

Decentralized ID Amenability Assessment (DLAA) for US Healthcare

Companion Guide – Textual Reference Manual

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Executive Summary

The Problem

The United States (US) healthcare system is awash in a sea of data. To ensure the efficient operation of the system, the vast amount of data generated – from clinical and reimbursement data to product information – must be easily accessible, editable, and trustworthy. However, current data flows are disrupted, including malicious attacks, preventing this from being fully achieved.

The Cause

The primary culprits of disrupted data flows are conflicting interests and incentives among healthcare stakeholders and the lack of digitization of trustworthiness to transmit it across all types of communication channels between interacting stakeholders.

The Solution

Conflicting interests and incentives are predominantly driven by the pursuit of financial gains and other organizational self-interests rather than technical complexities. Conversely, the cardinal problem of easily transmitting trustworthiness across distance can be deciphered technically with decentralized identity (ID). Decentralized ID has particularly begun to garner attention as a bulwark in the forthcoming generative AI era.

The Point of the Decentralized ID Amenability Assessment (DIAA)

- ▶ **Healthcare has a track record of failures in health information system (IS) deployments:** Health ISs are touted as solutions to some of healthcare’s most pressing issues, but a significant percentage of such deployments fail.
- ▶ **Increase the likelihood of success:** The framework is intended to assist in evaluating whether a healthcare use case is amenable to decentralized ID before proceeding with any investments. This enables you to make informed decisions when selecting use cases for decentralized ID and planning corresponding initiatives.
- ▶ **Evidence-based framework:** The framework has been developed from theory and extensive primary research.

Initial framework applicability test: A precursor to the full assessment

This is a preliminary test to gauge if the framework suits your organization’s specific use case. A single “yes” justifies a more thorough exploration of the framework.

| | Yes | No |
|--|-----|----|
| You face identification, authentication, authorization, and/or eligibility issues when interacting with external stakeholders. | | |
| You face data quality issues when interacting with external stakeholders. | | |
| You face security/compliance issues when interacting with external stakeholders. | | |

1 How to Use the DIAA

- ▶ **Primary purpose:** The DIAA aids US healthcare stakeholders facing digital trust challenges that require resolution and already have a specific use case in mind that decentralized ID may address in assessing whether a particular use case is amenable to, i.e., appropriate for decentralized ID. In this context, it is crucial to note that the framework examines decentralized ID as a concept and does not concentrate on specific implementation solutions.
- ▶ **Domain-crossing framework design:** Decentralized ID is a multifaceted concept that extends beyond mere technology, encompassing legal, social, and business domains. The assessment model has been crafted using a domain-crossing approach to capture this multidisciplinary nature.
- ▶ **Within-organization target group:** The framework's design enables collaboration among different divisions in your organization, allowing each division to contribute its respective expertise. Upon completion, the assessment's results may guide discussions with your organization's senior executives or analogous positions, followed by approaching external key healthcare stakeholders whose participation is required to address the use case.
- ▶ **Second-order uses of the framework:**
 - **Expectation management tool:** Deepens your understanding of decentralized ID and the underlying technologies as the driving forces behind this novel approach to ISs. By providing an overview of the capabilities and limitations of decentralized ID, it has the potential to deter opportunistic adopters from jumping on the bandwagon, hailing it as a panacea for every problem.
 - **Legitimacy provision:** Empowers your organization and managers to walk away from adopting a decentralized ID system before expending resources or devoting additional time to implementation planning.
 - **Implementation support tool:** Facilitates more informed decision-making in planning corresponding endeavors.
 - **Post-adoption project evaluation:** Facilitates explaining potential project failures retrospectively.
 - **Building block provision for context-specific needs:** While the framework has been developed based on the problems of the US healthcare system, its modular nature allows it to be applied in the context of other national healthcare systems and entirely different sectors with some smaller or larger modifications, depending on the sector.

2 Structure of the Framework

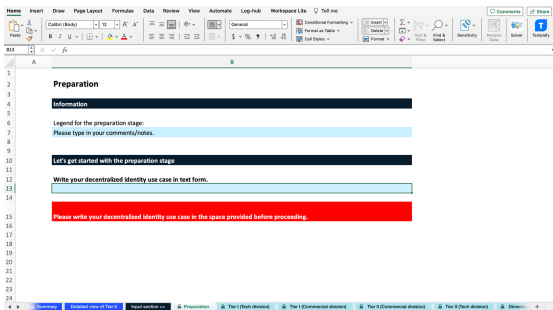
The DIAA is divided into a preparatory stage and two tiers, the *critical amenability assessment* (Tier I) and the *comprehensive amenability assessment* (Tier II), which are defined by different amenability factors. Tier I evaluates whether applying decentralized ID for a certain use case is appropriate solely based on theoretical effectiveness. Tier II considers contextual and situational factors that are described by six dimensions, acknowledging that although a socio-technological innovation might seem promising in theory, practical challenges may emerge during its implementation (Flessa & Huebner, 2021). A seventh temporal dimension links together the other six domains by considering how they evolve. The division into two tiers offers an early assessment exit

point. If Tier I yields negative results, it is not recommended to advance to the deeper use case evaluation of Tier II. Upon successful completion of both tiers, a final score determines the amenability of a use case to decentralized ID. A use case’s amenability to decentralized ID increases (decreases) with higher (lower) valence of Tier II’s six amenability dimensions. More information on the preparatory stage and the two tiers is available below, and a screencast, which can be found [here](#) on YouTube, further assists with the framework population. Section 5 of this companion guide includes a glossary that defines any italicized words.

Before evaluating the two tiers, identify at least two individuals who work in the technology and commercial divisions of your organization, respectively. If a single individual or team rides the fence between these two divisions and can answer all the questions, that is wonderful. However, in many cases, it will be an information technology leader (hereby referred to as *Tech Division*) and a commercial leader with healthcare market knowledge (hereby referred to as *Commercial Division*). Have each leader and their teams complete their respective section, and you will have a comprehensive picture of whether your use case is amenable to decentralized ID.

Preparation

Open the enclosed Excel workbook and begin drafting the use case in a clear and concise textual format. This will allow for the clear specification of any assumptions and facilitate the completion of the framework.



One of the recommended templates for writing use case descriptions is provided by Cockburn (2001). Use cases, according to this template, can range from simple to highly detailed. Which style to use depends on various factors, such as your familiarity with the domain and writing use cases, stakeholder needs, and available resources to write a use case. Regardless of whether it is a simple or detailed version, each use case should include the concepts of scope (referring to the system being discussed), primary actor(s)/end-user(s) (referring to the end-user of the potential decentralized ID solution), and goal level (indicating the appropriate level of the goal to be achieved, considering that many goals often contain sub-goals). Additional components that can be included in the use case description are, for instance, a list of stakeholders who have a vested interest in the goal but are not directly involved in the actions leading to it, main success scenarios that outline the process where nothing goes wrong, and potential issues or scenarios that differ from the main success scenarios.

Exemplary use case description

Use case: Facilitate Medication Prescriptions
Primary actor(s)/end-user(s): Physician, State Board of New York
Scope: Prescription process
Level: Summary (i.e., the entire prescription process is looked at)
Description: A board-certified physician practicing in New York writes daily prescriptions for his patients. To enhance accountability and verifiability in the prescription process, he desires a digital credential from the State Board of New York that confirms his certification to practice medicine in the state. The digital certificate enables attachment to the prescription, allowing the nearby pharmacy to verify his prescription writing privileges.

Tier I: Critical amenability assessment

Tier I assesses the appropriateness of decentralized ID to address the use case from a purpose-centric standpoint while omitting contextual and situational factors.

With the drafted use case in hand, follow each step as indicated in the Excel workbook. Since Tier I begins with technical aspects, it is recommended that the Tech Division initiates Tier I. The Tech Division should start in the *Preparation* tab by determining if the use case involves healthcare stakeholders, which must provide you as an organization with some proof of trustworthiness, such as certifications or the Health Insurance Portability and Accountability Act (HIPAA) Business Associate Agreement (BAA), to initiate a digital interaction with you. If this condition is met, proceed to identify whether there are any digital interaction issues involved in the use case. Here, only one of the four problem sections must be flagged as problematic to proceed with the assessment.

Upon completion of assessing the use case’s digital trust problems, hand the framework over to your commercial counterparts. The assessment requires them to list all healthcare stakeholders that would have to get involved for the use case to materialize, i.e., the *minimum viable ecosystem* (MVE). This is followed by the final step of the assessment framework, which involves analyzing whether all of these listed healthcare stakeholders have an incentive to address the digital trust problems of the use case. This last step determines if you should proceed to Tier II of the DIAA for a more comprehensive evaluation by considering contextual and situational factors.

Tier II: Comprehensive amenability assessment

Tier II, the comprehensive amenability assessment, evaluates the amenability of your use case to decentralized ID deployment through a weighted decision matrix that takes into account contextual and situational factors. The assessment involves evaluating the alignment between 61 standardized decentralized ID amenability factors arranged in six use case dimensions and your use case’s characteristics. The suitability of decentralized ID solutions for the use case is determined based on this alignment. To conduct this evaluation, follow the steps outlined in the Excel workbook, as you did with Tier I. The screencast may also be helpful in populating the assessment correctly since it provides a more practical and hands-on approach.

Critical Amenability Assessment (Tech Division)

Information

The words in *italic* are further specified in the textual reference manual of the multi-media companion guide.

Legend for the critical amenability assessment stage:
Please type in your comments/notes.
Please use the drop-down menu.
Tells you whether to proceed with the assessment or not.
Do not type anything - Excel magic happens here.

Critical amenability assessment

| Step # | Instruction |
|--------|---|
| Step 1 | Have your decentralized identity use case in text form readily available for the assessment. |
| Step 2 | Decentralized identity enables inclusive, trusted digital interactions. Does the use case involve one or more actors (i.e., individuals) that need to be brought within the trust boundary in order to interact with you, and is this process expensive? |
| Step 3 | Assess whether you face at least one of the following problems when interacting with an actor digitally: 3.1 Do you experience any relevant pain points when bringing an actor within the trust boundary to enable a digital interaction? 3.1.1 (Auto-) identification 3.1.2 (Auto-) authentication 3.1.3 (Auto-) authorization 3.1.4 (Auto-) eligibility 3.2 Do you experience any relevant data quality problem(s) upon having entered a digital interaction with an actor? 3.2.1 Data accuracy (including data provenance) 3.2.2 Data completeness (including depth) |

Summary Detailed view of Tier I Input section >> Preparation Tier I (Tech Division) Tier I (Commercial Division)

Critical Amenability Assessment (Commercial Division)

Information

Your technical counterpart has already successfully concluded Step 1 to Step 3. Thus, they ask you now to proceed with Step 4, relying on your domain know
The words in *italic* are further specified in the textual reference manual of the multi-media companion guide.

Legend for the critical amenability assessment stage:
Please type in your comments/notes.
Please use the drop-down menu.
Tells you whether to proceed with the assessment or not.

Your use case Please type your use case in Cell B13 of the Preparation tab.

Critical amenability assessment

| Step # | Instruction |
|--------|---|
| Step 4 | A decentralized identity's full potential can only be realized when all entities within the use case's minimum viable ecosystem (MVE) are involved entities that form the MVE and would have to collaborate for the use case to materialize and be addressed. |
| Step 5 | Is there an incentive for every MVE stakeholder to address the digital trust problem(s)? |

Summary Detailed view of Tier II Input section >> Preparation Tier I (Tech Division) Tier I (Commercial Division) Tier II

To calculate the overall amenability score, both divisions are expected to follow these steps:

1. Assign a relative importance rating to each amenability factor from each of the six amenability dimensions (human, organizational, technological, systemic, collaborative, and wider macro-economic use case characteristics) based on your best judgment regarding its relevance to the use case's manifestation and handling. Begin by rating the first item (Column F) as "10" and then rate subsequent items accordingly. For instance, if an item holds the same level of importance, rate it as "10". However, if it's less significant, rate it as a lower number, such as a "7". On the other hand, if it's more crucial, rate it higher, such as a "40". The default rating for all statements is "10", giving you the flexibility to adjust their significance. Column G automatically displays the importance rating as a percentage.
2. Next, each amenability factor is evaluated on how well it corresponds to the particular use case. In Column H, go through the statements from top to bottom and rate each based on how well it aligns with your use case at hand (-2 = *strongly misaligns*, -1 = *somewhat misaligns*, 0 = *neutral*, 1 = *somewhat aligns*, 2 = *strongly aligns*). The rating scale assumes higher values indicate higher amenability of decentralized ID to the use case. Use Column I to record any important observations made while assessing each amenability factor.
3. It is important to anticipate potential changes to the importance level and rating of each amenability factor in the future. In Column J, indicate whether you expect any changes in the situation described for each amenability factor. If you anticipate changes, use Column K to provide comments on how you believe these changes will occur.

| C | | D | E | | F | G |
|-----|---|---|--------------------|--|---------------------------|--------------------------------|
| | | Amenability factor keyword | Amenability factor | | Relative relevance rating | Relevance to your use case (%) |
| 1.1 | Prior information technology experience | End-users and/or decentralized identity adoption decision-makers have a positive or neutral experience with information systems (including blockchain). | | | 10 | 13% |
| 1.2 | Expected workload | The workload of the decentralized identity solution's end-users is not expected to increase. | | | 10 | 13% |

| C | | D | E | | H |
|-----|---|---|--------------------|--|----------------------------|
| | | Amenability factor keyword | Amenability factor | | Alignment rating (2 to -2) |
| 1.1 | Prior information technology experience | End-users and/or decentralized identity adoption decision-makers have a positive or neutral experience with information systems (including blockchain). | | | |
| 1.2 | Expected workload | The workload of the decentralized identity solution's end-users is not expected to increase. | | | |

| C | | D | E | | F | G |
|-----|---|---|--------------------|--|---|---|
| | | Amenability factor keyword | Amenability factor | | Do you expect this situation to remain stable (i.e., NOT to change)? (Yes/No) | If you answered "No" to any amenability factor remaining stable, this provides you with space to make any comments to help us recall to use of implementation to come back to later on. |
| 1.1 | Prior information technology experience | End-users and/or decentralized identity adoption decision-makers have a positive or neutral experience with information systems (including blockchain). | | | | |
| 1.2 | Expected workload | The workload of the decentralized identity solution's end-users is not expected to increase. | | | | |

Steps 1 to 3 are followed by both the Tech Division and Commercial Division in their respective Excel tabs, as indicated. While you may have concerns about quantifying such a subjective evaluation process, some form of quantification can aid in revealing and examining underlying

assumptions, particularly in the early stages of such potential undertakings (Cummings and Holmberg, 2012).

4. Finally, in the *Dimension importance rating* tab, both the Tech Division and Commercial Division jointly rate the amenability of each use case dimension according to its relative importance. This process is similar to the importance weighting of the individual amenability factors: Begin by assigning a relative importance rating of "10" to the *amenability of human-related use case characteristics* and then rate subsequent dimensions accordingly. Again, Excel converts these numbers into percentages in the background so that all of the amenability dimensions total 100%.

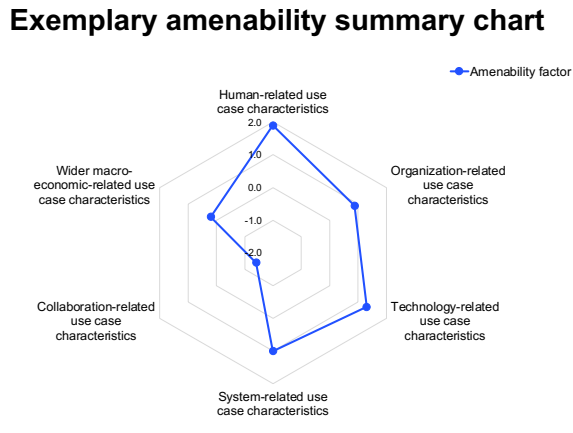
| Information | | |
|--|----|------|
| Legend for dimension importance rating: | | |
| Please enter a number (no percentage). | | |
| Do not type anything - Excel magic happens here. | | |
| Dimension Importance | | |
| Amenability of human-related use case characteristics | 10 | 17% |
| Amenability of organization-related use case characteristics | 10 | 17% |
| Amenability of technology-related use case characteristics | 10 | 17% |
| Amenability of system-related use case characteristics | 10 | 17% |
| Amenability of collaboration-related use case characteristics | 10 | 17% |
| Amenability of wider macro-economic-related use case characteristics | 10 | 17% |
| | 60 | 100% |

Upon completing Tiers I and II, you may proceed to the *Summary* tab to view the overall use case amenability score, including its breakdown into the six dimensions visualized in an amenability summary chart. A final amenability score of 0 corresponds to a factor of 1. Thus, a final score above 0 corresponds to a factor above 1, indicating an amplification of a use case's amenability. Conversely, a final score below 0 corresponds to a factor below 1, suggesting a reduction in a use case's amenability to decentralized ID.

| Final amenability score | 0.00 |
|---|--------------------|
| Use case dimensions | Amenability factor |
| Human-related use case characteristics | 0.00 |
| Organization-related use case characteristics | 0.00 |
| Technology-related use case characteristics | 0.00 |
| System-related use case characteristics | 0.00 |
| Collaboration-related use case characteristics | 0.00 |
| Wider macro-economic-related use case characteristics | 0.00 |

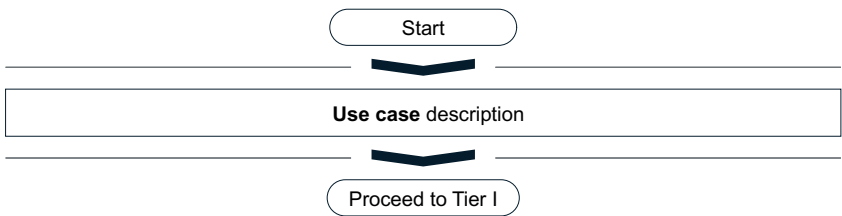
The information in the summary tab will provide a basis for follow-up discussions with your organization's senior executives or analogous positions and other MVE stakeholders you might approach in the subsequent steps.

To get a comprehensive overview of Tier II, including technology and market statements, visit the *Detailed view of Tier II* tab located next to the *Summary* tab. Red highlighted cells signify either the top 10% statements of critical importance or the statements that you gave a rating of -1 or lower, requiring extra attention during potential implementation.

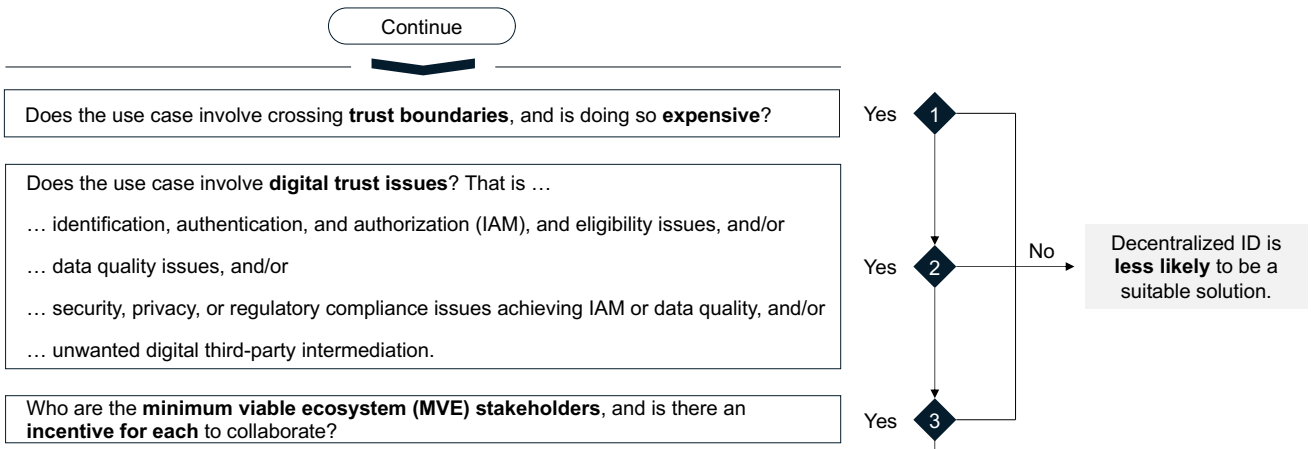


3 Assessment Framework Overview

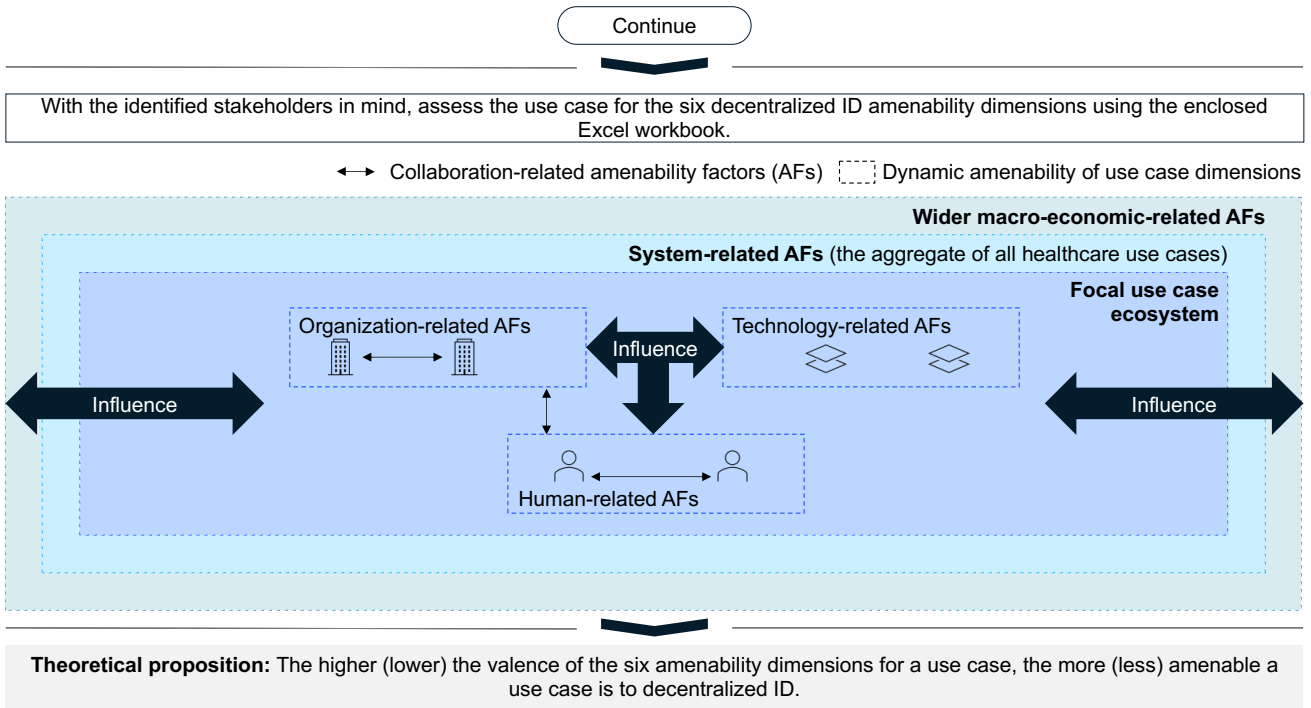
Preparatory step



Tier I: Critical amenability assessment



Tier II: Comprehensive amenability assessment



4 The DIAA Toolkit Overview

The DIAA toolkit comprises various components that will aid in your use case assessment and the potential launch of a decentralized ID implementation endeavor.

- ▶ **An analytical tool:** The core tool in Excel format, designed to facilitate the population and final score calculation of the framework. The workbook has two parts – input and output – with the latter summarizing and analyzing all the inputs and thus serving as a basis for further discussion with senior executives or analogous positions and other internal and external stakeholders.
- ▶ **A companion guide:** A multi-media guide, intended to assist in navigating the framework. It comprises a textual reference manual (i.e., this very document) and a screencast, which is a 10-minute how-to video that explains the framework for a more hands-on approach to populating it.
- ▶ **A live resource wiki:** A dynamic, i.e., live document, hosted on GitHub. It offers supplementary resources to assist in addressing Tier II questions and provide a jumpstart for potential implementation.

5 Glossary

| | |
|------------------|--|
| Actor | Decentralized ID is not limited to individuals but extends to actors, including for-profit and not-for-profit organizations, federal agencies, objects, and anything else requiring identification in the physical or digital world. |
| Amenability | The likelihood of the successful deployment (i.e., system-wide adoption and value-adding use within a set timeframe) of decentralized ID in the US healthcare system. |
| Decentralized ID | Decentralized ID refers to the concepts, ideas, architectures, processes, and technologies that facilitate inclusive and mutually trustworthy digital relationships that instigate power-structure changes and are collective-action- and network-dependent to reach their full potential. |
| Deployment | The umbrella term for technology adoption and use. The term <i>use</i> is to be understood as synonymous with “implementation.” Thus, deployment encompasses the entire innovation adoption process from the adoption decision to implementation, which involves integrating the technology into an actor’s operations to the extent that it is no longer novel. It is assumed that the scaling of the technology is a result of system-wide adoption and value-adding use, with both acting as preconditions. |
| Ecosystem | An ecosystem is defined by the alignment structures of the multilateral set of actors that need to interact in order for the use case to materialize and be addressed. Multilateral refers to the relationships between two actors that are themselves dependent on all other relationships within the ecosystem such that these relationships cannot be broken down into bilateral interactions. Although a set of actors implies the involvement of more than one actor, it does not necessarily mean that the set is complete and unchanging. |
| End-user | The US healthcare system stakeholder that will interact with the decentralized ID solution(s). |

| | |
|--------------------------------|---|
| Evidence | Past experiences, knowledge, policies, certifications and accreditations, computer configurations, and contracts such as the HIPAA BAA. Evidence is characterized along three dimensions. Within a given context, it needs to be sufficient, appropriate, and persuasive. |
| Minimum viable ecosystem (MVE) | Represents the minimum stakeholders and stakeholder groups necessary for the use case to materialize and be addressed. It serves as the catalyst for the joint endeavor, forming the foundation for further ecosystem development. |
| Relevance | The costs associated with the current way of (1) verifying and proving ID, authenticity, authorization, and eligibility and (2) achieving use-case-appropriate data quality (3) in a secure, privacy-preserving, and regulatory-compliant manner. The nature of these costs can differ depending on the actor and use case and may encompass financial expenditures, time expended, and effect on user satisfaction, which ultimately affect the bottom line. |
| System-wide adoption | The achievement of perceived critical mass, which signifies the point at which decentralized ID adoption decision-makers and users have the perception of whether the decentralized ID solution has a critical mass of users through interactions with others. |
| Trust | There are various definitions of trust, but for the purpose of this framework, the following definition is employed: “the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party” (Mayer et al., 1995, p. 712). While not explicitly accounted for in this definition, it is worth noting that trust involves vulnerability and inherent risk. |
| Trustworthiness | Can be understood as deserving of trust (Cambridge Dictionary, n.d.). |
| Trust boundary | Characterizes the evidence that regulates interactions between you and other actors within the trust boundary. Within the trust boundary, the evidence is sufficient, appropriate, and persuasive enough for you to engage in trustworthy interactions with the evidence-providing actor (i.e., the other party). Actors on this side of the boundary are considered trustworthy. Beyond the trust boundary, the provided evidence is insufficient, inappropriate, and unpersuasive for you to engage in interactions with the evidence-providing actor. Actors on this side of the trust boundary are deemed untrustworthy. For a trustworthy digital interaction to happen, these actors need to be brought within the trust boundary through verifiable evidence. Even if the audit standards (i.e., the sufficiency, appropriateness, and persuasiveness of the evidence required and provided) are exceedingly high, trust is never anticipated to be zero unless the interaction is solely among non-human actors (i.e., things). This is because trust is still needed in the actors within the trust boundary to comply with the evidence provided. Establishing these trust boundaries can be economically costly. The trust boundary for a particular interaction, and thus your willingness to bear risk, is determined by four factors: (a) the context of the relationship, (b) the probability of the process failing, (c) your expected return, and (d) the cost you are willing to incur to mitigate risk and enhance confidence in the outcome. Given the dependence of trust on these multiple factors, these trust boundaries are in flux. |
| Use case | In general, use cases, as a form of writing, describe a set of actions that actors need to perform jointly to achieve a certain goal. As not all individuals involved |

in a use case discussion may have specific engineering training, a textual format is typically used (Cockburn, 2001). Use cases are always named using verb phrases in the present tense. Prime examples of decentralized ID use cases across healthcare include Facilitate Medication Prescriptions, Prescribe Medication for Patients, Prove and Verify IDs and Insurance Coverage, Recruit Participants for Clinical Trials, and Prove and Verify Physician Credentials.

| | |
|------------------|--|
| Value-adding use | The extent to which a technology is utilized within a specific context to maximize and harness its full potential. |
|------------------|--|

6 References

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