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Digital Currency Ontology

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About this report

This document is the output of the Architecture Working Group of the Digital Currency Global Initiative.

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Summary

This technical report sets out 3 inter-related ontologies, as defined specifically in this document. The first "Supply" ontology is on the functional design creation and production of any Digital Currency Type. This is achieved by selecting "options" for all distinctions of all notions making up the "supply" ontology. Change the selection of one of the supply distinction options, change the architecture of the currency in a material way.

The second "agree" ontology models all transactions involving the purchase of digital and physical assets and services, and the lending/borrowing of value. A transaction involving an amount can result in a change of ownership, or not. Transactions move an amount" from a source digital currency store to a distinction store. Modelling different transactions is achieved by selecting "options" for all distinctions of all notions making up the "agree" ontology. Change the selection of one of the agree distinction options, change the agreement type executed in a material way.

With the ability to create any Digital Currency Type with the supply ontology, and the ability to engage in agreements with the agree ontology, the 3rd "market" ontology models the interactions between Digital Current Type Ecosystems, the exchange services to convert value in one digital currency form for the same value in another form; the services of empirical data; liquidity pools, etc. Modelling all the services and participant types is achieved by selecting "options" for all distinctions of all notions making up the "market" ontology. Change the selection of one of the market distinction options, change the architecture of the market transaction, in a material way.

The 1st supply ontology feeds into the 2nd agree ontology that executes in the 3rd "market" ontology.

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1 Scope

The scope of this work includes ontologies representing 1) all-matters Digital Currencies (DC), their form, type, and properties; 2) all-matters digital agreement executed using DC

2 References

No external references

3 Terms and definitions

3.1 Terms defined elsewhere

No use of terms defined elsewhere.

3.2 Terms defined here

This Technical Report defines the following terms:

3.2.1 Digital Currency Supply Ontology Terms

The following are the Digital Currency Supply Ontology (DCSO) related definitions.

1. **Digital Currency** ("**DC**"): a representation of monetary Value in digital form.
2. DC **Unit** ("**Unit**"): a DC must exist 1st at time of Issuance as a singular Data Structure that is produced whenever Supply increases.

3. DC **Uni**t Supply ("**Supply**"): the number of Units available as Supply in the Single Digital Currency Type Ecosystem ("Ecosystem").
4. Unit **State ("State")**: Units from their time of production to their removal from Supply, even during their availability, their **usability** can be controlled as follows:
5. **Inactive** Unit State (“**Inactive”**): non-operational state of the Unit after production and before Unit Value Determination and during removal of Units from Supply.
6. **Active** Unit State (“**Active”**): normal operational state of the Unit available in Supply.
7. **Locked** Unit State: as part of the Unit's normal operating state, a Unit can be locked and functionally unavailable. For example, in the cased of a programable Type, the Unit can enter a hold period.
8. DC **Form** (“**Form**”): The digital data architecture/structure of a Unit – how it is built.
9. DC **Store** (**“Store”**): The digital data architecture of where the Form exists and is maintained.
10. DC **Type** (“**Type**”): is defined by the combined attributes of Unit and Store.
11. DC **Ecosystem** (“**Ecosystem**”): means the ecosystem (all locations) where DC Type is created (+Unit), stored, maintained, and otherwise exists; and transferred, transformed, processed and destroyed (-Unit).
12. **Mechanical** Ecosystem: means the Ecosystem operational state independent of unit value determination, Unit state: Inactive
13. **Unit Supply Change**: instances where the # of Units available in Supply may vary.
14. **Fixed** Unit Supply: No change in the # of Units available in Supply
15. **Variable** Unit Supply: Changes, either increase or decrease, in the # of Units available in the DC Type Ecosystem.
16. **Increase/Decrease Unit Supply**: Increase in the # of Units available in Supply.
17. **Unit Change by Issuer Policy**: Increase/Decrease in Units determined by Policy.
18. **Unit Change by Issuer Algorithmic**: Increase/Decrease in Units determined by algorithm.
19. **Unit Change by Issuer Oracle**: Increase/Decrease in Units determined by Oracle, an authentic and objective source of empirical (non-subjective) data
20. **Unit Change by Issuer Voting**: Increase/Decrease in Units determined by a Voting Process
21. **Unit Supply Release Schedule**: the release of the # of Units produced can be all at once (immediate); over time (Gradual); or based on meeting one or more conditions (conditional).
22. **Unit Supply Distribution**: Issuer will move the Units from Issuer Store (Origin Store) to their destination Store, either directly (e.g., Genesis Units) or through an intermediary (Indirect)
23. **Physical Unit**: Currency that exists in “hard” form.
24. **Non-Physical Unit**: Currency that exists in “soft” form, electronic or digital form. An Electronic Currency and a Digital Currency
25. **Entry Data Structure**: A DC Form that is based on an entry in a data cell that is maintained in a database.
26. **Object Data Structure**: A DC Form that is based on a cryptographic object that is maintained in a File Repository
27. **DC Store Form** refers to whether the Unit in the Store can self-verify its integrity or not.
28. **Store Self-Verification Incapable** means integrity verification is dependent on the Store itself to determine and maintain integrity.
29. **Store Self-Verification Capable** means integrity verification is independent of the Store itself and can be determined through intrinsic self-verification.
30. **Unit Form Properties** are used to describe the characteristics of the Unit including Fungibility, Rights, and Acceptance.
31. **Unit Fungibility**, defined as either fully fungible, where the Unit can be converted into same Value in other Forms and denominations or not.
32. **Unit Rights** are defined as either Inherent, Inherited or Assigned Rights,

33. Unit **Inherent** Rights, that is intrinsic to the Unit itself such as right of Ownership,
34. Unit **Inherited** Rights, that is rights granted due to an executed agreement; or
35. Unit **Legal** Rights: rights granted to the Unit by the national government.
36. Unit **Acceptance** Rights, that is whether the Units must be accepted as payment or mandated; mandated with some exceptions; or under the discretion of the Receiving Party, voluntary basis.
37. **Unit Voting Rights** which is based on the Unit Vote Accessibility and Unit Vote Eligibility
38. **Unit Vote Accessibility**, which can be restricted and unrestricted.
39. **Unit Vote Eligibility**, which can be conditional or unconditional.
40. **Multi-Function Unit**: Unit having the capability to be programmed for specific use and time-of-use constraints.
41. **Single-Function Unit**: is a Unit that is non-programmable and has no ability constrain use.
42. **Unit Use Restriction**: constrains what the Unit can be used for.
43. **Unit Origin Restriction**: constrains where, what the Unit can be used for, originates.
44. **Unit Time Restriction**: constrains when the Unit can be used.
45. **Unit Location Restriction**: constrains where the Unit can be used.
46. **Unit Denomination Adjustable**: defines how a Unit can be divided into smaller or fractional sub-Units.
47. **Unit Value Drivers**: the mechanism by which the Unit derives its Unit Value.
48. **Initial Value Offer**: refers to the Unit Value Offer by the Issuer in the Genesis Event.
49. **Extrinsic Unit Value Drivers:** mechanisms that are externally *guaranteed* through *Pegging* and backed by Collateral.
50. **Intrinsic**: mechanisms that are inherently *guaranteed by law or through contract.*
51. **Issuer Guaranteed Driver**: 1) Public Sector as Central Bank, or Government, or 2) Private Sector as Private Bank, or Corporate Entity, or 3) Backer.
52. **Backer Degree-of-Separation**: the number of parties as potential Claimants between the Backer and the Borrower referred to as Degree-of-Separation as Integers: 1, 2, 3…
53. **Non-Fungible Tokens**: representations of Value that cannot be copied, substituted, or subdivided, referred to as Collectables.
54. **Backing Collateral Requirement**: specifies whether the Backing will require Collateral (x 1.0) or not (x 0) and the percentage risk factor to apply (Backing Amount x 1.#).
55. **Backing Collateral Type**: specifies the type of Collateral required when Backing Collateral Requirement is 1.#. Types include Commodities, Securities, Digital Currency, Digital Assets
56. **External Pegging Mechanism**: the mechanism by which the Value of a Unit is determined by its direct association or pegging to an external Value source.
57. **On-Chain Lock-in**: represents how a Value Amount is locked and retained as collateral on a distributed ledger-technology (DLT) blockchain-based DC, referred to as a Cryptocurrency.
58. **Escrow**: represents how Value Amount is unavailable and held as collateral for non-blockchain- and off-blockchain-based DC use cases.

3.2.2 Digital Currency Agree Ontology terms

The following are the Digital Currency Agree Ontology (DCAO) related definitions.

59. **Commit**: the act by a Participant in an Offer to buy or sell.
60. **Start Participant**: Participant that initiates a Commit.
61. **Amount**: the Unit Value times the number of Units.
62. **Agree**: covers all activities and actions involved in an Agreement (“Agree”) initiated by a Start Participant with an Amount Commit.

63. **Agree Participants**: all Participants involved in one Agree.
64. **Lender**: A Start Participant that Commits Amount to Lend
65. **Transferer**: A Start Participant that Commits Amount to Move from one Digital Store to another.
66. **Exchanger**: A Start Participant that Commits Amount to Exchange
67. **Staker**: A Start Participant that Commits Amount to Stake
68. **Buyer**: A Start Participant that Commits Amount to Purchase
69. **Physical Asset/Service**: an object or Service of value that exists or is provided in the natural world.
70. **Digital Asset/Service**: an electronically based Service and a digital cryptographic object both of value that exists or is provided in the virtual world.
71. **Intermediary Participant Pay-it-Forward (Serial) Fee Model**
    "S" = # Intermediary Participants, For I = 1 to S, Commit Full Amount = End Amount plus all Fees. S1 Service Provided, Fee "F1" extracted.
    S1 Forwards (Transfers) Remainder 1 to S2: where R1 = Full Amount - F1. Repeat For I = 2 to S, Ri = Ri-1 – Fi.
72. **End Participant** receives Final Remainder Amount Rs = Full Amount – all Fees
73. **Seller**: Participant that offers Physical or Digital Assets/Services
74. **Physical Asset Send**: An Agree involving the Purchase of a Physical Asset that must be sent to **Buyer**.
75. **Digital Asset Send**: An Agree involving the Purchase of a Digital Asset Object that must be sent to **Buyer**.
76. **Borrower**: A Participant that accepts a Loan from a Lender under terms set in Loan Agree.
77. **Liquidity Pool**: a reserve of Amount available for lending.
78. **Agree Terms**: the contractual terms and conditions of an Agree.
79. **Terms of Data** (“Data”): the contractual terms and conditions of an Agree encoded as data in a File.
80. **Terms of Code** (“Code”): the contractual terms and conditions of an Agree encoded as computer instructions.
81. **Agree Classes**: all Agrees are either Intra-Ecosystem, conducted within same Form of Value, or Inter-Ecosystem, between two or more Ecosystems of different Forms of Value.
82. **Intra-Ecosystem Agree**: Agree executed within same Form of Value.
83. **Transfer**: Start Participant moves an Amount of Form from **Sender Store** to **Receiver Store**. Sender Commits (Lock) Amount from source **Sender Store**, which is unavailable to Sender during Lock Period. Amount less Fees added to destination **Receiver Store**
84. **Inter-Ecosystem Agree**: Agree executed between two or more different Forms of Value through no, or one or more **Intermediary Participants**
85. **Digital Asset/Service Transaction** is an Agree to Purchase a Digital Asset/Service in exchange for a **Purchase Amount** equal to **Seller Price + Fees**.

~~86.~~ **Agree Initiation**: Start Participant as Buyer Commits (Lock) Purchase Amount from **Buyer Store**, unavailable to Buyer during **Lock Period**.

87. **Agree Condition**: (Purchase Amount-Fees)/Seller Price = 1
88. **Agree Fulfilment**: If yes, add/increase Seller Price to Seller Store. Seller to send Digital Asset to, or provide Digital Service to Buyer
    If no, Agree is terminated and Purchase Amount unlocked and returned to Buyer Store.
89. **Physical Asset/Service Transaction**: is an Agree to Purchase a Physical Asset/Service in exchange for a **Purchase Amount** equal to **Seller Price + Fees**.
90. **Agree Initiation**: Start Participant as Buyer Commits (Lock) Purchase Amount from **Buyer Store**, unavailable to Buyer during **Lock Period**.
91. **Agree Condition**: (Purchase Amount-Fees)/Seller Price = 1

92. **Agree Fulfilment**: If yes, add/increase Seller Price to Seller Store. Seller to send Physical Asset to, or provide Physical Service to Buyer
    If no, Agree is terminated and Purchase Amount unlocked and returned to Buyer Store.
93. **Exchange**: is an Agree to convert a **Source Unit Form** for an **Exchange Unit Form** based on the Unit Value ratio of the two Forms.
94. **Agree Initiation**: Start Participant as Exchanger Commits (Lock) **Exchange Amount** of Source Unit Form from **Exchanger Source Store**, unavailable to Exchanger during **Lock Period**.
95. **Agree Condition**: Exchange Rate = Unit Value of Source Form/Unit Value of Exchange Form, Exchange Fee
96. **Agree Fulfilment**: If yes, add/increase in **Exchanger Destination Store** by **Destination Amount** = Exchange Amount – Exchange Fee
97. **Agree Ownership Impact**: the outcome on ownership of Amount committed in Agree ("**Agree Amount**") as either full ownership change or no ownership change with the addition of restrictions for Restriction period.
98. **Ownership Restrictions:** are constraints on the Owner on the exercising the Amount Ownership rights, sale for a **Restriction Period**.
99. **Amount Availability Restriction**: the constraint on Amount is its availability.
100. **Agree Tax**: is the Amount of the Commit Amount extracted as a Tax.
101. **Amount Sufficiency**: whether the **Commit Amount** meets the **Agree Amount**
102. **Short Amount**: when Amount Sufficiency is negative, Commit Amount is less and does not meet the Agree Amount, a Debt Amount is generated where Start Participant accepts a Loan for the Short Amount
103. **Agree Finality**: refers to the temporal nature of Agree, whether it is reconciled synchronously in real time, or reconciled Asynchronously.
104. **Settle Now Synchronously**: refers to reconciling Agree synchronously in real time.
105. **Store Availability**: in both the Issuance Process and the Move Processes involve Stores that must be available for the Agree to process.
106. **Settle Later Asynchronously**: refers to reconciling Agree asynchronously by choice or design; by unintentional events; and by the unavailability of Stores in Agree.
107. **By Design Asynchronous Settlement**: Agree initiated is to be reconciled at more than one time as part of the **Agree Terms**
108. **By Context Asynchronous Settlement**: Agree initiated is reconciled later due to an unexpected Agree event.
109. **By State Asynchronous Settlement**: Agree initiated is reconciled later due to Store in Agree not being available.
110. **Accessible Online Store**: Store that is connected to the Internet
111. **Inaccessible Offline Store**: Store that is not connected to the Internet
112. **Paper**: A Form of a Unit in the Physical Asset.
113. **Commit-to-Destination Store Path**: are the connections necessary to complete the Amount movements between Agree participants as prescribed in Agree.
114. **Intra-Ecosystem Store Path**: all connections necessary to complete the Amount movements between Agree participants are in the same Ecosystem.
115. **Direct Intra-Ecosystem Store Path:** connections necessary to complete the Amount movements between Agree participants are in the same **Physical Store Space**.
116. **Indirect Intra-Ecosystem Store Path:** connections necessary to complete the Amount movements between Agree participants are in the separate **Physical Store Spaces**.
117. **Custodian** Store: A Store being managed by a Service Participant on behalf of an Owner.
118. **Inter-Ecosystem Path**: connections necessary to complete the Amount movements between Agree participants are in two different Ecosystems.

119. **Distributed Multi-Ecosystem Path** connections necessary to complete the Amount movements between Agree Participants are in the more than two Ecosystems.

120. **Ownership Change Update**: refers to recording all Amount Ownership changes involved in Agree.

121. **No Ledger Update**: refers to an Agree involving Forms where no update of Owner in Amount is recorded.

122. **One Unique Ledger Update**: An Agree involving Forms where the update of Amount Ownership change is recorded on one unique **Ledger**.

123. **One Unique Centralized Ledger Update**: An Agree involving Forms where the update of Amount Ownership change is recorded on one centralized **Ledger**.

124. **One Native Ledger**: An Agree involving Forms where the update of Amount Ownership change is recorded on one **Native Ledger**, one where the Form of Unit is native or of same protocol as the distributed ledger technology (DLT) recording mechanism.

125. **Many Identical Distributed Ledger Updates**: An Agree involving Forms where the update of Amount Ownership change is recorded on many identical distributed Ledgers.

126. **Public Validators**: Reward Participants providing a consensus service-for-renumeration in a public permissionless DLT-based network.

127. **Permissioned Validators**: Reward Participants providing a consensus service-for-renumeration in a private permissioned DLT-based network.

128. **Many Distinct Ledger Updates**: An Agree involving Forms where the update of Amount Ownership change is recorded on many distinct Ledgers.

129. **Many Unique Distinct Ledgers**: An Agree involving Forms where the update of Amount Ownership change is recorded on many unique Ledgers.

130. **Commit Ledger Update**: the ledger type of the Start Participant initiating the Agree.

131. **Intermediary Ledger Update**: the ledger type of the Intermediary Participants involved in the Agree.

132. **Destination Ledger Update**: the ledger type of the End Participant completing the Agree.

133. **Physical Ledger Update**: An Agree involving Forms where the update of Amount Ownership change is recorded on Paper.

3.2.3 Agree Market Ontology terms

The following are the Agree Market Ontology (AMO) related definitions.

133. **Participant:** An entity having control over a one or more Stores in one or more Ecosystems that can participate in an Agree.

134. **Issuer Participant**: an entity that has the capability to issue Form.

135. **Owner Participant**: A Participant that "owns" an Amount of Value

136. **Non-Owner Participant**: A Participant that "does not own" an Amount

137. **Entrant Participant:** Potential future Owner

138. **Service Participant**: Participant that provides Services-for-a-Fee, Fee originating from Existing Supply.

139. **Reward Participant**: Participant that provides Services-for-a-Reward, Renumeration originating from new additional Supply

140. **Fee:** Amount a Service Provider will extract (by paid) from the transaction for the service provided.

141. **Reward:** A Participant that generates validation trust in decentralized consensus mechanisms. Reward originating from newly issued Form.

142. **Genesis Supply**: is the 1st Supply event of Units produced by Issuer to establish the Unit Value of the Unit, referred to as the Initial Value Offer.

143. **Subsequent Supply Events** refers to all Issuer Supply events after Genesis Supply.

144. **Amount Owner**: Amount being the Unit Value times the number of Units owned by a Participant.
145. **Unit Access**: the control by a Participant that can be exercised on the Units owned either through an authentication or proof of control.
146. **Proof-of-Identity**: a process of establishing the authentic identity of a Participant to a level of assurance and whether the person asserting the identity is who they say they are.
147. **Identification**: the process of establishing the true identity of a Participant through a background vetting process.
148. **Authentication**: the process of establishing that the person making the Identity assertion is who they say they are.
149. **Authorization**: the process of controlling and constraining the use of the Unit based on rights management.
150. **Proof-of-Control**: the ability to demonstrate Unit Access and control not through Identification but through action.
151. **Send Action**: proof-of-control demonstrated by a transfer of the Unit to the control of a Receiver Participant.
152. **Trusted Intermediary**: A Participant that provides a Validation and/or Verification Service to other Participants.
153. **Amount Depreciation**: Amount of Value loss over time with no Activity
154. **Amount Value Percent Loss**: is a measure of depreciation.
155. **Credit Amount Available**: An Amount of Value available as Credit when exercised becomes a Debt.
156. **Percent of Amount Owned** is a measure of Credit Amount Available
157. **Financial Intermediary** is a Participant acting as "go-between" two or more Participants.
158. **Liquidity Participant** is one that Owns Amount and make it available for Borrowing.
159. **Lender** is a Liquidity Participant that performs Lending Transactions with Borrowers for an **Interest Rat**e over a **Lending Period**.
160. Collateral Provider is a Liquidity Participant that provides Amount as a guarantee against a Loan.
161. Non-Owners are Participants that do not Own any Amount.
162. **Smart Contract:** Code Instructions contained in a program.
163. **Distributed Autonomous Organization** is a Participant whose conduct and actions are based on a Consensus Algorithm with Oracle data inputs.
164. **Exchange** Service ("Exchange") is a Participant that converts one Unit Form for another based on their Unit Value ratio, referred to as **Exchange Rate**.
165. Transfer Service is an **Intermediary Participant** that Moves Amount from a **Source Store** owned by a **Sender** Participant to a **Destination Store** owned by a **Receiver** Participant.
166. **Custodian** is a Participant that "holds" an Amount on behalf of the Owner.
167. **Oracle** is a Participant that provides objective and empirical data as a service to Participants such as DAOs (Decentralized Autonomous Organizations) and Exchanges.
168. Price: is the Amount paid, or to be paid, in a **Purchase Transaction**.
169. **Validator**: is a Participant that provides validation/confirmation Service-for-Reward.
170. **Verifiers**: is a Participant that provides a verification, or proof certification Service-for-Reward.
171. **Market Engagement**: The commit of a **Participant** and another Market Participant, involving an Amount, in one or more Forms.
172. **Positive Engagement**: The commit made by a **Participant** involves adding liquidity to the Market.
173. **Change Ownership Commit**: The commit made by a **Participant** involves a change of Ownership of Amount committed.

174. **Transfer Commit**: The commit made by a **Participant** involves the transfer of Amount to a **Receiving Participant**.

175. **Exchange Commit**: Commit to Exchange one Form for another based on their constant Value Exchange Rate.

176. **Stake Commit**: Commit to Stake an Amount with no change in Ownership.

177. **Match Commit**: when Offer-to-Sell "crosses" Bid-to-buy, Agree Pre-condition

178. **Invest Commit**: Commit to Stake an Amount to Invest

179. **Sell Commit**: Offer to sell at a Price.

180. **Buy Commit**: Offer to purchase at Price.

181. **Digital Transact Commit:** Purchase Commit for Digital Asset and/or Digital Service

182. **Physical Transact Commit:** Purchase Commit for Physical Asset or Physical Service

183. **Negative Engagement**: The commit made by a **Participant** involves removing or locking liquidity rendering it unavailable as liquidity in the Market.

184. **Accept Commit**: The commit made by a **Participant** to Accept Ownership of Amount

185. **Cold Store**: Units maintained in Internet-disconnected Store.

186. **Stake**: To assign the right-of-Control of Amount to Liquidity Participant for Staking Period in return for renumeration.

187. **Un-Stake**: The act of un-assigning the previously assigned right-of-Control of Amount before the expiration of Staking Period.

4 Abbreviations

DC	Digital Currency
DCT	Digital Currency Type
AMO	Agree Market Ontology
DCAO	Digital Currency Agree Ontology
DCSO	Digital Currency Supply Ontology

5 Ontology as Anchor Information Construct

This workstream aims to demonstrate the critical importance, utility, and distinctions of an ontology as the construct of “information organization” in defining the “thing we are talking about,” as compared to other more traditional organizational structures such as a taxonomy, classification, framework, or tabulation. As such, an ontological “method-of-development” is also described with associated rules and constraints to ensure the outcome of the more stringent ontological method successfully produces the unique characteristics of an ontology. It also ensures that the process does not easily and naturally degenerate into lower form and therefore lower utility constructs, such as frameworks which are challenged by issues of completeness and correctness.

The absence of a common understanding of a reliable representation of “the thing we are talking about,” before requirements are defined and mandated for it, yields only notional requirements that do not deliver the assurance levels necessary for protection of complex systems in the digital age.

5.1 Ontology compared to Other Forms:

Putting aside for a moment, “the thing we are talking about,” what does an ontology versus a taxonomy, classification, framework, table or list have in terms of its ability to reliable capture and retain knowledge about the “thing,” thereby enabling a reliable multi-disciplinary and integrated analysis of the thing we are all concerned about protecting.

- In philosophy, **ontology** is the branch of metaphysics that studies the nature of existence or being. In computer science, an ontology is a formal and explicit specification of a conceptualization of a domain of knowledge. In other words, an ontology is a way of representing knowledge about a particular domain, such as a field of study or an industry, in a structured way that allows for precise and unambiguous communication between different elements of a system through their relationships. It typically consists of a vocabulary of terms, along with rules for combining those terms to create more complex concepts and relationships between them.
- A **taxonomy** is a way of classifying and categorizing things based on their characteristics and relationships. It is often used in biology to classify living organisms into different groups based on their physical and genetic characteristics. In information science and knowledge management, a taxonomy is a way of organizing information or knowledge in a hierarchical structure, where each level of the hierarchy represents a more specific or detailed category of information. This allows for more efficient and effective retrieval and organization of information.
- **Classification** is the process of **organizing** or **categorizing** items or concepts into groups based on their similarities or differences. It is a fundamental process that helps us make sense of the world by identifying and grouping similar things together. Classification can be based on many different criteria, such as physical characteristics, function, behavior, or purpose. For example, in biology, organisms are classified based on their physical characteristics and genetic makeup. In library science, books are classified based on their subject matter and content. In data science, classification is a type of machine learning technique that involves training a model to recognize patterns in data and classify new data based on those patterns.
- A **framework** is a set of rules, guidelines, or models that provide a structure for organizing and understanding a complex system or concept. It is essentially a set of pre-established assumptions, concepts, and practices that help to guide and inform a particular area of inquiry or practice. Frameworks are used in a wide variety of contexts, including software development, project management, education, and research.

- In computer science, a **table** is a collection of data organized into rows and columns. Tables are used to store and represent structured data in a way that is easy to read and analyze. They are a common data structure used in relational databases, spreadsheets, and other applications. A table is typically composed of one or more columns, each of which represents a particular attribute or type of data, such as a name, date, or numerical value. Each row in the table represents a specific instance of the data and contains values for each of the attributes defined in the columns. Tables are often used for tasks such as storing and retrieving data, performing calculations and analyses, and displaying information in a structured format. They can be manipulated using specialized software tools or programming languages, which provide a variety of operations for managing and working with table data.
- In computer science, a **list** is a collection of items that are ordered and can be accessed by their position or index. Lists are used to store and represent sequences of data, such as a series of numbers, names, or objects. A list can be created and modified dynamically, meaning that items can be added, removed, or rearranged as needed. Lists can also be used to perform operations on their contents, such as sorting, searching, or filtering. In programming, lists are a fundamental data structure, and are often used to represent arrays or vectors.

Ontology, taxonomy, classification, framework, table, and list are all terms that are used in different contexts to represent different concepts. However, there are some similarities and differences between these concepts. All these terms are used to represent structures or systems for organizing information. They all involve the use of categories or groupings to organize and classify data. They all facilitate the understanding and processing of complexity.

Ontology on the other hand is a formal and explicit representation of concepts and their relationships in a particular domain, while taxonomy is a hierarchical structure that organizes categories based on their characteristics. Classification is the process of assigning items or concepts to specific categories, while taxonomy is the specific hierarchical structure that defines those categories.

A framework is a set of rules, guidelines, or models that provide a structure for organizing and understanding a complex system or concept, while taxonomies or ontologies are more specific structures for organizing information. A table is a collection of data organized into rows and columns, while a list is a collection of items that are ordered and can be accessed by their position or index. Tables are often used for storing and organizing data in a structured format, while lists are often used for representing sequences of data.

Taxonomies, ontologies, or classifications can be implemented using tables or lists, but the former three are higher-level concepts that define the organization of the information, while the latter two are lower-level data structures used to store the information.

With an understanding of what an ontology is, compared to other data organization structures, the following will define the assumptions, rules, and criteria by which an ontology is developed.

5.2 Ontology Principles and Development Rules

One: There can only be one (1) ontology representing a given domain scope, that is the Ontology must be complete by-design. It therefore, by definition, must cover “all matters” domain. The implication of an ontology is that only one can exist for a given scope, so that all derivatives (forms) can be generated by the same ontology simply be selecting different distinction values. Change the value of one distinction and the outcome is a different instantiation. For example, the “digital currency supply” ontology must cover all digital currency types. One type is defined by all distinctions having been assigned a value. Change one value of one distinction, and you have a different type.

Generally, frameworks contain requirements that were defined without any knowledge of the thing it is to be applied to. Consequently, there is no guarantee of completeness. That is, the coverage of the requirements in frameworks are insufficient for what is necessary to fully cover the thing.

- **Bounded:** An ontology must be of a well bounded, specific, and explicit scope of knowledge or of a domain. The ontology must, by definition, cover “all matters” within the defined scope. For example, “all matters” Cryptographic Processes that cover all keyed and non-keyed cryptographic operations for encryption, digital signatures, and authentication.
- **Decomposition**: Once the breadth of the scope is defined, a principle of completeness must apply in the decomposition process of defining, with increasing precision, the structure within the scope. Referred to as de-compositional Completeness, any topic (“parent”) can be broken down into two or more sub-topics (“children”). The sum of the scopes covered by each sub-topic (children) must equal the original topic (parent) Scope. This rule ensures no loss of scope in the decomposition process.

5.2.1 Correctness by Enhancement:

Generally, there are many frameworks that describe differently the same set of requirements to be applied to the same components, for example, the application of encryption while information is stored. Which one is correct?

- "The thing we are talking about” will be ultimately described in words of a particular language. Whether a particular word in a statement is correct versus another is subjective and a matter of linguistic debate. Consequently, the goal is not to “select a word that all can agree with,” but to drive towards “the natural correctness of a word” given its context by adopting a few “choice of words” principles. The objective is to minimize subjectiveness and maximize clarity.
- The first is related to the choice of words within a language. Some words, such as “jargon,” are to be avoided because they are context specific and come with preconceived past notions or “baggage.” On the other end of the spectrum, neutral, agnostic technical terms are clear and concise and context independent. For example, the choice of words to describe where digital currency is stored. A “wallet” is often used as it is where we place physical currency. Selecting jargon is often a choice made to bring forward the past meaning into the future. The problem is that jargon is language specific and jargon in one language does not remain consistent in another language. On the other hand, this ontology uses “digital currency store” as a technology neutral term that means only one thing – where digital currency is stored.

5.2.2 Ontological Notions & their Distinctions:

Ontologies have key architecture terms referred to as “notions”, “distinctions”, and “values”. The following will define these terms and their relationships.

- An ontology is first described by of a set of high-level notions, referred to as “level 1 notions”. Each notion is separated from others at the same level by a fundamental distinction present and unique to the “thing being modelled.”
- Notions must be **mutually exclusive** from each other. There cannot be any coverage overlap. Aspects of one notion cannot exist in another.
- Each level 1 notion is then in turn sub-divided into distinctions, fundamental differences in that notion that must be unique: described, accounted for, and located once, and nowhere else in the ontology.
- The cumulative coverage of a notion’s distinctions must equal that of the notion. That is, distinctions of a notion must be complete.
- Level 1 notions decompose into level 2 distinctions; these level 2 distinctions become level 2 Notions which in turn can decompose further into level 3 distinctions. This process continues for each individual notion separately until no further distinctions can be made and only values of the distinctions can be provided. This is the “bottom” of one path of the distinction tree.

5.2.3 Building Blocks & their Assembly

A core aspect of building an ontological model is the concept of defining “elemental” building blocks at the lowest and simplest level possible. Given the inherent narrow scope of a building blocks, their correctness can be demonstrated more easily and with higher confidence.

Building Block Assembly into more Complex Constructs

More complex constructs are created by “assembling” simpler building blocks. That is, more complex constructs are not defined independently of other simpler constructs but must be defined by the simpler ones. This constraint increases dramatically the consistency of elements and their relationships. By extension, the integration of two “correct” building blocks, through a logical relationship, results on a larger more complex building block that can be demonstrated to be also correct.

Distinction Interdependence:

As was mentioned previously, the building block and assembly method central to building an ontology, yields a highly interdependent information construct. Selecting values of one distinction, impacts, constrains, or determines other distinctions and their values.

6 Digital Currency Supply | Agree | Market Ontology

This report describes the outcome of an ontological development initiative to model three independent yet interrelated ontologies. The three ontological models are:

- **DC supply ontology** (DCSO) defining how digital currency types (DCTs) are created and supplied.
- **DC agree ontology** (DCAO) defining how DCTs are involved in agreements involving other DCTs and other digital assets (DA);
- **Agree market ontology** (AMO) defining how agreements are executed in a market of multiple DCTs and DA Types

The ontology development, refinement, and enhancement processes are conducted in a software application with a many-to-many relational database providing the ability to capture unique relationships, and therefore knowledge between ontology notions and distinctions. The flattened current status of this work is contained in Section 5.

The model makes the following assumptions:

- **Scope**: all digital currency types
- **Value**: Determined by a market driver and expressed in the unit value of a DCT unit.
- **Ownership**: The legal right to control value and to transfer and transact with it.

6.1 Background and prior ITU-DCGI work

The model discussed is based on, and supersedes, prior ITU-DCGI S&A work entitled "Digital Currency Conservation of Supply Model," published by Jacques Francoeur, Team Lead of Security WG (Working Group), illustrated in Figure 1.

The model divided the universe of all DCs according to one separation rule. On the left, changes in available DC supply can occur, and on the right, changes in available supply cannot occur. On the right, a Move involves subtracting DC Amount of value from one Digital Currency Store and to deposit the same amount in a destination store. The left side of the model allows the supply of DC to be issued centrally, de-centrally, or distributed while all moves on the right side of the model occur between a sender Store and a receiver Store on a direct peer-to-peer network.

All Moves occur according to the following rule.

Move =

Subtract "-" /Remove

Origin Amount from Source Store
"- condition -"
Add "+"/Place

Same Amount to Destination Store

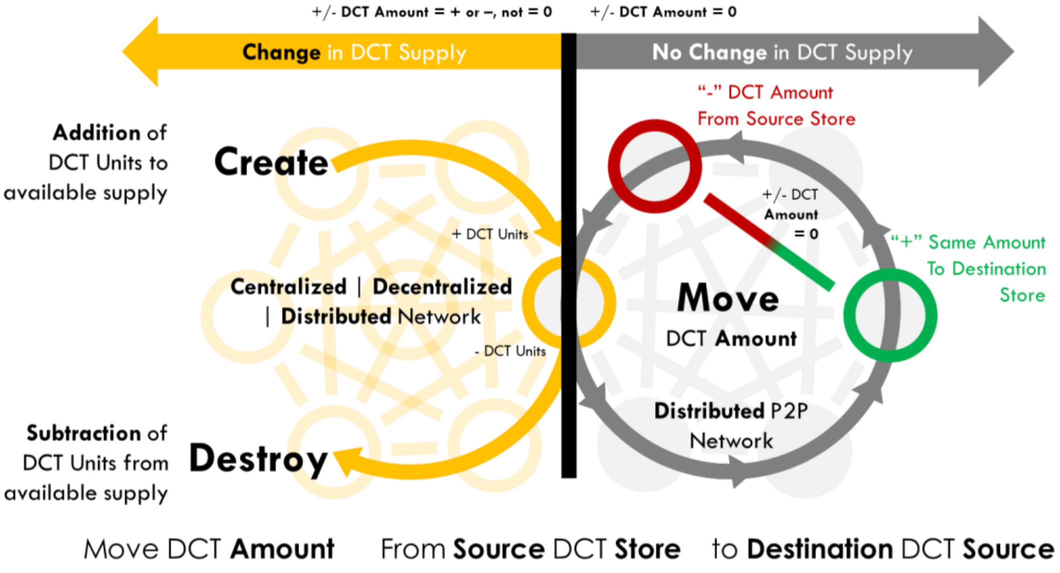

+/- DCT Amount = + or –, not = 0
+/- DCT Amount = 0
Change in DCT Supply
No Change in DCT Supply
Addition of DCT Units to available supply
Create
+ DCT Units
Centralized | Decentralized | Distributed Network
- DCT Units
Subtraction of DCT Units from available supply
Destroy
"-" DCT Amount From Source Store
+/- DCT Amount = 0
"+" Same Amount To Destination Store
Move
DCT Amount
Distributed P2P Network
Move DCT Amount
From Source DCT Store
to Destination DCT Source

Figure 1: Prior Superseded Model - Digital Currency Type Conservation of Supply Model

6.2 Generation 2 digital currency type ecosystem model

The previously published model is replaced by the following 2nd generation model, greatly enhanced by a parallel ontology development process.

Each DC Type ("Type") creates a single DC Type Ecosystem ("Ecosystem") where the Type exists, is maintained, and engaged in value transfer within the same Type, referred to as Intra-Ecosystem.

The following will describe the formation of the Ecosystem model in stages defined by a **Genesis Time Sequence**, a series of related and interdependent time increments relative to Time = 0, defined as when the Ecosystem is available for its 1st unit swap, referred to as the **Genesis Transfer**. Components of the model that are laid out in a time-sequence that respect certain ontology rules about what exists and does not at any point in time.

The top pinnacle notion of this Ecosystem model is Owners and non-Owners of Units and therefore Value. Following this notion, the key distinctions of "Access is Ownership." Consequently, the Owner has the legal right to exercise any action on that Value.

The overview of Genesis Time Sequence can be described as follow:

- @ Time = **-2**: Issuance Digital Store Availability & Genesis Unit **Production**
  By this time, the production of the number of Genesis Units has occurred and are maintained in the Genesis Digital Store.
- @ Time = **-1**: **Move** Digital Store **Availability** & Non-Owner Participant **Onboarding**
  By this time, the finite types of non-owner Participants, referred to as Entrant Participants ("Entrants") have been onboarded and are in control of a Store which contains no Units.
- @ Time = **0**: Creation of **Genesis Owner** Participant(s)
  By this time, the Issuer (configuration of Issuance Participants) executes the 1st transfer of Units at an agreed Unit Value. Referred to as the Genesis Transfer, it determines the first instance where the Issuer Initial Value Offer "crosses" a Participant Bid.
- @ Time = **+1**: **Open** & **Active** Single Digital Currency Ecosystem
  By this time, a supply of Units is in circulation among Ecosystem Participants and the Ecosystem is open for business.

6.2.1 Time = 0-2: Issuer store availability and genesis unit production

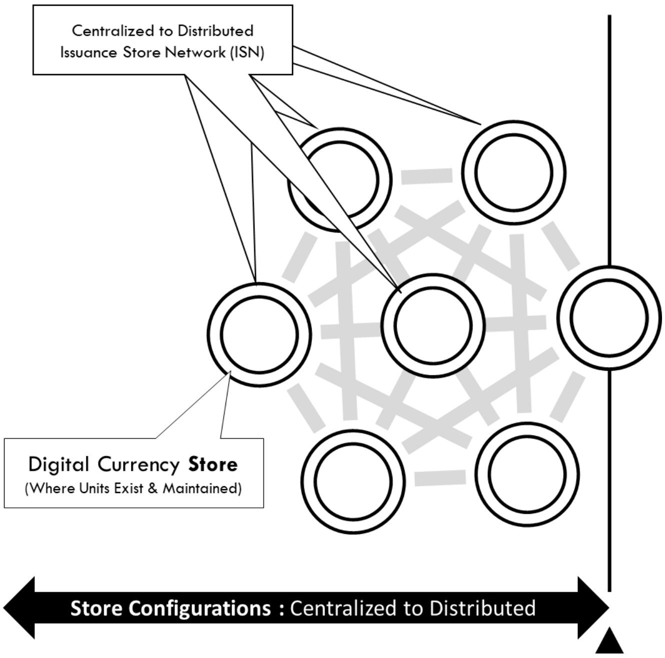

Centralized to Distributed
Issuance Store Network (ISN)
Digital Currency Store
(Where Units Exist & Maintained)
Store Configurations : Centralized to Distributed

Figure 2: Issuance Configuration Store Availability

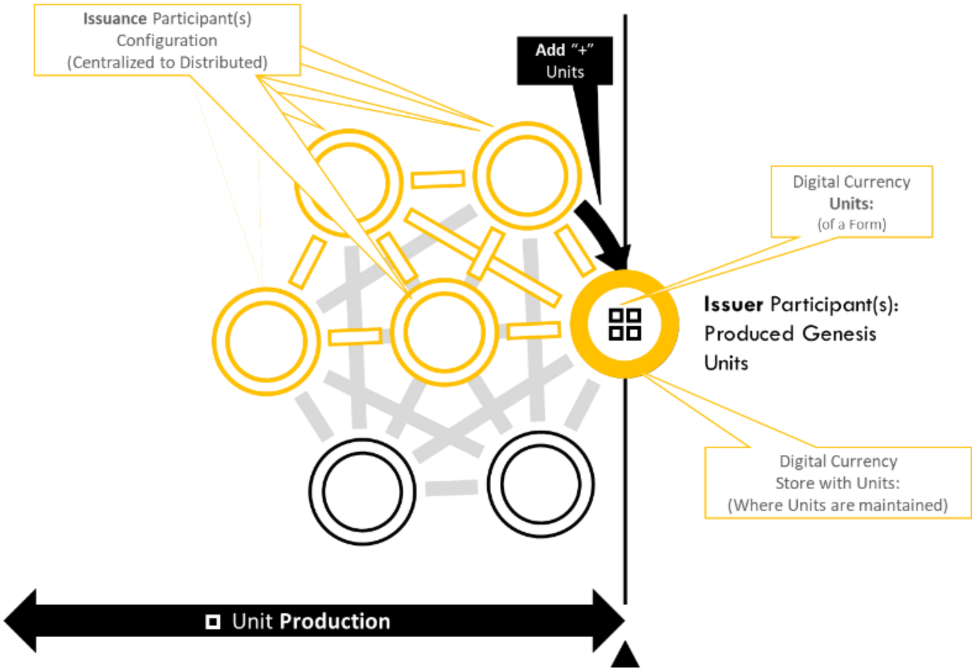


Figure 3: Production of Genesis Units

As illustrated in Figure 2, @ Time = -2^{-}, all Digital Stores involved in the Unit Production Process, referred to as the Issuance Configuration ("Configuration"), are available, a precondition of proceeding forward. A Digital Currency Store (DCS, "Store") is "where Digital Currency Units ("Unit") exists, are maintained, and updated. The Configuration can be centralized, decentralized, or distributed. Configuration determines the Digital Currency Type ("Type"), in part. For example, a Digital Currency issued centrally by a central bank yields a Central Bank Digital Currency, issued centrally by a private bank yields a Stablecoin; while issued decent rally yields a cryptocurrency.

As illustrated in Figure 3, @ Time = -2^+, the Issuance Configuration executes the Genesis Protocol to produce the number of Genesis Units which are stored and maintained in the Issuer Genesis Store.

A Digital Currency Type (DCT) ("DC") is a digital representation of Value. A Digital Currency Unit (DCU, "Unit") has a Digital Currency Form (DCF, "Form") which is defined by the digital data architecture/structure of a Unit – how it is built.

A Digital Currency has a "State," even with its availability, the usability of the Unit at any given time can be: **Inactive** (e.g., pre-value Unit, Hold (external control); **Locked** (Internal programable event), or **Active** State (post-value event).

6.2.2 Time = 0-1: Participant store availability and onboarding

In the same way an Issuance Configuration of Issuer Participants with Stores are required to produce Units, @ Time = -1^-, a peer-to-peer network of Participant Stores is required to onboard Participant Types ("Participants"), illustrated in **Figure 4**.

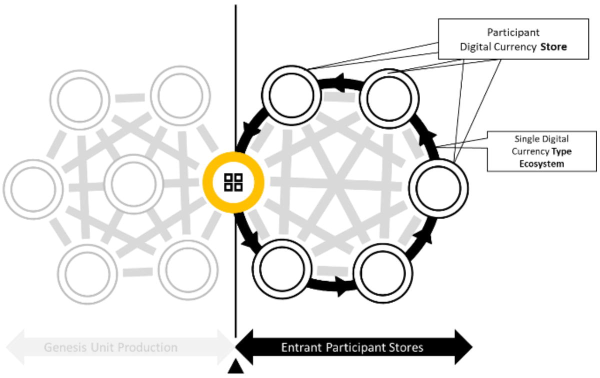


Figure 4: Production of Genesis Units

At this point, the Issuer Participant(s) exists, and the Genesis Units are produced and maintained in the Genesis Store. Next, non-Issuer Participants of specific types will onboard into the DCT Ecosystem. These Participant Types have a specialized and specific **function** or purpose.

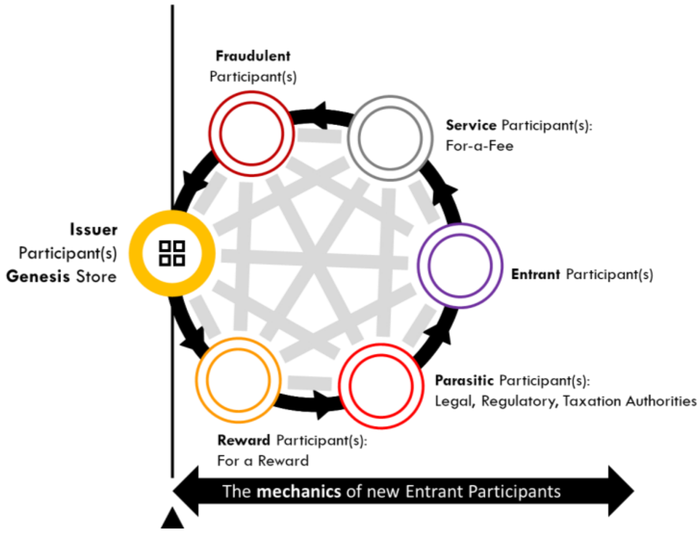


Figure 5: Entrant Participant Onboarding

All new Ecosystem **Participants** are 1st an **Entrant** Participant ("Entrant") and will become a specialized. All **Entrants** are **non-Owners**, a binary State-of-a-Participant: **Owner/Non-Owner.** Entrants can remain non-Owners, become Specialized Participants, or become Owners. Participants can either be **Inactive** or **Active.**

Entrant Types:

- **Service** Participant**:** Entrant become a Service Participant ("Service Provider") performing a Service for-a-Fee in an Agree.

- **Synchronous** Multiple Service Provider **Pass-it-Forward** Fee Model: More than one Service Providers can provide Services in series when the Buyer commits the Seller Amount plus all Service Fees. Each Service Provider extracts their Fee and passes the **Remainder Forward** to the next Service Provider.
- **Asynchronous** Multiple Service Provider: payment of fees occurs after (**post-Agree**) or before (**pre-Agree**)

- **Reward** Participant**:** Entrant become a **Reward** Participant ("Validator, Verifier") performing a function for remuneration in an Agree.
- **Fraudulent** Participant: a legitimate Participant under the control of a malicious actor.
- **Parasitic** Participants: Legal, Regulatory, and Taxation authorities that impose "friction" and costs to the DCT Ecosystem.

@ Time = **-1**$^{+}$: Entrant Participant of all types begin **Onboarding** which is an ongoing process.

6.2.3 Time = 0: creation of genesis owner – first value move, unit value

By this time, **Genesis Units** exist and are maintained in **Genesis Store**. Non-Owner Participants including Service and Reward Participants; Parasitic Participants have been onboarded. Now is the time to create the 1st Owner Participant, referred to as the **Genesis Event**.

One or more Entrants become the first "owner" Participant(s), referred to as the **Genesis Participants**. The following is the process involved in the **Genesis Transfer**, the formation and execution of the **Genesis Agree**, the only first event of its kind.

As illustrated in Figure 6, the critical outcome of creating the Genesis Owner is the establishment of the **Unit Value**. The Issuer makes an Offer @ a specific Unit Value, referred to as the **Initial Value Offer** (IVO). Entrant(s) submit Bids.

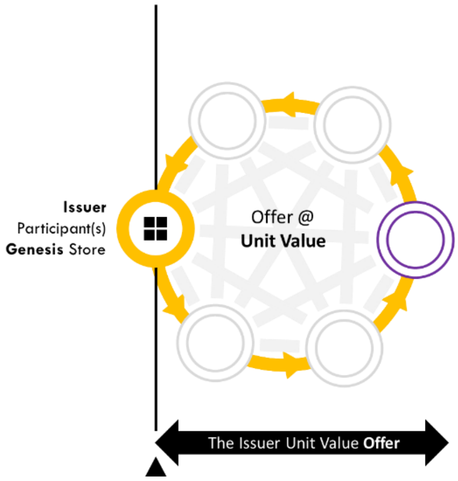


Figure 6: Initial Value Offer

As illustrated in Figure 7, when Entrant Bid(s)s cross IVO, the Genesis Agree "**Cross**" condition is met. Issuer moves **Genesis Amount** (Unit Value x # of Units) from Genesis Store to Genesis Participant(s) Stores. More specifically,

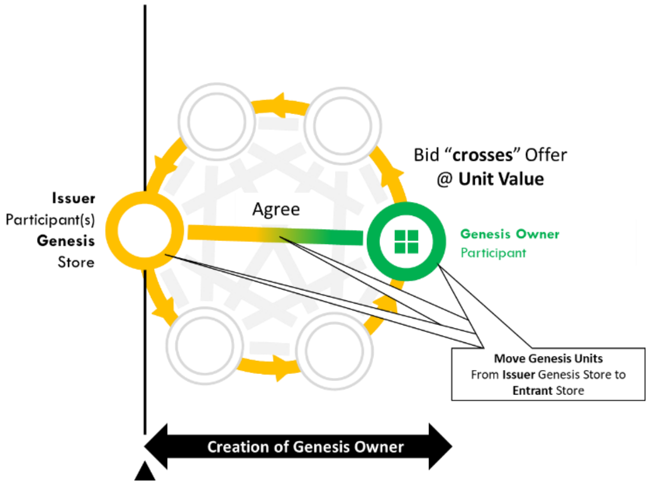


Figure 7: Entrant Bid(s)s cross IVO.
Issuer moves **Genesis Amount**

- ○ Issuer Commits Genesis Units (locked) to be transferred to each Genesis Participant.
- ○ Genesis Amount is Removed/Subtracted “-” from Genesis Store
- ○ Genesis Amount is Transferred & Deposited/Added “+” to one or more Genesis Participant Stores
- ○ Ecosystem Supply = # of Units in Genesis Issuance

6.2.4 Time = 0+1: Open single digital currency ecosystem

As illustrated in **Figure 8**, the Issuance Store Network or Issuance Configuration Network of Digital Stores is combined at the Issuer Digital Store junction with the Participant Store Network.

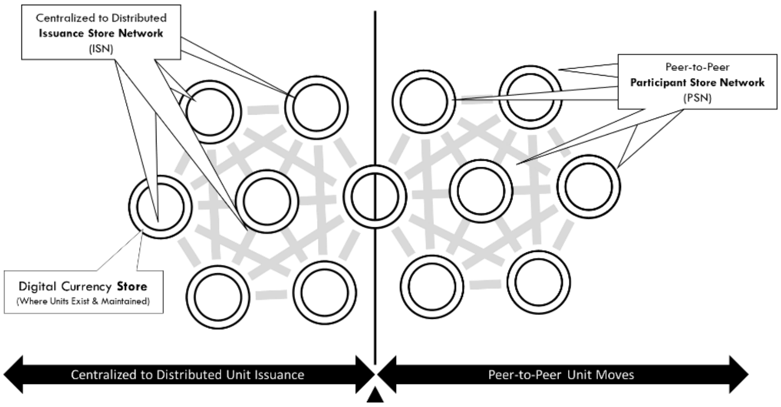

Centralized to Distributed
Issuance Store Network
(ISN)
Peer-to-Peer
Participant Store Network
(PSN)
Digital Currency Store
(Where Units Exist & Maintained)
Centralized to Distributed Unit Issuance
Peer-to-Peer Unit Moves

Figure 8: Issuance Configuration Store Network linked to Move Store Network

As illustrated in **Figure 9**, once all the Participant Types are active and the **Genesis Event** has occurred, a single Digital Currency Type Ecosystem Model is created.

@ Time = +1: **Open** Single Digital Currency Type Ecosystem (DCE, “Ecosystem”).

Ecosystem (all locations) where DC is created (+Unit), stored, maintained, and otherwise exists; and transferred, transformed, processed, and destroyed (-Unit).

@ Time = $+1^{+}$: **Active** Single Digital Currency Type Ecosystem. By this time, a supply of Units is in circulation among Ecosystem Participants and the Ecosystem is open for business and actively transferring value.

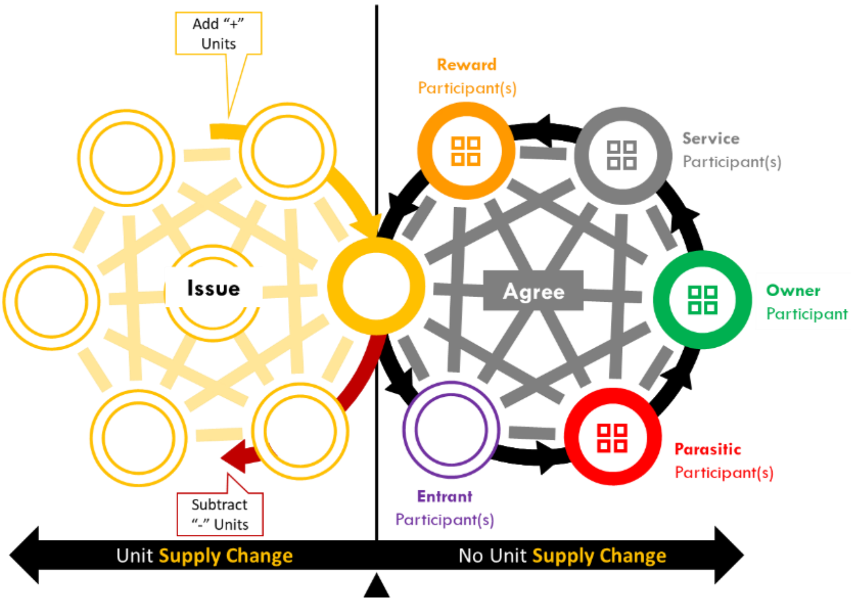


Figure 9: Single Digital Currency Type Ecosystem with all Participant Types

6.3 Inter-digital currency form model

As illustrated in Figure 10, the Single Digital Currency Ecosystem A can be replicated to represent a second Digital Currency Form B Ecosystem. As previously discussed, the two ecosystems can conduct intra-agreements within their own DCT Ecosystems. The Model illustrated in Figure 10 expands to represent the interaction between 2 different Digital Currency Type Ecosystems.

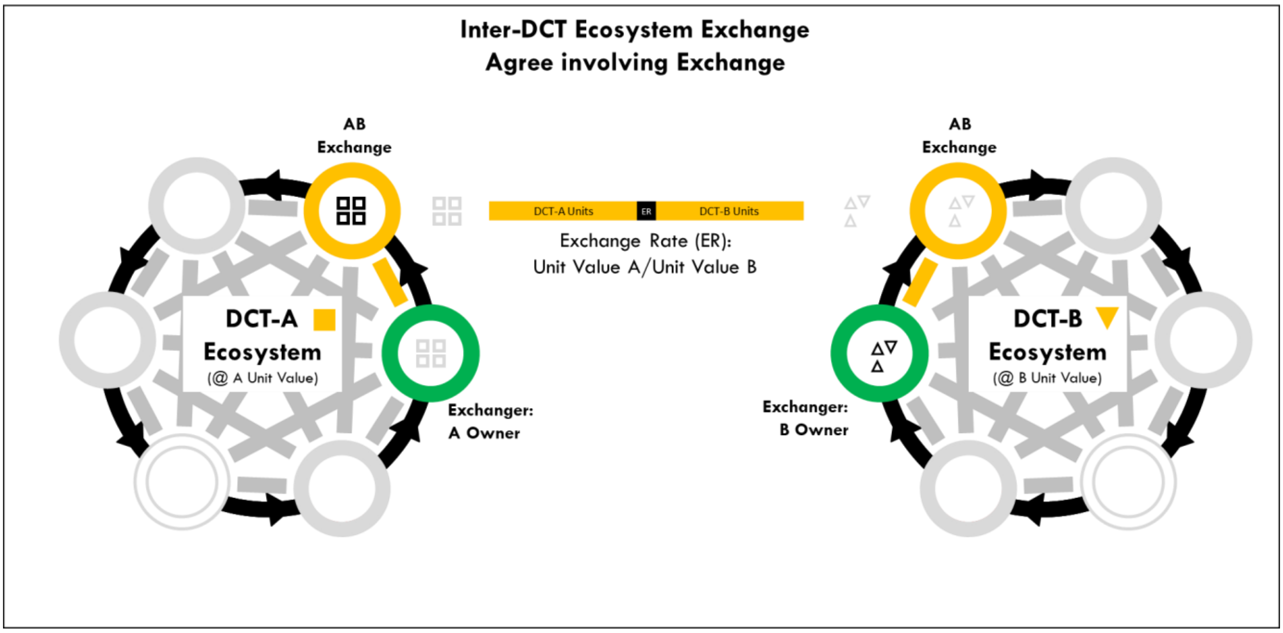


Figure 10: Inter-Ecosystem Agree Exchange of DCT-A for DCT-B

7 Digital market ecosystem ontologies: supply, agree, market

The DC world is diverse in terms of form, function, architecture, and uses. For example, issuance can be decentralized in the case of cryptocurrencies (CC) and centralized in the case of commercial bank demand accounts, with other forms in between. The degree-of-decentralization is not the only key characteristic of a DC. What are the others? What makes one DC different from another? What are the core elements of all DCs? How does DC move value around? How can value be moved between DC Forms. How are services paid for, rewards granted, ownership acquired and transferred.

These questions, and many more that were discovered, have evolved the scope of work to define a full DC Market Ecosystem Ontology. A framework of notions composed of distinctions, each composed of sub-distinctions that are architypes, "DNA-like" reference architecture components that must be agnostic and complete in what they address.

The persistent application of ontological and de-compositional techniques in the development of this work consolidated a large set of notions into three fundamental 1st-level ontology notion groups: DC Supply, DC Agree and Agree Market.

1. **Digital Currency <u>Supply</u> Ontology** covers the notions and distinctions related to representing all possible DC forms, while being able to define anyone specifically. Section 3.2.1 contains a list of Supply Ontology Notions, Distinctions, and Options.
2. **Digital Currency <u>Agree</u> Ontology** covers the notions and distinctions related to an agreement between two participants involving the movement of value. Section 3.2.2 contains a list of Agree Ontology Notions, Distinctions, and Options.
3. **Agree <u>Market</u> Ontology** relates to the market where all DC Agrees occur between any and all DC Forms. Section 3.2.3 contains a list of Market Ontology Notions, Distinctions, and Options.

As the larger set of notions consolidated into three, notions became sub-notions falling under one of the three. The consolidation, however, must maintain the connection and interaction between DC Supply injected into one Agree Market to conduct DC Agrees.

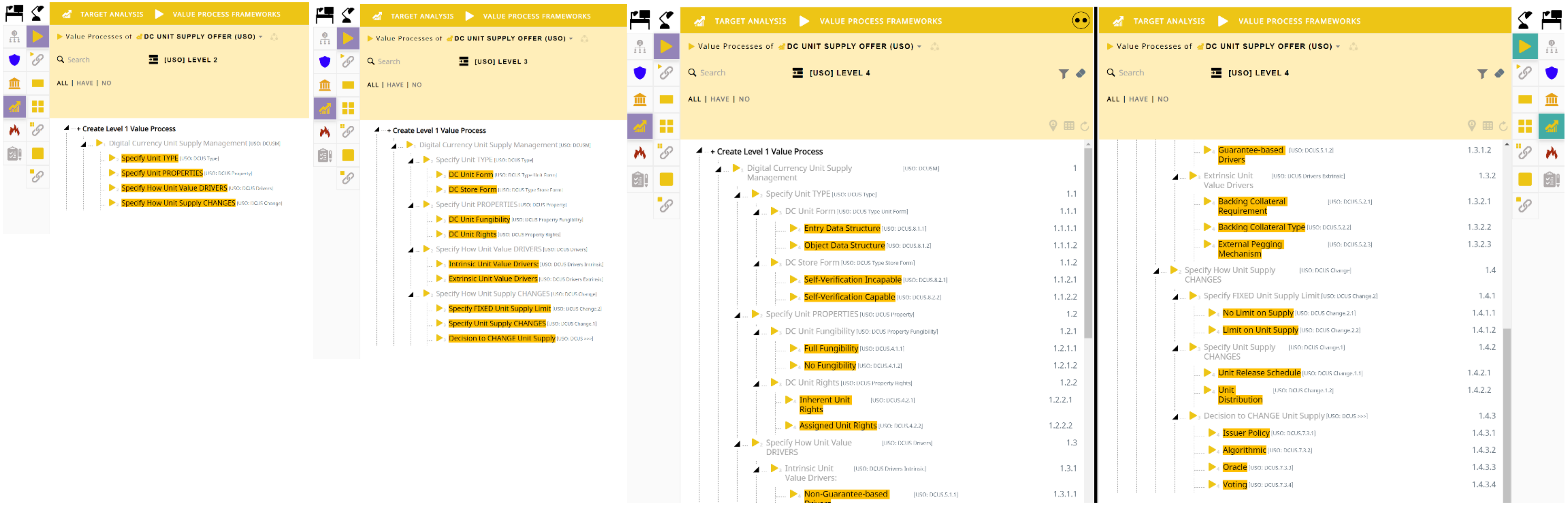
7.1 Digital currency supply ontology notions, distinctions, and options

See Section 3.2.1 for list of DC Supply Ontology Notions, Distinctions, and Options definitions.

Key terms include Digital Currency or "DC"), the units that make up the currency (DC Unit or "Unit"), the overall supply of units (DC Unit Supply or "Supply"), and the different states that units can be in (Unit State, Inactive Unit State, Active Unit State, Locked Unit State). It also defines terms related to the data architecture of the currency (DC Form, DC Store, DC Type), the ecosystem in which the currency exists (DC Ecosystem), and the ways in which the supply of units can change (Unit Supply Change, Fixed Unit Supply, Variable Unit Supply, Increase/Decrease Unit Supply, Unit Change by Issuer Policy, Unit Change by Issuer Algorithmic, Unit Change by Issuer Oracle, Unit Change by Issuer Voting, Unit Supply Release Schedule, Unit Supply Distribution). It also differentiates between physical and non-physical units, and between different types of data structures used to represent the currency. Additionally, it defines terms related to unit Form Properties such as Fungibility, Rights and Acceptance.

Figure 11 and 12 display the DCSO notions, their distinctions each ending with a set of options from which one is to be selected.

Figure 11 illustrates DC Unit Supply Ontology increasing detailed side-by-side views: level 2 (left), level 3 (middle), level 4 (right



- + Create Level 1 Value Process
  - Digital Currency Unit Supply Management [USO: DCUSM]
    - Specify Unit TYPE [USO: DCUS Type]
    - Specify Unit PROPERTIES [USO: DCUS Property]
    - Specify How Unit Value DRIVERS [USO: DCUS Drivers]
    - Specify How Unit Supply CHANGES [USO: DCUS Change]

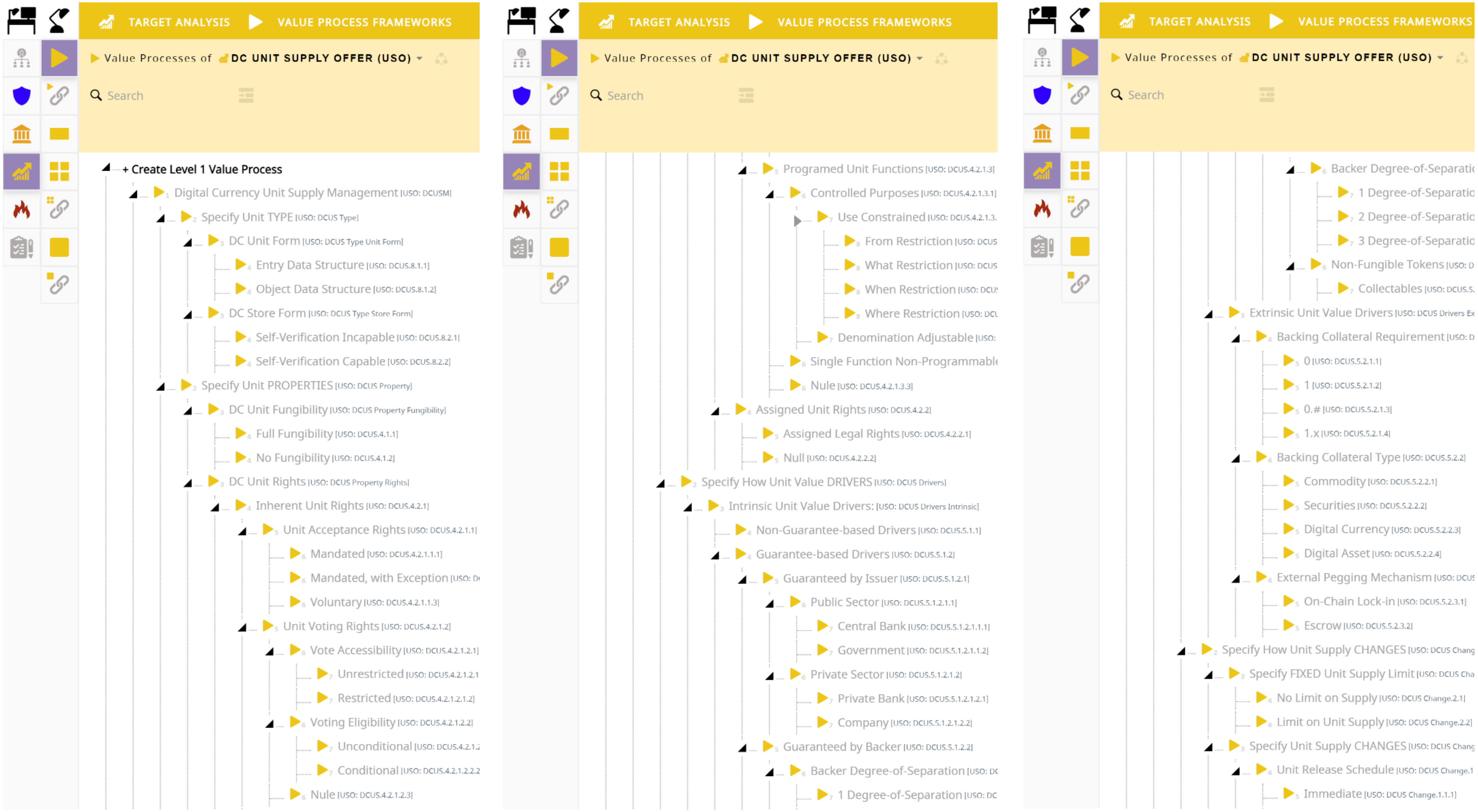
- + Create Level 1 Value Process
  - Digital Currency Unit Supply Management [USO: DCUSM]
    - Specify Unit TYPE [USO: DCUS Type]
      - DC Unit Form [USO: DCUS Type Unit Form]
      - DC Store Form [USO: DCUS Type Store Form]
    - Specify Unit PROPERTIES [USO: DCUS Property]
      - DC Unit Fungibility [USO: DCUS Property Fungibility]
      - DC Unit Rights [USO: DCUS Property Rights]
    - Specify How Unit Value DRIVERS [USO: DCUS Drivers]
      - Intrinsic Unit Value Drivers: [USO: DCUS Drivers Intrinsic]
      - Extrinsic Unit Value Drivers [USO: DCUS Drivers Extrinsic]
    - Specify How Unit Supply CHANGES [USO: DCUS Change]
      - Specify FIXED Unit Supply Limit [USO: DCUS Change.2]
      - Specify Unit Supply CHANGES [USO: DCUS Change.1]
      - Decision to CHANGE Unit Supply [USO: DCUS >>>]

- + Create Level 1 Value Process
  - Digital Currency Unit Supply Management [USO: DCUSM] 1
    - Specify Unit TYPE [USO: DCUS Type] 1.1
      - DC Unit Form [USO: DCUS Type Unit Form] 1.1.1
        - Entry Data Structure [USO: DCUS.8.1.1] 1.1.1.1
        - Object Data Structure [USO: DCUS.8.1.2] 1.1.1.2
      - DC Store Form [USO: DCUS Type Store Form] 1.1.2
        - Self-Verification Incapable [USO: DCUS.8.2.1] 1.1.2.1
        - Self-Verification Capable [USO: DCUS.8.2.2] 1.1.2.2
    - Specify Unit PROPERTIES [USO: DCUS Property] 1.2
      - DC Unit Fungibility [USO: DCUS Property Fungibility] 1.2.1
        - Full Fungibility [USO: DCUS.4.1.1] 1.2.1.1
        - No Fungibility [USO: DCUS.4.1.2] 1.2.1.2
      - DC Unit Rights [USO: DCUS Property Rights] 1.2.2
        - Inherent Unit Rights [USO: DCUS.4.2.1] 1.2.2.1
        - Assigned Unit Rights [USO: DCUS.4.2.2] 1.2.2.2
    - Specify How Unit Value DRIVERS [USO: DCUS Drivers] 1.3
      - Intrinsic Unit Value Drivers: [USO: DCUS Drivers Intrinsic] 1.3.1
        - Non-Guarantee-based [USO: DCUS.5.1.1] 1.3.1.1

        - Guarantee-based Drivers [USO: DCUS.5.1.2] 1.3.1.2
      - Extrinsic Unit Value Drivers [USO: DCUS Drivers Extrinsic] 1.3.2
        - Backing Collateral Requirement [USO: DCUS.5.2.1] 1.3.2.1
        - Backing Collateral Type [USO: DCUS.5.2.2] 1.3.2.2
        - External Pegging Mechanism [USO: DCUS.5.2.3] 1.3.2.3
    - Specify How Unit Supply CHANGES [USO: DCUS Change] 1.4
      - Specify FIXED Unit Supply Limit [USO: DCUS Change.2] 1.4.1
        - No Limit on Supply [USO: DCUS Change.2.1] 1.4.1.1
        - Limit on Unit Supply [USO: DCUS Change.2.2] 1.4.1.2
      - Specify Unit Supply CHANGES [USO: DCUS Change.1] 1.4.2
        - Unit Release Schedule [USO: DCUS Change.1.1] 1.4.2.1
        - Unit Distribution [USO: DCUS Change.1.2] 1.4.2.2
      - Decision to CHANGE Unit Supply [USO: DCUS >>>] 1.4.3
        - Issuer Policy [USO: DCUS.7.3.1] 1.4.3.1
        - Algorithmic [USO: DCUS.7.3.2] 1.4.3.2
        - Oracle [USO: DCUS.7.3.3] 1.4.3.3
        - Voting [USO: DCUS.7.3.4] 1.4.3.4

Figure 11: DC Unit Supply Ontology increasing detailed side-by-side views: level 2 (left), level 3 (middle), level 4 (right)

Figure 12 illustrates the DC Unit Supply Ontology illustrates start-to-end across all levels over 3 columns.


TARGET ANALYSIS
VALUE PROCESS FRAMEWORKS
Value Processes of DC UNIT SUPPLY OFFER (USO)
Search
TARGET ANALYSIS
VALUE PROCESS FRAMEWORKS
Value Processes of DC UNIT SUPPLY OFFER (USO)
Search
TARGET ANALYSIS
VALUE PROCESS FRAMEWORKS
Value Processes of DC UNIT SUPPLY OFFER (USO)
Search

- + Create Level 1 Value Process
  - Digital Currency Unit Supply Management [USO: DCUSM]
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      - DC Store Form [USO: DCUS Type Store Form]
        - Self-Verification Incapable [USO: DCUS.8.2.1]
        - Self-Verification Capable [USO: DCUS.8.2.2]
    - Specify Unit PROPERTIES [USO: DCUS Property]
      - DC Unit Fungibility [USO: DCUS Property Fungibility]
        - Full Fungibility [USO: DCUS.4.1.1]
        - No Fungibility [USO: DCUS.4.1.2]
      - DC Unit Rights [USO: DCUS Property Rights]
        - Inherent Unit Rights [USO: DCUS.4.2.1]
          - Unit Acceptance Rights [USO: DCUS.4.2.1.1]
            - Mandated [USO: DCUS.4.2.1.1.1]
            - Mandated, with Exception [USO: D
            - Voluntary [USO: DCUS.4.2.1.1.3]
          - Unit Voting Rights [USO: DCUS.4.2.1.2]
            - Vote Accessibility [USO: DCUS.4.2.1.2.1]
              - Unrestricted [USO: DCUS.4.2.1.2.1
              - Restricted [USO: DCUS.4.2.1.2.1.2]
            - Voting Eligibility [USO: DCUS.4.2.1.2.2]
              - Unconditional [USO: DCUS.4.2.1.2
              - Conditional [USO: DCUS.4.2.1.2.2.2
            - Nule [USO: DCUS.4.2.1.2.3]
          - Programed Unit Functions [USO: DCUS.4.2.1.3]
            - Controlled Purposes [USO: DCUS.4.2.1.3.1]
              - Use Constrained [USO: DCUS.4.2.1.3.
                - From Restriction [USO: DCUS
                - What Restriction [USO: DCUS
                - When Restriction [USO: DCU
                - Where Restriction [USO: DCU
              - Denomination Adjustable [USO:
            - Single Function Non-Programmabl
            - Nule [USO: DCUS.4.2.1.3.3]
        - Assigned Unit Rights [USO: DCUS.4.2.2]
          - Assigned Legal Rights [USO: DCUS.4.2.2.1]
          - Null [USO: DCUS.4.2.2.2]
    - Specify How Unit Value DRIVERS [USO: DCUS Drivers]
      - Intrinsic Unit Value Drivers: [USO: DCUS Drivers Intrinsic]
        - Non-Guarantee-based Drivers [USO: DCUS.5.1.1]
        - Guarantee-based Drivers [USO: DCUS.5.1.2]
          - Guaranteed by Issuer [USO: DCUS.5.1.2.1]
            - Public Sector [USO: DCUS.5.1.2.1.1]
              - Central Bank [USO: DCUS.5.1.2.1.1.1]
              - Government [USO: DCUS.5.1.2.1.1.2]
            - Private Sector [USO: DCUS.5.1.2.1.2]
              - Private Bank [USO: DCUS.5.1.2.1.2.1]
              - Company [USO: DCUS.5.1.2.1.2.2]
          - Guaranteed by Backer [USO: DCUS.5.1.2.2]
            - Backer Degree-of-Separation [USO: DC
              - 1 Degree-of-Separation [USO: DC
            - Backer Degree-of-Separatio
              - 1 Degree-of-Separatio
              - 2 Degree-of-Separatio
              - 3 Degree-of-Separatio
            - Non-Fungible Tokens [USO: D
              - Collectables [USO: DCUS.5.
      - Extrinsic Unit Value Drivers [USO: DCUS Drivers Ex
        - Backing Collateral Requirement [USO: D
          - 0 [USO: DCUS.5.2.1.1]
          - 1 [USO: DCUS.5.2.1.2]
          - 0.# [USO: DCUS.5.2.1.3]
          - 1.x [USO: DCUS.5.2.1.4]
        - Backing Collateral Type [USO: DCUS.5.2.2]
          - Commodity [USO: DCUS.5.2.2.1]
          - Securities [USO: DCUS.5.2.2.2]
          - Digital Currency [USO: DCUS.5.2.2.3]
          - Digital Asset [USO: DCUS.5.2.2.4]
        - External Pegging Mechanism [USO: DCUS
          - On-Chain Lock-in [USO: DCUS.5.2.3.1]
          - Escrow [USO: DCUS.5.2.3.2]
    - Specify How Unit Supply CHANGES [USO: DCUS Chang
      - Specify FIXED Unit Supply Limit [USO: DCUS Cha
        - No Limit on Supply [USO: DCUS Change.2.1]
        - Limit on Unit Supply [USO: DCUS Change.2.2]
      - Specify Unit Supply CHANGES [USO: DCUS Chang
        - Unit Release Schedule [USO: DCUS Change.1
          - Immediate [USO: DCUS Change.1.1.1]

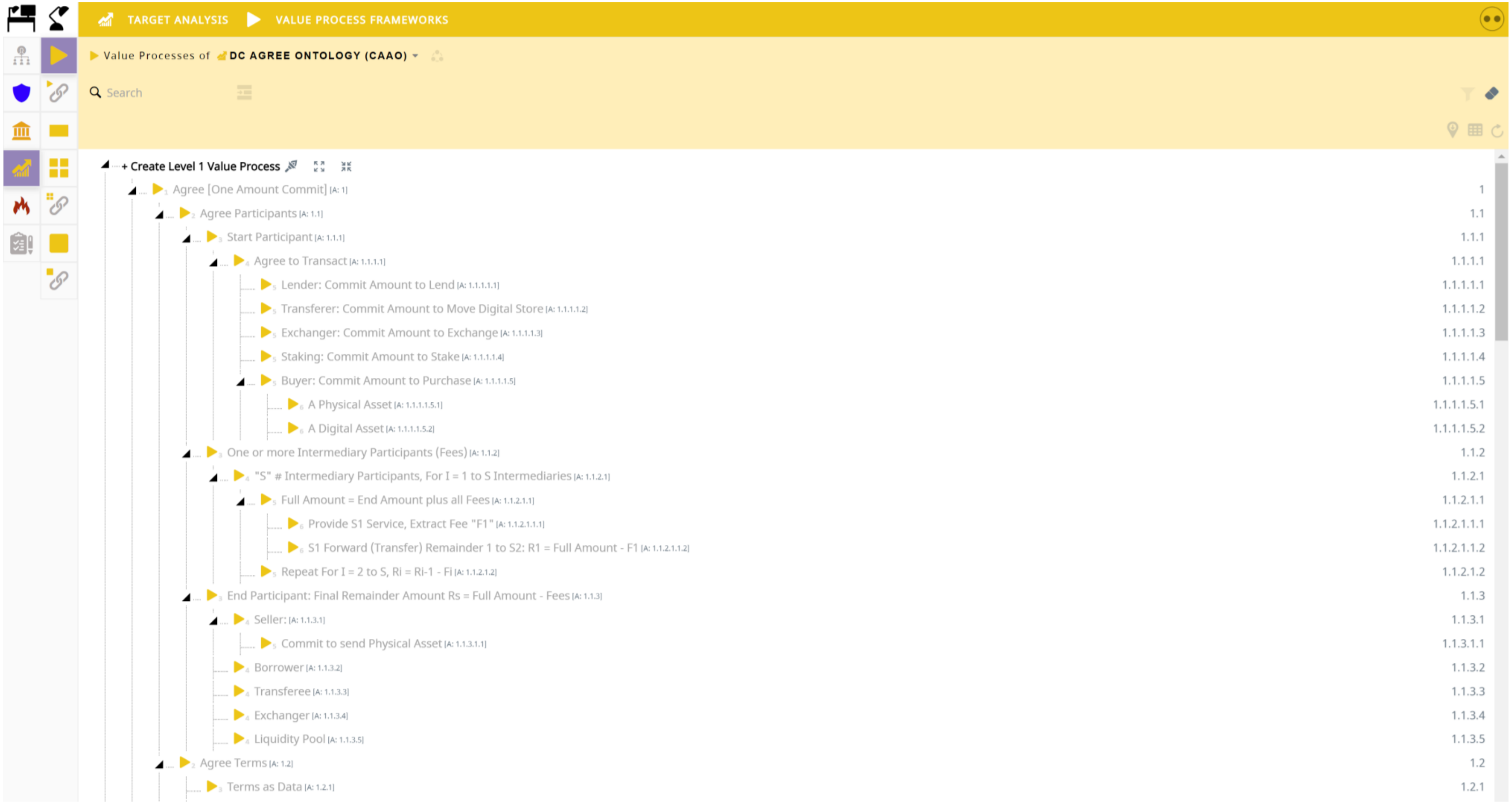
Figure 12: DC Unit Supply Ontology illustrated start-to-end across 3 columns.

7.2 Digital currency agree ontology notions, distinctions, and options.

Section 3.2.2 for list of Digital Currency Agree Ontology (DCAO) Notions, Distinctions, and Options.

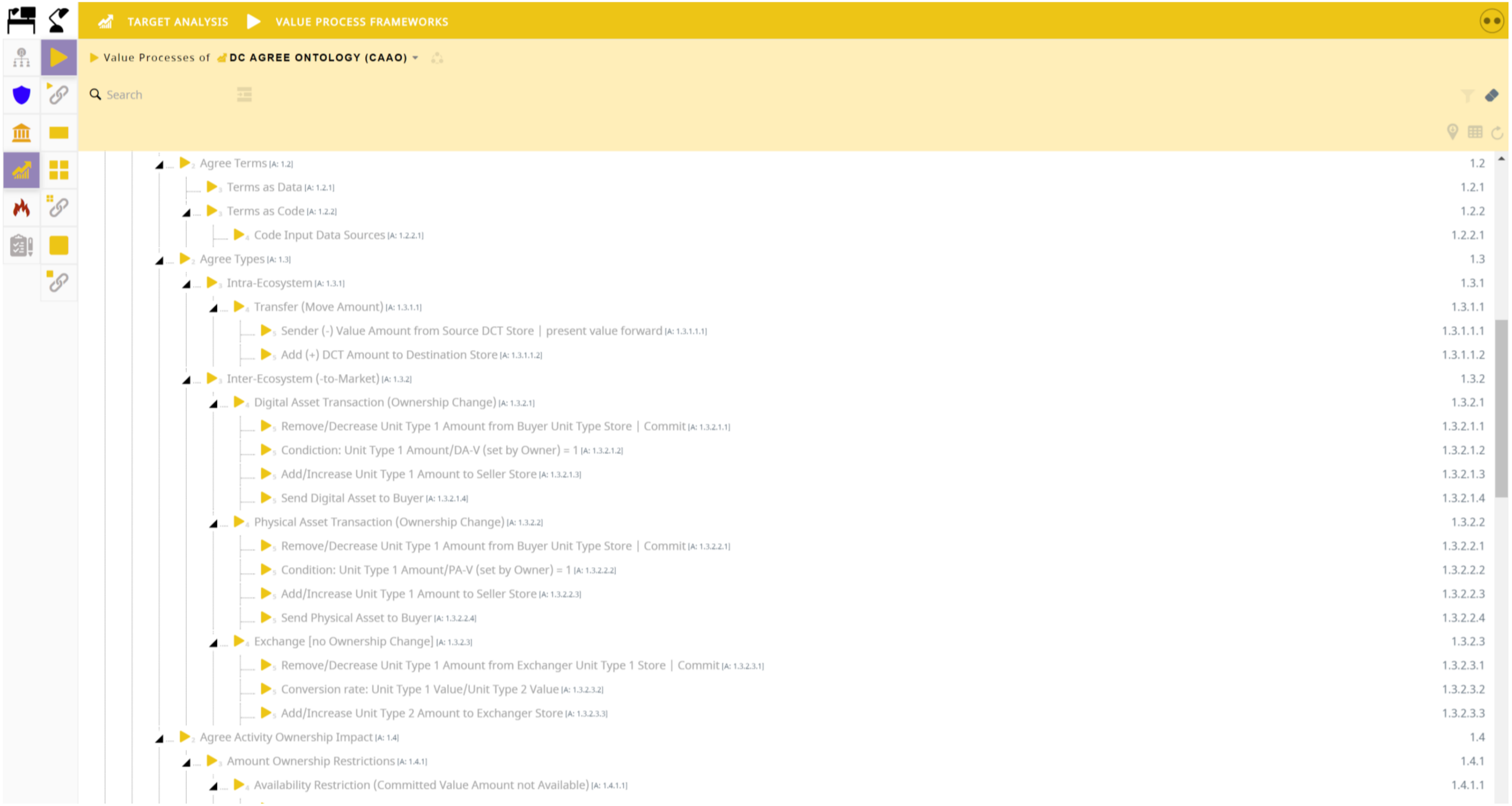
The definitions are terms related to agreements ("Agree") made between participants in a digital currency ecosystem. These agreements can include lending, transferring, exchanging, staking, and buying assets and services. The text also defines different types of participants such as issuers, owners, and non-owners, and different types of agreements such as intra-ecosystem and inter-ecosystem agreements. The text also defines terms related to the terms and conditions of agreements, the initiation and fulfilment of agreements, and the movement of assets and services.

Figures 13 and 19 sequentially display the DCAO notions, their distinctions each ending with a set of options from which one is to be selected.



- + Create Level 1 Value Process
  - Agree [One Amount Commit] [A: 1] 1
    - Agree Participants [A: 1.1] 1.1
      - Start Participant [A: 1.1.1] 1.1.1
        - Agree to Transact [A: 1.1.1.1] 1.1.1.1
          - Lender: Commit Amount to Lend [A: 1.1.1.1.1] 1.1.1.1.1
          - Transferer: Commit Amount to Move Digital Store [A: 1.1.1.1.2] 1.1.1.1.2
          - Exchanger: Commit Amount to Exchange [A: 1.1.1.1.3] 1.1.1.1.3
          - Staking: Commit Amount to Stake [A: 1.1.1.1.4] 1.1.1.1.4
          - Buyer: Commit Amount to Purchase [A: 1.1.1.1.5] 1.1.1.1.5
            - A Physical Asset [A: 1.1.1.1.5.1] 1.1.1.1.5.1
            - A Digital Asset [A: 1.1.1.1.5.2] 1.1.1.1.5.2
      - One or more Intermediary Participants (Fees) [A: 1.1.2] 1.1.2
        - "S" # Intermediary Participants, For I = 1 to S Intermediaries [A: 1.1.2.1] 1.1.2.1
          - Full Amount = End Amount plus all Fees [A: 1.1.2.1.1] 1.1.2.1.1
            - Provide S1 Service, Extract Fee "F1" [A: 1.1.2.1.1.1] 1.1.2.1.1.1
            - S1 Forward (Transfer) Remainder 1 to S2: R1 = Full Amount - F1 [A: 1.1.2.1.1.2] 1.1.2.1.1.2
          - Repeat For I = 2 to S, Ri = Ri-1 - Fi [A: 1.1.2.1.2] 1.1.2.1.2
      - End Participant: Final Remainder Amount Rs = Full Amount - Fees [A: 1.1.3] 1.1.3
        - Seller: [A: 1.1.3.1] 1.1.3.1
          - Commit to send Physical Asset [A: 1.1.3.1.1] 1.1.3.1.1
        - Borrower [A: 1.1.3.2] 1.1.3.2
        - Transferee [A: 1.1.3.3] 1.1.3.3
        - Exchanger [A: 1.1.3.4] 1.1.3.4
        - Liquidity Pool [A: 1.1.3.5] 1.1.3.5
    - Agree Terms [A: 1.2] 1.2
      - Terms as Data [A: 1.2.1] 1.2.1

Figure 13: Digital Currency Agree Ontology: Top Section



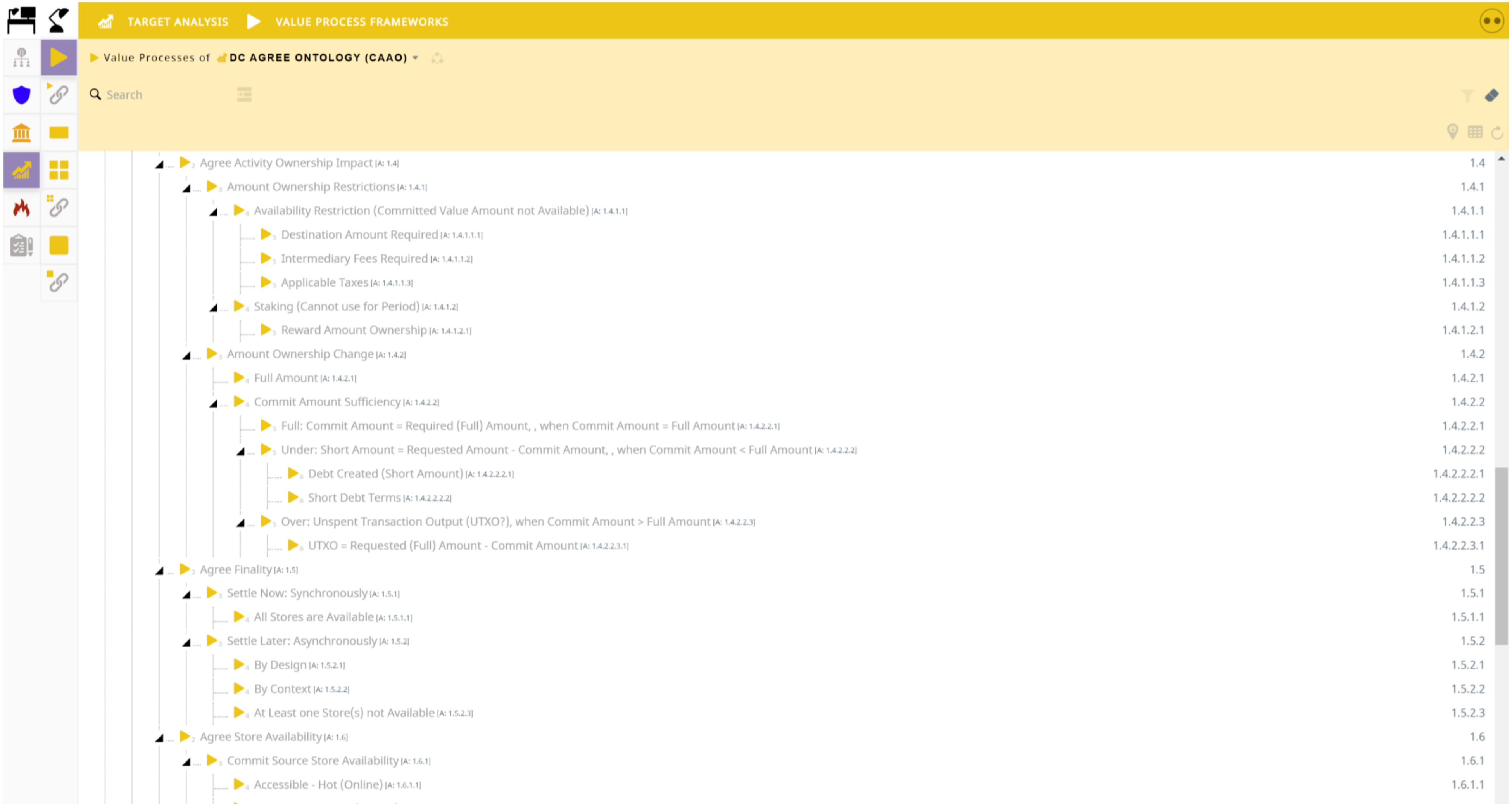
TARGET ANALYSIS ▶ VALUE PROCESS FRAMEWORKS

▶ Value Processes of DC AGREE ONTOLOGY (CAAO)

Search

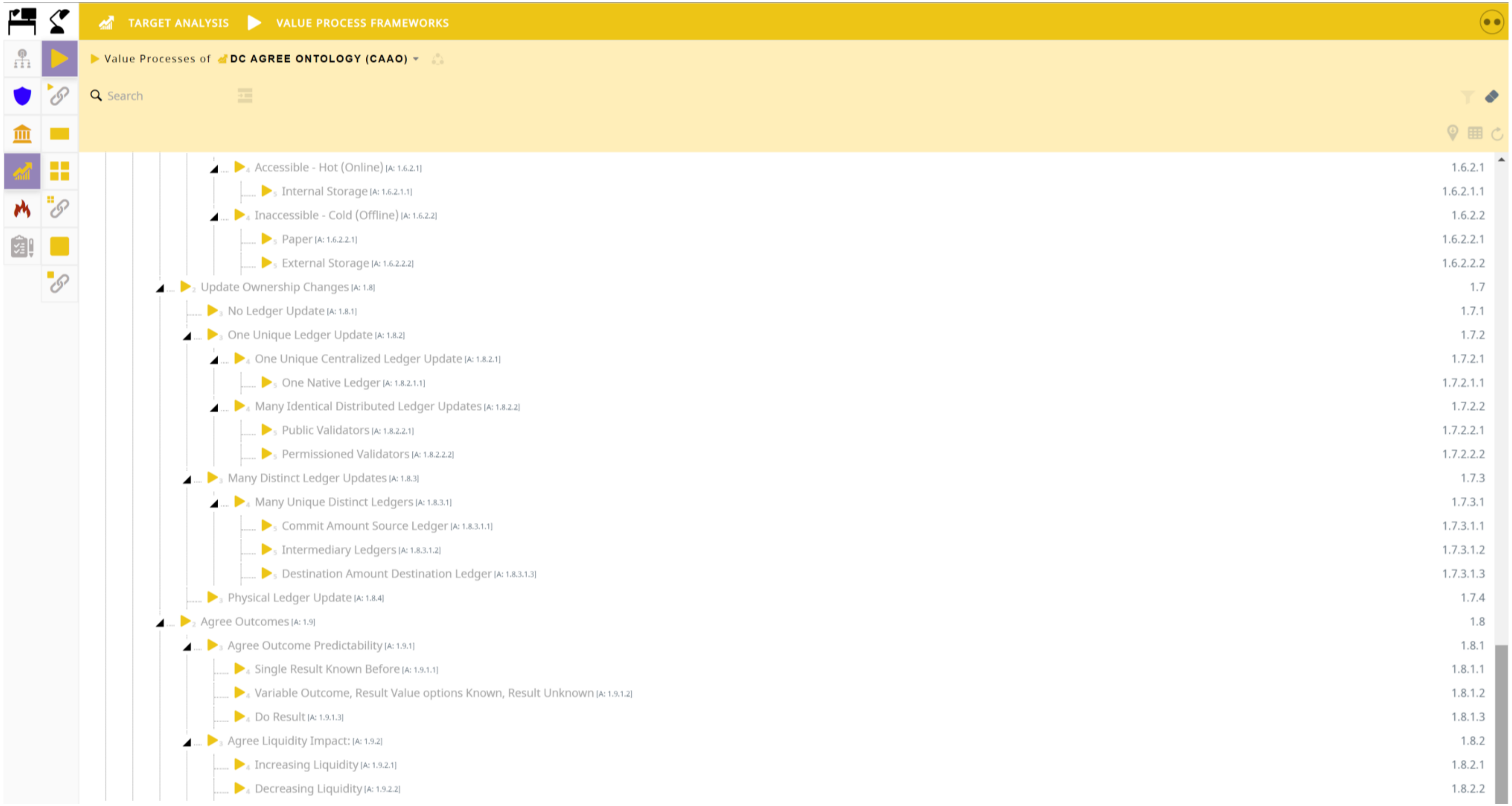
```
Agree Terms [A: 1.2]                                                                 1.2
    Terms as Data [A: 1.2.1]                                                         1.2.1
    Terms as Code [A: 1.2.2]                                                         1.2.2
        Code Input Data Sources [A: 1.2.2.1]                                         1.2.2.1
Agree Types [A: 1.3]                                                                 1.3
    Intra-Ecosystem [A: 1.3.1]                                                       1.3.1
        Transfer (Move Amount) [A: 1.3.1.1]                                          1.3.1.1
            Sender (-) Value Amount from Source DCT Store | present value forward [A: 1.3.1.1.1]   1.3.1.1.1
            Add (+) DCT Amount to Destination Store [A: 1.3.1.1.2]                   1.3.1.1.2
    Inter-Ecosystem (-to-Market) [A: 1.3.2]                                          1.3.2
        Digital Asset Transaction (Ownership Change) [A: 1.3.2.1]                    1.3.2.1
            Remove/Decrease Unit Type 1 Amount from Buyer Unit Type Store | Commit [A: 1.3.2.1.1]   1.3.2.1.1
            Condiction: Unit Type 1 Amount/DA-V (set by Owner) = 1 [A: 1.3.2.1.2]    1.3.2.1.2
            Add/Increase Unit Type 1 Amount to Seller Store [A: 1.3.2.1.3]           1.3.2.1.3
            Send Digital Asset to Buyer [A: 1.3.2.1.4]                               1.3.2.1.4
        Physical Asset Transaction (Ownership Change) [A: 1.3.2.2]                   1.3.2.2
            Remove/Decrease Unit Type 1 Amount from Buyer Unit Type Store | Commit [A: 1.3.2.2.1]   1.3.2.2.1
            Condition: Unit Type 1 Amount/PA-V (set by Owner) = 1 [A: 1.3.2.2.2]     1.3.2.2.2
            Add/Increase Unit Type 1 Amount to Seller Store [A: 1.3.2.2.3]           1.3.2.2.3
            Send Physical Asset to Buyer [A: 1.3.2.2.4]                              1.3.2.2.4
        Exchange [no Ownership Change] [A: 1.3.2.3]                                  1.3.2.3
            Remove/Decrease Unit Type 1 Amount from Exchanger Unit Type 1 Store | Commit [A: 1.3.2.3.1]   1.3.2.3.1
            Conversion rate: Unit Type 1 Value/Unit Type 2 Value [A: 1.3.2.3.2]      1.3.2.3.2
            Add/Increase Unit Type 2 Amount to Exchanger Store [A: 1.3.2.3.3]        1.3.2.3.3
Agree Activity Ownership Impact [A: 1.4]                                             1.4
    Amount Ownership Restrictions [A: 1.4.1]                                         1.4.1
        Availability Restriction (Committed Value Amount not Available) [A: 1.4.1.1] 1.4.1.1
```

Figure 14: Digital Currency Agree Ontology: Below Top Section



- Agree Activity Ownership Impact [A: 1.4] 1.4
  - Amount Ownership Restrictions [A: 1.4.1] 1.4.1
    - Availability Restriction (Committed Value Amount not Available) [A: 1.4.1.1] 1.4.1.1
      - Destination Amount Required [A: 1.4.1.1.1] 1.4.1.1.1
      - Intermediary Fees Required [A: 1.4.1.1.2] 1.4.1.1.2
      - Applicable Taxes [A: 1.4.1.1.3] 1.4.1.1.3
    - Staking (Cannot use for Period) [A: 1.4.1.2] 1.4.1.2
      - Reward Amount Ownership [A: 1.4.1.2.1] 1.4.1.2.1
  - Amount Ownership Change [A: 1.4.2] 1.4.2
    - Full Amount [A: 1.4.2.1] 1.4.2.1
    - Commit Amount Sufficiency [A: 1.4.2.2] 1.4.2.2
      - Full: Commit Amount = Required (Full) Amount, , when Commit Amount = Full Amount [A: 1.4.2.2.1] 1.4.2.2.1
      - Under: Short Amount = Requested Amount - Commit Amount, , when Commit Amount < Full Amount [A: 1.4.2.2.2] 1.4.2.2.2
        - Debt Created (Short Amount) [A: 1.4.2.2.2.1] 1.4.2.2.2.1
        - Short Debt Terms [A: 1.4.2.2.2.2] 1.4.2.2.2.2
      - Over: Unspent Transaction Output (UTXO?), when Commit Amount > Full Amount [A: 1.4.2.2.3] 1.4.2.2.3
        - UTXO = Requested (Full) Amount - Commit Amount [A: 1.4.2.2.3.1] 1.4.2.2.3.1
- Agree Finality [A: 1.5] 1.5
  - Settle Now: Synchronously [A: 1.5.1] 1.5.1
    - All Stores are Available [A: 1.5.1.1] 1.5.1.1
  - Settle Later: Asynchronously [A: 1.5.2] 1.5.2
    - By Design [A: 1.5.2.1] 1.5.2.1
    - By Context [A: 1.5.2.2] 1.5.2.2
    - At Least one Store(s) not Available [A: 1.5.2.3] 1.5.2.3
- Agree Store Availability [A: 1.6] 1.6
  - Commit Source Store Availability [A: 1.6.1] 1.6.1
    - Accessible - Hot (Online) [A: 1.6.1.1] 1.6.1.1

Figure 15: Digital Currency Agree Ontology: 2 Below Top Section



TARGET ANALYSIS ▶ VALUE PROCESS FRAMEWORKS

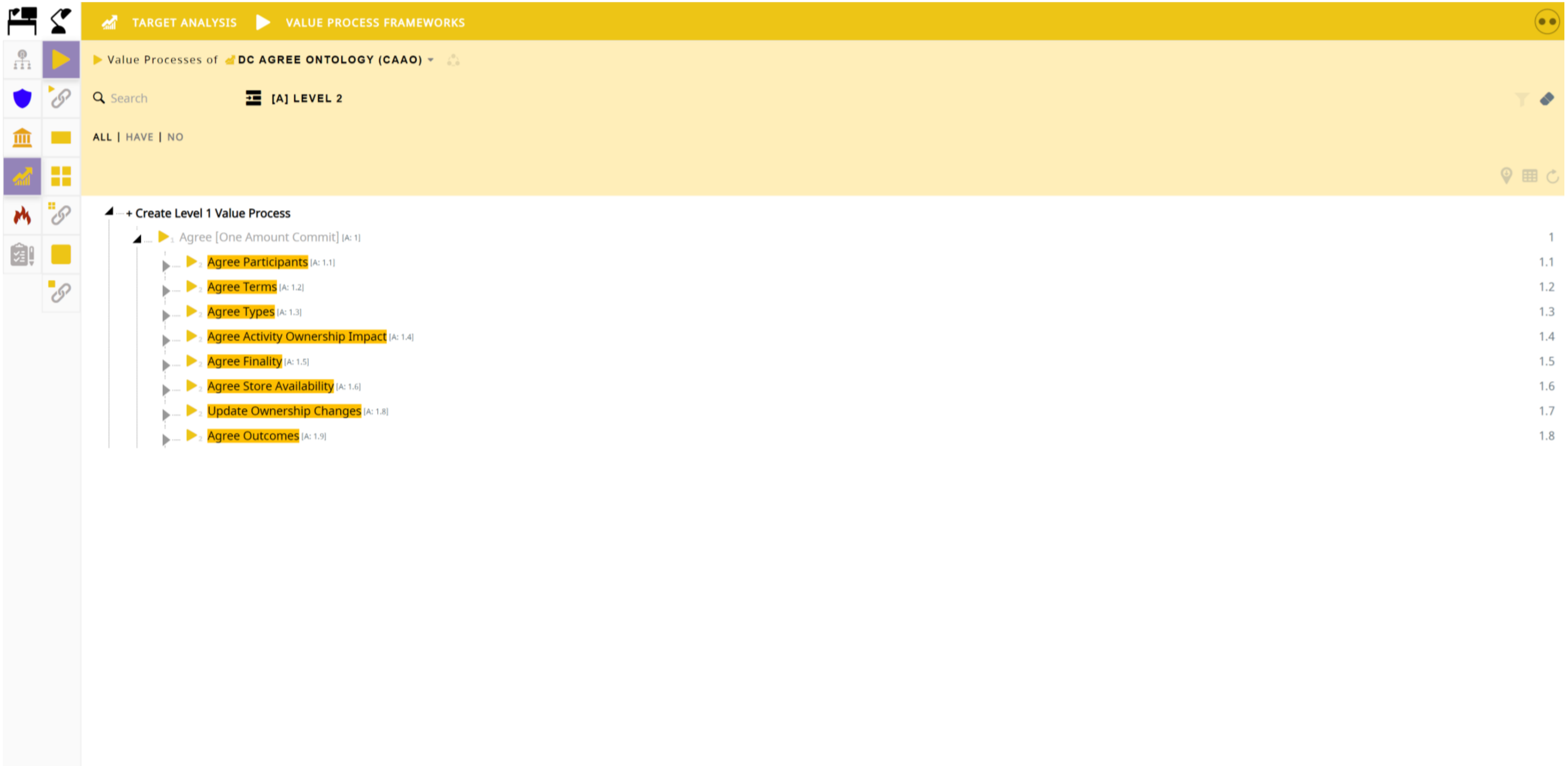
▶ Value Processes of DC AGREE ONTOLOGY (CAAO)

Search

- Accessible - Hot (Online) [A: 1.6.2.1] 1.6.2.1
  - Internal Storage [A: 1.6.2.1.1] 1.6.2.1.1
- Inaccessible - Cold (Offline) [A: 1.6.2.2] 1.6.2.2
  - Paper [A: 1.6.2.2.1] 1.6.2.2.1
  - External Storage [A: 1.6.2.2.2] 1.6.2.2.2

- Update Ownership Changes [A: 1.8] 1.7
  - No Ledger Update [A: 1.8.1] 1.7.1
  - One Unique Ledger Update [A: 1.8.2] 1.7.2
    - One Unique Centralized Ledger Update [A: 1.8.2.1] 1.7.2.1
      - One Native Ledger [A: 1.8.2.1.1] 1.7.2.1.1
    - Many Identical Distributed Ledger Updates [A: 1.8.2.2] 1.7.2.2
      - Public Validators [A: 1.8.2.2.1] 1.7.2.2.1
      - Permissioned Validators [A: 1.8.2.2.2] 1.7.2.2.2
  - Many Distinct Ledger Updates [A: 1.8.3] 1.7.3
    - Many Unique Distinct Ledgers [A: 1.8.3.1] 1.7.3.1
      - Commit Amount Source Ledger [A: 1.8.3.1.1] 1.7.3.1.1
      - Intermediary Ledgers [A: 1.8.3.1.2] 1.7.3.1.2
      - Destination Amount Destination Ledger [A: 1.8.3.1.3] 1.7.3.1.3
  - Physical Ledger Update [A: 1.8.4] 1.7.4
- Agree Outcomes [A: 1.9] 1.8
  - Agree Outcome Predictability [A: 1.9.1] 1.8.1
    - Single Result Known Before [A: 1.9.1.1] 1.8.1.1
    - Variable Outcome, Result Value options Known, Result Unknown [A: 1.9.1.2] 1.8.1.2
    - Do Result [A: 1.9.1.3] 1.8.1.3
  - Agree Liquidity Impact: [A: 1.9.2] 1.8.2
    - Increasing Liquidity [A: 1.9.2.1] 1.8.2.1
    - Decreasing Liquidity [A: 1.9.2.2] 1.8.2.2

Figure 16: Digital Currency Agree Ontology: Bottom Section



TARGET ANALYSIS ▶ VALUE PROCESS FRAMEWORKS

▶ Value Processes of DC AGREE ONTOLOGY (CAAO)

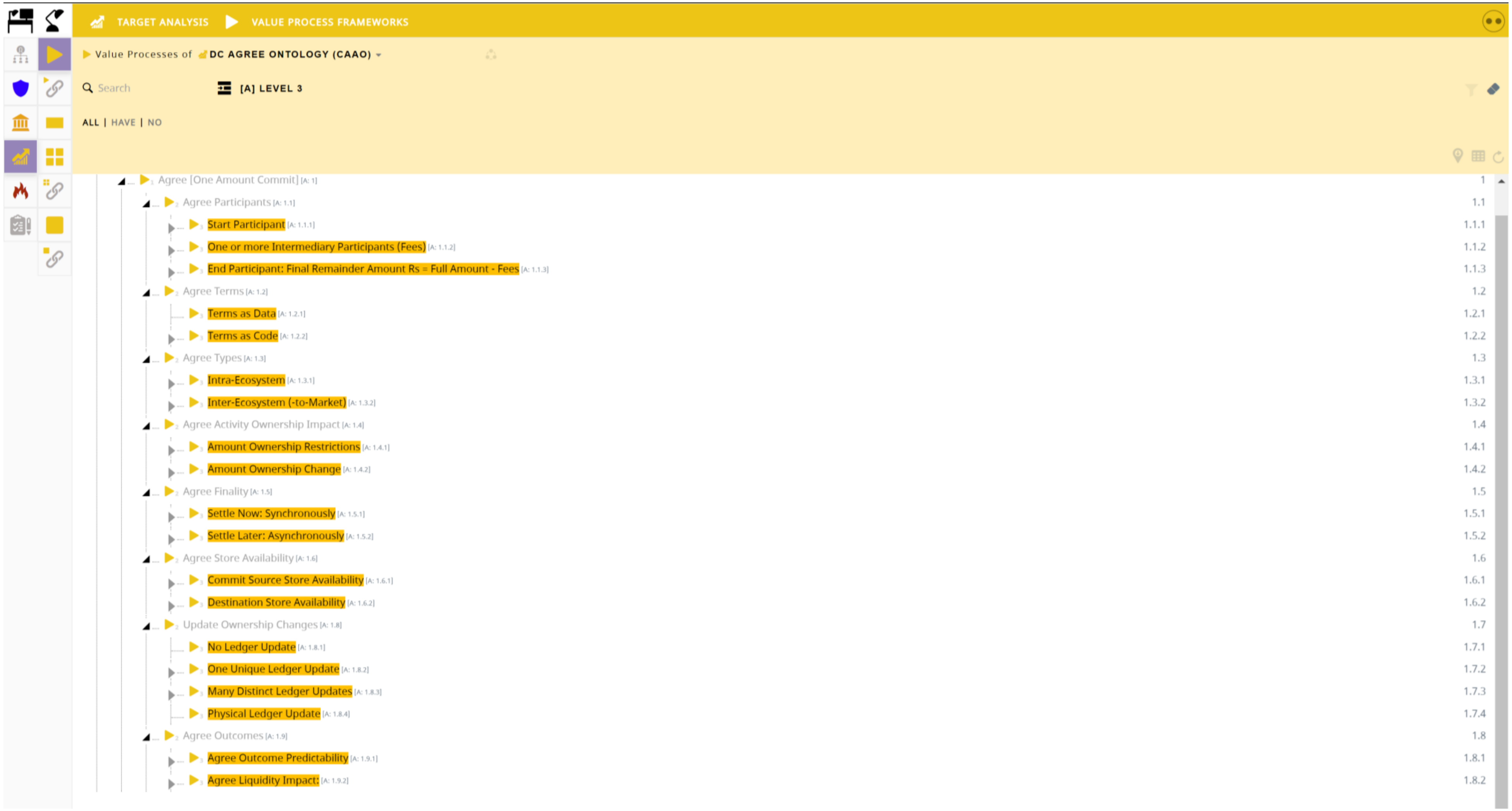
Search [A] LEVEL 2

ALL | HAVE | NO

+ Create Level 1 Value Process

- Agree [One Amount Commit] [A: 1] — 1
  - Agree Participants [A: 1.1] — 1.1
  - Agree Terms [A: 1.2] — 1.2
  - Agree Types [A: 1.3] — 1.3
  - Agree Activity Ownership Impact [A: 1.4] — 1.4
  - Agree Finality [A: 1.5] — 1.5
  - Agree Store Availability [A: 1.6] — 1.6
  - Update Ownership Changes [A: 1.8] — 1.7
  - Agree Outcomes [A: 1.9] — 1.8

Figure 17: Digital Currency Agree Ontology: Notion (level 2) View



Value Processes of DC AGREE ONTOLOGY (CAAO)

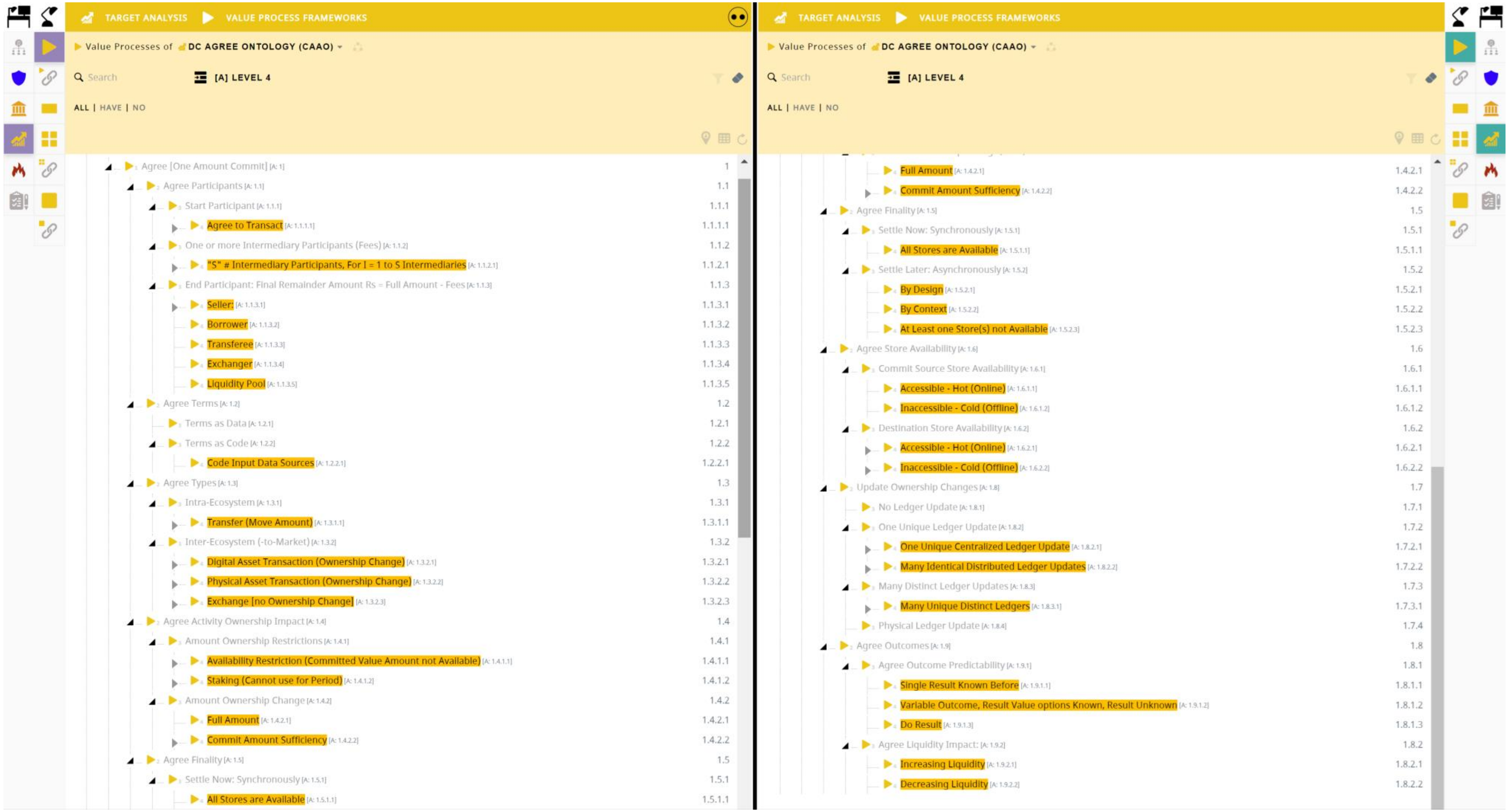
Search

[A] LEVEL 3

ALL | HAVE | NO

- Agree [One Amount Commit] [A: 1] — 1
  - Agree Participants [A: 1.1] — 1.1
    - Start Participant [A: 1.1.1] — 1.1.1
    - One or more Intermediary Participants (Fees) [A: 1.1.2] — 1.1.2
    - End Participant: Final Remainder Amount Rs = Full Amount - Fees [A: 1.1.3] — 1.1.3
  - Agree Terms [A: 1.2] — 1.2
    - Terms as Data [A: 1.2.1] — 1.2.1
    - Terms as Code [A: 1.2.2] — 1.2.2
  - Agree Types [A: 1.3] — 1.3
    - Intra-Ecosystem [A: 1.3.1] — 1.3.1
    - Inter-Ecosystem (-to-Market) [A: 1.3.2] — 1.3.2
  - Agree Activity Ownership Impact [A: 1.4] — 1.4
    - Amount Ownership Restrictions [A: 1.4.1] — 1.4.1
    - Amount Ownership Change [A: 1.4.2] — 1.4.2
  - Agree Finality [A: 1.5] — 1.5
    - Settle Now: Synchronously [A: 1.5.1] — 1.5.1
    - Settle Later: Asynchronously [A: 1.5.2] — 1.5.2
  - Agree Store Availability [A: 1.6] — 1.6
    - Commit Source Store Availability [A: 1.6.1] — 1.6.1
    - Destination Store Availability [A: 1.6.2] — 1.6.2
  - Update Ownership Changes [A: 1.8] — 1.7
    - No Ledger Update [A: 1.8.1] — 1.7.1
    - One Unique Ledger Update [A: 1.8.2] — 1.7.2
    - Many Distinct Ledger Updates [A: 1.8.3] — 1.7.3
    - Physical Ledger Update [A: 1.8.4] — 1.7.4
  - Agree Outcomes [A: 1.9] — 1.8
    - Agree Outcome Predictability [A: 1.9.1] — 1.8.1
    - Agree Liquidity Impact: [A: 1.9.2] — 1.8.2

Figure 18: Digital Currency Agree Ontology: Notion Distinction (level 3) View



Value Processes of DC AGREE ONTOLOGY (CAAO)

[A] LEVEL 4

- Agree [One Amount Commit] [A: 1] — 1
  - Agree Participants [A: 1.1] — 1.1
    - Start Participant [A: 1.1.1] — 1.1.1
      - Agree to Transact [A: 1.1.1.1] — 1.1.1.1
    - One or more Intermediary Participants (Fees) [A: 1.1.2] — 1.1.2
      - "S" # Intermediary Participants, For I = 1 to S Intermediaries [A: 1.1.2.1] — 1.1.2.1
    - End Participant: Final Remainder Amount Rs = Full Amount - Fees [A: 1.1.3] — 1.1.3
      - Seller: [A: 1.1.3.1] — 1.1.3.1
      - Borrower [A: 1.1.3.2] — 1.1.3.2
      - Transferee [A: 1.1.3.3] — 1.1.3.3
      - Exchanger [A: 1.1.3.4] — 1.1.3.4
      - Liquidity Pool [A: 1.1.3.5] — 1.1.3.5
  - Agree Terms [A: 1.2] — 1.2
    - Terms as Data [A: 1.2.1] — 1.2.1
    - Terms as Code [A: 1.2.2] — 1.2.2
      - Code Input Data Sources [A: 1.2.2.1] — 1.2.2.1
  - Agree Types [A: 1.3] — 1.3
    - Intra-Ecosystem [A: 1.3.1] — 1.3.1
      - Transfer (Move Amount) [A: 1.3.1.1] — 1.3.1.1
    - Inter-Ecosystem (-to-Market) [A: 1.3.2] — 1.3.2
      - Digital Asset Transaction (Ownership Change) [A: 1.3.2.1] — 1.3.2.1
      - Physical Asset Transaction (Ownership Change) [A: 1.3.2.2] — 1.3.2.2
      - Exchange [no Ownership Change] [A: 1.3.2.3] — 1.3.2.3
  - Agree Activity Ownership Impact [A: 1.4] — 1.4
    - Amount Ownership Restrictions [A: 1.4.1] — 1.4.1
      - Availability Restriction (Committed Value Amount not Available) [A: 1.4.1.1] — 1.4.1.1
      - Staking (Cannot use for Period) [A: 1.4.1.2] — 1.4.1.2
    - Amount Ownership Change [A: 1.4.2] — 1.4.2
      - Full Amount [A: 1.4.2.1] — 1.4.2.1
      - Commit Amount Sufficiency [A: 1.4.2.2] — 1.4.2.2
  - Agree Finality [A: 1.5] — 1.5
    - Settle Now: Synchronously [A: 1.5.1] — 1.5.1
      - All Stores are Available [A: 1.5.1.1] — 1.5.1.1

TARGET ANALYSIS
VALUE PROCESS FRAMEWORKS
Value Processes of DC AGREE ONTOLOGY (CAAO)
Search
[A] LEVEL 4
ALL | HAVE | NO
Full Amount [A: 1.4.2.1] — 1.4.2.1
Commit Amount Sufficiency [A: 1.4.2.2] — 1.4.2.2
Agree Finality [A: 1.5] — 1.5
Settle Now: Synchronously [A: 1.5.1] — 1.5.1
All Stores are Available [A: 1.5.1.1] — 1.5.1.1

- Settle Later: Asynchronously [A: 1.5.2] — 1.5.2
  - By Design [A: 1.5.2.1] — 1.5.2.1
  - By Context [A: 1.5.2.2] — 1.5.2.2
  - At Least one Store(s) not Available [A: 1.5.2.3] — 1.5.2.3
- Agree Store Availability [A: 1.6] — 1.6
  - Commit Source Store Availability [A: 1.6.1] — 1.6.1
    - Accessible - Hot (Online) [A: 1.6.1.1] — 1.6.1.1
    - Inaccessible - Cold (Offline) [A: 1.6.1.2] — 1.6.1.2
  - Destination Store Availability [A: 1.6.2] — 1.6.2
    - Accessible - Hot (Online) [A: 1.6.2.1] — 1.6.2.1
    - Inaccessible - Cold (Offline) [A: 1.6.2.2] — 1.6.2.2
- Update Ownership Changes [A: 1.8] — 1.7
  - No Ledger Update [A: 1.8.1] — 1.7.1
  - One Unique Ledger Update [A: 1.8.2] — 1.7.2
    - One Unique Centralized Ledger Update [A: 1.8.2.1] — 1.7.2.1
    - Many Identical Distributed Ledger Updates [A: 1.8.2.2] — 1.7.2.2
  - Many Distinct Ledger Updates [A: 1.8.3] — 1.7.3
    - Many Unique Distinct Ledgers [A: 1.8.3.1] — 1.7.3.1
  - Physical Ledger Update [A: 1.8.4] — 1.7.4
- Agree Outcomes [A: 1.9] — 1.8
  - Agree Outcome Predictability [A: 1.9.1] — 1.8.1
    - Single Result Known Before [A: 1.9.1.1] — 1.8.1.1
    - Variable Outcome, Result Value options Known, Result Unknown [A: 1.9.1.2] — 1.8.1.2
    - Do Result [A: 1.9.1.3] — 1.8.1.3
  - Agree Liquidity Impact: [A: 1.9.2] — 1.8.2
    - Increasing Liquidity [A: 1.9.2.1] — 1.8.2.1
    - Decreasing Liquidity [A: 1.9.2.2] — 1.8.2.2

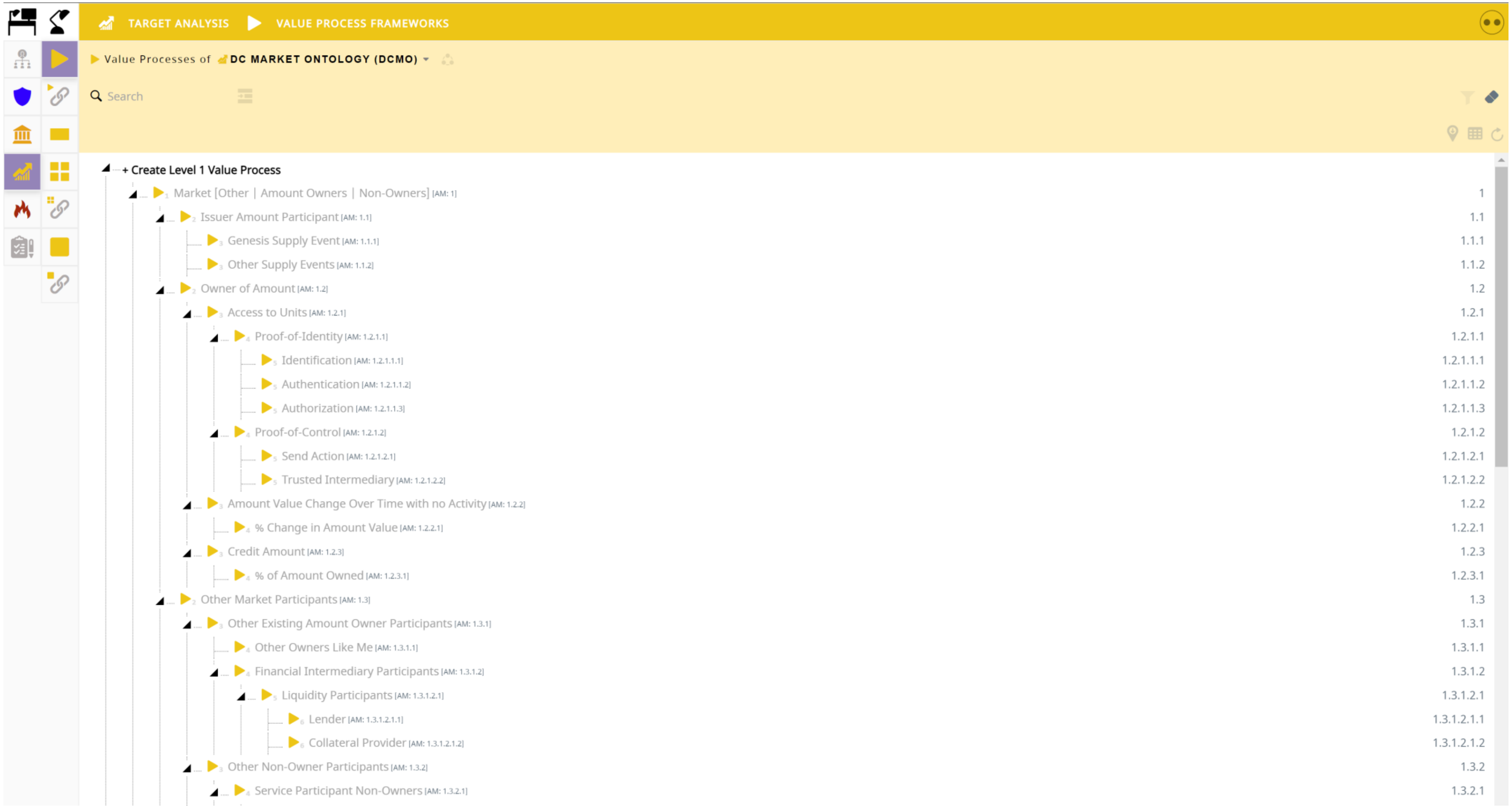
Figure 19: Digital Currency Agree Ontology: Notion Distinction Distinctions (level 4) View

7.3 Agree “market” ontology notions, distinctions, and options.

See Section 3.2.3 for list of Agree Market Ontology (AMO) Notions, Distinctions, and Options.

The following is a set of definitions for terms related to digital currency, market participants, and transactions. These include definitions for different types of participants in the market, such as issuers, owners, and intermediaries; terms related to the supply and value of digital currency units; and terms related to various types of transactions, such as lending, exchanging, and validating. The text also includes definitions for concepts such as proof of identity, authentication, and authorization, and introduces concepts such as "distributed autonomous organization" and "oracle" in the context of digital currency markets.

Figure 20 and 26 display the AMO notions, their distinctions each ending with a set of options from which one is to be selected.



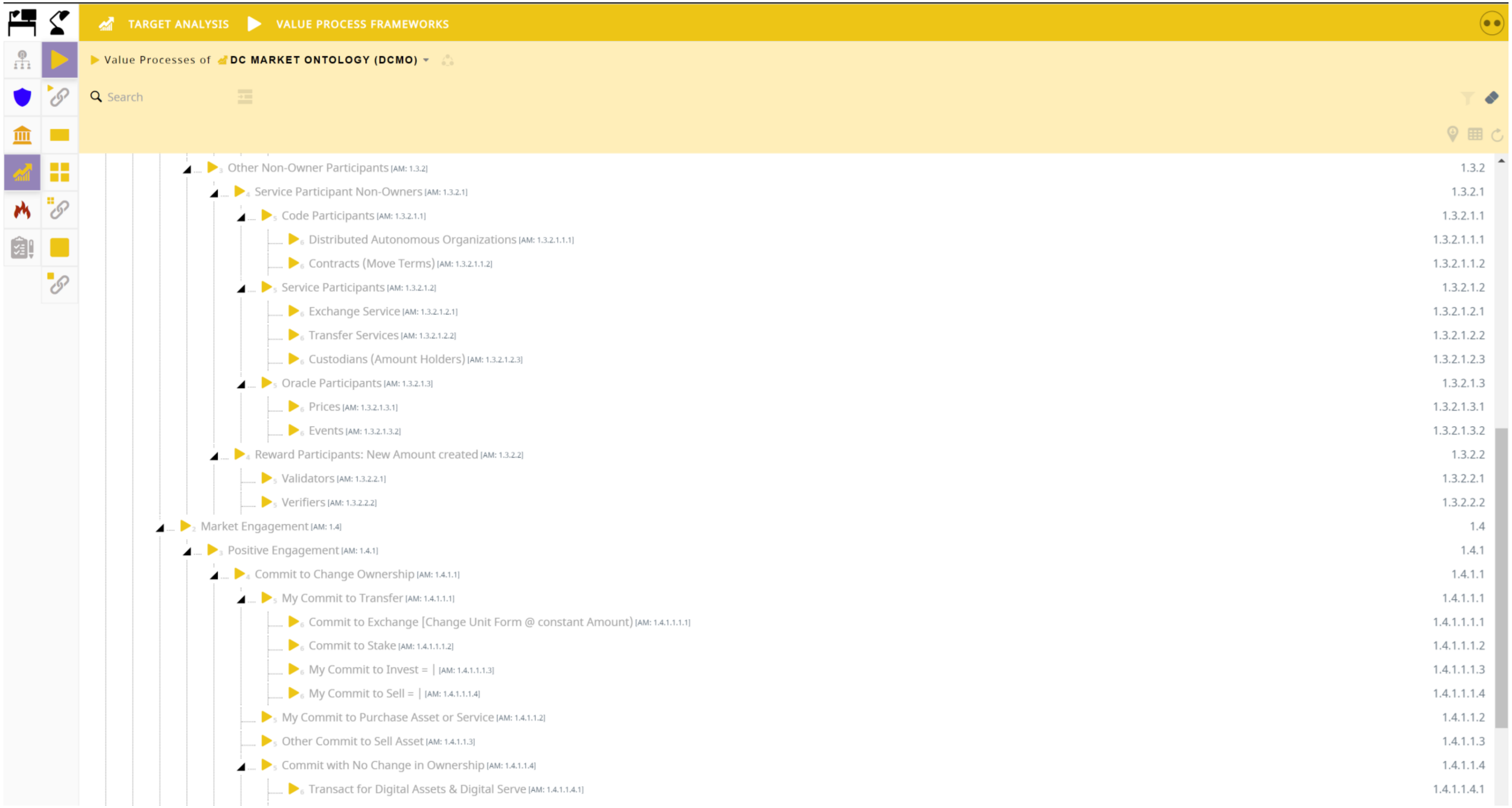
TARGET ANALYSIS ▶ VALUE PROCESS FRAMEWORKS

▶ Value Processes of DC MARKET ONTOLOGY (DCMO)

Search

- + Create Level 1 Value Process
  - Market [Other | Amount Owners | Non-Owners] [AM: 1] 1
    - Issuer Amount Participant [AM: 1.1] 1.1
      - Genesis Supply Event [AM: 1.1.1] 1.1.1
      - Other Supply Events [AM: 1.1.2] 1.1.2
    - Owner of Amount [AM: 1.2] 1.2
      - Access to Units [AM: 1.2.1] 1.2.1
        - Proof-of-Identity [AM: 1.2.1.1] 1.2.1.1
          - Identification [AM: 1.2.1.1.1] 1.2.1.1.1
          - Authentication [AM: 1.2.1.1.2] 1.2.1.1.2
          - Authorization [AM: 1.2.1.1.3] 1.2.1.1.3
        - Proof-of-Control [AM: 1.2.1.2] 1.2.1.2
          - Send Action [AM: 1.2.1.2.1] 1.2.1.2.1
          - Trusted Intermediary [AM: 1.2.1.2.2] 1.2.1.2.2
      - Amount Value Change Over Time with no Activity [AM: 1.2.2] 1.2.2
        - % Change in Amount Value [AM: 1.2.2.1] 1.2.2.1
      - Credit Amount [AM: 1.2.3] 1.2.3
        - % of Amount Owned [AM: 1.2.3.1] 1.2.3.1
    - Other Market Participants [AM: 1.3] 1.3
      - Other Existing Amount Owner Participants [AM: 1.3.1] 1.3.1
        - Other Owners Like Me [AM: 1.3.1.1] 1.3.1.1
        - Financial Intermediary Participants [AM: 1.3.1.2] 1.3.1.2
          - Liquidity Participants [AM: 1.3.1.2.1] 1.3.1.2.1
            - Lender [AM: 1.3.1.2.1.1] 1.3.1.2.1.1
            - Collateral Provider [AM: 1.3.1.2.1.2] 1.3.1.2.1.2
      - Other Non-Owner Participants [AM: 1.3.2] 1.3.2
        - Service Participant Non-Owners [AM: 1.3.2.1] 1.3.2.1

Figure 20: Agree market ontology, top section view.



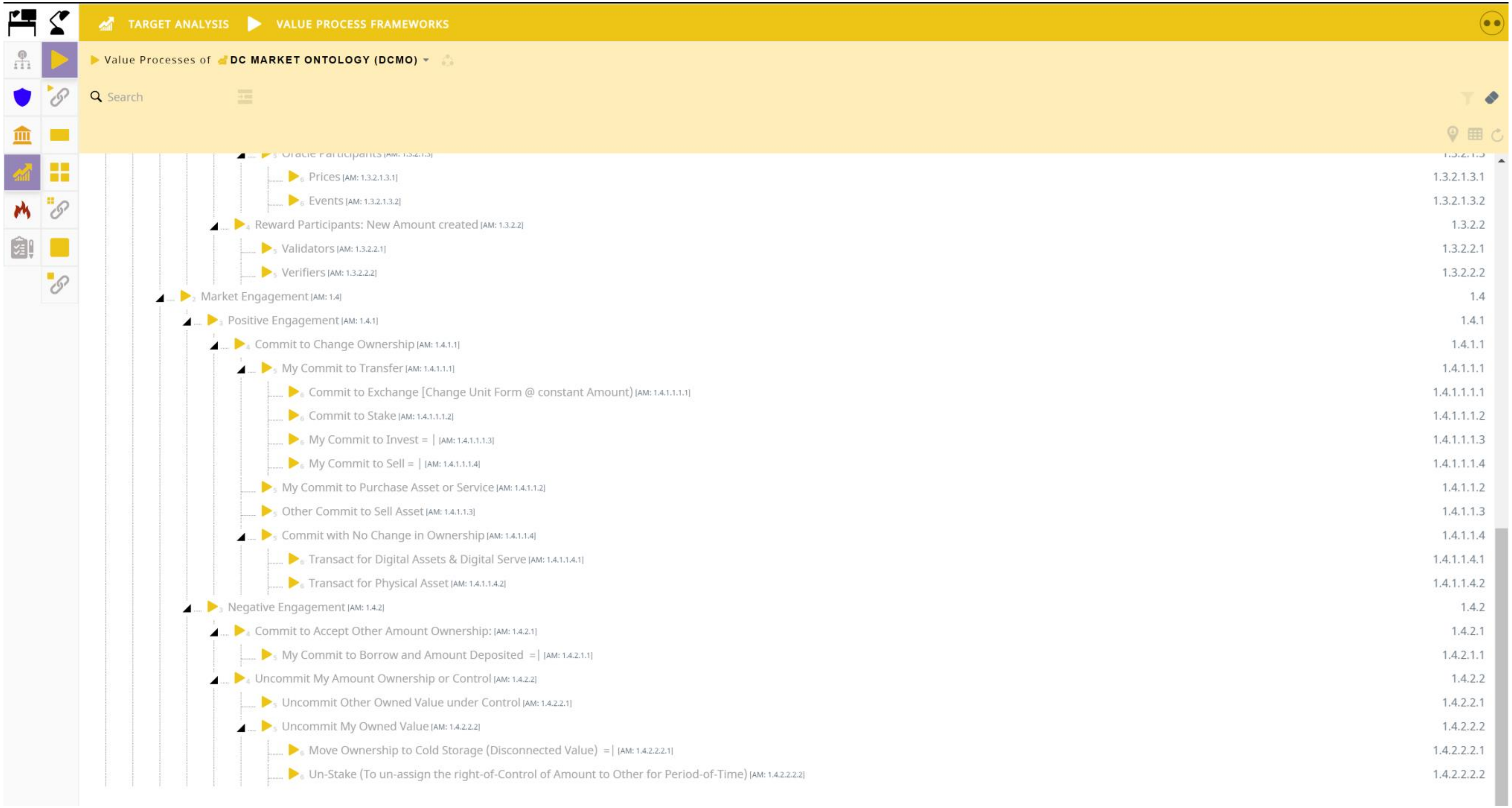
TARGET ANALYSIS ▶ VALUE PROCESS FRAMEWORKS

▶ Value Processes of DC MARKET ONTOLOGY (DCMO)

Search

- ▶ Other Non-Owner Participants [AM: 1.3.2] 1.3.2
  - ▶ Service Participant Non-Owners [AM: 1.3.2.1] 1.3.2.1
    - ▶ Code Participants [AM: 1.3.2.1.1] 1.3.2.1.1
      - ▶ Distributed Autonomous Organizations [AM: 1.3.2.1.1.1] 1.3.2.1.1.1
      - ▶ Contracts (Move Terms) [AM: 1.3.2.1.1.2] 1.3.2.1.1.2
    - ▶ Service Participants [AM: 1.3.2.1.2] 1.3.2.1.2
      - ▶ Exchange Service [AM: 1.3.2.1.2.1] 1.3.2.1.2.1
      - ▶ Transfer Services [AM: 1.3.2.1.2.2] 1.3.2.1.2.2
      - ▶ Custodians (Amount Holders) [AM: 1.3.2.1.2.3] 1.3.2.1.2.3
    - ▶ Oracle Participants [AM: 1.3.2.1.3] 1.3.2.1.3
      - ▶ Prices [AM: 1.3.2.1.3.1] 1.3.2.1.3.1
      - ▶ Events [AM: 1.3.2.1.3.2] 1.3.2.1.3.2
  - ▶ Reward Participants: New Amount created [AM: 1.3.2.2] 1.3.2.2
    - ▶ Validators [AM: 1.3.2.2.1] 1.3.2.2.1
    - ▶ Verifiers [AM: 1.3.2.2.2] 1.3.2.2.2
- ▶ Market Engagement [AM: 1.4] 1.4
  - ▶ Positive Engagement [AM: 1.4.1] 1.4.1
    - ▶ Commit to Change Ownership [AM: 1.4.1.1] 1.4.1.1
      - ▶ My Commit to Transfer [AM: 1.4.1.1.1] 1.4.1.1.1
        - ▶ Commit to Exchange [Change Unit Form @ constant Amount) [AM: 1.4.1.1.1.1] 1.4.1.1.1.1
        - ▶ Commit to Stake [AM: 1.4.1.1.1.2] 1.4.1.1.1.2
        - ▶ My Commit to Invest = | [AM: 1.4.1.1.1.3] 1.4.1.1.1.3
        - ▶ My Commit to Sell = | [AM: 1.4.1.1.1.4] 1.4.1.1.1.4
      - ▶ My Commit to Purchase Asset or Service [AM: 1.4.1.1.2] 1.4.1.1.2
      - ▶ Other Commit to Sell Asset [AM: 1.4.1.1.3] 1.4.1.1.3
      - ▶ Commit with No Change in Ownership [AM: 1.4.1.1.4] 1.4.1.1.4
        - ▶ Transact for Digital Assets & Digital Serve [AM: 1.4.1.1.4.1] 1.4.1.1.4.1

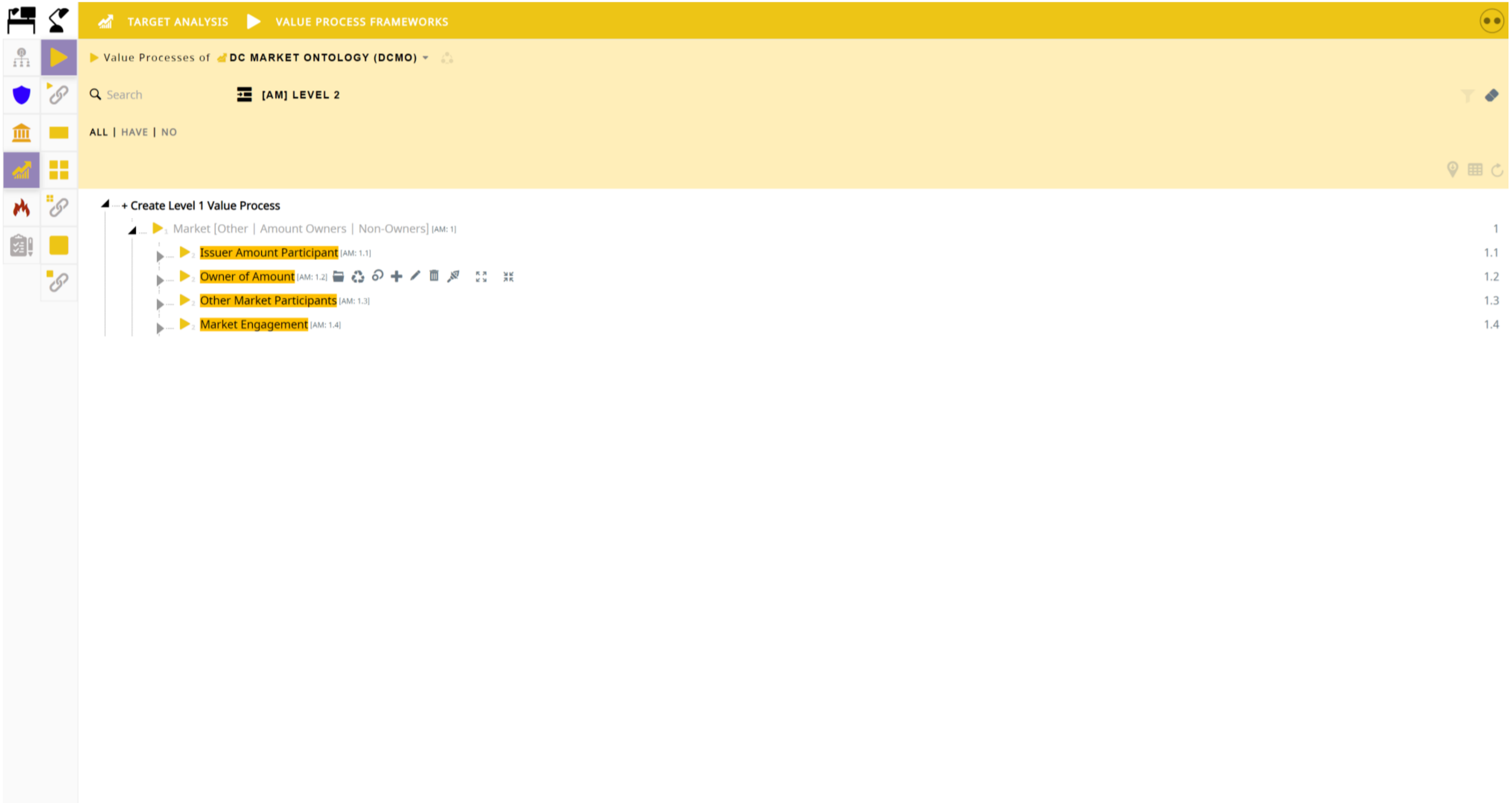
Figure 21: Agree market ontology, mid-section view.



Value Processes of DC MARKET ONTOLOGY (DCMO)

- Oracle Participants [AM: 1.3.2.1.3] — 1.3.2.1.3
  - Prices [AM: 1.3.2.1.3.1] — 1.3.2.1.3.1
  - Events [AM: 1.3.2.1.3.2] — 1.3.2.1.3.2
- Reward Participants: New Amount created [AM: 1.3.2.2] — 1.3.2.2
  - Validators [AM: 1.3.2.2.1] — 1.3.2.2.1
  - Verifiers [AM: 1.3.2.2.2] — 1.3.2.2.2
- Market Engagement [AM: 1.4] — 1.4
  - Positive Engagement [AM: 1.4.1] — 1.4.1
    - Commit to Change Ownership [AM: 1.4.1.1] — 1.4.1.1
      - My Commit to Transfer [AM: 1.4.1.1.1] — 1.4.1.1.1
        - Commit to Exchange [Change Unit Form @ constant Amount) [AM: 1.4.1.1.1.1] — 1.4.1.1.1.1
        - Commit to Stake [AM: 1.4.1.1.1.2] — 1.4.1.1.1.2
        - My Commit to Invest = | [AM: 1.4.1.1.1.3] — 1.4.1.1.1.3
        - My Commit to Sell = | [AM: 1.4.1.1.1.4] — 1.4.1.1.1.4
      - My Commit to Purchase Asset or Service [AM: 1.4.1.1.2] — 1.4.1.1.2
      - Other Commit to Sell Asset [AM: 1.4.1.1.3] — 1.4.1.1.3
      - Commit with No Change in Ownership [AM: 1.4.1.1.4] — 1.4.1.1.4
        - Transact for Digital Assets & Digital Serve [AM: 1.4.1.1.4.1] — 1.4.1.1.4.1
        - Transact for Physical Asset [AM: 1.4.1.1.4.2] — 1.4.1.1.4.2
  - Negative Engagement [AM: 1.4.2] — 1.4.2
    - Commit to Accept Other Amount Ownership: [AM: 1.4.2.1] — 1.4.2.1
      - My Commit to Borrow and Amount Deposited =| [AM: 1.4.2.1.1] — 1.4.2.1.1
    - Uncommit My Amount Ownership or Control [AM: 1.4.2.2] — 1.4.2.2
      - Uncommit Other Owned Value under Control [AM: 1.4.2.2.1] — 1.4.2.2.1
      - Uncommit My Owned Value [AM: 1.4.2.2.2] — 1.4.2.2.2
        - Move Ownership to Cold Storage (Disconnected Value) =| [AM: 1.4.2.2.2.1] — 1.4.2.2.2.1
        - Un-Stake (To un-assign the right-of-Control of Amount to Other for Period-of-Time) [AM: 1.4.2.2.2.2] — 1.4.2.2.2.2

Figure 22: Agree market ontology, bottom section view.



TARGET ANALYSIS ▶ VALUE PROCESS FRAMEWORKS

▶ Value Processes of DC MARKET ONTOLOGY (DCMO)

Search [AM] LEVEL 2

ALL | HAVE | NO

+ Create Level 1 Value Process

Market [Other | Amount Owners | Non-Owners] [AM: 1] 1

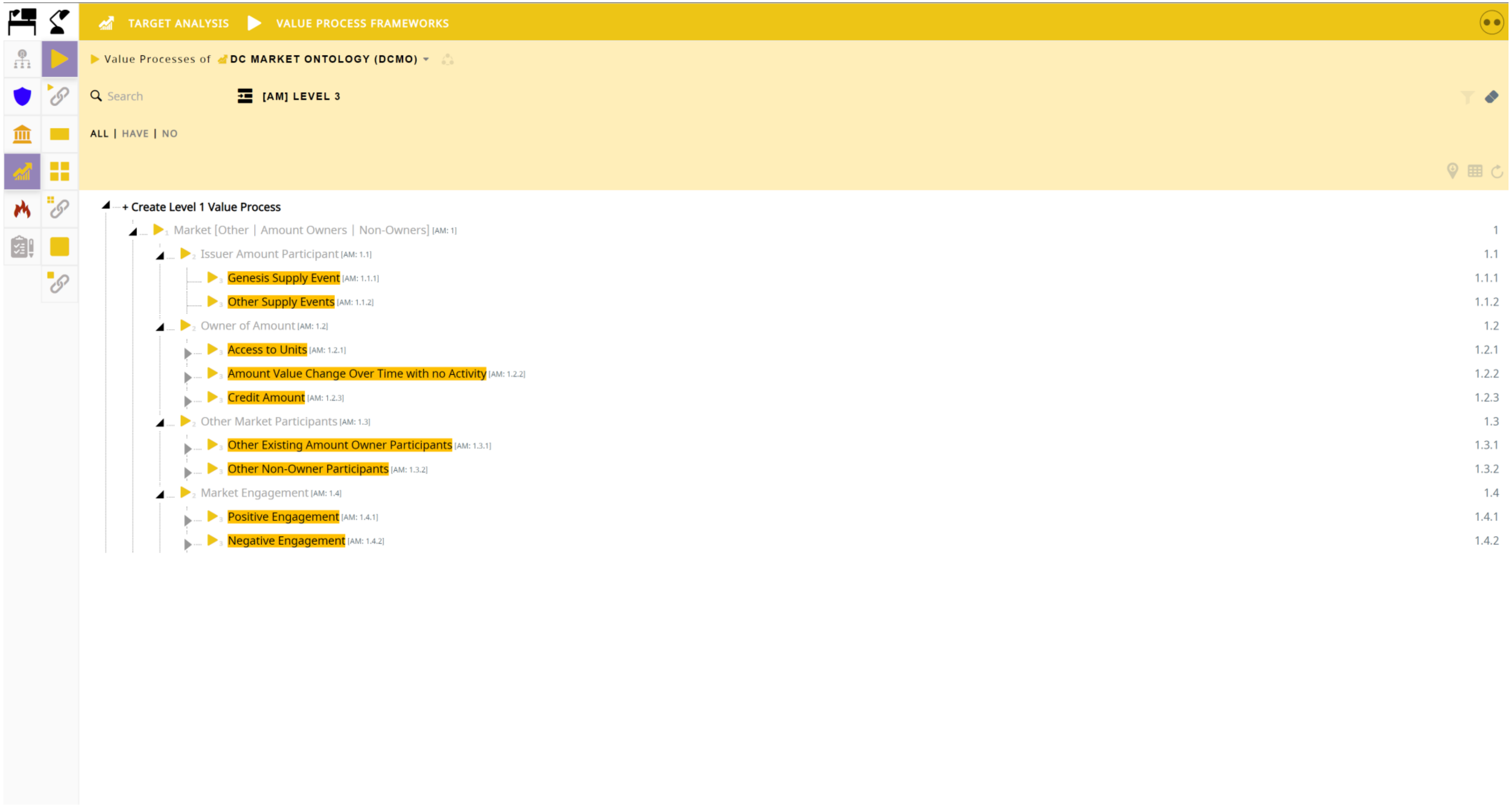
Issuer Amount Participant [AM: 1.1] 1.1

Owner of Amount [AM: 1.2] 1.2

Other Market Participants [AM: 1.3] 1.3

Market Engagement [AM: 1.4] 1.4

Figure 23: Agree market ontology, Notions (level 2) view.



TARGET ANALYSIS ▶ VALUE PROCESS FRAMEWORKS

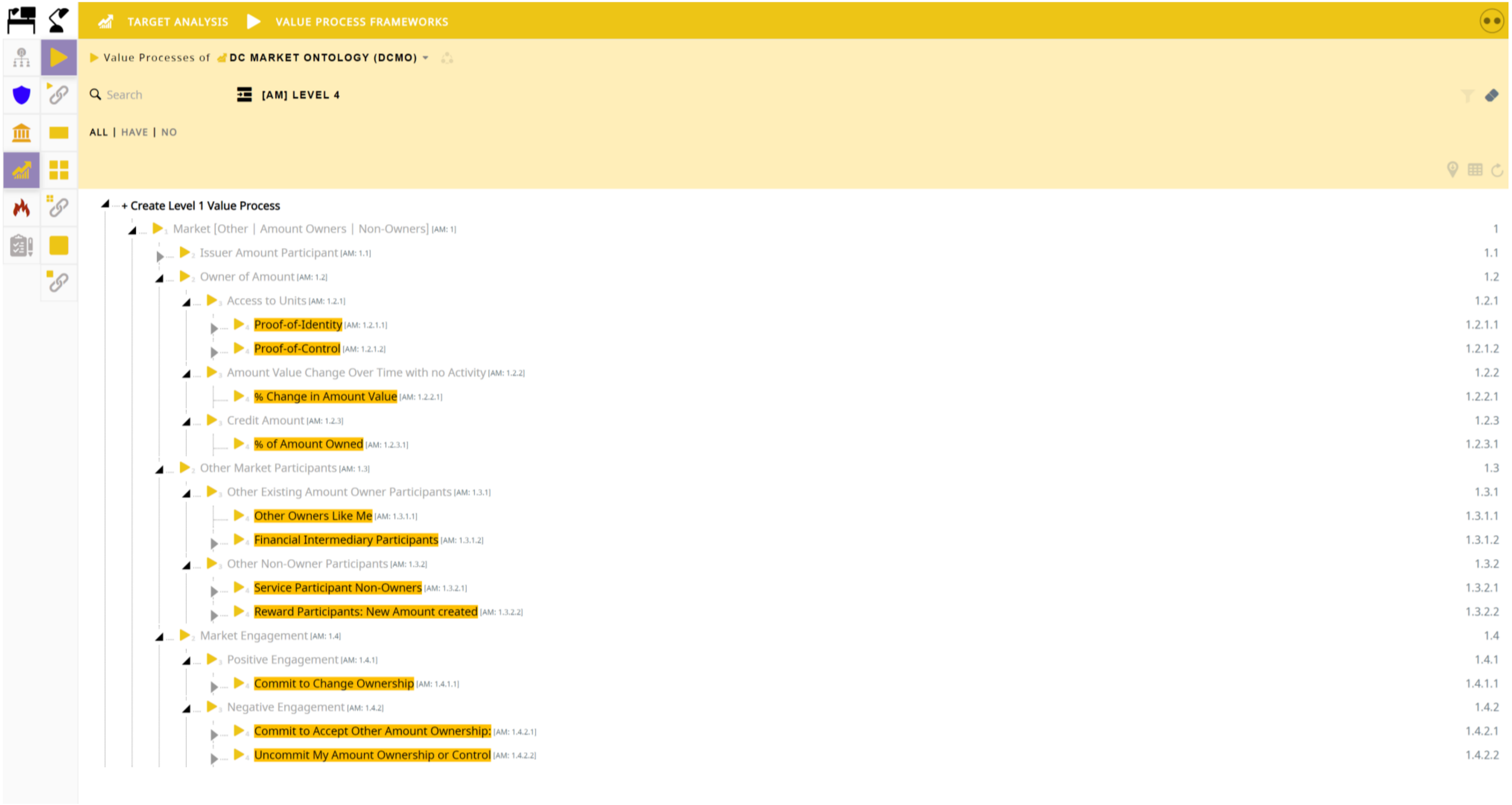
▶ Value Processes of DC MARKET ONTOLOGY (DCMO)

Search [AM] LEVEL 3

ALL | HAVE | NO

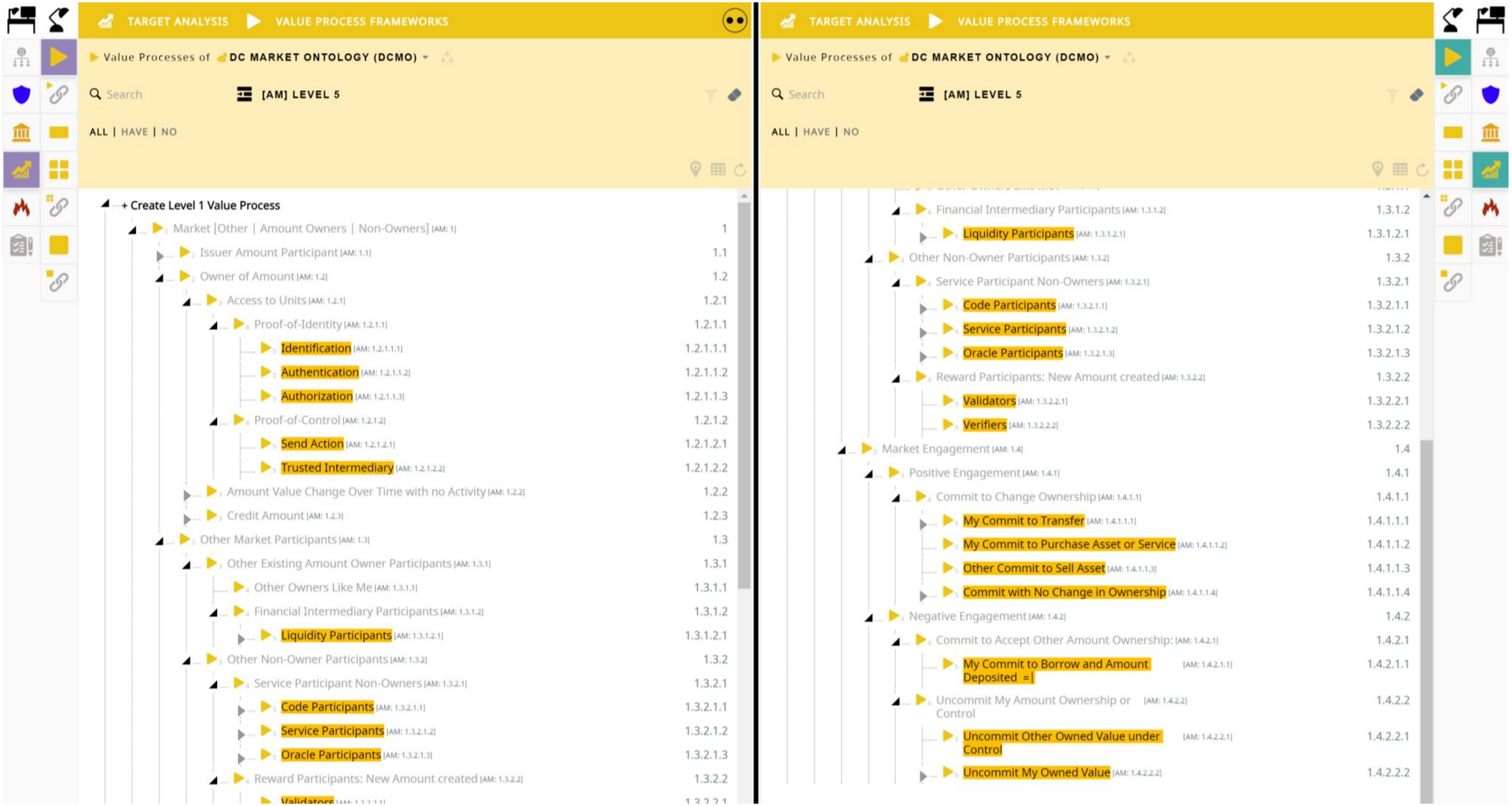
- + Create Level 1 Value Process
  - Market [Other | Amount Owners | Non-Owners] [AM: 1] — 1
    - Issuer Amount Participant [AM: 1.1] — 1.1
      - Genesis Supply Event [AM: 1.1.1] — 1.1.1
      - Other Supply Events [AM: 1.1.2] — 1.1.2
    - Owner of Amount [AM: 1.2] — 1.2
      - Access to Units [AM: 1.2.1] — 1.2.1
      - Amount Value Change Over Time with no Activity [AM: 1.2.2] — 1.2.2
      - Credit Amount [AM: 1.2.3] — 1.2.3
    - Other Market Participants [AM: 1.3] — 1.3
      - Other Existing Amount Owner Participants [AM: 1.3.1] — 1.3.1
      - Other Non-Owner Participants [AM: 1.3.2] — 1.3.2
    - Market Engagement [AM: 1.4] — 1.4
      - Positive Engagement [AM: 1.4.1] — 1.4.1
      - Negative Engagement [AM: 1.4.2] — 1.4.2

Figure 24: Agree market ontology, Notion Distinctions (level 3) view.



- + Create Level 1 Value Process
  - Market [Other | Amount Owners | Non-Owners] [AM: 1] 1
    - Issuer Amount Participant [AM: 1.1] 1.1
    - Owner of Amount [AM: 1.2] 1.2
      - Access to Units [AM: 1.2.1] 1.2.1
        - Proof-of-Identity [AM: 1.2.1.1] 1.2.1.1
        - Proof-of-Control [AM: 1.2.1.2] 1.2.1.2
      - Amount Value Change Over Time with no Activity [AM: 1.2.2] 1.2.2
        - % Change in Amount Value [AM: 1.2.2.1] 1.2.2.1
      - Credit Amount [AM: 1.2.3] 1.2.3
        - % of Amount Owned [AM: 1.2.3.1] 1.2.3.1
    - Other Market Participants [AM: 1.3] 1.3
      - Other Existing Amount Owner Participants [AM: 1.3.1] 1.3.1
        - Other Owners Like Me [AM: 1.3.1.1] 1.3.1.1
        - Financial Intermediary Participants [AM: 1.3.1.2] 1.3.1.2
      - Other Non-Owner Participants [AM: 1.3.2] 1.3.2
        - Service Participant Non-Owners [AM: 1.3.2.1] 1.3.2.1
        - Reward Participants: New Amount created [AM: 1.3.2.2] 1.3.2.2
    - Market Engagement [AM: 1.4] 1.4
      - Positive Engagement [AM: 1.4.1] 1.4.1
        - Commit to Change Ownership [AM: 1.4.1.1] 1.4.1.1
      - Negative Engagement [AM: 1.4.2] 1.4.2
        - Commit to Accept Other Amount Ownership: [AM: 1.4.2.1] 1.4.2.1
        - Uncommit My Amount Ownership or Control [AM: 1.4.2.2] 1.4.2.2

Figure 25: Agree market ontology, notion distinction sub-distinctions (level 4) view.



TARGET ANALYSIS ▶ VALUE PROCESS FRAMEWORKS

▶ Value Processes of DC MARKET ONTOLOGY (DCMO)

Search [AM] LEVEL 5

ALL | HAVE | NO

```
+ Create Level 1 Value Process
  Market [Other | Amount Owners | Non-Owners] [AM: 1]                           1
    Issuer Amount Participant [AM: 1.1]                                         1.1
    Owner of Amount [AM: 1.2]                                                   1.2
      Access to Units [AM: 1.2.1]                                               1.2.1
        Proof-of-Identity [AM: 1.2.1.1]                                         1.2.1.1
          Identification [AM: 1.2.1.1.1]                                        1.2.1.1.1
          Authentication [AM: 1.2.1.1.2]                                        1.2.1.1.2
          Authorization [AM: 1.2.1.1.3]                                         1.2.1.1.3
        Proof-of-Control [AM: 1.2.1.2]                                          1.2.1.2
          Send Action [AM: 1.2.1.2.1]                                           1.2.1.2.1
          Trusted Intermediary [AM: 1.2.1.2.2]                                  1.2.1.2.2
      Amount Value Change Over Time with no Activity [AM: 1.2.2]                1.2.2
      Credit Amount [AM: 1.2.3]                                                 1.2.3
    Other Market Participants [AM: 1.3]                                         1.3
      Other Existing Amount Owner Participants [AM: 1.3.1]                      1.3.1
        Other Owners Like Me [AM: 1.3.1.1]                                      1.3.1.1
        Financial Intermediary Participants [AM: 1.3.1.2]                       1.3.1.2
          Liquidity Participants [AM: 1.3.1.2.1]                                1.3.1.2.1
      Other Non-Owner Participants [AM: 1.3.2]                                  1.3.2
        Service Participant Non-Owners [AM: 1.3.2.1]                            1.3.2.1
          Code Participants [AM: 1.3.2.1.1]                                     1.3.2.1.1
          Service Participants [AM: 1.3.2.1.2]                                  1.3.2.1.2
          Oracle Participants [AM: 1.3.2.1.3]                                   1.3.2.1.3
        Reward Participants: New Amount created [AM: 1.3.2.2]                   1.3.2.2
          Validators [AM: 1.3.2.2.1]                                            1.3.2.2.1
```

TARGET ANALYSIS ▶ VALUE PROCESS FRAMEWORKS

▶ Value Processes of DC MARKET ONTOLOGY (DCMO)

Search [AM] LEVEL 5

ALL | HAVE | NO

```
        Financial Intermediary Participants [AM: 1.3.1.2]                       1.3.1.2
          Liquidity Participants [AM: 1.3.1.2.1]                                1.3.1.2.1
      Other Non-Owner Participants [AM: 1.3.2]                                  1.3.2
        Service Participant Non-Owners [AM: 1.3.2.1]                            1.3.2.1
          Code Participants [AM: 1.3.2.1.1]                                     1.3.2.1.1
          Service Participants [AM: 1.3.2.1.2]                                  1.3.2.1.2
          Oracle Participants [AM: 1.3.2.1.3]                                   1.3.2.1.3
        Reward Participants: New Amount created [AM: 1.3.2.2]                   1.3.2.2
          Validators [AM: 1.3.2.2.1]                                            1.3.2.2.1
          Verifiers [AM: 1.3.2.2.2]                                             1.3.2.2.2
    Market Engagement [AM: 1.4]                                                 1.4
      Positive Engagement [AM: 1.4.1]                                           1.4.1
        Commit to Change Ownership [AM: 1.4.1.1]                                1.4.1.1
          My Commit to Transfer [AM: 1.4.1.1.1]                                 1.4.1.1.1
          My Commit to Purchase Asset or Service [AM: 1.4.1.1.2]                1.4.1.1.2
          Other Commit to Sell Asset [AM: 1.4.1.1.3]                            1.4.1.1.3
          Commit with No Change in Ownership [AM: 1.4.1.1.4]                    1.4.1.1.4
      Negative Engagement [AM: 1.4.2]                                           1.4.2
        Commit to Accept Other Amount Ownership: [AM: 1.4.2.1]                  1.4.2.1
          My Commit to Borrow and Amount        [AM: 1.4.2.1.1]                 1.4.2.1.1
          Deposited =|
        Uncommit My Amount Ownership or    [AM: 1.4.2.2]                        1.4.2.2
        Control
          Uncommit Other Owned Value under      [AM: 1.4.2.2.1]                 1.4.2.2.1
          Control
          Uncommit My Owned Value [AM: 1.4.2.2.2]                               1.4.2.2.2
```

Figure 26: Agree market ontology, notion distinction sub-distinction sub-distinctions, (level 5) view.

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