GSMI 6.0

TECHNICAL STANDARDS

Technical standards are documented, agreed upon rules for design, production, and use of a technology or system. Technical standards may impact design, performance, processes, or testing, in addition to establishing basic safety and quality benchmarks. They provide harmonized criteria, guidelines, and characteristics that ensure consistency for a given product that have been reconciled amongst a Committee, over a period of time, in consultation with the intended users and providers of the deliverable. With greater uniformity comes increased interoperability and reliability. Standards enable technology to thrive by minimizing unproductive options and decision making. Ultimately, standards are fundamental for scale for any emerging technology and are relied on by both early implementers and later adopters to guarantee interoperability across platforms.

WHY STANDARDS?

The goal of standards:

- Common guidelines based on agreed upon rules and definitions
- Ensure functionality, with interoperability for scale
- May precede regulatory developments
- Necessary for reliable, safe, continued innovation

Standards also support a dynamic of “coopetition,” where the opportunities become greater for all players by collaborating on certain parameters. Standards are the “cooperation” part of coopetition, bringing alignment to areas where entities are not competing but that represent common goals among them, even among competitors. From a commercial viewpoint, the reason for many organizations to participate as experts in standards setting committees is to get insight on upcoming trends and be able to take action in that direction.

STANDARDS SETTING BODIES

There is a wide range of organizations involved in standards setting initiatives blockchain and digital assets.

GLOBAL STANDARDS SETTERS

Globally recognized, formal standards setting bodies sit at the top of the hierarchy of standards setting – namely organizations like the International Organization for Standardization (ISO), which influence regulations as well as regional and national standards. They have the greatest weight in standards, with their work driving the output and activity of most other organizations in the ecosystem of standards setting. In the ecosystem of standards setting initiatives, formal standards setters can be distinguished from all other organizations by the status and authority they command.

These organizations function solely to develop, publish, and promote technical standards to be accepted and used internationally. They are fundamental for a technology to scale by promoting harmonized rules and understandings with the greatest weight.

As formal bodies, they collaborate across nations (through representative expert organizations) and industries, bringing together key stakeholders and experts toward agreement. Technical committees, generally comprised of member organizations, lead standards development work (e.g., ISO/TC 307 focused on blockchain), alongside national standards bodies representing countries (e.g., BSI for UK, ANSI for US), liaison organizations which may be other standards bodies, and expert individuals appointed by member bodies. While formal standards setters have global influence, these organizations remain neutral in their mission to harmonize technical standards globally through rigorous consensus-driven processes.

The respect granted to global standards setters is largely due to their impact promoting global trade and globalization, in addition to consumer safety. Global standards setters also facilitate regulatory compliance, ultimately improving trust in any given product, innovation, or industry subject to the technical standards they develop. By improving interoperability and global compatibility, they also facilitate ongoing innovations and their scale.

REGIONAL STANDARDS ORGANIZATIONS

These bodies aim to harmonize standards among countries or states (which may participate as members), serving as a bridge between national and international standards. They promote trade and interoperability across their respective regions, while supporting regional regulatory integration. One example of such integration is the EU Single Market initiative.

NATIONAL STANDARDS ORGANIZATIONS

National bodies are responsible for developing and maintaining common standards within a given country, helping businesses understand and implement them. They also represent their respective countries in international standards bodies. Some countries have formalized national standardization committees (e.g., INCITS/Blockchain for USA, SAC/TC 180 for China, Slovenian Institute of Standardization – SIST/TC Blockchain) that author and publish national standards, while also serving as the Technical Advisory Group (TAG) representing the country at international standards committees (e.g., ISO/TC 307 for blockchain technology), where they provide inputs for global standards setting process and also help adopt global standards.

INDUSTRY-SPECIFIC STANDARDS ORGANIZATIONS

Industry-specific standards bodies develop standards for a specialized field or technology, focusing on rapid development of technical standards to drive innovation and interoperability. Their standards are often considered de facto standards prior to formal adoption by a formal standards setting body.

CONSORTIA & ALLIANCES

These refer to private groups and partnerships that publish widely adopted standards that are, however, developed outside of formal processes. They focus on practical and fast-track specifications, coordinate testing and certifications, and generally influence the development of formal standards.

INDUSTRY INITIATIVES

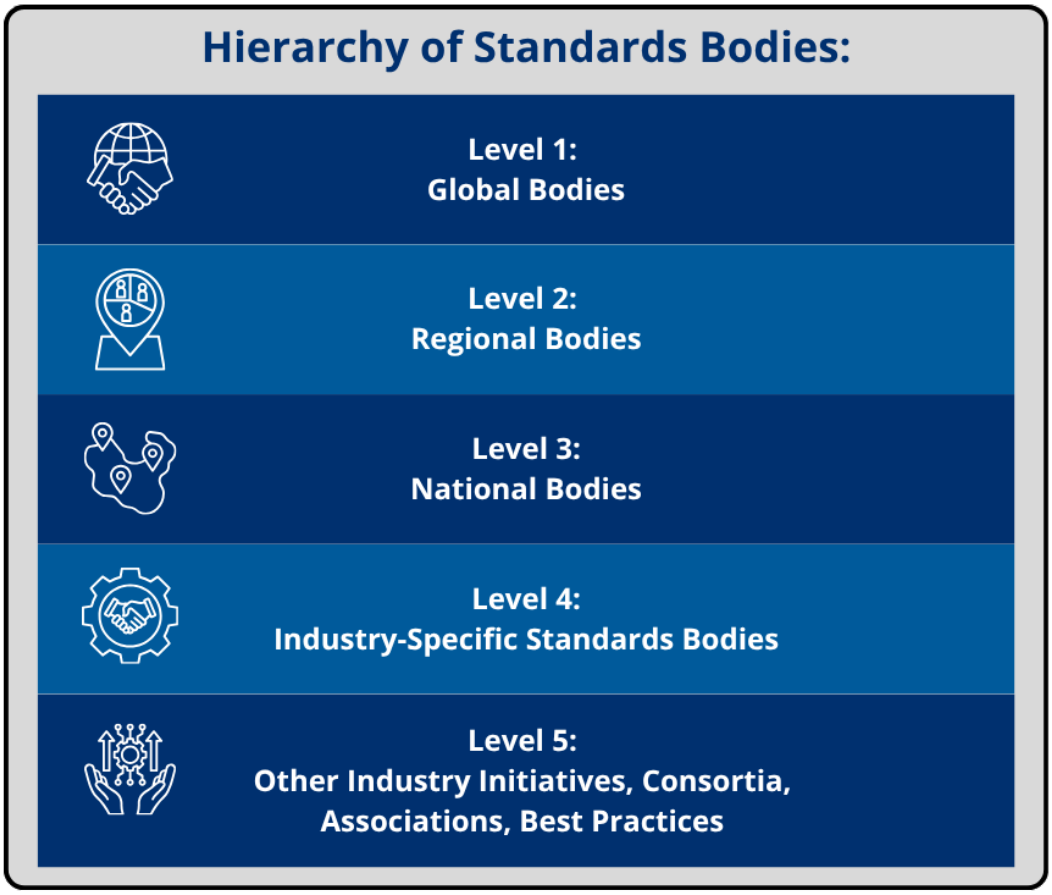
These may include protocol-specific specifications and sets of agreed-upon rules that go through an approval process within the ecosystem where they operate, such as Ethereum Request for Comments (ERC), or protocols specific to Layer 1 blockchains. While they may be designated as "standards" by the industry, they do not follow the formal standards setting process of global bodies, and they often consist in a set of APIs within a standard (requiring implementation of a number of AIP function calls to be considered "compliant"), or even a standard interface. Rather, the process for approval may vary widely across protocols, which may have different governance structures involving different voting processes. Often, when there is a use case in need of harmonized specifications (e.g., NFTs or other token types), a community centered around a protocol may propose and approve a set of rules. This "standard" may indeed evolve into an official standard if it gets endorsed by a globally recognized body and goes through the formal approval process. In the case of ERC standards, ad hoc industry adoption has led to significant harmonization and alignment (especially in the absence of globally recognized standards for the latest trends in innovation), to the point where even national standards bodies may take part in the governance committees of industry-based initiatives working toward harmonization at the forefront of latest trends.

REGULATORY ENTITIES

Regulators often engage with standards setters to adopt standards into regulatory requirements, or at times provide inputs into the standards setting process. For instance, regulatory sandboxes, which allow testing innovations within controlled environments that generally aim to provide lessons in the development of new regulations, can benefit greatly from technical standards. Alignment of regulatory developments with industry standards can be driven by a demand to ensure the entire ecosystem follows the standard. While government action is not necessary for the formation of standards, standards can be referenced by regulations, and in some cases required by regulations.

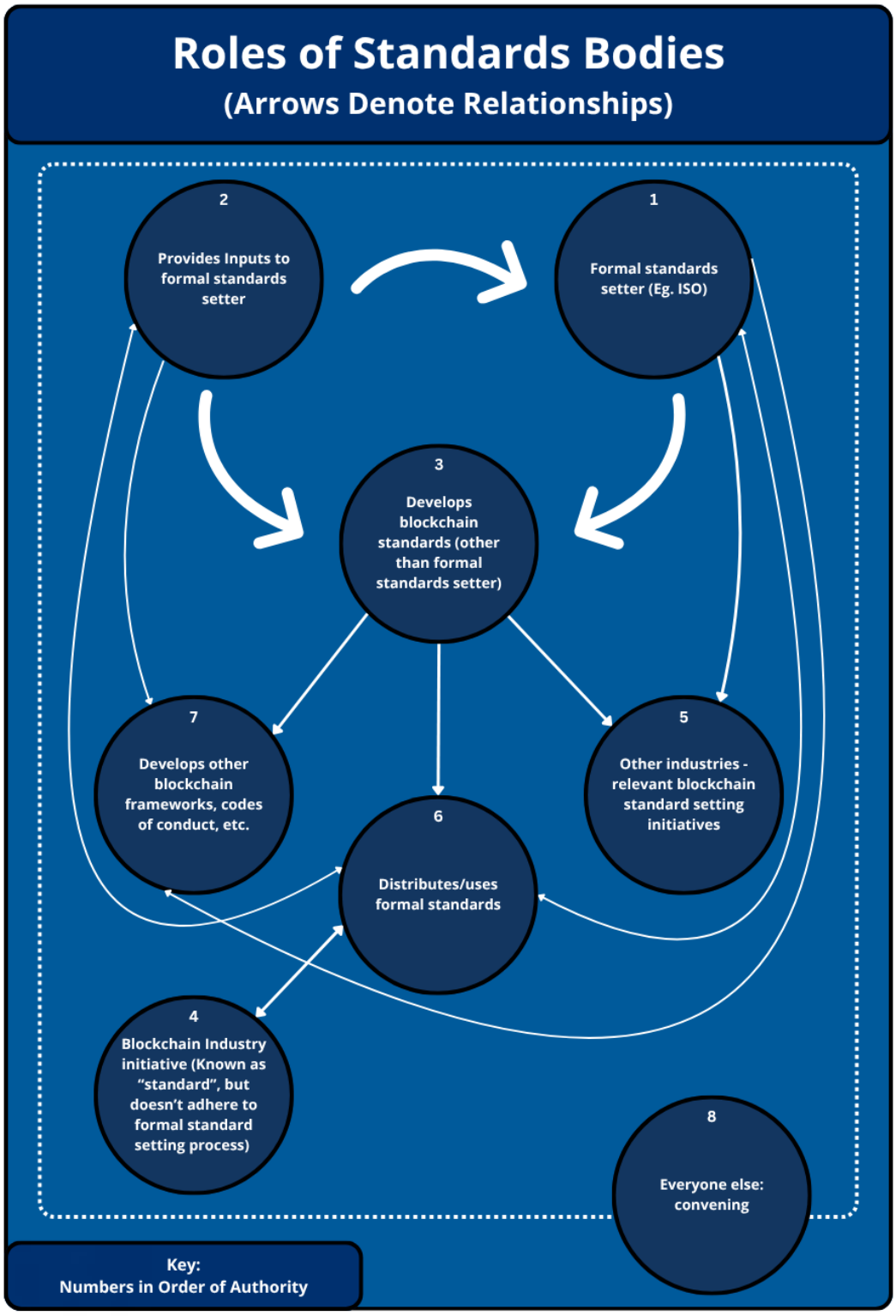
ASSOCIATIONS

These bodies focus on a wide range of activities including convening, research, and engagement across stakeholders to promote understanding and adoption of standards within an industry. In certain cases, associations may also provide an industry voice as an input to standards organizations in the process of developing standards.



ROLES OF STANDARDS BODIES

The various organizations involved in the standards setting ecosystem can take several roles, interacting on multiple layers involving top-down influence and bottom-up innovation (e.g., de facto or industry-specific rules) that may be later formalized as official standards. These layers of influence and collaboration are illustrated below:



STANDARDS SETTING PROCESS

The ideal outcome of standards development is to set effective standards, which industry players will use and purchase. This should start with a clear definition on the basis for a standard (e.g., for whom and what, when and where to use, who will use it, cost, etc.). When structured effectively, standards can drive major industry trends, and even entire enterprises and industries. For instance, the entire space of contactless cards was driven by clear and effective standards. The blockchain and digital assets space needs similar developments to promote scale, starting with definitions and taxonomies, and trickling to harmonized regulatory requirements.

Technical standards undergo an adoption and approval process that generally aims to attain the authorization of an internationally recognized standards organization. Often, the journey to develop standards starts with building locally, upon agreement of common rules. Next these common rules gain recognition at a national level, and ultimately attain acceptance internationally, which represents the most widely respected authority.

Local or industry-specific standards initiatives have stronger economic incentives toward rapid standards development, acceptance, and adherence.

National standards initiatives, which involve more stakeholders, may bring additional incentives (e.g., opportunity to win government contracts), but also bring additional bureaucracy and processes.

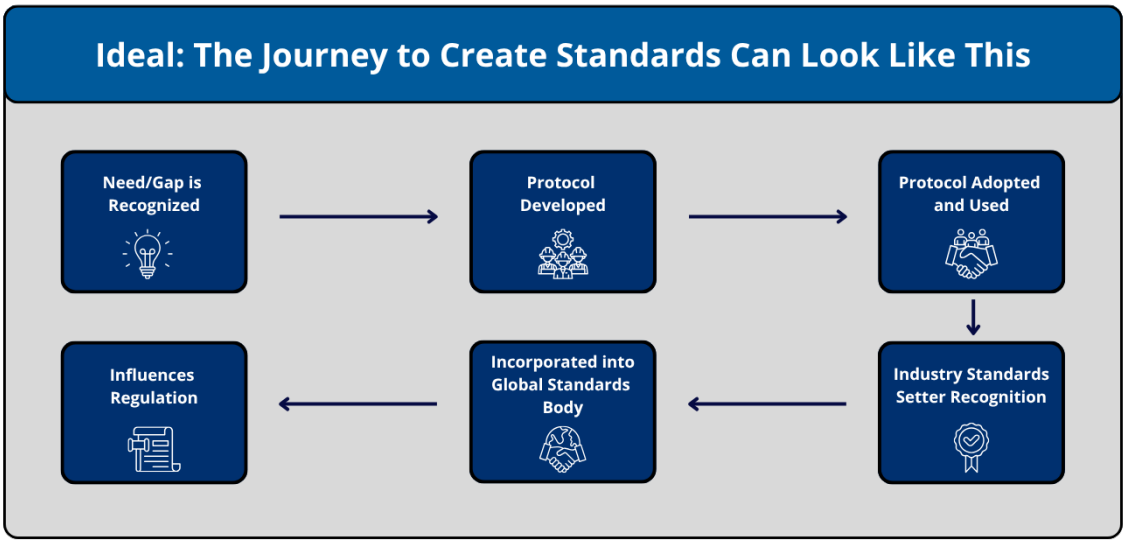
International standards initiatives may not have as many incentives for rapid approval, so the process to develop global standards can be time consuming and involve multiple iterations and assessments. Yet the value of global standards comes in the consensus of key stakeholders that they represent (e.g., several governments, corporations, and industry organizations), as well as additional opportunities for economic activity (e.g., doing business in a particular region).

Dedicated resources and expertise are fundamental to ensuring effective standards. International standards setters need direct feedback and inputs from countries and experts. Global standards may also require governments, large institutions, and corporates to update their systems. These are compelling reasons for major decision makers, especially public authorities, to participate in global standards committees for blockchain and digital assets, such as those hosted by ISO, to set a focused agenda, structure, and strategy for innovation. Effective standards development can be greatly enhanced through public-private partnerships, promoting collaboration among standards bodies and between standards bodies and the industry.[1]

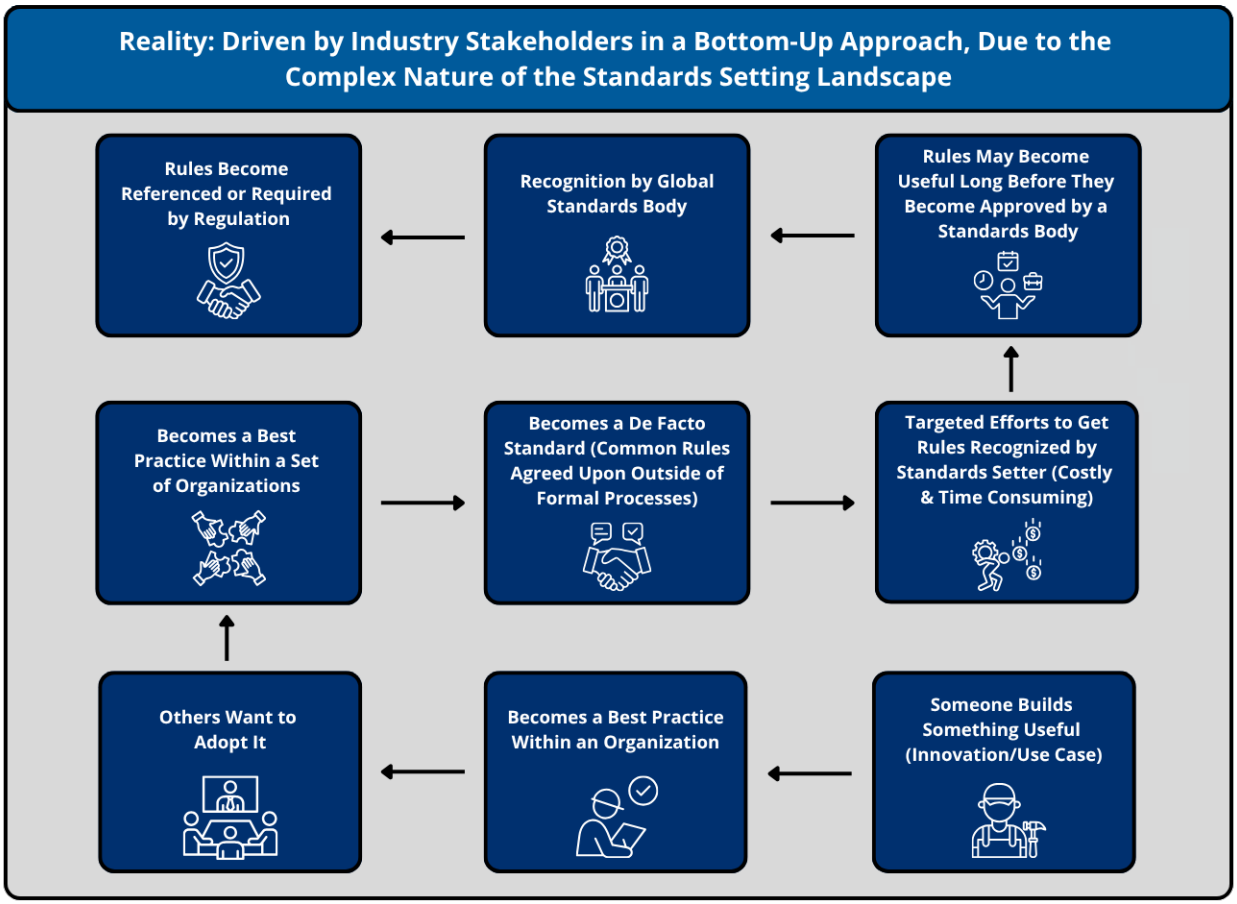
The World Trade Organization has developed 6 Principles for the Development of International Standards, which are relevant for the standards setting landscape:[2]

1. **Transparency**
2. **Openness**
3. **Impartiality and Consensus**
4. **Effectiveness and Relevance**
5. **Coherence**
6. **Development Dimension**

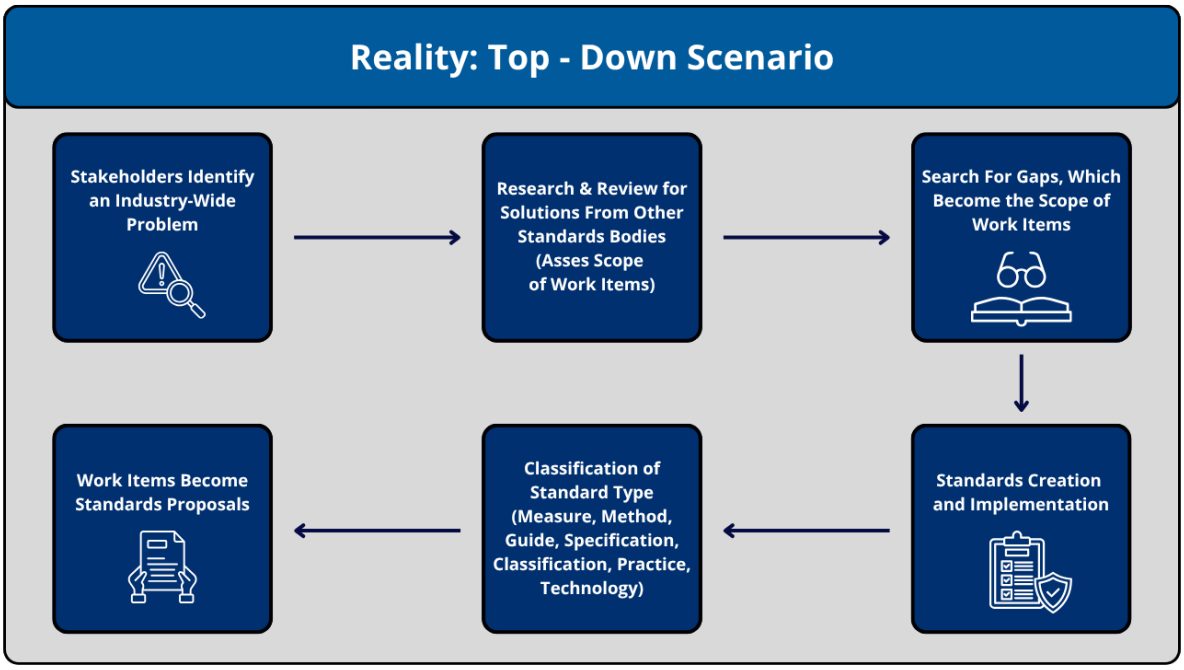
While the journey to create standards can look like this:



In practice, it often becomes driven by industry stakeholders in a bottom-up approach that looks like this, due to the complex nature of the standards setting landscape:



Adding to the complexity, when a gap is recognized, different standards organizations may start addressing it separately, creating counterproductive silos and duplicate work. From the perspective of a standards setting body, a top-down approach to setting standards in this context can also look like this:



To address the issue of fragmentation and duplicate work, certain standards bodies have agreed to not only collaborate in joint workstreams (e.g., ISO/IEC Joint Technical Committee 1 for blockchain standards), but also share information on their workstreams, such as the ISU/ITU/IDC commitment to shared listings of published work items.[3]

FORMAL STANDARDS SETTING

The key principles for global standards development are centered on consensus-based processes, where all views are considered, and ultimate agreement is attempted in the case of disagreements. Several steps involve formal balloting procedures, which can occur remotely or in person, with a threshold of votes required for approval (e.g., 2/3 "yes" votes to move to next stage). Inclusiveness is key, where input is sought from various sectors, interest groups (e.g., industry, regulators, consumers, etc.), and country representatives. These developments are only achieved with openly transparent communication, where documents and progress must be made visible to all relevant members and stakeholders.

The process of formal standards setting generally involves the following stages:

1. **Proposal:** Submitted by an authorized group, such as a member organization or technical committee, to introduce a new standard or revise an existing standard. In order to move forward, the proposal must be reviewed by the standards body members, voted upon, and accepted.

2. **Drafting:** Relevant technical committees or subcommittees are assigned to a working group comprised of experts, who also represent different participating countries, to draft a given standard.

3. **Expert Review:** Once an initial draft standard is finalized, it is distributed to relevant members for feedback and comment, and there may be several rounds of iterations and reviews.

4. **Public Review:** The updated draft standard is circulated to all member bodies of the standard setting body for a broader review and vote. Upon reaching a threshold of positive votes (e.g., 2/3 majority), the draft standard may move ahead in the process.

5. **Approval:** A final draft of a standard is issued and may undergo a final vote for approval.

6. **Publication:** The finalized standard is published and made available for adoption.

7. **Maintenance:** Standards are often revised on a recurring basis (e.g., 5 years), with potential outcomes to confirm them as they are, revise them (with the same process delineated above), or withdraw them.

This journey to develop formal standards, however, can be as rigorous as it is time-consuming. Certain challenges can also get in way of a standard being relevant. A standard may exist but the relevant stakeholders it covers may not adopt it as expected. For instance, as soon as ISO publishes a standard, it can be expected that a portion of the industry may already be adopting other standards with less global weight that have been released at an earlier time.

Moreover, a standard may become outdated if the approval process takes a longer time than expected, while a technology continues to evolve and present novel issues. For fast moving sectors like emerging technologies, the latest trends in innovation may remain out of scope of global standards setting initiatives for some time – during which more localized, fragmented, and informal industry initiatives may attempt to produce common rules for the sake of harmonization, with varied results and limited scope. Nevertheless, it is relevant for global standards setters to gain awareness of these smaller scale endeavors, as they may provide important inputs in the formal standards setting process as the voice industry experts.

COMPLYING WITH STANDARDS

The path toward adherence to standards can be approached as a journey propelled by specific drivers, to address specific needs for any company or organization. It is important to be mindful of the relationship between a standard and an organization seeking to adhere to it.

While formal standards are generally voluntary and not legally binding or proscriptive, they may be adopted into regulatory developments, and thus made mandatory. An entity that is compliant with a standard supports the technical functionality and uses the designated vocabulary set by the standard.

The process to comply with formal standards, especially those put forth by globally recognized bodies, can be rigorous for companies and organizations, which must employ a structured approach with several steps. Once compliant with a standard, these entities generally must maintain their status through internal audits, management reviews, both corrective and preventive actions, and ultimately periodic recertifications. Recent initiatives to address this issue have involved standards setters' cooperation with industry adoption, providing tools for working together, enhancing standards delivery in a more digitally native and agile format.[4]

There are, of course, clear benefits to standardization. Leadership buy-in, cross-functional teams for implementation, and frequent engagement with stakeholders can greatly improve an entity's success to achieve and maintain compliance. Moreover, ISO provides guiding principles, treating standards compliance not merely as a one-time initiative but as an effort toward continuous improvement.

Effective standards adoption requires intentional communication and educational initiatives to improve understanding on the importance of standards. In a future pointing toward leadership in mixed reality contexts with increasing connectivity, management challenges are made even more complex by emerging technologies like blockchain. Standards are fundamental to the future of businesses adopting these emerging technologies. This will also require integrations in various forms, form system upgrades, acquisitions, and partnerships. Blockchain technology is being recognized increasingly as a mitigation tool to address and prevent modern risks and provide resilience to data systems in the face of potential intrusions.

The process to comply with formal standards generally entails the following:

1. **Identification of Relevant Standards:** A number of different standards may be relevant for a company or organization, depending on the industry and operations.

2. **Understanding of Standards Requirements:** Obtaining and evaluating an official standard document, which may also involve training and additional consulting services.

3. **Gap Analysis:** Comparing current systems and processes with those required by the standard, to identify areas that don't meet those requirements.

4. **Establishing a Plan for Compliance:** This involves documenting policies and processes to meet requirements set by the standard, in addition to setting milestones, timelines, and corrective actions where needed.

5. **Implementing Compliance Plan:** This involves implementing processes and integrating required systems (e.g., controls, audits, risk assessments), communicating expectations, training staff, and integrating required systems.

6. **Ongoing Management Reviews and Internal Audits:** Periodic reviews to ensure compliance over time, improve processes, and address any nonconformities.

7. **Selection of a Certification Body and Certification Audits (if relevant):** An external body may conduct audits by first conducting documentation reviews and readiness assessments, followed by an on-site audit of practices in compliance with a standard.

Case Study: Standards Compliance

A typical startup in the digital assets space can provide a generic example of an entity's journey to comply with standards:

Company: US based digital asset exchange, seeking interoperability with other exchanges, and seeking to operate in a compliant manner

Challenges:

- Globally recognized standards setters do not yet drive harmonization in the latest trends on latest blockchain innovations, so they're not the most relevant
- Globally recognized standards may be expensive to attain
- The value of globally recognized standards may not appeal to a startup in earlier stages as they would for a large corporate with high volumes of activity
- Stage of startup is in proof-of-concept, meaning funding is limited

Solutions:

- Registration/licensing pursued in a state with clear regulatory structures (e.g., Wyoming)
- Industry initiatives toward harmonization provide the most attainable and relevant technical standards
- Selection of a widely adopted Layer 1 blockchain infrastructure to build solutions upon, aligned with industry standards initiatives (e.g., ERC)

TECHNICAL STANDARDS STRATEGY FOR BLOCKCHAIN INNOVATORS

Much of the value that blockchain brings for companies and organizations revolves around trust. There are costs to mistrust and uncertainty in any system, which blockchain technology can help mitigate. In the standards development ecosystem, blockchain technology can have 2 roles:

1. **Tool to help comply and verify compliance with standards for any company or organization**
2. **Blockchain technology itself is subject to technical standards, which ultimately aim to improve trust in this innovation and its use cases**

ETHICAL MATURITY MODEL FOR BLOCKCHAIN INNOVATIONS

While a company/organization may identify the standards available and relevant for its operations (refer to GSMI Technical Standards working group documented landscape of standards), an ethical maturity model provides a blueprint for developing a strategy around standards compliance. Ultimately, trust in a system enables it to thrive. In the blockchain and digital assets space, different levels of compliance with standards can pave the way toward greater trust. Standards reduce and quantify uncertainty in operations between parties, becoming a part of a risk management approach. Adherence to standards presents an expectation of certain activities and quality. This section presents a competitive model that goes hand in hand with an ethics maturity model.

Standards should be driven by value, and an ethical maturity model provides a structured framework to self-assess one's performance relative to standards requirements, allowing companies to decide their desired positioning considering the business, operational, and ethical implications. A given set of rules defines each level of maturity. These levels point to the degree of capability and sophistication, which can be defined as follows:

Layer 1: Compliance with legal and regulatory frameworks. In the blockchain and digital assets space, these are often emergent or yet to be developed. This makes Level 1 the lowest stage in the ethical maturity model (e.g., "thou shalt not").

Layer 2: Compliance with industry best practices and internal guidelines and standards. These rules generally function to maintain an organization's brand and reputational status. Level 2 therefore revolves around safeguarding the integrity of other stakeholders – a Golden Rule in ethics (e.g., "don't do to others what you don't want them to do to you").

Layer 3: Compliance with relevant globally recognized formal standards, in a way that indicates a firm commitment, and significant resources devoted to meeting high expectations. Level 3 is an indicator of leadership in ethics.

Layer 4: Adherence to standards and best practices in such a way that extends value to other stakeholders (e.g., Shared Value concept going beyond Corporate Social Responsibility). Level 4 indicates the highest level of ethical maturity (e.g., "blessed are they").

	Governance	Smart Contracts	Digital Assets	Interoperability	Identity	Use Cases
International and Global Standards						
National Standards						
Interorganizational Standards						
Industry Best Practices, Internal Guidelines, and Standards						
Local Legal and Regulatory Compliance						

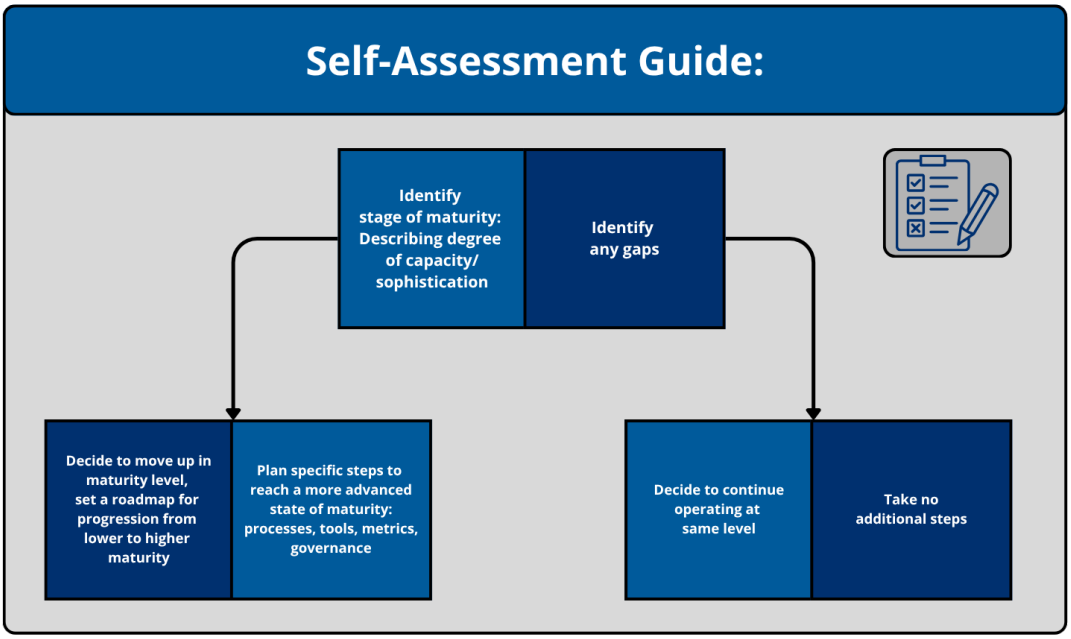
Name of Standard:
Standards Organization :
Other Metadata:
Example of Use Case:
Cost/accessibility
Level of Maturity (KPIs):

Value Offering:
- Compliance
- Transact directly
- No reconciliations
- Instant status
- Data integrity and provenance
- Automatically execute agreements
- Lower transaction costs
- Fault tolerant, resilient, available
- Predictability of smart contracts
- Inclusion
- Self-sovereignty
- Empowerment

Risks
- Misuse of blockchain capabilities (securities fraud)
- Regulatory risks
- Are the risks predictable?
- How large are the risks and are they reversible?
- Are the benefits worth the risks? Who should decide?
- Do those persons on whom the risks will fall know about the risks? Have they consented to bear these risks?
- Will they be justly compensated for their losses
- Are the risks fairly distributed among the various segments of society?

Mitigation
- Policy
- Risk mitigation best practices
- Other Approaches

The parameters laid out above (governance, smart contracts, digital assets, interoperability, identity, use cases) with respect to standards compliance at the levels of ethical maturity point to essential aspects of blockchain-driven digital transformation within the organizational space, affecting people, processes, and technology. For innovation use cases to be effective, it is essential to define necessary fields and characteristics, and especially define value. A statement of business value and social values (e.g., inclusion) clarifies the purpose behind business practices.



At each level of ethical maturity, a company/organization can evaluate the set of applicable standards and decide whether to remain compliant at that level, or define additional standards to comply with to reach the next level of maturity. It is an ethical and competitive choice to make a conscious decision to adhere to a particular maturity level (after assessing pros/cons, benefits/costs of remaining at the same level or progressing to the next level), as opposed to operating unaware of such strategic assessment. For instance, a company that is legally operating in a given US state may need to comply with ISO standards in order to operate globally.

At the lowest level, which comprises regulatory requirements, the blockchain industry has yet to agree on harmonized requirements, as a lowest form of ethical considerations. In a context of regulatory uncertainty, volatility and uncertainty may remain, and it is difficult for companies to become leaders in their industry. Incumbents may even resist the development of a proper risk framework to keep their own competitive advantage. Moreover, local regulatory compliance is different for different jurisdictions, which may present conflicts at a local level vs. broader geographical level. Ethical choices involve protecting local interests vs. global interests.

On the other hand, at the highest level, compliance with standards, in a way that embraces leadership and ethics in the highest degree, requires long term strategic considerations that go beyond short-term business goals. At the highest level, an organization's governance structure would not only embrace compliance with regulations and standards but subsume them into a broader ethical model of transparent compliance and decision making.

RECOMMENDATIONS

1. Take measures to address the concern of overlapping standards and efforts toward standardization (e.g., sharing lists of new standards among standards bodies)
2. Promote open standards and alternative revenue models for standards setters
3. Promote harmonized terminology for processes of standardization

ENDNOTES

TECHNICAL STANDARDS

1 https://www.ansi.org/standards-news/all-news/9-9-24-new-ansi-report-enabling-standards-development-through-public-private-partnerships

2 https://www.wto.org/english/tratop_e/tbt_e/principles_standards_tbt_e.htm#:~:text=The%20principles%20include:%20*%20Making%20essential%20information,Constraints%20on%20developing%20countries%20should%20be%20considered

3 https://www.worldstandardscooperation.org/; https://www.ansi.org/standards-news/all-news/2024/08/8-6-24-iso-iec-and-itu-july-2024-listings-of-work-items-published

4 https://www.archyde.com/astm-compass-platform-expanded-access-resources/