



) FIT WITH ONTOLOGIES

MICHEL STORNEBRINK

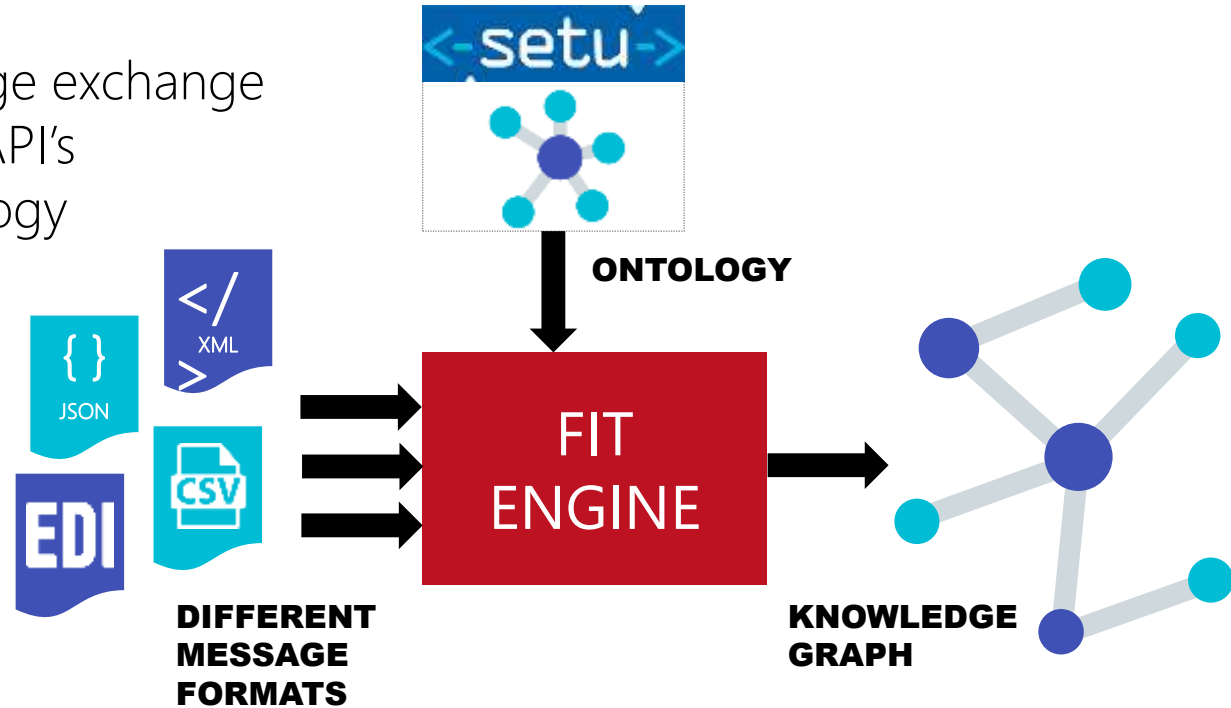
22 JANUARY 2020

PLDN EVENT – KNOWLEDGE GRAPHS & LINKED DATA

TNO innovation
for life

› FLEXIBLE IT (FIT) WITH ONTOLOGIES

From traditional message exchange to flexible, automated API's using semantic technology



Together with our partners in the flexible staffing industry:

MICHEL STORNEBRINK

- TNO Data Science afdeling
- Adviseur data standaarden & interoperabiliteit
- Jarenlange ervaring met opstellen en beheren van berichtstandaarden in vele domeinen
- Project FIT with ontologies
- michiel.stornebrink@tno.nl



› PRESENTATIE

- › Probleem en doelstelling van het project
- › Proof of concept ontwikkeld
- › Ervaringen tot nu toe
- › Vragen



ADOPTIE VAN SETU STANDAARDEN



Ordering &
Selection

170
data-elementen



Human Resource
Information

189
data-elementen



Assignment

94
data-elementen



Timecard

144
data-elementen



Factuur

158
data-elementen



Vacancy

321
data-elementen



CV

242
data-elementen



Probleem/uitdaging:

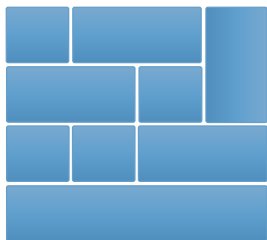
Kostbaar om huidige SETU standaarden te implementeren



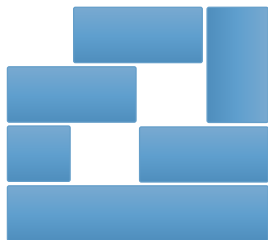
Doel

Vergemakkelijken van adoptie van standaard(en),
óók voor kleinere uitzenders en afnemers

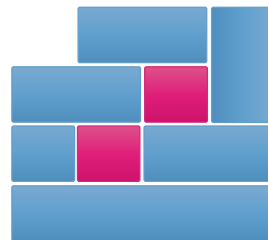
1 STANDAARD ??



SETU Timecard v1.4



Implementatie A



Klantspecifieke
uitbreidingen



Niet-SETU
implementaties



Probleem/uitdaging:

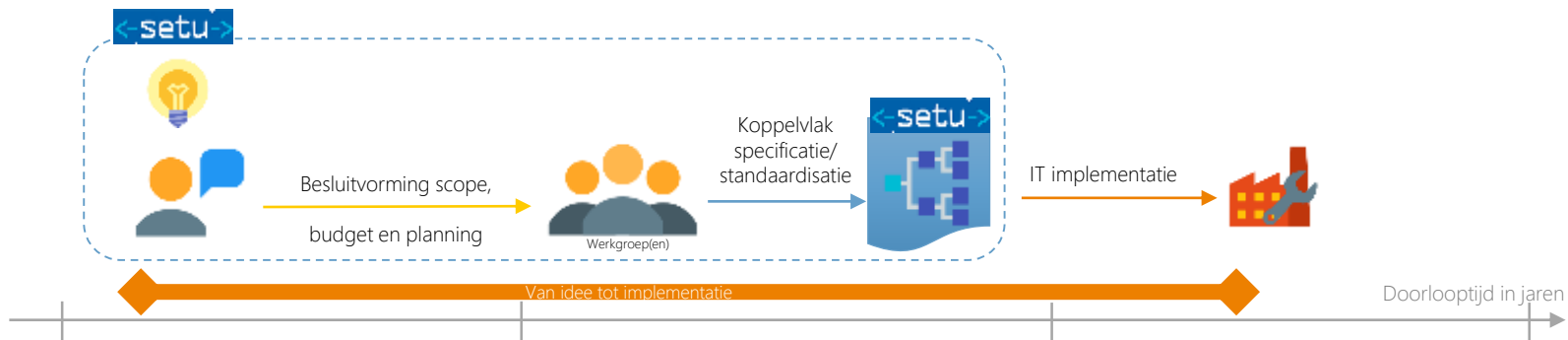
Niet altijd sprake van één standaard



Doel

Ondersteunen van flexibiliteit/diversiteit in berichten
op een beheersbare wijze

DOORLOOPTIJD STANDAARDISATIE



Probleem/uitdaging:

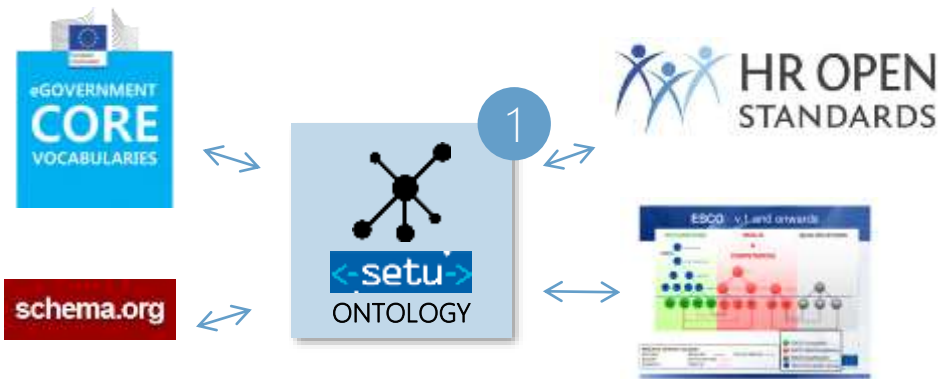
Lange doorlooptijd, daarmee lastig inspelen op nieuwe ontwikkelingen/vraag



Doel

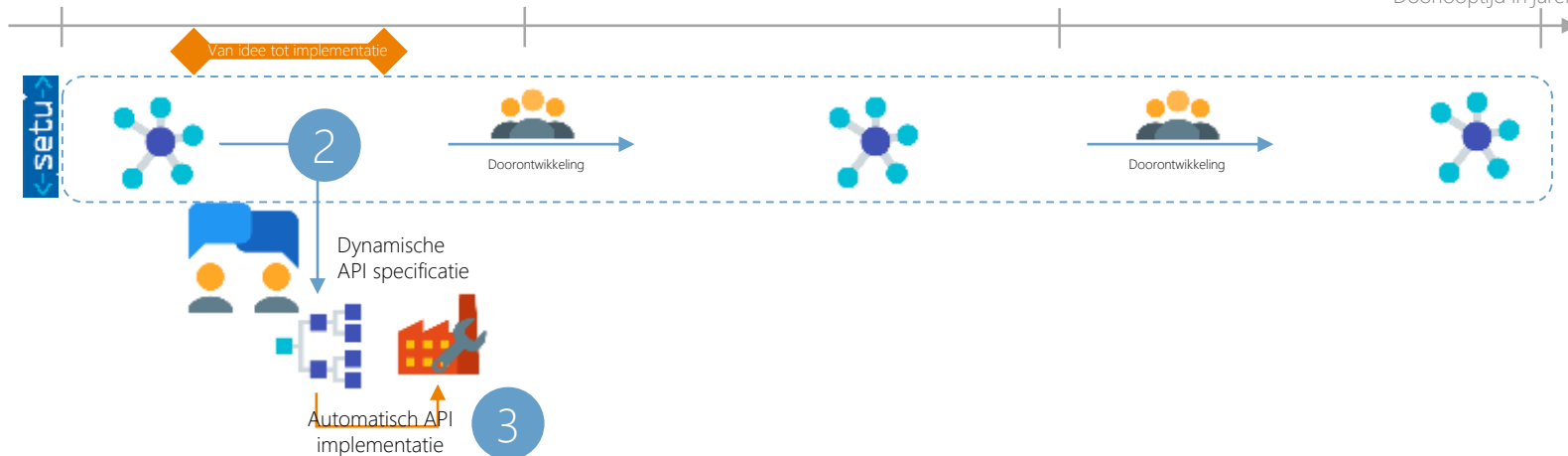
Optimaliseren en herbruikbaar maken van SETU data definities

SETU KNOWLEDGE GRAPH ALS OPLOSSING

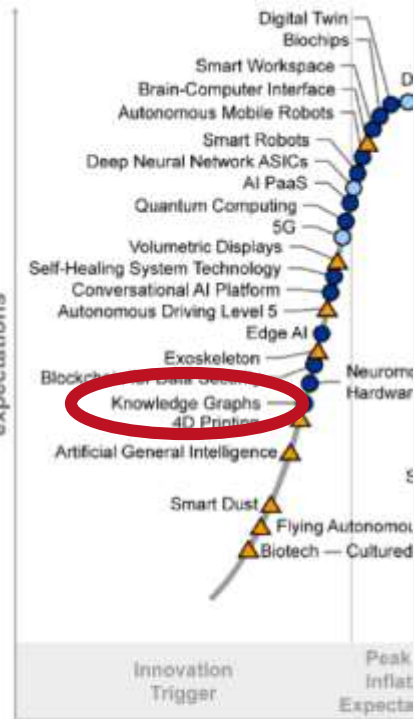


- 1 Domeintaal voor uitzendbranche
- 2 Methode + tooling voor ontology-driven API specificatie
- 3 Tooling voor automatische API implementatie

Doorlooptijd in jaren



2018



Gartner Hype Cycle for Emerging Technologies, 2019



Emerging Technology Trends 2019



- Sensing and Mobility**
- 3D sensing cameras
 - AR cloud
 - Light-cargo delivery drones
 - Flying autonomous vehicles
 - Autonomous driving Levels 4 and 5



- Augmented Human**
- Biochips
 - Personalification
 - Augmented intelligence
 - Emotion AI
 - Immersive workspaces
 - Biotech (cultured or artificial tissue)



- Postclassical Compute and Comms**
- 5G
 - Next-generation memory
 - Low-earth-orbit satellite systems
 - Nanoscale 3D printing



- Digital Ecosystems**
- DigitalOps
 - Knowledge graphs
 - Synthetic data
 - Decentralized web
 - Decentralized autonomous organizations

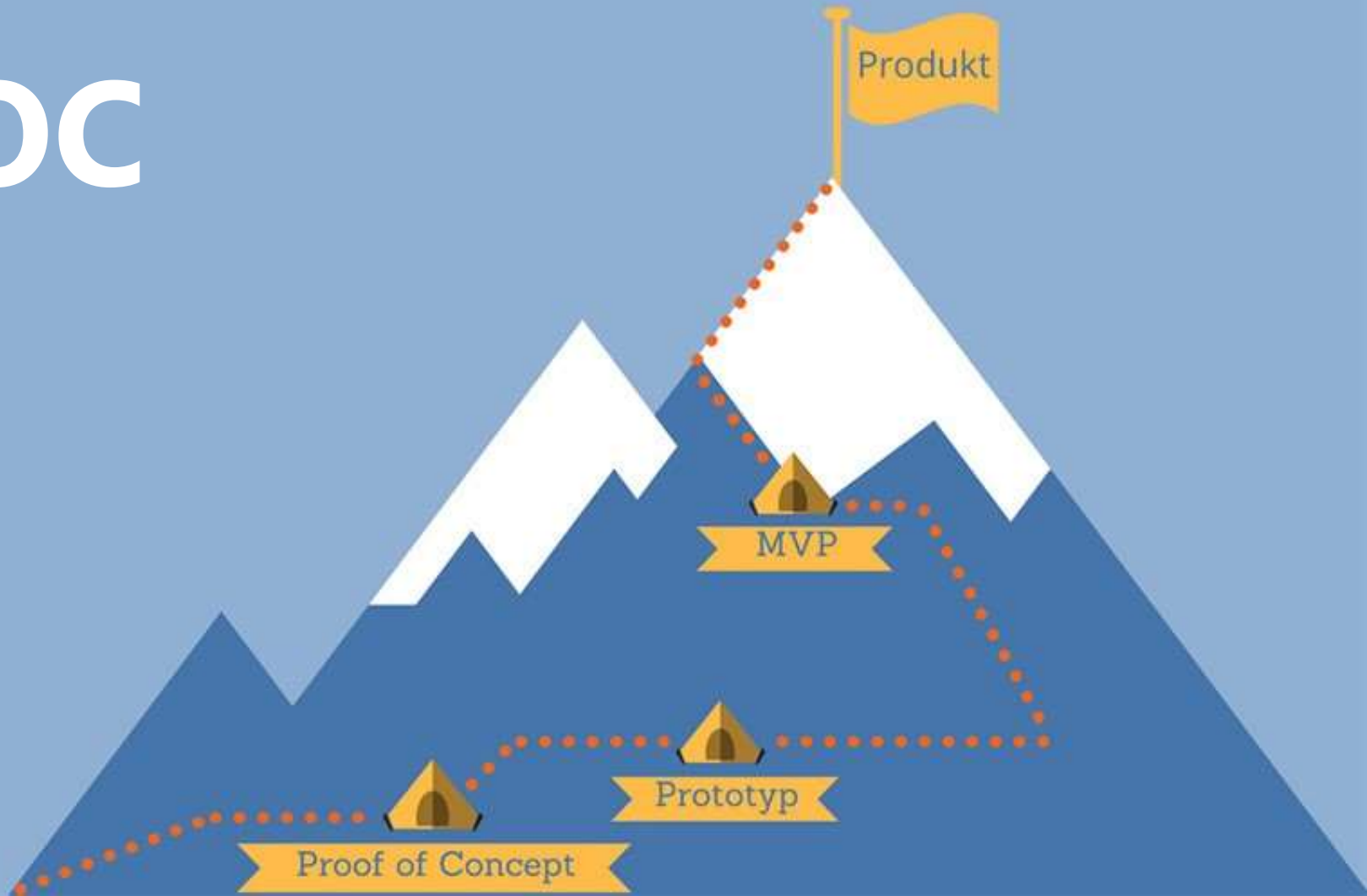


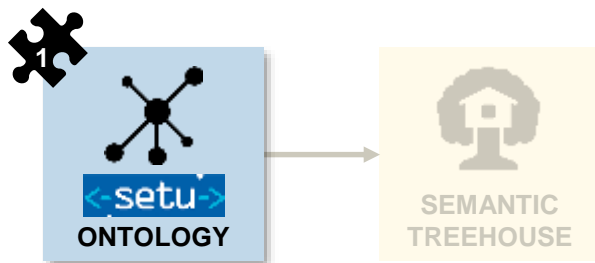
- Advanced AI and Analytics**
- Adaptive machine learning (MLOps)
 - Edge AI
 - Edge analytics
 - Explainable AI
 - AI PaaS
 - Transfer learning
 - Generative adversarial networks
 - Graph analytics

gartner.com/SmarterWithGartner



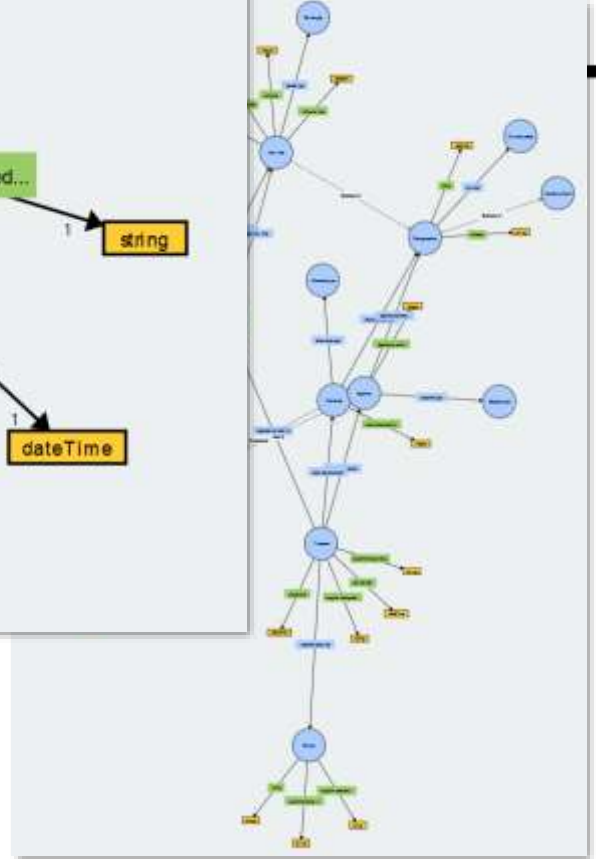
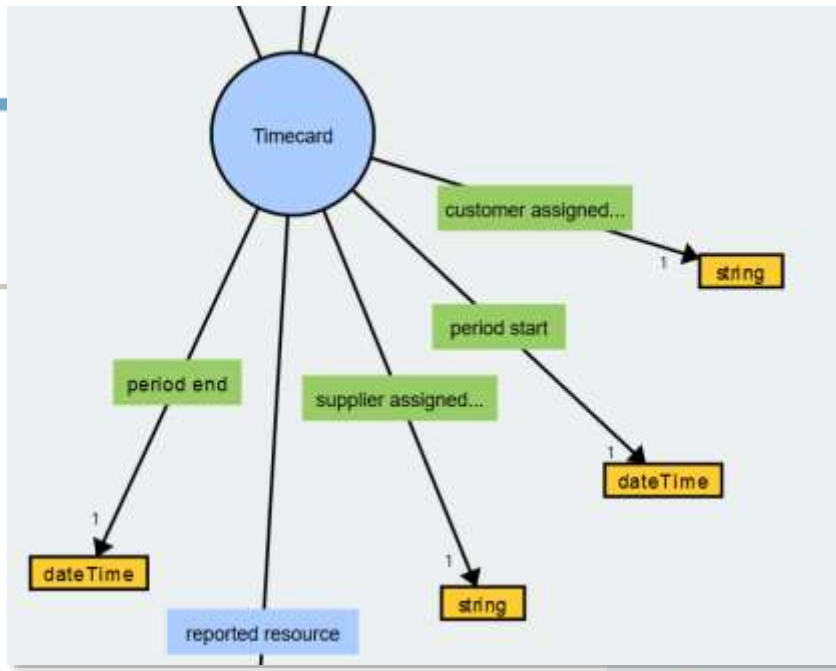
POC

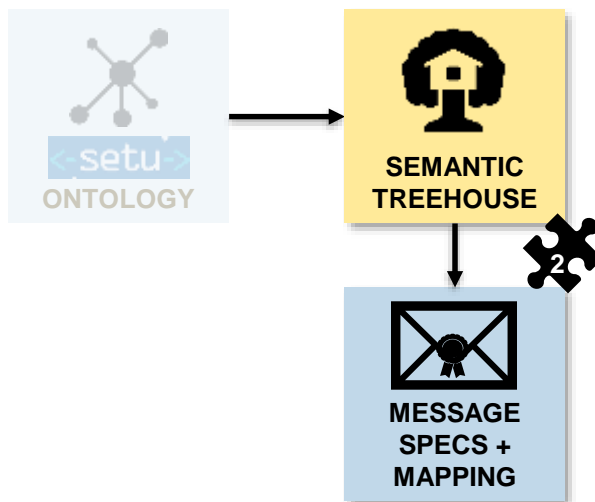




PROOF OF CONCEPT COMPONENTEN

1. Het specificeren van een deel van de ontologie (scope timecard)





PROOF OF CONCEPT COMPONENTEN

2. Het samenstellen van een XML berichtdefinitie uit de SETU ontologie

SEMANTIC TREEHOUSE – COMMUNITY PLATFORM

Documentation

Data models

Codelists

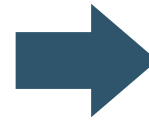
Contact list

Examples

Change requests

E-mail

Workgroups



PUBLICATION

COMMUNITY

MAINTENANCE

VALIDATION

COMMUNITIES DIE SEMANTIC TREEHOUSE GEBRUIKEN



Supply chain standards in Transport & Logistics



Supply chain standards for smart industry
Brainport

smartconnected.semantic-treehouse.nl



Standards for the construction, maintenance and installation sector

ketenstandaard.semantic-treehouse.nl

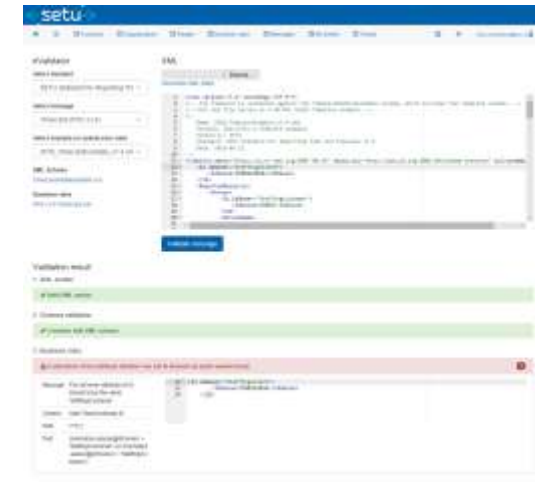
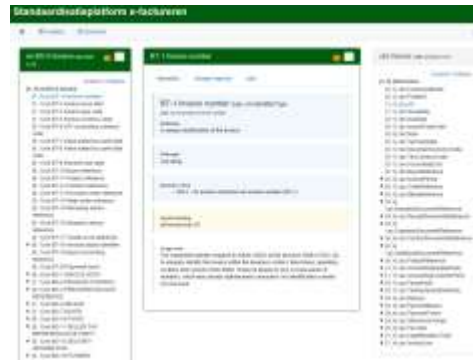
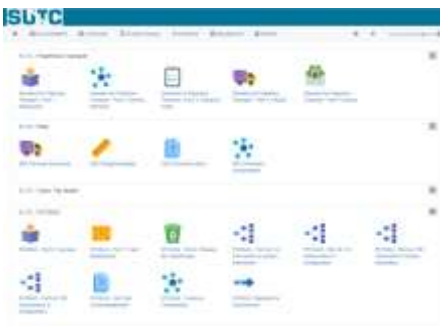


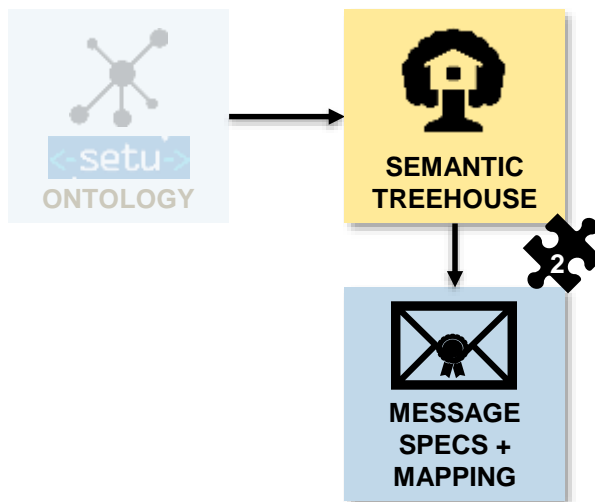
Standaarden voor flexibele arbeid

Standards for the Dutch flexible staffing industry

setu.semantic-treehouse.nl

sutc.semantic-treehouse.nl





PROOF OF CONCEPT COMPONENTEN

2. Het samenstellen van een XML berichtdefinitie uit de SETU ontologie

PROOF OF CONCEPT COMPONENTEN

urenGeweikt

Element Value constraints Usage notes

Tech: details

ELEMENT NAME
urenGeweikt

NAMESPACE
http://ontology.setu.nl

DEFINITION
The duration of the work activity that is reported

PROPERTY DEFINITION
The duration of the work activity that is reported

Configure your endpoint using the following output

XSD

```
<?xml version="1.0" encoding="l...
<xs:schema xmlns:xs="http://www.w3...
<xs:element name="urenbrief">
  <xs:complexType>
    <xs:sequence>
      <xs:element name="urenbriefNu...
      <xs:element name="werkneer">
        <xs:complexType>
          <xs:sequence>
            <xs:element name="werk...
          </xs:sequence>
        </xs:complexType>
      </xs:element>
    </xs:sequence>
  </xs:complexType>
</xs:element>
<xs:element name="activiteit">
  <xs:complexType>
    <xs:sequence>
```

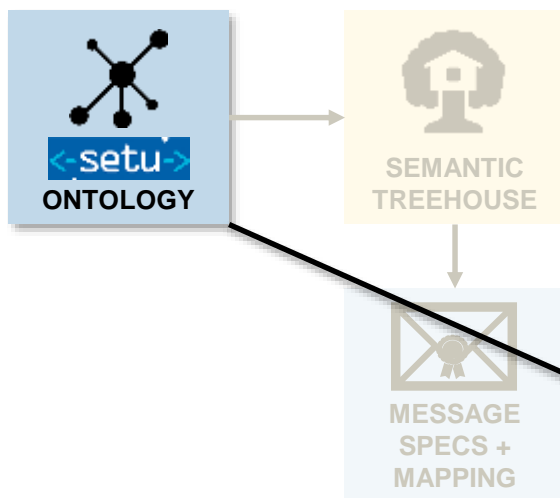
RML

```
@prefix rri: <http://www.w3.org...
@prefix setu: <http://ontology.setu...
@prefix rml: <http://semweb.mlab.t...
@prefix ql: <http://semweb.mlab.be...

<http://ns.semantic-treehouse.nl/rri...
rri:predicateObjectMap [
  rri:predicate setu:customerAssig...
  rri:objectMap [ rml:reference "%...
], [
  rri:predicate setu:reportedResou...
  rri:objectMap [ rri:parentTriples...
], [
  rri:predicate setu:reportedWorkM...
  rri:objectMap [ rri:parentTriples...
], ]
```

Example

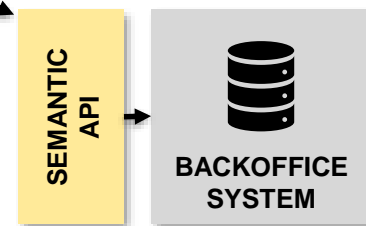
Configure new endpoint



PROOF OF CONCEPT COMPONENTEN

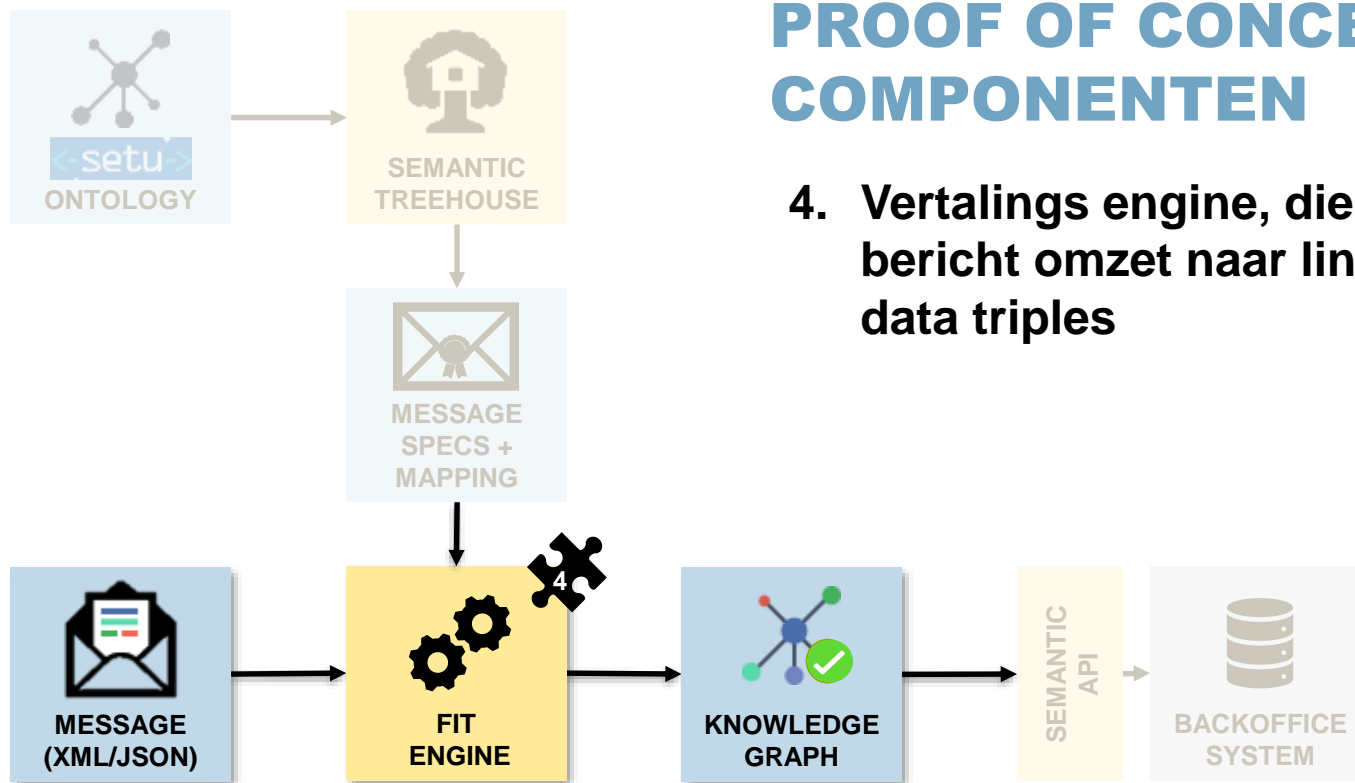
3. Een mapping naar de systemen van projectpartners

FlexForceMonkey **S** easyflex®
solid online
Flowers semantic engine



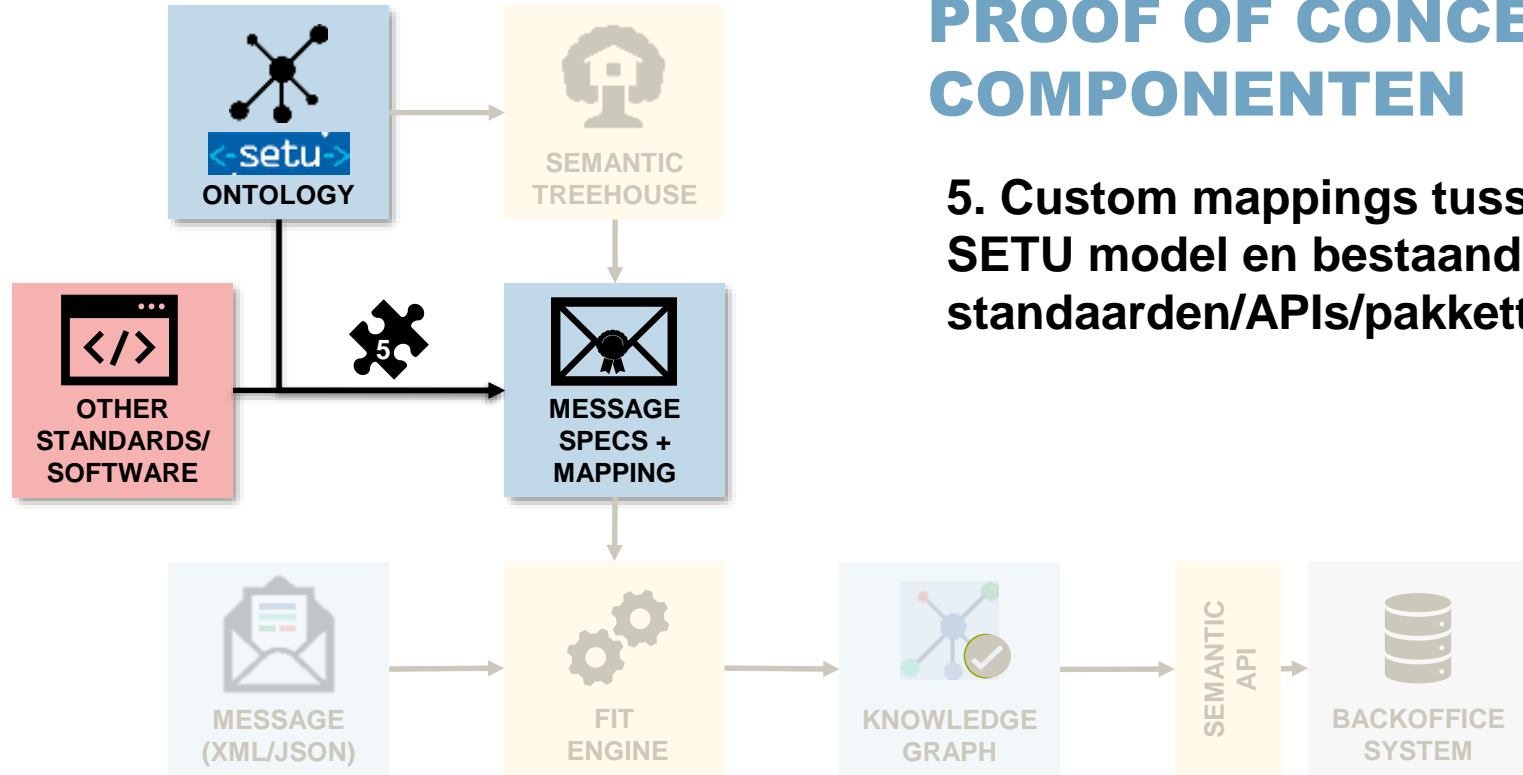
PROOF OF CONCEPT COMPONENTEN

4. Vertalings engine, die XML bericht omzet naar linked data triples



RML engine - <https://rml.io>

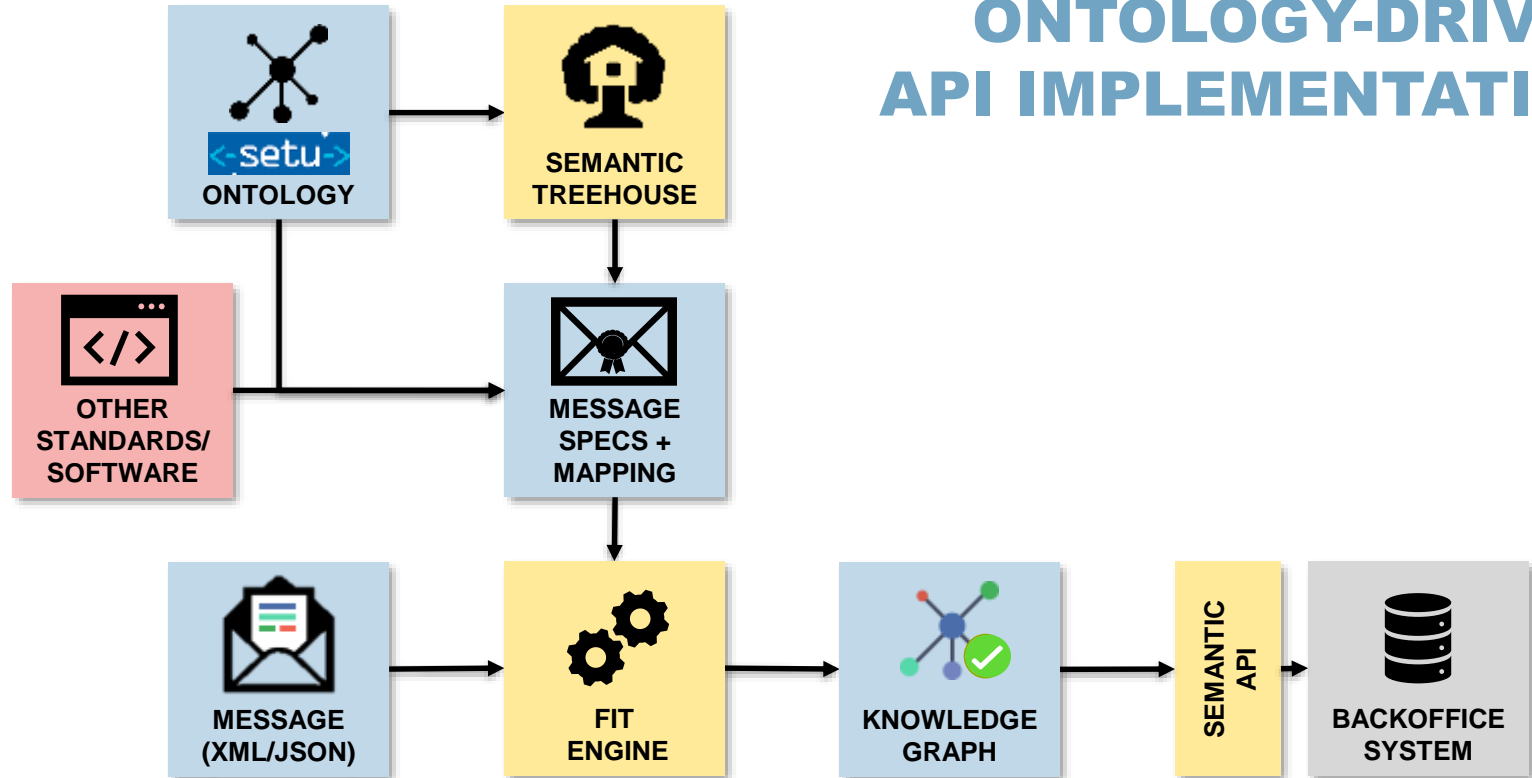
Alternatief: CARML engine – <https://github.com/carmil/carmil>



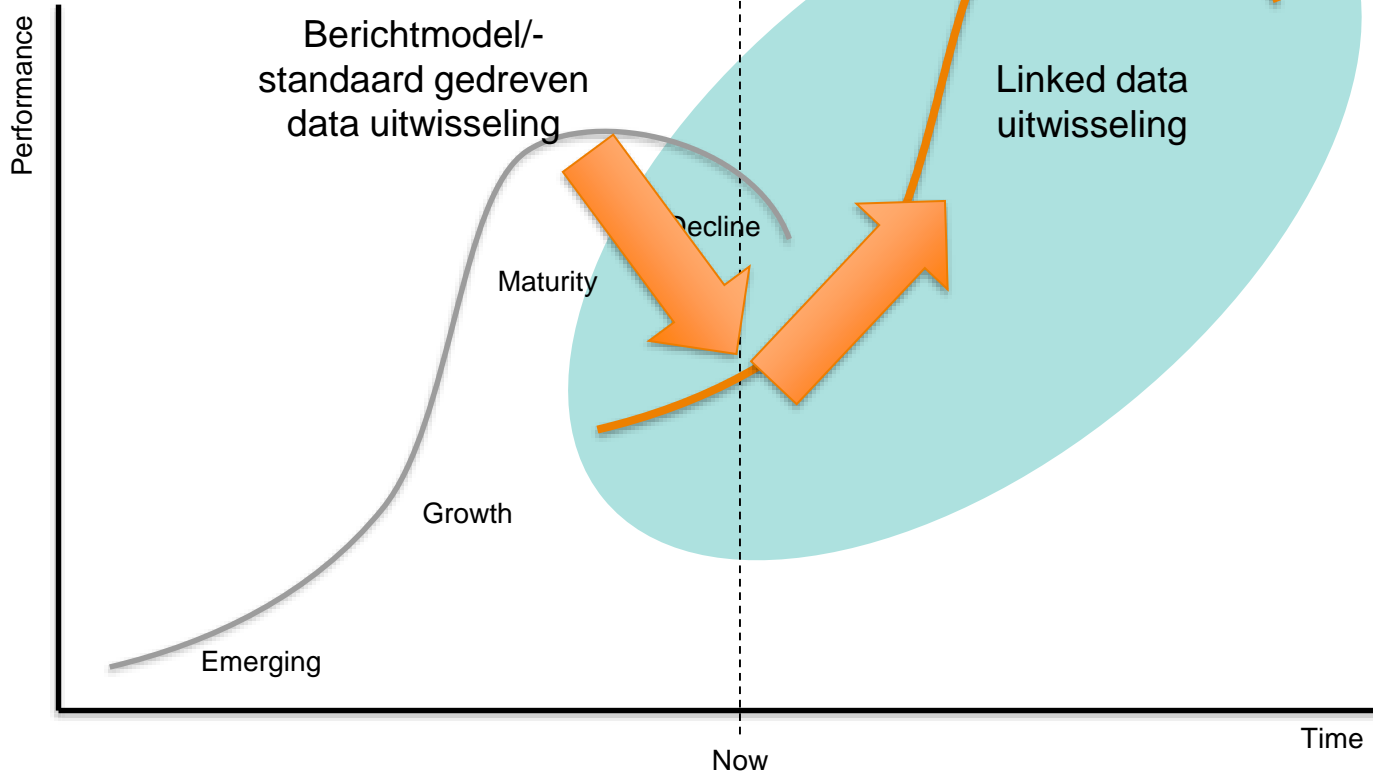
PROOF OF CONCEPT COMPONENTEN

5. Custom mappings tussen SETU model en bestaande standaarden/APIs/pakketten

ONTOLOGY-DRIVEN API IMPLEMENTATION



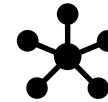
DATA DELEN



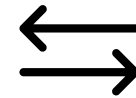
Data format
RDF



Storing
Triple stores



Modelling
Ontologies



Querying
SPARQL



Paradigm
Linked data

MEER ZIEN/WETEN? DAT KAN!

- › Projectpagina op SETU website: <https://setu.nl/project-flexible-it-with-ontologies/>
- › Artikel op TNO.nl: <https://www.tno.nl/nl/aandachtsgebieden/informatie-communicatie-technologie/roadmaps/data-sharing/efficienter-en-flexibeler-samenwerken-met-nieuwe-generatie-data/>
- › Aanmelden voor project klankbordgroep (nog 2 keer in 2020)
 - › Email michiel.stornebrink@tno.nl
- › Semantic Treehouse community platform: <https://www.semantic-treehouse.nl>
- › Verder praten over mogelijkheden voor uw branche/sector?
 - › Laat het ons weten

VRAGEN



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