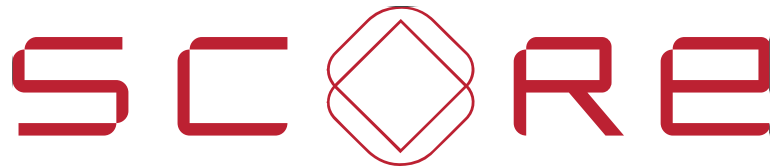


Towards a Risk-Based Analysis of Terms of Service for Consumer Decision Support

Elena Molino-Peña, Beatriz Esteves, José María García, Antonio Ruiz-Cortés

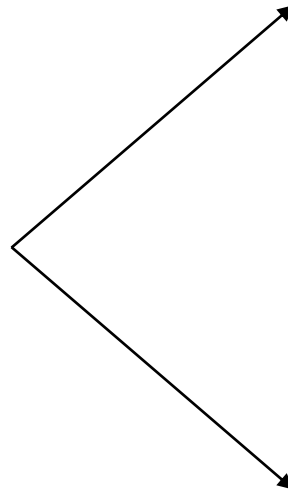


UNIDAD de EXCELENCIA
SMART COMPUTER SYSTEMS
RESEARCH and ENGINEERING



What do we want

“Provider may discontinue the API at any time for any reason without notice.”



UCTD

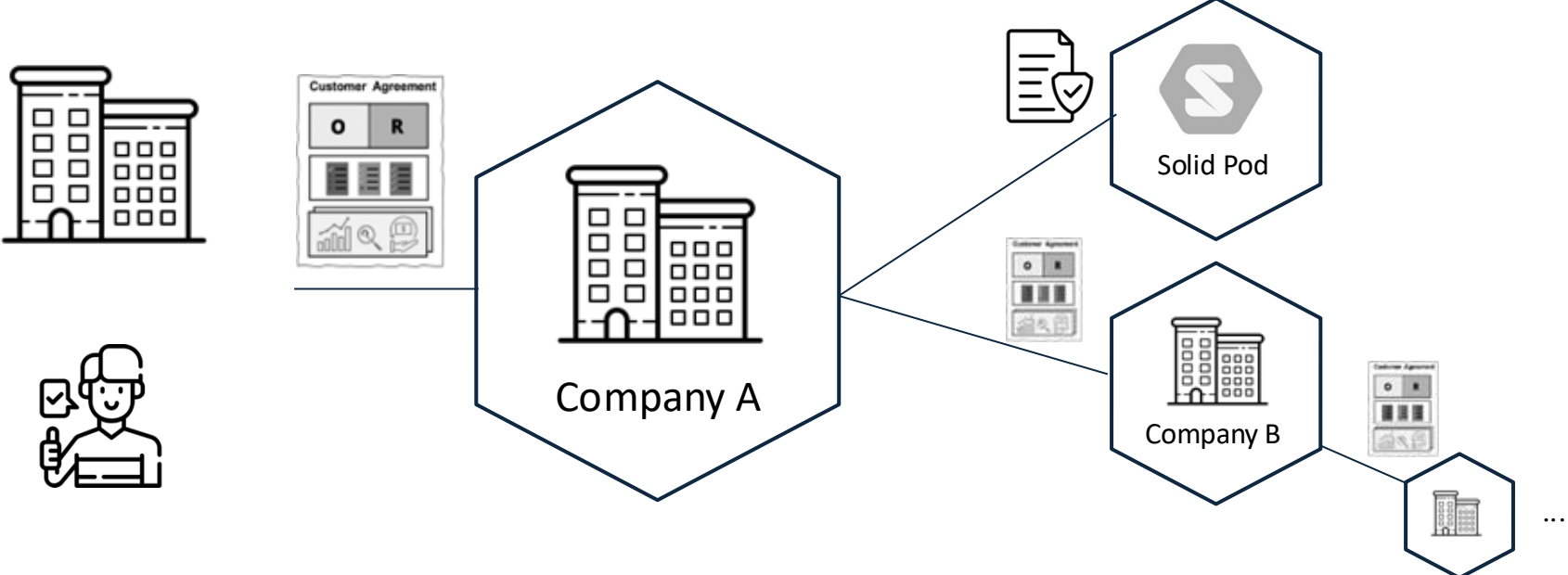
- without a valid reason
- without reasonable prior notice



RISK

- Data Unavailable
- Service Termination

SaaS ecosystem



Non-interoperable agreements

Inter-agreement dependencies

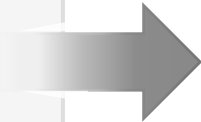
Automatic analysis & compliance

Monitoring & enforcement

Provider Power vs Consumer Power

PROVIDER POWER

- UNILATERAL DRAFT
- ZERO NEGOTIATION



UNILATERAL DECISION

 PRICE	 POLICY	 SUPPLY
---	---	---

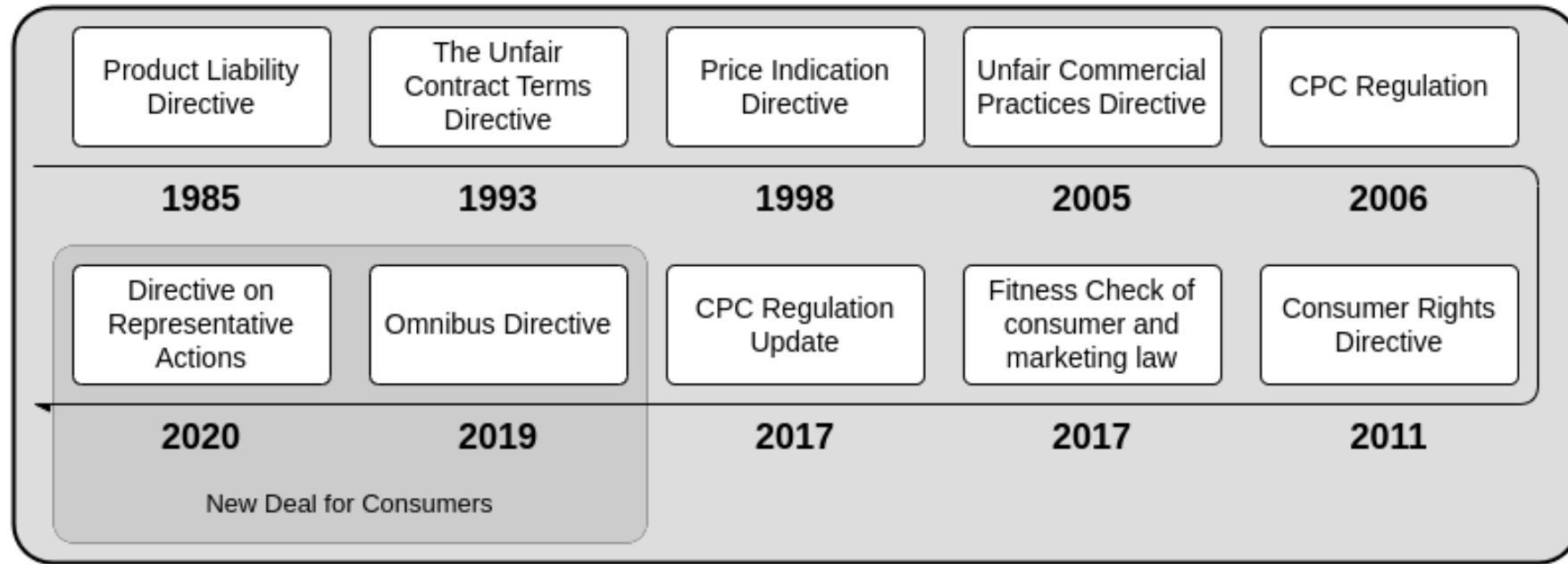


IMPACT ON CONSUMER

- HIGHER COSTS
- LESS CONTROL



EU consumer protection law B2C



*If these clauses create a significant imbalance in the parties' rights and obligations to the detriment of the consumer → **Potentially Unfair Terms***

ToS to Open Digital Right Language

API SERVICE AGREEMENT

PLEASE READ THE FOLLOWING TERMS AND CONDITIONS CAREFULLY. THESE TERMS AND CONDITIONS ELSEVIER.

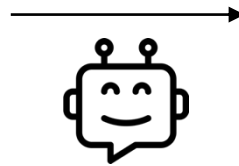
1 ACKNOWLEDGEMENT AND ACCEPTANCE

1.1 The application programmable interfaces service (the "API Service") owned and operated by Elsevier B.V. ("Elsevier") is provided to You under the terms and conditions of this API Service Agreement. You confirm that You have the right and authority to enter into and accept the conditions of this Agreement on Your own behalf and/or on behalf of Your company, institute or organization as described in the Agreement.

1.2 Elsevier reserves the right, at its sole discretion, to change the terms of this Agreement at any time with reasonable notice. If such changes are made, Elsevier will make a new copy of the Agreement available on the API Service's web site. Elsevier will notify You of such changes by email and by posting the modified Agreement on the API Service's web site, describing the modifications made.

1.3 Elsevier grants You a limited license to use the, application programmable interfaces ("APIs"), data, files and content ("Content") and to integrate the Application with the API, subject to the usage restrictions set forth in the Agreement. For more information, please visit <http://dev.elsevier.com/policy.html>. All notices given pursuant to this Agreement shall be in writing and delivered to You at the email address provided to dev.elsevier.com.

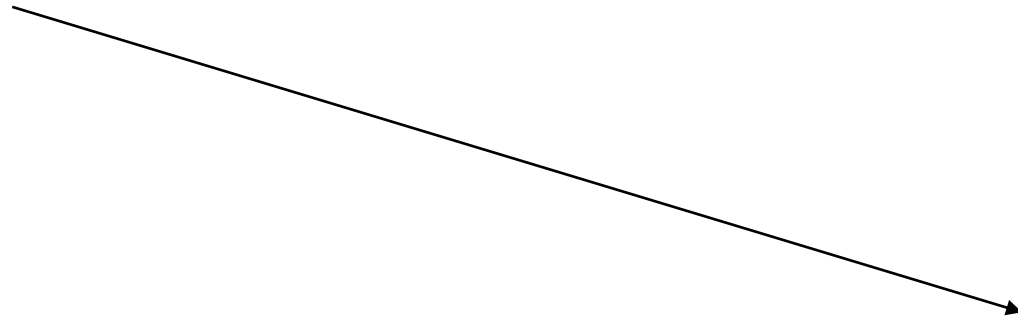
LLMs



```
:Agreement a odr1:Agreement ;
  odr1:profile dpv-odr1: ;
  :PermissionDeleteUserAccount a odr1:Permission ;
    odr1:assigner :customer ;
    odr1:assignee :provider ;
    odr1:action dpv-odr1:Remove ;
    odr1:target :userData ;
    odr1:constraint [
      a odr1:Constraint ;
      odr1:leftOperand odr1:delayPeriod ;
      odr1:operator odr1:gteq ;
      odr1:rightOperand "P30D"^^xsd:duration
    ] ;
  odr1:constraint [
    a odr1:Constraint ;
    odr1:leftOperand dpv-odr1:Justification ;
    odr1:operator odr1:isAnyOf ;
    odr1:rightOperand justifications:SecurityImpaired
  ] .
```

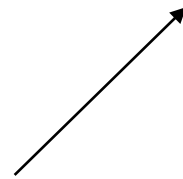
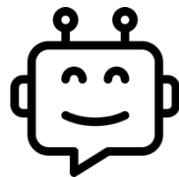



Can we develop agents capable of detecting unfair terms and associated risks?

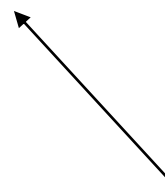
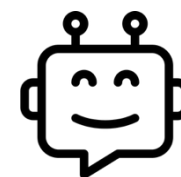


TOSL + ODRL + DPV

Hey, is this unfair?



Hey, is this risky?



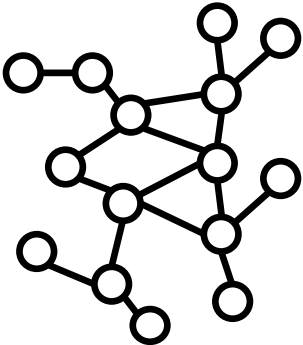
Approach

Rule-based Inference for Risk Detection

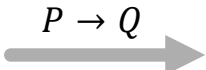
Formal Representation (ODRL)




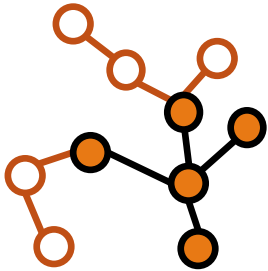
Knowledge Graph (base)



{permissions, duties, prohibitions}



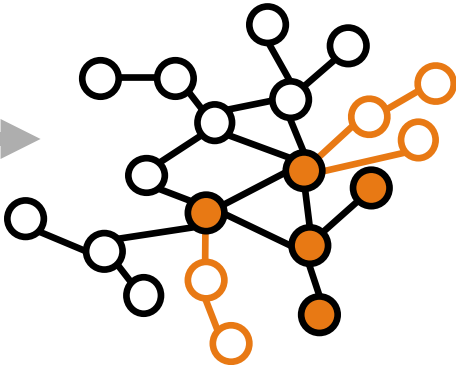
Unfair Detection & DPV Risks Inference 



{risk, consequences, impacts, mitigation}



Enriched Knowledge Graph



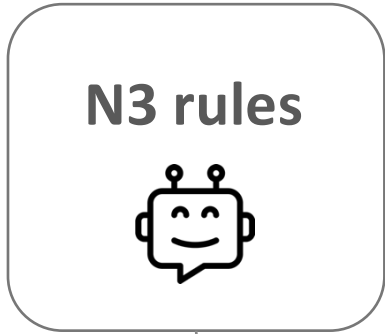
ODRL Policy + DPV Risks

STEP 1: formalising the ToS

“Provider may discontinue the API at any time for any reason without notice.”

```
# Potential mitigations:  
# - constraint: justification = valid_reason  
# - constraint: delayPeriod >= X days  
# - duty: provider informs customer  
  
:TerminateService a odrl:Permission ;  
  odrl:assignee :provider ;  
  odrl:action tosl:terminate ;  
  odrl:target :service .
```

STEP 2: detecting the absence of legal safeguards



```
{
  ?G log:includes { ?P } .
  ?G log:notIncludes { ?S1 ?S2 ?SN } .
}
=>
{
  ?risk a dpv:Risk .
  ?mitigation a dpv:RiskMitigationMeasure .
} .
```

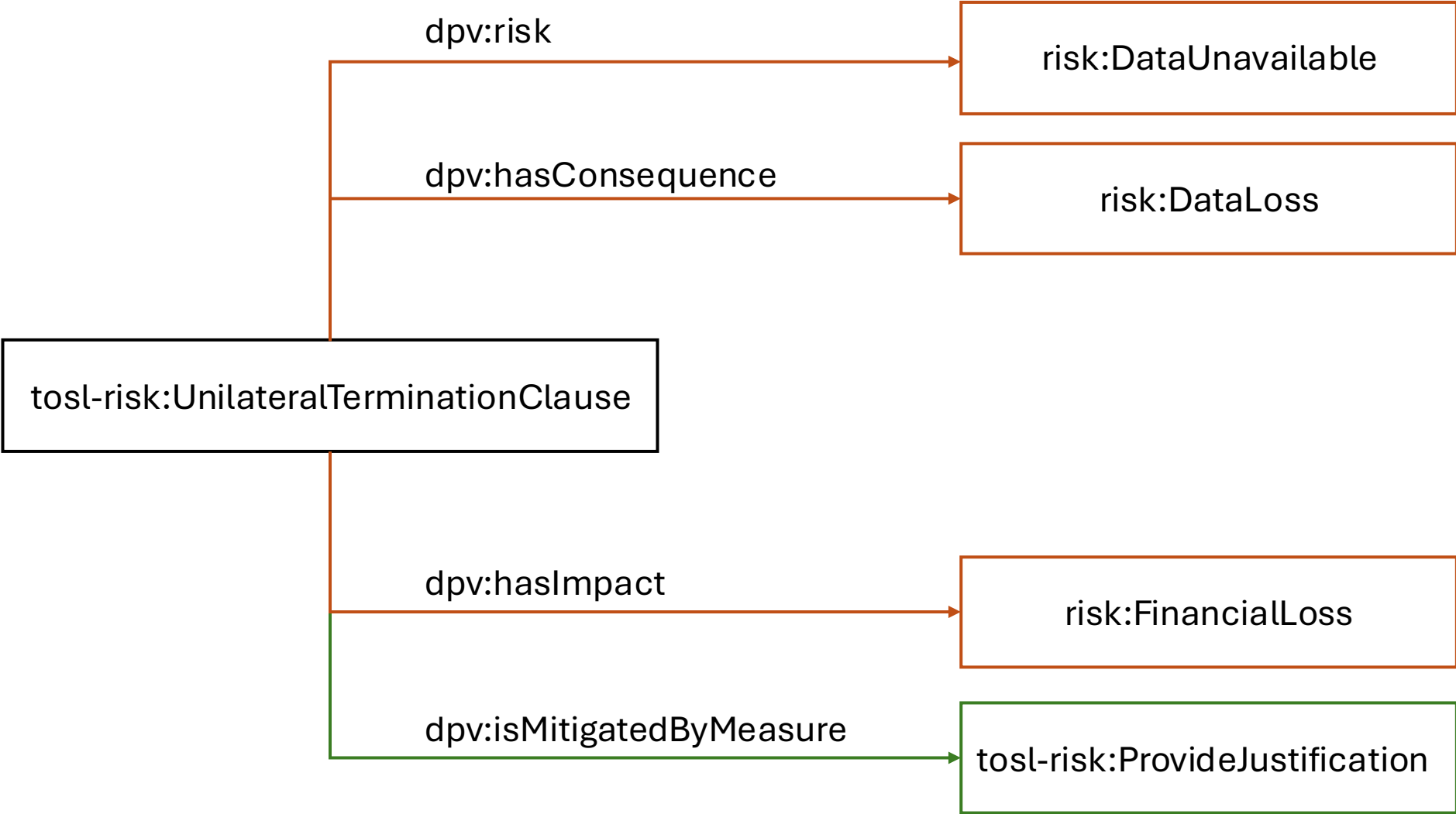
Condition 1: Positive inclusion

Does the agreement include a permission to terminate ?

Condition 2: Negative inclusion

Does this permission not include notification duty or prior notice?

STEP 3: infer risk



Detecting Risks in Policies with ODRL and DPV

Risk Analyser

Abusive – content removal ▼ Load example

```
@prefix : <http://example.com/> .
@prefix dcterms: <http://purl.org/dc/terms/> .
@prefix odrl: <http://www.w3.org/ns/odrl/2/> .
@prefix tosl: <https://w3id.org/tosl/> .
@base <http://example.com> .


:Agreement a odrl:Agreement ;
  dcterms:title "Agreement with a user data removal term" ;
  :policyGraph {
```

Analyse policy

Risk Assessment Result:

Risk: data removal is permitted without restrictions (no justification constraint, no prior notice constraint, and no duty to inform). **Permission:** <http://example.com/PermissionDeleteUserData>

```
:Agreement a odrl:Agreement .
:Agreement dcterms:title "Agreement with a user data removal term" .
:Agreement :policyGraph {
  :PermissionDeleteUserData a odrl:Permission .
  :PermissionDeleteUserData dcterms:description "Provider can delete your data without prior notice and without a reason" .
  :PermissionDeleteUserData odrl:assignee :provider .
  :PermissionDeleteUserData odrl:action tosl:remove .
  :PermissionDeleteUserData odrl:target :userData .
  :provider a tosl:Provider .
  :userData a tosl:UserContent .
} .
```



User requirements



I require prior notice for changes



I do not allow data deletion without justification



I require an option to export my data

Risk score

