Global Impact Investing Network (GIIN)
Mardi McBrien, Climate Disclosure Standards Board (CDSB)
George Serafeim, Impact Weighted Accounts Initiative (IWAI)
Ross Simson, CDP
Eric Usher, United Nations Environment Programme – Finance Initiative (UNEP FI)
Karen Wilson (Observer), OECD

Other Contributors

Kate Williams, Huawei Global Finance (UK) Ltd
John Glover, CDW Corporation
Kathy Dubansky, Workiva Inc.
Jacob Kaufman
Sheng-Feng (Philip) Hsieh, Rutgers Business School

This report was written by David Wray, James Hicks, Jo Fackler, Liv Watson, Michal Piechocki, Natalia Kaleta, Tanuj Agarwal and Urmish Mehta.

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