Engaging Content
Engaging People

Compliance through Informed Consent: Semantic Based Consent Permission and Data Management Model

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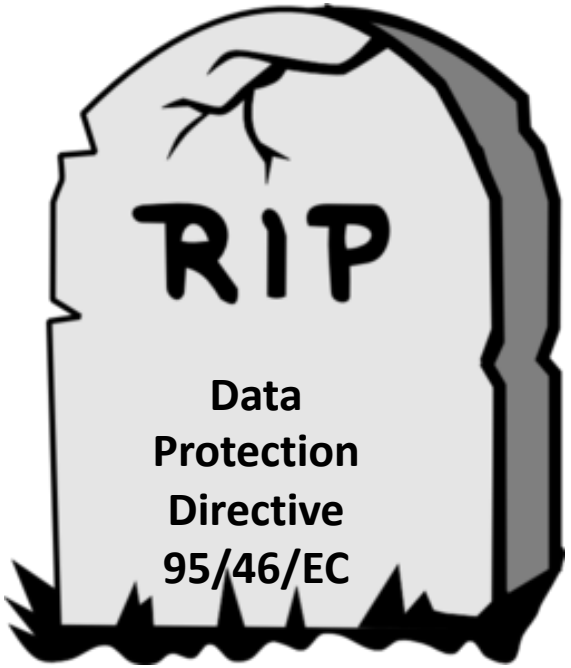
EU's General Data Protection Regulation

Data Protection Directive 95/46/EC needed reform to be fit for

- technological developments like social networks and cloud computing
- globalisation.

EU has replaces DPD with General Data Protection Regulation (GDPR)

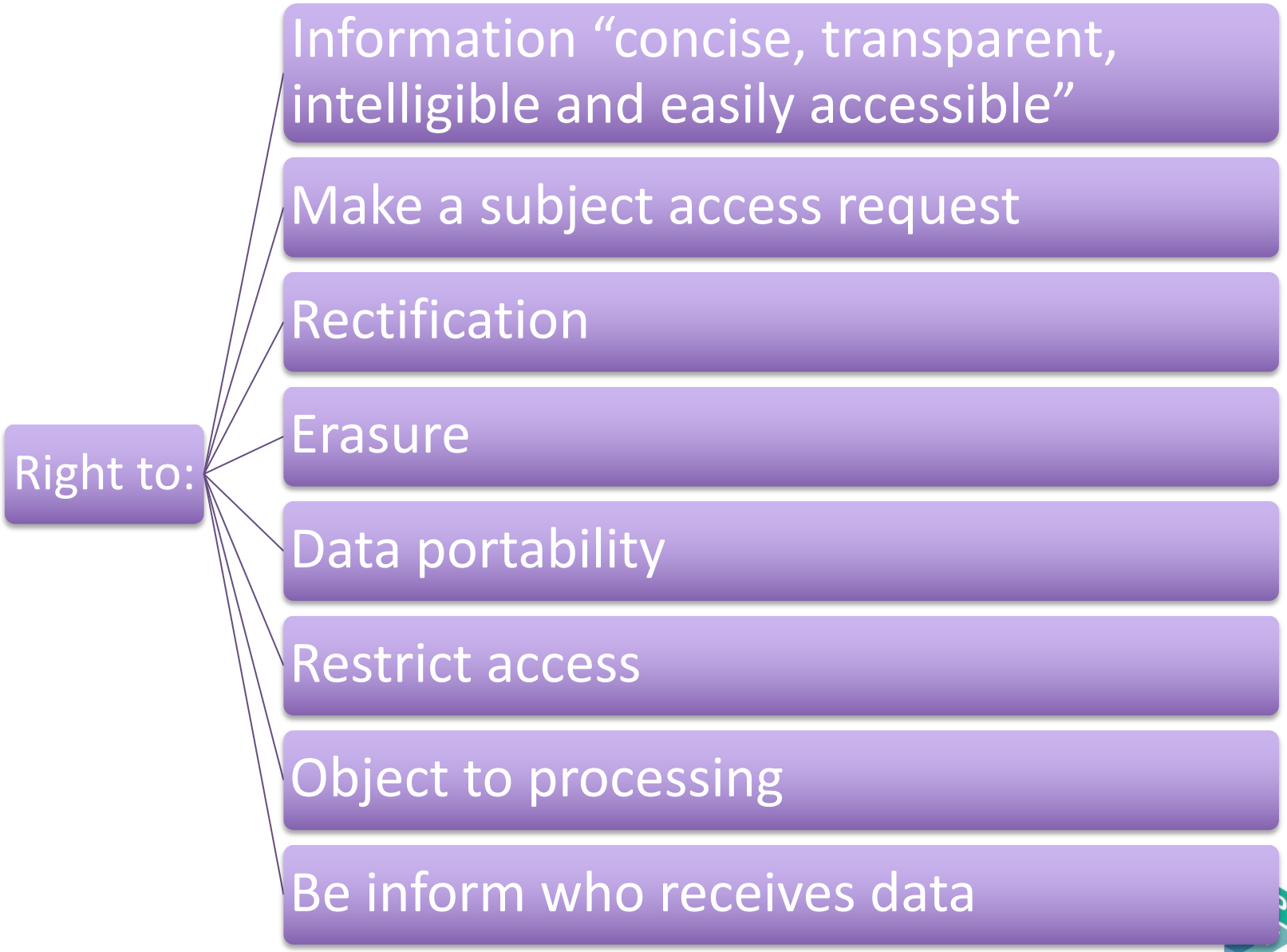
GDPR will have immediate effect on all 28 EU Member States on 25 May 2018.



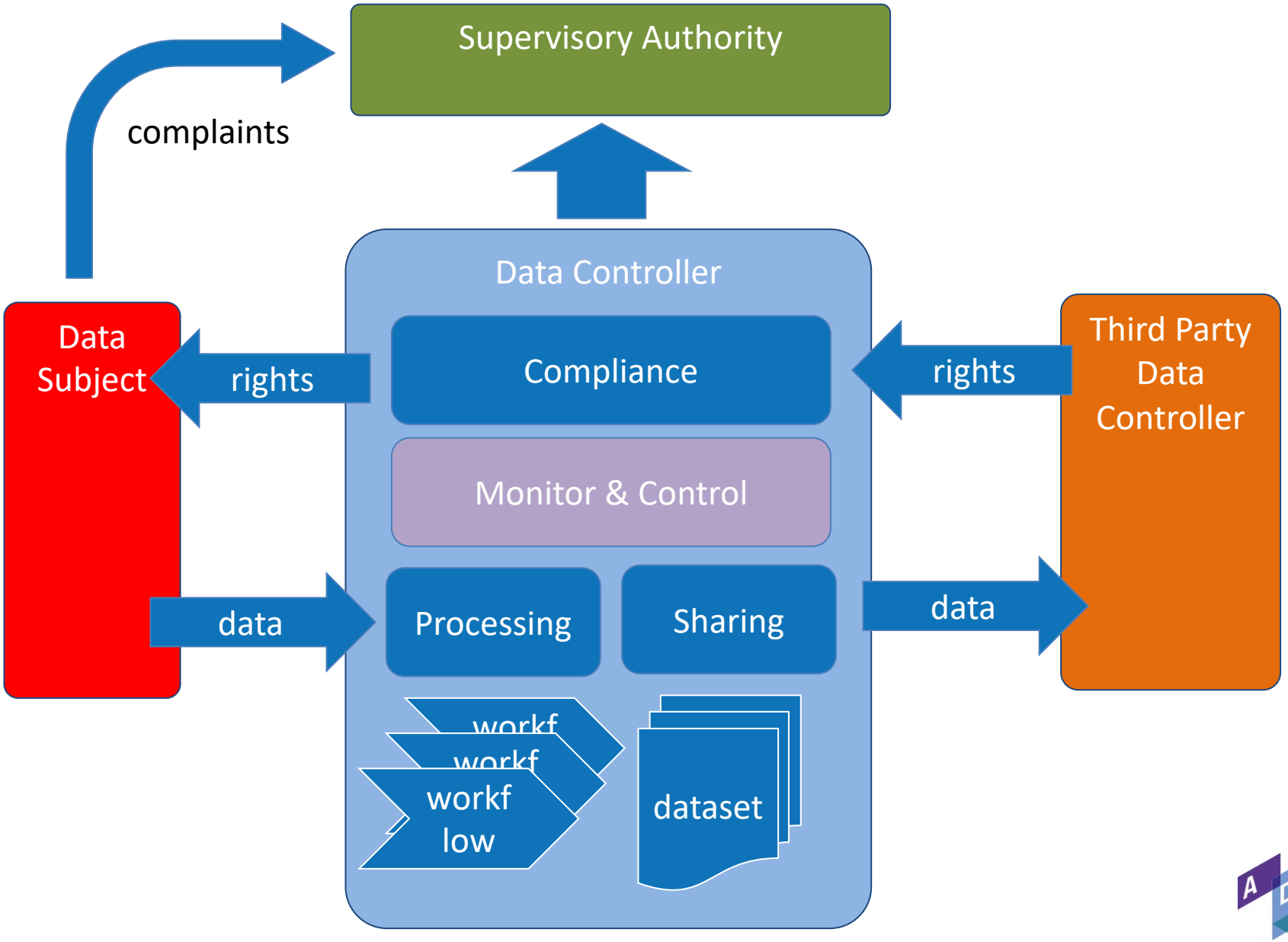
Key GDPR Provisions

- International reach: data about any EU citizen
- Fines upto €20M or 4% of global turnover
- Must Demonstrate compliance
- Processing lawful only through Informed Consent

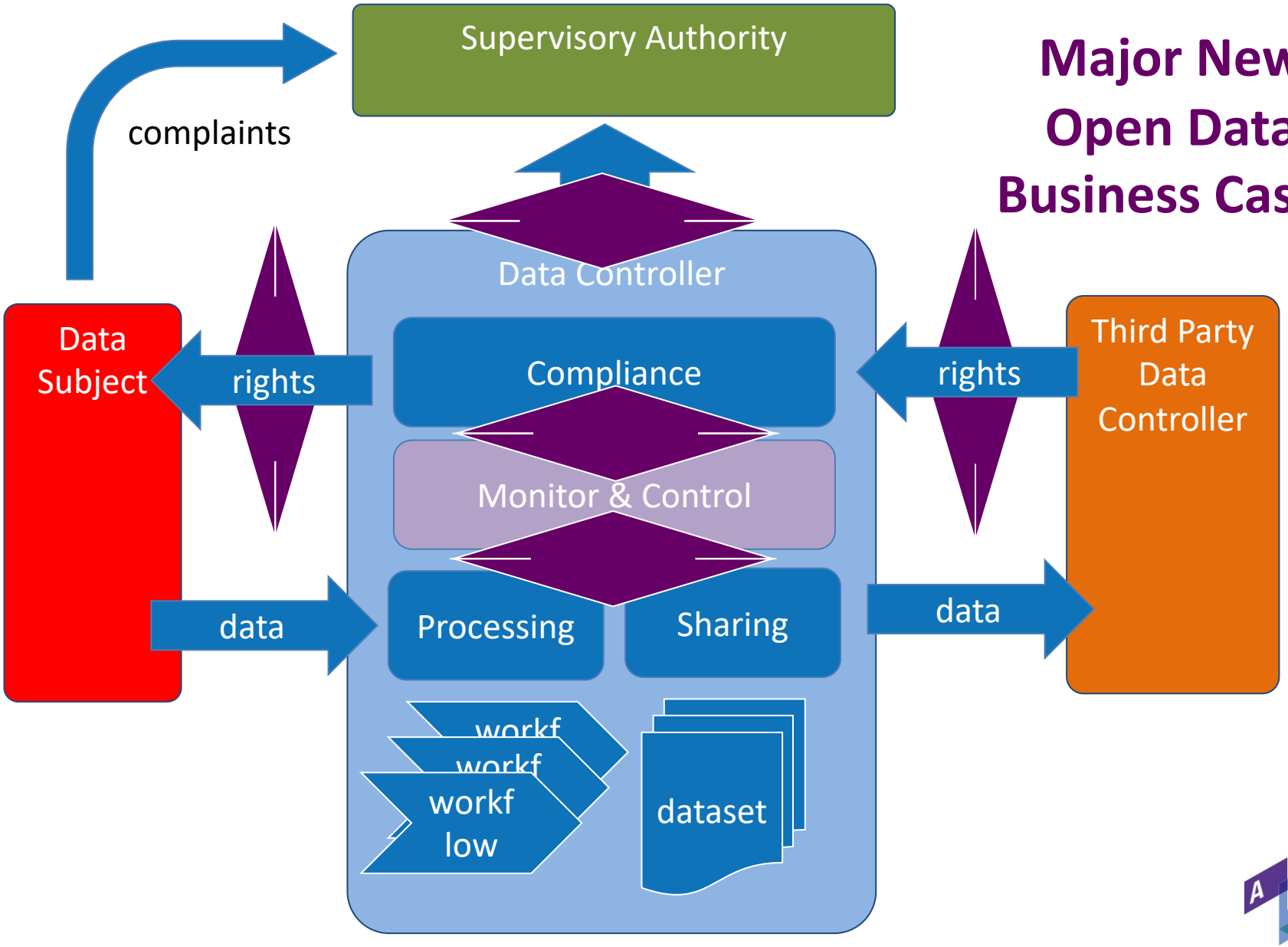
Data Subject RIghts



GDPR Roles and Processes



GDPR Roles and Open Data



Major New Open Data Business Cases

Requirements for Consent

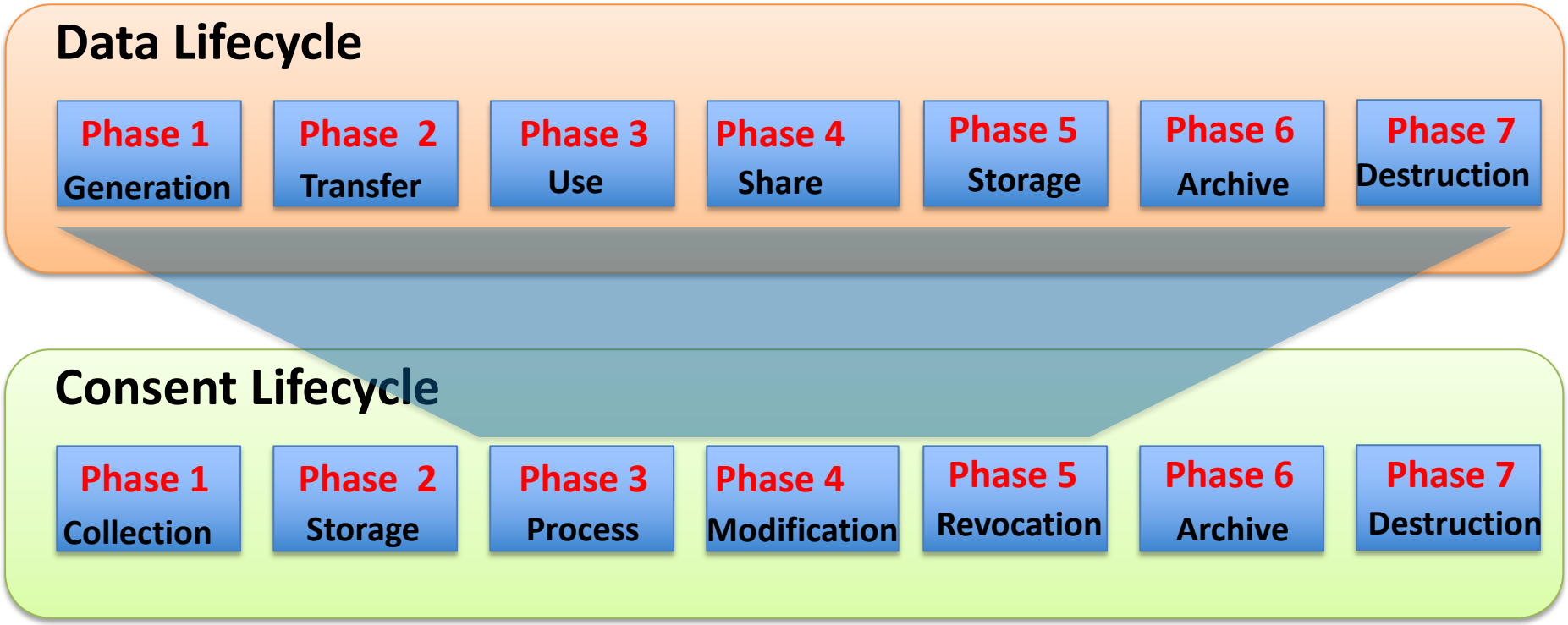
To be considered as a valid one the consent should be:

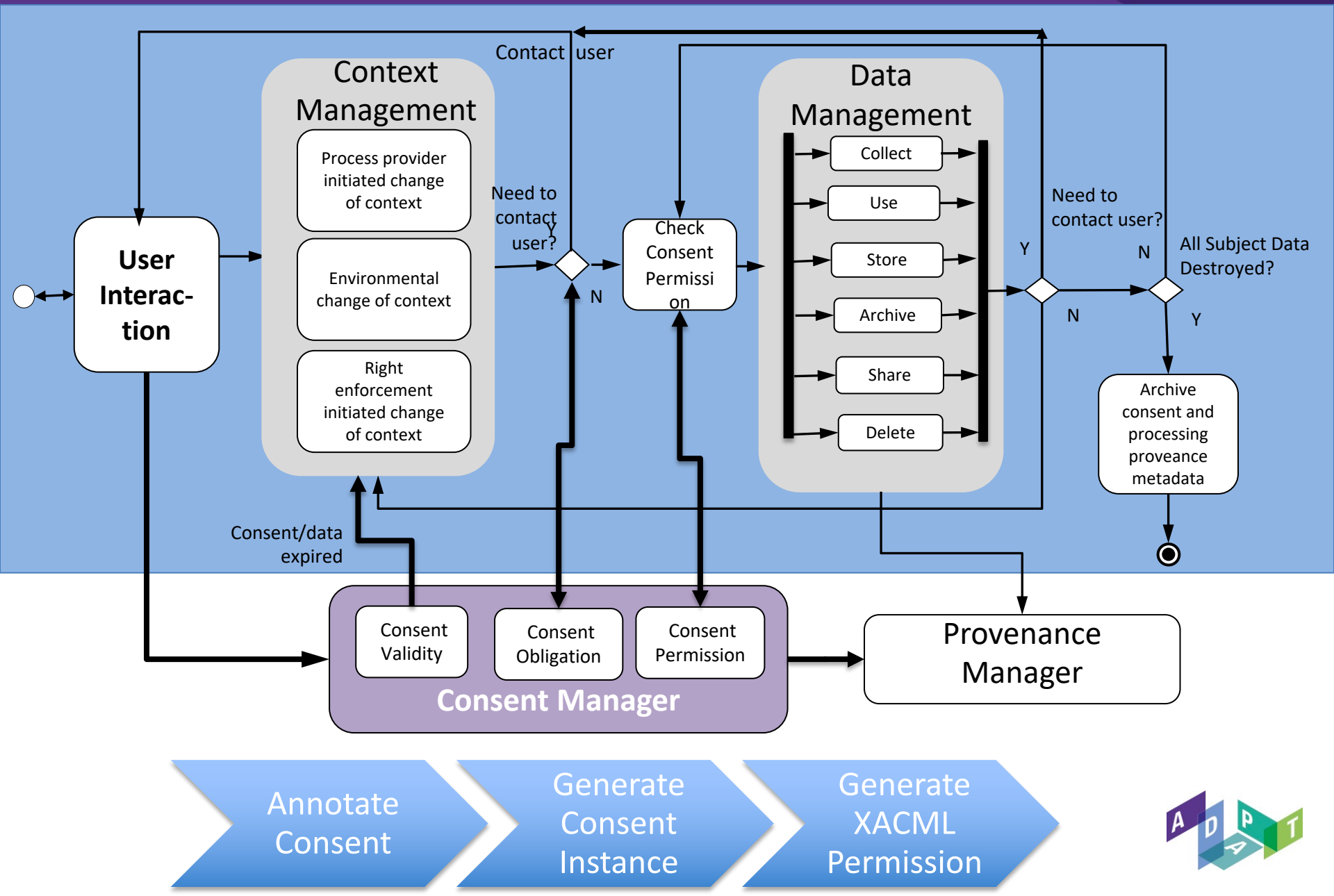
- ✓ **Freely given**
- ✓ **Specific**
- ✓ **Informed**
- ✓ **Unambiguous**
- ✓ **Parental permission**

- ✓ **If purpose or recipients change new consent must be sought**

Silence ≠ Consent

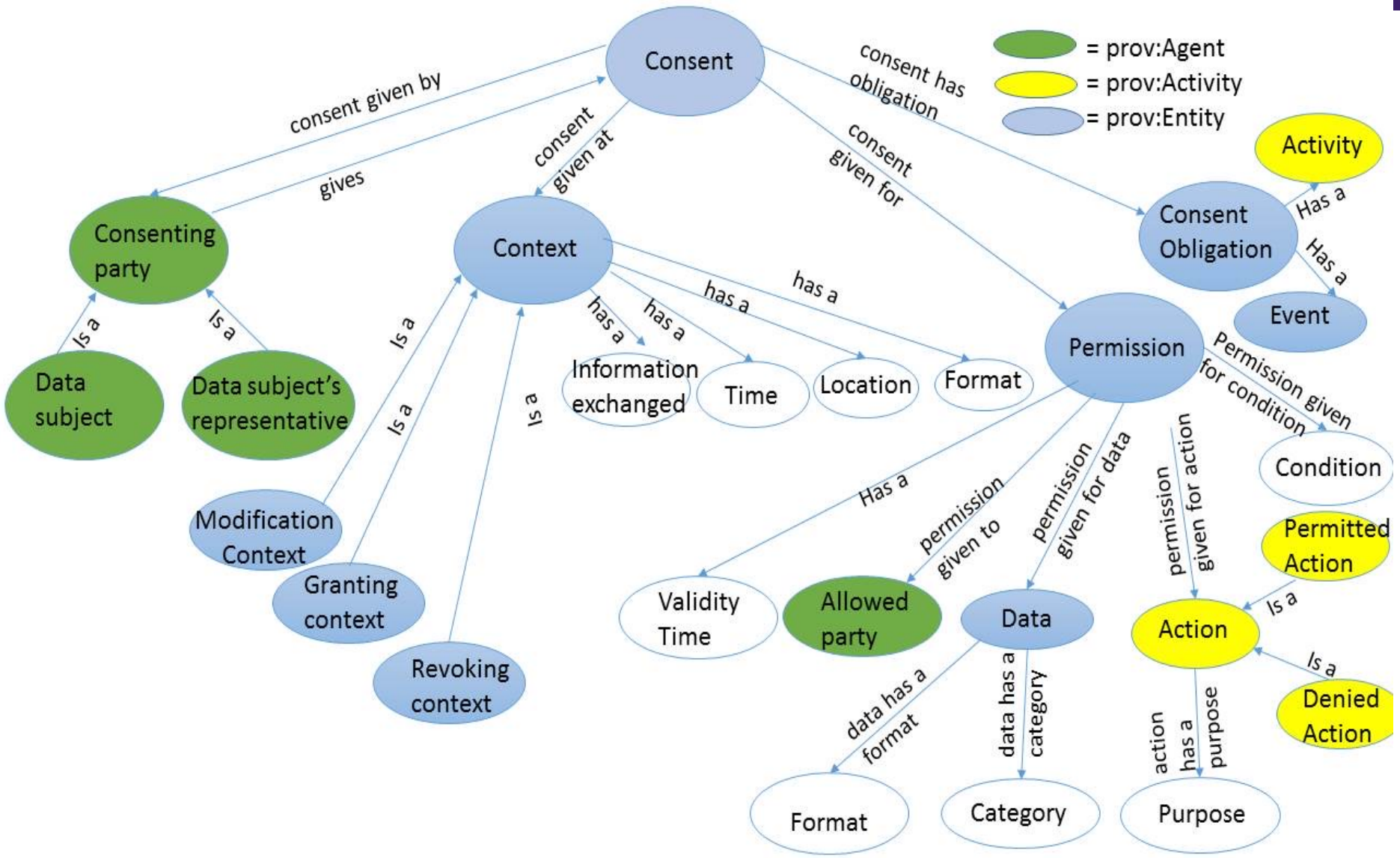
Data vs. Consent Lifecycle





Annotate Consent → Generate Consent Instance → Generate XACML Permission

Consent Ontology



https://openscience.adaptcentre.ie/projects/CDMM/

Annotation of consent with elements of ontology in RDFa

I agree that my data will be used for scientific purposes

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">

<html xmlns="http://www.w3.org/1999/xhtml">

<head>
<title>Title of document</title>
</head>

<body prefix="rdfs: http://www.w3.org/2000/01/rdf-schema# consent:
http://www.semanticweb.org/kaniz/ontologies/2017/0/untitled-ontology-12#">

    <p typeof="consent:Permission">
        I agree that my <span rel="consent:permission_given_for_data"><span
typeof="consent:Data"><span property="rdfs:label">data</span><span
rel="consent:data_has_a_category" typeof="consent:Category"><span property="rdfs:label"
content="interview data"></span></span></span></span> will be
        <span rel="consent:permission_given_for_activity"><span
typeof="consent:Permitted_Action"><span property="rdfs:label" content="use">used</span>
        <span rel="consent:activity_has_purpose">for
        <span typeof="consent:Purpose"><span property="rdfs:label">scientific
purposes</span></span></span></span></span>
    </p>

</body>

</html>
```

RDF representation of the annotated XHTML


```
<rdf:RDF
  xmlns:consent="http://www.semanticweb.org/kaniz/ontologies/2017/0/untitled-ontology-12#"
  xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
  xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#"
>
  <consent:Permission>
    <consent:permission_given_for_data>
      <consent:Data>
        <consent:data_has_a_category>
          <consent:Category>
            <rdfs:label>interview data</rdfs:label>
          </consent:Category>
        </consent:data_has_a_category>
        <rdfs:label>data</rdfs:label>
      </consent:Data>
    </consent:permission_given_for_data>
    <consent:permission_given_for_activity>
      <consent:Permitted_Action>
        <rdfs:label>use</rdfs:label>
        <consent:activity_has_purpose>
          <consent:Purpose>
            <rdfs:label>scientific purposes</rdfs:label>
          </consent:Purpose>
        </consent:activity_has_purpose>
      </consent:Permitted_Action>
    </consent:permission_given_for_activity>
  </consent:Permission>
```

XACML Permission Rule generated using XPARQL


```
▼<PolicySet>
  ▼<Policy>
    ▼<Rule RuleId="ConsentPolicy" Effect="Permit">
      ▼<Condition>
        ▼<Apply FunctionId="urn:oasis:names:tc:xacml:1.0:function:and">
          ▼<Apply FunctionId="urn:oasis:names:tc:xacml:1.0:function:string-at-least-one-member-of">
            <ActionAttributeDesignator AttributeId="Purpose" DataType="http://www.w3.org/2001/XMLSchema#string"/>
           ▼<Apply FunctionId="urn:oasis:names:tc:xacml:1.0:function:string-bag">
              <AttributeValue DataType="http://www.w3.org/2001/XMLSchema#string">use</AttributeValue>
            </Apply>
          </Apply>
          ▼<Apply FunctionId="urn:oasis:names:tc:xacml:1.0:function:string-at-least-one-member-of">
            <ResourceAttributeDesignator AttributeId="urn:oasis:names:tc:xacml:1.0:action:resource-id"
            DataType="http://www.w3.org/2001/XMLSchema#string"/>
           ▼<Apply FunctionId="urn:oasis:names:tc:xacml:1.0:function:string-bag">
              <AttributeValue DataType="http://www.w3.org/2001/XMLSchema#string">interview data</AttributeValue>
            </Apply>
          </Apply>
          ▼<Apply FunctionId="urn:oasis:names:tc:xacml:1.0:function:string-at-least-one-member-of">
            <ActionAttributeDesignator AttributeId="urn:oasis:names:tc:xacml:1.0:action:action-id"
            DataType="http://www.w3.org/2001/XMLSchema#string"/>
           ▼<Apply FunctionId="urn:oasis:names:tc:xacml:1.0:function:string-bag">
              <AttributeValue DataType="http://www.w3.org/2001/XMLSchema#string">scientific purposes</AttributeValu
            </Apply>
```

Conclusions and Further Work

- GDPR implies a *full lifecycle management of consent* that encloses the lifecycle management of personal data
- *Open Data Formats* give us the tools to handle Consent as a first class object in Data Protection Management
- Explored the generation of XACML permissions from human readable consent via RDF instance
- Future Work:
  - Assessing generation of access control rules against consent forms and privacy policies
  - Integration with PROV for compliance tracking
  - Integration with ODRL for third party compliance agreements

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