

Towards Privacy Policy Conceptual Modeling



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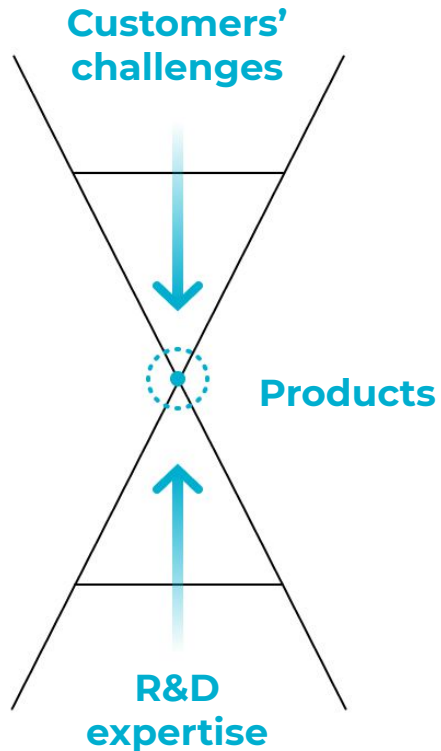
Anas **Al Bassit**



Sabri **Skhiri**

EURA NOVA

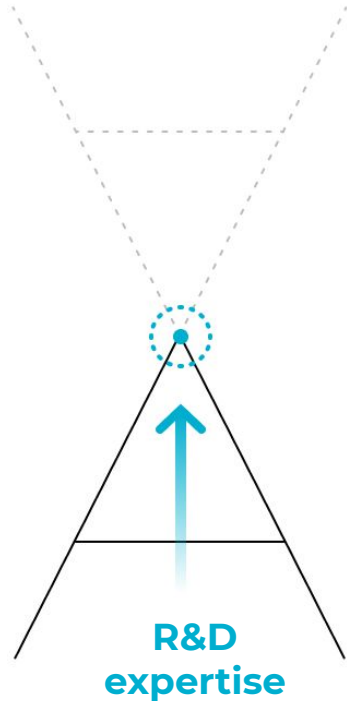
A R&D-fueled consultancy company



WE BELIEVE **TECHNOLOGY** IS THE **ENGINE OF CHANGE.**

ASGARD

The next two-year program



1

DATA PRIVACY

GDPR compliance costs **\$1 to \$5 Mi**

What if we can understand what each user **agreed** about their **data**?

2

AUTOMATION

+700 K positions are waiting to be filled

What if you could simplify and even **automate** a **machine learning** task?

4

DATA QUALITY

85% of AI projects will produce false results

What if you can **detect** which sources impact the **accuracy** the **most**?

3

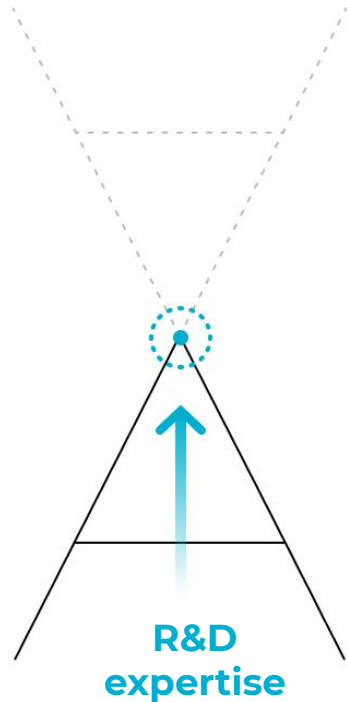
DATA PIPELINES

\$500 K - The minimum cost of an AI use case

What if we could recommend the **best configuration** of **data pipelines**?

Rune

The next two-year program



1

DATA PRIVACY

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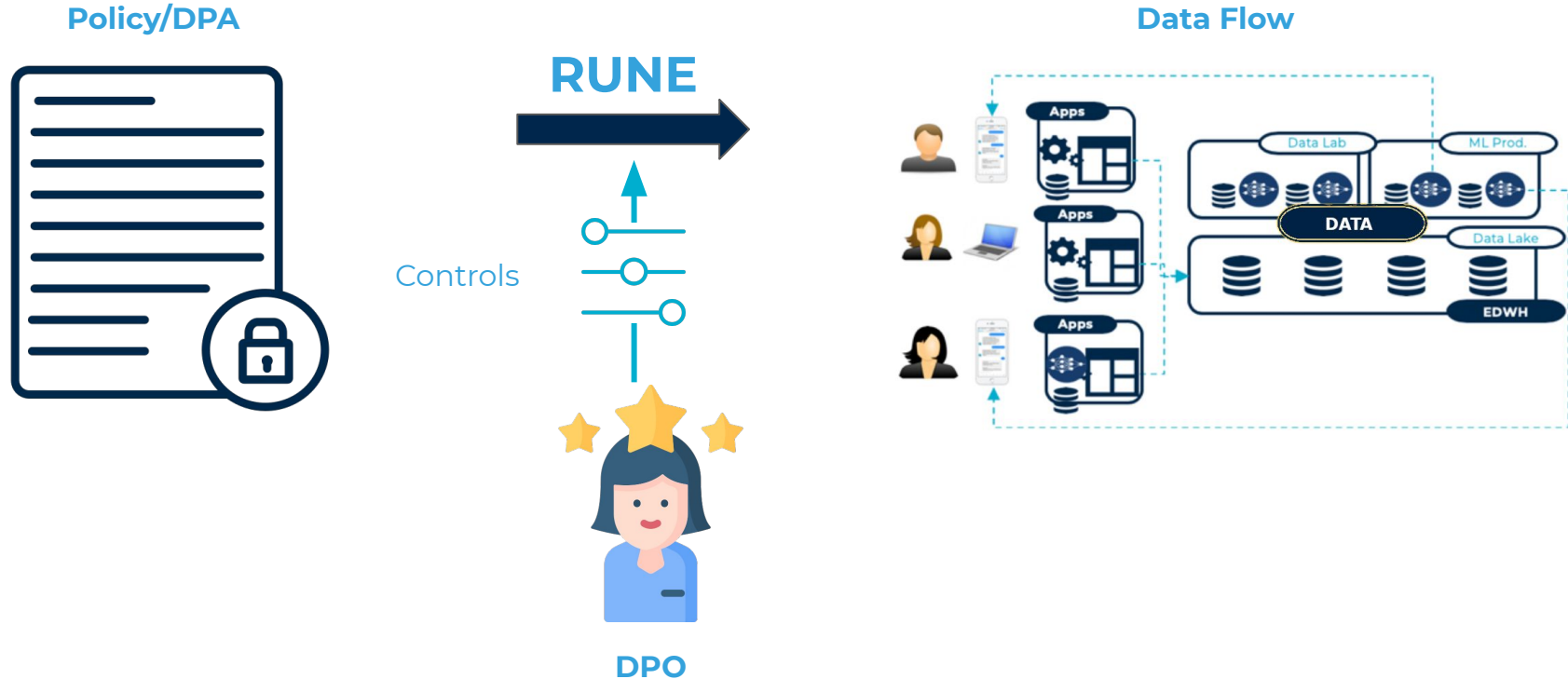
Creating new approaches in **nlp** in order to support **gdpr & privacy by design**



- 1- Towards Privacy Policy Conceptual Modeling
- 2- Privacy Policy Classification With XLNet

Goal

Automate privacy by design based on policies and DPAs



Privacy Policy

IMDB use case

Information You Give Us: We receive and store any information you enter on our Web site or give us in any other way. [Click here](#) to see examples of what we collect.

...you might supply us with such information as your name, e-mail address, physical address, zip code, and phone number; your age and gender; the movies and actors you like or dislike; and your general movie preferences.

You can choose not to provide certain information, but then you might not be able to take advantage of many of our features. We use the information that you provide for such purposes as responding to your requests, customizing future browsing for you, improving our site, and communicating with you.

Privacy Policy

IMDB use case

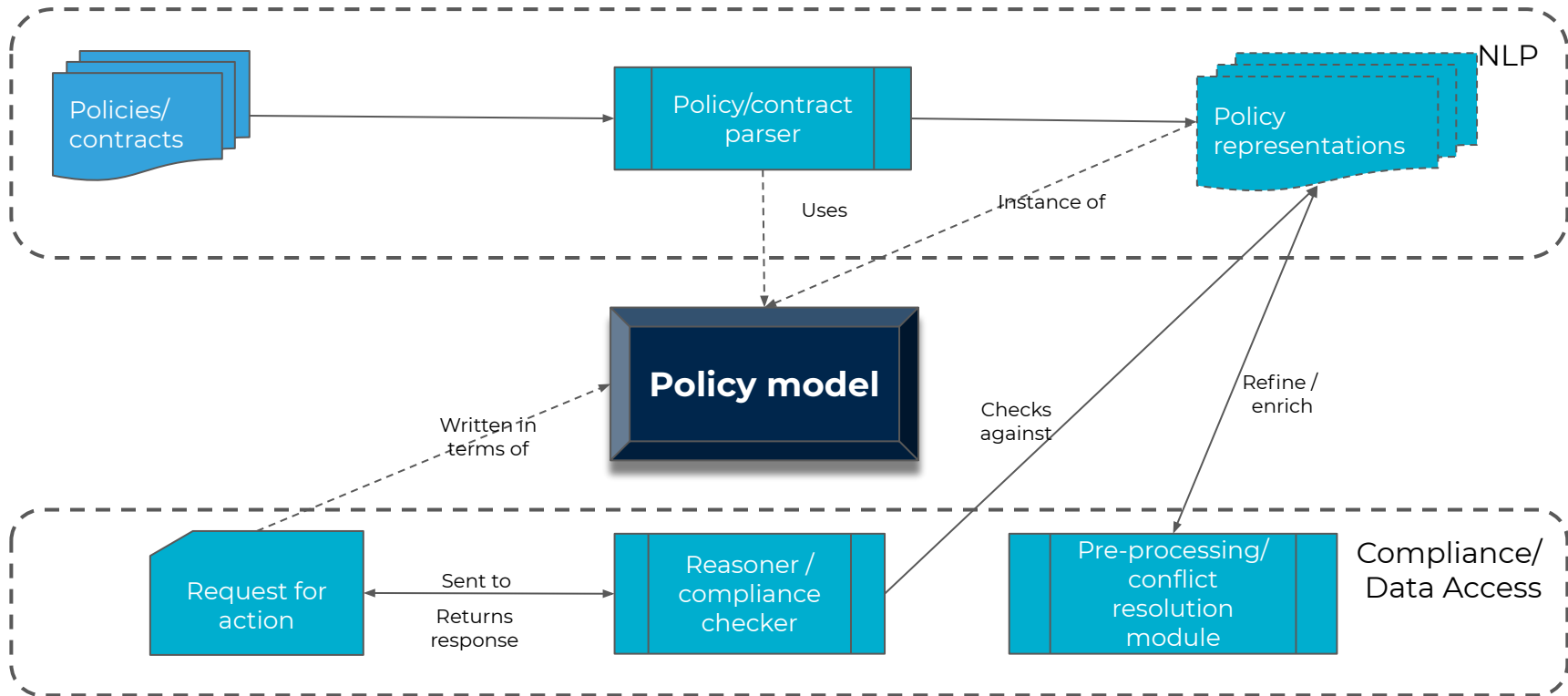
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End-to-end system

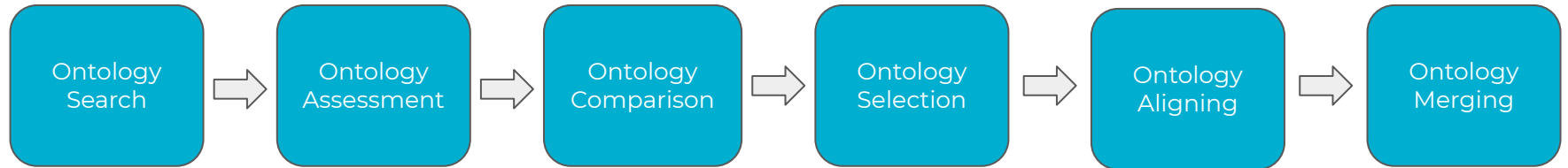
Automate privacy by design based on policies and DPAs



NeON Methodology

Ontology Engineering

Scenario 5: Reusing and Merging Ontological Resources

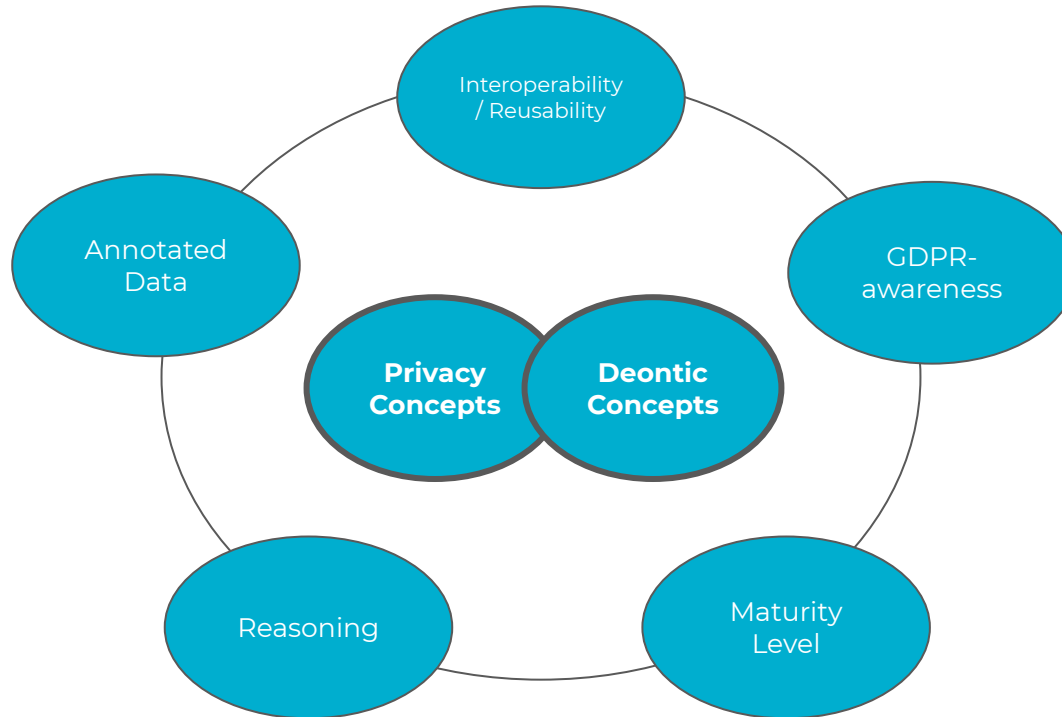


STATE OF THE ART



Comparison Criteria

For Model Selection



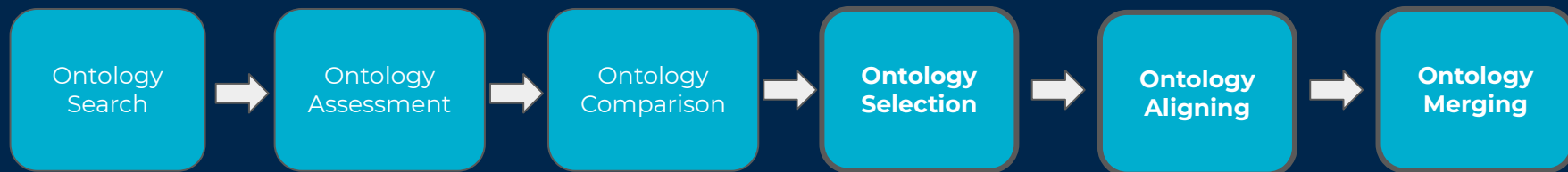
Model Comparison

State of the Art

Table 1. Related work comparison

Models / Criteria	GDPR aware	PP Concepts	Deontic Concepts	Inter-operability/ Reusability	Annotated Data	Specification Maturity Level	Reasoning/ Compliance Checking
ODRL [22]	-	-	+	+	-	W3C Rec.	-
Korba and Kenny [10]	+/-	+/-	+/-	+/-	-	N/A	+/-
Coen-Parisini et al. [4]	+/-	+/-	+/-	+/-	-	N/A	+/-
Caramujo and da Silva [2]	-	+/-	-	+/-	-	N/A	-
OPP-115 [23]	-	+/-	-	-	+	N/A	-
GDPRtEXT [15] GDPRov [16]	+	+/-	+/-	+	-	Draft	+/-
ODP Pandit et al. [17]	+	+/-	-	+	-	Draft	-
PrivOnto [11]	-	+/-	-	+/-	+	N/A	+/-
PrOnto [13]	+	+/-	+	+/-	-	N/A	+
Argawal et al. [1]	+	-	+	+/-	-	N/A	+/-
RSL-IL4Privacy [3]	-	+/-	+	+/-	-	N/A	+
Torre et al. [21]	+	+	+/-	+/-	-	N/A	-
Joshi and Banerjee [8]	+	+	+/-	+	-	N/A	+
ORCP(ODRL) [5]	+	+/-	+	+	-	Draft	+
DPV [18]	+	+	-	+	-	Draft	-
SPECIAL [9]	+	+	+/-	+	-	Draft	+

MODEL ENGINEERING



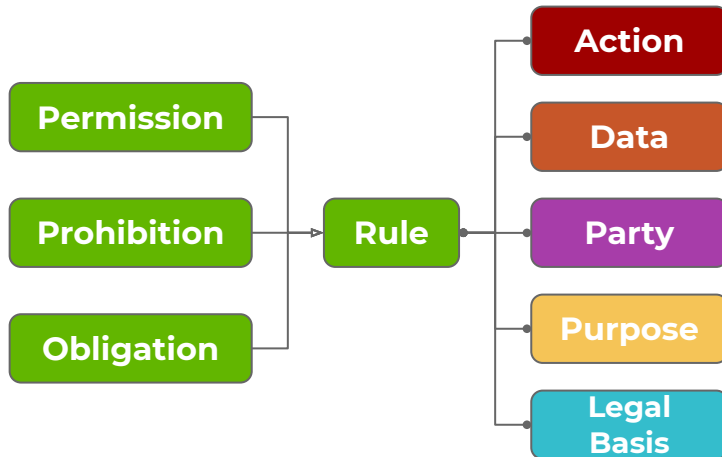
Model Selection

Combine existing models to cover full requirements for our model

ODRL/ORCP

ODRL Regulatory Compliance Profile

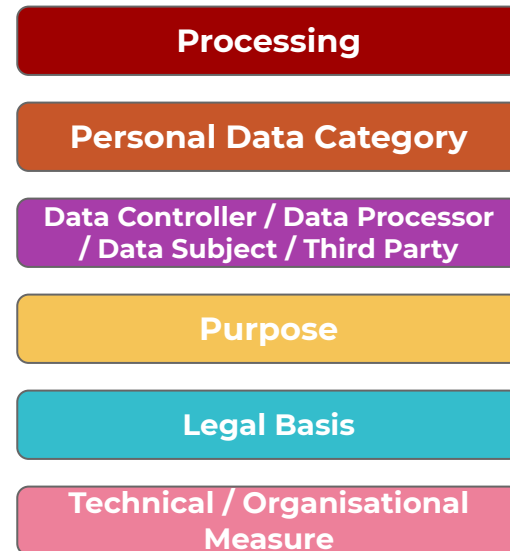
Deontic concepts



DPV

Data Privacy Vocabularies

Vocabularies of privacy terms

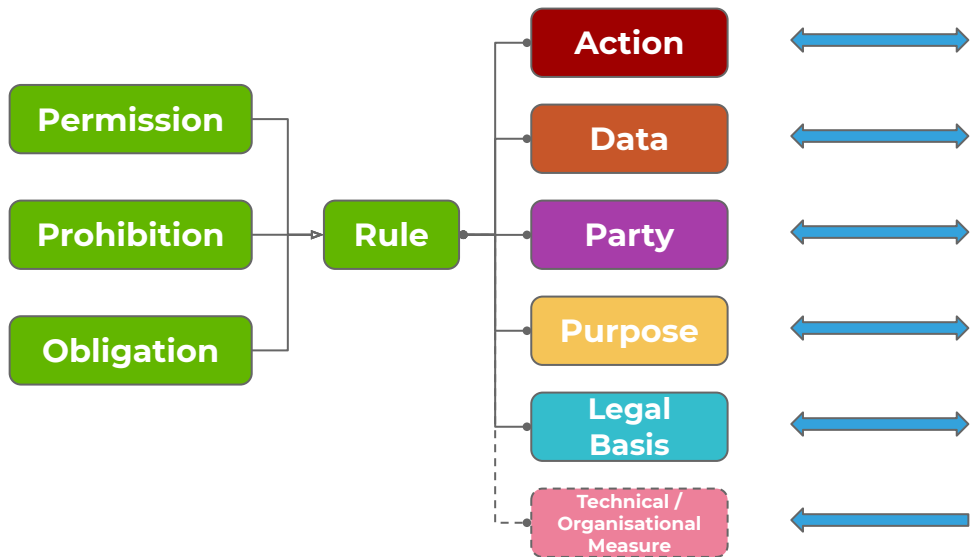


1. De Vos, Marina, et al. "ODRL policy modelling and compliance checking." International Joint Conference on Rules and Reasoning. Springer, 2019.
2. Pandit, Harshvardhan J., et al. "Creating a Vocabulary for Data Privacy." OTM Confederated International Conferences" On the Move to Meaningful Internet Systems". Springer, 2019.

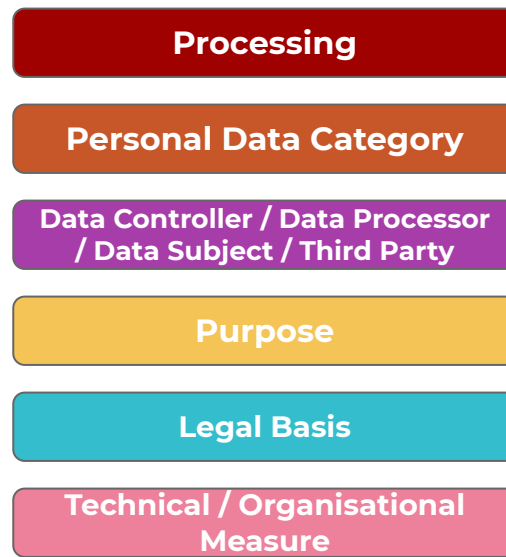
Model Alignment

Combine existing models to cover full requirements for our model

ODRL/ORCP
ODRL Regulatory Compliance Profile
Deontic concepts



DPV
Data Privacy Vocabularies
Vocabularies of privacy terms



Model Alignment

Reuse existing models to cover full requirements for our model

Table 2. Ontology alignments established by SAVE

	DPV/DPV-GDPR Concept	Relation	ORCP/ORDL Concept
1	PersonalDataCategory	owl:equivalentClass	PersonalData
2	Processing	owl:equivalentClass	Action
3	Purpose	owl:equivalentClass	Purpose
4	LegalBasis	owl:equivalentClass	LegalBasis
5	A6-1-a-explicit-consent A6-1-a-non-explicit-consent A9-2-a	rdfs:subClassOf	Consent
6	A6-1-b	owl:equivalentClass	Contract
7	A6-1-c	owl:equivalentClass	LegalObligation
8	A6-1-d A9-2-c	rdfs:subClassOf	VitalInterest
9	A6-1-f	owl:equivalentClass	LegitimateInterest
10	A6-1-e A9-2-g A9-2-i A9-2-j	rdfs:subClassOf	PublicInterest
11	DataController	owl:equivalentClass	Controller
12	DataProcessor	owl:equivalentClass	Processor
13	DataSubject ThirdParty	rdfs:subClassOf	Party
14	hasTechnicalOrganisationalMeasure	rdfs:domain	Policy or Rule
15	hasDataSubject	rdfs:subPropertyOf	function

IMDB USE CASE

IMDB PP

Permission Example

Information You Give Us: We receive and store any information you enter on our Web site or give us in any other way. Click here to see examples of what we collect.

...you might supply us with such information as your name, e-mail address, physical address, zip code, and phone number; your age and gender; the movies and actors you like or dislike; and your general movie preferences.

You can choose not to provide certain information, but then you might not be able to take advantage of many of our features. We use the information that you provide for such purposes as responding to your requests, customizing future browsing for you, improving our site, and communicating with you.

```
:Permission1 rdf:type owl:NamedIndividual ,
               save:Permission ;
save:action   :Collect ,
               :Store ,
               :Use ;
save:controller :IMDB ;
save:sender    :DataSubject ;
save:data     :Address ,
               :Age ,
               :EmailAddress ,
               :Gender ,
               :Dislikes ,
               :Likes ,
               :Preferences ,
               :Name ,
               :PhoneNumber ,
               :ZipCode ;
save:purpose  :CustomerCare ,
               :ServicePersonalization .
```

IMDB PP

Obligation with Technical Measure Example

If **you** use our subscription service, **we** work to protect the security of your **subscription information** during **transmission** by using Secure Sockets Layer (SSL) software, which **encrypts** information you input.

```
:Obligation1 rdf:type save:Obligation ;  
  save:action :DiscloseByTransmission ;  
  save:controller :IMDB ;  
  save:data :Authenticating ;  
  dpv:hasTechnicalOrganisationalMeasure  
:EncryptionInTransfer .
```

CONCLUSION

Conclusion

Validation ⇔ refinement

- **SAVE – Semantic dAta priVacy modEl:**
 - GDPR-aware,
 - fine-grained,
 - reusable,
 - supports semantic interoperability,
 - possesses potential for automated compliance checking.
- **Based on the principles of ontology reuse and merging:**
 - inheriting the expressive power and functionality of each of its components,
- can model a wide range of privacy-related agreements - privacy policies, data processing agreements, other contracts - **anything that involves rules of personal data processing.**

ONGOING WORK / FUTURE PLANS

Plan

Ongoing



Validating the model with the help of **legal experts**.



Improvement, enrichment and **correction** of the model.



Usage in Downstream Applications

- Ontology Population from contracts (NLP)
- Access Control/Compliance Checking (SHACL)

Future



Adding another level of policies based on individual user's consent

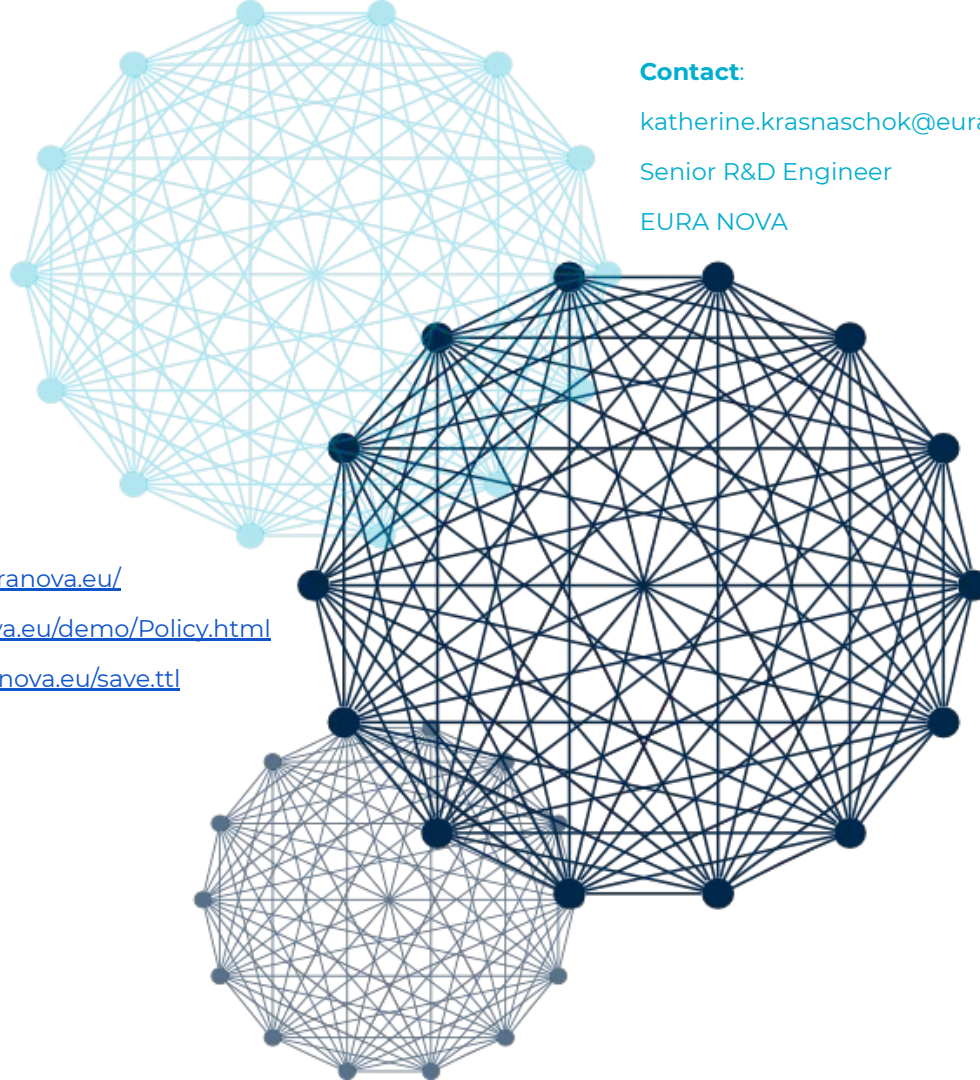


Representing GDPR norms (functional) to provide "level 0" of policies and compliance



Automatic generation of data processing agreements in NL.

Questions ?



Contact:

katherine.krasnaschok@euranova.eu

Senior R&D Engineer

EURA NOVA

Links:

SAVE spec: <http://rune.research.euranova.eu/>

IMDB demo: rune.research.euranova.eu/demo/Policy.html

Ontology: <http://rune.research.euranova.eu/save.ttl>

euranova.eu

research.euranova.eu

Summary Presentation

Towards Privacy Policy Conceptual Modeling



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EURV
NOVA

CONTEXT

Context

Goals:

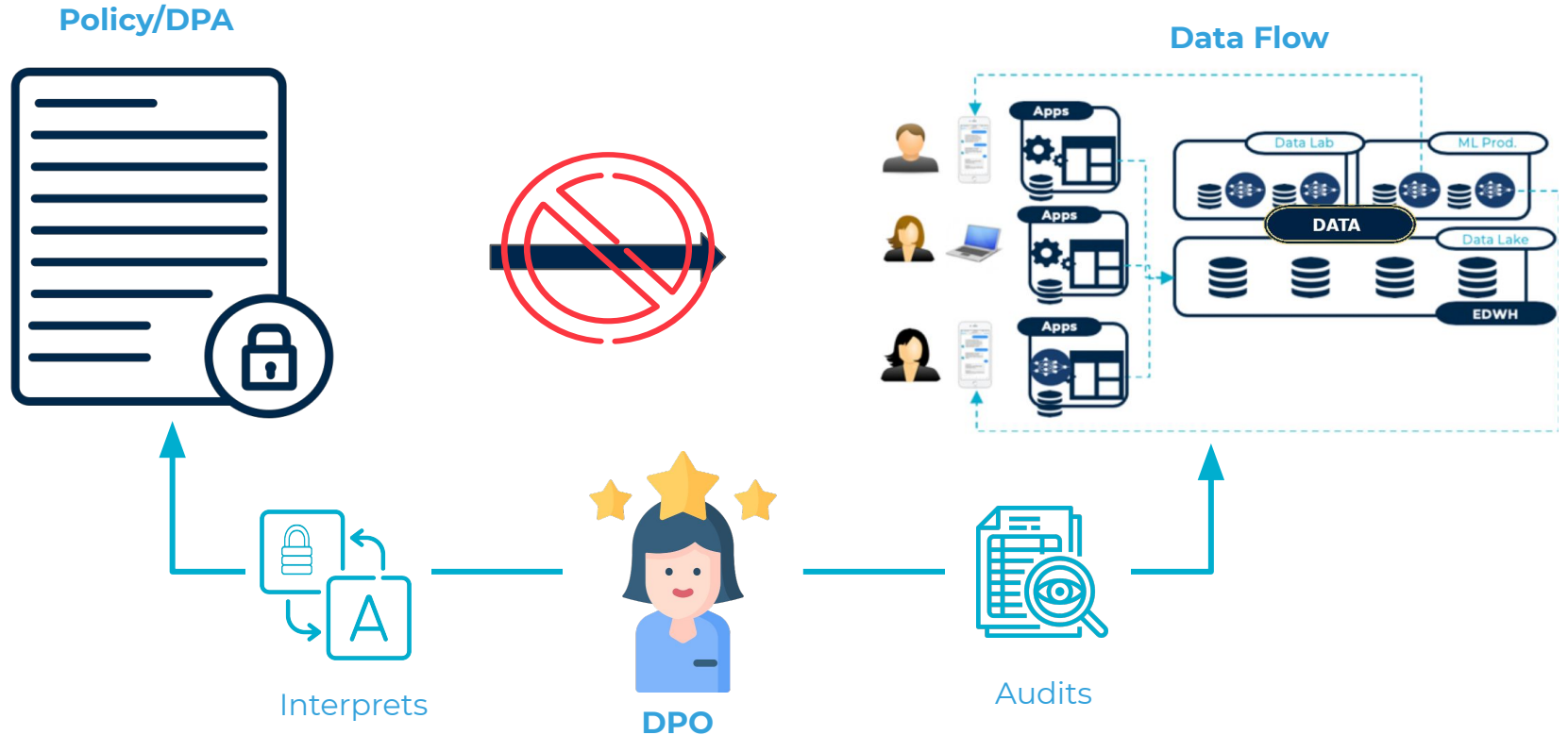
- Support GDPR compliance & privacy by design.
- Represent privacy policies and data processing agreements in a machine-readable “operational” way.

Contributions:

- A conceptual model for **fine-grained** representation of privacy policies;
- Merge of two Semantic Web models;
- Open, reusable, flexible;

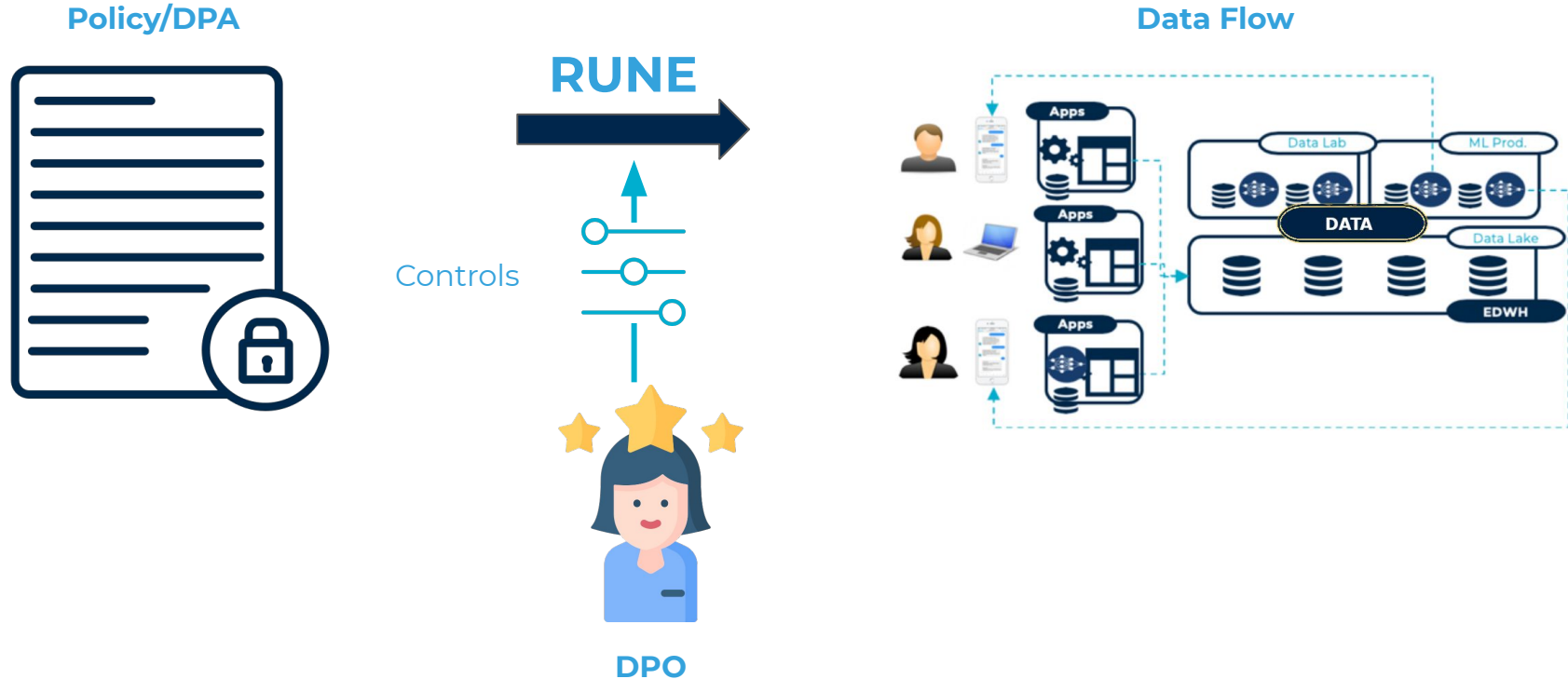
Problem

Policies and contracts do not guarantee privacy by design!



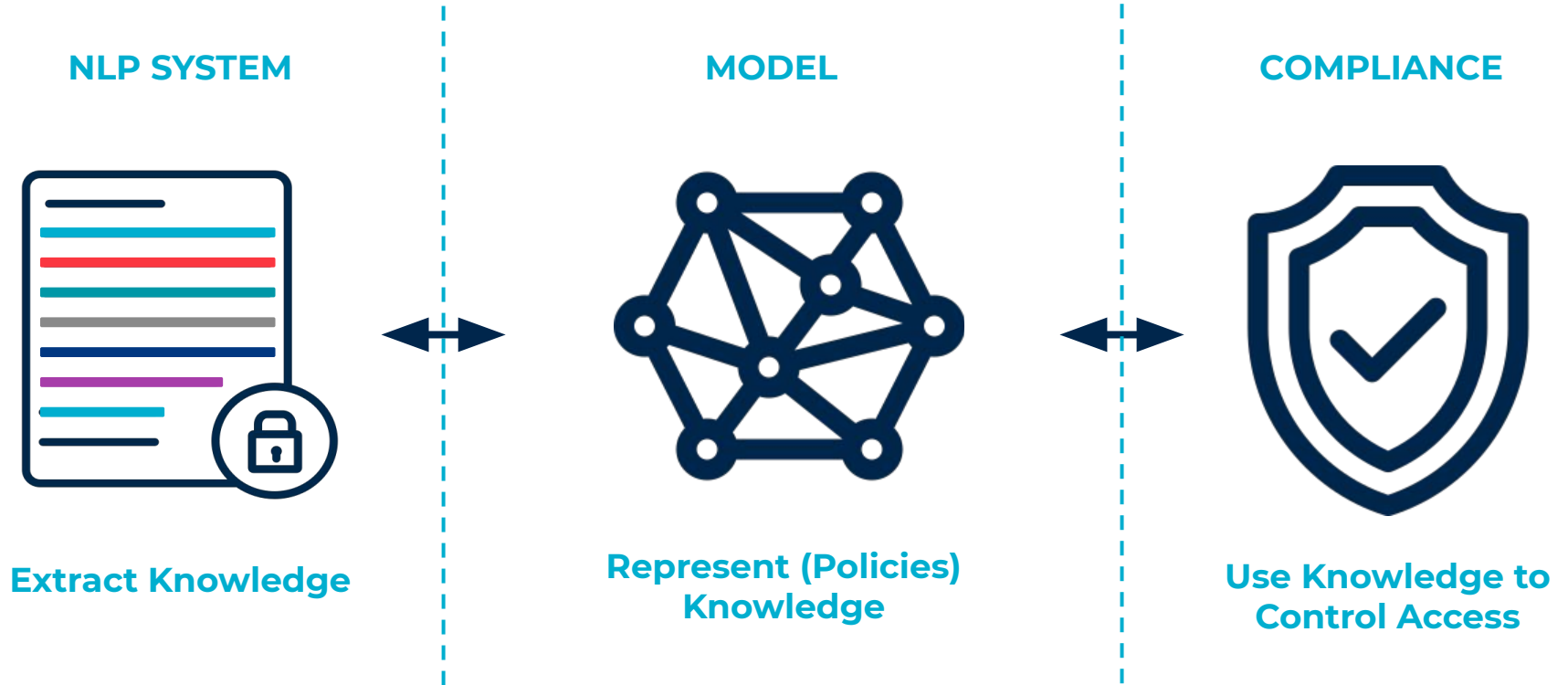
Goal

Automate privacy by design based on policies and DPAs



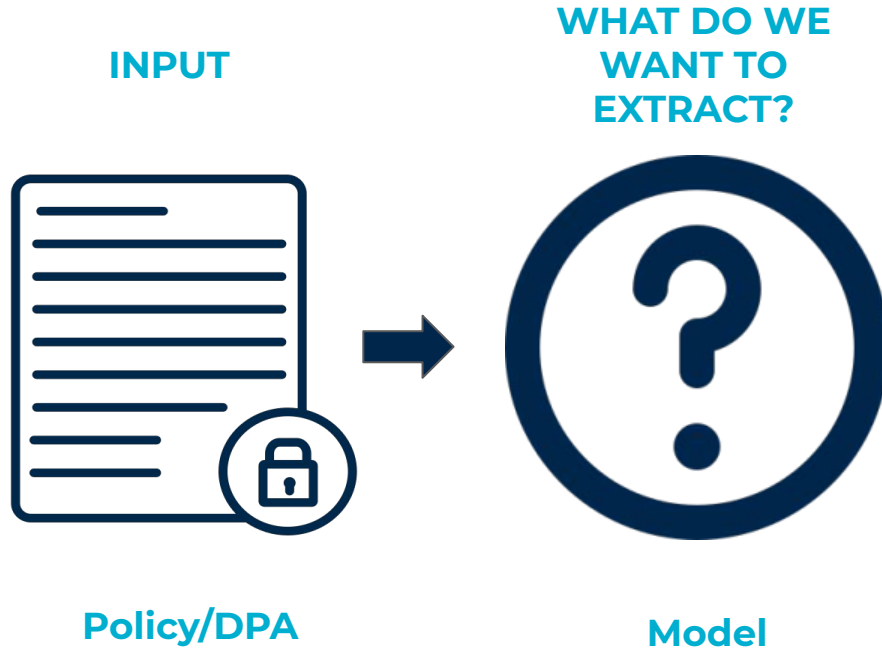
End-to-end system

Automate privacy by design based on policies and DPAs



Privacy Policy Conceptual Model

Requirements



Privacy Policy Conceptual Model

Requirements

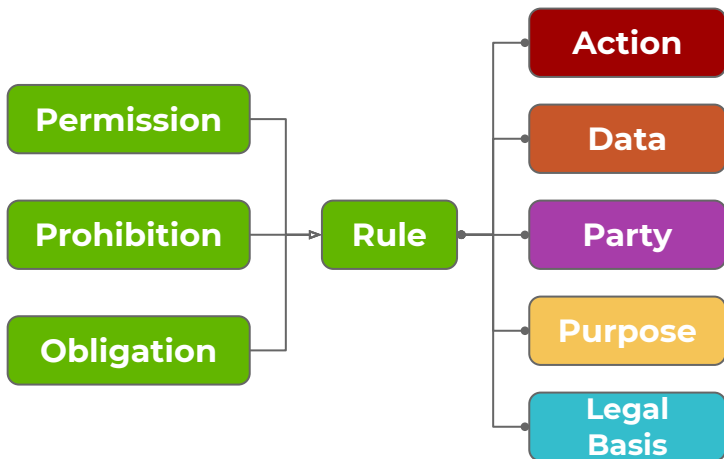


SAVE - Semantic dAta priVacy modEl

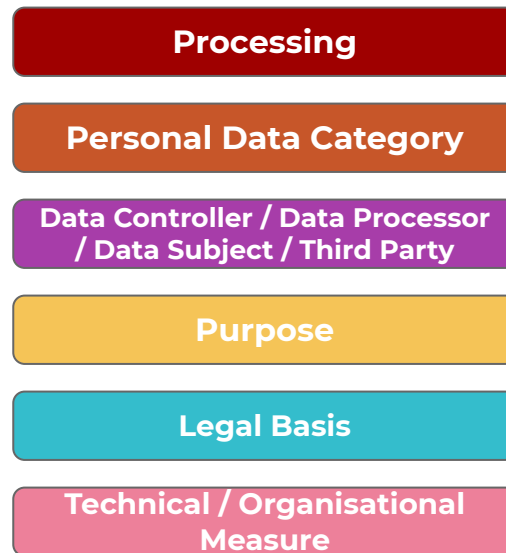
Model Selection

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ODRL/ORCP ODRL Regulatory Compliance Profile Deontic concepts



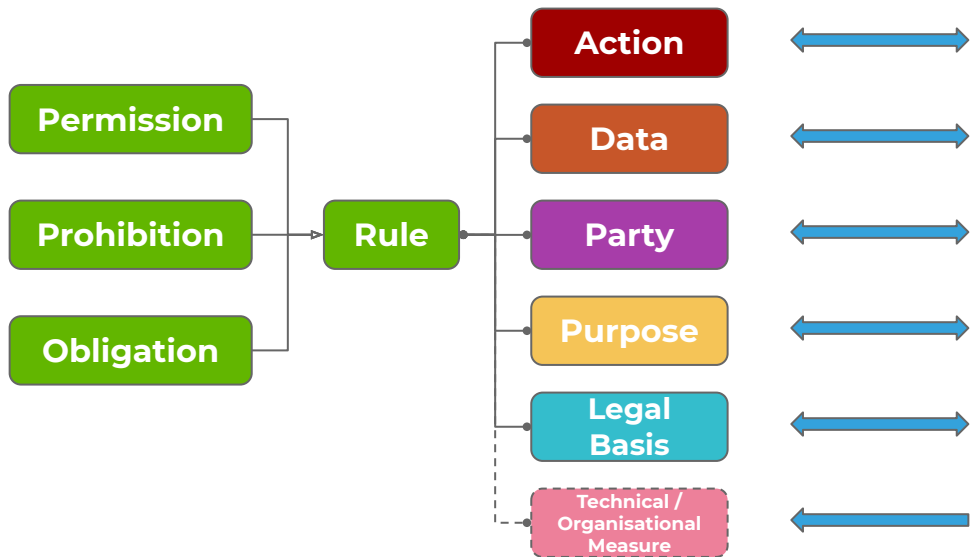
DPV Data Privacy Vocabularies Vocabularies of privacy terms



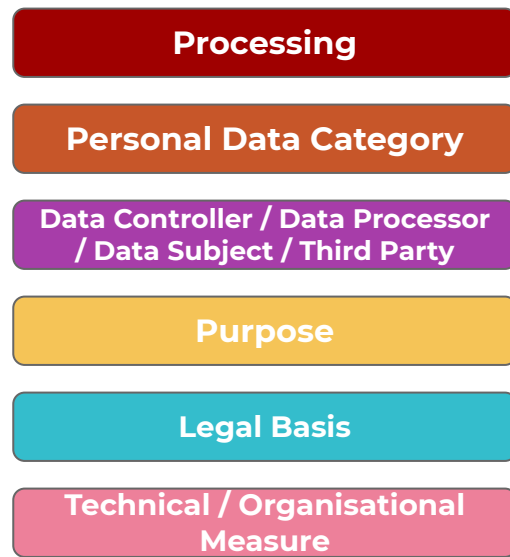
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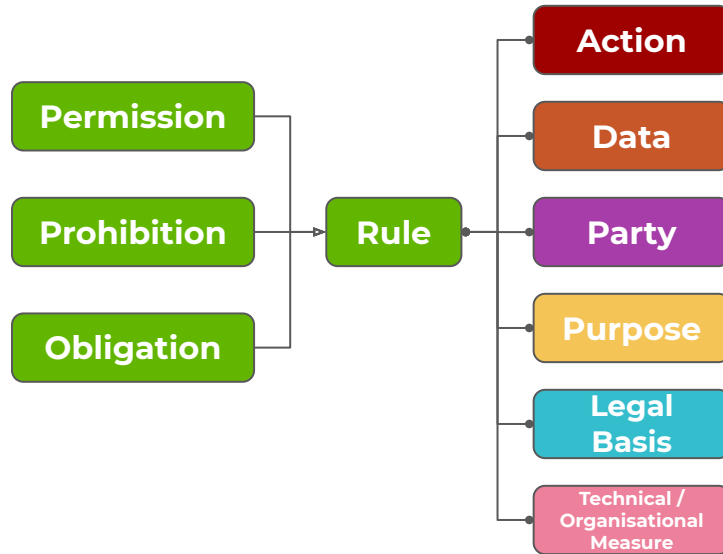
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SAVE

Semantic dAta priVacy modEl

Semantic Web / Ontology



- Merged from two existing ontologies
- Machine-readable
- Open
- Reusable
- Potential for semantic reasoning
- Potential to mature in Semantic Web community

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EXAMPLE

SAVE Rules

IMDB example

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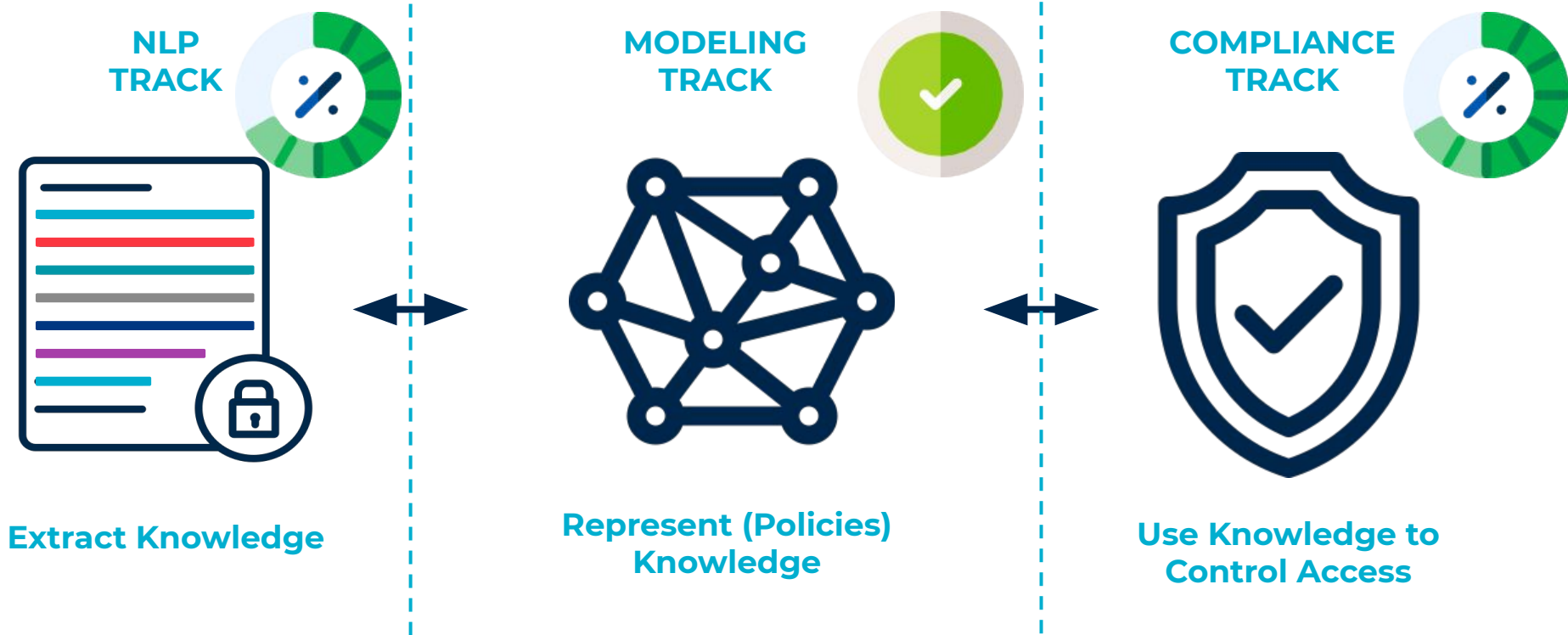
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```
:Permission1 rdf:type owl:NamedIndividual ,
              save:Permission ;
save:action   :Collect ,
              :Store ,
              :Use ;
save:controller :IMDB ;
save:sender     :DataSubject ;
save:data      :Address ,
              :Age ,
              :EmailAddress ,
              :Gender ,
              :Dislikes ,
              :Likes ,
              :Preferences ,
              :Name ,
              :PhoneNumber ,
              :ZipCode ;
save:purpose   :CustomerCare ,
              :ServicePersonalization .
```

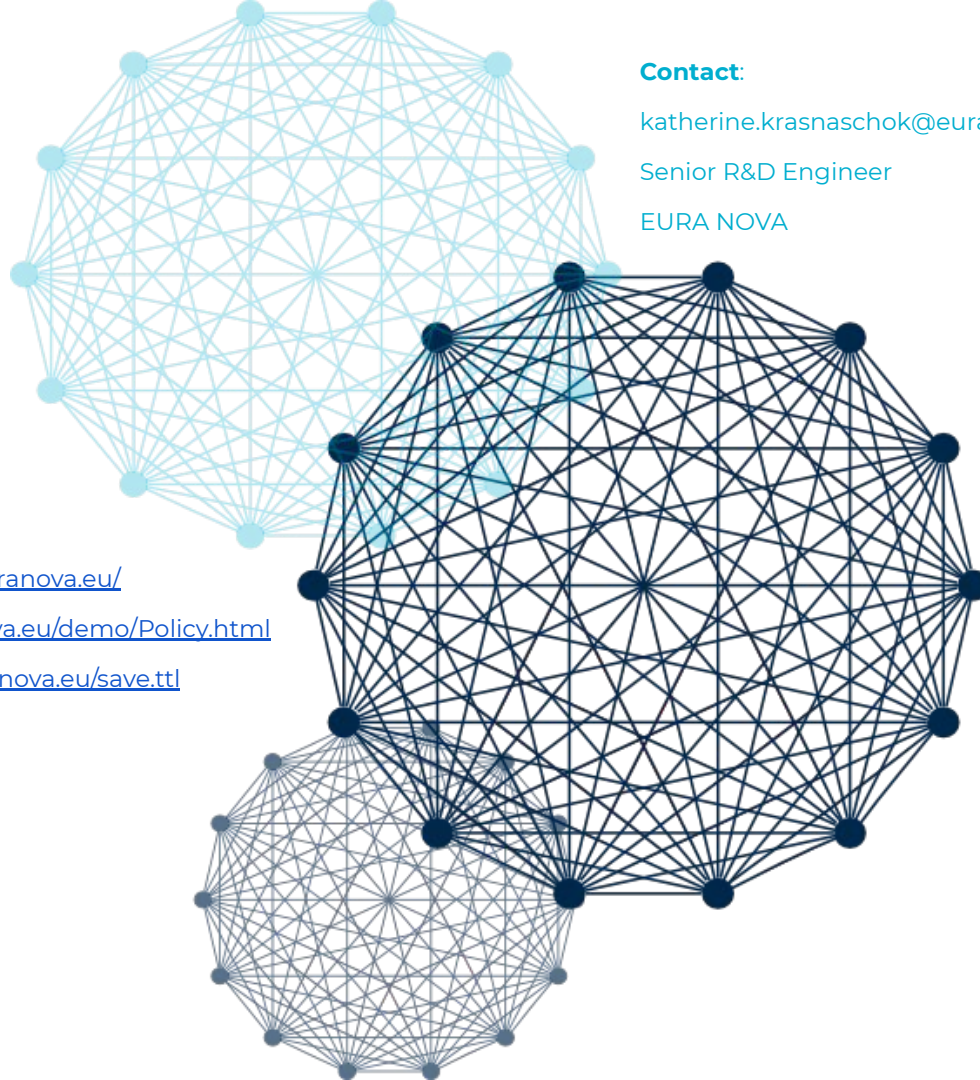
CONCLUSION

Ongoing Work

Automate privacy by design based on policies and DPAs



Questions ?



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euranova.eu

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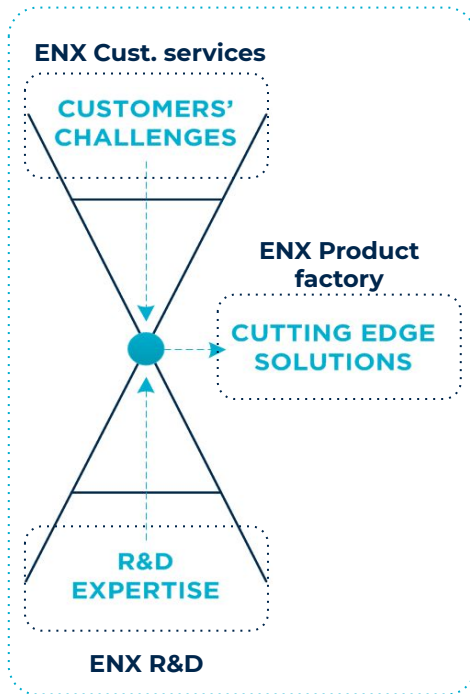
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EURA NOVA (ENX)



ASGARD (Started Feb 2020)

A research **Initiative** from EURA NOVA

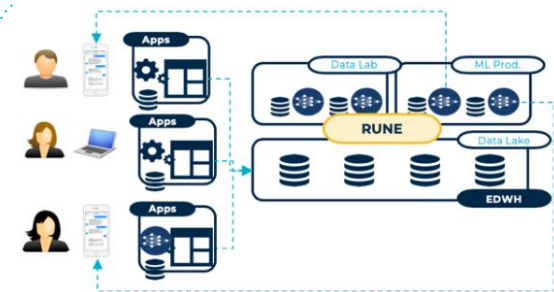
Impacting the society with **Technologies**

We want to **contribute** to the world **digital transformation**

We believe **technology** is the **engine** of **change**.

We believe **creating** new **knowledge** is the best way to see further and to lead the path to tomorrow.

RUNE GDPR - Security



Creating new approaches in **NLP** in order to support **GDPR & Privacy by design**



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