**Objectives:**

Rosetta Stone like engine enabling Ontology (Data, Schema / Information, Knowledge / Behavior) discovery, matching and integration.

Reactive Service Bus for pluggable integration of application and translation of gestures between domains business systems allowing workflows alignment and discovery of application systems behavior.

**Layers: RDF Quads Representation. Augmentation / Inference Matrix Models**

Patterns:

(Context, Occurrence, Attribute, Value);

(Dimension, Measure, Unit, Value);

(Dimension, Resource : SPO, Kind, Statement);

Sets Model Layers Structure:

(Dimension, Resource, Kind, Statement);

(Statement, Dimension, Resource, Kind);

(Kind, Statement, Dimension, Resource);

(Resource, Kind, Statement, Dimension);

(Dimension, Resource, Kind, Statement);

Dimension: U

Resource: SPO

Kind: SPO Intersections (pairs)

Subject Kind: P intersection O

Predicate Kind: S intersection O

Object Kind: S intersection P

Statement: SPO Intersection (of the three sets)

Sets / Individuals Mappings:

IDs: metaclass, class, instance, context, role, occurrence, previous, next ID roles relations for Model Set Contexts.

Augmentations / Transforms: Model / Domains functional mappings. Order. Dimensions. Axes. Flows. Hierarchies. Inference / Population.

Levels: Augmentations. Mappings.

Levels: Resource, Kind, Statement.

Levels: Reify Statement as Kind, Kind as Resource, Resource as Statement.

Levels: Reify Resource as Kind, Kind as Statement, Statement as Resource.

Sets / Individuals Mappings:

Levels (layer statements) shifts (quads matrix). CSPO roles:

(Dimension, Resource, Kind, Statement);

Sets / Individuals Mappings:

Levels (layer statements) shifts (quads matrix). CSPO roles:

(Dimension, Resource, Kind, Statement);

Resource: Statement Semantic Address / ID / Occurrence. Dereference / browse: Representation State / Roles (CSPO) according request / response referrer / occurrence / transforms / mappings browsing context states. Representation exchanges: Forms / Flows. Examples: Faceted search (build context template schema roles via form request / response exchange updates), Shopping Cart (build use case representation items via state representation request / response exchange updates). Representational state transfer on each request / response bodies. Placeholders / Flows history Roles. Stateless services: product representation submit to order service submit to payment service submit to delivery service. Functional dataflow, distributed representation services (URNs).

Encoding. Index Lists: C ID of SPOs Statements. CS ID of POs Statements. CSP ID of Os Statements. Schema: Zippers. Representation: cons cells. Functional Mappings: data types / monads.

Augmentations (purposes) specification encodings discovery: Self organizing graphs / maps. Fitness function. Problem (encoded / dataflow signatures) solver.

IDs:

Data Schema Representations UIDS. Results of Behavior Interactions. Messages Dataflow Flows Blockchain. Contextual ID: State of Entities at Representation Dimensional State Context (state respect to other entities dimensional state in various axis).

Example: Quads Context State Representation (dimensions state snapshot) ID calculated from (CSPO Subject example):

CSPO Subject parents state: CSPO Contexts.

CSPO Subject children state: CSPO Predicates.

Idem for other CSPOs. Encode, address / serialize in such a way that allows retrieval of entity ids, state: data, schema: roles, behaviors: available mappings / transforms state by dimensional contextual state spaces of an entity. Example: Tell me the weather conditions of the day of the playing of the match between A and B and B wins the game.

IDs:

Relations, Relationships, Zippers parse / materialize.

Upper / dimensional knowledge. Apply / classify Patterns. Relations encoding / sets quads. Functional Transforms: Functor(Role, Definition Transform) : Functor(Role).

IDs encoding. Functional mappings / roles. Patterns: definitions / instances. Matching definitions materialize instances. Relation types / Relation relations (inverse, complement, etc.).

Dataflow: FamilyMember<Son> (FamilyMember<?> -> FamilyMember<Uncle>) Transforms I/O Flows.

Augmentations: materialize mappings. Metaclass, class, instance, context, occurrence roles. Functor mappings / transforms contexts / arguments (dataflow): roles.

Examples: Uncle. Marital status. Temporal. Containment. Order. Time. Hierarchy. Containment / Order: Graphs. Trees. Lattices.

IDs:

Content Addressable RDF (Memory / Network). Dataflow (executions / query transforms flows: next address activation).

MetaModel: Content Addressable Network Nodes: Quads matrices projected in a virtual multi-dimensional Cartesian coordinate space, overlay network, on a multi-torus?.

Jena SPARQL Services (code / functions) CSPO Resources. Contextual (parameterized states) specification (vars, wildcards, placeholders) of statements expansion.

Services: W3C DIDs Contracts. Rules. Application: StratML / Integration. Logs / Workflows / BPM / Dashboards.

Encoding: Functional / DOM / OGM:

Content Addressable: Context / Content IDs. Pseudo grammar:

Locator: URL / URL + OccurrenceContext;

OccurrenceContext: Locator(Locator) + Locator;

SPO: Locator + OccurrenceContext;

ID: SPO / SPO + OccurrenceContent;

OccurrenceContent: ID(ID) + ID;

Resource: ID + OccurrenceContent;

Node: Resource / Resource + Arc;

Arc: Node(Node) + Node;

Context: Node + Arc;

SPO: Resources.

Resource: Kinds.

Context: Statements.

Materialize Quads layers hierarchy roles. Functional API (TBD). S-Expressions. Forms.

Quads layers hierarchy roles:

(Dimension, Resource, Kind, Statement);

(Dimension, Measure, Unit, Value);

(Context > Occurrence > Attribute > Value);

C: Functor Wrapper Type.

S: Functor Value Type.

P: Functor Mapping / Transform.

O: Functor Transform Wrapped Values.

Functional Functors / Transforms roles:

Resource Statements:

C: Metaclass. Context.

S: Class. Subject.

P: Context. Predicate.

O: Instance. Objects.

Dimensional Statements (Mappings: order / dataflows) transforms:

C: Input Role / Kind. Context.

S: Occurrence. Resource. Subject.

P: Role. Output Kind. Predicate.

O: State. Statements. Object.

Functors / Mappings: Dimensionally Augmented Upper / Inferred domain knowledge. Resources Dataflow / Order populated Dimensional Mappings.

Apply Dimensional Transforms: Reactive materialization of matching Resource Kinds over Dimensional Mappings. Pipeline outputs with matching mappings outputs / inputs (order rules).

Transforms Specifications:

Upper Augmentation Dimensional Transforms: Activation, Alignment, Aggregation over core upper / root model roles.

Domain Transforms: declaratively stated in Resources and Dimensional models. Upper alignments. TBD.

Encoding: Quads Matrices / CAN (Content Addresable Network) coordinate space.

Axis: Quad Statements layers / projections. Dimensions / Functional Mappings:

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

(O, C) : Dimensional Context. Object Dimensional extension. Functional Mappings / Transforms context (object member property traversal).

C, S, P, O Axis Dimensional Mappings / Transforms populated from Augmented Quads CSPO Roles (axis / dimensions):

(Dimension, Measure / Resource, Unit / Kind, Value / Statement);

Addressing: Semantic hashing (context / content functional) references data (entities). CSPO Functional Roles IDs. Address space functional / traversal.

Hashing (content addressable) IDs: VSM (Vector Space Model). FCA (Formal Concept Analysis). Index / mappings / encodings. Render quad polygon / vectors similarity function (context / content polygon sides / angles).

Graph / ANN CAN CAM: Augmentations (align, activate, aggregate layers) functors / transforms. FP / ML. Papers (DGI Infomax).

Typed RDF, monads, bnodes (wrapper types, i.e: Address primitives / locators / bnodes fields. Drafts. Dimensional: quads: sets / elements / transforms definitions / declarations. Relationship / Relation higher level ontology / objects.

Augmentation: Graph / ANN FP / ML Data flows. Nodes: functors. Activation functions: transforms (meta model roles / meta relations lambdas: metaclass, class, etc.). Data flows: Quads input patterns activation, alignment, aggregation transforms pipelines results according graph context / state.

Property Graphs: CSPO Network Occurrences Attributes (metaclass, class, context, instance, role, etc.) of Graphs Nodes inputs / outputs. State. Example: Context for which Predicate Occurrence is valid. Order: hierarchies.

Domains Graph:

(C, S, P, O);

(Relationship, C, S, P);

(Relation, Relationship, C, S);

(Entity, Relation, Relationship, C);

Relationship: Declarative aggregation of instance types (Relations) contexts, subjects, predicates (attributes). Marriage.

Relation: Aggregation of Relationship instances role types declarations. Wife, Husband, Wedding. Type attributes due Relationship aggregated predicates.

Entity: Aggregation of Relation contexts role instances. aWife, aHusband, aWedding. Attribute values due Relation Relationship aggregated predicate objects.

Layout:

(Context, Occurrence, Attribute, Value);

Relationship:

Marriage Context: One Context Statement for each Marriage Relationship Predicate: all Marriage(s) Relationship statements. Aggregate Relationships types.

Relation:

Wedding Context: One Context Statement for each Wedding Relation Subject. Relation is a Relationship (metaclass / occurrence) instances aggregation: all Marriage Relationship Wedding(s) statements. Aggregate Relation types (metaclass).

Entity:

aWedding Context: One Context Statement for each aWedding Entity Context. Entity is a Relation (metaclass / occurrence) instances aggregation: all Wedding Relation aWedding statements. Aggregate Entity types (Relations) instances.

C, S, P, O: Meta Model metaclass, class, instance, context, role, etc.

Dimensional / CSPO Alignments.

Dimensional Matrix:

(Kind, Relationship, Relation, Entity);

(Entity, Kind, Relationship, Relation);

(Relation, Entity, Kind, Relationship);

(Relationship, Relation, Entity, Kind);

Kind: Type inference. Hierarchies, Context sets statements / attributes declaration. Aggregate Relationships types. Aggregate Relations (metaclass) types. Aggregate Entity types (Relation) instances.

DGI (Deep Graph Infomax) / CAN Tensors / Nodes / Dimensions.

Dimensional Matrix Graphs / Network Inferences:

Augment SPO input statements into Relationships hierarchy matrices aggregated quads. Example: (:Peter :wife :Mary) entails a Marriage, a Wife, a Husband, a Wedding, aWife, aHusband, aWedding layers contexts instances / attributes for input statement augmented via dimensional matrices instances kinds / links / matching (activation, alignment, aggregation) on previous knowledge. Prompt and augment funtional shapes bindings layout (CSPO Dimensional / semiotic context / metaclass, class, instance, context, role, occurrence) matching signatures: Data flow.

Expand all Relationship hierarchy matrix aggregated quads knowledge back to SPO statements. Relationships / SPOs reactive updates: Data flow expressions for further knowledge updates (CSPO Dimensional / semiotic context / metaclass, class, instance, context, role, occurrence) shapes bindings layout. Statements / Relationships functional concepts slots (variables / signatures reactive placeholders). Produce and augment new matching knowledge statements.

RDF Graph Literals: Contexts. Bnodes: lambdas. OWL Facets, SPARQL Functions, RIF Operations.

Monads Meta Model:

Functor type: Resource<? extends URI>.

Wrapped types hierarchy (Contexts):

(URI, Statement, Kind, Occurrence);

(Occurrence, URI, Statement, Kind);

(Kind, Occurrence, URI, Statement);

(Statement, Kind, Occurrence, URI);

Transforms:

Core Transforms: context, metaclass, class, instance, occurrence, role Resource functions. Browse Resource graph contexts / occurrences / relations / attributes. Transforms yields meta model contexts Resource roles. Navigate data / schema / behavior.

Transform pipelines: state context traversal (domain / range). Example: Person, Address, Street, Number. GetAddress(Person / Address) transform, GetStreet(Address, Street) transfom, GetNumber(Street, Number) transform.

Transform Dimension Models Hierarchies:

Semiotic Dimension. Core Data Model I/O, CRUD / persistence events. Meta Model templates dispatch / dataflow to corresponding dimensions:

(Value, Context, Object, Attribute);

(Attribute, Value, Context, Object);

(Object, Attribute, Value, Context);

(Context, Object, Attribute, Value);

Inputs / Outputs events (sync) are of the shape: (TableName, PKVal, ColName, CellVal);

provided / consumed by any "tabular"-able serialization format (XML, JSON, etc.).

Semiotic (Sets) Model / Mappings:

(Context / Set / Kind, Occurrence / CSPO Individual, Attribute, Value);

Mappings / Kinds Aggregation:

SPO Kinds: SPO Context typed Kind.

SPO Kinds : Implements generic Kind (Models).

Aggregate Kind Context Mappings for all Sets Model SPO statements.

(SubjectKind, Subject, PredicateKind, Predicate);

(SubjectKind, Subject, ObjectKind, Object);

(PredicateKind, Predicate, SubjectKind, Subject);

(PredicateKind, Predicate, ObjectKind, Object);

(ObjectKind, Object, SubjectKind, Subject);

(ObjectKind, Object, PredicateKind, Predicate);

Hierarchies / Order:

Statement Predicate as Subject, Object as Predicate.

Dimensional: Measure as Dimension, Value as Unit.

Meta Model Dimension. Normalized representations of aggregated Dimensions models data / metadata:

(URI, Statement, Occurrence, Kind);

(Kind, URI, Statement, Occurrence);

(Occurrence, Kind, URI, Statement);

(Statement, Occurrence, Kind, URI);

Context : Statement;

Object : Occurrence;

Attribute : Kind;

Value : URI;

Relationship Dimension (Domains): Aggregated domain knowledge ontologies of Meta Model / Semiotic populated layers (upper reactive dataflows).

(Entity, Relationship, Relation, Kind);

(Kind, Entity, Relationship, Relation);

(Relation, Kind, Entity, Relationship);

(Relationship, Relation, Kind, Entity);

Relationship : Statement;

Relation : Occurrence;

Kind: Kind;

Entity : URI;

Dimensional Dimension: Cube like aggregation of Meta Model / Domains / Semiotic populated layers (upper ontologies reactive dataflows).

(Value, Dimension, Measure, Unit);

(Unit, Value, Dimension, Measure);

(Measure, Unit, Value, Dimension);

(Dimension, Measure, Unit, Value);

Dimension : Statement;

Measure : Occurrence;

Unit : Kind;

Value : URI;

Dimensional Interoperation: Functional Mappings and Models schema class hierarchies. Resource Monad. Semiotic Value and Domain Entity sharing the same identifier: Framework URI (OntURIs).

Dimensional hierarchies: Functional Mappings and data flow for reactive base upper ontology templates:

Dimensional population:

Contexts class hierarchy plus reactive functional dataflow in upper ontology shapes / templates. Resolve missing Resources or they placeholders (functional transforms APIs): data flow Values.

Transform Templates / Augmentation:

Mappings / Transforms:

(DomainSelector : Kind, Input : URI, RangeSelector : Kind, Value : URI);

Multiple Values.

Nested Transforms (Value Input context).

Assert Transforms: Materialize Meta Model assertions.

Query Transforms: Values occurrences (contexts) for Meta Model Domain Inputs.

Mapping signatures: Kinds I/O. Shapes. Templates. DOM.

Inputs / Values: Reactive data flow slots.

Shape (Transform instance) compliance: Input / Value slots fulfilment (Value / Object domain).

Template (Transform spec) layout rendering: Dimensional layout Inputs / Values (Context / Subject domain).

DOM: Functional Dynamic Object Model.

Transforms: Streams. Emits Contexts (from Aggregated layers Objects), emits Contexts Subjects, Subjects Predicates, Predicate Objects aggregated into Statements.

Activates / Aligns into Dimensions. Activate types: perform CSPO Occurrences Kinds activation. Align layers: aggregate layer context instances occurrences. Flows Selector Predicates.

Dimensions layers (matrices) functional data flow pipelines. Contexts, occurrences, attributes, values templates (data flow Resource: matching kinds) reactive resolution for definitions of instances (upper ontology / data flow slots).

Domain Transform: Kind wrapped Resource. Dataflow resolution: Kinds I/O signatures (domain / range). Domains Transforms (lambdas / graph template resources). Navigate domain (types / instances / attributes / relations).

**Refactor: TBD:**

Kinds are instances of Types in a Role in an Occurrence of a Context.

Type: Aggregated Context Occurrence SPO. Sets.

Kind: Aggregated Kind Occurrence SPO Context augmented Role Type occurrences. Type reification. Statement reification: property graphs.

(Kind, Context, Role / Type, Occurrence);

Matrices: (X, Y) invocation of Functors over Resources. Resource Mappings.

To Do.

Model:

Context: CSPO Contexts Occurrences.

(Type, Context, Attribute, Value);

(Kind, Type, Context, Attribute);

Mappings (Models):

(Kind, Context, Type, Context);

(Type, Context, Kind, Context);

Mappings:

CSPOs.

Metaclass example: Type of a Kind (Developer kindOf Employee).

C: Type.

S: Context.

P: Kind.

O: Context.

(Statement, Type, Kind, Context);

(Type, Kind, Statement, Context);

Kind: Context Resource Statement Type Reification. Type Kinds in model statements (type occurring). Statement reification: property graphs.

(Relationship, Relation, Kind, Entity);

(Dimension, Measure, Unit, Value);

Order / Hierarchies: S as C, O as P. Dimensional example: To do.

APIs: Models. Functional. Classes. Monads, Transforms. I/O, CRUD.

Normalize Models:

Context: CSPO Contexts Occurrences (Model hierarchies). Resource Monad containing role instance.

Metaclass example: Type of a Kind (Developer kindOf Employee).

Core Meta Model:

(Type, SubjectContext, Statement, Kind);

SubjectContext: for a given Type, stream of its aggregated statement same subject role occurrences. (subject attributes). Idem for other statement roles data flow population.

(Kind, ReifiedType, SubjectContext, Statement);

Kind: Augments Type instance with contextual role semantic attributes.

(Statement, Kind, ReifiedType, SubjectContext);

(SubjectContext, Statement, Kind, ReifiedType);

Hierarchy / Aggregations:

Context.

Statement : Context.

Kind : Statement.

Type : Kind.

Models:

Discrete events model:

(Relationship, Relation, Kind, Entity);

Hierarchy / Aggregations:

Relationship : Context.

Relation : Relationship, Statement.

Kind : Relation, Kind.

Entity : Kind, Type.

Continuous measures model:

(Dimension, Measure, Unit, Value);

Hierarchy / Aggregations:

Dimension : Context

Measure : Dimension, Statement.

Unit : Measure, Kind.

Value : Unit, Type.

Normalize Mappings:

Mappings: R / describe. Transforms (CUD): Mappings / Transforms Models layout. Functional invocation (streams / signatures): schema / domains matching / execution.

Transforms Resource layout: Types (including reified roles, i.e.: Relationship Resource instance). CUD.

Mappings Resource layout: Kinds (including reified roles, i.e.: Entity Resource instance). R.

Matching Resource layout: Statements.

Output Resource layout: Statements (of augmented instances of Types / Kinds).

Core Model reifies models (events / measures) CSPO statements for augmentation and inference. Core Transforms / Mappings for Models Augmentation / Population (reified roles).

To do:

Normalize / homologate models / mappings / transforms. Functional APIs / reactive streams: I/O: Types / Kinds Aggregation. Mappings / Transforms Models Augmentation / synchronization.

Mappings / Transforms:

Mappings: retrieve / browse graph.

Transforms: CUD graph manipulation.

Context Functional layout: Input: Contexts. Output: Statement stream.

Statement Functional layout: Input: Statements. Output: Kind stream.

Kind Functional layout: Input: Kinds. Output: Type stream.

Type Functional layout: Input: Types. Output: Subject stream.

Augmentation:

Resource Functional Matching:

Statement, Kind, Type, Subject class hierarchy.

Statement, Kind, Type, Subject instances hierarchy.

Input: Statement. Pattern. Selector.

Pattern CSPO Matching (traversal):

* CUD: (C, (C, S, (C, S, P, (C, S, P, O)))). If not exists, create / append (role factory). Transforms.
* R: (C, (C, S, (C, S, P, (C, S, P, O)))). If not exists, retrieve last. Traversal.

Predicate exists: data flow streams ontology matching. Append: align models (references). Augmentations.

Output: Augmented Statements.

Models Mappings:

Discrete events model:

(Relationship, Relation, Kind, Entity);

Continuous measures model:

(Dimension, Measure, Unit, Value);

Meta Model Reification (sync):

(Context, Statement, Kind, ReifiedType);

CSPO models Resource classes: meta model classes inheritance.

Events domains, dimensional model, core: upper ontology (primitives) for functional matching data flow / models aggregation / layers. Order / hierarchies. Dimensional / events core classes.

**Runtime / Component:**

Input Statements:

Wrap aligned input Statement Resources into Resource monads. Populate functional Statement with Resource monads instances wrapping aligned source Resources.

Factories: To do. Current Model / Input Model.

Factory CSPO streams actions:

Init: Session. Current model / Object Model (models runtime / persistent state).

Factory Collectors / API patterns.

Dataflow: CSPO Builder slots (resolved / resolvable mappings / transforms).

Kind / Type: Activation (Context / Statement aggregation). Aggregate Kinds / Types incrementally into functionally resource resolved / resolvable Futures streams (dataflow builder slots).

Append / Delete (versions): Aggregation. Resolved Kinds / Types aggregation of Statements / Contexts functionally into resources resolved / resolvable: Futures streams (dataflow builder slots).

Update / Link (relations, i.e: sameAs, schemas: uncle): Alignment. Functional inference: models (metamodel, discrete, dimensional) ontology statements. Apply Mappings / Transforms. Dimensional / Events / Model schemas / quads translation / transforms.

Update Factory session runtime model.

Comparison: Order, Hierarchy. Loop for each input resources over a model resource of a model stream.

Builder: Aggregate Statements (Persistence / Factory Models).

Update model persistent state.

Builder: Aggregate Statements (Persistence / Factory Models):

Statements stream: Functional Model Contexts. Pairwise streaming merge of persisted model resources with Factory session state augmented resources. Emits streams of augmented resources (CSPO) / Statements: Persistence / Mappings / Transforms / Factories subscribers.

For each layer (Meta Model): Feed Input: Statement. Pattern. Selector. Infer matching input Resource types (Factories: functional Mapping / Transforms shapes / descriptions builder of model contexts via inputs aggregation / inferences).

Builder Pattern CSPO Matching (traversal):

* CUD: (C, (C, S, (C, S, P, (C, S, P, O)))). If not exists, create / append (role factory). Transforms.
* R: (C, (C, S, (C, S, P, (C, S, P, O)))). If not exists, retrieve last. Traversal.

Matching resolves CSPO next item in Transforms / Mappings model streams traversal contexts. Builder / Factory builds / update items upon its input Statement Resource (resolve types / contexts), functional context and model metadata. Resulting statements are appended / removed from the model.

Data flow traversal augmentation. Functional Resources / Contexts model flow roles traversal paired with inputs Resources / Contexts resolving augmented Resources (CUD / Merge).

Streams, Collector, Map Reduce. Data flow: CSPO aggregation. Parse / build CSPO model contexts / mappings / DOM. Factories streaming model context resources (chained CSPO streams) resolve new / existing contexts resources given input resources CSPO matching model resources streams CSPO augmented contexts (CUD).

APIs. XML:

XML / XSLT: XUL Application. Node: Augmentation Services Endpoint (I/O). Templates. Connectors. REST. DCI (XML code / data HAL I/O).

APIs. JavaScript:

JS / JSON / JSON-LD / Semantic / DOM / Functional QL (CRUD). TBD.

Input: RDF Quads.

ResourceRegistry: Mappings. Naming / Matching. Streams. Index. Functional Services.

Model Layers: StatementBuilder. Mappings.

Augment Models. Mappings. REST Context (referrer). Factory CSPO streams actions.

ResourceRegistry: Mappings. Naming / Matching. Streams. Index. Functional Services.

Model Layers: StatementBuilder. Mappings.

Output: RDF Quads (graph).

APIs: Facades. I/O Data CRUD Formats / Endpoints.

Inputs / Naming:

Input Quads: Statements from R2RQ, Apache Any23, Stanbol, MetaModel, Olingo, JBoss Teiid.

Resources Wrapper:

OntResource (Source URIs, Model URN);

Sources Alignment.

Contextual / Metadata URN:

CSPO URN IDs. DIDs.

Functional alignments (Mappings / Transforms / Layers).

Naming / Registry

IDs / Roles, Contexts:

Context Role Class (i.e: Dimension, Entity)

Context Role Class Instance

OntResource ID

CSPO ID

Metaclass

Class

Instance

Context

Occurrence

Role

urn:ont:[ID:ID][ID:ID][ID:ID]

URN IDs Syntax / Grammar.

Resolution: Traversal / Patterns / Predicates.

Blockchain: DHT CAN. Revisions: CUD / Versions.

Contracts: Mappings / Transforms.

Resources Monad<OntResource>.

IDs: Encoding (order / hierarchy). Aggregation. Dimensions. Bitstring lattices.

Patterns: Encoding Augmented with new knowledge still matching with previous one (Contexts, Subjects, etc.).

Augmented via Augmentation / functional data flow traversals aggregation (encoding).

Resource Monad

Statement Contexts

Wrapped Resource Type (Dimension, Unit, Measure)

Wrapped Resource Instance (Time, Minutes, 60)

Wrapped Resource Monad occurrence (Statement Context)

(TypeID, TypeInstanceID, WrappedResourceID, WrappedResourceOccurrenceID);

Statement resolves / matches IDs. Futures. Patterns, hierarchies, order resolution of Resources (data flow traversal build / match).

**Encoding**

To do.

IDs. Hierarchy / Order: CSPO Selector patterns / IDs Encoding (Octal Quads Addressing):

Features encoding: Bitstrings / VSM / Layers / Hierarchies / Order operations: resolve metaclass, class, instance, context, occurrence, role.

Layers CSPO streams aggregation / merge. Context / roles.pipelines.

CAN W3C DIDs. (Dimensional Addressing).

Inferences (Dimensional / Facts Models Augmentation):

Dialog. State Flows. Functional signatures / resources exchange activation.

PCN Aggregation Schema Model.

PCN: Nested until primitives. Reification. Schema.

* C: Context.
* P: Previous.
* N: Next.
* PCN: (Previous : PCN, Current : PCN, Next : PCN);
* Previous: 100 (prev : S) : Occurrence / Domain / Kind / Meta class.
* Prev / Curr: 110 (parent : OK) : Range signature.
* Current : 010 (this : P) : Context.
* Curr / Next: 011 (children : SK : SubjectType).
* Next: 001 (next : O) : Range / Role.
* Always: 111 (C: dimensions : Contexts) Meta class.

Complement: 101 : PK (ctx / roles XOR mask). Functional operations. CSPO masks / patterns (signatures). Context.

Masks: From Context, Metaclass, Type, etc. apply encoded mask: traversal (transforms / mappings).

Dataflow: Context mask (PKs O P, N) resolves Predicates matching Contexts S, O Types / Kinds. Functional Transforms, Mappings traversal / pipelines.

Populate network (primitives):

(TypeID, TypeInstanceID, WrappedResourceID, WrappedResourceOccurrenceID);

Populate network (sets models hierarchies):

(Type, Kind, Statement, Context);

Order:

Verb: action, passion, state. S(A, P). Transforms, Mappings signatures.

Predicates / Predicate Types / Kinds:

(john : lover, loves, mary : loved):

For a loved to exist there should exist first a lover. Dataflow: domain / range. PCN aggregation / recursion: axis / dimensions.

**Data flow:**

Mappings: Create, Update, Delete (CUD).

(Mapping, DomainSelector : Kind, Input : URI, RangeSelector : Kind);

Transforms: Retrieve.

(DomainSelector : Kind, Input : URI, RangeSelector : Kind, Value : URI);

Functional Mapping: Value specification.

Functional Transform: Mapping Value.

Mappings / Transforms are declaratively stated in Meta Model meta resources (context / selector, object / selector, transform, values). Values updated in model references (slots).

Mappings / Transforms declares shapes / instances (type / value slots) of reified types / values. Kinds: Data flow Value slots. Shapes, Templates.

Input / Output:

(Context, Object, Attribute, Value);

tabular / meta model I/O / alignments translation interfaces. Handle CRUD semantics (messages). Functional REST / HATEOAS (DCI core transforms / mappings) message based model browsing. Mapping Values: data flow slots.

Layers Matrices fulfills Mappings / Transforms. Perform Augmentations: Inference, matching, alignment, learning populating Mappings / Transforms. Example: Kind Context layer aggregates Kinds Transforms / Mappings from matrix layers occurrences. Kind as result of a Subject Transform.

Mapping / Transforms Kinds types:

CSPO Dimensional layers.

Context

Subject

Predicate

Object

ContextKind

SubjectKind

PredicateKind

ObjectKind

Kind Mappings:

(ContextKind, Occurrence, Attribute : Kind, Value);

Attribute: Predicate / super Kind;

(SubjectKind, Occurrence, Attribute : Kind, Value);

Attribute: Predicate / super Kind;

(PredicateKind, Occurrence, Attribute : Kind, Value);

Attribute: Predicate / super Kind;

(ObjectKind, Occurrence, Attribute : Kind, Value);

Attribute: Predicate / super Kind;

Augmentations:

Mappings signatures: (DomainKind, RangeKind). Data flow streams. Reactive event driven (Resource functor core transforms).

Aggregations:

Subjects Streams. Context aggregated Subject Occurrences stream. Mappings driven transform.

Mapping: (ContextKind, SubjectKind);

Activations:

Predicate Streams. Subject aggregated Predicate Occurrences stream. Mappings driven transform.

Mapping: (SubjectKind, PredicateKind);

Alignments:

Object Streams. Predicate aggregated Object Occurrences stream. Mappings driven transform.

Mapping: (PredicateKind, ObjectKind);

Functional Augmentation streams: Augmentation streams concatenation (functors pipelines). Apply domain / range signature matching Transforms. Collect / merge of CSPO aggregated Mappings contextual Transforms augmented statements. Populate matrices. Populate Mappings / Transforms.

Transforms / Mappings:

Augmentations

Metaclass

Class

Instance

Occurrence

Context

Role

Others

Kinds: Domain / Range Types

Schema Kinds: Meta Model / CSPO

StatementKind

OccurrenceKind

KindKind

URIKind

Semiotic Kinds: Input / Output

ContextKind

ObjectKind

AttributeKind

ValueKind

Domain Kinds:

RelationshipKind

RelationKind

KindKind

EntityKind

Dimensional Kinds:

DimensionKind

MeasureKind

UnitKind

ValueKind

Schema Kinds: Reified Kind Values.

Domain Kinds: Kind types instances.

Transform Invocation contexts:

Kind: Aggregated Kind occurrences.

Kind / Value: Value aggregated Kind occurrences.

Value : Aggregated Value occurrences.

EntityKind instance in Subject, Predicate, Object role Mapping occurrences. Kind Value Attributes / Values according domain data flow context state (Transform Kind Value).

Example:

(Marriage, Wedding, Invited : Kind, Entity);

Kind 'Invited' as a statement Context role (Invited Context Layer) maps / transforms to all 'Invited' entities. Mappings multiple values.

Kind 'Invited' as a Marriage Wedding statement Predicate maps / transforms to given Marriage Wedding instance 'Invited' entities. Mappings multiple values.

**Augmentation**

Aggregation: Keys. Identify Key / Equivalence (in some Domain axis) Predicates. Domain / Range schema. Object functional values. Alignment. Activation. Subjects Key Predicate to same Object: Subjects equivalence.

i.e., if the same resource has multiple “first” arcs from it then those nodes must be equivalent.

Functional (wrappers) List encoding of Layer Quads. Order: Types: sub / super inheritance, Keys: Aggregation / Properties hierarchies. Grammar: context / context addressable facts.

Kinds (Attributes / Values):

Subject Kind: (Context, Subject, Attribute, Value);

Predicate Kind: (Context, Attribute, Predicate, Value);

Object Kind: (Context, Attribute, Value, Object);

Type hierarchy inference due aggregation of multiple occurrences of the same attributes together.Kinds:

S: ?; SK: class (employee);

P: ?; PK: context (worksFor);

O: ?; OK: role (employer);

Ordered hierarchies: Kinds properties sets inclusion relationship. Sequential ordered sets type / subtype relationship. Sub type "next" in order relationship. Context domain / range assertions.

Alignment / Dataflow: ordered domain / schema assertions: Contexts metadata aligns matching Subjects / Objects resolving Context Statements.

Services: GraphQL. Property Graphs. Distributed Naming (blank / new nodes uniform hashing), Index and Registry Services.

Service Predicate URIs: P(S) : O. Augmentation expansions. Value types / reference types.

Naming Os: All Subject names occurrences in Statements.

Registry Os: All Subject occurrences as Predicate Object (role) values.

Index Os: All Subject Predicate hierarchies graph Statements.

Dimensional roles: N as :age, N as :distance. Relation / Relationship Interaction Domain Flows model layers.

**Protocol:**

HTTP REST HATEOAS RDF I/O. State flows: transaction workflow data encoded in request / response interaction state (Gestures: application / domain upper) messages. Augmentation.

Functional browsing. Facets, variables, wildcards, placeholders. Prompts. Runat code / data resolution semantics. Content addressable (DHT / CAN) dataflow browsing.

Rendering: declarative clients transaction state encoding specifications. Templates. Layers: Model, Service, Client translation / transforms (Templates / Gestures: upper / application / domain Model Entities). Messages DOM: DCI Interaction Graph. Annotated Addressable Interactions (objectives / rels: context / roles / goal / purposes flow items tagging).

**Framework:**

CAN: Content Addressable Network (Distributed Hash Table):

Zones: Nodes assigned Virtual n-dimensional Coordinate Space portions.

2-Dimensional spaces: Quads matrix zones (CSPO x OPSC axis).

4-Dimensional spaces: CSPO axis zones.

Neighbors: Node Join (Axis partitioning) Similarity / routing point P, Split P Zone (axis), assign Zone to Node.

Point: Node Zone Put (key, value). Similarity / routing point P dimensional distance.

Key: Content dimensional points. Similarity / hashing. Adjacency (neighbours / routing distance) by CSPO Quads matrix sides (torus).

To do: DHT Blockchain / W3C DIDs (Distributed IDs).

**Domains Modelling:**

Upper abstract domain modeling classes. Abstract use cases concepts applicable in different domains integration such as e-commerce, health-care or any other business organizational structures domains.

Semantic Dimensional Encoding (align abstract upper ontology levels, i.e.: Interactions / Gestures). StratML interoperability.

Alignment to / from Dimension, Measure, Unit, Value / Meta Model Layers. DCI Flows / Data flow (order / reactive).

Classes:

* Needs
* Good
* Product
* Item
* InventoryItem
* Supplier
* Producer
* Consumer
* Ownership
* Transaction
* Context (Campaign)
* Goals / Purposes
* Exchange (Transaction specification)
* Protocol: State Representations exchanges (Contexts Roles Facets / Levels)

**Models: Sets, Individuals, Mappings**

Models which are instances of the Sets Layers Model Structure. Model Properties:

Metaclass, Class, Instance, Occurrence, Context, Role, Attribute, Value.

Functional. Mappings / Transforms. T-Box / A-Box. Sets, Groups, Categories: TBD.

Types Model:

Types (types in sets roles):

(Relation : Statement, Relationship : Kind, Role : SPO, Dimension : U);

(Dimension, Context, Class, Resource);

(Resource, Dimension, Context, Class);

(Class, Resource, Dimension, Context);

(Context : Statement, Class : Kind, Resource : SPO, Dimension : U);

Individuals Model:

Individuals (individuals / sets types instances):

(Context : Statement, Class : Kind, Resource : SPO, Dimension : U);

(Dimension, Context, Class, Resource);

(Resource, Dimension, Context, Class);

(Class, Resource, Dimension, Context);

(Context : Statement, Class : Kind, Resource : SPO, Dimension : U);

Mappings Model:

Mappings (type / individual relationships):

(Context : Dimension, Occurrence : Measure / SPO, Attribute : Unit / Kind, Value : Value / Statement);

Models metadata, properties and upper alignments / augmentations relationships Model data.

(Value, Context, Occurrence, Attribute);

(Attribute, Value, Context, Occurrence);

(Occurrence, Attribute, Value, Context);

(Context, Occurrence, Attribute, Value);

**Layers: Augmentations / Inference**

Activation: Classification (Context types Occurrences Attributes).

Activation: Which Attributes has Context Occurrence (according to its Kind in Context / Role) in this Occurrence.

Alignment: Regression (Context types Occurrences Attributes Values).

Alignment: Context Occurrence Attributes Values (according to its Kind in Context / Role).

Aggregation: Clustering (Context types Occurrences).

Aggregation: Context type instance aggregates type instance child Occurrences (parent Context type instances) matching grouping criteria (Encoding).

Augmentations:

(Context, Occurrence) : Value;

Activation:

(Statement, Resource) : Kind;

Alignment:

(Kind, Statement) : Resource;

Aggregation:

(Resource, Kind) : Statement;

**Model Semantics:**

Data: Individuals. Mappings. Data Occurrences Aggregation.

Data: Individuals Model.

(Dimension, Context, Class, Resource);

Mappings (type / individual relationships):

(Context : Dimension, Occurrence : Measure / SPO, Attribute : Unit / Kind, Value : Value / Statement);

Information: Types. Mappings. Type Occurrences Attributes. Activation.

Information: Types Model. Schema.

(Dimension, Relation, Relationship, Role);

Mappings (type / individual relationships):

(Context : Dimension, Occurrence : Measure / SPO, Attribute : Unit / Kind, Value : Value / Statement);

Knowledge: Individuals / Types Mappings (Attributes) Values. Alignment.

Knowledge: Behaviors.

Mappings (type / individual relationships):

(Context : Dimension, Occurrence : Measure / SPO, Attribute : Unit / Kind, Value : Value / Statement);

**Ontology Matching: Relations / Relationships**

Entity Relationship instance asserted as a reified concept with its type and attributes or as a series of triple statements which describes the given Entity Relationship instance via individual assertions. Bidirectional translation.

aPerson loves anotherPerson.

Person loverOf Person.

loverOf predicate: Kind of aPerson. Domain / Range. Dataflow (Functional Augmentations).

Loving: loverOf Kind.

aLoving: loves Kind.

TBD: Relationship / Relation

Reify Kinds as SPOs : Types Model

Reify Statements as / Kinds / SPOs : Mappings Model

Augmentations (Aggregation).

**Ontology Matching: Dimensional Alignments (Mappings):**

Explain Layer Context, Occurrence, Attribute, Value Pattern for Models SPO Statements functional mappings expansion:

(Context, Occurrence, Attribute, Value);

For a given CSPO Quad:

(C, S, P, O);

Expansion:

(C, P, S, O);

(C, O, P, S);

TBD.

Mappings (set / individual relationships):

(Context : Dimension, Occurrence : Measure, Attribute : Unit, Value : Value);

Order. Comparison. Relations. Upper Ontology assertions. Augmentations. TBD.

Relation / Relationship: Tabular / OGM (Object Graph Mapper):

I/O: (Class, ClassID, Attribute, Value);

Class: Table / Object Type.

ClassID: PK / Object ID.

Attribute: Column / Member.

Value: Cell / Field Value.

Subject Kind: Relation / Domain.

Predicate Kind: Relationship.

Object Kind: Mapping / Range.

Dataflow: Reactive Functional Augmentation / Integration APIs.

Indices: Apply functional mappings expansion.

**Functional API: Monads / Transforms**

Resource / Layer?

Context / Occurrence / Mapping?

Mapping: Selector Monad. Matching Resource / Role set?

Context / Occurrence Monads wrapping Layers Hierarchy Contexts.

Entity Alignment / Matching resolution via Functional Augmentations: Agggregations / Activation / Alignments (upper / dimensional matchings). Versioned graph: stateless / functional. Mappings assertions matching.

APIs: Augmentations, Query, Traversal, Matching, Transforms. Functional APIs Query / Browse / Traversal / Transforms examples. Encoding / Matching.

**Encoding: Functional Mappings**

Masks: Predicates of Set memberships. Functional Mappings. ID encoded state / transforms. Models merge. Ontology Matching. Mappings Model: Types / Instances Models merge (upper) Augmentations.

Mappings / Functional Encoding: Upper Dimensional Matchings / Augmentations. Mappings Model masks matchings reflects / leads to Types / Individuals Models Augmentations / Assertions.

Mappings / Functional Encoding: Relation Statements / Relationship views / matchings examples.

Mappings Upper Alignments examples (dates, marital status, hiring). Relation Relationship statements order / context properties (Dimensional Alignments).

IDs: metaclass, class, instance, context, role, occurrence, previous, next ID roles relations for Model Set Contexts.

Augmentations / Transforms: Model / Domains functional mappings. Order. Dimensions. Axes. Flows. Hierarchies. Inference / Population.

Levels: Augmentations. Mappings.

Levels: Resource, Kind, Statement.

Levels: Reify Statement as Kind, Kind as Resource, Resource as Statement.

Levels: Reify Resource as Kind, Kind as Statement, Statement as Resource.

**TODO Items:**

* Dimensions Encoding: Given Dimensional Contexts (CSPO Models set layouts) having four dimensional sets (Types Model, Individuals Model, Mappings Model, State Model) each representing (nested) CSPO inputs / parts of a recursively aggregated CSPO layout (i.e. aggregated layout Context is Mappings Model, Subject is State Model, etc.) having this setting (Models types / layers class / instance IDs) reified in this fifth "Focus" Model which represents a "snapshot" of current state and available transitions (Focus shifts).
* Models: CSPO Layers (matrix) layout.
* Focus Mapping Model. Axes (X / Y: Model instances matrices, cycles), intersection (Z: Model instance matrix):
* Model patterns:
* (Dimension, Unit, Measure, Value);
* (Context, Occurrence, Attribute, Value);
* Context / Dimension / Context:
* Occurrence / Unit / Subject:
* Attribute / Measure / Predicate:
* Value / Value / Object:
* X Model: Context / Schema / Information / Relationships
* Y Model: Data / Relations
* Z Model: Interaction / Context instance Data state calculated intersection. Behavior
* Upper Y / Lower Y: Previous / next data state.
* Left X / Right X: Previous / next context state.
* Augmentations calculate current, previous, next Model states.
* ImplementationItems & drafts documents topics.
* Diagrams (TO DO):

**Contents**

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.

**RDF triples, quads introduction**

RDF Models: rdfs type, class, subClassOf, sameAs, reification when appropriate. RDFS. OWL (alignments).

RDF / OWL Backend: APIs. Details: Contents triples / models introductions.

Turtle. N3.

Example: feed Dimensional model for equivalences (units), comparison (orders).

TBD.

**Models: Quads, Contexts, Occurrences, Attributes, Values.**

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

Aggregation.  
Kinds.  
Grammar.

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.

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.

TBD.

**URIs, Resource, Statement, Kind APIs**

TBD.

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.

**Model Layers**

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.