Ontological Constructs to Create Money Laundering Schemes

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List of Topics

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Problem Statement

- MLS evolved to use internet based financial services
- Regulations alone have not been able to deter MLS
- Digital currencies are particularly suitable for MLS
- Difficulty is in differentiating between legitimate and fraudulent transactions

Purpose of Research

- To provide ontological components
  - that can be combined to construct some of the MLS
- To help investigators
  - to decompose suspected financial schemes and recognize misuses using ontological constructs
- To provide assists in forensic analysis
  - and integrate ontological constructs with financial transaction specification languages, such as XBRL
- To semi-automate the process of evidence generation and sharing

Definition of Money Laundering

- **Money laundering :** Use proven and secret techniques to make money obtained in dirty way appear to have been acquired elsewhere
- Anything can be used in money laundering process, it is limited only by the imagination of perpetrators
  - diamonds, rare coins,
  - airline tickets, livestock,
  - music tracks sold in iTunes,
  - rental property in second life
  - stock and derivatives (transfer value)

Known MLS

- Structured Transfer Scheme
- Alternative Remittance Systems Scheme
- Loan Back Scheme
- Low Invoicing Scheme
- High Invoicing Scheme
- Anonymous Account Holder Services

Components of MLS -I

Four basic entities:

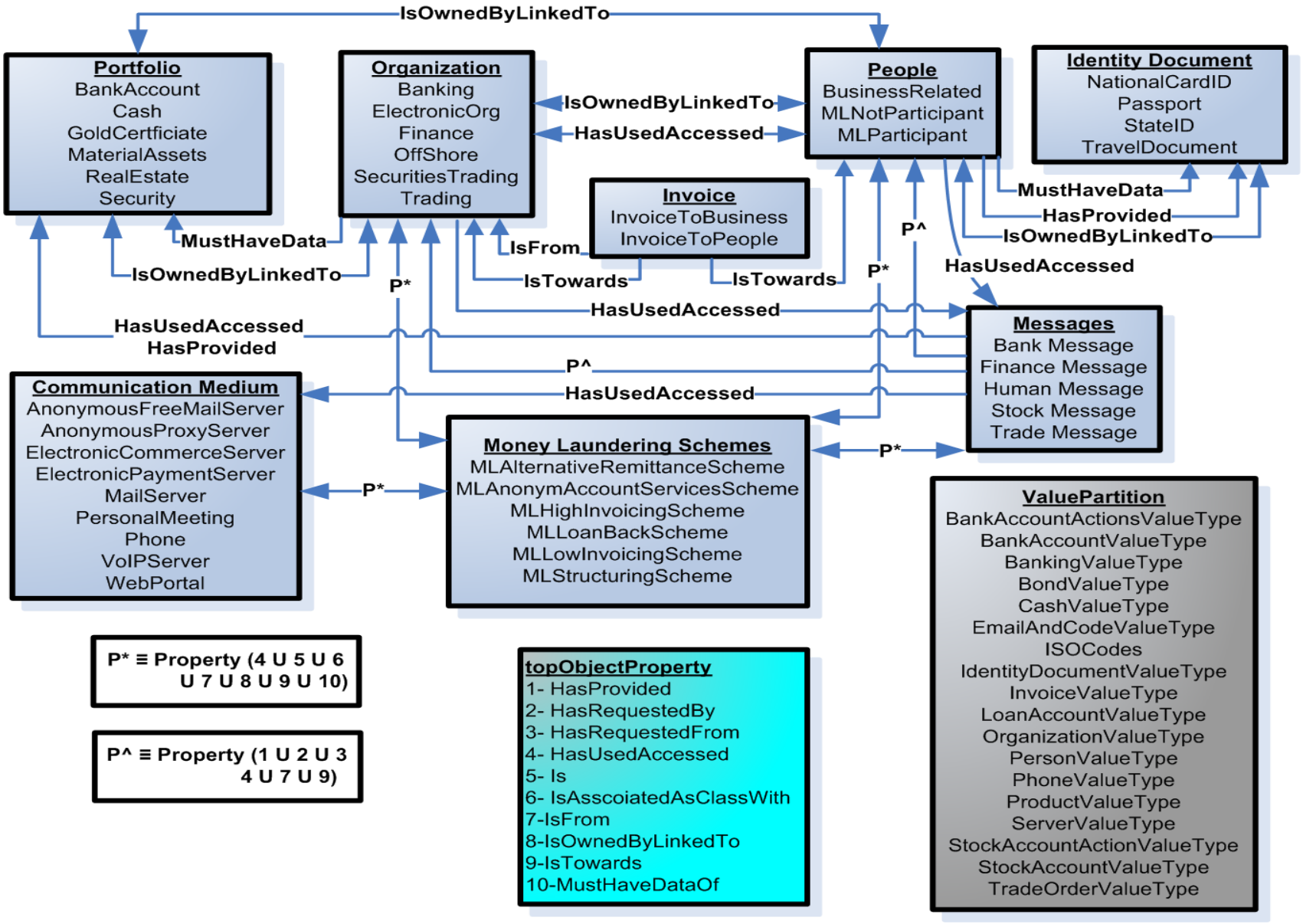
1. **People:** Individuals who participate in a business transaction
2. **Organization** : Any institution or firm that engages in financial operation or business trading
3. **Portfolio :** Any asset of a person or an organization in a financial institution
4. **Messages**: Any form of communication exchanged between people and organizations

Components of MLS -II

Three auxiliary entities:

1. **Communication medium :** Any environment that allows the delivery of messages
   - Electronic or Otherwise
2. **Invoice :** Represents the demand for payment issued in schemes
3. **Identification documents :** Are used to identify *people*

Ontology of MLS



Entity People

- Consists of the subclasses “business related”, “ML participant”, and “ML not participant”
- Is associated with entities: “organization”, “portfolio”, “messages”, “identification document”, and “money laundering schemes”
- Example:
  - money launderer “people” need “identification documents”, to send “messages” to withdraw “portfolio” cash from an “organization” bank, as part of a structuring “money laundering scheme”

Entity Portfolio

- Has many subclasses such as “cash”, “security”, and “bank account”
- Is associated with “organization”, “people” and “messages”
- Example:
  - “people” own accounts linked to a bank “organization”, they access them via bank transaction “messages”

Entity Organization

- Has many subclasses such as “banking”, “securities trading”, and “electronic organization”
- Is associated with entities: “people”, “portfolio”, “messages”, “invoice”, and “money laundering schemes”
- Example:
  - security trading company sends invest “messages”, or issues an “invoice” from the security account to the account owner

Entity Messages -I

- Represents all the activities in the domain , any action is performed via messages, such as “bank messages”, “trade messages”, and “human messages”
- Is associated with entities: “people”, “organization”, “portfolio”, “communication medium” and “money laundering schemes”

Entity Messages -II

- Bank messages are withdraw, deposit, transfer, open account, and close account
- Example:
  - To withdraw funds the money launderer "people" send the withdraw "message" to the bank "organization", and thereby the withdraw "message" accesses the "portfolio" bank account, as part of the structuring "money laundering scheme" using the phone "communication medium"

Entity Communication medium

- Represents all methods of standard and encrypted communication
  - Has many subclasses such as “anonymous proxy server”, “electronic payment server”, and “mail server”
  - Is associated with entities “message” and “money laundering schemes”
  - Examples:
    - the deposit uses the “electronic payment server”
    - people communicate using “mail server”
    - buy stock using anonymous proxy server

Entity Identification document

- Represents all documents that can be provided by the person for identification purposes
- Has subclasses “national card ID” , “passport”, “state ID”, and “Travel document”
- Is only associated with the entity “people”
- Example:
  - money launderer “person” must have an “identification document” passport

Entity Invoices

- Represents trading statements
- Consists of the subclasses “invoice to business” and “invoice to people”
- Is associated with entities “organization” and “people”
- Example:
  - an “organization” issues an “invoice” to “people”

Entity MLS

- Has many subclasses such as “low invoicing scheme” and “structuring scheme”
- This entity is associated with entities: “people”, “organization”, “message”, and “communication medium”
- Example:
  - money launderer “people” send transfer “message” to bank “organization”, as part of the high invoicing “money laundering schemes”

Object Properties in the Ontology

1. **HasProvided:** For one entity to provide information to another entity
   - Example, a person provides his or her bank account number to an organization
2. **HasRequestedBy:** An entity makes a request to another entity
   - Example, EFT is requested by an account holder from a bank
3. **HasRequestedFrom**: An entity receives a request
   - Example, EFT requested from a bank by a person

Object Properties in the Ontology

4. **HasUsedAccessed:** An entity uses or accesses another entity
5. **Is**: To associate an entity within the MLS with their specific entity
   - Example, the entity "EMSS Launderer" is a "MLSParticipant"
6. **IsAssociatedAsClassWith**: To associate or link an entity "Value Type" with its super class
7. **IsFrom**: To associate the source entity of messages that is not in the form of a request
   - Example, an EFT is from a person

Object Properties in the Ontology

8. **IsOwnedByLinkedTo:** An entity that is owned by or linked to another
9. **IsTowards:** To associate the target entity of messages that is not in the form of a request
   - Example, an electronic fund transfer is towards a shell company
10. **MustHaveDataOf:** An entity has data of another
   - Example, a bank must have data of the account holder person

Messages in the Ontology

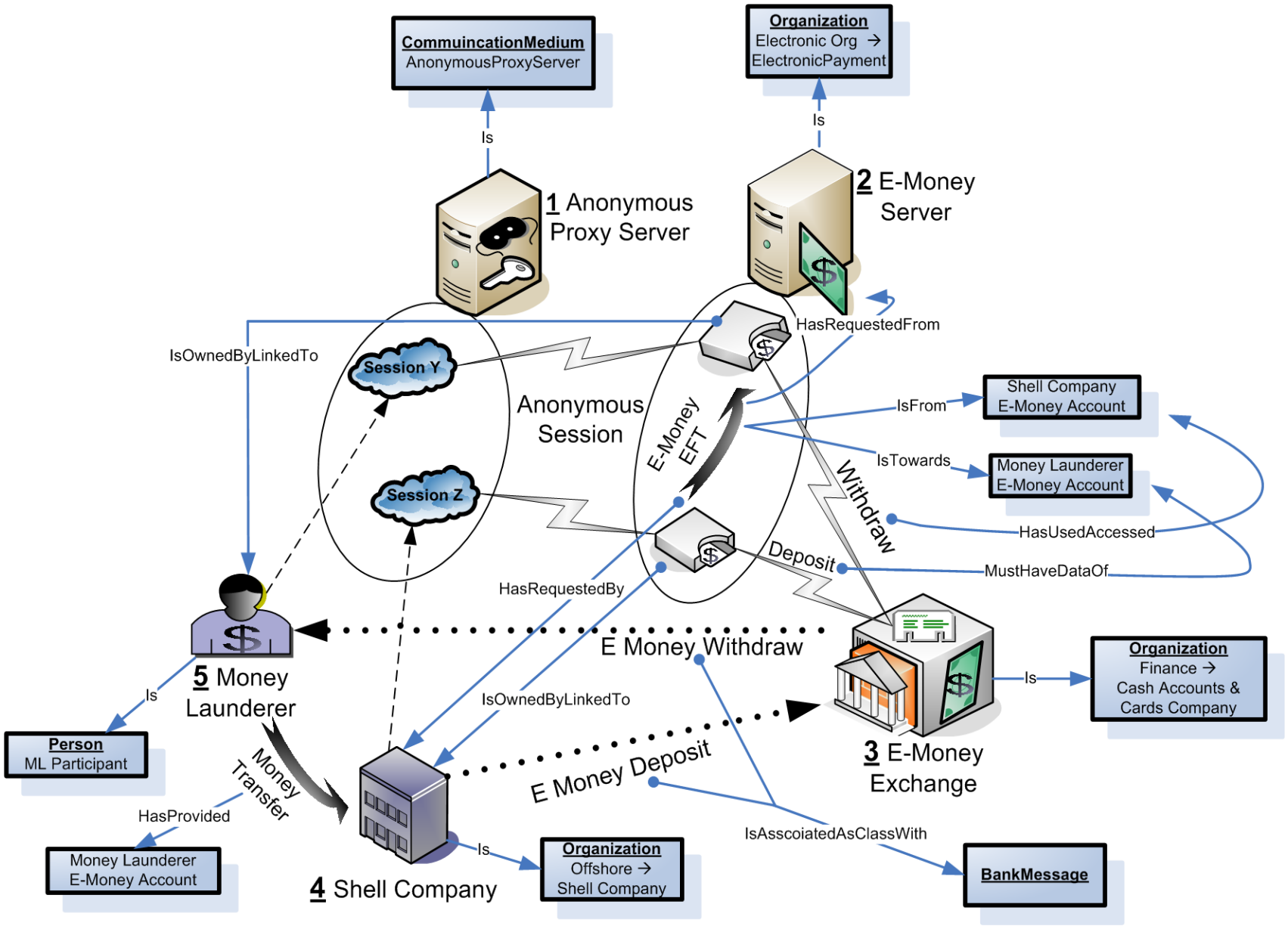
- Messages are linked to one or more entities
- Opening an account is a relation linked to the requester entity and the requested entity, the request message is sent by a person to a bank
- The relation in electronic fund transfer (EFT) is associated with a receiver and a sender entity
- Owning an account is linked to only one entity

Example Construction of Scheme

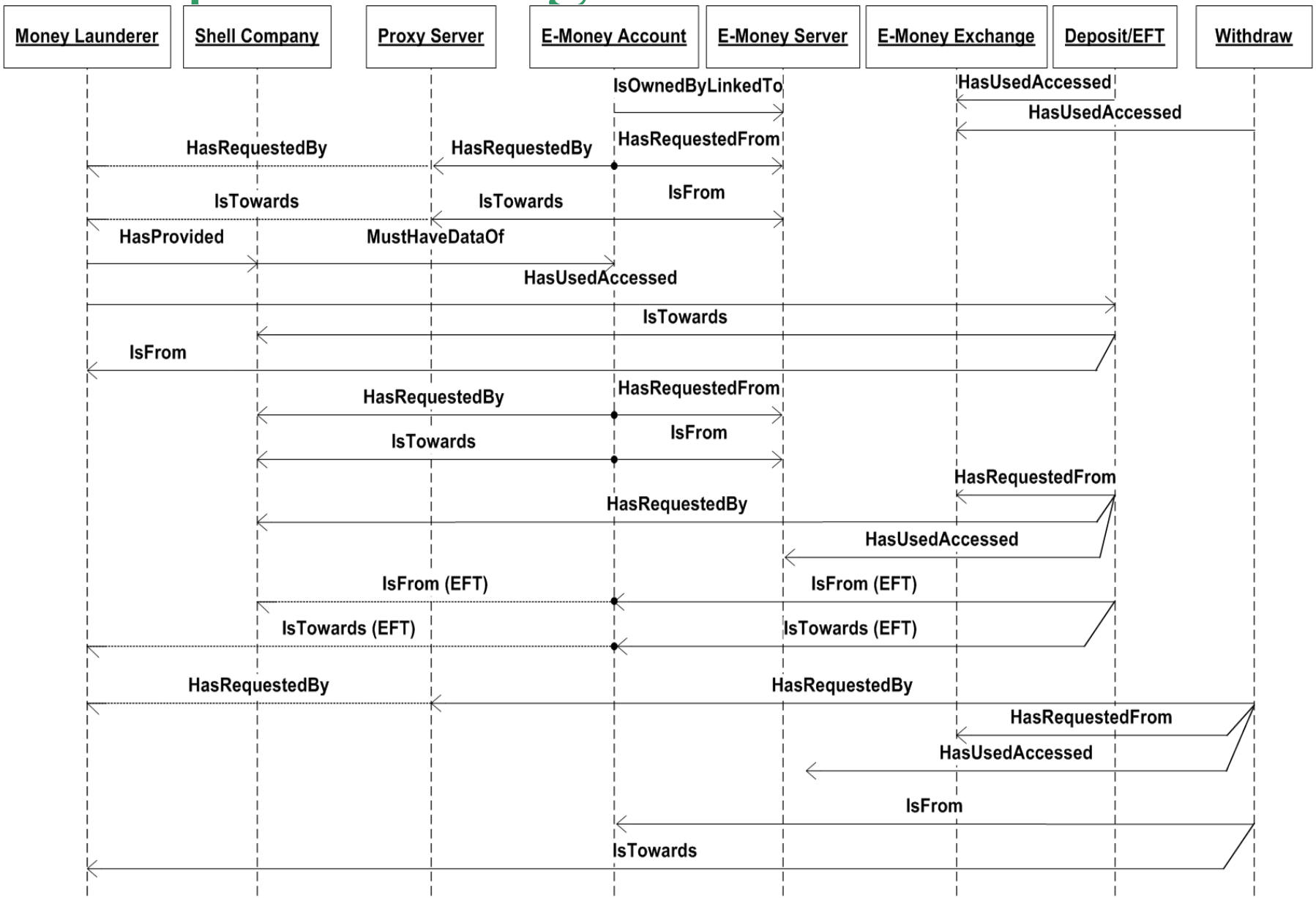
- Create the anonymous account holder services scheme, using the constructs from OWL ontology

- Accounts are created by E-Money servers for customers who wish to be anonymous during the use of E-Money transactions

Example Construction of Scheme



Sequence Diagram of the Scheme



Related Work

- Financial Action Task Force - Annual reports
  - annual reports and statistics of money laundering trends
- FF POIROT - ontology project of European Law
  - detailed ontology of preventive practices of financial fraud
- Viveo - "QUALIFY-IT- XBRL" reporting
  - provide bankers with uniform message content (e.g. Fraud detection, Risk control, Money laundering)

Related Work

- SEPBLAC - "Telematic Reporting Project"
  - automates the reporting process of suspicious transactions
- Interactive Financial Exchange (IFX)
  - standardize the messaging protocol in web-based financial transaction and business-to-business banking
- eXtensible Business Reporting Language (XBRL)
  - A standard used for reporting in the financial industry

Conclusions

- Describe a preliminary OWL ontology to build money laundering schemes
- Provides components to construct MLS
- Future Work:
  - Providing formal semantics for financial transaction data, and facilitating detection of illegal financial schemes
  - Provide a formal evidence generation schema
  - Provide semi automated detection algorithms