Blockchain PSIG Call Notes

*12 August 2021*

# Attendees

* Mike Bennett
* Robert Rencher
* Nick Stavros
* Ian Stavros

**Apologies:** Rob Nehmer

# Agenda

* Updates
  + Questions on IIC, DTC, OMG remit and scope
* Knowledge Articulation

# Meeting Notes

## Updates / Questions

### IIC, Digital Twin Consortium, OMG itself

There are these 2 OMG sister organizations:

* OMG IIC
* Digital Twin Consortium

Both IoT related – how do they interact with each other?

Not clear.

From an industry PoV, there is Industry 4.0, IoT, Digital Twin (maturing rapidly). Digital Threads, infrastructure, sensor.

IIC: doing a Smart City initiative. So some tension about which is doing what. Needs resolution on Threads, Twins, IoT etc.

Also limited resources. Both corporate and OMG. So for participation budgets – where to spend the person hours? Not to mention other bodies like IEEE.

Nick is formulating an email on this question.

#### Activity Streams

The relevant streams are:

* Digital Twins
* Digital Threads

What even is Digital Thread? Still being figured out.

It is too early in the opportunity space to define what these things really are.

Not the same as 'thread' in program / operating system context.

Digital threads: consider a Product Lifecycle system: the thread (verb not object) is the threading of information through systems. Traceability through systems through the lifecycle of the product.

Tracing as distinct from Workflow. Can put those together.

Not Data Flow diagrams.

In the distributed world, data can flow through the system. Data at rest v data in motion.

In distributed, flow of the data is not prescribed in the same way as in conventional computing.

Compare with tracing on an IP network – varies each time.

Other concepts:

* Value
  + Value Thread

As in value creation over time and what information is needed to enable value creation.

This gives a Value Thread.

Traceability of value creation through the product. Through the PLM systems.

In the overall ecosystem, no one company owns the lifecycle of the product.

How well does this align with well established literature on value chains? There is a lot of literature both in academia on economics and in the ontology community for modeling that.

#### DLT Relevance

Are these activities specific to DLT?

Hype Curve: DLT has tended to approach things as though there are no pre-existing sources of knowledge in the things they approach. Is that the case here?

What can we do to be more synergistic?

* Glossaries
* Concept ontologies
* Etc.

Is there value in what this PSIG can do in terms of locking down some of these concepts - via the VCoI approach to contextual definition of terms versus ontology-based concepts?

**Q for this PSIG:** What is the scope of concepts we should aim to represent in a concept ontology and associated vocabulary?

## Concepts Arcticulation

### VCoI Approach

Word (W) means Concept (C) in Context X.

Concept: Concept library;

Concept Library = an ontology. Not an OWL application ontology but an ontology of the real things in the world.

Like e.g. 'Currency'

Then the definitions go against the Concept NOT the word / term.

### DLT Terms and Concepts

e.g. the DLT context for the meaning of e.g.

* Currency
* Oracle
* Contract
* Smart
* Exchange
* Wallet
* Ledger

All of these words have their own meaning in DLT.

Context (X) = the DLT Community. Blockchain etc.

Context: DLT along or DIDO as a whole (e.g. IPFS) – no?

Some of the usages of words in e.g. IPFS are starting to be redefined to point to the same concepts as in the Blockchain world, e.g. 'Ledger' and potentially others.

Originally IPFS used Journal, now uses Ledger, for the same Concept (C)

Journal in disk parlance: Mac has a Journal disk; tracks the deltas.

IPFS is a Unix based file system

So this notion of Ledger / Journal is not quite the same sense as in DLT (broader or narrower)

### Transaction Meaning

Journal Entry – like a Transform

DLT – the nearest equivalent is 'Transaction' or (e.g. IOTA) 'Message'.

Another word:

* Transaction
  + Meaning 1: a post to a 'Ledger' see above
  + Meaning 2: an exchange of commitments or benefits / e.g. goods, money, between two entities
  + Meaning 3: in accounting: a post to an accounting Ledger
    - More correctly a 'transaction' creates a 'posting' as the concept above is a Posting.
    - What then is Transaction?
      * E.g. the more abstract concept that is then posted OR
      * The two entries in a double entry
      * The agreement for the Meaning 2 transaction (from that party's perspective)

Meaning 3 is similar to but not the same as Meaning 1. Meaning 1 is defined by analogy to Meaning 3 but is not the same (since the 'Ledger' is not the same thing).

Sometimes these seem the same but the context is different.

### SKOS Broader and Narrower assertions

SKOS lets you define broader and narrower (not limited to Generalization)

Extensions to SKOS for different kinds of broader and narrower – both SKOS recommended extensions and our own work (e.g. from the Open Financial Data Group) on these.

Concept ontology – gets to abstractions. These often flush out common linguistic roots.

### Term: Ledger

Ledger in DLT is a modern equivalent of how an older version of a word gets reused.

Ledger: 2 meanings

* Accounting ledger
* DLT ledger (data record)

Don't have a word for the abstraction of which these 2 are refinements. So there is a more general thing of which these are each a kind.

### Back to Transaction Meanings

**Actually:** See correction above on Transaction v Posting in accounting.

So Transaction is really Meaning 2 (exchange between 2 people)

Can have an inventory posting v a financial posting. Increment and decrement.

So then:

* Concept 1: DLT 'Transaction' or 'message' posted to a DLT 'Ledger'
* Concept 2: Transaction in economics etc.
* Concept 3: Posting (in Accounting)
  + Is analogous to Concept 1.

So we still have the missing / unlabelled abstraction:

* That which is the posting of some new data record to some information record structure
  + Sub-class 1: the record structure is a DLT 'Ledger' e.g. a Blockchain, DAG
  + Sub-class 2: the record structure is a ledger in a double entry ledger accounts system

This is where the definition belongs but there is no word mapped to it.

The ontology has the 2 sub classes above

One of these has the word 'transaction' associated with it (context = DLT)

One of these has the word 'posting' associated with it. Context = accounting

With a (loose) synonym of Transaction.

These 2 specialized sub-classes are differentiated by

* The nature of the record that is added to (the defining characteristic for the concept)
* The process involved

### Supply Chain

Applying this to another context (supply chain):

Broader concepts in play:

* Value chain
* Value
* Chain
* Supplier / consumer
  + Business supplier / consumer
  + Individual supplier / consumer

For Finance or Blockchain or Retail or elsewhere?

Does OMG even have a TF that deals directly with supply chain?

- don't think so

Then

OMG-related orgs: digital twin consortium – IoT related variants of more general notions in supply chain, manufacturing, cities, transportation, and of course industrial / petrochemical etc.

### Concept: Twins

SCADA + e.g. matrix display panels – are a kind of analog twin. So digital twins are nothing new.

There are two directions in which the notion of a 'twin' holds:

* Twin 1: A Digital representation of a physical object
* Twin 2: a physical object as a reflection of a pre-existing design (digital object precedes the physical object)

So these concepts both need to be considered.

If we define the relationships between a physical and a digital object.

Then: the representation of the physical objects are not all reflected in a Digital Twin – so you have to account for those other things in the world.

Also on this, DT might be the twin of a sensor reading, or may be the twin of the overall physical system of which those sensors are sensing something.

On the latter they will be a relationship with e.g. time lag and other issues (tolerance, accuracy etc.)

e.g. if you change the content of a vessel or pipeline, the same sensors won't tell you the same thing about the real thing.

So:

* Understanding the environment of the physical object is just as important as understanding the object itself
* The ontology that underlies some digital twin must account for many dimensions of the situation in reality

That can't be anything other than an ontology of the thing being 'twinned' in this Twin 1 sense.

Example we have learned the environmental factors that affect the performance of an aircraft engine. Then the engine manufacturers need to understand the environment of the aircraft – so they can figure out dynamic maintenance and performance so as to minimize the cost of thrust provision to the airline purchasing the thrust.

Also in design of future engines – so back to Meaning 2 of Twin i.e. Design => actuality.