

**Distributed Ledger
Technology Project
Best Practice Report**
May 2024



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1 Executive Summary

The International Securities Services Association (ISSA) is a global association that supports the Securities Services industry. ISSA's members include CSDs, custodians, technology companies and other firms who are actively involved in all aspects of the Securities Services value chain. By connecting its members and facilitating collaboration, ISSA provides the leadership necessary to drive change in the Securities Services industry. The focus is on finding progressive solutions to reduce risk and improve efficiency and effectiveness – from issuer through to investor – as well as on providing broader thought-leadership to help shape the future of the industry.

Thought leadership is driven through the ISSA Working Groups (WG). ISSA's Distributed Ledger Technology (DLT) Working Group published the findings of the 2023 '[DLT in the Real World Survey](#)' in October 2023.

One of the key conclusions from this research was that “We are getting better at planning and realizing returns from our DLT projects.” In light of the material differences between DLT and normal project management that have been observed and, with the current maturity level of understanding these differences, the WG has compiled a Best Practice Report to help its members navigate the specific complexities of DLT projects.

The WG conducted a questionnaire across a subset of member's experiences of their DLT projects and identified a number of common themes across firm and project type, containing both positive learnings and, equally importantly, challenges which need to be carefully managed. This short paper summarizes these findings.

DLT projects — despite sharing similar themes with traditional projects, such as project execution — need to be handled differently from a planning and preparation perspective, since the success is likely dependent on multiple stakeholders coming together in an ecosystem. The research focused on the following themes, which are expanded upon in the body of the report:

Business Case - a DLT project should have a clear business case, with sufficient scope and participation to demonstrate that it can provide benefits and deliver a scalable solution, with the efficiency, privacy, control and connectivity demanded by multiple parties. If the initial group of participants is too small, this can be difficult to prove, since working at scale often results in a different set of challenges

Client - DLT has different capabilities than existing technology. A joint understanding of the opportunity between a provider and its clients allows a more successful transformation of the service. Due to the novelty of the solution set, clear communication, escalation and allowing sufficient time for client education are critically important. Upfront involvement of the client's control functions will allow for a higher chance of project success.

Design - good design is a key prerequisite for any project but particularly for those involving DLT and interfacing with legacy technology. Understanding the controls, privacy and deployment options is not a necessity for just the project team but also its control stakeholders and its clients. The temptation is to start building, but the WG would caution that a good design and deployment plan that addresses the business case, allows for agile adjustments whilst delivering control and privacy, and engages the stakeholders is essential.

Deployment - deployment methodologies can make or break a project — there is widespread consensus on the importance of incremental builds and phased implementation in order to demonstrate progress and deliver early benefits. The WG believes that true agile methodology is best used for DLT projects. This should be used in conjunction with teams who are managing the legacy systems and who are involved in the delivery. If possible, the solution should be built adjacent to legacy systems and run in parallel in order to eliminate the need for a hard cutover. Non-functional requirements are a key requirement for any system supporting financial markets, so should be designed into the solution and robustly tested

Knowledge Management - DLT implementations are a team sport. The whole firm — business, technology, control and enabling functions — must all be educated to ensure its success. Even if the whole firm is educated, the ecosystem partners (such as clients, regulators, service providers) also need to be brought up to the same level of knowledge, since the ecosystem is key to the success of the DLT implementation. Education around DLT includes explaining the variety and capabilities of DLT, smart contracts and data lineage. New technology may require the application of new training techniques and methodologies.

Governance of DLT projects must be first-class. DLT projects are under the microscope as the regulatory spotlight is focused on DLT, there have been some infamous high profile project failures, and senior managers know enough to be worried but not enough to be assured about the technology. Good governance, including clarity of problems as they arise and the mitigation, with a clear scope to help ensure that sponsorship is assured and projects can deliver.

Network - the choice of network is increasingly important to deliver the promise of connected interoperable applications suitable for regulated financial markets. It must be able to support the attributes critical to these markets — namely, control and connectivity — without sacrificing the privacy, transparency or sovereignty that are rightly demanded by application owners, clients or regulators. Furthermore, the choice of network should factor in the ability to address NFRs, extend an initial solution to other use cases, or to applications which deliver greater value and operate at scale. These decisions may need to adapt over time.

Regulation is both necessary — and for ISSA members — an imperative to comply with. As with OTC derivative regulation before the 2008 crisis, there is no universal regulatory stance on DLT. Now, as then, there are new assets and new ways of transferring value, and it takes time for the synthesis of operations, technology and regulation to occur. The competing regulatory views can be extreme — crypto is bad, crypto should replace my currency, etc.— and the needs of different industry participants — disruptors or established firms — gives rise to a wide array of regulatory outcomes. The goal of the regulators is to ensure that no harm comes to the clients, markets or wider economy through a poor regulatory framework. Therefore, it is up to the market participants to work with, and explain to, the regulators about the technology, the projects it facilitates, and what controls exist in order to ensure no harm occurs. It is the WG's belief that early regulatory dialogue is helpful to the success of both individual projects as well as the wider ecosystem.

Vendors – Build / Buy- unsurprisingly, the option between build / buy from a vendor perspective remains limited as most, if not all, of the projects identified had been built for specific outcomes. The challenge remains the wide variety of networks, technology options and vendors in this still maturing technology. One of the identified pitfalls — given the maturity level of the technology — is the likelihood of changes that may need to be made. A classic Request for Proposal (RFP) which does not allow for agile changes can cause additional problems for DLT projects.

In the view of the WG during 2024, more DLT projects in the industry have lived up to its headline: “We are getting better at planning and realizing returns from our DLT Projects”. The WG hopes that this short paper will help to provide further guidance to assist the industry in moving from ‘better’ to ‘excellent’.

The WG welcomes any feedback on this paper to improve its usefulness and wishes every success to those who are currently embarking or about to embark on a DLT journey.

2 Report Objectives and Target Audience

The primary objectives of the paper are to:

- **Provide** an objective set of insights on the different factors that can influence any DLT project, drawing on member experience, previous use cases and other inputs.
- **Educate** Securities Services participants, regulators and other market participants on the underlying factors which influence the delivery of successful projects, thereby ensuring there is a structure for the success of their own programmes.
- **Provide** a set of practical insights and recommendations to these entities for future projects.

This paper is addressed to market intermediaries, such as custodian banks, clearers, brokers as well as to asset managers, issuers, industry associations, financial market infrastructures specifically such as CSDs, exchanges and CCPs, regulators and FinTech providers.

3 Working Group Participation / ISSA Reviews and Approval

The approach taken and terms of reference were approved by the ISSA Operating Committee prior to the WG's actions, namely:

- The WG comprised the members of the DLT WG, who were all ISSA members.
- Inputs and insights were sought from other external parties, although the paper and best practices laid out were reviewed and approved by the ISSA membership only and no external party's approval was sought when publishing this paper, in line with ISSA practices.
- The report was approved by the ISSA Board and the ISSA Operating Committee, prior to publication.

4 Introduction and Context

Distributed Ledger Technology projects are theoretically no different from any complex project within Securities Services. Whilst many projects are successful, some can take significant time to deliver, and others have not been successful at all. Given the transformative potential of DLT, projects are often initiated as pilots, in parallel with legacy systems or on a small scale, which can appear as a challenge to the rapid, mainstream adoption of the technology. Additionally, a small number of unsuccessful projects have been highlighted in the media, making it appear there is a bias towards failure of DLT projects. The WG believes this has detracted attention from the many successful DLT initiatives, and that widespread failure is not the case.

The WG highlights that there is a wide spectrum of DLT projects with markedly different aims — from pure research to minimal viable product, through to scaling path to production. Firms need to be clear about what they expect from a DLT project which could be positioned on any part of that spectrum; i.e., what is the purpose and goal of the project? This could be anything from providing proof points through to a full return on investment proposal. It is important to note that this paper is written with a bias towards the delivery of economic benefits but is equally applicable to projects which are merely aiming to provide proof points.

There are a number of elements identified by this report which can present unique challenges to DLT projects or require more focused management compared to a 'simple' Securities Services project. These challenges can be managed and the following chapters address both the success factors and challenges of DLT projects. The aim is to ensure the industry learns its lessons and increases the number of successful projects delivered.

5 Themes to be managed to ensure success in DLT projects

5.1 Business case

Successes – The foundation for any successful project, or carefully constructed business case, will share the following attributes:

A clearly understood problem and a clearly defined solution, including why DLT represents the right technology for that solution. It is essential to first understand the problem that a firm is looking to solve and to define what success looks like in order to define the detailed requirements necessary to achieve the end goal. The WG regards this as equally true for any project. For projects using DLT, an equally crucial step is a thorough upfront evaluation to confirm that DLT is the right technology to solve the problem; i.e.:

- How do distributed workflows or ledgers provide a solution that other technology, including traditional databases, cannot?
- What additional benefits or future proofing are available with DLT?
- What business case benefits — new clients, new revenues, reduced cost or risk — are best achieved by a distributed network?

Understanding the answers to these questions is fundamental and will help to ensure the solution is scaled to the problem being solved and support the level of investment and upskilling necessary to learn a new technology.

Early, incremental, tangible benefits. There is a need to build confidence by demonstrating the benefits from the chosen solution. These benefits can be multifaceted, such as savings on fixed operating costs, faster client onboarding, better access to data, shorter timeframes, more efficiency, accelerated time to market, or a combination of all of the above. With a targeted use case and defined success criteria, it becomes easier to demonstrate that a project is achieving the desired goals. When projects can be seen to deliver tangible results — on either a large or a small scale — the project scope generally increases to tackle larger problems and deliver greater value.

Position for future growth. Firms should take care to address today's challenges with a solution that is scalable to meet both the business needs of today and tomorrow. The solution should also be able to expand to incorporate other use cases or asset types. Additionally, given that network effects generate the greatest value, the solution should be interoperable with market utilities, customers, and other market participants. If not, the firm will run the risk of creating a new operational or data silo, thereby cutting off the ability to achieve broader efficiencies or interconnectivity. DLT and smart contracts can achieve this interoperability, creating a sound foundation for future growth. The WG found that the technology enables a redesign of how data is defined, used, transferred and reported, enabling a variety of solutions which are both asset and service-agnostic. This in turn creates a strong technological foundation to accelerate incremental or step-change growth.

Challenges – DLT projects typically struggle when their business case, or use case, are not well-defined. This can lead to a variety of issues including:

1. **Embarking on a DLT project whilst the business case is still under development.** This can result in longer development timeframes and higher infrastructure costs, as planning and development will be taking place in parallel and any immediate benefits will take longer to deliver. This can also lead to an erroneous selection of DLT, which may ultimately fail to fit the business case. Since DLT is a new technology with significant benefits, there can be an over eagerness to align it with projects; however, not every project is a good fit for DLT, particularly where a simple database might suffice. Ensuring the fit of DLT to the business case is critical for its success.

2. **A lack of understanding as to why DLT might be the right technology to solve the problem versus other options.** This includes understanding the specific attributes and benefits which can be delivered by golden source data, smart contracts, and a distributed workflow and ledger.
3. **A difficulty articulating the benefits which might be achieved in a DLT project.** This can lead to project funding issues or the inability to sufficiently demonstrate agreed value.

A DLT project should have a clear business case, with sufficient scope and participation to demonstrate that it can provide benefits and deliver a scalable solution, with the efficiency, privacy, control and connectivity demanded by multiple parties. If the initial group of participants is too small, this can be difficult to prove, since working at scale often results in a different set of challenges.

5.2 Client

Successes – A close working relationship with the client is essential. Like any other technology initiative, a successful DLT program relies upon a detailed, shared understanding of the technology and how it specifically applies to the industry and client-specific issues or opportunities. However, in a DLT project, the real opportunity is the transformation of existing processes rather than just their improvement or replacement.

1. **Detailed market and industry knowledge is essential to get into the detail of a process in order to re-engineer it.** With deep knowledge, the team can break a current state into its component parts, then restructure the use of data and transfer of value into a new solution or approach by leveraging the attributes of DLT and smart contracts. Doing so enables truly transformative solutions and avoids simply replicating existing processes using new technology.
2. **When using a technology partner, their client team(s) should be able to help the client understand the inherent differences of the new technology.** Given the newness of DLT technology, successful projects have relied on closely aligned business and technical expertise in order to define solutions, products and services. This includes early and ongoing involvement from the various corporate functions required to create or approve a new product or service (such as risk, legal, compliance, audit and regulatory). New solutions can be more readily defined and implemented with contributions from all these functions, combined with a shared and reasonably detailed understanding of the technology.
3. **A successful engagement relies on constant communication.** For every project, this includes establishing clear and close touchpoints to stay attuned to client needs, particularly in respect of any concerns or changes. This in turn ensures strong project governance, including timely and effective issue escalation and risk management. Strong, transparent governance is even more critical for DLT projects, since with a new technology any misunderstanding can cause errors or issues to escalate exponentially. All parties need to communicate clearly and to be sure that what they are communicating is understood, at both a business and technical level.

Challenges – Every client will have multiple stakeholder groups and processes to manage. In particular when the technology is unfamiliar, this process can affect delivery timeframes or the ultimate project scope.

1. **Agreeing on contracts or the contractual framework can require additional time.** This is particularly true when a new technology is involved. For example, certain terms and conditions for a Distributed Ledger Technology platform may be unfamiliar to the client's legal team or used in a different context. This can necessitate further explanation or additional review. In some cases, there may be a desire to include unknown or unclear regulations in an agreement. Balancing the needs of the different parties involved may require additional discussion to determine whether, or how, the regulations should be included.

2. **Prior to going into production, the client (and project plan) should allocate time for engagement and approvals by the corporate functions of a business** (e.g., legal, risk, controls). Agreements or risk and control procedures may need to be reviewed or revised, for example, before a new solution is implemented.
3. **A client's ability to deliver the proposed solution to its clients may be restricted due to legal and regulatory limitations.** This can limit the initial benefits derived from implementation and should be incorporated into KPIs or other determinants of success.

DLT has different capabilities than existing technology. A joint understanding of the opportunity between a provider and its clients allows a more successful transformation of the service. Due to the novelty of the solution set, clear communication, escalation and allowing sufficient time for client education are critically important. Upfront involvement of the client's control functions will allow for a higher chance of project success.

5.3 Design

Successes – Initial and ongoing alignment of all participants – client, technology provider (including the product and production teams), stakeholders and underlying client – on goals, priorities and objectives is critical.

1. **DLT projects are successful when the objectives detail both the 'how' and the 'what'.** It is the case that for DLT, the technology is often also the product and delivery mechanism. The design requirements need to go beyond stating what needs to be accomplished and what the outcomes need to be. When using smart contracts, for example, it must also state how the workflow will be written, what are the different rights and obligations of each role, who operates that role, etc. This keeps the 'how' and the 'what' aligned and in sync, which is particularly critical should the scope change during the project lifetime.
2. **Include underlying clients and stakeholders.** Most DLT solutions involve multiple parties (clients, stakeholders or counterparties) with efficiencies driven by the ability to act asynchronously across a set of actions and activities. Involving these participants early, and often, will better assure the solution meets the objectives across the workflow, and will also increase the likelihood of adoption and use. Without this input, a project runs the risk of meeting internal goals but failing to address the concerns of underlying clients or stakeholders.
3. **Participants should understand business and control priorities.** The project should clearly articulate the technological impact on end-to-end workflows. Technology may have downstream effects (both positive and negative) that are best identified early on. For example, lifecycle events can be embedded into the definition of the digital or tokenized asset, automating or effecting change for a whole range of middle and back-office activities for the client and, often, their partners. A golden source of data can remove the need for additional data purchases or multiple layers of reconciliation, thereby streamlining operations. However, this may require adjustments as to how data is captured by downstream systems along with agreement by the control functions that the reconciliation is now obsolete.
4. **The model and method of design and deployment should be clearly defined and understood.** Generally, the most successful deployments take an incremental approach. These can include:
 - Accelerating time to market with reusable, open-source building blocks.
 - Managing the complexity of blockchain with an abstraction layer.
 - Using incremental builds to add functionality, products or asset classes.
 - Running in parallel with existing infrastructure.

- Evolving existing infrastructure and applications so that they can access tokenized assets and markets, rather than starting from scratch and building entirely new infrastructure and technology stacks. This could include, for example, the ability for the DLT solution to send and receive legacy message types (such as ISOs) on at least an interim basis.
- Focusing on launching with a distributed workflow using a centralized network model directly managed by the client (versus a fully decentralized network where the client's clients are operating their own nodes). These choices can build confidence and encourage adoption, with incremental changes over time versus the need for a massive technology overhaul across multiple parties.

Data privacy, especially privacy at a sub-transaction level, is fundamental to any commercial solution. For regulated financial markets, the ability to keep customer and transaction data private — except where and when it must be shared to complete the transaction — remains critical. The interrelationships between financial institutions — sometimes counterparties, sometimes competitors — depends upon the ability to retain sovereignty over their data and applications, only sharing what is necessary, when it is necessary, and for a specific known purpose to those who are permitted to see it.

Challenges – Delays or missed deliverables can result from a poor design or subsequent lack of agility, flexibility, knowledge transfer, integration, or interoperability.

1. **Keep the scope and technology together.** This avoids sliding back to a less-productive legacy waterfall approach. Maintaining an agile, iterative and flexible development approach is the best way to address likely changes to scope, requirements or participants during the project lifecycle. This enables small course corrections to be made as needed.
2. **Spend the time and effort to ensure that all parties remain up-to-date on the technology, scope and design decisions.** DLT technology is still relatively new and evolving quickly. In regulated financial services and markets, it is essential for all parties to stay abreast and, preferably, ahead of market and provider enhancements. This is particularly important in longer-term, multi-phase projects in order to stay aligned on objectives and outcomes.
3. **Avoid creating a limited solution or 'walled garden'.** This will raise a barrier to future growth or development. Work toward a solution that meets the requirements of the initial business case, whilst retaining flexibility to expand and potentially connect or interoperate with other networks.
4. **Understand that each project is charting new territory.** It is unlikely that any one project will be exactly like another. The differences can include defining how a solution will integrate with a legacy system, becoming a core component of broader market models (particularly in post-trade) and interoperating across emerging DLT options. Sufficient time and effort should be spent upfront on understanding and defining:
 - Upstream or downstream integrations to legacy systems, including changes that may need to be made to those systems.
 - The need for integration with other technology, providers or platforms. Both sides of an integration effort need to understand the technology, allocate sufficient time and resources, and collaborate to identify any areas needing additional attention.
 - If using more than one blockchain how assets and transactions will integrate and interoperate across the blockchains, since cross chain interoperability was limited at the time of writing.
 - How the asset and the cash side of transactions interact and ensure that finality is achieved.

Good design is a key prerequisite for any project but particularly for those involving DLT and interfacing with legacy technology. Understanding the controls, privacy and deployment options is not a necessity for only the project team but also for its control stakeholders and clients. The temptation is to start building, but the WG would caution that a good design and deployment plan is essential; i.e., one that addresses the business case, allows for agile adjustments whilst delivering control and privacy, and engages the stakeholders.

5.4 Deployment

Successes – There is widespread consensus on the importance of incremental builds, phased implementation, and running in parallel with legacy systems. Additionally, the WG believes it is essential to use an agile development methodology and evidence benefits early on.

1. **Incremental build and integration is key, using true agile development methodologies to write requirements, develop and test along the way.** The rationale for this is as follows:
 - This process is not only efficient but allows for constant learning and modification, ultimately improving the outcome.
 - Combining agile methodologies with a constant cycle of Proof of Concept (POC), to Pilot, to Minimum Viable Product (MVP), to Production, allows functionality to be added over time (including non-functional requirements (NFRs)). Importantly, this also allows for continual development and deployment, and achieving incremental ‘go-to-market’ goals.
 - A phased implementation builds out core functionality models in priority order, while incremental builds provide the flexibility to adapt and extend a successful solution over time.
 - Frequent releases allow clients to integrate early on working software, with the flexibility to provide important feedback on functionality during development.
 - An agile process provides the transparency and evidence needed to justify continued funding.
 - Agile development also enables responsiveness to changing market or regulatory conditions.
2. **Build adjacent to legacy systems and run in parallel, to eliminate the need for a hard cutover.** The legacy systems can be integrated with or replaced by the new solution as the project moves towards production. Successful DLT projects demonstrate value not just by the solution, product or service enabled by DLT, but by delivering broad efficiencies to the whole ecosystem, and often that ecosystem will necessarily include legacy systems. Acknowledging and planning for that allows DLT to form a foundation to extend to new solutions or interoperate with other applications.
3. **Focus on NFRs early.** It is imperative that NFRs are incorporated and tested so that they do not become stumbling blocks later in the development or implementation process. Given the multiparty, large-scale nature of DLT solutions, and the involvement of regulated financial markets and entities, NFRs require special attention.
4. **Prove business value along the way for each portion of scope.** Delivering benefits early in the timeline gives stakeholders confidence that the whole opportunity will be realized.
5. **Showcase benefits early and often, including:**
 - Proven scalability across real production transactions.
 - The ability to blend legacy transactions with digital transactions on the platform, if needed, to minimize risk and market disruption while still allowing evolutionary transformation.
 - Connectivity to other platforms to integrate point of trade with post-trade lifecycle management.

- Metrics showing the project goals have been achieved, whether that is tokenizing an asset, or removing points of friction for clients and / or operations.
6. **Demonstrate a clear path to production** with a detailed design and high-level architecture, incremental builds and integration, and well-defined, well-communicated ‘go-to-market’ goals.
 7. **Create a truly distributed (or decentralized) network.** DLT has “Distributed” in the name and hence the network will ideally have participants who have nodes and interact via the network, rather than being a centralized network running on DLT technology. This allows more participants to join and enables the creation of a network effect, since each new solution provides the ability for new experiences and new solutions to be composed. A good analogy for this would be the internet, where a common protocol allows independent applications to connect whilst application owners remain in full control of their system. No single server or database stores the entire network, enabling horizontal scalability, while a browser provides users with a single point of entry to the entire network of applications (see Challenges below).

Challenges – The biggest challenges for DLT projects stem from a reliance upon existing technology, processes or mindsets. These challenges range from underestimating dependencies or failing to coordinate closely enough, to insufficiently managing issues, escalation, testing, training or business involvement.

1. **Conflicting methodologies, technologies, processes or mindsets.** These can put teams at odds and make it difficult to achieve the end goal. For example, a project team employing an agile methodology could be working at cross-purposes with a team on the other side of an integration using a traditional waterfall method, thereby making it difficult to hit project milestones with confidence. This issue is not unique to DLT projects and many firms already deploy ‘agile waterfalls’, but it is often more pronounced when prototyping.
2. **Failing to identify dependencies on external data sources or technology partners, or failing to sufficiently coordinate, can affect project delivery.** Throughout the project, it is critical to identify and closely communicate / coordinate with areas of upstream or downstream dependency.
3. **Limiting or missing opportunities to identify and manage issues upfront, or insufficiently testing throughout development.** Constant communication, feedback, and a shared risk management framework are critical to ensuring transparency and keeping the project on track.
4. **Missing the opportunity for active, early client engagement.** At the start of the project and throughout subsequent phases — including testing — client engagement can falter either through poor communication, a lack of training materials or inadequate operating procedures. These documents should be materially detailed early in the process, evolving over the course of development.
5. **Network skills.** The skills and ability of ‘DevOps’ to create and connect networks efficiently and effectively are often missing for organizations. This, again, is not unique to DLT but, given the nature of the deployment, represents a critical skill.
6. **Create a truly distributed (or decentralized) network.** This goal is hard to achieve. In a regulated environment, there is the historical precedent of ‘unique control’ of books and records. The impacts of proposing a decentralized network are far-reaching, since distributed control remains complex, even if data sovereignty can be evidenced. At a minimum, distributed control requires educating every participant and stakeholder of the entity on the new control environment — this is an extremely lengthy and difficult process. Following that, it is even more difficult to gain acceptance that a decentralized network is a controlled solution, since one negative reaction can stop the project.

Deployment methodologies can make or break a project — there is widespread consensus on the importance of incremental builds and phased implementation in order to demonstrate progress and deliver early benefits. The WG believes that true agile methodology is best used for DLT projects. This should be used in conjunction with teams who are managing the legacy systems and who are involved in the delivery. If possible, the solution should be built adjacent to legacy systems and run in parallel in order to eliminate the need for a hard cutover. Non-functional requirements are a key requirement for any system supporting financial markets, so should be designed into the solution and robustly tested.

5.5 Knowledge Management

Successes – Firms understand that any DLT-related project naturally attracts additional scepticism. To counter this, firms should invest in prepared knowledge and training programs to ensure success.

1. **External training is as important as internal training.** A comprehensive approach to training is essential to the success of any DLT project. The design should consider the knowledge needs of both the internal and external vendors / teams involved in projects.
2. **Management buy-in for training.** The firm’s management must understand the importance of change management and budget the necessary funds for training prior to the project. This will allow the project to effectively plan for extensive training prior to and during the project, which is critically important for success. The technology landscape of DLT continues to evolve. Often, within firms, there can be misunderstandings and misleading assumptions between different groups. Common training helps ensure that all parties are describing the same thing with the same attributes.

Challenges – Given the number of the possibilities and variations in DLT implementations - whether that be private permissioned, public, etc., there is a danger of projects being derailed due to erroneous assumptions. The ecosystem and the options for a deployment are becoming more complex and this requires addressing from a training and knowledge management perspective.

1. **Technology awareness and the changing nature of DLT.** A key ingredient to the success of a DLT project is the preparation and understanding of project teams of the specific DLT ‘flavour’ being implemented. Incorrect assumptions of the technology can be very costly and negatively impact the success of projects. Creating the correct level of understanding requires extensive preparation and training, across all departments. Project teams that emphasize training around the various distinctions of DLTs, address the common misconceptions, and communicate it effectively will probably see more success in their projects.
2. **Cross-departmental education.** Typically, departments within a firm do not have similar levels of knowledge. A regularly cited example is legal or risk departments being less developed in their understanding of either the DLT technology or its implications. Time spent educating and training the support areas of a firm — not just the technology areas — will represent an important step in the change management exercise of introducing the new technology.
3. **Business misunderstanding.** There is often a substantial focus on the technology training and readiness side of DLT projects. However, it is important that business within a firm clearly understands the implications and application of the technology in order to mutually support the technology teams and other supporting departments.
4. **‘Teaching’ DLT.** A great deal of the power of DLT is in its network effect when applied within an ecosystem. This means that training purely based on code, linear PowerPoint slides or UI / UX demos, are in fact limited in their ability to train or accurately predict the benefit of DLT as the chosen technology ideology. Instead, interactive and potentially more complex training methodologies need to be employed including visualizations, animations and effective change management materials.

DLT implementations are a team sport. The whole firm — business, technology, control and enabling functions — must all be educated to ensure its success. Even if the whole firm is educated, the ecosystem partners (such as clients, regulators, service providers) also need to be brought up to the same level of knowledge, since the ecosystem is key to the success of the DLT implementation. Education around DLT includes explaining the variety and capabilities of DLT, smart contracts and data lineage. New technology may require the application of new training techniques and methodologies.

5.6 Governance

Generally, in the WG's experience, governance for projects which are DLT-related will attract a more rigorous process than non-DLT projects. Furthermore, DLT projects are often run in a more agile style, focusing on proof of concepts, minimum viable products and rapid prototyping. Hence, the governance model employed in DLT projects needs to be both flexible and more rigorous in its project management discipline than for traditional projects.

Successes – Governance for DLT-related projects requires even more focused project disciplines (deliverables, up-to-date roles, etc.) than those seen in 'traditional' technology implementations. As one of the WG members recalls, "nobody cared when the firm was replacing IBM Mainframe with an Oracle database, but the mention of moving from Oracle to DLT caused huge, and possibly undue, interest." This adverse reaction is the result of a number of factors, such as:

- Regulatory uncertainty around DLT and crypto leading to a reticence to approve deployment, even if the project is not crypto-related.
- The rapidly changing nature of the DLT technology.
- Misunderstanding of DLT technology in terms of its benefits or application within a capital markets ecosystem.
- Competing and other industry initiatives, along with their relative priorities.

Therefore, to execute a successful DLT project, governance must be robustly led and managed, including:

1. **Improved project disciplines.** Project discipline is important for any project. However, for a DLT project it is even more important, given the changing nature of the technology and the length of time these projects often take. Onboarding of new vendors or teams over a multi-year project where technology assumptions are changing, requires project documentation that is of a high standard and is frequently updated.
2. **Committed to the scope.** DLT, by its nature, delivers unique product features and abilities to projects and the project's sponsors. This can lead to project teams expanding the scope of these projects, often at the request of the sponsor. To prevent scope and budget creep, there need to be clearly defined and agreed scopes linked to benefits of the project which are subsequently adhered to. To ensure success, the scope needs to be underpinned by well-prepared and well-trained teams on the underlying DLT technology.
3. **Relevant and flexible roles and responsibilities.** Updated documentation on roles and responsibilities are required throughout the lifecycle of the project. Furthermore, flexibility is required in the lifecycle of these projects given that additional third parties and team members will be rolling on and off projects.

Challenges – the challenges for governance include the list of things found in all projects however two are worth highlighting as they affect DLT projects more significantly.

1. **Production viability.** Tensions will exist between viable POCs / MVPs and a production-grade readiness for projects, since not all of the POCs / MVPs undertaken will graduate into viable production projects. As part of the governance process, 'productionization' plans and strategy should be incorporated into early-stage governance processes
2. **Competing market priorities.** This is the generic problem in most firms. There will always be competition for resources with market priorities generally taking precedence, particularly over POCs / MVPs, which are often the starting point for DLT projects.

Governance of DLT projects must be first-class. DLT projects will be under the microscope for a number of reasons: because the regulatory spotlight remains focused on DLT, because there have been some infamous high-profile project failures, and because senior managers know enough to be worried but not enough to be assured about the technology. Good governance includes the clarification and mitigation of problems as soon as they arise, along with clear scoping, helps to ensure that sponsorship is assured and that projects can be delivered.

Network (including technology, Non – Functional Requirements (NFRs))

Successes – Every firm operates within a connected capital markets ecosystem. The ability to connect, interoperate, collaborate and address NFRs will determine the DLT solution’s long-term value and success.

1. **The breadth and depth of the problem and opportunity being addressed will play a key role in network selection.**

Public and private networks will each have limitations which should be assessed against both short- and long-term objectives before any choice is made. Furthermore, a network must support sufficient scalability and participation to accommodate potential growth beyond the initial use case.

The BIS Basel Committee on Banking Supervision’s December 2022 standards on the prudential treatment of ‘crypto asset’ exposure highlights the need to choose the right network. Stating that permissionless blockchains could give rise to a number of unique risks, the Basel Committee places assets – including crypto assets and tokenized assets that use permissionless blockchains – in Group 2, making them subject to a punitive 1,250% risk weighting. The Basel Committee standards are just one example of heightened regulatory oversight that should be factored into network selection.

2. **The ability to interoperate, and importantly increase connectivity while maintaining control, across systems, ledgers and technologies is essential.** This can relate to interoperability with other applications on the same network, or the ability to connect with different blockchains or legacy systems. A DLT project which exists in a silo or results in a ‘walled garden’ will be of limited utility.

Although the connectivity of a DLT network is important, regulators are increasingly making clear that the choice of technology will impact the regulatory treatment of tokenized and digital assets. As noted in #1 above, the Basel Committee on Banking Supervision affords tokenized assets the same capital treatment as the non-tokenized form of the asset, but only if certain classification conditions are met, including conditions of the ledger holding such assets.

3. **Extensibility is required in order to connect to payments / digital currencies.** This applies whether payment is taking place off-chain or, ultimately, with on-chain funds. Extensibility also enables connectivity to other pre- and post-trade solutions, extending the value of the application and enabling workflows to cross-organizational boundaries.

4. **Early identification of non-functional requirements (NFRs) is vital.** This is particularly true in this period of transition to modern technology in order to support digital-native, tokenized and traditional assets. NFRs often become complex when multi-party workflows are being re-engineered, particularly where the solution is transforming a workflow across multiple parties that previously operated across separate, siloed systems.

5. **Driving industry-wide progress requires collaborative innovation.** Partners can learn from one another to create a more robust financial ecosystem. This minimizes the risk of creating bespoke, fragmented types of solutions, fosters a culture of innovation, and contributes to regulatory advancement on issues critical to digital assets and capital markets.

Challenges – Like any other project, DLT initiatives will suffer when roles and responsibilities are not clearly defined, or the project cannot be integrated into systems and workflows. Given the dynamic capital markets environment, DLT initiatives can also be challenged by changes to technology or the macro environment which occur during the project lifecycle.

1. **Clearly defined roles and responsibilities.** To manage the project effectively, it is essential to identify upfront how the development work should be shared amongst each of the participants, including what should be insourced or allocated to a lead provider if there is a consortium of providers. When a development is shared amongst multiple stakeholders, it can be difficult to identify and address challenges early on in the project. In that case, it may be helpful to have extra governance or to create a shared simulated environment.
2. **Choose a network that works for regulated financial markets.** With mounting evidence that permissionless networks are not likely to be suitable for financial services (see above), projects that start out using permissionless networks often face challenges when it is time to go into production.
3. **The DLT landscape is in a significant state of growth.** This is driven by increased industry demand for solutions, competitive pressures, and differing degrees of change readiness. Not only are there numerous projects at different stages of development, but there is also significant work underway across the industry on regulatory requirements, governance and operating models. It is critical to recognize this pace of change and growth, particularly for its impact on project scope and timeline.
4. **The nature of capital markets is fluid in terms of opportunities, market and regulatory change.** This can mean the underlying business case for a solution radically shifts during the project lifecycle or – at a minimum – can affect the timeline or cost. This can either take place on a macro level or as a result of changing client priorities. The evolving technology landscape can also play a role, as some emerging technologies do not succeed in the long-term or client demand for a particular solution can be short-lived. The flexibility, functionality, scalability and support for a chosen technology should be sufficient for the long haul to assure a wise technology investment.

The choice of network is increasingly important to deliver the promise of connected, interoperable applications suitable for regulated financial markets. It must be able to support the attributes critical to these markets — namely, control and connectivity — without sacrificing the privacy, transparency or sovereignty which are rightly demanded by application owners, clients or regulators. Furthermore, the choice of network should factor in the ability to address NFRs, extend an initial solution to other use cases, or to applications which deliver greater value and operate at scale. These decisions may need to adapt over time.

5.7 Regulation

In a similar vein to DLT projects requiring additional knowledge management activities and a more focused governance structure versus traditional projects, engagement with regulators will require a similar level of pre-planned engagement.

Successes – In the WG’s experience, regulation is still evolving and even in jurisdictions which have passed legislation, this is under review and can change

1. **Jurisdictional specificity (and single jurisdiction projects).** Each jurisdiction will have specific nuances which will affect any given DLT project. Some jurisdictions already have enabling legislation around tokenization, crypto and DLT, such as Switzerland (established in 2021). This type of innovation-friendly and enabling regulation becomes an accelerator for innovation and ultimately does not stifle projects moving from a POC to a production-ready solution. Markets such as Switzerland, Singapore and Luxembourg have already instigated successful regulatory change in order to put in place the necessary framework for all manner of DLT-related initiatives, from public crypto offerings to initial token offerings and other private blockchain solutions.
2. **Early and continual engagement.** It is crucial that, once a project is initiated within a firm, the project team simultaneously engages with regulators on matters of regulatory specificity which might affect the project choices. Further to the point above on jurisdictional specificity, the regulatory environment is absolutely critical in enabling new technology and providing a contextual guideline in designing market solutions.

3. **Education.** Part of the engagement process with regulators is education-focused. As already noted, DLT technology is fast moving and ensuring that the regulator understands the changes and nuances of different approaches is key to obtaining buy-in and ultimately approval. This is not a one-off exercise, but a series of interventions, possibly across many market participants, to ensure that the regulators have the best possible knowledge of the technologies involved.

Challenges – As noted in the ‘DLT in the Real World’ Survey regulatory uncertainty is reducing across the global but it is still present. The concerns on the impact of data privacy regulation on DLT projects are also increasing at the same time. Two elements are worth calling out:

1. **Cross-border projects.** Cross-border DLT projects are faced with substantial hurdles, given that not all regulatory regimes are aligned, or at the same level of advancement, on these issues. It is likely that this will continue to develop and evolve over time, although early indications (and existing capital market regulations) suggest that not all jurisdictions are likely to be harmonized, which means there will be additional complexity in multi-jurisdictional DLT projects.
2. **Regulatory clarity.** Although experimentation in the form of POCs / MvPs has been promising, in some instances it has been halted prematurely due to a lack of regulatory clarity. A clear understanding and pathway to production, preferably within an existing framework, is essential for DLT projects.

Regulation is both necessary — and for ISSA members — an imperative to comply with. As with OTC derivative regulation before the 2008 crisis, there is no universal regulatory stance on DLT. Now, as then, there are new assets and new ways of transferring value, and it takes time for the synthesis of operations, technology and regulation to occur. The competing regulatory views can be extreme — crypto is bad, crypto should replace my currency, etc.— and the needs of different industry participants — disruptors or established firms — gives rise to a wide array of regulatory outcomes. The goal of the regulators is to ensure that no harm comes to the clients, markets or wider economy through a poor regulatory framework. Therefore, it is up to the market participants to work with, and explain to, the regulators about the technology, the projects it facilitates, and what controls exist in order to ensure no harm occurs. It is the WG’s belief that early regulatory dialogue is helpful to the success of both individual projects as well as the wider ecosystem.

5.8 Vendors: Build / Buy

As previously stated, DLT is continuing to evolve. As opportunities or problems are identified, then solutions are created to address these. This evolution has attracted a number of vendors, none of which are dominant, and each of which may serve a particular function or need. This creates complexity in selecting from the multiplicity of solutions. This issue is further compounded by the need to select a solution which addresses the additional complexity of interoperable solutions in order to attain cross-chain functionality and features. A vendor offering may solve for partial interoperability for public or private solutions but may need to be supplemented by other solutions from different vendors to solve for the firm’s whole use case.

Successes – The selection of many vendors to deliver a use case creates challenges. There is a higher likelihood of a multi-vendor selection to resolve the elements within a DLT use case and so it is critical that:

1. **Close vendor cooperation.** Where there has been effective collaboration and partnership with vendors on key deliverables, DLT projects have enjoyed great success. Whilst close vendor cooperation is essential for all projects, it particularly applies to DLT projects with potential co-dependencies between vendors. These co-dependencies tend to be less well understood and potentially more complex in their nature given the rapid evolution of DLT technology, therefore reinforcing the importance of close cooperation and collaboration.

Challenges – vendor selection is more fraught when technology is changing fast, firms need to be aware of the ‘sunk cost fallacy’ and ensure that the project team is cognizant of the market developments.

1. **Mid-project technology changes.** Given the evolving nature of DLT, technological changes present challenges in scope (expanding projects) or complexity, which leads to cost and time overruns on these projects, or the projects ceasing altogether.
2. **Vendor selection.** Given the kaleidoscope of choices and options in DLT, the Request for Proposal (RFP) process can be more complex and time consuming than for a traditional vendor selection process. As is the theme in most project literature focused on DLT, the education process cannot be underestimated and a RFP process will likely need to factor in more time than for a traditional project.
3. **In-house knowledge.** As noted above, the technological changes occurring within DLT environments are fast-moving and maintaining the in-house expertise across the required disciplines remains a challenge. That is not to say that it is impossible but it does require the team to be given time, not only to deliver, but also to learn and investigate the evolving solution sets.

Unsurprisingly, the option between build / buy from a vendor perspective remains limited as most, if not all, of the projects identified had been built for specific outcomes. The challenge remains the wide variety of networks, technology options and vendors in this still maturing technology. One of the identified pitfalls — given the maturity level of the technology — is the likelihood of changes that may need to be made. A classic RFP which does not allow for agile changes can cause additional problems for DLT projects.