**DRAFT:**

Distributed Integration and Consistency for Knowledge Semantic Enhanced Applications.

**Description**

Distributed systems / micro services access to shared data. Shared data consistency / inference. Ontology matching. Integration (EAI / ESB). Introduction of new features / products integrating over existing (linked) data with Semantic capabilities and enhancements.

Distributed Knowledge Base. Functional Syndicated Application Integration Framework. Plug existing backends (applications / datasources / services) via Connector(s) in an EAI / ESB fashion. Provide semantic augmentation of learned applications metadata (data / schema / behavior).

**Purpose**

Objectives: Develop Protocol (APIs) to facilitate Enterprise Application Integration (EAI) by means of Semantic technologies and Machine Learning. Ontology matching driven data, schema, behavior inference / aggregation / matching. Reasoning and learning over different consolidated backends alignments.

Distributed P2P (Blockchain) approach of data synchronization between peers for ease of deployment patterns election and datasources integration (APIs, microservices, etc.).  
  
Data alignment:  
  
Determine if two instances (example: records) of two different backends or services refer to the same entity (Customers : John D. / Employees : John Doe).  
  
Schema alignment:  
  
Determine, for example, meaning and equivalences between diverse (aggregated / composite) schemas (equivalent classes, equivalent attributes, equivalent roles).  
  
Behavior alignment:  
  
Determine meaning and equivalences between (aggregated / composite) behavior contexts and behavior contexts invocations / interactions (Appointment / Interview, anAppointment / anInterview. Behavior flows aggregated from backends / services learning).  
  
Layered models semantic infrastructure for integration of heterogeneous backends (meta models).

Alignments Augmentations:  
  
Activation: type inference : classification (determine class / metaclass / roles for entity attributes and values).  
  
Activation infer attributes / relations : clustering (from multiple occurrences of same entity in diverse data sources).  
  
Aggregation: infer roles in contexts: regression (Person class in Employment interaction : Developer role).  
  
Integration of addressable resources. Reactive I/O (sync back ends). Content type driven semantic augmentation / annotations.  
  
Integrated view. Navigate contexts, data, interactions. APIs. Dimensional views annotations (analysis / mining).  
  
Augmentation of distributed resources. Annotations (Semantic / ML). API for resource / schema / interactions exploration / protocol for message based API "dialogs" execution. HAL (Hypertext Application Language), OData (REST) like interfaces.  
  
Example: Google Drive / Google Knowledge Graph APIs Augmented with ML / Semantic intelligence tailored for specific domains / application kinds.

**Features**

Graph encoding of data / schema / behavior. Dimensional / Grammar annotations. MetaGraph: augmentation / transforms (Messages). Features.

Parallel distributed graphs models augmentation / transforms synchronization (Messages). Event sourcing (distributed inferences). P2P / DIDs.

Augmentation. Ontology matching. Hypermedia augmentation protocol. Browser / Client APIs.

URIs API for annotating network retrievable resources metadata. Content type / model driven augmentations / activations (models features / outputs). Subject attributes / values. Occurrences contexts / roles. Paths, pointers, locators. Example: annotate document URIs (parts, sections, mentions), annotate images URI (whole image description, coords: classes, individuals), annotate DB, table, row, column, value URIs, annotate / describe service / APIs URIs. Hypermedia protocol composable with other (described / annotated) APIs / resources. Example: Drive APIs.

**Description**

**Analysis (mission)**

Develop Protocol (APIs) to facilitate Enterprise Application Integration (EAI) by means of Semantic technologies and Machine Learning. Ontology matching driven data, schema, behavior inference / aggregation / matching. Reasoning and learning over different consolidated backends alignments for applications interoperation

**Declarative Model / Domain driven**

**Design (vision)**

Domain Business Modelling. Integration. Syndication. General purpose business domains upper ontologies for ad-hoc application building overs existing domains. Domains: Use cases “problem spaces" domain translation / exchange / integration. Hypermedia Activation and Addressing. Link extended content types resources elements / parts with other resources addressed elements in a dimensional fashion.

Domains: Use cases domains abstractions (problem "spaces" / ontologies) enabling domain translation / exchanges / integration.

Semantic components:

BI / EAI smart dashboards / reports / workflows / process / activity / indicators inference / prediction / execution. Abstract upper ontology application models. QA, polls, learning, profiles, guided task wizards / editors. Goal. Purpose. Forms. Templates. Model context to fulfill (roles / rels).

Hypermedia Use Cases (Ontology Levels). Integration / Augmentation / Alignment / Annotation of distributed resources. (Augmented) Content type driven. Encoding / Addressing (links / browse / parts / rels / roles). Microformats (embedding). Wiki like abstract representation (indexes).

Solution

Integration by Augmentation.

Integration by Extension.

Declarative Application Design.

Domain Business Modelling. Integration. Syndication. General purpose business domains upper ontologies for ad-hoc application building overs existing domains.

Develop Protocol (APIs) to facilitate Enterprise Application Integration (EAI) by means of Semantic technologies and Machine Learning. Ontology matching driven data, schema, behavior inference / aggregation / matching. Reasoning and learning over different consolidated backends alignments for applications interoperation.  
  
Distributed P2P (Blockchain DIDs) approach of data synchronization between peers for ease of deployment patterns election and datasources integration (client APIs, microservices, etc.).

Integration by Augmention: sources / back ends. Model I/O materialized in source (plugged) application / services backends. Framework inferences augment original (source) applications and services.

Integration by Extension: Extended functionalities data / schema / behavior exposed as services external to source (plugged) applications. Sync (Augment / link) sources. Declaratively stated via Model descriptions. Discoverable, browseable (HAL / REST).

Declarative Application Design.

Features / Approach:

Data / Schema / Behavior Abstraction:

Source inputs of Connector(s) (plugged backends, applications, datasources) and data comming from declaratively stated Model interactions (Message IO) is rendered in a layered Model of Statement(s), each one representing: Input, Data (instance: Statement, class: Entity), Schema (instance: Kind / Role, class: Class) and Behavior (instance: Flow, class: Behavior) layers.

Layers are implemented as an RDF Quads hierarchy aggregating each one on top of another. The idea is that aggregating Data according some criteria one could enable us to infer the Schema that those Data belongs to and that aggregating Schema and Data one could enable us to infer the Behavior (operations) that correspond to the Data manipulation in that corresponding Behavior layer class / instance.

Several types of Model(s) exists: Facets, each one preserving this layered structure. Model Facets have corresponding Layers and those layers are populated by corresponding Data, Schema, Behavior conforming Ontology Levels for each Facet. Facets abstract Model(s) inputs regarding this aspects: Source (Functional) Data, Semiotic and Dimensional Model Facets.

Facets are also populated in what are called Ontology Levels, which are Facet data, schema, behavior statements aggregated from feedback from the data, schema and behavior corresponding instance layers of the Facet Models themselves again into the input layer thus allowing for further describe upper ontology abstractions. These upper abstraction may be grouped into: Backend / Source (Data : plain inputs), Grammar / Session / Context (Schema : schema layer feedback inputs) and Interaction (Behavior : behavior layer feedback inputs).

The idea is to infer Schema (classes and instance of classes / relations) operating over Data layer. Then, by aggregating Data and Schema, infer Behavior (classes and instances of operations / functions). This Aggregation, together with Alignment and type Activation mechanisms comprehend the Model core Augmentations.

Protocol (deployment):

Functional "Dialog" Augmentation.

Semantics Protocol (Dataflow Message).

Applications:

Hypermedia Dataflow Activation (reactive / event driven knowledge based contents). Dataflow layers.

Distributed: Consistency. Inference of distributed state. Event sourcing. Trust. Reconciliation.

Connected application sources (backends: EAI / ESB) and declaratively stated application models.

**Domains alignment / matching**

**Sources augmentation / data virtualization**

**Implementation**

Deployment:

Container: Forms / Flow DCI / MVC Facade APIs. Resource (REST) Monad and Context Functors (reified Message resources). Protocol (Connector / Client Adapters).

Low level Resource API.

DOM / OGM rendering / activation APIs.

Model Context DOM members (layers): order (prev, next, parents, children) in axis. Metaclass, class, instance, occurrence (roles / rels in contexts). Functors / DOM events API: request reified Message resource in "possible" (domain, mapping, range) context. Bindings (subscriptions).

Trust. Consistency. Event sourcing. Inferencing (of distributed state). Reconciliation. Certify Entity / Subject Identity. Class / instance alignment (matching).

Distributed systems / micro services access to shared data. Shared distributed data consistency / inference. Ontology matching. Integration (EAI / ESB). Introduction of new features / products integrating over existing (linked) data with Semantic capabilities and semantic enhancements.

Distributed Knowledge Base. Functional Syndicated Application Integration Framework. Plug existing backends (applications / datasources / services) via Connector(s) in an EAI / ESB fashion. Provide semantic augmentation of learned applications metadata (data / schema / behavior).

Primitives / meta / upper resources. Grammars: patterns / signatures. Context Kinds (Message / Augmentation)

Kinds: hierarchies. Semiotic / Sets DM / RM encoding.

Layers. Streams. Events. Augmentation.

Resource Monad (REST). Addressable Interface. DOM (roles, rels, members, etc.) Functors.

Form / Flow Facades

Message Functor. LHS: domain: source / RHS: range: dest. Augmentation / Event pattern declaration. Mapping encoding. To do.

Model Context hierarchy (DOM). Layers CSPOs classes DOM: type / context, occurrence, attribute, value, prev, next, parent, children, etc. members. Functors.

Message: Augmentation (event). declaration.

Core: primitive / meta / upper resources. Reified layers contexts. Order (dataflow) encoding.

Core: Augmentation. Aggregation (pragmatics, roles). Alignment (semantics, rels). Activation (levels: schema, grammar, syntax of roles / rels).

Core Contexts. Layers. Augmentations.

Domains (Context DOM instances).

Dataflow: Events I/O. Message augmentations. Connector / Client / Adapter.

Message Mapping Augmentation perform. XML / XSL over RDF (cons) lists. DOM members resolution (functors) / embedding.

Aggregation / Matching (Model / Entity, Behavior / Measure). OntResource embedding (contextual functor).

Events I/O "fans in/out" model layers performing Augmentation Activation.

Graph key / value (properties) encoding. Map Reduce event flow tasks.

## Features

### Ontology matching

Determine whether two identifiers refer to the same entity, whether two relations are the same and which results corresponds to instances of the same actions.

ToDo.

### Augmentation Protocol

Functional declarative way of stating Augmentation Transforms over Messages / Resources matching / populated by input Templates performing output Mappings Augmentation reflecting input, model and behavior state.

ToDo.

### Reactive / Event Driven

Message based Augmentation Events Dataflow. Augmentation Mapping Dataflow allowing to embed dynamic state in Model entities (including Mappings Augmentations themselves).

ToDo.

**Deployment Use Case: Goals Application**

Integration by Augmentation:

Model I/O materialized in source (plugged) application / services backends. Framework inferences augment original (source) applications and serviced.

Integration by Extension:

Extended functionalities data / schema / behavior exposed as services external to source (plugged) applications. Sync (Augment / link) sources. Declaratively stated via Model descriptions. Discoverable, browseable (HAL / REST).

Declarative Application Design.

Semantic components.

BI / EAI smart dashboards / reports / workflows / process / activity / indicators inference / prediction / execution. Abstract upper ontology application models. QA, polls, learning, profiles, guided task wizards / editors. Goal. Purpose. Forms. Templates. Model context to fulfill (roles / rels).

Distributed systems / micro services access to shared data. Shared data consistency. Ontology matching. Integration (EAI / ESB). Introduction of new features / products integrating over existing (linked) data with Semantic capabilities and enhancements. Domains: use cases “problem "spaces" (distributed domain translation / exchanges / integration).

First, I'll try to describe a "problem" (problem "spaces" in this case) and how a Purpose driven user Community achieves its Goal(s) by means of Goods, Products and Needs satisfaction (ontology levels: from abstract upper ontology to user gesture command in user interface / service invocation).  
  
The problem is to organize interdisciplinary (multiple domains) Task(s) in a Purpose fulfilment network with Actors, Contexts and Roles (with attributes and values). Problem spaces (domains) are declaratively stated by DCI[1] design pattern: Data / Context / Interaction use cases definitions and instances.  
  
Collaborative Federated Actor network complying determinate Profile(s) satisfying specific Product / Good / Need abstraction playing determinate Role in use cases Context.  
  
Domain Translation between business domains, example: orders, delivery, invoicing (micro) services Model instances are the means by which distributed disparate data, schema and behavior of different sources (applications, services) integration could be performed by means of Semantic Intelligence and Augmentation Protocol(s).  
  
A domain can be defined in terms of a set of actions / tasks with the Purpose of satisfying some Goal solving the Need for a Good producing / gathering a Product. Ontology. Purpose as Goal “class”.

The principal focus is to deploy a (social) Collaborative peer (Actor) network for which entities and individuals develop Profile(s) which acquaint them with Purpose resolution capabilities. Then, according peer’s specific needs (domain Goals) the application orchestrates interactions needed for Product(s) Task(s) accomplishment.

Solution

Hypermedia Use Cases (Ontology Levels). Integration by Augmentation: Aggregation / Alignment / Activation Annotation of distributed resources. Augmented Content types driven. Encoding / Addressing (links / browse / parts / rels / roles). Microformats (embedding). Wiki like abstract interfaces / representation (indexes).

Ontology matching (Data, Schema, Behavior alignments):

Data alignment:  
  
Determine if two instances (example: database records) of two different backends or services refer to the same entity / database row (Customers : John D. / Employees : John Doe).  
  
Schema alignment:  
  
Determine, for example, meaning and equivalences between diverse (aggregated / composite) schemas (equivalent classes / tables, equivalent attributes / columns, equivalent roles / relations).  
  
Behavior alignment:  
  
Determine meaning and equivalences between (aggregated / composite) behavior contexts and behavior contexts invocations / interactions (Appointment / Interview, anAppointment / anInterview. Behavior flows aggregated from backends / services learning).

Augmentation:

Augmentations: aggregate / align / activate (classify) sources of ontology matched data / schema / behavior enabling semantic layers interoperation.

Aggregation: Infer input data streams data, schema, behavior class / instance context layers.

Alignment: Infer layer missing / deducible attributes and values.

Activation: Infer layer CSPO Kind / Roles. Basic type system.

The idea is to infer Schema (classes and instance of classes / relations) operating over Data layer. Then, by aggregating Data and Schema, infer Behavior (classes and instances of operations / functions). This Aggregation, together with Alignment and type Activation mechanisms comprehend the Model core Augmentations.

Reactive Event driven Model Representations.

Purpose driven hypermedia activation:

Protocols / Services / Clients: Context interaction sessions (state flows). Content type activation. Messages / gestures. Rules (commands / verbs). Browser referring context (Work, Peter, Employee).

Approach

Distributed P2P (Blockchain based) approach of semantic data persistence and synchronization between peers for ease of deployment patterns election and data sources integration (client APIs, microservices, etc.). Layered models semantic infrastructure for integration of heterogeneous backends (meta models).

Source inputs of Connector(s) (plugged backends, applications, datasources) and data coming from declaratively stated Model events interactions (Message IO) is rendered in a layered Model of RDF Quad Statement(s), each one aggregating input data into a Meta Model for further functional facet abstractions into data / schema / behavior layers, dimensional layers and semiotic layers.

Integration by augmentation: sources / back ends. Model I/O materialized in source (plugged) application / services backends. Framework inferences augment original (source) applications and services.

Integration by Extension: Extended functionalities data / schema / behavior exposed as services external to source (plugged) applications. Sync (Augment / link) sources. Declaratively stated via Model descriptions. Discoverable, browseable (HAL / REST).

Declarative Application Design.

Trust. Consistency. Event sourcing. Inferencing (of distributed state). Reconciliation.

Certify Entity / Subject Identity. Class / instance alignment (matching).

Integration: Augment sources / back ends. Model I/O materialized in source (plugged) application / services back ends.

Integration: Extension. Extended functionalities data / schema / behavior exposed as services external to source (plugged) applications. Sync (Augment). Declaratively stated via Model descriptions. Discoverable, browseable (HAL / REST).

Integration of addressable resources. Reactive I/O (sync back ends). Content type driven semantic augmentation / annotations. Augmentation of distributed resources. Annotations (Semantic / ML). API for resource / schema / interactions exploration / protocol for message based API "dialogs" execution. HAL (Hypermedia Application Language), OData (REST) like interfaces.

Hypermedia Activation. Addressing. Link extended content types resources elements / parts with other resources addressed elements. Domains: data, schema and behavior of business applications (ERP, CRM, BI, SCM, HMS, etc.) addressable information resources inference and resolution. General purpose business domains problem resolution / tasks, goals accomplishment helper tools. Syndication (contextual hypermedia activation): QA. Polls. Learning. Profiles. Guided task (wizards), guided editors: Context: Goal / Purpose.

URIs API for annotating network retrievable resources metadata. Content type / model driven augmentations / activations (models features / outputs). Subject attributes / values. Occurrences contexts / roles. Paths, pointers, locators. Example: annotate document URIs (parts, sections, mentions), annotate images URI (whole image description, coords: classes, individuals), annotate DB, table, row, column, value URIs, annotate / describe service / APIs URIs. Hypermedia protocol composable with other (described / annotated) APIs / resources. Example: Drive APIs.

Graph encoding of data / schema / behavior. Dimensional / Grammar annotations. MetaGraph: augmentation / transforms (Messages). Features.

Parallel distributed graphs models augmentation / transforms synchronization (Messages). Event sourcing (distributed inferences). P2P / DIDs.

Augmentation. Ontology matching. Hypermedia augmentation protocol. Browser / Client APIs.

**Architecture**

**Model. Layers. Aggregation**

Encoding. Model layers:

URIResource context: CSPO form. RESTful / HAL monad: HTTP category functors.

OntResource context: (Resource, Occurrence, Attribute, Value) form. Aligned (matched) URIResource(s).

Resource context: OntResource (aligned / matched URIResource) occurrences in reified Role in Statement.

(URIResource, URIResource, URIResource, URIResource);

(OntResource, URIResource, URIResource, URIResource);

Aggregated URIResource OntResource attributes / values (recursion to attributes / values OntResource).

(Transform, OntResource, URIResource, URIResource);

(Mapping, Transform, OntResource, URIResource);

(Template, Mapping, Transform, OntResource);

(Augmentation, Template, Mapping, Transform);

(Message, Augmentation, Template, Mapping);

(Context, Message, Augmentation, Template);

Model.

(Resource, Context, Message, Augmentation);

(Role, Resource, Context, Message);

Reified CSPO / Resource, Occurrence, Attribute, Value Resource role types in Resource occurrence / context.

(Statement, Role, Resource, Context);

(Entity, Statement, Role, Resource);

Aggregated "subject" occurrences of Resource in Role in Statement(s).

(Class, Entity, Statement, Role);

Aggregated Entity Role occurrences type (attributes).

(Kind, Class, Entity, Statement);

Aggregated kinds / roles ("interfaces") of Class occurrences.

(Flow, Kind, Class, Entity);

Action "instance". Entity of Class performs role (Kind) of Behavior Flow.

(Behavior, Flow, Class, Kind);

Action "class". Statements: propositions, prescriptions, rules, productions. DCI / Link Grammar. Context satisfaction (rules).

(Measure, Behavior, Flow, Class);

(Unit, Measure, Behavior, Flow);

(Dimension, Unit, Measure, Behavior);

Order.

**Dataflow:**

Events: Monads (IDs Contexts hierarchy instances), Functors (layers classes instances reifying model classes / domain instances from facets / levels). Augmentation: materialized Transform. Flow: Mapping possible Transforms. Browse / Apply (generic flows?). Dimensional.

Classes: Layers monads Contexts cllass hierarchy. Inputs resolves from wrapper containers to next layer occurrences (map forward), occurrences contexts collects matching result graph (reduce backwards). Map / Reduce: Graph key / value / properties encoding.

Functors: Model / Domain Augmentations (Forms / Flows). MDM. Provenance. Versions (time, dimensional / semiotic / functional axes: location, language, events, types, roles, behaviors, other rels).

Flows: Addressable interactions (Model signatures reactive bindings).

Flows: Explain URI, Resource, Layers, Model, Kinds, etc. APIs. Meta Resources. Meta Model. Hierarchies. Order. Iteration. Flows.

Message (Form / Flow) / Resource: Meta Model parent classes? Specification / Protocol. Signatures: Mappings Context Kinds. Possible Flows (Form), actual Augmentation (Flow).

Basic hypermedia browse / CRUD (HTTP verbs) bound Message functors compatible for all Resources (REST).

Resolve Message / dialog (CRUD) semantics via MetaGraph driven transforms (data / schema / behavior augmentation: dialogs).

Messages: CRUD / Domain  Invocation semantics. Flow grammars / verbs. Dialog. Prompts. Inputs are aligned into Message and are applied to Mapping Template and rendered by Mapping Transform (class extension for Augmentation class intention).

Outputs are resolved by pattern matching with Transform, Message and existing Model data. Augmentations may play the role of “placeholder” Resource(s) which are bound to context aware Augmentations thus rendering Transforms into Model entities (including Mapping Augmentations themselves).

Component. Services. Protocols. Archetype Reactive Functional (Monads) Component APIs. Reactive: Connector / Client Endpoints: Consumer / Producer / Processor (Service / Model) inputs / outputs handlers (formats / protocols parsing / matching / alignment into IDs / Contexts. Reactive Augmentations: fire possible dataflows).

Environment: Models events abstraction (subscribe / augment / publish) Connector / Model / Client Augmentations IO.

Encoding: XML / XSL / Template Scripts (functional runat: peer dialogs / reactive callbacks). Mappings declarations / encodings (primitives, wildcards, variables, placeholders templates: actual / result of, possible).

Streams: URIs, Resource, Statement, CSPO Roles, Kinds. Dataflow: index / signatures dispatch, reactive.

Formalization: Functional / Object APIs. Reference / Data model. Sets, categories, models. SortedSet (hierarchical structures).

Kinds, Signatures. Contents. Contextual metadata. Lattices. Roles / Sets (bitstring cuads). Definitions (elements). SortedSet (hierarchical structures). Key / Value graph encoding. Map Reduce. Flows: Mapping declarations / assertions (possible flows).

Operations. Rules. Categories. Groups.

Semantic resolution: Query Resource(s) satisfying “criteria” (i.e.: Object(s) for predicate / Augmentation Mappings Forms / Flows) IDs by IDs resolution pattern: (Message applicable signatures : resolution result: Transform).

Query Resources by role in context.

Query Resources by attributes / values.

Query Resources by identity / type.

Streams. Subject Kind: Subjects stream. Object Kind: Objects stream. Predicate / Context Kind: Flow Signature. Stream (filter SO kinds).

Context Kind: Functional stream of Context Statements (Occurrences).

Subject Kind: Functional stream of Subject Statements (Occurrences).

Predicate Kind: Functional stream of Predicate Statements (Occurrences).

Object Kind: Functional stream of Object Statements (Occurrences).

Messages: Dataflow Template matches signatures (Session level, enrichs Message with Model / Dialog prompts / contents alignments). Augmentation Functor applied over Message contents (Interaction level). Transform matching output signature emits (Session level, populated / prompts) output Message (parse Transform).

Messages: Dataflow. Subscriptions. Reactive Model. Dynamic subscriptions / bindings. Events publish / subscribe between Model Resource. Mappings.

Mappings: Declarative IO signatures: Context Kinds Templates / Transforms. Subscriptions / routes. Dataflow.

Interactions declarations: signature definitions (Template / Transform contexts). Interaction instances: Exchanges (Augmentations, Message, Model context / Mapping bindings / matchings / performance). Contexts / Exchanges: Meta Model / Levels event driven source Augmentation events declarations (populating Facets / Layers / Levels).

Facets:

Models have “Facets” which renders the different ways Model data / schema / behavior could be regarded and used for different purposes, from application development to Business Intelligence and Ontology Matching.

Facets are models implemented the same way other models are with Model Resource Contexts and layers and from the same data. Each Facet implements its own Resource URI wrapper (same URIs, ontology matching, provenance of aligned URIs, Facet pivoting). Then, each Facet has its own Model Context Resource class hierarchy having Augmentation / Dataflow functors as Model Resource(s) does.

Functors:

Functors: Meta Model declarations / Context classes / instance by hierarchies: declarative implementations of monadic functors (Levels: Augmentation / Domain Flows). Aggregation type: invocation over each CSPO / Context roles.

Functor applied to context: Aggregation.

Functor applied to subject: Alignment.

Functor applied to predicate: Activation.

Functor applied to object: members traversal.

Functors: Augmentation declaration: Meta Model definitions (Context class / instances). Message: dataflow matches Template signatures: interactions. Apply Augmentation Functors over Message contents (interactions enrich Message with Models contents: ontology matching / Levels / Facets). Materialize / emit dialog / prompts Message (enrich Message from Models / reactive IO events / Mapping Transform).

**RDF CSPO Quads store backend. RDFS / OWL inference**

Backend:

Messages: Saga Activation. Interaction Model (Meta Model). Aggregated (Interaction) Meta Model interactions (performed / inferred / possible) emitted as Model event Messages (Saga pattern). Mappings.

Messages: Events IO / Persistence: Saga Activation / Passivation populating Node local Quad store / persisting peers via DIDs (inference enabled distributed consistency) semantic (resolvable / discoverable) identifiers.

Messages: Dataflow Template matches signatures (Session level, enrichs Message with Model / Dialog prompts / content alignments). Augmentation Functor applied over Message contents (Interaction level). Transform matching output signature emits (Session level, populated / prompts) output Message.

Functor applied to context: Aggregation.

Functor applied to subject: Alignment.

Functor applied to predicate: Activation.

Functor applied to object: members traversal.

Deployable entity: Node. Publish / Subscribe signatures (interface). Augmentation / Mappings Interaction Model (Runtime). Models, Facets, Services, etc. ToDo.

Grammars / Levels / Discovery (Model Forms / Flows Specifications / Protocols): Definitions: Quads, contexts, Kinds, Grammar / upper ontology as level / aggregation relationship. From data to dialog gestures. Augmentations aggregation, alignment, activation.

Core API: Model, URI, Resource, Role, Statement, Kind.

Quads Context / Object: class by intension / extension. Transform matches Context signature, filters by Object(s) extension. Resource(s) specification.

Reified Kind(s) / Meta Model. IDs, (Ont)Resource, Statement, Kind (reifying class / instances) contexts / occurrences / attributes / values. Encoding. Message dispatch, event bus routes. URIs / IDs mappings. Resource set specification (SortedSet hierarchies). resolution. Resolve concrete resources, Message expansion. Resolve Message / dialog (CRUD) semantics.

Deployment / Use Cases:

Purpose driven hypermedia activation:

Protocols / Services / Clients: Context interaction sessions (state flows).

Augmented Semantic Content type activation. Messages / gestures. Rules (commands / verbs).

Browser referring context (Work, Peter, Employee).

Resource URIs specialized implementations for different connectors / endpoints and content types (DB / OData, REST / HAL, etc.). Feature Resources backends (i.e.: URI for DB interaction).

Purposes: Metamodel declarative goal statement. Fulfill flows (templates / forms: Messages).

Goal: P2P service that connects to services / endpoints (DB, REST, etc.), homogenizes them and exposes an API by which (augmented) knowledge of an stated entity is returned in response (protocol that entails queries / CRUD, object navigation in message / session state contexts). Peer shares / syncs with other peers.

Goal: Intermediate API (HAL for example) aggregating previous objects knowledge (DCI, DOM, OGM, MVC)

Goal: Semantic Browser. Homogenize diverse domains. Query examples. Search session history. Referrer semantics. Collected items in goals roles. Create session purpose document. Link to / from any addressable resource in context / role. Annotate source / destination context roles, attributes

Core (upper / onto) Messages: Getters, setters, nav, etc. Domain Messages: raiseSal: setSal(sal \* increment); promotion: setPosition.

Event sourcing / tracking: married -> marriage occurred. Dataflow: Messages hierarchy. Aggregate contexts from coarse to fine grained  transforms (raiseSal -> setAttr, single - marryWith).

Message dispatch, input statements resolve to applicable messages from switch from behavior to data layer invoking async microservice. Message case matching may involve entering and leaving data, schema and behavior paths if aggregated contexts matches more than one message. Visitor.

Message: functor (monadic transform) : Resource<T> -> R, T, R : URIs (hierarchies, models, semantic content types). Available verbs / flows / navigation (browse models, state of application returned from materialized models). Parameterized functions (partial applications) into Messages metamodel resources. Contexts (dataflow). Execution graph.

Alignment Message: Resource -> Statements (attributes, values).

Activation Message: Statement -> Kind, Class.

Aggregation Message: Statement -> Statement (next layer).

Subscriptions declarations / definitions. Applied on streams activations (transforms, executions resource parameterized partial contexts).

Messages metamodel: functor declarations partially defined over metamodels resource (T) defining transforms into (R) over appplication (flatMap) over / into (S). Messages inferred / aligned, activated, aggregated according base message transofrms resources. Messages inferred from models / layers. TBD.

R : Model Context hierarchy.

Functors <T, R> -> Resource<R>;

Form / Template describing (reified as a Resource in a context model) declaratively subscriptions and actual exchange capabilities (datflow). Mappings, Transforms.

Processor which acts upon Resource events. Materialize results. Specify declaratively augmentations by means of messages.

Upper onto / domain aggregated messages.

Event bus: P2P deployment.

Messages: Monadic applicables over Resource (flatMap). Matches Augmentation Forms / Flows.

Base HTTP / Browse (REST) Messages. Custom Messages.

Service URIs (reactive clients / connectors):

Base core service URIs (index, naming, registry). URI subclasses implementing / wrapping state for Resource monads offering protocols / addressing / content types / representations facades for services: DBs, WS (REST, SOAP, SPARQL), ML (predictions), etc.

Hierarchies: layered quad statements are represented by a class hierarchy which root is the Resource<T> monad. There is a subclass relationship between each layer implementing class and the one of the next layer (Dynamic Object Model).

Quads in the context role of lower layers represents occurrences of context enclosing layer.

Assert class hierarchies, order relation (temporal, causal, containment, etc.) by attrs / vals, set / superset relations. TBD.

Discovery: All model kinds are browseable / discoverable. Encode behavior in statements / graph: Comparisons, order. Sort. Order (kinds hierarchy?) Pattern matching, iteration, jumps. Discovery: routes / signatures, next event in bus / graph. Dataflow.

Express Augmentation (Alignment, Activation, Aggregation) as Messages / Transforms. Reified Model entity types / roles (CSPO, Kinds, Layers, etc.).

Example: submitting Behavior layer grammar / context "template" initiates "dialog" for fulfill Behavior expanding Message(s) and nested context layer statements (known / resolvable, new behavior / subitems) needed to complete / update full Behavior layers contexts graph.

Augment. Alignment, Activation, Aggregation Message(s) : Resource set specifications (SortedSet).

Dimensional input set model specificatíon (from Statement layer, ordered SPOs: order criteria, comparisons. Kinds / class / occurrence / instance order criteria?). Value, Previous, Distance, Next. Dimension, Unit, Measure, Value (aggregated ordered statements layers).

Populate / align / annotate models with dimensional data. Model input: statements (model resources). Model specification: augment, sort statements. Model specification: specialization of base model layers. Resolve resolution statements order.

**Shared data consistency**

**Distributed Persistence**

**Event sourcing / Saga pattern. CQRS**

**Activation Protocol**

Protocol:

Protocol: Input statements for querying augmented knowledge (Specification Forms / Flows). Browse result model graphs. Input statements encoding queries / commands: grammars, reified message contexts (templates / forms). Browseable models, contexts, interactions (state / content semantic activation). Dataflow according Messages input signatures.

Dataflow embedding: Resources reifying global state. Specifications: Forms, Flows. Augmentation Dataflow: Functional declarative way of stating Augmentation Transforms over Messages / Resources matching / populated by input Templates performing output Mappings Augmentation reflecting input, model and behavior state.

Source / Grammar / Pragma Levels.

Functional / Dimensional / Semantic Facets.

Reactive Entities: Resource, Model, Message, Kind.

Entities: ID (routes), State (ctx / rel pointers, occurrences). Streams, Dataflow (routes / bindings: addressing).

Transforms, Augmentation (functors / mappings).

Dataflow: Message / Model /

Augmentation / Model / Message.

Meta Model (Interaction Layer Augmentation Aggregated Model declarations: facets, levels, layer).

Meta Model Interaction Layer (Augmentation: aggregated Source, Grammar, Pragma Levels Mappings) Mappings render Data, Schema, Behavior Resources for Functional, Dimensional, Semantic Meta Model Facets layers.

Entity Kind aggregation (Statements) procedure example. Encode into Quads. Alignment and Activation Quads encoding.

Context / Resource type hierarchy design pattern: plain class hierarchy,  parameterized class on Resource(s) / URIs, monads, metaclass, others. Actor / context / role (Statement CSPO position / Meta Resource). Reified Model types. DOM. DOM, Actor / Role / Context, OGM APIs.

Augmentation: transform algorithm (basic operation).

Encoding: Model (Resource).

Model: RDF Backend.

URIs Services: API for plugging whatever connector may be implemented for behaving in a reactive message oriented fashion (back ends).

Resource: Abstracts (wraps) URIs Services in a functional API (Resource streams). DOM, Actor / Context / Role (Meta Resources).

Augmentation: Parse Message (event: context quad) according Template (pattern), materialize output Transform. Algorithm (TBD): case classes, pattern matching, destructuring, Resource monad chained operations (Template: functor) functional streams, ADTs.

Dataflow, Reactive: Resource Monad handling of wrapped URIs messages / events I/O via HTTP verbs. Augmentation: Model, Context instance / class (layers), Resources producing / reacting to events. Endpoints: Discovery / Location / Resolution services. URI APIs (signatures discovery).

Meta Graph / Model, Meta Resource(s): Resources / Messages reifying "patterns" on inputs (URI, Resource, Statement, Kind(s), Context, Occurrence, Attribute, Value, Layer Context classes, etc.). Declarative statement for Augmentation shapes applyied to input contexts.

Model Meta Resource: Model components reified Resource types / instances (URIs, Resource, Statement, Context : Layer, Kind, etc.). Augmentation templates "placeholders" (signatures, matching of common upper resources).

Kinds (Application): Basic type inference. Applied over layers CSPO during Activation Augmentation.

Source / Session / Pragma levels. DCI. Data / Information / Knowledge. Syntax, Semantic, Pragmatic. Model state: Context (Resource : data), Kind (Grammar : schema), Dimension (behavior). Context Kind(s) signatures: Dataflow.

Message: Dataflow matches Template signatures: interactions. Apply Augmentation Functors over Message contents (interactions enrich Message with Models contents: ontology matching / Levels / Facets). Materialize / emit dialog / prompts Message (enrich Message from Models / reactive IO events). CQRS. Dialog (EAI pattern: Isis docs).

Augmentation: Context Resource Monads / Functors. Message Resource(s) / Meta Resource(s) (nested / wrapped) elements determines flow Template Transform results / behaviors (CRUD, Functor invocations). Message IO performs Augmentations. Ontology levels resolution (Templates / Transforms / Augmentatiom levels: matching patterns / dialog prompts in Ontology levels).

Augmentations: matching Events Functors aggregate / align / activate (classify) sources of ontology matched data / schema / behavior enabling semantic layers interoperation.

Aggregation: Infer input data streams data, schema, behavior class / instance context layers statement CSPO roles.

Alignment: Infer layer missing / deducible attributes and values for CSPO Subjects.

Activation: Infer layer CSPO Kind / Roles. Basic type system.

Aggregation (Augmentation): Apply each Context (layer) Functor on inputs (from input layer) and emits Transform, matching corresponding (next) layer. Next layer Context and SPO according functional mapping declared by Meta Resource types on augmented layer.

Alignment (Augmentation): ToDo.

Activation (Augmentation): ToDo.

Ontology matching: Dataflow: sort statements. Units. Equivalences. Distances / events (order). Services (Augmentation / Context Functors Meta Model mappings / transforms).

Explain ontology matching: data, schema, behavior alignments. Layers. Levels. Facets. Meta Resources / Model. IDs, Encoding / Addressing.

Encoding. Functional, Semiotic, Dimensional (Facets). Layers. Levels. Meta Resource / Model. Sets. Value as occurrence of attribute. metaclass / class / instance IDs.

Functionsl / Semiotic / Dimensional layers / levels examples / alignments. Model, URIs, Resource, Contexts Functional APIs. Meta Model / Resources encoding. Mappings.

IDs: Addressing / Encoding. Semantic (signature, contents, context) resolvable / discoverable identifiers.

**Connectors / Adapters**

**Messages**

**Ontology Matching:**

Ontology Matching: IDs, Addressing, Encoding. Functional, Semiotic, Dimensional (Facets). Layers. Levels. Meta Resource / Model. Sets. Value as occurrence of attribute. metaclass / class / instance IDs.

Ontology Matching: Encode: order, iteration, flows, units, relations, events, enums, etc.

Ontology matching (table, pk, col, val example). Helper upper models for models linking / alignment. Shapes. ISO.

Ontology Matching: Encode: order, iteration, flows, units, relations, events, enums, etc.

Ontology matching: Dataflow: sort statements. Units. Equivalences. Distances / events (order). Services (Augmentation / Context Functors Meta Model mappings / transforms). OntResource; Merged URI(s) wrapper. OntResource hierarchy: layers statement contexts. Facets DOM, Actor / Role. Resource (OntResource Context Roles hierarchies Monad wrapper); Statement : Resource Role quad, Resource.

Ontology matching: Events declarative definition. State change of value in axis in measure of context. Dimensional Model.

Ontology matching (table, pk, col, val example). Helper upper models for models linking / alignment. Event sourcing (“offline” sync). Graph linking / alignment / sinchronization by entailments from event sourcing over inferred state. Reconciliation.

Meta Resource / Models / Messages: IDs / Encoding / Addressing formats. Ontology matching and Template / Augmentation / Transform enrichment (alignments), transforms (functors), materialization (model updates) via Mappings (events) and Meta Resource / Model Encoded Resource declarations (enrich / align, transform, updates algorithms: Encodings).

Ontology Matching:

Ontology Matching: IDs, Addressing, Encoding. Functional, Semiotic, Dimensional (Facets). Layers. Levels. Meta Resource / Model. Sets. Value as occurrence of attribute. metaclass / class / instance IDs. SortedSet hierarchies membership (octal) values.

Ontology Matching: Encode: order, iteration, flows, units, relations, events, enums, etc. Semiotic / Dimensional alignment. TBD.

Ontology Matching. Semiotic. Dimensional. Sets. Functional Reference Model. SortedSet hierarchies membership (octal) values.

Ontology matching. Dataflow: sort statements. Units. Equivalences. Distances / events (order). Services (Augmentation / Context Functors Meta Model mappings / transforms).

Explain ontology matching: data, schema, behavior alignments. Layers. Levels. Facets. Meta Resources / Model. IDs, Encoding / Addressing.

Encoding. Functional, Semiotic, Dimensional (Facets). Layers. Levels. Meta Resource / Model. Sets. Value as occurrence of attribute. metaclass / class / instance IDs. Functionsl / Semiotic / Dimensional layers / levels examples / alignments.

**Augmentations:**

Activation (type inference): classification (determine class / metaclass / roles for entity attributes and values).

Alignment (infer attributes / relations): clustering (from multiple occurrences of same entity in diverse data sources).

Aggregation: infer roles in contexts: regression (Person class in Employment interaction : Developer role).

Integration of addressable resources. Reactive I/O (sync back ends). Content type driven semantic augmentation / annotations.

Augmentation of distributed resources. Annotations (Semantic / ML). API for resource / schema / interactions exploration / protocol for message based API "dialogs" execution. HAL (Hypertext Application Language), OData (REST) like interfaces.

Hypermedia Activation. Addressing. Link extended content types resources elements / parts with other resources addressed elements.

Domains: data, schema and behavior of business applications (ERP, CRM, BI, SCM, HMS, etc.).

General purpose business domains problem resolution / tasks, goals accomplishment helper tools.

Syndication (contextual hypermedia activation): QA. Polls. Learning. Profiles. Guided task (wizards), guided editors: Context: Goal / Purpose.

Super Kind / sub Kind hierarchy relationship is given by a set of Kind Attributes being super set / sub set of each other.

SubjectKind (meta Resource): For a given URI occurring as Subject (Occurrence) across a set of Statements (Contexts), its aggregated Predicates (Attributes) defines its "Kind" and its Attribute values determines the given Kind instance "members" values.

ObjectKind (meta Resource):  for a given URI occurring as Object (Value) over a set of Statements, Subject (Kind Attribute), Predicate (Kind Value).

PredicateKind (meta Resource): for a given URI occurring as Predicate over a set of Statements, Object (Kind Attribute), Subject (Kind Object).

ContextKind: SubjectKind (Attribute), ObjectKind (Value). Context (Statement) "signature" (dataflow inputs / outputs activation: domain / range).

Extended content types activations on domain / range (verbs, augmentations). Example: image, face, crop.

Meta Model: Encode / reify Model(s) w./ Meta Resources and Model Context(s) hierarchies. Meta Model: Encode order, iteration, conditional flow. Dataflow.

Encoding: Kind hierarchies / Grammars

(CK, SK, PK, OK);

Semiotic / Dimensional Alignment, Aggregation (known mappings)  : Class / ID Ontology Matching. Contextual IDs (infer occurrence contexts). Inference ID lookup of ID for desired satisfaction of given transforms / roles / operations.

Graph Execution Semantics: Dataflow by Context Kind domain (Subject Kind) / range (Object Kind) matching Forms / Flows. Ontology Matching. Upper ontologies. Primitives.

Encoding: Resource ID. Encoded Resource contents (signature / occurrence). Augmentation: Resource (SortedSet) set (Message) resolution from context over Template / Resource(s).

Encode IDs: Context Kind, upper (meta) Resources (levels / layers). Resource contents / contexts (identify by occurrences in roles in other contexts, Meta Resources, layers class, metaclass, instance). Compose IDs (hierarchical graph properties encoded string) from outer to inner resources (Context, Kind, Occurrence, Role, Resource). "Operable" IDs (ClassIDs / InstanceIDs: Meta Model reifications / occurrences).

Encode common upper Semiotic / Dimensional Model: Reference Model.

Encode Kind / Context hierarchies.

Encode Augmentation(s) as Resource descriptions.

Encode Model(s) as Respurce set. Meta Resources, layers Contexts, Kinds (reified).

Encode Graph Execution Semantics. Dataflow: Context Kind signatures. Iteration, conditional jumps.

Object occurrence of Predicate.

Sets. Quads. SortedSet.

Metaclass / Class / Instance.

Class / Instance ID pairs:

Subject / Context / Role : Attribute, Value. Metamodel. Encoding: each type as each (pair) kind. Pairs.

Semiotic encoding:

(Context, Sign, Concept, Object);

Value as Occurrence of Attribute in Attribute Occurrence Context. Meta Resource context roles).

Augmentation: basic operation. Resource Set Specification (SortedSet / Statement) matching Model which returns augmented Message response (Model I/O).

Encoding: recursive resource quads encoding hierarchy, order, class, instance, attributes. Operate inferences over (upper) patterns (bitstring / lattice). Meta Model, Facets, Levels. Specifications: Signatures, Forms, Flows (encode events / transforms provenance).

Message: Resource aggregation (occurrence, context, model) dataflow (Augmentation). Resolves Resource Set specification.

Dataflow: Message - Model - Template (functor) - Augmentation (interaction) - Transform - Message - Model

Order: Common super type / kind / role / occurrences. SortedSet.

Augmentation: common super type inference / alignment: Aggregation, Alignment, Activation. Verbs / Activation. Functors (context: messages, reified mappings: templates).

Message: specification / transform (input / output dialog domain / range). Context Kind.

Augmentation: Aggregation (Context template).

Augmentation: Alignment (Attribute, Value template).

Augmentation: Activation (Kind type inference, Class / ID resolution / alignment: semiotic / encoding templates).

* Meta Model:
* URI;
* Resource (URI\*);
* Role (Model CSPO hierarchies) : Resource;
* Statement (Resource, Resource, Resource, Resource) : Resource;
* Kind (Statement\*) : Resource;
* Class (Kind\*) : Resource;
* Context (Class\*) : Resource;
* Hierarchy: class (Object / Value) as superclass Context.
* Object: class (extension);
* Context: super class (intention);
* (Kind, Statement, Role, Resource); Data (Resource Kind).
* (Class, Kind, Statement, Role); Schema (Role Class)
* (Context, Class, Kind, Statement); Interaction (Statement Context).
* State Facet / Layer / Level / Augmentation / Model Resource Mappings.
* Meta Resource / Meta Model:
* Meta Resource / Model: encode Model, URIs / Layers / Contexts / Facets / Levels / Resources hierarchies. Mappings.
* Meta Resource / Model: Encode Message, Template, Augmentation(s), Transforms and Mappings (Dataflow).
* Meta Model: Data, Session, Interaction Levels (Message, Template, Transform, Augmentation statements). Mappings.
* Model Context / Layers, Facets, Ontology levels, Meta Resources / Models mappings / reification. APIs. Levels example: Behavior / Interaction (Action, Gesture..., Flow). Upper ontologies: Action, Gesture etc. classes.
* Contexts / Layers / Levels / Facets Meta Resources / Models classes / instances hiers (ontology matching / data, schema, behavior alignments). Members: URIs, Resource, Context, CSPO, Meta Resource / Model APIs.
* Meta Resources are used by a Model Meta Model for describing models.
* Augmentation. Aggregation Meta Model: Describe layers contexts compositions. Alignment Meta Model: Describe augmented attributes (by kinds clustering). Activation Metamodel: Describe Kinds / Roles activation (by attributes aggregations).
* Encoding. Addressing (contents, signatures, contexts). Events publish / subscribe. Dynamic subscriptions / bindings. Subscription, reactive Meta Resource(s). Message flow mechanism: from Model to base layers.
* Encoding: Layers relations: Metaclass / Class / Instance. Subject / Occurrence / Role / Attributes / Values. Mappings declarations: Specifications, Forms, Flows.
* Subject (Resource) / Context (Statement) / Occurrence (CSPO instance) / Role (Kind) / Attribute / Value.
* Metaclass (Occurrence) / Class (Context) / Instance (Attributes / Values).
* Ontology matching. Dataflow: sort statements. Units. Equivalences. Distances / events (order). Services (Augmentation / Context Functors Meta Model mappings / transforms).
* Explain ontology matching: data, schema, behavior alignments. Layers. Levels. Facets. Meta Resources / Model. IDs, Encoding / Addressing.
* Encoding. Functional, Semiotic, Dimensional (Facets). Layers. Levels. Meta Resource / Model. Sets. Value as occurrence of attribute. metaclass / class / instance IDs.
* Functionsl / Semiotic / Dimensional layers / levels examples / alignments.
* Ontology matching (Data, Schema, Behavior alignments):

**DESIGN:**

MDM. Provenance. Versioning. Dimensional context values / queries. Model Facets APIs: Functional, Semiotic, Dimensional Dataflow contexts / order / roles HATEOAS APIs workflows. Protocol: Dialog. Browse / analyze / transform "activations" (REST / JAF) according Facets. Clients / Connectors.

Contents / Features (Mision / Vision). Distributed consistent Knowledge Applications. Trust. Consistency. Event sourcing. Inferencing (of distributed state). Reconciliation.

Certify distributed Entity / Subject Identity / State (in roles / dimensional points). Class / instance alignment (matching).

Integration: Augment sources / back ends. Model I/O materialized in source (plugged) application / services back ends.

Integration: Extension. Extended functionalities data / schema / behavior exposed as services external to source (plugged) applications. Sync (Augment). Declaratively stated via Model descriptions. Discoverable, browseable (HAL / REST).

The idea of the project is to "augment" an ESB for EAI platform and to enable it allowing it to make "inferences" regarding which routes to use, "discovering" sources / destinations of an event message(s) which then it transforms / enriches according destination "semantics" and format(s).

This featuring the exposure of a generic facade which allows to see in an "homologated" view the applications or services and their data, schema and behavior (actions) that could be integrated into the tool.

Different integrated applications are enriched with this facade and with the events that, given the inferred routes and transformations, augments theirs data, schema and behaviors, invoking activities corresponding to each destiny semantics.

Resource monad of Model(s) layers Contexts: Transform, Kind, Entity, Behavior, etc. Model(s) Context hierarchy classes (model) instances (domain). Contexts, Occurrences, Attributes, Values : CSPO Functors (eval in Resource contexts). Functor declarations (model augmentations / domain dataflows encoding).

Monads / Functors examples (order: comparables / upper / dimensional ontologies):

Kind<SubjectClass<Resource>, Set<PredicateClass<Resource>>>, others. Example: Subject / Predicate(s). (quads prev / next relation).

Metaclass<ObjectClass<Resource>, Set<OccurrenceClass<Resource>>>, others. Example: Object / Statement(s). (layers parent / child occurrences relation).

Class<ObjectClass<Resource>, Set<ContextClass<Resource>>>, others. Example: Resource / Kind(s) (class definition relations: extension / intension, layers parent occurrences prev relation).

Backend: RDF(S), OWL, Resource Services (Naming, Index Registry), ISO, Shapes, IDs matching. DIDs Backend.

Runtime: Objects, Events. Distributed Runtime Functional (Dataflow) reactive Resource objects / models (forms / flows).

Deployment: Spring / Vertx / others (Jersey / CDI: Resources Meta Model / Domain APIs). HATEOAS / HAL APIs (Encoding / Dialog Endpoint Protocol). Environment / Container: Messaging / Services. Models I/O.

Integration Connectors: Runtime Model embedded Resources. Sources as reactive stream objects. API.

Integration Clients: Runtime Model embedded Resources. Services as reactive stream objects. API.

Integrations (augment / extend): RDBMS (R2QL / R2ML) / Rules / BPM, KIE / Teiid / Metamodel / Olingo / Solid / ERP / CMS / Feeds (Hypermedia Resources / Apache Stanbol) / Browser / Messaging (JMS overlay, Apache Camel / ActiveMQ: ServiceMix Connectors / Clients) / ML, Big Data (Apache Spark).

Dialog: Encoding / Protocol. Activation, Location, Context (Hypermedia type / context interfaces). Augmentations.

Encoding: XML / XSL / XPath / XLink / XForm / XPointer / XQuery (RDFS / OWL / ISO DM / RM Forms / Functors / DOM). Endpoints (streams / signatures): documents (messages) / resources (paths).

Comparable: parent / child relations (SortedSet). Model sets / dimensional alignments.

Models: Augmentation, Kind (Metamodel), Entity, Class, Behavior (Functional), Dimensional, Semiotic (Matching / Alignment / Upper).

Runtime. Bus. Signatures bindings (reactive), content type / domain context interactions data transforms (roles).

Design: Augmentation (Aggregation, Alignment, Activation Functors), Domain Functors. Encoding. Design Functors Dataflows.

CQRS. Event Sourcing. Functor Commands.

Protocol / Encoding: hierarchical contexts dialog (runat) prompt / pick / select (roles).

Endpoints: Model (classes) objects / resources, Domain (instances) objects / resources

Apache Isis (DDD / Actors). Connector / Client / Runtime (Hypermedia / Facade / Dialog Protocol: services / actions). Backend: Augmented Services / Persistence. Representations (resource: types / activation). Domain, Services, View Models.

JBoss Teiid / Apache Metamodel: Clients / Connectors / Backend / Runtime (Translators).

CMS / Wiki API / WebDAV. Apache Stanbol. DOM / REST / JAF.

StratML Client / Connector (Goods, Needs, Products, Goals, Purposes. Exchange ontologies).

Ontology Matching: Dimensional metaclass / class / instance attributes relationships in axes / contexts / roles evaluations. Resolve equivalence of dimensions, units, measures, values via aggregation of value occurrences. Resolve value kinds by occurrences of Semiotic (grammar) model. Contexts (CSPOs) Attribute / Value "clustering". Sets specifications. Dimensional order relations.

Distributed Inference (dimensional / matching / predictions). Distributed consistency. Event sourcing (Dialog, CQRS Protocol). HATEOAS distributed / lazy reconciliation: hashing of source / destination (hierarchical contextual model quads hashing) state in interactions tokens. Prompts. Distributed Alignment (until reach of goal synchronization states). Distributed state / IDs.

Comparable: parent / child relations (SortedSet). Model sets / dimensional axes alignments.

Semiotic: syntax, semantics (grammar), pragmatics. Verbs: action, passion, state (for / due to action / passion). Models. Dimensional (axis / order) relations. Alignments. (Sorted) Set relations: hierarchical encoding. Verb roles (CSPO / Kinds sets).

Example aggregation: candy (type), red (color attribute), strawberry (flavor attribute).

Encode IDs: Context Kind, upper (meta) Resources (levels / layers). Resource contents / contexts (identify by occurrences in roles in other contexts, Meta Resources, layers class, metaclass, instance). Compose IDs (hierarchical graph properties encoded string) from outer to inner resources (Context, Kind, Occurrence, Role, Resource). "Operable" IDs (ClassIDs / InstanceIDs: Meta Model reifications / occurrences).

Message parsing (Template, Message Context) matches Form / Flow Augmentation Mappings signatures.

(Template, Context, Attribute, Value); Value as Context: hierarchical models. Same attributes: types / collections.

Semiotic (encodings):

(Context, Sign, Concept, Object);

Object as Sign: Object properties (Concepts).

Semiotic encoding: encode Meta Model (syntax facet) / Functional (Meta Model encoded pragmatic facet) / Dimensional (Meta Model encoded semantic facet) data / reference model (by contexts / upper alignments / aggregation).

Facets contexts semiotic encoding. Facets IO (events) by semiotic encoding of facets input layers.

(Context, Sign, Concept, Object);

Roles encoding: Object as Sign (properties), Sign as Object (types / roles), Concept as Sign / Object / Context, etc.

Grammars encoding: express models contexts layers and augmentation templates in input contexts.

Meta Model:

(Transform, ID, ID, ID);

(Mapping, Transform, ID, ID);

(Template, Mapping, Transform, ID);

(Augmentation, Template, Mapping, Transform);

(Resource, Augmentation, Template, Mapping);

(Role, Resource, Augmentation, Template);

(Statement, Role, Resource, Augmentation);

(Model, Statement, Role, Resource); Resource Occurrence in Model (Kind? Kind Role type, Kind hierarchies.)

Functional Facet:

Occurrence

Entity

Kind

Class

Flow

Behavior

Dimensional Facet:

(Value, Previous, Distance, Next);

(Measure, Value, Previous, Distance);

(Unit, Measure, Value, Previous);

(Dimension, Unit, Measure, Value);

(Concept, Dimension, Unit, Measure);

DCI / DOM: Subject, Context, Occurrences, Roles, Attributes, Values, Activation.

Semiotic, Meta Model, Dimensional, Functional DOM. DOM Contexts. DOM Functors. Resources Contexts (CSPO Monads: encoding / addressing).

Activable DOM Contexts: DOM views (object mappings, etc.).

Map Reduce encoding inputs, grammar templates context mappings. Emit Semiotic reference / data model parent / child properties encoding (Context / SPOs, Context:Subject / POs, etc.).

Model:

Integration: Purpose (description, mision, vision).

Task list focus for each item.

Analysis (mision).

Design (vision).

Containers / Components / Addressing / Routing / Protocols / Interfaces / Services (Message IO data / Backend Models schema / Behavior encoding).

Deployments (use case) Goals app (tasks, exchanges, etc. over integrated backends: "wizards").

Model / Semiotic reification.

Facets / Levels / Shapes: Aligned entities / values occurring in aligned models / dimensions.

(Context, Sign, Concept, Object);

Resource Monad / Message Functor (Contexts hierarchy parent). Resource<Context>. Events bindings. Message / Augmentation event declarations / instances.

Resource

(Message, LHS, Cond, RHS);

(Context, Sign : Message, Concept : OntResource, Object : ID Resource);

(Transform, Context, Message, Concept);

(Mapping, Transform, Context, Message);

(Template, Mapping, Transform, Context);

(Augmentation, Template, Mapping, Transform);

(Resource, Augmentation, Template, Mapping);

(Role, Resource, Augmentation, Template);

(Statement, Role, Resource, Augmentation); Augmentation of which Statement is result of.

(Model, Statement, Role, Resource);

(Entity, Model, Statement, Role); Model (Backends) aligned entities.

(Kind, Entity, Model, Statement);

(Class, Kind, Entity, Model);

(Flow, Class, Kind, Entity);

(Behavior, Flow, Class, Kind);

(Measure, Behavior, Flow, Class);

(Value, Measure, Behavior, Flow);

(Unit, Value, Measure, Behavior);

(Dimension, Unit, Value, Measure);

Functional: Entities in different Models in Kind, Class, Flow, Behavior.

Dimensional: Measures in different Dimensions in Units, Values.

Value, Previous, Distance / Event, Next. Order (in axis):

Siblings: previous / next (Semiotic containment relationship / roles). To do.

Hierarchies: parent / children (Semiotic containment relationship / roles). To do.

Semiotic model: reification / primitives / upper ontology (meta model, inferred / aggregated). Levels: syntax / grammars, semantics, pragmatics. To do.

Model (meta / upper resources) / DOM (domain instances) Augmentation Functors:

Aggregation: Create. Context occurrences. Materialise into next layer(s) streams. Context occurrences statement(s) (children: next layers). To do.

Alignment: Update / Retrieve. Augment attributes / values. Materialise into next context augmented statement streams (next context occurrence attributes / values, layer siblings). To do.

Activation: type / role in contexts. Parent (occurrence Context) occurrence Kind for Context object (parents: previous layers). To do.

Activation: type / role in contexts. Parent layer (occurrence context layer) CSPOs Kind(s). Materialise into dataflow Message(s) streams: (CK, SK, PK, OK). (parents: previous layers). To do.

Example:

Entity in (Model, Statement, Role, Resource).

Kind in (Entity, Model, Statement, Role).

Aggregation / Alignment Messages from primitives / meta / upper / domains resources Activation.

CSPO: Context (intension), Object (extension). SortedSet comparison hierarchies (encode order in semiotic DM / RM, octal comparison values).

Message: Augmentation (materialised Resource set) specification (functor). Event declaration (I/O patterns bindings). Context layers monad publishes / subscribes (dataflow bindings pipelines).

Addressing (hypermedia):

Content Type: Metaclass

Resource: Class

Representation: Instance

Address: Occurrence / Response (Materialised Message Augmentation)

Request: Message (state flow). Context DOM event API: Request Message Resource in possible domain / range / mapping contexts.

URIs: Contexts (data), Types (reified schema), Service (behavior). Class, instance, occurrence links, paths, pointers (annotations / transforms / embeddings / calculated / descriptions).

Persistence: distributed event queue (saga) of distributed addresses (occurrences metaclass, class, instance resolution). Composite occurrences (links / rels / roles).

Purpose / content type driven (state / rendering / roles / links /contexts / data / flows / attributes) declarative hypermedia activation application. Model, Application, Domain ontology / upper resources (connectors). Generic API / metamodel (DCI: Form / Flow) client. Extension protocols / APIs.

Resource: Model, graph (encoding). Dataflow: order encoding. Sort dimensional measures (SortedSet?).

Encoding: Semiotic levels metaclass, class, instance, occurrence (in context in role: metaclass?).

Ontology matching: signatures encoding. Dimensional ordered aggregated measures. Sets. Semiotic reification.

Use Case: Goals App

Goals App: purpose / goals / domain driven syndication of integrated business / social / cloud application features. User / Groups / Roles Purpose(s), Goal(s), Task(s) "intelligent" tracking oriented focus providing an abstraction and integration layer of players process flows / interactions and players process assets management and semantic orchestration.

Goals App: Semantically annotated gestures / interactions (contexts, purposes messages / interactions / resources / content). Subject context occurrence role attributes values (metaclass, class, instance, occurrences).

Goals App: API Facade for rendering aggregated data roles in contexts interactions topics / subjects assets (conceptual domain contexts axis / state views / activations: Forms / Flows). Example: domain declared Customer (actor / role), Product, Order, Purchase, Invoice, etc. topics / subjects assets rendered in contexts (Sales Report, Expenses Report, etc. embedded / linked dashboards). Wizards.

Goals App: Browse / search / activate: history / relations / referrer context / interaction / gestures roles traceability / (dialogs). Gestures / interactions (actor / asset, actor / actor). Wizards.

Goals App: Hypermedia contents APIs (embedded / embeddable resources: Semantic contextual Wiki / Apache Stanbol / CMS: hypermedia augmentation, knowledge / behavior maps). Integration: augmentation / sync backends / apps. Extension: services / APIs. Annotate / augment link content. DAV protocol (integration / extension facades).

Low level Resource / Message / Context model / layers API. REST. Render DOM Context / OGM Domain (model) instances: Restful Objects / Apache Isis / HAL / GraphQL (meta / domains models endpoints) like APIs. Forms / Flows MVC / DCI APIs (connectors / clients / adapters). Wiki APIs: Knowledge discovery. Assistants.

Transactions: Request IDs. CQRS. Reified interactions / gestures. Event sourcing / logs. Reified (resource) Message activation (dataflow) Forms / Flows.

Reference Model / Encoding:

Syntax: data (signs). Semantics: schema (concepts). Pragmatics: behaviors (objects CRUD / Interactions / Contexts).

Reify able roles. Agregate semiotic Activation of a statement resources roles. Example: aggregate kinds / entities. Instance (extension) / Class (intension): Object / Concept.

Order / hierarchies: reified Context / Concept roles relation (example: Concept as Context, Concept aggregations are siblings / children of first Concept).

CSPO Reference Model: (attribute / value). Reified roles (Semiotic layer). Order. Hierarchies.

Encoding: To do. Compatible with Message Augmentation Mappings Predicate comparison and Index traversal.

Index: To do. Compatible with Message Augmentation Mappings Predicate comparison. Encoding representation (cons list, graph, tree, etc.). Truth values (flows) traversal.

Comparison: Ternary truth values results (previous / parent, current / OK, next / children) according Predicates for a Message resource set and and a Mapping comparison (apply augmentation).

Predicates: quad encoded comparison specification, result of iterating Mapping comparisons until Augmentation Message matches all Resource set. Augmentation comparison behavior. Message / Augmentation application specification.

Mappings: comparison iterations matching Message / Augmentation Predicates patterns truth values. Compare input Message resource set with Mappings till truth values are all OK. Perform Augmentation.

Model encoded Augmentation (Aggregation, Alignment, Activation) determined Comparison, Predicates, Mappings.

Encoding: IDs. Relative / contextual metadata. Serialization. Index.

Event: Message (specification), Augmentation (instance).

Predicate: comparison specification (axis). Message SPO.

(Message, LHS, Predicate, RHS);

Mapping: comparison result (patterns). Augmentation SPO. Template Transform rendered in Message context resources set.

Abstract Adapter / Connector / Client APIs:

Populate Model Context layer (Model Statements).

Protocol: Form / Flow Context (interaction). I/O data / schema / behavior input / output abstraction. Domain (model driven) interfaces / schema.

Inputs (data): Resources augmented / aggregated from OntResource until Dimensional layer.

Protocol (schema / behavior): Browse from Dimensional up to OntResource layers selecting, creating and matching intermediate Context(s). Form / Flow interaction use case roles.

Aggregation / augmentation: feedback from interactions (levels) CUD interactions.

Adapter Meta Resources (upper). Translate inputs. Render outputs from Model protocol into backends adapter specific protocol APIs.

Languaje levels: Use, mention. Pronouns.

Sign, Interpreter, Concept, Object: relations (syntax, semantics, pragmatics).

Adapter Model: metaclass, class, instance, occurrence. Context (interpreter), Sign, Concept, Object.

Connector I/O (gestures):

Client I/O (dialog):

Model layers:

OntResource: Resolves reified aligned / matched aggregated Resources.

Predicate: 'kind', aggregates roles attributes / values. Grammar.

Encoding: metaclass, class, instance, occurrence (contextual / nested / orders / ops) CSPO IDs. CURIEs.

Encoding: Sets CSPO Context specification (sets quad encoding).

Model:

(OntResource, OntResource, OntResource, OntResource);

OntResource represents aggregated / matched different identifiers / URIs referring to the same subject.

(Predicate, OntResource, OntResource, OntResource);

For a Predicate occurrence, attributes / values.

(Message, Predicate, OntResource, OntResource);

For a Message Predicate occurrence, possible attributes.

(Context, Message, Predicate, OntResource);

Occurrence (object) for a Context (interpreter) Message (sign) Predicate (concept). Adapter: Context layer (semiotic interpreter).

(Transform, Context, Message, Predicate);

(Mapping, Transform, Context, Message);

(Template, Mapping, Transform, Context);

(Augmentation, Template, Mapping, Transform);

(Resource, Augmentation, Template, Mapping);

(Role, Resource, Augmentation, Template);

(Statement, Role, Resource, Augmentation); Augmentation of which Statement is result of.

(Model, Statement, Role, Resource);

(Entity, Model, Statement, Role); Model (Backends) aligned entities.

(Kind, Entity, Model, Statement);

(Class, Kind, Entity, Model);

(Flow, Class, Kind, Entity);

(Behavior, Flow, Class, Kind); Statement, proposition.

(Value, Behavior, Flow, Class); Value on which Behavior occurrence holds.

(Unit, Value, Behavior, Flow);

(Dimension, Unit, Value, Behavior);

(Measure, Dimension, Unit, Value); Truth values. Equivalent Measure(s), comparisons (order / hierarchies). Measure Dimension attributes / values.

Ontology Matching: Equivalent propositions that for different subjects have the same dimensional layer equivalent Measure(s) Value(s): attributes / values.

Example: Application (protocol) shows aggregated Measures Dimensions, select Unit / Value and assert / browse Measures.

Pick (matched / new) Behavior corresponding to Measures Values. Select available / new Flow.

Pick Flow Class and assign Kind (DCI Role). Assign / create Entity (model alignment / assignation).

Follow up in occurrences hierarchy: CRUD / CUD available / possible. Perform Augmentations.

Rendering: S: current document URL, P: link tag body, O: href, rel: Context (referrer). Navigation: GET / headers. GET (navigate, possible resources, posible contexts / subjects / attributes): CRUD / Contexts aggregation / transforms / matching. Encoding: CRUD / browse layers (CSPO Patterns Forms / Flows layers de-aggregations / faceted traversals).

Encoding:

Encoding, APIs: REST HATEOAS, JSON-LD, HAL. Distributed (normalized) address ID spaces.

TBD:

Layers down / up traversal:

C: Anchor rel (referrer);

S: Current URL;

P: Anchor tag body;

O: Anchor href;

Layers up / down traversal:

C: Current URL;

S: Anchor rel / referrer;

P: Anchor tag body;

O: Anchor href;

Functors functional declaration:

(((a: O, b: S), c: P), d: C);

(((O, S), P), C): Referring Context. Augmentations functors signature. Traversal performs functor augmentations "backwards" traversal direction concatenating type, role, interactions transforms incrementally.

Encoding (example): recursive CSPO IDs: (metaclass, class, instance, occurrence) IDs. URLs: domain/CID:SID:PID:OID. Graph URLs / rels traversal.

Addressing: URLs encode complete (possible) state flows: reified model state URLs (faceted browse / CRUD).

REST HATEOAS: Link rel (account): deposit, whitdraw, etc. Flow Behavior "referrer" rel.

Resource entity 'whitdrawal': context interaction. Actions 'possible'. Behavior Flow "referrer" rel.

ROC Resource: Resource set resolution (operations over subjects).

Reactive: PUT registers callbacks IRIs (subscribe to updates). Streams: Functors (hypermedia events / subscriptions dataflows).

Serialization / Links: JSON, XML (XPath, XLink, XPointer, XQuery, XForm). Encoding (rel, location, href, text). Framing / GraphQL.

State graph locators: relative lists identifiers encoding of all HATEOAS browsing attributes of a given state: logs.

As we have shown, JSON-LD itself is not a complete technology stack, it needs ontologies to express domain semantics. In future work we would like to investigate how a lightweight ontology to support a wide range of application domains could be modeled. Furthermore, we would like to explore various ideas to create smarter service clients.

Property graphs allow properties (key/value pairs) to be associated with both nodes and links in directed graphs. This allows you to annotate links with information such as the start and stop times for when the link is valid, its provenance, a statement about its quality and so forth.

Resource Monad: encode protocol functors. Endpoint address activation behavior facades. Graph state / rels traversal: Monad encodes entire state location flows to current CSPO URL IDs state (traceability in interaction context rels). Abstract Form / Flow attrs / rels.

Functors resolution on API addresses URLs: resource monads rels / attrs activation.

Model / Domain levels of common model / domain monads, functors: model / domain abstract augmentations / behaviors. Declared in model contexts messages / augmentation instances.

Behavior layer renders domains possible aggregated augmentations / messages of model functors composition. Rendered in domain levels as concrete contexts operations: named context operations over abstract model functors behaviors.

Adapter (Connector / Client):

Synchronization: Functional. Monads (source / dest: domain / range). Functors (APIs: templates / event drivers for function composition / translation). Inverse functions: backend IO protocols / formats. Adapter endpoint resolution: activates on backends protocols / formats / data.

Adapter (Connector / Client): Model Encoding. Container (reactive message / event driven) APIs. Model / Container APIs interactions.

Adapter / Model "statements" IO abstraction (Forms / Flows: Message events attribute / values).

Message (events): bidirectional CRUD streams (Adapter "template" methods, Model Message declarations):

Adapter: Context layer (semiotic interpreter).

onCreate;

onRetrieve;

onUpdate;

onDelete;

Ontology Matching:

Statements (encoding): Proposiciones / Razonamientos / Cuantificadores / Predicados / Clases / Relacion: validez / valor de verdad (en contextos, ejes, variables: funciones / enunciados / casos de sustitución / equivalencias). Pronombres.

Truth values: Predicate / reasoning. Sets encodings Predicate comparisons matches context templates / transforms mappings: inferences.

Relaciones de equivalencia, clases de equivalencia: reflexividad, transitividad, simetría. Identidad. Propiedades determinan alcanze / relato, dominio / codominio, universo y campo. Clases y relaciones (atributos / valores) determinan matcheos / relaciones entre clases / individuos y relaciones y tuplas / miembros. Formas proposicionales, categorícas (predicados), clases y relaciones (reglas, valores de verdad) para afirmar equivalencias (operar entre relaciones de propiedades).

Relaciones, cardinalidad: (1, n), (n, 1), (1, 1), (n, n). Función / inversa: inyectiva / biyectiva.

Relaciones de orden. Inclusión / jerarquías. Rendering: lattice (encoded statements / properties bitstring / vector). Equivalencias.

Predicate como occurrence de un Predicate: axis (attributes / values). Intensión / extensión (representante partición)

Functors:

Functors: model layers aggregations declarations / instances. Type, Role, Alignment levels. Domain / range: CSPO contexts (Template, Transform signatures). Transform: Mapping Message. Hypermedia events dataflows triggered functors (signature bindings).

Message: Functor Declaration. (events / grammar: protocols).

Augmentation: Functor Instance.

Functors functional declaration:

(((a: O, b: S), c: P), d: C);

(dado rango y alcance, universo: U de una relación: P, inferir dominio y codominio, campo: C). TBD.

From Object (O) extension / instances to Context (C) intension / class. Matching grammar shapes. Incrementally render type, role, occurrence context layers.

Type functor: contexts stream.

(((Mapping, Augmentation), Template), Resource);

Context layer class / instances.

Role functor: type contexts occurrences stream.

(((Template, Resource), Augmentation), Role);

Type Context layer class occurrence (Subject) in aggregated context layers.

Alignment functor: type occurrence attributes / values in contexts interactions stream.

(((Augmentation, Role), Resource), Statement);

Type Subject occurrence attributes / values (statements / augmentation "kinds").

Behavior flows functor composition: Behavior, Flow, Class, Kind, Entity layers aggregation. Determine type, role, alignment augmentations. Example: type (Class Model) in context (Flow Entity) in interaction (Behavior Kind).

Navigation (TMRM, key / value) functors:

Keys.

Remote keys.

Local values.

Key / value proxies.

Value proxies.

Constraints.

Merge.

Legends (constraints).

Path languages.

Path expressions.

Encoding:

Encoding: metaclass, class, instance, occurrence (contextual / nested / orders / ops) CSPO IDs. CURIEs.

Encoding: Sets CSPO Contexts specification (sets quad encoding).

Encoding: Functor application. Predicate: functor behavior, domain: statement predicate, transform / range: statement object.

Encoding: Levels (OntResource context hierarchy) reification: Message as Predicate, etc. Resource Monad (context statement / signatures). Functor aggregation: levels (type, role, alignment).

Encoding: Grammars. OntResource hierarchy reification: rules (contexts) / non terminals (reified Predicates / Kinds). Aligned OntResource URLs: terminals. Augmentations: productions (functors).

Link Grammars. Types: links left / right types defined when a shape / slot match satisfaction occurrs (roles).

Parsing: extract propositions, knowledge assertions (in a domain ontology). Assert propositions links, order, concepts relations (between domains). Link Grammar. ISO TMDM / TMRM.

Parsing: extract prescriptions, knowledge rules (in domain ontology concepts relations: causal, requirements, etc.). StratML.

Parsing: infer possible statements propositions / prescriptions productions. Link Grammar Disjuncts. Embeddings.

Reference model (encoding):

Statements:

(OntResource, OntResource, OntResource, OntResource);

Grammar dictionary: link type, left, context (word), right types:

(Predicate, OntResource, OntResource, OntResource);

Grammar Links (Functor / Parser): link types, left / right links.

(Message, Predicate, OntResource, OntResource);

Types / Categories: Resource Monad. Examples: aggregate Predicate / Entity Kind / Resource Type Attributes / Values. Infer SPO statements.

Functor / Parser signature:

(((O, S), P), C);

Model layers:

OntResource: Resolves reified aligned / matched aggregated Resources.

Predicate: 'kind', aggregates roles attributes / values. Grammar.

(OntResource, OntResource, OntResource, OntResource);

(Predicate, OntResource, OntResource, OntResource); For a Predicate occurrence, attributes / values.

(Message, Predicate, OntResource, OntResource); For a Message Predicate occurrence, possible attributes / values. Functor declaration.

(Context, Message, Predicate, OntResource); Occurrence (object) for a Context (interpreter) Message (sign) Predicate (concept). Adapter.

(Transform, Context, Message, Predicate);

(Mapping, Transform, Context, Message);

(Template, Mapping, Transform, Context);

(Augmentation, Template, Mapping, Transform);

(Resource, Augmentation, Template, Mapping); Type Functor Augmentation instance.

(Role, Resource, Augmentation, Template); Role Functor Augmentation instance.

(Statement, Role, Resource, Augmentation); Augmentation of which Statement is result of. Alignment Functor Augmentation instance.

(Model, Statement, Role, Resource);

(Entity, Model, Statement, Role); Model (Backends) aligned entities.

(Kind, Entity, Model, Statement);

(Class, Kind, Entity, Model);

(Flow, Class, Kind, Entity);

(Behavior, Flow, Class, Kind); Statement, proposition.

(Value, Behavior, Flow, Class); Value on which Behavior occurrence holds.

(Unit, Value, Behavior, Flow);

(Dimension, Unit, Value, Behavior);

(Measure, Dimension, Unit, Value); Truth values. Equivalent Measure(s), comparisons (order / hierarchies). Measure Dimension attributes / values.

Update:

Distributed Integration and Consistency for Knowledge Semantic Interoperability.

Link grammar: (employer, employee). Categories, monads. Reference Model.

Link Grammars. Types: links left / right types defined when a shape / slot match satisfaction occurrs (roles).

Parsing: extract propositions, knowledge assertions (in a domain ontology). Assert propositions links, order, concepts relations (between domains). Link Grammar. ISO TMDM / TMRM.

Parsing: extract prescriptions, knowledge rules (in domain ontology concepts relations: causal, requirements, etc.). StratML.

Parsing: infer possible statements propositions / prescriptions productions. Link Grammar Disjuncts. Embeddings.

Functors: model layers aggregations declarations / instances. Type, Role, Alignment levels. Domain / range: CSPO contexts (Template, Transform signatures). Transform: Mapping Message. Hypermedia events dataflows triggered functors (signature bindings).

Message: Functor Declaration. (events / grammar: protocols).

Augmentation: Functor Instance.

Functors functional declaration: (((a: O, b: S), c: P) d: C);

(dado rango y alcance, universo: U de una relación: P, inferir dominio y codominio, campo: C).

From Object (O) extension /instances to Context (C) intension / class. Incrementally render type, role, occurrence context layers.

Type functor: contexts stream. (((Mapping, Augmentation), Template), Resource). Context layer class / instances.

Role functor: type contexts occurrences stream. (((Template, Resource), Augmentation), Role). Type Context layer class occurrence (Subject) in aggregated context layers.

Alignment functor: type occurrence attributes / values in contexts interactions stream. (((Augmentation, Role), Resource), Statement). Type Subject occurrence attributes / values (statements / augmentation "kinds").

Types / Categories: Resource Monad.

Navigation (TMRM, key / value) functors:

Keys.

Remote keys.

Local values.

Key / value proxies.

Value proxies.

Constraints.

Merge.

Legends (constraints / Mappings Augmentations).

Path languages.

Path expressions.

Encoding. Model layers:

Levels: reify layers from bottom up through contexts hierarchy superclass contexts relationship. Message, Type, OntResource, etc.

Resource context: Resource monad CSPO Form. From Message / Type OntResource / Resource value mappings (functors / navigation).

OntResource context: (Resource, Occurrence, Attribute, Value) Form. Aggregated from Resource context.

(Resource, Resource, Resource, Resource);

(OntResource, Resource, Resource, Resource);

Values. Sets. Equivalences / matching assertions. In Context occurrences, matching attributes / values (recursion to contexts / occurrences).

(Type, OntResource, Resource, Resource);

Labels. Type (C: key) occurrence (S: value), value occurrence (P) aggregated attributes (O).

(Message, Type, OntResource, Resource);

For a Message (proxy / subject context), Type (sign / key / label), OntResource (concept: P), Resource (object / value). Functor declarations. TMRM navigation / paths.

(Context, Message, Type, OntResource);

Context (key / value interpreter / map: connectors legends), Message (sign / proxy / subject), Type (concept / key / label), OntResource (value). Key / Value Adapter. TMRM.

(Transform, Context, Message, Type);

(Mapping, Transform, Context, Message);

(Template, Mapping, Transform, Context);

(Augmentation, Template, Mapping, Transform);

(Resource, Augmentation, Template, Mapping);

Type Functor Augmentation instance.

(Role, Resource, Augmentation, Template);

Role Functor Augmentation instance. Role: CSPO Resource role type in occurrence / context.

(Statement, Role, Resource, Augmentation);

Augmentation of which Statement is result of. Alignment Functor Augmentation instance.

(Model, Statement, Role, Resource);

(Entity, Model, Statement, Role);

Model (Backends) aligned entities.

(Kind, Entity, Model, Statement);

(Class, Kind, Entity, Model);

(Flow, Class, Kind, Entity);

(Behavior, Flow, Class, Kind);

Statements: propositions, prescriptions / rules / productions. DCI / Link Grammar. Entities Statement occurrences: contexts / interactions / proposition Class / Kind roles (satisfaction / rules).

(Value, Behavior, Flow, Class);

Value on which Behavior occurrence holds.

(Unit, Value, Behavior, Flow);

(Dimension, Unit, Value, Behavior);

(Measure, Dimension, Unit, Value);

Truth values. Equivalent Measure(s), comparisons (order / hierarchies). Measure Dimension attributes / values.

Ontology matching: sets, singletons / equivalence classes merge. Encoding: Sets CSPO Contexts specification (sets quad encoding).

Proof of concept: Relational inductive biases, deep learning, and graph networks. Deep Graph Infomax. Train model to extract (augmented) knowledge from training set encoded models. Test output in new encoded examples / different ontologies / domains.

Encoding of types, instances and behavior flows along with the data and information needed to infer knowledge necessary to understand encoded models (meta models).

Model (update / draft). TBD.

Backend: Kernel. Models, Services / Adapters "service" URLs (naming schemes). Messages. Interfaces signatures / content types. JMX, OSGi, CDI, Spring, MQ / Camel (events / bus). Reactive facade for protocol endpoint / service interactions. Dialog (Form / Flow) interaction contexts.

Pluggable "bundles" adapter implementing APIs (i.e.: index, naming, registry services) for each (declarative / functional / reactive) Model / Service / Adapter bundles. HAL (Augmentation / Legends), ActivityStreams, StratML, LoD, Solid Adapters.

Context hierarchies: categories of wrapped subject occurrences. Statement Context monad (category) for Subject occurrences.

Context category instance identity: Employee Kind, Work Behavior, etc. Context statement attribute / value aggregation. Key / value abstraction scoped in category type / instance.

Functors: Layers (Context categories) aggregation / transforms. Augmentations.

Augmentations: Categories Aggregation (types), Alignment (contexts), Activation (roles / matching in interactions).

Locators (keys): (metaclass, class, instance, occurrence);

Metaclass: Transform OntResource

Class: Message Augmentation

Instance: Statement Role

Occurrence: Flow Kind

Locators (keys): local / remote keys. Navigation. Paths. Legends. Signatures (streams).

Monadic  (locators / signature streams based) category wrappers Functors:

M<T>::flatMap(functor(T) : U) : M<U>;

Dado rango y alcance, universo: U de una relación R, inferir dominio y codominio, campo: C.

From Object (O) extension /instances to Context (C) intension / class.

**Encoding:**

Radix, Digit, Position. SPO: radix:digit. Radix: resource count. Digit: resource radix index. Position: context hierarchy aggregation. Normalized radix encoding: metaclass, class, instance, occurrence context metadata operable IDs. Example: Base 2 normalization, concepts lattice bitstring (routing tables), boolean operations metadata extraction / traversal (contexts masks). IPv6 addresses. Masks (contexts), routes. Address resolution resolves recursively expanded (CSPO hierarchy contexts / occurrences / attributes / values) resources representations (graph statements members nested browseable addresses of ID contexts). Addresses representing behaviors (HATEOAS: browse representation links / addresses renders state / operations, i.e.: address plus according referrer context and representation addresses links states CRUD operations).

Normalization: contextual form IDs. Internal four sides polygon angles for each CSPO addressable IDs. Embeed operable metadata in CSPO contextual IDs. Vector space model like.

CAM (Ternary bitstring). Routes. CSPO Functional Mappings (contextual / occurrences vector IDs).

Addresses browse state transforms: navigation renders context layers statements transforms with contextual browsing state (IDs, referrer, contextual / occurrences vector IDs, metadata) as parameters. Contexts navigation (Forms, Flows) as functors. Navigation state transforms: possible activations context / argument / attributes / values. Dialog / prompts (argument resources navigation state transforms).

JAF / Naming / Registry (HATEOAS Forms / Flows navigation / states): DCI / MVC Engine.

Semiotic:

Subjects: attributes / values. Occurrences: contexts / roles.

(Context, Occurrence, Attribute, Value);

(Context, Sign, Concept, Object);

Metaclass, class, instance, occurrence.

Assert order / hierarchies / relations in dimensional axes. Containment (sets).

Messages: Service Context URIs: Signature for face recognition (image URI / resource : domain, detection / search results endpoint / placeholder : range). Others services: ML Classification, Clustering, Regression, Services Index, Naming, Registry. Presets "inferred" models and augmentation services (populated / online learning).

Augmented Semantic Content Types (img/xml;facesCoords).

Upper Ontologies. Load. Grammar level services (schema browse, possible flows query / browse). Message: wildcards, variables, placeholders.

Dimensional:

Value, Previous, Distance, Next. Dimension, Unit, Measure, Value (aggregated ordered statements layers).

Value -> distance(prev, next); ordering;

Assert knowledge: 1h -> 60min;

Assert: dom-lun-mar-mie-jue-vie-sab;

Assert: 1mt -> 100cm; etc.

Comparison / order: Alignments (prev, curr, next asserted knowledge). Next hour, location, city, country, next distance at next time at current speed. Event sourcing / tracking: married -> marriage occurred.

Order / comparisons: tree representation ordered by Context Role class hierarchy, instances hierarchies and aggregation hierarchies. Resources order (IDs). Statements order (Statement IDs). Comparison criteria (choose relevant IDs). ToDo. SortedSet hierarchies.

Sort: cause / effect, temporal, etc. Messages align, functional map, fold, etc. Primitives. Encode layered statements ordering. Complement / supplement concepts definitions.

* (Value, Previous, Distance, Next); Person, Single, Marriage, Married; Man, Single, Marriage, Husband; Woman, Single, Marriage, Wife.
* (Measure, Value, Previous, Distance);
* (Unit, Measure, Value, Previous);
* (Dimension, Unit, Measure, Value);
* (Concept, Dimension, Unit, Measure);
* (Resource, Concept, Dimension, Unit);
* (Statement, Resource, Concept, Dimension);

Populate / align / annotate models with dimensional data. Model input: statements (model resources). Model specification: augment, sort statements. Model specification: specialization of base model layers. Resolve resolution statements order.

Dimensional input set model specificatíon (from Statement layer, ordered SPOs: order criteria, comparisons. Kinds / class / occurrence / instance order criteria?).

Encoding:

Cons lists. Binary Trees. Huffman / Prefix codes. RDF List serialization. Meta Resources / Models declarative statements Encoding, Addressing.

Kinds, Signatures. Contents. Contextual metadata. Lattices. Roles. Sets (bitstring cuads). Definitions (elements). Operations. Rules. Categories. Groups. SortedSet hierarchies (3 digit octal set membership values).

Statement: (ID (ID (ID (ID, Nil))));

(C (S (P (O, Nil))));

Quad encoding: Context relative IDs.

Order / comparisons: tree representation ordered by Context Role class hierarchy, instances hierarchies and aggregation hierarchies. Resources order (IDs). Statements order (Statement IDs). Comparison criteria (choose relevant IDs). ToDo.

Dataflow: Order, Forms, Flows (Signatures, Mappings, hierarchies).

State order (in context class hierarchies axes), comparison relations, iterations, flow, events, causal relations, units, enums, equivalence, etc.

Data order: Resource Kind hierarchies.

Schema order: Role Class hierarchies.

Interaction order: Statement Context hierarchies.

IDs: Addressing / Encoding. Semantic (signature, contents, context) resolvable / discoverable identifiers.

Encoding, IDs: magic numbers (MIME types : Context Kinds), metaclass, class, instance, context, CSPO, etc. relations "contextual slots" for IDs. Resource resolution, Operation (primes, encoded lattice, slots context relations) factors in Meta Model relations. Encode order, hierarchies, temporal, causal (reified), containment, etc. relations into IDs encoding. Ontology matching: encoded IDs roles in context aggregation / learning.

Semiotic / Dimensional alignment / aggregation layers (lower resource alignment layers):

Semiotic / Dimensional Alignment, Aggregation (known mappings)  : Class / ID Ontology Matching. Contextual IDs (infer occurrence contexts). Inference ID lookup of ID for desired satisfaction of given transforms / roles / operations.

**2.1.: Dataflow Augmentation KB**

Functional declarative way of stating Augmentation Transforms over Messages / Resources matching / populated by input Templates performing output Mappings Augmentation reflecting input, model and behavior state.

**2.2.: Reactive Event Driven Architecture**

Message based Augmentation Events Dataflow. Augmentation Mapping Dataflow allowing to embed dynamic state in Model entities (including Mappings Augmentations themselves).

**2.3.: Ontology Matching**

Determine whether two identifiers refer to the same entity or type, whether two relations are the same and which results corresponds to instances of the same actions.

Ontology matching. Dataflow: sort statements. Units. Equivalences. Distances / events (order). Services (Augmentation / Context Functors Meta Model mappings / transforms).

Explain ontology matching: data, schema, behavior alignments. Layers. Levels. Facets. Meta Resources / Model. IDs, Encoding / Addressing.

Encoding. Functional, Semiotic, Dimensional (Facets). Layers. Levels. Meta Resource / Model. Sets. Value as occurrence of attribute. metaclass / class / instance IDs.

Functional / Semiotic / Dimensional layers / levels examples / alignments.

Ontology matching (Data, Schema, Behavior alignments):

Data alignment:  
  
Determine if two instances (example: records) of two different backends or services refer to the same entity (Customers : John D. / Employees : John Doe).  
  
Schema alignment:  
  
Determine, for example, meaning and equivalences between diverse (aggregated / composite) schemas (equivalent classes / tables, equivalent attributes / columns, equivalent roles / relations).  
  
Behavior alignment:  
  
Determine meaning and equivalences between (aggregated / composite) behavior contexts and behavior contexts invocations / interactions (Appointment / Interview, anAppointment / anInterview. Behavior flows aggregated from backends / services learning).

Model, URIs, Resource, Contexts Functional APIs. Meta Model / Resources encoding. Mappings.

IDs: Addressing / Encoding. Semantic (signature, contents, context) resolvable / discoverable identifiers.

Ontology Matching:

Ontology Matching: IDs, Addressing, Encoding. Functional, Semiotic, Dimensional (Facets). Layers. Levels. Meta Resource / Model. Sets. Value as occurrence of attribute. metaclass / class / instance IDs.

Ontology Matching: Encode: order, iteration, flows, units, relations, events, enums, etc.

**3.: RDF: Introduction**

**4.: RDF Quads / Object Mapping (DOM / OGM)**

As RDF Quads encodes four URI values (CSPO Statement) an Object - RDF Quad elemental mapping could be implemented regarding an RDF Quad Statement CSPO as follows:

(C: Context, S: Occurrence, P: Attribute, O: Value);

where Context (C) is the URI of an Object Class identifier, Occurrence (S) is the URI of an Object Class Instance identifier and, aggregating same Class / Instance pairs, Attribute (P) and Value (O) are, respectively, Class Instance member (name, domain / range) and values for the aggregated (S) Object of Class (C).

Contexts. Occurrences, Attributes, Values: Roles of Meta Resource(s) in contexts.

Subject in Statement has Predicate and Object Attribute / Value (roles).

Predicate in Statement has Subject and Object Attribute / Value (roles).

Object in Statement has Subject and Predicate Attribute / Value (roles).

Value as Occurrence of Attribute in Attribute Occurrence Context.

Context Kind (signature): Subject Kind and Object Kind Attribute / Value (roles).

Subject / Occurrence / Context / Role : Attribute, Value. Concepts. Semiotic Metamodel. Dimensional Encoding: each type as each (pair) kind. Pairs (tags / facets).

Meta Model: Layers Resource relations:

Instance, class, metaclass, occurrence, role. DOM, Actor / Context / Role.

Layer Context: Statement class. Aggregates same Context Statement(s). Next layer metaclass (Occurrence)..

Layer Occurrence: Statement Context metaclass. Aggregates same Context / Occurrence Statement(s). Previous layer context.

Layer Attribute: Statement Context Ocurrence Attribute (occurrence). Previous layer Occurrence.

Layer Value: Statement Context Occurrence Attribute Value (role). Previous layer Attribute.

Layer Aggregation begins with Model initial Statement having a new Context (class) “pushing” previous CSPO right, being the new class the new layer Context and CSP becoming SPO:

(C, S, P, O) : (N, C, S, P).

Functional / Object Oriented Resource API (Model, Statement, Semiotic, Dimensional layers, Meta Resources).

**5.: Models**

Models aggregates Message input IO / Connectors data into corresponding knowledge Facets (Functional, Semiotic, Dimensional). Model is a layered structure of RDF Quads which follow the base (Functional) Model structure:

OntResource is the class responsible for aggregating different URIs referring the same entities (Ontology Matching).

Resource : Functional (Monad) OntResource wrapper.

(Context : Resource, Occurrence : Resource, Attribute : Resource, Value : Resource);

(Statement, Occurrence, Attribute, Value);

(Entity, Statement, Occurrence, Attribute);  
(Role, Entity, Statement, Occurrence);  
(Class, Role, Entity, Statement);  
(Flow, Class, Role, Entity);  
(Behavior, Flow, Class, Role);

Models have layer statements in which statement context (Facet Roles) classes are a hierarchy from Resource to Behavior and where context role instances follow a hierarchy of a dynamic type system (Kinds).

Input Layer (Resource).

Data Layer (Statement instance, Entity class).

Schema Layer (Kind / Role instance, Class class).

Behavior Layer (Flow instance, Behavior class).

The idea is to infer Schema (classes and instance of classes / relations) operating over Data layer. Then, by aggregating Data and Schema, infer Behavior (classes and instances of operations / functions). This Aggregation, together with Alignment and type Activation mechanisms comprehend the Model core Augmentations.

**5.1.: Contexts Quads Layers**

Kinds: example aggregate CSPO Kinds from an Statement. Kind / Class hierarchies. Order (dataflow / dimension / grammar / facets).

Layers: Data, Schema, Behavior. Class / Instance.

Interaction Layer.

The idea is to infer Schema (classes and instance of classes / relations) operating over Data layer. Then, by aggregating Data and Schema, infer Behavior (classes and instances of operations / functions). This Aggregation, together with Alignment and type Activation mechanisms comprehend the Model core Augmentations.

What my attempts where about in the beginning was to match different URIs or, for example, database identifiers which refer to the same entity (in different databases / ontologies, for example) to perform some kind of "ontology matching".  
  
Then I've tried to develop a mechanism for using RDF Quads for encoding an object graph (and a layers class hierarchy) using Contexts to denote the class of an instance, Subjects to denote class instances and attributes (members) and values: Predicates / Objects.

Then I've realized that some basic type inference could be performed with, for example, aggregating Subjects with the same predicates (Subject Kinds). Idem for Predicates, Objects and Contexts. I've also realized that plain "facts" statements could be aggregated in the previously mentioned class hierarchy to abstract further, from plain data, instance / class layers of what I call data / schema / behavior layers. Higher layers (i.e.: Behavior) "aggregate" lower layers.

Quads are "reified" as Resource(s). Also, Resource is a functional wrapper reactive and event driven of an URI. And an URI could be implemented with whatever backend which could produce or consume events (databases, services, etc.). Resource layers hierarchy (Context) is to be implemented by an actor / role type object pattern according the hierarchy layer level it corresponds (and declaratively stated in a Model of Meta Resources).  
  
Layers shape is as follow:  
Resource : Functional URI wrapper.

(Context : Resource, Occurrence : Resource, Attribute : Resource, Value : Resource);

CSPO Names are according roles (Meta Resource) in the Model. For example: layer Occurrence is parent layer class.  
  
Each layer abstract instances of its own contexts instances.

Input Layer: (CSPO layer):

(Transaction, someOne, buys, someProduct);

Statement (data layer instance):

Inputs regarding the same context are aggregated into data layer instance.

(Statement, Occurrence, Attribute, Value);  
(transactionStatement, someOne, buys someProduct);

Entity (data layer class):

Aggregated Statement and Occurrence Statement occurrences reified into an Entity along with its Occurrences Attributes.

(Entity, Statement, Occurrence, Attribute);

(someTransaction, transactionStatement, someOne, buys);

Role / Kind (schema layer instance):

Aggregated Entity and Statement Entity occurrences reified into a Role / Kind along with its Statements and Occurrences.

(Role / Kind, Entity, Statement, Occurrence);  
(someBuyer, someTransaction, transactionStatement, someOne);  
  
Class (schema layer class):

Aggregated Role and Entity Role occurrences reified into a Class along with its Entities and Statements.

(Class, Role, Entity, Statement);  
(Person, someBuyer, someTransaction, transactionStatement);  
  
Flow (behavior layer instance):

Aggregated Class and Role Class occurrences reified into a Flow along with its Roles and Entities.

(Flow, Class, Role, Entity);  
(someBuy, Person, someBuyer, someTransaction);  
  
Behavior (behavior layer class):

Aggregated Class and Role Class occurrences reified into a Behavior along with its Classes and Roles.

(Behavior, Flow, Class, Role);  
(Buy, someBuy, Person, someBuyer);

Then, each Model aggregates its Statements in the form (for example):

(Model Impl, Buy, someBuy, Person); Interaction / Meta Model.  
  
This "aggregations" are part of what I call "Augmentation(s)": Aggregation, Alignment and Activation are ones of those, which are functional transforms described declaratively in an object graph Meta Model. The act of applying an Augmentation implies one source Message Resource (context layer), one matching Template Resource (input signature) an Augmentation (Interaction functor) a Transform Resource (output signature) and a resulting (set of) Message Resource(s) materialized as further layers instances / Messages to be “parsed” by further corresponding Augmentations of matching Template signatures (dataflow).

Declarative means of using RDF quads to state application object models (data, schema and behavior).

Formalization: Functional / Object API. Reference / Data model. Sets, categories, models.

Subjects: attributes / values, contexts / roles.

(Context, Occurrence, Attribute, Value);  
(Context, Sign, Concept, Object);

Instance, occurrence, class, metaclass.

Hierarchies: layered quad statements are represented by a class hierarchy which root is the Resource<T> monad. There is a subclass relationship between each layer implementing class and the one of the next layer (Dynamic Object Model).

Quads in the context role of lower layers represents occurrences of context enclosing layer. Assert class hierarchies, order relation (temporal, causal, containment, etc.) by attrs / vals, set / superset relations.

Discovery: All model kinds are browseable / discoverable. Reactive Streams.

Determine class (reified layers contexts) hierarchies:  
(ContextReifiedClass, ContextReifiedSubClass, SubClassAttributeKind, SubClassValueKind);

Merge / specify model, context, interaction graphs. Reified model resources, statements, kinds. Model, context, interaction model graphs layers specifications. Reified models layers contexts resources describe graphs. Augmentation. Message context statement occurrence: Model.

Model MetaGraph: Resource, Statement, Kind (reifying class / instances) contexts / occurrences / attributes / values. Encoding. Message dispatch,  
event bus routes. URIs / IDs mappings.Resource set specification resolution. Resolve concrete resources, Message expansion. Resolve Message / dialog (CRUD) semantics.  
Dimensional / Grammar models.

Kinds (Application):

Kind: Basic type inference. Applied over layers CSPO during Activation Augmentation. An Occurrence Attributes / Values, aggregated for its URI and Context, determines Kind "members" (Attribute) and Kind instance member values (Value).

Super Kind / sub Kind hierarchy relationship is given by a set of Kind Attributes being super set / sub set of each other.

Examples.

SubjectKind (meta Resource): For a given URI occurring as Subject (Occurrence) across a set of Statements (Contexts), its aggregated Predicates (Attributes) defines its "Kind" and its Attribute values determines the given Kind instance "members" values.

ObjectKind (meta Resource): for a given URI occurring as Object (Value) over a set of Statements, Subject (Kind Attribute), Predicate (Kind Value).

PredicateKind (meta Resource): for a given URI occurring as Predicate over a set of Statements, Object (Kind Attribute), Subject (Kind Object).

ContextKind: SubjectKind (Attribute), ObjectKind (Value). Context (Statement) "signature" (dataflow inputs / outputs activation: domain / range).

OntResource is the class responsible for aggregating different URIs referring the same entities (Ontology Matching).

Resource : Functional (Monad) OntResource wrapper.

(Context : Resource, Occurrence : Resource, Attribute : Resource, Value : Resource);

(Statement, Occurrence, Attribute, Value);

(Entity, Statement, Occurrence, Attribute);  
(Role, Entity, Statement, Occurrence);  
(Class, Role, Entity, Statement);  
(Flow, Class, Role, Entity);  
(Behavior, Flow, Class, Role);

Class intension / extension (Context / Value).

**5.2.: Meta Resources**

Meta Model Context hierarchy classes:

Classes: Layers monads. Class hierarchy. Inputs resolves from wrapper containers to next layer occurrences (map forward), occurrences contexts collects matching result graph (reduce backwards).

ID<ID> : Reified matching URIs

Transform<ID> : Range

Mapping<Transform>

Template<Mapping> : Domain

Augmentation<Template>

Resource<Augmentation>

Role<Resource> : CSPO Role

Statement<Role> : CSPO Quad

Model<Statement> : Set of Statements

Meta Resource / Model: encode Model, URIs / Layers / Contexts / Facets / Levels / Resources hierarchies. Mappings.

Meta Resource / Model: Encode Message, Template, Augmentation(s), Transforms and Mappings (Dataflow).

Meta Model: Data, Session, Interaction Levels (Message, Template, Transform, Augmentation statements). Mappings.

Model Context / Layers, Facets, Ontology levels, Meta Resources / Models mappings / reification. APIs. Levels example: Behavior / Interaction (Action, Gesture..., Flow). Upper ontologies: Action, Gesture etc. classes.

Contexts / Layers / Levels / Facets Meta Resources / Models classes / instances hiers (ontology matching / data, schema, behavior alignments). Members: URIs, Resource, Context, CSPO, Meta Resource / Model APIs.

Functional API: Message IO. Mappings.

State order (in context class hierarchies axes), comparison relations, iterations, flow, events, causal relations, units, enums, equivalence, etc.

Data order: Resource Kind hierarchies.

Schema order: Role Class hierarchies.

Interaction order: Statement Context hierarchies.

**5.3.: Meta Model**

Messages: Augmentation (performed transform), Template, Mapping (possible transform), Transform.

Monads / Functors examples (order: comparables / upper / dimensional ontologies):

Kind<SubjectClass<Resource>, Set<PredicateClass<Resource>>>;

Example: Subject / Predicate(s), others (quads prev / next relation).

Metaclass<ObjectClass<Resource>, Set<OccurrenceClass<Resource>>>;

Example: Object / Statement(s), others (layers parent / child occurrences relation).

Class<ObjectClass<Resource>, Set<ContextClass<Resource>>>;

Example: Resource / Kind(s), others (class definition relations: extension / intension, layers parent occurrences prev relation).

Reactive Uniform Component API: Context reactive instances: network addressable / operable (pub / sub streams). Wrapper API.

Addressing: Encoding. Network URLs, Semantic URNs. Naming, Index, Registry operations.

Dataflow Routes: Context Signatures. Forms. Bus. Addressing dispatch resolution.

Message: IDs Statement. Specifications (CRUD).

Template Matching: Alignment / Encoding. Populate Template with Message. Map.

Augmentation Mappings: Flows (Wrapper API). Exchange.

Materialize Specification: Transform (Wrapper API). Reduce.

Classes: Layers monads. Class hierarchy. Inputs resolves from wrapper containers to next layer occurrences (map forward), occurrences contexts collects matching result graph (reduce backwards). Map / Reduce: Graph key / value / properties encoding.

ID<ID> : Reified matching URIs.

Message (encoded reified verb?)

Transform<ID> : Augmentation Range

Mapping<Transform>

Template<Mapping> : Augmentation Domain

Augmentation<Template> : Domain / range signature

Resource<Augmentation>

Role<Resource> : CSPO Role

Statement<Role> : CSPO Quad

Model<Statement> : Set of Statements Role Resource Occurrences (Kind?)

Messages: Augmentation (performed transform, Flow), Template, Mapping (possible transform, Form), Transform. Dialog.

Model Reactive I/O:

Model forward (map inputs): aggregate inputs into reified layers contexts instances (Model Meta Resources reification).

Augmentation: populate / perform Flows. Aggregate, Align, Activate (over mapped inputs). Mapping Template Transform algorithms / services encoding in Statement plus Meta Resources.

Model backwards (reduce outputs): collect occurrences graph (matching signatures contexts from Model layer to IDs).

ContextClass<OccurrenceClass> : Layer (IDs). Attributes, Values.

Events: Message Monads (IDs hierarchy instances), Functors (layers classes instances reifying model classes / domain instances from facets / levels). Flow: Augmentation materialized Transform. Form: Mapping possible Transforms. Browse / Apply (generic forms, flows?, Wrapper API).

Layers:

Resource?

(ID, ID, ID, ID); Message (encode reified verb?)

(Transform, ID, ID, ID);

(Mapping, Transform, ID, ID);

(Template, Mapping, Transform, ID);

(Augmentation, Template, Mapping, Transform);

(Resource, Augmentation, Template, Mapping);

(Role, Resource, Augmentation, Template);

(Statement, Role, Resource, Augmentation);

(Model, Statement, Role, Resource); Resource Occurrence in Model (Kind? Kind Role type, Kind hierarchies.)

Functional layers?

Resources (reactive entity: quad / ID):

Layers Context types: reified Resource quads instances (Meta Model Kinds). Resource quad wrapping: signatures bindings.

Context layers instances: Meta Model Kinds hierarchy. Resource quad wrapping: signatures bindings.

Meta Model Kinds hierarchy (super / sub Resource class / kinds rels: super: ctx kind, sub: obj kind). Reified model entities: layers super types,

Uniform Reactive Resource Quads Wrapper API (Resource / IDs / Message / Layers): Metaclass (P) / Class (C) / Instance (O) / Occurrence (S) CSPO Resource roles / rels members, monads / transforms. Events domain / range.

Reactive component: Resource, pub / sub (endpoints APIs) for wrapping signature bindings (layers). Events domain / range.

Aggregations: Subject / Attributes, Attributes / Object, Subject / Object (Kinds). API for Functional layers interaction / composition.

Enable uniform treatment of Resources for layers aggregation / augmentation, etc.

Message / Specifications (Mappings Forms / Flows). Encoding (Specification, Form, Flow) of Mapping Transforms.

Transform. Compare: common upper types.

Encoding: nested shapes of recursive cuads (till primitives). Patterns / expressions: wildcards, variables, placeholders:

[[123, 456, \_b, $a][\_b][\*][$a]]

Resource Component:

reactive resolution / instantiation events matching conditions.

Resource class / component kind:

Members. Relations: Graph quad layers bindings (DOM). Previous, next, parent, child (order: class hier relations), Resource (instance), Role (metaclass), Statement (occurrence), Kind (class). Resource Monads. Eval rels axis: instance. Functors: ID Monads rels traversal.

(Context, Occurrence, Attribute, Value);

Events API. DOM. Monads. Functors (domain / range). Relations / traversal. Events. Encoded in Meta Model (Message Monad).

Encoding: signatures / bindings. Representation query / traversal / transform. Class / instance Functor / Monads relations Dataflow.

Resolution / instantiation: Resource & Resource members / graph quad layers bindings.

Statements: Backend. Encoding. Addressing. IDs. Sync Functional Object Model. Services. Reified Object Model. Onto aligns: upper / dimensional. Messages I/O: IDs matching / alignments.

Functional Object Model:

Events (Message I/O) conditions matching (resolution / instantiation / bindings).

Objects: componed of aggregation of monad resources of a reified ID.

Flows: (Resource (Role (Statement (Kind))));

Forms: (Template (Mapping (Transform (Augmentation))));

Object: (Value (Attribute (Occurrence (Context))));

Members, relations, endpoints (API).

Message I/O: Dispatch according signatures bindings. Augmentation events (Functors) Kind streams.

Message<Monad<ID>>: Objects matching Message encoded structure (value, attribute, occurrence, context, class / instance, rels). Resolve, instantiate: perform Message logic (encoded in Model monads / Meta Resources). Example: Map Reduce. Return Dialog Graph Message.

ID

Message<Monad<ID>>

4 Transform: Range Flow

3 Mapping: Bind Specification

2 Template: Domain Form

1 Augmentation: Verb / Event. Browse rels

4 Resource

3 Role

2 Statement

1 Kind: Event streams

(...Model, Functional? Class, Entity, Flow, Behavior)

OGM: Object Graph Mapper. REST Facade. Domains activation.

Meta Model: encode Layers, Contexts, Kind / Roles hierarchies (subject, context, occurrence, roles, atributes, values / metaclass, class, instance relations / meta resources).

Augmentation: Described in Meta Model. Encode Message, Template, Augmentation and Transforms roles (Meta Resources). Data, Session, Interaction Levels (Message, Template, Transform, Augmentation statements declaration realization).

Augmentation. Aggregation Meta Model: Describe layers contexts compositions. Alignment Meta Model: Describe augmented attributes (by kinds clustering). Activation Metamodel: Describe Kinds / Roles activation (by attributes aggregations).

Encoding. Addressing (contents, signatures, contexts). Events publish / subscribe. Dynamic subscriptions / bindings. Subscription, reactive Meta Resource(s). Message flow mechanism: from Model to base layers.

Context: Resource / Message Monad Events: Augmentations. Mapping: Endpoint. Events: Implement Message / Resource / URIs Protocols.

Monadic wrapper for which Augmentation (Functor Events) are declared into Interaction Model. Model(s) themselves are Augmentation(s). Augmentation Statement Context Kind defines Event “signature”: Resource input / output Event domain / range. Output from an Event application (Transform) may feedback Model triggering further events (Dataflow). Augmentation Template, Mapping and Transform may behave as placeholder for Dataflow rendering of Meta Models.

Model Resources react to events according Message matching event “signature”.

Message (Subject : Data level)

Template (Context / domain : Session level)

Augmentation (Occurrence, declarative / service Resources: functors. Interaction level)

Transform (Role / range: Kind transform matches. Session level). Resulting Message Attribute / Value roles populated.

Meta Model encodes:

Meta Resource class / instance patterns.

Participation: Subject in Occurrence.

Role: Participation for Subject.

Kind / Context hierarchies.

Mappings: Facets (Models / Contexts declarations) by Meta Resource statements in Meta Model. Mappings renders Model(s) contents statements (layers) by Context Augmentations.

Augmentations defined as declarative Mappings in Meta Model encoding Context (layer) inputs matching signatures and augments current / previous layer emmiting mapping transforms. Context : Functor. Participation wraps Context / Resource.

Aggregation (Augmentation): Apply each Context (layer) Functor on inputs (from input layer) and emits Transform, matching corresponding (next) layer. Next layer Context and SPO according functional mapping declared by Meta Resource types on augmented layer.

Alignment (Augmentation): ToDo.

Activation (Augmentation): ToDo.

**5.3.1.: Facets**

Models have “Facets” which renders the different ways Model data / schema / behavior could be regarded as and used for different purposes, from application development to Business Intelligence and Ontology Matching.

Facets are models implemented the same way other models are with Model Resource Contexts and layers and from the same data. Each Facet implements its own Resource URI wrapper (same URIs, ontology matching, provenance of aligned URIs, Facet pivoting). Then, each Facet has its own Model Context Resource class hierarchy having Augmentation / Dataflow functors as Model Resource(s) does.

Facets: Context to Model Mappings. Data / schema / behavior class / instances views (aggregation) APIs. Model Meta Model layer aggregations.

Several types of Model(s) exists: Facets, each one preserving this layered structure. Model Facets have corresponding Layers and those layers are populated by corresponding Data, Schema, Behavior conforming Ontology Levels for each Facet. Facets abstract Model(s) inputs regarding this aspects: Source (Functional) Data, Semiotic and Dimensional Model Facets.

Facets are also populated in what are called Ontology Levels, which are Facet data, schema, behavior statements aggregated from feedback from the data, schema and behavior corresponding instance layers of the Facet Models themselves again into the input layer thus allowing for further describe upper ontology abstractions. These upper abstraction may be grouped into: Backend / Source (Data : plain inputs), Grammar / Session / Context (Schema : schema layer feedback inputs) and Interaction (Behavior : behavior layer feedback inputs).

**5.3.1.1.: Functional Facet**

Facet Aggregated Quad Statement Layers:

Layers are implemented as an RDF Quads hierarchy aggregating each one on top of another. The idea is that aggregating Data according some criteria one could enable us to infer the Schema that those Data belongs to and that aggregating Schema and Data one could enable us to infer the Behavior (operations) that correspond to the Data manipulation in that corresponding Behavior layer class / instance.

The idea is to infer Schema (classes and instance of classes / relations) operating over Data layer. Then, by aggregating Data and Schema, infer Behavior (classes and instances of operations / functions). This Aggregation, together with Alignment and type Activation mechanisms comprehend the Model core Augmentations.

(Statement, Role, Resource, Augmentation);

(Entity, Statement, Role, Resource);

(Kind, Entity, Statement, Role);

(Class, Kind, Entity, Statement);

(Flow, Class, Kind, Entity);

(Behavior, Flow, Class, Kind);

**5.3.1.2.: Semiotic Facet**

Facet Aggregated Quad Statement Layers:

(Context, Sign, Concept, Object);

Object as Sign: Concepts represents attributes (DOM / OGM). Ontology Matching (shapes).

Semantic / Semiotic Facet:

Resource : Functional URI wrapper.

(Context : Resource, Occurrence : Resource, Attribute : Resource, Value : Resource);

(Attributes, Occurrence, Attribute, Value);

(Object, Attributes, Occurrence, Attribute);  
(Concept, Object, Attributes, Occurrence);  
(Sign, Concept, Object, Attributes);  
(Context, Sign, Concept, Object);  
(Interaction, Context, Sign, Concept);

(Model, Interaction, Context, Sign);

**5.3.1.3.: Dimensional Facet**

Facet Aggregated Quad Statement Layers:

(Value, Previous, Distance, Next);

(Measure, Value, Previous, Distance);

(Unit, Measure, Value, Previous);

(Dimension, Unit, Measure, Value);

(Concept, Dimension, Unit, Measure);

(Context : Resource, Occurrence : Resource, Attribute : Resource, Value : Resource);

(Properties, Occurrence, Attribute, Value); Data (Properties: distance / facts).

(Value, Properties, Occurrence, Attribute); Info (Properties distance between Occurrence / previous and Occurrence / next).  
(Measure, Value, Properties, Occurrence); Knowledge.  
(Unit, Measure, Value, Properties);  
(Dimension, Unit, Measure, Value);  
(Concept, Dimension, Unit, Measure);

(Model, Concept, Dimension, Unit);

Dimensional alignment / aggregation layers (lower resource alignment layers):

(Value, Distance, Prev, Next : in Units); (Measure, Value...) (Unit, Measure, Value,...); (Resource, Unit, Measure, Value); Marriage event example.

Model Contexts: Meta Resources / Contexts hierarchies. Models:

Data: Source / Interaction, Schema: Encoding / Grammar, Behavior: Dimensional / Measures (marriage).

Example:

(Value, Previous, Distance, Next); Person, Single, Marriage, Married; Man, Single, Marriage, Husband; Woman, Single, Marriage, Wife.

Order layers statements. Hierarchies (contexts / kinds). Parent / child relationships (steps). Order type relationships: husband: single / marriage / married.

(Value, Previous, Distance, Next); Person, Single, Marriage, Married; Man, Single, Marriage, Husband; Woman, Single, Marriage, Wife.  
(Measure, Value, Previous, Distance);  
(Unit, Measure, Value, Previous);  
(Dimension, Unit, Measure, Value);  
(Concept, Dimension, Unit, Measure);  
(Resource, Concept, Dimension, Unit);  
(Statement, Resource, Concept, Dimension);

Value, Previous, Distance, Next. Dimension, Unit, Measure, Value (aggregated ordered statements layers).

Value -> distance(prev, next); ordering;

Assert knowledge: 1h -> 60min;

dom-lun-mar-mie-jue-vie-sab (orders);

1mt -> 100cm;

etc.

Comparison / order: Alignments (prev, curr, next asserted knowledge). Next hour, location, city, country, next distance at next time at current speed. Event sourcing / tracking: married -> marriage occurred.

Sort: cause / effect, temporal, etc. Messages align, functional map, fold, etc. Primitives. Encode layered statements ordering. Complement / supplement concepts definitions.

Encoding / Dimensional example: role in context. X is Y for Z in W.

(W (Z (X (Y))));

(Marriage (Role (Man (Husband))));

(Hour (Minute (1 (60))));

Encoding, Dimensional, Meta Model. Units. Events. Order. Relations. Comparison. Input layers. Augmentation.

Events metamodel (TBD):

**5.3.2.: Layer Levels**

Models / Meta Model Levels: reify models Contexts hierarchies into IDs layer. For each model layer into different hierarchies reify an ID layer quad statement corresponding to those layer Context and perform corresponding layer(s) aggregations. Inferred “upper” ontologies. Mappings population / resolution.

Models have “Ontology” Levels. Levels are Layers (of the Model) which are feed into its input Layer with (instance) Statements aggregated from initial input data (Data Level) aggregated into subsequent layers. Schema Level instances feeds the Model input conforming a Session (context / grammars) ontology Level. Then, behavior Level instances feeds the Model input conforming an Interaction (behavior) ontology Level.

Examples: Source, Session, Interaction declarative application protocol use case upper ontology levels (Action… Gesture, etc).

**6.: ID: Context Reactive Abstraction**

Model IDs. Service (Connector / Client) IDs. Addressing reactive abstraction.

Context<ID>; Signature route. Reactive producer / observer.

Mapping<Context<ID>, Context<ID>> : Context<ID>;

Mapping<Template : Person (S), Transform : Address (O)> (P) : Context<ID> (C) : Augmentation;

Mappings Encoding: parse Template in context of Transform. Augmentation: materialized result Resource (query / assertion).

Meta Model: IDs to Context hierarchy Mappings.

Meta Model levels reification populates / resolves Mappings.

Queries / Assertions: Domain driven and Core Augmentation Messages: Model Message layout (Flows browsable API) defined in models levels reifications (grammars / layers / facets / levels).

Model Message layout Dataflow: Mapping routes, Templates, Transforms signatures matching (bindings).

Model Message layout Augmentation: Message input transform / alignment (raw quads: ontology matching / match Model patterns). Message<Context> : apply Dataflow transforms. Emit resulting Message (dialog / feedback).

Model Encoding: Property graph. Properties (prefix codes, key / value, reification). Sets, groups, categories. Functors applications: Transforms as graph navigation / browse. Template Message parsing (grammar, verbs, state flow). Contextual Quad Context ID: ID according occurrence in Statement context (normalized forms). Occurrence Context IDs indices / mappings.

Encoding, IDs: magic numbers (MIME types : Context Kinds), metaclass, class, instance, context, CSPO, etc. relations "contextual slots" for IDs. Resource resolution, Operation (primes, encoded lattice, slots context relations) factors in Meta Model relations. Encode order, hierarchies, temporal, causal (reified), containment, etc. relations into IDs encoding. Ontology matching: encoded IDs roles in context aggregation / learning.

IDs: Addressing / Encoding. Semantic (signature, contents, context) resolvable / discoverable identifiers.

Ontology Matching:

Ontology Matching: IDs, Addressing, Encoding. Functional, Semiotic, Dimensional (Facets). Layers. Levels. Meta Resource / Model. Sets. Value as occurrence of attribute. metaclass / class / instance IDs.

Ontology Matching: Encode: order, iteration, flows, units, relations, events, enums, etc.

Messages CRUD / Invocation semantics. Dialog. Prompts.

Encoding: Cons lists. Trees. Huffman / Prefix codes. RDF List serialization. Meta Resources / Models declarative Encoding, Addressing, Mappings, Transforms (Immutable sequences, dataflow Mapping: Template / Augmentation / Transform functional streams).

Kinds, Signatures. Contents. Contextual metadata. Sets (bitstring cuads). Lattices.

Encoding: Template Message augmentation (inputs).

Encoding: Declarative functors (Augmentation) behavior encoded in statements. Mappings (subscription / routes).

Encoding: Transform Message augmentation (outputs).

Interaction Model (Interaction Level):

(Augmentation, Template, Mapping, Transform);

Dataflow: Order, Flows (Mappings, hierarchies).

Order / comparisons: tree representation ordered by Context Role class hierarchy, instances hierarchies and aggregation hierarchies. Resources order (IDs). Statements order (Statement IDs). Comparison criteria (choose relevant IDs). ToDo.

Semantic resolution: Query Resource(s) satisfying “criteria” (i.e.: Object(s) for predicate) IDs by IDs resolution pattern:

Query Resources by role in context.

Query Resources by attributes / values.

Query Resources by identity / type.

Context Kind: Functional stream of Context Statements (Occurrences).

Subject Kind: Functional stream of Subject Statements (Occurrences).

Predicate Kind: Functional stream of Predicate Statements (Occurrences).

Object Kind: Functional stream of Object Statements (Occurrences).

Message - Model - Template (data) - Augmentation (functor) - Transform (interaction) - Model - Message.

Ontology Matching:

Ontology Matching: IDs, Addressing, Encoding. Functional, Semiotic, Dimensional (Facets). Layers. Levels. Meta Resource / Model. Sets. Value as occurrence of attribute. metaclass / class / instance IDs.

Ontology Matching: Encode: order, iteration, flows, units, relations, events, enums, etc.

Messages CRUD / Invocation semantics. Dialog. Prompts.

Encoding: Cons lists. Trees. Huffman / Prefix codes. RDF List serialization. Meta Resources / Models declarative Encoding, Addressing, Mappings, Transforms (Immutable sequences, dataflow Mapping: Template / Augmentation / Transform functional streams).

Kinds, Signatures. Contents. Contextual metadata. Sets (bitstring cuads). Lattices.

(C (S (P (O, Nil))));

(C2 (C (S (P, Nil)));

Encoding / Dimensional example: role in context. X is Y for Z in W.

(W (Z (X (Y))));

(Marriage (Role (Man (Husband))));

(Hour (Minute (1 (60))));

Encoding, Dimensional, Meta Model. Units. Events. Order. Relations. Comparison. Input layers. Augmentation.

Meta Model:

IDs:

URI(s);

OntResource; Merged URI(s) wrapper.

OntResource hierarchy: layers statement contexts. Facets DOM, Actor / Role.

Resource (OntResource Context Roles hierarchies Monad wrapper);

Statement : Resource quad, Resource.

Message (Resource Monad wrapper); Request / Response Encoding.

Template / Transform (Message blueprints) domain / range : Message.

IDs:

A: ID

B: Transform

C: Mapping

D: Template

E: Augmentation

F: Model

G: OntResource

H: CSPO Role

I: Statement

J: Kind

K: Class

L: Context

State Facet / Layer / Level / Augmentation / Model Resource Mappings.

Meta Resources layers contexts class hierarchy:

Context : Class : Kind : Statement : Role : Resource : Model : Augmentation : Template : Mapping : Transform : ID;

Meta Resources layers Reification: Context : Class : Kind : Statement : Role : Resource : Model : Augmentation : Template : Mapping : Transform as ID Context Statement (ID statements for each context layer). Model Levels (Facets / Levels). Aggregate reifications.

Meta Model:

A: (ID, ID, ID, ID);

B: (Transform, ID, ID, ID);

C: (Mapping, Transform, ID, ID);

D: (Template, Mapping, Transform, ID);

E: (Augmentation, Template, Mapping, Transform);

F: (Model, Augmentation, Template, Mapping);

G: (Resource, Model, Augmentation, Template);

H: (Role, Resource, Model, Augmentation);

I: (Statement, Role, Resource, Model);

J: (Kind, Statement, Role, Resource); Data (Resource Kind).

K: (Class, Kind, Statement, Role); Schema (Role Class)

L: (Context, Class, Kind, Statement); Interaction (Statement Context).

ID: (L (K (J (I (H (G (F (E (D (C (B (A, Nil))))))))))));

Cons lists. Binary Trees. Huffman / Prefix codes. RDF List serialization. Meta Resources / Models declarative statements Encoding, Addressing.

Kinds, Signatures. Contents. Contextual metadata.Lattices. Roles.Sets (bitstring cuads). Definitions (elements). Operations. Rules. Categories. Groups.

ID: Augmentation occurrences metadata in Statement contexts;

Statement: (ID (ID (ID (ID, Nil))));

(C (S (P (O, Nil))));

IDs, Meta Model, Interaction Model (Level), Session (Level), Backend (Level), Facets features:

Augmentations: Interaction Model Mappings execution / persistence / retrieval. Reactive model via representation of IDs: Mappings (signatures) dataflow inferred Augmentations.

Persistence: (activation / passivation): IDs / Meta Model / Facets from Interaction Model events (Messages) from Node IO. Interaction Model: Main Model(s) Message IO.

Order / comparisons: tree representation ordered by Context Role class hierarchy, instances hierarchies and aggregation hierarchies. Resources order (IDs). Statements order (Statement IDs). Comparison criteria (choose relevant IDs). ToDo.

Semantic resolution: Query Resource(s) satisfying “criteria” (i.e.: Object(s) for predicate) IDs by IDs resolution pattern:

Query Resources by role in context.

Query Resources by attributes / values.

Query Resources by identity / type.

Message (Resource Monad wrapper) : Statement; Request / Response Encoding.

Template / Transform (Message blueprints) domain / range : Message.

Augmentation : Functor.

Mappings: Immutable Resources Message based Augmentation bindings. Dataflow subscription routes: Signatures / CKs (Augmentation(s) functional streams).

Subject Kind: Subjects stream. Object Kind: Objects stream.

Encoding: Template Message augmentation (inputs).

Encoding: Declarative functors (Augmentation) behavior encoded in statements. Mappings (subscription / routes).

Encoding: Transform Message augmentation (outputs).

Interaction Model (Interaction Level):

(Augmentation, Template, Mapping, Transform);

Dataflow: Order, Flows (Mappings, hierarchies).

Interaction Model: aggregated Meta Model interactions (performed / inferred / possible) declared Models events (saga pattern).

Messages: Saga Activation. Interaction Model (Meta Model). Aggregated (Interaction) Meta Model interactions (performed / inferred / possible) emitted as Model event Messages (Saga pattern). Mappings.

**8.: Signatures**

CSPO Context Kind (Statement Subject Kind + Object Kind). Context Dataflow domain / range (Context as reactive streams producer / consumer).

**9.: Routes / Dataflow**

Routes: Dataflow pub / sub bindings between matching signatures.

Core Model and Domain driven Message flow layout (Mappings).

**10.: Event Bus / Messages / Addressing**

Dispatch Event into Dataflow Route.

Messages:

Monadic Functional Statement (Resource) wrapper.

Messages: Message semantics (Augmentation: Verbs, CRUD, Behavior) according Message structure / pattern (dialog / prompts).

Augmentation result: Message / interaction layer matching / populated Transform Statement. Template, Mapping, Transform Augmentation Meta Resources.

Messages: Dataflow Template matches signatures (Session level, enrichs Message with Model / Dialog prompts / contents). Augmentation Functor applied over Message contents (Interaction level). Transform matching output signature emits (Session level, populated / prompts) output Message.

Persistence:

Messages: Events IO / Persistence: Saga Activation / Passivation populating Node local Quad store / persisting peers via DIDs ([ont.io](http://ont.io/)) semantic (resolvable / discoverable) identifiers.

Interaction Model: aggregated Meta Model interactions (performed / inferred / possible) declared Models events (saga pattern).

Augmentations: Interaction Model Mappings execution / persistence / retrieval. Reactive model via representation of IDs: Mappings (signatures) dataflow inferred Augmentations.

Persistence: (activation / passivation): IDs / Meta Model / Facets from Interaction Model events (Messages) from Node IO. Interaction Model: Main Model(s) Message IO.

Messages: Saga Activation. Interaction Model (Meta Model). Aggregated (Interaction) Meta Model interactions (performed / inferred / possible) emitted as Model event Messages (Saga pattern). Mappings.

Saga Activation / Passivation populating Node local Quad store / persisting peers via DIDs ([ont.io](http://ont.io/)) semantic (resolvable / discoverable) identifiers.

Messages: Saga Activation. Interaction Model (Meta Model). Aggregated (Interaction) Meta Model interactions (performed / inferred / possible) emitted as Model event Messages (Saga pattern). Mappings.

Messages: Saga Passivation. Model layers data routed by Mappings as event Message into (Interaction) Meta Model. Message inputs: Models. Mappings. Populate.

Messages: Dataflow. Subscriptions. Reactive Model. Dynamic subscriptions / bindings. Events publish / subscribe between Model Resource. Mappings.

Messages: Saga Activation. Interaction Model (Meta Model). Aggregated (Interaction) Meta Model interactions (performed / inferred / possible) emitted as Model event Messages (Saga pattern). Mappings.

Messages: Saga Passivation. Model layers data routed by Mappings as event Message into (Interaction) Meta Model. Message inputs: Models. Mappings. Populate.

Resolve Message matching Resource from behavior layers / matching kinds from Model / data layers.

(Kind, SuperKind, Attribute, Value);

(Occurrence, Kind, SuperKind, Attribute);

(Context, Occurrence, Kind, SuperKind); (attributes / links bindings).

(Resource, Context, Occurrence, Kind); State Resource Kind in occurrence context (context / role bindings).

(Statement, Resource, Context, Occurrence); State Resource URIs occurrences / Resource class IDs (classification bindings).

(Interaction, Statement, Resource, Context);

(Action, Interaction, Statement, Resource);

Example: a message composed of a kinds CSPO matches statements “instances” of those specifications (statements whose CSPO have matching kinds). A message with three CSP kinds and a (potentially unknown) object URI retrieves matching resources having that object value into corresponding property kinds. An statement of plain (potentially unknown) URIs instantiates / updates and augments new / known resources added to models and returns an augmentation transform result.

Interaction Model: Context of Messages model for a given interactions session / dialog state. Message invocation requests: Statement(s) building Resource invocation graph with layers matching Message patterns. Layers graph invocation patterns matching from higher to lower layers resources fulfilling higher layers templates. Variables, wildcards, placeholders.

Dialog arguments resolutions example: higher layer Resource / Message request / invocation instantiates in Interaction Transform context corresponding lower layer graph statements to be “populated” to fulfill request. Message IO of “forms” (Messages) inter-peers (originating peer  
acting as “server”) for initial requested peer to “ask” for form elements to be populated (interaction context “dialogs”). Resolution may propagate to other peers (content aware addressing dataflow routes dispatch: P2P resources address encodings, matching forms models requests). Nested interactions.

Explain messages (resource resolution). Grammar. Match model Resource(s). Compound nested CSPO statement contexts defines result behaviors. Message CSPO contexts may define create, retrieve, update or delete operations (passing 'null' for example for resource / statement to be deleted).

Explain transforms (message application). Transform: Resource stream result of Message application over resolved Resource(s)). Input statements: Message(s) / Resource(s) (from input message or to be populated or populated in dialog) and "goal" Message / Resource aggregating a model from Resource MetaGraph with Message / Resource bindings.

**11.: Model I/O**

Dialog Protocol:

Example: a message composed of a kinds CSPO matches statements “instances” of those specifications (statements whose CSPO have matching kinds). A message with three CSP kinds and a (potentially unknown) object URI retrieves matching resources having that object value into corresponding property kinds. An statement of plain (potentially unknown) URIs instantiates / updates and augments new / known resources added to models and returns an augmentation transform result.

Interaction Model: Context of Messages model for a given interactions session / dialog state. Message invocation requests: Statement(s) building Resource invocation graph with layers matching Message patterns. Layers graph invocation patterns matching from higher to lower layers resources fulfilling higher layers templates. Variables, wildcards, placeholders.

Dialog arguments resolutions example: higher layer Resource / Message request / invocation instantiates in Interaction Transform context corresponding lower layer graph statements to be “populated” to fulfill request. Message IO of “forms” (Messages) inter-peers (originating peer  
acting as “server”) for initial requested peer to “ask” for form elements to be populated (interaction context “dialogs”). Resolution may propagate to other peers (content aware addressing dataflow routes dispatch: P2P resources address encodings, matching forms models requests). Nested interactions.

Explain messages (resource resolution). Grammar. Match model Resource(s). Compound nested CSPO statement contexts defines result behaviors. Message CSPO contexts may define create, retrieve, update or delete operations (passing 'null' for example for resource / statement to be deleted).

Explain transforms (message application). Transform: Resource stream result of Message application over resolved Resource(s)). Input statements: Message(s) / Resource(s) (from input message or to be populated or populated in dialog) and "goal" Message / Resource aggregating a model from Resource MetaGraph with Message / Resource bindings

**11.1.: Mappings: Events Transforms Declarations**

Interaction Model declares Events (Augmentations) which have a functional Mapping between its domain (Template) and range (Transform). An Augmentation Context Kind correspond to this Mapping “signature”. Dataflow binds input Message(s) to domain Template by pattern matching and resolving any input Message references (Addressing).

Outputs are resolved by pattern matching with Transform, Message and existing Model data. Augmentations may play the role of “placeholder” Resource(s) which are bound to context aware Augmentations thus rendering Transforms into Model entities (including Mapping Augmentations themselves).

**11.2.: Core Augmentation Mappings**

One also could Augment Resource(s) in a functional manner, using reactive event driven APIs so, for example applying "Person" class to "Employee" role could shield a Resource set of people being working for someone. The ultimate goal is to be able to "plug" as much "backends" connectors as possible into distributed peers which exposes protocols / APIs for knowledge driven hypermedia applications.

Extension / Augmentation: BI / EAI. Smart dashboards / reports / workflow / process / activity components. Activable smart indicators / components (predict / execute). Declarative Model interpretation into abstract application models. Rendering (Gestures ontology).

**11.2.1.: Aggregation**

Aggregation: infer roles in contexts: regression (Person class in Employment interaction : Developer role).

**11.2.2.: Alignment**

Alignment (infer attributes / relations): clustering (from multiple occurrences of same entity in diverse data sources).

**11.2.3.: Activation**

Aggregation: infer roles in contexts: regression (Person class in Employment interaction : Developer role).

Message service URIs: contextual (statement / dialog) service invocations.

Example: Subject (image URI / resource : source), Predicate (detection service / index service), Object (detection / search results endpoint / placeholder : destination).

Grammars: Predicate Kind (face / search recognition signature) from Subject (faces images / names) / Object (face classes / subjects) Kinds. Kind model layers.

Models definition: data (Statement, Entity), schema / context (Role, Class), interactions / behavior (Flow, Behavior).

Kinds / Roles:  
Grammar: kinds layers aggregation (CSPO layers Kinds).  
Layers: Roles (Models metaclass context resources).

Reified Kind: (Kind, Occurrence, Attribute, Value);  
Grammar input set model specificatíon (Statement layer kinds).

Dimensional input set model specificatíon (from Statement layer, ordered SPOs: order criteria, comparisons. Kinds / class / occurrence / instance  
order criteria?). Value, Previous, Distance, Next. Dimension, Unit, Measure, Value (aggregated ordered statements).

MetaGraph (resolution). Dimensional / Grammar alignments / annotations.

Model MetaGraph: Resource, Statement, Kind (reifying class / instances) contexts / occurrences / attributes / values. Encoding. Message dispatch,  
event bus routes. URIs / IDs mappings. Resource set specification resolution. MetaGraph resolves concrete resources, Message expansion. Resolve Message / dialog (CRUD) semantics via MetaGraph driven transforms (data / schema / behavior augmentation: dialogs).

URIs API for annotating network retrievable resources metadata. Content type / model driven augmentations / activations (models features / outputs). Subject attributes / values. Occurrences contexts / roles. Paths, pointers, locators. Example: annotate document URIs (parts, sections, mentions), annotate images URI (whole image description, coords: classes, individuals), annotate DB, table, row, column, value URIs, annotate / describe service / APIs URIs. Hypermedia protocol composable with other (described / annotated) APIs / resources. Example: Drive APIs.

Resource<T : URI> monad. Message functors. Transform reactive extensions.

Transform : Observer / Observable of Resource<T : URI>. Stream. Built upon Resources / Messages (TransformBuilder).

Identity and other core transforms (core messages). Stream.

flatMap(Message::apply) : Transform<Resource<R : URI>>.

API: Class for layer for model.  
API: Class for layer (DOM).  
API: Parameterized Resource: layer classes determined by URIs hierarchy, i.e.: Resource<Entity>, Entity : URI.

Base core services URIs (index, naming, registry). URI subclasses implementing / wrapping state for Resource monads offering protocols / addressing / content types / representations facades for services: DBs, WS (REST, SOAP, SPARQL), ML (predictions), etc.

Discovery: All model kinds are browseable / discoverable.

Determine class (reified layers contexts) hierarchies:  
(ContextReifiedClass, ContextReifiedSubClass, SubClassAttributeKind, SubClassValueKind);

Merge / specify model, context, interaction graphs. Reified model resources, statements, kinds.

Model, context, interaction model graphs layers specifications. Reified models layers contexts resources describe graphs. Augmentation. Message context statement occurrence: Model.

MetaGraph (resolution). Dimensional alignments / annotations.

Model MetaGraph: Resource, Statement, Kind (reifying class / instances) contexts / occurrences / attributes / values. Encoding. Message dispatch, event bus routes. URIs / IDs mappings.Resource set specification resolution. Resolve concrete resources, Message expansion. Resolve Message / dialog (CRUD) semantics.

**11.3.: Augmentation: Events Mappings Realizations**

Functors: Augmentation declaration: Meta Model definitions (Context class / instances). Message: dataflow matches Template signatures: interactions. Apply Augmentation Functors over Message contents (interactions enrich Message with Models contents: ontology matching / Levels / Facets). Materialize / emit dialog / prompts Message (enrich Message from Models / reactive IO events).

Augmentation: Context / Functors. Message Resource(s) / Meta Resource(s) (nested / wrapped) elements determines flow Template Transform results / behaviors (CRUD, Functor invocations). Message IO performs Augmentations. Ontology levels resolution (Templates / Transforms / Augmentatiom levels: matching patterns / dialog prompts in Ontology levels).

Interactions declarations: signature definitions (Template / Transform contexts). Interaction instances: addressable exchanges (Augmentations, Message, Model context / Mapping bindings / matchings / performances). Meta Model / Levels event driven Model Augmentation.

Interactions declarations: signature definitions (Template / Transform contexts). Interaction instances: Exchanges (Augmentations, Message, Model context / Mapping bindings / matchings / performance). Contexts / Exchanges: Meta Model / Levels event driven source Augmentation events declarations (populating Facets / Layers / Levels).

**12.: Backend**

**12.1.: Model Containers**

**12.1.1.: Services / Protocols**

Layers (session, dialog, etc.). Node, Peer, Client, Connector, etc. Reactive / Event Driven. REST HATEOAS.

Protocol (deployment):

Functional "Dialog" Augmentation Semantics Protocol (Dataflow Message).

Applications:

Hypermedia Dataflow Activation (reactive / event driven knowledge based contents). Dataflow layers.

Distributed: Consistency. Inference of distributed state. Event sourcing. Trust. Reconciliation.

Connected application sources (backends: EAI / ESB) and declaratively stated application models.

Index, Naming, Registry.

**12.2.1.: Models Declarative Encoding**

**12.2.2.: Functional APIs**

Index, Naming, Registry.

MapReduce.

**12.3.: Persistence**

Blockchain DIDs.

MapReduce (Encoding).

**12.4.: Connectors**

Tryton

GNU Health

Apache Metamodel

JBoss Teiid

JBoss Drools / JBPM

OData

R2RQ / R2RML

SPARQL

ISO 15926 / ISO Topic Maps

DCI / MVC: JDBC / OGM / ORM / JCA / Activation JAF / Process Flows (state)

Declarative hypermedia: REST / HAL / HATEOAS

Declarative hypermedia: SOAP / WSDL

CMS / Wiki (API / Protocol / DAV). Docs. Forms (Docs Flows)

### Models: Layers

What my attempts where about in the beginning was to match different URIs or, for example, database identifiers which refer to the same entity (in different databases / ontologies, for example) to perform some kind of "ontology matching".  
  
Then I've tried to develop a mechanism for using RDF Quads for encoding an object graph (and a layers class hierarchy) using Contexts to denote the class of an instance, Subjects to denote class instances and attributes (members) and values: Predicates / Objects.

Then I've realized that some basic type inference could be performed with, for example, aggregating Subjects with the same predicates (Subject Kinds). Idem for Predicates, Objects and Contexts. I've also realized that plain "facts" statements could be aggregated in the previously mentioned class hierarchy to abstract further, from plain data, instance / class layers of what I call data / schema / behavior layers. Higher layers (i.e.: Behavior) "aggregate" lower layers.

Quads are "reified" as Resource(s). Also, Resource is a functional wrapper reactive and event driven of an URI. And an URI could be implemented with whatever backend which could produce or consume events (databases, services, etc.). Resource layers hierarchy (Context) is to be implemented by an actor / role type object pattern according the hierarchy layer level it corresponds (and declaratively stated in a Model of Meta Resources).  
  
Layers shape is as follow:  
Resource : Functional URI wrapper.

(Context : Resource, Occurrence : Resource, Attribute : Resource, Value : Resource);

CSPO Names are according roles (Meta Resource) in the Model. For example: layer Occurrence is parent layer class.  
  
Each layer abstract instances of its own contexts instances.

Input Layer: (CSPO layer):

(Transaction, someOne, buys, someProduct);

Statement (data layer instance):

Inputs regarding the same context are aggregated into data layer instance.

(Statement, Occurrence, Attribute, Value);  
(transactionStatement, someOne, buys someProduct);

Entity (data layer class):

Aggregated Statement and Occurrence Statement occurrences reified into an Entity along with its Occurrences Attributes.

(Entity, Statement, Occurrence, Attribute);

(someTransaction, transactionStatement, someOne, buys);

Role / Kind (schema layer instance):

Aggregated Entity and Statement Entity occurrences reified into a Role / Kind along with its Statements and Occurrences.

(Role / Kind, Entity, Statement, Occurrence);  
(someBuyer, someTransaction, transactionStatement, someOne);  
  
Class (schema layer class):

Aggregated Role and Entity Role occurrences reified into a Class along with its Entities and Statements.

(Class, Role, Entity, Statement);  
(Person, someBuyer, someTransaction, transactionStatement);  
  
Flow (behavior layer instance):

Aggregated Class and Role Class occurrences reified into a Flow along with its Roles and Entities.

(Flow, Class, Role, Entity);  
(someBuy, Person, someBuyer, someTransaction);  
  
Behavior (behavior layer class):

Aggregated Class and Role Class occurrences reified into a Behavior along with its Classes and Roles.

(Behavior, Flow, Class, Role);  
(Buy, someBuy, Person, someBuyer);

Then, each Model aggregates its Statements in the form (for example):

(Model Impl, Buy, someBuy, Person); Interaction / Meta Model.  
  
This "aggregations" are part of what I call "Augmentation(s)": Aggregation, Alignment and Activation are ones of those, which are functional transforms described declaratively in an object graph Meta Model. The act of applying an Augmentation implies one source Message Resource (context layer), one matching Template Resource (input signature) an Augmentation (Interaction functor) a Transform Resource (output signature) and a resulting (set of) Message Resource(s) materialized as further layers instances / Messages to be “parsed” by further corresponding Augmentations of matching Template signatures (dataflow).

ToDo.

### Models: Facets

Models have “Facets” which renders the different ways Model data / schema / behavior could be regarded and used for different purposes, from application development to Business Intelligence and Ontology Matching.

Facets are models implemented the same way other models are with Model Resource Contexts and layers and from the same data. Each Facet implements its own Resource URI wrapper (same URIs, ontology matching, provenance of aligned URIs, Facet pivoting). Then, each Facet has its own Model Context Resource class hierarchy having Augmentation / Dataflow functors as Model Resource(s) does.

#### Functional Model Facet:

(Context : Resource, Occurrence : Resource, Attribute : Resource, Value : Resource);

(Statement, Occurrence, Attribute, Value);

(Entity, Statement, Occurrence, Attribute);  
(Role, Entity, Statement, Occurrence);  
(Class, Role, Entity, Statement);  
(Flow, Class, Role, Entity);  
(Behavior, Flow, Class, Role);

(Model, Behavior, Flow, Class);

#### Semantic / Semiotic Model Facet:

(Context : Resource, Occurrence : Resource, Attribute : Resource, Value : Resource);

(Attributes, Occurrence, Attribute, Value);

(Object, Attributes, Occurrence, Attribute);  
(Concept, Object, Attributes, Occurrence);  
(Sign, Concept, Object, Aytributes);  
(Context, Sign, Concept, Object);  
(Interaction, Context, Sign, Concept);

(Model, Interaction, Context, Sign);

#### Dimensional Model Facet:

(Context : Resource, Occurrence : Resource, Attribute : Resource, Value : Resource);

(Properties, Occurrence, Attribute, Value); Data (Properties: distance / facts).

(Value, Properties, Occurrence, Attribute); Info (Properties distance between Occurrence / previous and Occurrence / next).  
(Measure, Value, Properies, Occurrence); Knowledge.  
(Unit, Measure, Value, Properties);  
(Dimension, Unit, Measure, Value);  
(Concept, Dimension, Unit, Measure);

(Model, Concept, Dimension, Unit);

ToDo.

### Models: Levels

Models have “Ontology” Levels. Levels are Layers (of the Model) which are feed into its input Layer with (instance) Statements aggregated from initial input data (Data Level) aggregated into subsequent layers. Schema Level instances feeds the Model input conforming a Session (context / grammars) ontology Level. Then, behavior Level instances feeds the Model input conforming an Interaction (behavior) ontology Level.

#### Model Source Level (Backend)

Input Statements coming from plain RDF Quads aggregated according Data / Schema / Layers Augmentation(s). Base facts Model Level.

ToDo.

#### Model Session Level

Aggregate Source (Backend) Level Schema layer Statements as Model Session level Data layer input. Reify Schema (roles / grammars).

ToDo.

#### Model Interaction Level

Aggregate Session Level Behavior layer Statements as Model Data level Data layer input. Reify behaviors (context / interactions).

Declarative application protocol use case upper ontology levels (Action… Gesture, etc).

ToDo.

## Meta Resources

Meta Resources are used by a Model Meta Model for describing models. Some of them are:

URI

Resource

Context / Context

Subject / Occurrence

Predicate / Attribute

Object / Value

Statement

Model

Kind

ContextKind

SubjectKind

PredicateKind

ObjectKind

Message

Template

Augmentation

Transform

Class

Metaclass

Instance

(Augmentation, Template, Mapping, Transform); Meta Resources.

Model declared as Interaction Model Augmentation (matching Messages) in Interaction Model. Flows:

Message

Model (Functor)

Augmentation (Addressable Interaction)

Template (Message)

Mapping (Functor)

Transform (Message)

Model (Functor)

Message

Interaction Model: Model Events (Augmentation).

Augmentation: Event. Signature. Declarations / Occurrences. Domain, Input / Mapping, Transform / Range, Output.

Embeddings: Message Match Event Signature. Tempate matching / Transform rendering. Dataflow.

Embeddings: Meta Model Augmentation, Template, Mapping, Transform Meta Resources (input layer). Meta Model Source, Session, Interaction levels.

Model OntResource Augmented with Event Transform aggregates new Event Mapping.

ToDo.

## Meta Model

Meta Model: encode Layers, Contexts, Kind / Roles hierarchies (subject, context, occurrence, roles, atributes, values / metaclass, class, instance relations / meta resources) and Facets using corresponding Facets implementations of base Model Meta Resources.

URI(s);

OntResource; Merged URI(s) wrapper.

OntResource hierarchy: layers statement contexts. Facets DOM, Actor / Role.

Resource (OntResource Context Roles hierarchies Monad wrapper);

Resource (OntResource CSPO / Contexts hierarchies Monad wrapper);

Role (Model CSPO Context Roles hierarchies type classes) : Resource;

Statement (Resource, Resource, Resource, Resource) : Resource;

Kind (Statement\*) : Resource;

Class (Kind\*) : Resource;

Context (Class\*) : Resource;

Hierarchy: class (Object / Value) as superclass Context.

Object: class (extension);

ContextStatement: super class (intention); Context Role.

(Resource, ?, ?, ?);

(Role, Resource, ?, ?);

(Statement, Role, Resource, ?);

(Kind, Statement, Role, Resource); Data (Resource Kind).

(Class, Kind, Statement, Role); Schema (Role Class)

(ContextStatement, Class, Kind, Statement); Interaction (Statement ContextStatement).

State Facet / Layer / Level / Augmentation / Model Resource Mappings.

Functional API: Message IO. Mappings.

ToDo.

## Interaction Model

(Augmentation, Template, Mapping, Transform);

Model declared as Interaction Model Augmentation (matching Messages) in Interaction Model. Flows:

Message

Model (Functor)

Augmentation (Addressable Interaction)

Template (Message)

Mapping (Functor)

Transform (Message)

Model (Functor)

Message

Interaction Model: Model Events (Augmentation).

Augmentation: Event. Signature. Declarations / Occurrences. Domain, Input / Mapping, Transform / Range, Output.

Embeddings: Message Match Event Signature. Tempate matching / Transform rendering. Dataflow.

Embeddings: Meta Model Augmentation, Template, Mapping, Transform Meta Resources (input layer). Meta Model Source, Session, Interaction levels.

Model OntResource Augmented with Event Transform aggregates new Event Mapping.

Encoding. Addressing (contents, signatures, contexts). Events publish / subscribe. Dynamic subscriptions / bindings. Subscription, reactive Meta Resource(s). Message flow mechanism: from Model to base layers.

Match Message subjects to Templates, Augmentations and Transforms roles (bound by CK signatures dataflow). Message inputs: Models.

Interaction Model for Encoding / Addressing (Mapping : Event routes) Dataflow metadata.

Augmentation: Described in Interaction Model. Encode Message, Template, Augmentation and Transforms roles (Meta Resources). Data, Session, Interaction Levels (Message, Template, Transform, Augmentation statements declaration realization).

Augmentation. Aggregation Meta Model: Describe layers contexts compositions. Alignment Meta Model: Describe augmented attributes (by kinds clustering). Activation Metamodel: Describe Kinds / Roles activation (by attributes aggregations).

ToDo.

## Dataflow: Mapping

Interaction Model declares Events (Augmentations) which have a functional Mapping between its domain (Template) and range (Transform). An Augmentation Context Kind correspond to this Mapping “signature”. Dataflow binds input Message(s) to domain Template by pattern matching and resolving any input Message references (Addressing).

Outputs are resolved by pattern matching with Transform, Message and existing Model data. Augmentations may play the role of “placeholder” Resource(s) which are bound to context aware Augmentations thus rendering Transforms into Model entities (including Mapping Augmentations themselves).

Model declared as Interaction Model Augmentation (matching Mappings) in Interaction Model. Flows:

Message

Model (Functor)

Augmentation (Addressable Interaction)

Template (Message)

Mapping (Functor)

Transform (Message)

Model (Functor)

Message

Interaction Model: Model Events (Augmentation).

Augmentation: Event. Signature. Declarations / Occurrences. Domain, Input / Mapping, Transform / Range, Output.

Embeddings: Message Match Event Signature. Tempate matching / Transform rendering. Dataflow.

Embeddings: Meta Model Augmentation, Template, Mapping, Transform Meta Resources (input layer). Meta Model Source, Session, Interaction levels.

Model OntResource Augmented with Event Transform aggregates new Event Mapping.

ToDo.

# IDs: Encoding / Addressing

Message - Model - Template (data : Resource) - Augmentation (functor) - Transform (interaction : Resource) - Model - Message.

Encoding, IDs: magic numbers (MIME types : Context Kinds), metaclass, class, instance, context, CSPO, etc. relations "contextual slots" for IDs. Resource resolution, Operation (primes, encoded lattice, slots context relations) factors in Meta Model relations. Encode order, hierarchies, temporal, causal (reified), containment, etc. relations into IDs encoding. Ontology matching: encoded IDs roles in context aggregation / learning.

Explain URI, Resource, Layers, Model, Kinds, etc. APIs. Meta Resources. Meta Model. Hierarchies. Order. Iteration. Flows.

Model, URIs, Resource, Contexts Functional APIs. Meta Model / Resources encoding. Mappings.

IDs: Addressing / Encoding. Semantic (signature, contents, context) resolvable / discoverable identifiers.

Ontology Matching:

Ontology Matching: IDs, Addressing, Encoding. Functional, Semiotic, Dimensional (Facets). Layers. Levels. Meta Resource / Model. Sets. Value as occurrence of attribute. metaclass / class / instance IDs.

Ontology Matching: Encode: order, iteration, flows, units, relations, events, enums, etc.

Messages CRUD / Invocation semantics. Dialog. Prompts.

Encoding: Cons lists. Trees. Huffman / Prefix codes. RDF List serialization. Meta Resources / Models declarative Encoding, Addressing, Mappings, Transforms (Immutable sequences, dataflow Mapping: Template / Augmentation / Transform functional streams).

Kinds, Signatures. Contents. Contextual metadata. Sets (bitstring cuads). Lattices.

(C (S (P (O, Nil))));

(C2 (C (S (P, Nil)));

Models:

URI(s);

OntResource; Merged URI(s) wrapper.

Resource (OntResource CSPO / Contexts hierarchies Monad wrapper);

Message (Resource Monad wrapper); Request / Response Encoding.

Template / Transform (Message blueprints) domain / range : Message.

Augmentation : Functor.

Mappings: Declarative IO signatures: Context Kinds Templates / Transforms. Subscriptions / routes. Dataflow.

Encoding: Template Message augmentation (inputs).

Encoding: Declarative functors behavior encoding statements. Mappings (subscription / routes).

Encoding: Transform Message augmentation (outputs).

(Augmentation, Template, Mapping, Transform);

Dataflow: Order, Flows (Mappings, hierarchies).

Message (Resource Monad wrapper) : Statement; Request / Response Encoding.

Template / Transform (Message blueprints) domain / range : Message.

Augmentation : Functor.

Mappings: Immutable Resources Message based Augmentation bindings. Dataflow subscription routes: Signatures / CKs (Augmentation(s) functional streams).

Subject Kind: Subjects stream. Object Kind: Objects stream.

Encoding: Template Message augmentation (inputs).

Encoding: Declarative functors (Augmentation) behavior encoded in statements. Mappings (subscription / routes).

Encoding: Transform Message augmentation (outputs).

Interaction Model (Interaction Level):

(Augmentation, Template, Mapping, Transform);

Dataflow: Order, Flows (Mappings, hierarchies).

ToDo.

## Models / Meta Model IDs

IDs:

URI(s);

OntResource; Merged URI(s) wrapper.

OntResource hierarchy: layers statement contexts. Facets DOM, Actor / Role.

Resource (OntResource Context Roles hierarchies Monad wrapper);

Statement : Resource quad, Resource.

Message (Resource Monad wrapper); Request / Response Encoding.

Template / Transform (Message blueprints) domain / range : Message.

IDs:

A: OntResource.

B: CSPO Role.

C: Statement : OntResource Occurrence.

D: Kind CSPO Instances.

E: Class : Kind CSPO Classes.

F: ContextStatement : Context Role.

Meta Model:

A: (Resource, ?, ?, ?);

B: (Role, Resource, ?, ?);

C: (Statement, Role, Resource, ?);

D: (Kind, Statement, Role, Resource); Data (Resource Kind).

E: (Class, Kind, Statement, Role); Schema (Role Class)

F:.(ContextStatement, Class, Kind, Statement); Interaction (Statement ContextStatement).

ID: (F (E (D (C (B (A, Nil))))));

Cons lists. Binary Trees. Huffman / Prefix codes. RDF List serialization. Meta Resources / Models declarative statements Encoding, Addressing.

Kinds, Signatures. Contents. Contextual metadata.Lattices. Roles.Sets (bitstring cuads). Definitions (elements). Operations. Rules. Categories. Groups.

Statement: (ID (ID (ID (ID, Nil))));

(C (S (P (O, Nil))));

ToDo.

## Resolution: graph criteria / query

ToDo.

## Sorting / Order / Comparisons

Order / comparisons: tree representation ordered by Context Role class hierarchy, instances hierarchies and aggregation hierarchies. Resources order (IDs). Statements order (Statement IDs). Comparison criteria (choose relevant IDs). ToDo.

Semantic resolution: Query Resource(s) satisfying “criteria” (i.e.: Object(s) for predicate) IDs by IDs resolution pattern:

Query Resources by role in context.

Query Resources by attributes / values.

Query Resources by identity / type.

ToDo.

# Model Functional APIs

## Resource Monad

Monadic wrapper for which Augmentation (Functor Events) are declared into Interaction Model. Model(s) themselves are Augmrntation(s). Augmentation Statement Context Kind defines Event “signature”: Resource input / output Event domain / range. Output from an Event application (Transform) may feed back Model triggering further events (Dataflow). Augmentation Template, Mapping and Transform may behave as placeholder for Dataflow rendering of Meta Models.

ToDo.

## Reactive / Events (Resource Monad)

Model Resources react to events according Message matching event “signature”.

ToDo.

## Meta Resources

Declare Meta Model Meta Resources as Interaction Model Augmentations, Mappings, Templates and Transforms. Model(s) (Facets) are “root” Augmentations over input Message Statements. Further Dataflow and Meta Model Interaction Resources embeddings shapes Meta Model instances.

ToDo.

## Meta Model

Meta Resources built Model which instantiates Interaction Model statements into layered Facets Models.

ToDo.

## Streams (Context, Kinds, etc.)

Context Kind: Functional stream of Context Statements (Occurrences).

Subject Kind: Functional stream of Subject Statements (Occurrences).

Predicate Kind: Functional stream of Predicate Statements (Occurrences).

Object Kind: Functional stream of Object Statements (Occurrences).

ToDo.

# Messages

Messages: Mappings. Meta Resources / Model Message based Model interactions (Subscriptions / Mappings).

Messages: Message semantics (Augmentation: Verbs, CRUD, Behavior) according Message structure / pattern (dialog / prompts).

Messages: Dataflow Template matches signatures (Session level, enrichs Message with Model / Dialog prompts / contents). Augmentation Functor applied over Message contents (Interaction level). Transform matching output signature emits (Session level, populated / prompts) output Message.

Messages: Dataflow. Subscriptions. Reactive Model. Dynamic subscriptions / bindings. Events publish / subscribe between Model Resource. Mappings.

Mappings: Declarative IO signatures: Context Kinds Templates / Transforms. Subscriptions / routes. Dataflow.

Messages: Mappings. Meta Resources / Model Message based Model interactions (Mappings : Subscriptions).

Messages: Message semantics (Augmentation: Verbs, CRUD, Behavior) according Message structure / pattern (dialog / prompts).

Messages: Dataflow Template matches signatures (Session level, enrichs Message with Model / Dialog prompts / content alignments). Augmentation Functor applied over Message contents (Interaction level). Transform matching output signature emits (Session level, populated / prompts) output Message.

Messages: Dataflow. Subscriptions. Reactive Model. Dynamic subscriptions / bindings. Events publish / subscribe between Model Resource. Mappings.

ToDo.

## Message Monad

Encode Model Events Interactions (Augmentation) inputs (Template) and outputs (Transform) wrapping corresponding Resource(s).

ToDo.

## Reactive / Events (Message Monad)

(Augmentation, Template, Mapping, Transform);

Model declared as Interaction Model Augmentation (matching Messages) in Interaction Model. Flows:

Message

Model (Functor)

Augmentation (Addressable Interaction)

Template (Message)

Mapping (Functor)

Transform (Message)

Model (Functor)

Message

Interaction Model: Model Events (Augmentation).

Augmentation: Event. Signature. Declarations / Occurrences. Domain, Input / Mapping, Transform / Range, Output.

Embeddings: Message Match Event Signature. Tempate matching / Transform rendering. Dataflow.

Embeddings: Meta Model Augmentation, Template, Mapping, Transform Meta Resources (input layer). Meta Model Source, Session, Interaction levels.

Model OntResource Augmented with Event Transform aggregates new Event Mapping.

ToDo.

## Model Functional APIs

Invoke Augmentation over Resource Message matching Event signature.

ToDo.

## IDs: Encoding / Addressing

Encoding: Template Message augmentation (inputs).

Encoding: Declarative functors behavior encoding statements. Mappings (subscription / routes).

Encoding: Transform Message augmentation (outputs).

(Augmentation, Template, Mapping, Transform);

Dataflow: Order, Flows (Mappings, hierarchies).

IDs: Addressing / Encoding. Semantic (signature, contents, context) resolvable / discoverable identifiers.

ToDo.

## Persistence

Messages: Events IO / Persistence: Saga Activation / Passivation populating Node local Quad store / persisting peers via DIDs ([ont.io](http://ont.io/)) semantic (resolvable / discoverable) identifiers.

Interaction Model: aggregated Meta Model interactions (performed / inferred / possible) declared Models events (saga pattern).

Augmentations: Interaction Model Mappings execution / persistence / retrieval. Reactive model via representation of IDs: Mappings (signatures) dataflow inferred Augmentations.

Persistence: (activation / passivation): IDs / Meta Model / Facets from Interaction Model events (Messages) from Node IO. Interaction Model: Main Model(s) Message IO.

Messages: Saga Activation. Interaction Model (Meta Model). Aggregated (Interaction) Meta Model interactions (performed / inferred / possible) emitted as Model event Messages (Saga pattern). Mappings.

Saga Activation / Passivation populating Node local Quad store / persisting peers via DIDs ([ont.io](http://ont.io/)) semantic (resolvable / discoverable) identifiers.

Messages: Saga Activation. Interaction Model (Meta Model). Aggregated (Interaction) Meta Model interactions (performed / inferred / possible) emitted as Model event Messages (Saga pattern). Mappings.

Messages: Saga Passivation. Model layers data routed by Mappings as event Message into (Interaction) Meta Model. Message inputs: Models. Mappings. Populate.

ToDo.

# Augmentation

Interaction Model Event. Matches Message signature (domain Template / range Transform) performing Mapping. Dataflow: Transform output matches another Event signature. Embedding: OntResource augmented with new referenced aligned / matched Model entity.

Augmentations defined as declarative Mappings in Interaction Model encoding Context (layer) inputs matching signatures and augments current / previous layer emmiting mapping transforms.

Functors: Meta Model declarations / Context classes / instance declarative implementations. Aggregation type: invocation over each CSPO / Context roles.

Functor applied to context: Aggregation.

Functor applied to subject: Alignment.

Functor applied to predicate: Activation.

Functor applied to object: members traversal.

Reactive Context Kind (matching signatures) dataflow.

Message - Model - Template (context) - Augmentation (interaction) - Transform (data) - Model - Message.

Implementation API: Node / Container. Services (URIs Context Kind signatures resolution).

Core Services: Activation Augmentation (Naming).

Core Services: Alignment Augmentation (Index).

Core Services: Aggregation Augmentation (Registry).

Core Services: RDF / OWL Backend (endpoint, reasoning, persistence).

Core Services: DIDs Persistence (sync Node state: events sourcing).

Core Services: Protocol (I/O). Node, Session, Intetaction levels. Base Connector Augmentation API. Event driven URIs dialog / prompts protocol adapters.

Explain Context layers Aggregation Augmentation. Example: Role(s) for each CSPO. Entity in Statements. Meta Model. Meta Resources.

Explain Context layers Alignment Augmentation. Meta Model. Meta Resources.

Explain Context layers Activation Augmentation. Meta Model. Meta Resources.

Explain Augmentation. Context : Functor<Template, Transform>; Template, Transform : Context Kind (Levels: Data, Session, Interaction / Functor instance / execution contexts?).

Functors: Meta Model declarations / Context classes / instance declarative implementations. Aggregation type: invocation over each CSPO / Context roles.

Functor applied to context: Aggregation.

Functor applied to subject: Alignment.

Functor applied to predicate: Activation.

Functor applied to object: members traversal.

Message. For each layer perform each Functor: (Object : aggreg, Kind : activ, Attr : align, Obj : onto).

Augmentation:

Functors: Augmentation declaration: Meta Model definitions (Context class / instances). Message: dataflow matches Template signatures: interactions. Apply Augmentation Functors over Message contents (interactions enrich Message with Models contents: ontology matching / Levels / Facets). Materialize / emit dialog / prompts Message (enrich Message from Models / reactive IO events).

Augmentation: Context / Functors. Message Resource(s) / Meta Resource(s) (nested / wrapped) elements determines flow Template Transform results / behaviors (CRUD, Functor invocations). Message IO performs Augmentations. Ontology levels resolution (Templates / Transforms / Augmentatiom levels: matching patterns / dialog prompts in Ontology levels).

ToDo.

## Reactive / Events (Functors)

Augmentations: matching Events Functors aggregate / align / activate (classify) sources of ontology matched data / schema / behavior enabling semantic layers interoperation.

Aggregation: Infer input data streams data, schema, behavior class / instance context layers.

Alignment: Infer layer missing / deducible attributes and values.

Activation: Infer layer CSPO Kind / Roles. Basic type system.

Aggregation (Augmentation): Apply each Context (layer) Functor on inputs (from input layer) and emits Transform, matching corresponding (next) layer. Next layer Context and SPO according functional mapping declared by Meta Resource types on augmented layer.

Alignment (Augmentation): ToDo.

Activation (Augmentation): ToDo.

ToDo.

## Interaction Model

(Augmentation, Template, Mapping, Transform);

Model declared as Interaction Model Augmentation (matching Messages) in Interaction Model. Flows:

Message

Model (Functor)

Augmentation (Addressable Interaction)

Template (Message)

Mapping (Functor)

Transform (Message)

Model (Functor)

Message

Interaction Model: Model Events (Augmentation).

Augmentation: Event. Signature. Declarations / Occurrences. Domain, Input / Mapping, Transform / Range, Output.

Embeddings: Message Match Event Signature. Tempate matching / Transform rendering. Dataflow.

Embeddings: Meta Model Augmentation, Template, Mapping, Transform Meta Resources (input layer). Meta Model Source, Session, Interaction levels.

Model OntResource Augmented with Event Transform aggregates new Event Mapping.

ToDo.

## Message

Augmentation Event input (Template) / output (Transform) declaration / instance (Mapping).

ToDo.

## Augmentation

ToDo.

## Template

ToDo.

## Mapping

Mappings / Augmentation Context Kind.

ToDo.

## Transform

Augmentation Mapping range declaration / result instance (Transform Message).

ToDo.

## IDs: Encoding / Addressing

Contextual / patterns embedding metadata / resolution. Augmentation occurrences Dataflow sources / context sync.

ToDo.

# Dataflow

(Augmentation, Template, Mapping, Transform);

Model declared as Interaction Model Augmentation (matching Messages) in Interaction Model. Flows:

Message

Model (Functor)

Augmentation (Addressable Interaction)

Template (Message)

Mapping (Functor)

Transform (Message)

Model (Functor)

Message

Interaction Model: Model Events (Augmentation).

Augmentation: Event. Signature. Declarations / Occurrences. Domain, Input / Mapping, Transform / Range, Output.

Embeddings: Message Match Event Signature. Tempate matching / Transform rendering. Dataflow.

Embeddings: Meta Model Augmentation, Template, Mapping, Transform Meta Resources (input layer). Meta Model Source, Session, Interaction levels.

Model OntResource Augmented with Event Transform aggregates new Event Mapping.

ToDo.

## Reactive / Events (Functors)

Augmentations: matching Events Functors aggregate / align / activate (classify) sources of ontology matched data / schema / behavior enabling semantic layers interoperation.

## Interaction Model

(Augmentation, Template, Mapping, Transform);

## Messages

ToDo.

## Augmentation

ToDo.

## Template

ToDo.

## Mapping

ToDo.

## Transform

ToDo.

## IDs: Encoding / Addressing

Contextual / patterns embedding metadata / resolution. Augmentation occurrences Dataflow sources / context sync.

# Ontology Matching

ToDo.

## Ontology Merge

Ontology matching. Dataflow: sort statements. Units. Equivalences. Distances / events (order). Services (Augmentation / Context Functors Meta Model mappings / transforms).

Explain ontology matching: data, schema, behavior alignments. Layers. Levels. Facets. Meta Resources / Model. IDs, Encoding / Addressing.

Encoding. Functional, Semiotic, Dimensional (Facets). Layers. Levels. Meta Resource / Model. Sets. Value as occurrence of attribute. metaclass / class / instance IDs.

Functionsl / Semiotic / Dimensional layers / levels examples / alignments.

Model, URIs, Resource, Contexts Functional APIs. Meta Model / Resources encoding. Mappings.

IDs: Addressing / Encoding. Semantic (signature, contents, context) resolvable / discoverable identifiers.

Ontology Matching:

Ontology Matching: IDs, Addressing, Encoding. Functional, Semiotic, Dimensional (Facets). Layers. Levels. Meta Resource / Model. Sets. Value as occurrence of attribute. metaclass / class / instance IDs.

Ontology Matching: Encode: order, iteration, flows, units, relations, events, enums, etc.

ToDo.

## Alignments (data / schema / behavior).

Ontology matching (Data, Schema, Behavior alignments):

Data alignment:  
  
Determine if two instances (example: records) of two different backends or services refer to the same entity (Customers : John D. / Employees : John Doe).  
  
Schema alignment:  
  
Determine, for example, meaning and equivalences between diverse (aggregated / composite) schemas (equivalent classes / tables, equivalent attributes / columns, equivalent roles / relations).  
  
Behavior alignment:  
  
Determine meaning and equivalences between (aggregated / composite) behavior contexts and behavior contexts invocations / interactions (Appointment / Interview, anAppointment / anInterview. Behavior flows aggregated from backends / services learning).

ToDo.

## IDs: Encoding / Addressing

Ontology Matching:

Ontology Matching: IDs, Addressing, Encoding. Functional, Semiotic, Dimensional (Facets). Layers. Levels. Meta Resource / Model. Sets. Value as occurrence of attribute. metaclass / class / instance IDs.

Ontology Matching: Encode: order, iteration, flows, units, relations, events, enums, etc.

ToDo.

# Implementation

Persistence:

Interaction Model: aggregated Meta Model interactions (performed / inferred / possible) declared Models events (saga pattern).

Languages, Patterns, APIs, Frameworks. (Container, Node, Model, Service, etc.).

Deployment / Implementation:

Protocols:

XML / XSL. Event bus (encoding / discovery). Addressing (node / model / ontology levels, topics / queues).

Implementation: Spring / Vert.x.

Spring: Vert.x / APIs Factories. Services.

Core Messaging / Event Bus backend Service Bean.

Persistence: Topic / Subject wrapping ont.io DIDs Saga (Semantic IDs) Messaging pattern.

Core Meta Resource / Meta Model. Mappings. Service Bean.

Core Model Facets / Levels / Layers Functional Service (streams: Augmentation) APIs.

Message: Augmentation (Encoding) request / response. Mapping: routes / contexts (dataflow).

Index, Registry, Naming Hypermedia Service Beans. Backend, Session, Interaction Levels: Functional Service stream APIs Beans.

DOM (Dynamic Object Model) OGM (Object Graph Mapping). Beans API. JAF (JavaBeans Activation Framework). REST / Client OO APIs. Service Bean.

Apache ServiceMix / JBoss Fuse.

Karaf. Bundles.

OSGi wrapper for Spring / Vert.x. declarative services. Event bus. Discovery (Semantic IDs). Camel.

CXF. Endpoints. Servicr Connectors.

ActiveMQ

Camel. Backend Connectors.

ToDo.

# Client APIs / Connectors

## Services

Message APIs: Augmentation / Dialog Protocol. Connectors. Services.

Hypermedia APIs: Augment, Extend, Declare. REST. Extended Content Type signatures Activation / Dataflow. Services.

Wiki like abstract representation / protocol. Template rendering. Services.

DCI Activation DOM OGM. REST. API Client. Services.

ToDo.

URIs, Resource, Contexts Functional APIs

Services:

Registry.

Naming.

Index.

Connectors (URIs):

JDBC.

Meta Model:

URI;

Resource (URI\*);

Role (Model CSPO hierarchies) : Resource;

Statement (Resource, Resource, Resource, Resource) : Resource;

Kind (Statement\*) : Resource;

Class (Kind\*) : Resource;

Context (Class\*) : Resource;

Hierarchy: class (Object / Value) as superclass Context.

Object: class (extension);

Context: super class (intention);

(Kind, Statement, Role, Resource); Data (Resource Kind).

(Class, Kind, Statement, Role); Schema (Role Class)

(Context, Class, Kind, Statement); Interaction (Statement Context).

State Facet / Layer / Level / Augmentation / Model Resource Mappings.

Functional API: Message IO. Mappings.

State order (in context class hierarchies axes), comparison relations, iterations, flow, events, causal relations, units, enums, equivalence, etc.

Data order: Resource Kind hierarchies.

Schema order: Role Class hierarchies.

Interaction order: Statement Context hierarchies.

Resource / Message Monad Events: Augmentations. Mapping: Endpoint. Events: Implement Message / Resource / URIs Protocols.

Services. Connectors. URIs APIs.

Endpoints (Events Mapping) messaging interface.

ToDo.

# Deployment

Protocol plugins (Protocol Service) Connectors. Runtime. Core Services. Endpoints. Dataflow.

JavaScript (browser) / NodeJS Core.

Endpoints. Connectors (OData, HAL, OGM, Spring, ServiceMix / Fuse).

Browser (JavaScript) / NodeJS / Connectors.

Applications. Use Cases.

Levels. Gestures / Actions (Services / UX). Rendering (REST APIs / Dynamic UX).

Deployable entity: Node. Publish / Subscribe signatures (interface). Augmentation / Mappings Interaction Model (Runtime). Models, Facets, Services, etc. ToDo.

ToDo.

See Messages / Augmentation.

Composed of quads semantically aggregated into layers.

Core features provides:  
Alignment  
Activation  
Aggregation

Message / Transform driven specification of Alignment, Activation, Aggregation (Augmentation).

Message (Resource set expression);

Message: Model parent layer (Resource). Nested Messages CSPOs.

Model: Message scopes. Described as (nested) Message Resource set expressions.

Models: Data (Models), Contexts (Grammars), Interactions (MetaGraph : Models / Grammars bindings). Dimensional annotations.

MetaGraph: Resource, Statement, Kind class / instance as CSPO MetaGraph statement roles. Class / subclass relationship, Kind / subkind relationship.

Reactive nodes (Message events):

. Input Message event;

. Augmentation;

. Model / MetaGraph Message resolution (grammars / models / backends / services); Model Resource(s) response activation;

. Augmentation (Message : response / dialog);

. Output Message (events);

Grammars.

Upper / Dimensional ontology.

Inter models alignments.

Services (Endpoint URIs: Resource facades).

Reified model resources (CSPO, Resource, Statement, Kinds, Layers). Augmentation (Alignment, Activation, Aggregation) Messages / Transforms.

Model, Contexts, Interactions IO:  
Model: aggregated resource statements.

Context: aggregated model kinds (grammar statements).

Interaction: aggregated model / context bindings.

Inputs: resource statements, resolvable messages. Operation semantics (CRUD, browse, etc.) according input statements layout. Model endpoint. Materializes input resource statements and fully resolved message resource statements from interactions applying Augmentation and matching messages transforms.

Resource flow: input plain RDF URIs statements. Model / Context updates. Transform matches concrete resources.  
Resource flow: input message URIs statements. Context / Interaction perform. Transform matches resources in messages context grammar kinds hierarchies.

Outputs: resource statements with possible further resolvable messages (Model IO recursion / dialogs). Interaction queries context / model back for further resolutions. Message transform stream with request message applied plus matching context resolved resources from message.

Model, Contexts, Interactions IO:

Resource, Statement, Kind, Message, Transform.

Subscription, Subscriber, Producer, Consumer, Processor.

Model: aggregated resource statements model.

Context: aggregated model kinds (grammar statements model).

Interaction: aggregated model / context / dialogs bindings model.

Aggregation: layers. Parameterized Resource<C, S, P, O> : CSPO : URIs hierarchy.

Materialized interactions re-populate model and context (Augmentation). Browse context model: kinds and grammar known statement "templates" (by kinds hierarchy layers aggregation) navigation for discovery of domain messages resource kinds.

Model, Context, Interaction IO: Message. Nested CSPO contexts quad, CSPO resources (plain URIs, kinds, nested contexts). Wildcards, variables, placeholder, null values: Message structure defines CRUD behavior.

Message: Resource model hierarchy parent class (monad of plain URI, parameterized resources). Resource set specification. Any Resource is a Message, specifying a potential set of other Message (Resource) in a model (layers).

Resource : Message. Resource resolution: known URIs, known resource kinds bindings, dialog (resource set specification) recursively. Interaction model (dialog resolved resources set). Wildcards, variables, placeholder, null values: Message structure defines CRUD behavior.

Resource monad of URIs or Message monad of Resource?

**Data Model**

Data Model layers population / augmentation.

(Resource, Resource, Resource, Resource) : Resource / Message (Model).  
(Entity, Subject, Attribute, Value);  
(Role, Entity, Attribute, Value);  
(Kind, Role, Entity, Attribute);  
(Class, Kind, Role, Entity);  
(Flow, Class, Role, Entity);  
(Behavior, Flow, Class, Role);

Messages (Model : Resource) as Resource set specifications. Subject, Attribute, Value : Resource.

Determine class (reified layers contexts) hierarchies:  
(ContextReifiedClass, ContextReifiedSubClass, SubClassAttributeKind, SubClassValueKind);

Merge / specify model, context, interaction graphs. Reified model, resources, statements, kinds.  
Model, context, interaction model graphs layers specifications. Reified models layers contexts resources describe graphs. Augmentation. Message context statement occurrence: Model.

Model MetaGraph: Resource, Statement, Kind (reifying class / instances) contexts / occurrences / attributes / values. Encoding. Message dispatch,  
event bus routes. URIs / IDs mappings. Resource set specification resolution. MetaGraph resolves concrete resources, Message expansion. Resolve Message / dialog (CRUD) semantics via MetaGraph driven transforms (data / schema / behavior augmentation: dialogs).

Models definition: data (Statement, Entity), schema / contex (Role, Class), interactions / behavior (Flow, Behavior).

Kinds / Roles:  
Grammar: kinds layers aggregation (CSPO layers Kinds).  
Layers: Roles (Models metaclass context resources).  
Reified Kind: (Kind, Occurrence, Attribute, Value);

**Schema Model (Grammars)**

Schema Model layers population / augmentation.

Grammar Resource input set model specificatíon (Statement layer kinds Messages).

Grammars: Predicate Kind from Subject / Object Kind. Kind model layers.

**Behavior Model (Dimensional annotations)**

Dimensional Model layers population / augmentation. Purpose modelling. Dimensional Concepts.

Order layers statements. Hierarchies (contexts / kinds). Parent / child relationships (steps). Order type relationships: husband: single / marriage / married.

(Value, Previous, Distance, Next); Person, Single, Marriage, Married; Man, Single, Marriage, Husband; Woman, Single, Marriage, Wife.  
(Measure, Value, Previous, Distance);  
(Unit, Measure, Value, Previous);  
(Dimension, Unit, Measure, Value);  
(Concept, Dimension, Unit, Measure);  
(Resource, Concept, Dimension, Unit);  
(Statement, Resource, Concept, Dimension);

Populate / align / annotate models with dimensional data. Model input: statements (model resources). Model specification: augment, sort  
statements. Model specification: specialization of base model layers. Resolve resolution statements order.

Dimensional input set model specificatíon (from Statement layer, ordered SPOs: order criteria, comparisons. Kinds / class / occurrence / instance  
order criteria?).

Value, Previous, Distance, Next. Dimension, Unit, Measure, Value (aggregated ordered statements layers).

Value -> distance(prev, next); ordering;

Assert knowledge: 1h -> 60min;

dom-lun-mar-mie-jue-vie-sab (orders);

1mt -> 100cm;

etc.

Comparison / order: Alignments (prev, curr, next asserted knowledge). Next hour, location, city, country, next distance at next time at current speed. Event sourcing / tracking: married -> marriage occurred.

Sort: cause / effect, temporal, etc. Messages align, functional map, fold, etc. Primitives. Encode layered statements ordering. Complement / supplement concepts definitions.

Events metamodel (TBD):

(Object, State, Axis, Type)  
(State, Axis, Type, Event)  
(Axis, Type, Event, Event)  
(Type, Event, Event, Event)  
(Event, Event, Event, Event)

**MetaGraph Model (models aggregations)**

See Message Resolution.

Model MetaGraph (TBD):

MetaGraph: Resource, Statement, Kind class / instance as CSPO MetaGraph statement roles. Class / subclass relationship, Kind / subkind relationship. Grammar / Model bindings.

Grammar: layers aggregate kinds from resource / statement layer or kinds for each model layers.

Layers, contexts, occurrences, kinds: Role Entity layer occurrences instantiated with each Entity SPO as Entity subject (Entities occurrences in Role context for each Entity SPO). Idem for subsequent layers.

Statement class: context.

Statement instance: context occurrence.

State resource kind in occurrence in context.

State resource (context) class / (occurrence) kind hierarchies.

State Resource URIs occurrences / class IDs.

Resolve Message matching Resource from behavior layers / matching kinds from Model / data layers.

(Kind, SuperKind, Attribute, Value);

(Occurrence, Kind, SuperKind, Attribute);

(Context, Occurrence, Kind, SuperKind); (attributes / links bindings).

(Resource, Context, Occurrence, Kind); State Resource Kind in occurrence context (context / role bindings).

(Statement, Resource, Context, Occurrence); State Resource URIs occurrences / Resource class IDs (classification bindings).

(Interaction, Statement, Resource, Context);

(Action, Interaction, Statement, Resource);

Model MetaGraph: Resource, Statement, Kind (reifying class / instances) contexts / occurrences / attributes / values.

Encoding. Message dispatch, event bus routes. URIs / IDs mappings.Resource set specification resolution. Resolve concrete resources, Message expansion. Resolve Message / dialog (CRUD) semantics.

Ontology matching (table, pk, col, val example). Helper upper models for models linking / alignment.

Events declarative definition. State change of value in axis in measure of context.

Messaging metamodel:

(Message, Resource, LHS, RHS);  
(Interaction, Message, Resource, LHS);  
(Role, Interaction, Message, Resource);  
(Context, Role, Interaction, Message);  
(Dataflow, Context, Role, Interaction);

**Datasources / Backends / Services (URIs)**

TBD.

**Addressing. IDs. Encodings**

Resource<T : URI> monadic hierarchy.

Basic hypermedia browse / CRUD (HTTP verbs) bound Message functors compatible for all Resources (REST).

Resource.flatMap(Message::apply) : Observable<Resource> (stream). Composable functions.

Basic Message application (Context Mapping): shift right mapped applied statement resources. Mapped resource context > instance (occurrence) of next layer message reified resource context.

Model MetaGraph: Resource, Statement, Kind (reifying class / instances) contexts / occurrences / attributes / values. Encoding. Message dispatch, event bus routes. URIs / IDs mappings. Resource set specification resolution. MetaGraph resolves concrete resources, Message expansion.

Resolve Message / dialog (CRUD) semantics via MetaGraph driven transforms (data / schema / behavior augmentation: dialogs).

Dimensional / Grammar models.

aX^4 + bY^3 + cZ^2 = dW;  
d, a, b, c: classes (CSPO);  
WXYZ: instances (CSPO);  
Powers: CSPO role;  
Terms: CSPO resources;  
Z(obj) is Y(pred) for X(subj) in W(ctx);

Instance, class, metaclass, occurrence terms. Primitives, variables, placeholders.

Resolution (Discovery, DIDs). Templates (grammars). Subjects: attr / val, ctx / role.

Behavior: order / compare.

Proof of work.

MetaGraph model: map URIs -> IDs.

Satisfy dW. Sync resolution (recurse terms contexts).

FCA. Resource attributes.

Tensor, adjacency matrix, tree.

Model MetaGraph: Resource, Statement, Kind (reifying class / instances) contexts / occurrences / attributes / values. Encoding. Message dispatch, event bus routes. URIs / IDs mappings.Resource set specification resolution. Resolve concrete resources, Message expansion. Resolve Message / dialog (CRUD) semantics. Dimensional / Grammar models.

Naming: Context URIs. Dimensional (Statement, Resource, Kind) addressing (conventions). Discovery: patterns / locators: Semantic URIs / MetaGraph ID mappings. Encodings: contextually encoded addresses / URIs.

Naming: NLP. Bind / suggest human readable names / labels.

Naming: Source (plain class) URIs.

Naming: Statement (Context) addresses.

Naming: Occurrence URIs (in Statement in CSPO role).

Naming: Contextually encoded addresses (URIs in Occurrences in Statements in relation with other occurrences).

Naming: Kinds addresses (global / mask, from occurrences in statements). Signatures. MetaGraph: operate over IDs.

TBD.

**Dataflow (reactive models)**

TBD.

For input Resource(s) (Model reactive / async IO APIs):  
. Create / retrieve Model  
. Create / retrieve Context Message(s)  
. Create / retrieve Message(s) Interactions  
. Bind Interaction Message Resource(s)  
. Perform Message transform. Materialize results. Message application rules: upper / domain ontology selectors (closest matching role in  
hierarchies), context alignments.

Match request statement / graph with model via context in interaction (algorithm: addressing, encoding, interaction model upper bindings /  
alignments). Resource MetaGraph. Reified model resources (Resource, Statement, Kinds, CSPO, etc.).

Apply subsequent transforms in interaction context (referrer context, get classes playing entity role, get behavior flows, browse / navigate  
streams). Context, variables, wildcards, placeholders.

Services: distributed addressing / resolution, reactive distributed event bus: streams / contracts, index, naming, registry.

Discovery: All model kinds are browseable / discoverable.

Determine class (reified layers contexts) hierarchies:

(ContextReifiedClass, ContextReifiedSubClass, SubClassAttributeKind, SubClassValueKind);

Merge / specify model, context, interaction graphs. Reified model resources, statements, kinds.

Model, context, interaction model graphs layers specifications. Reified models layers contexts resources describe graphs. Augmentation. Message context statement occurrence: Model.

Message flow (event loop) in / out:

Activation (data) <-> Alignment (schema) <-> Aggregation (behavior);

Encode behavior in statements / graph:  
Comparisons, order. Sort. Order (kinds hierarchy?).

Pattern matching, iteration, jumps. Discovery: routes / signatures, next event in bus / graph.

Context Model Message: Resource Specification (Grammar Template).

Messages Model: context model instance from input model grammar. Transform: context model instance from Messages.

Express Augmentation (Activation, Alignment, Aggregation) as Messages / Transforms. Reified Model entity types / roles (CSPO, Kinds, Layers, etc.).

Resource monad of URIs or Message monad of Resource?

Encoding. Addressing. Schema / MetaModel for data (Model), schema (Context), behavior (Interaction) resources / layers (aggregation). Naming  
formats / schemes: namespaces, contexts.

Class hierarchies (express context / class / kinds hierarchy). Grammars / Dimensional metadata.

Resource MetaGraph bindings (Message expansion / resolution index).

Subscription, Subscriber, Producer, Consumer, Processor. Example: submitting Behavior layer grammar / context "template" initiates "dialog" for fulfill Behavior expanding Message(s) and nested context layer statements (known / resolvable, new behavior / subitems) needed to complete / update full Behavior layers contexts graph.  
Augment. Alignment, Activation, Aggregation Message(s) : Resource set specifications.

Model listens onMessage (interaction context model population / dialogs scopes / namespaces).

Model augments input Message (augmentation specifications over in Message).

Model expands Message (Message over model resources):

Resource listen modelMessage. Model subscribes to response.

Matching triggered Resource. Message matching semantics (transforms).

Triggered Resource publish itself modelMessage.

Model augments output Message (augmentation specifications over out Message).

Model publish onMessage (interaction context model dialogs / resource dumps).

**Messages: Transforms. Graph Execution Semantics**

Message encoding semantics resolve transform execution resource set declaratively from MetaGraph / Models.

Specification resolves to query / create / update / delete according interaction contexts. Messages models determines “possible” messages according models grammars. Interaction specifications (statement / graph / dialog) may have any message encoding components in corresponding statement roles.

For each behavior, flow, class, kind, entity, statement in input request, transforms matches those components by applying messages into model resources (grammar) matched into interaction model (binding subsequent roles by dialogs).

New (potentially unknown) resources are added and augmented into the graph. Augmented resource events emitted from transform streams.

Example: a message composed of a kinds CSPO matches statements “instances” of those specifications (statements whose CSPO have matching kinds). A message with three CSP kinds and a (potentially unknown) object URI retrieves matching resources having that object value into corresponding property kinds. An statement of plain (potentially unknown) URIs instantiates / updates and augments new / known resources added to models and returns an augmentation transform result.

Interaction Model: Context of Messages model for a given interactions session / dialog state. Message invocation requests: Statement(s) building Resource invocation graph with layers matching Message patterns. Layers graph invocation patterns matching from higher to lower layers resources fulfilling higher layers templates. Variables, wildcards, placeholders.

Dialog arguments resolutions example: higher layer Resource / Message request / invocation instantiates in Interaction Transform context corresponding lower layer graph statements to be “populated” to fulfill request. Message IO of “forms” (Messages) inter-peers (originating peer  
acting as “server”) for initial requested peer to “ask” for form elements to be populated (interaction context “dialogs”). Resolution may propagate to other peers (content aware addressing dataflow routes dispatch: P2P resources address encodings, matching forms models requests). Nested interactions.

Explain messages (resource resolution). Grammar. Match model Resource(s). Compound nested CSPO statement contexts defines result behaviors. Message CSPO contexts may define create, retrieve, update or delete operations (passing 'null' for example for resource / statement to be deleted).

Explain transforms (message application). Transform: Resource stream result of Message application over resolved Resource(s)). Input statements: Message(s) / Resource(s) (from input message or to be populated or populated in dialog) and "goal" Message / Resource aggregating a model from Resource MetaGraph with Message / Resource bindings.

Message types (Augmentation: onto / domains):  
Attribute / Link (data):  
. Alignment: Augment / infer Attribute / Link.  
Class / ID (schema):  
. Activation: Augment / infer Kind, Class.  
Role / Context (behavior):  
. Aggregation: Augment / infer Role / Context.

Runtime / Resources / Messages: Core (upper / onto) Resources, Messages, Transforms. Reified entities (CSPO, Kind, SubjectKind, etc.). Match cases in messages.

Core (upper / onto) Messages: Getters, setters, nav, etc.

Domain Messages: raiseSal: setSal(sal \* increment); promotion: setPosition.

Event sourcing / tracking: married -> marriage occurred.

Resource.flatMap(messageInst::apply) : Resource.

Dataflow: Messages hierarchy. Aggregate contexts from coarse to fine grained transforms (raiseSal -> setAttr).  
data <-> schema <-> behavior.

Message dispatch, input statements resolve to applicable messages from switch from behavior to data layer invoking async microservice.  
Message case matching may involve entering and leaving data, schema and behavior paths if aggregated contexts matches more than one  
message. Visitor.

Message: functor (monadic transform) : Resource<T> -> R, T, R : URIs (hierarchies, models, semantic content types). Available verbs / flows /  
navigation (browse models, state of application returned from materialized models). Parameterized functions (partial applications) into Messages metamodel resources. Contexts (dataflow). Execution graph.

Alignment Message: Resource -> Statements (attributes, values).  
Activation Message: Statement -> Kind, Class.  
Aggregation Message: Statement -> Statement (next layer).

Subscriptions declarations / definitions. Applied on streams activations (transforms, executions resource parameterized partial contexts).

Messages metamodel: functor declarations partially defined over metamodels resource (T) defining transforms into (R) over application  
(flatMap) over / into (S). Messages inferred / aligned, activated, aggregated according base message transforms resources. Messages inferred from models / layers. TBD.

Functors <T, R> -> Resource<R>

Form / Template describing (reified as a Resource in a context model) declaratively subscriptions and actual exchange capabilities (datflow).  
Mappings, Transforms.

Processor which acts upon Resource events. Materialize results.

Specify declaratively augmentations by means of messages.

Upper onto / domain aggregated messages.

Event bus: P2P deployment.

Messages: Monadic applicables over Resource (flatMap).

Base HTTP / Browse (REST) Messages. Custom Messages.

Model MetaGraph: Resource, Statement, Kind (reifying class / instances) contexts / occurrences / attributes / values. Encoding. Message dispatch, event bus routes. URIs / IDs mappings. Resource set specification resolution. Resolve concrete resources, Message expansion. Resolve Message / dialog (CRUD) semantics.

**Augmentation (via Messages)**

Activation (Statement / Entities : data).

Alignment (Kinds / Classes : context / schema).

Aggregation (Flows / Behaviors : interaction).

Messages describes declaratively augmentation steps materializing models contexts / hierarchy layers.

**Protocol (API): dialogs (distributed resource augmentation / sync)**

Message resolution (contexts).

Reactive. Interaction / session contexts.

Annotate, link, browse resources instances, classes, metaclasses, occurrences in roles in contexts, attributes / values. Services / clients: endpoints: Virtualization (wrapper protocols).

Semantically annotated content types: image/png;face, text/xml;faceImgCoords. RDF schemas describing content, attributes, links in context / target roles. Content types: labels (schemas).

Message: Context Model API. Input statements: Model Grammar. Augmented IO by interaction transforms of applied matching Message with model statements inputs. Context of core models instances. API.

Transform: Interaction Model API. Input statements: Transform request invocation specification. Functional application of Message(s) over Resource(s): Transform (streams). Augmented IO: Requested Transform which applied augments resulting responses (dialog arguments  
resolutions). Context of context model instances.

Reactive / streams API. Message Transform (interaction result): matches request context specification built upon Resources / Messages (TransformBuilder). Resolve state / dialog session graph. Returns observable stream. Dataflow (chaining). Operations (over streams).

Transform request invocation specifications: means to interact with underlying contexts models (CRUD, domains behavior). Transforms result from applicating Message(s) over Resource(s). Sending a Message Resource to a given interaction context initiates a “dialog” in which to “populate” target Resource(s) and Resource arguments. Each dialog “step” renders resources / layers streams of requested arguments (server “queries” clients) or resources / layers streams of response augmented Resource(s).

Graph linking / alignment / synchronization by entailments from event sourcing over inferred state. Distributed predictive alignments.

DOM / OGM APIs (JAF). I/O Implementation, Deployment.  
Model, URI, Resource, Statement, Kind hierarchies. Models architecture (URI class per layer). DIDs / P2P / Rx Implementations. Model API. ModelManager. Event loop. IO.

**Protocol (API): resource activation (hypermedia application browser)**

Reactive. Interaction / session contexts.

Protocols / Services / Clients: Context interaction sessions (state flows).

Content type activation. Messages / gestures. Rules (commands / verbs). Content types: labels (schemas).

Browser referring context (Work, Peter, Employee).

Annotations (protocol): JSON-LD. Model / Grammar / Dimensional. Map annotations to resources (query string / meta resource description). Browse data (model), schema (grammar), behavior (metagraph).

Models ‘plug’ into Runtime augmenting its capabilities via standard extension APIs (added features / knowledge reactive URIs). Models ‘modules’: parsing modules declarative descriptions. Augment, link instance data.

Upper aligned ontology plugins / blueprints:

Resource URIs specialized implementations for different connectors / endpoints and content types (DB / OData, REST / HAL, etc.). Feature  
Resources backends (i.e.: URI for DB interaction).  
Purposes: Metamodel declarative goal statement. Fulfill flows (templates / forms: Messages).

Goal: P2P service that connects to services / endpoints (DB, REST, etc.), homogenizes them and exposes an API by which (augmented)  
knowledge of an stated entity is returned in response (protocol that entails queries / CRUD, object navigation in message / session state contexts). Peer shares / syncs with other peers.

Goal: Intermediate API (HAL for example) aggregating previous objects knowledge (DCI, DOM, OGM, MVC)

Goal: Semantic Browser. Homogenize diverse domains. Query examples. Search session history. Referrer semantics. Collected items in goals roles. Create session purpose document. Link to / from any addressable resource in context / role. Annotate source / destination context roles,  
attributes and schema.

TBD.

**Ontology matching**

TBD.

**Data / Reference Model (APIs, Functional Semantics)**

TBD.

Upper ontology: Node "levels" of domains abstraction. Highest level: service / user interaction (resource / hypermedia activation: model gestures). Lowest levels: upper ontology / business domains.

Application / Site / Service node types (Node ontologies domains layers). Renderers producers / consumers. Backends integration (Augmentation, Messages).

**Platform: implementation**

Introduction. Document. Use Cases (EHR). Standards. Models (predictions / signatures).

Implementation. Languages. Backends. Reactive frameworks / microservices. Distributed consistency. P2P / DIDs. Models / APIs. Nodes / Endpoints. Containers. Deployment.

Implementation: render RDFS / OWL upper ontology aligned (sameAs, type, subClassOf, restrictions, etc.). from Model / Message+ XSLT transforms. Semantic engine / reasoner / backend (URI published reactive service, Message based wrapper). Record Model / Message transforms.

API: URI, Resource, Message, Statement, Kind, Layers. Representation: XML bindings.

Kind : Statement : Message : Resource : URI;

URI<T extends URI> : Monad.

Resource: (URI, URI, URI, URI);

Message: specification / transform (input / output dialog).

XSLT / XPath / XLink / XPointer / XQuery.

Resource XML Encoding (nested layers quads).

Message XML Encoding.

XSLT templates (Resolution, Activation, Alignment, Aggregation). Resolution algorithm: TBD (ontology matching).

Events: Dataflow. Reactive Model endpoint Message dispatch / resolution (Producer). Resolve (addressable) Message resources (Resolution template). Apply templates (Resolved resources : model / Message resources : view context) : XML (Message).

Ontology levels: data / schema / behavior (backend, business, frontend) objects.

TBD.

**APPLICATION:**

Products And Services Community Exchange Network:

Contents / Features (Mision / Vision). Distributed consistent Knowledge Applications. Trust. Consistency. Event sourcing. Inferencing (of distributed state). Reconciliation.

Certify distributed Entity / Subject Identity / State (in roles / dimensional points). Class / instance alignment (matching).

Integration: Augment sources / back ends. Model I/O materialized in source (plugged) application / services back ends.

Integration: Extension. Extended functionalities data / schema / behavior exposed as services external to source (plugged) applications. Sync (Augment). Declaratively stated via Model descriptions. Discoverable, browseable (HAL / REST).

The idea of the project is to "augment" an ESB for EAI platform and to enable it allowing it to make "inferences" regarding which routes to use, "discovering" sources / destinations of an event message(s) which then it transforms / enriches according destination "semantics" and format(s).

This featuring the exposure of a generic facade which allows to see in an "homologated" view the applications or services and their data, schema and behavior (actions) that could be integrated into the tool.

Different integrated applications are enriched with this facade and with the events that, given the inferred routes and transformations, augments theirs data, schema and behaviors, invoking activities corresponding to each destiny semantics.

Going through my most recent attempts of having something concrete for sharing in plain English I realize one mistake I'm committing: I'm trying to describe combustion vehicles (Hypermedia Applications) saying that petroleum exists (Semantic Intelligence).  
  
As long as my post are going I've just got a stack of (incoherent) "analysis" documents as the result of my work. And I had only those until now because I was stuck because of the previously mentioned mistake (ah, and because of my Bipolar Disease maniac episodes...).  
  
I should try to describe applications instead and see how and where fuel should burn properly inside a motion vehicle to generate traction. Every semicolon I write is updated into my GitHub repository, so, sorry if you browse that "scrapbook" and you don't find anything even intelligible.  
  
First, I'll try to describe a "problem" (problem "spaces" in this case) and how a Purpose driven user Community achieves its Goal(s) by means of Goods, Products and Needs satisfaction (ontology levels: from abstract upper ontology to user gesture command in user interface / service invocation).  
  
The problem is to organize interdisciplinary (multiple domains) Task(s) in a Purpose fulfilment network with Actors, Contexts and Roles (with attributes and values). Problem spaces (domains) are declaratively stated by DCI[1] design pattern: Data / Context / Interaction use cases definitions and instances.  
  
Collaborative Federated Actor network complying determinate Profile(s) satisfying specific Product / Good / Need abstraction playing determinate Role in use cases Context.  
  
Domain Translation between business domains, example: orders, delivery, invoicing (micro) services Model instances are the means by which distributed disparate data, schema and behavior of different sources (applications, services) integration could be performed by means of Semantic Intelligence and Augmentation Protocol(s).  
  
A domain can be defined in terms of a set of actions / tasks with the Purpose of satisfying some Goal solving the Need for a Good producing / gathering a Product. Ontology. Purpose as Goal “class”.

The principal focus is to deploy a (social) Collaborative peer (Actor) network for which entities and individuals develop Profile(s) which acquaint them with Purpose resolution capabilities. Then, according peer’s specific needs (domain Goals) the application orchestrates interactions needed for Product(s) Task(s) accomplishment.

Ontology:

Domain / Actor / Context / Role / Product / Good / Need / Purpose / Task / Goal / Exchange.

Domains: data, schema and behavior of business applications (ERP, CRM, BI, SCM, HMS, etc.).

General purpose business domains problem resolution / tasks, goals accomplishment helper tools.

Syndication (contextual hypermedia activation): QA. Polls. Learning. Profiles. Guided task (wizards), guided editors: Context: Goal / Purpose.

Contents: Wiki view of augmented knowledge. Addressing. Hypermedia. API (Wiki) render nodes / links semantically browseable.

Backend: Nodes / Protocol.  
  
SoLiD:

[https://solid.mit.edu](https://solid.mit.edu/)

DIDs (Blockchain dApps):

<https://w3c-ccg.github.io/did-spec/>

<https://ont.io/#/>

Executable models (flows): testing results, prompts, scoring.

Applications (use / implement like):

Drive / Jira / Trello / Keep / Mural / Tasks / Calendar.  
  
Ontology levels abstractions (data, schema, behavior): service / user interface rendering (activation).   
  
Dashboards components (widgets / media / extended content types / addressing).  
  
Hypermedia Activation. Addressing. Link extended content types resources elements / parts with other resources addressed elements.

Objectives:

Develop Protocol (APIs) to facilitate Enterprise Application Integration (EAI) by means of Semantic technologies and Machine Learning. Ontology matching driven data, schema, behavior inference / aggregation / matching. Reasoning and learning over different consolidated backends alignments.  
  
Distributed P2P (Blockchain) approach of data synchronization between peers for ease of deployment patterns election and datasources integration (APIs, microservices, etc.).  
  
Data alignment:  
  
Determine if two instances (example: records) of two different backends or services refer to the same entity (Customers : John D. / Employees : John Doe).  
  
Schema alignment:  
  
Determine, for example, meaning and equivalences between diverse (aggregated / composite) schemas (equivalent classes, equivalent attributes, equivalent roles).  
  
Behavior alignment:  
  
Determine meaning and equivalences between (aggregated / composite) behavior contexts and behavior contexts invocations / interactions (Appointment / Interview, anAppointment / anInterview. Behavior flows aggregated from backends / services learning).

Alignments Augmentations:  
  
Activation: type inference : classification (determine class / metaclass / roles for entity attributes and values).  
  
Activation infer attributes / relations : clustering (from multiple occurrences of same entity in diverse data sources).  
  
Aggregation: infer roles in contexts: regression (Person class in Employment interaction : Developer role).  
  
Integration of addressable resources. Reactive I/O (sync back ends). Content type driven semantic augmentation / annotations.

Augmentation of distributed resources. Annotations (Semantic / ML). API for resource / schema / interactions exploration / protocol for message based API "dialogs" execution. HAL (Hypertext Application Language), OData (REST) like interfaces.  
  
Example: Google Drive / Google Knowledge Graph APIs Augmented with ML / Semantic intelligence tailored for specific domains / application kinds.

Augmentation. Ontology matching. Hypermedia augmentation protocol. Browser / Client APIs.

URIs API for annotating network retrieveable resources metadata. Content type / model driven augmentations / activations (models features / outputs). Subject attributes / values. Occurrences contexts / roles. Paths, pointers, locators. Example: annotate document URIs (parts, sections, mentions), annotate images URI (whole image description, coords: classes, individuals), annotate DB, table, row, column, value URIs, annotate / describe service / APIs URIs. Hypermedia protocol composable with other (described / annotated) APIs / resources. Example: Drive APIs.

What my attempts are about where, in the beginning, to match different URIs or identifiers which refer to the same entity (in different databases / ontologies, for example) to perform some kind of "ontology matching".  
  
Then I've tried to develop a mechanism for using RDF Quads for encoding an object graph (and a layers class hierarchy) using Contexts to denote the class of an instance, Subjects to denote class instances and attributes (members) and values: Predicates / Objects.  
  
Quads are "reified" as Resource(s). Also, Resource is a functional wrapper reactive and event driven of an URI. And an URI could be implemented with whatever backend which could produce or consume events (databases, services, etc.). Resource layers hierarchy (Context) is to be implemented by an actor / role type object pattern.  
  
Then I've realized that some basic type inference could be performed with, for example, aggregating Subjects with the same predicates (Subject Kinds). Idem for Predicates, Objects and Contexts. I've also realized that plain "facts" statements could be aggregated in the previously mentioned class hierarchy to abstract further, from plain data, instance / class layers of what I call data / schema / behavior layers. Higher layers (i.e.: Behavior) "aggregate" lower layers.  
  
Layers shape is as follow:  
Resource : Functional URI wrapper.  
(Context : Resource, Occurrence : Resource, Attribute : Resource, Value : Resource);  
  
Each layer abstract:  
  
Statement (data instance):   
(Statement, Occurrence, Attribute, Value);  
someOne buys someProduct  
  
Entity (data class):  
(Entity, Statement, Occurrence, Attribute);  
someBuyer, someProduct (Entity);  
  
Role (schema instance):  
(Role, Entity, Statement, Occurrence);  
Buyer, Product (Role);  
  
Class (schema class):  
(Class, Role, Entity, Statement);  
Person, Good (Class);  
  
Flow (behavior instance):  
(Flow, Class, Role, Entity);  
someBought (Flow);  
  
Behavior (behavior class):  
(Behavior, Flow, Class, Role);  
Buy (Behavior);  
  
This "aggregations" are part of what I call "Augmentation(s)": Aggregation, Alignment and Activation are ones of those, which are functional transforms described declaratively in an object graph metamodel. The act of applying an Augmentation implies one source Resource (context), one template Resource (transform) and a resulting (set of) Resource(s).  
  
One also could Augment Resource(s) in a functional manner, using reactive event driven APIs so, for example applying "Person" class to "Employee" role could shield a Resource set of people being working for someone. The ultimate goal is to be able to "plug" as much "backends" connectors as posible into distributed peers which exposes protocols / APIs for knowledge driven hypermedia applications.

Implementation. Async / Reactive Service URIs / Connectors (sample):

Spark,

Lucene / Solr,

Kafka,

MQ,

ServiceMix,

Vert.x,

OSGi,

Spring Boot,

SCDF,

Jena, (RDFS, OWL, Turtle, N3, SPARQL),

Reasoning / Shapes,

JAF / JCA / JDBC / JNDI / JMX,

Metamodel / Teiid / D2RQ / OData,

HAL,

DIDs,

OpenShift (containers / deployment).

Application:

features / techniques / patterns.

Implementation deployment use cases. Sample Apps: SoLiD / PIM / PASCEN: App declaratively built with framework, Implementation Integrations.

[1] <https://en.wikipedia.org/wiki/Data,_context_and_interaction>

**Encoding:**

IDs:

URI(s);

OntResource; Merged URI(s) wrapper.

OntResource hierarchy: layers statement contexts. Facets DOM, Actor / Role.

Resource (OntResource Context Roles hierarchies Monad wrapper);

Statement : Resource quad, Resource.

Message (Resource Monad wrapper); Request / Response Encoding.

Template / Transform (Message blueprints) domain / range : Message.

IDs:

A: OntResource.

B: CSPO Role.

C: Statement : OntResource Occurrence.

D: Kind CSPO Instances.

E: Class : Kind CSPO Classes.

F: ContextStatement : Context Role.

Meta Model:

A: (Resource, ?, ?, ?);

B: (Role, Resource, ?, ?);

C: (Statement, Role, Resource, ?);

D: (Kind, Statement, Role, Resource); Data (Resource Kind).

E: (Class, Kind, Statement, Role); Schema (Role Class)

F:.(ContextStatement, Class, Kind, Statement); Interaction (Statement ContextStatement).

ID: (F (E (D (C (B (A, Nil))))));

Cons lists. Binary Trees. Huffman / Prefix codes. RDF List serialization. Meta Resources / Models declarative statements Encoding, Addressing.

Kinds, Signatures. Contents. Contextual metadata.Lattices. Roles.Sets (bitstring cuads). Definitions (elements). Operations. Rules. Categories. Groups.

Statement: (ID (ID (ID (ID, Nil))));

(C (S (P (O, Nil))));

IDs, Meta Model, Interaction Model (Level), Session (Level), Backend (Level), Facets features:

Augmentations: Interaction Model Mappings execution / persistence / retrieval. Reactive model via representation of IDs: Mappings (signatures) dataflow inferred Augmentations.

Persistence: (activation / passivation): IDs / Meta Model / Facets from Interaction Model events (Messages) from Node IO. Interaction Model: Main Model(s) Message IO.

Order / comparisons: tree representation ordered by Context Role class hierarchy, instances hierarchies and aggregation hierarchies. Resources order (IDs). Statements order (Statement IDs). Comparison criteria (choose relevant IDs). ToDo.

Semantic resolution: Query Resource(s) satisfying “criteria” (i.e.: Object(s) for predicate) IDs by IDs resolution pattern:

Query Resources by role in context.

Query Resources by attributes / values.

Query Resources by identity / type.

Message (Resource Monad wrapper) : Statement; Request / Response Encoding.

Template / Transform (Message blueprints) domain / range : Message.

Augmentation : Functor.

Mappings: Immutable Resources Message based Augmentation bindings. Dataflow subscription routes: Signatures / CKs (Augmentation(s) functional streams).

Subject Kind: Subjects stream. Object Kind: Objects stream.

Encoding: Template Message augmentation (inputs).

Encoding: Declarative functors (Augmentation) behavior encoded in statements. Mappings (subscription / routes).

Encoding: Transform Message augmentation (outputs).

Interaction Model (Interaction Level):

(Augmentation, Template, Mapping, Transform);

Dataflow: Order, Flows (Mappings, hierarchies).

Interaction Model: aggregated Meta Model interactions (performed / inferred / possible) declared Models events (saga pattern).

Messages: Saga Activation. Interaction Model (Meta Model). Aggregated (Interaction) Meta Model interactions (performed / inferred / possible) emitted as Model event Messages (Saga pattern). Mappings.

**Meta Model:**

URI(s);

OntResource; Merged URI(s) wrapper.

OntResource hierarchy: layers statement contexts. Facets DOM, Actor / Role.

Resource (OntResource Context Roles hierarchies Monad wrapper);

Resource (OntResource CSPO / Contexts hierarchies Monad wrapper);

Role (Model CSPO Context Roles hierarchies type classes) : Resource;

Statement (Resource, Resource, Resource, Resource) : Resource;

Kind (Statement\*) : Resource;

Class (Kind\*) : Resource;

Context (Class\*) : Resource;

Hierarchy: class (Object / Value) as superclass Context.

Object: class (extension);

ContextStatement: super class (intention); Context Role.

(Resource, ?, ?, ?);

(Role, Resource, ?, ?);

(Statement, Role, Resource, ?);

(Kind, Statement, Role, Resource); Data (Resource Kind).

(Class, Kind, Statement, Role); Schema (Role Class)

(ContextStatement, Class, Kind, Statement); Interaction (Statement ContextStatement).

State Facet / Layer / Level / Augmentation / Model Resource Mappings.

Functional API: Message IO. Mappings.

Interaction Model (Interaction Level):

(Augmentation, Template, Mapping, Transform);

Dataflow: Order, Flows (Mappings, hierarchies).

State order (in context class hierarchies axes), comparison relations, iterations, flow, events, causal relations, units, enums, equivalence, etc.

Data order: Resource Kind hierarchies.

Schema order: Role Class hierarchies.

Interaction order: Statement Context hierarchies.

**To Do:**

* Resource / Message Monad Events: Augmentations. Mapping: Endpoint. Events: Implement Message / Resource / URIs Protocols.
* Services. Connectors. URIs APIs.
* Endpoints (Events Mapping) messaging interface.
* Meta Resource / Meta Model:
* Model, URIs, Resource, Contexts Functional APIs. Meta Model / Resources encoding. Mappings.
* Meta Resource / Model: encode Model, URIs / Layers / Contexts / Facets / Levels / Resources hierarchies. Mappings.
* Meta Resource / Model: Encode Message, Template, Augmentation(s), Transforms and Mappings (Dataflow).
* Meta Model: Data, Session, Interaction Levels (Message, Template, Transform, Augmentation statements). Mappings.
* IDs: Addressing / Encoding. Semantic (signature, contents, context) resolvable / discoverable identifiers.
* Meta Resource / Models / Messages: IDs / Encoding / Addressing formats. Ontology matching and Template / Augmentation / Transform enrichment (alignments), transforms (functors), materialization (model updates) via Mappings (events) and Meta Resource / Model Encoded Resource declarations (enrich / align, transform, updates algorithms: Encodings).
* Ontology Matching:
* Ontology Matching: IDs, Addressing, Encoding. Functional, Semiotic, Dimensional (Facets). Layers. Levels. Meta Resource / Model. Sets. Value as occurrence of attribute. metaclass / class / instance IDs.
* Ontology Matching: Encode: order, iteration, flows, units, relations, events, enums, etc.
* Messages: Events IO / Persistence: Saga Activation / Passivation populating Node local Quad store / persisting peers via DIDs ([ont.io](http://ont.io)) semantic (resolvable / discoverable) identifiers.
* Messages: Mappings. Meta Resources / Model Message based Model interactions (Mappings : Subscriptions).
* Messages: Message semantics (Augmentation: Verbs, CRUD, Behavior) according Message structure / pattern (dialog / prompts).
* Messages: Dataflow Template matches signatures (Session level, enrichs Message with Model / Dialog prompts / content alignments). Augmentation Functor applied over Message contents (Interaction level). Transform matching output signature emits (Session level, populated / prompts) output Message.
* Messages: Dataflow. Subscriptions. Reactive Model. Dynamic subscriptions / bindings. Events publish / subscribe between Model Resource. Mappings.
* Messages: Saga Activation. Interaction Model (Meta Model). Aggregated (Interaction) Meta Model interactions (performed / inferred / possible) emitted as Model event Messages (Saga pattern). Mappings.
* Messages: Saga Passivation. Model layers data routed by Mappings as event Message into (Interaction) Meta Model. Message inputs: Models. Mappings. Populate
* Augmentation:
* Functors: Meta Model declarations / Context classes / instance declarative implementations. Aggregation type: invocation over each CSPO / Context roles.
* Functor applied to context: Aggregation.
* Functor applied to subject: Alignment.
* Functor applied to predicate: Activation.
* Functor applied to object: members traversal.
* Implementation:
* JavaScript (browser) / NodeJS Core.
* Endpoints. Connectors (OData, HAL, OGM, Spring, ServiceMix / Fuse).
* Client APIs:
* Browser (JavaScript) / NodeJS / Connectors.
* Applications. Use Cases.
* Levels. Gestures / Actions (Services / UX). Rendering (REST APIs / Dynamic UX).

Deployable entity: Node. Publish / Subscribe signatures (interface). Augmentation / Mappings Interaction Model (Runtime). Models, Facets, Services, etc. ToDo.