# Legal Conflict Detection in Interacting Legal Systems


*Tingting Li [1], Tina Balke [2,1], Marina De Vos [1], Julian Padget [1] and Ken Satoh [3]*

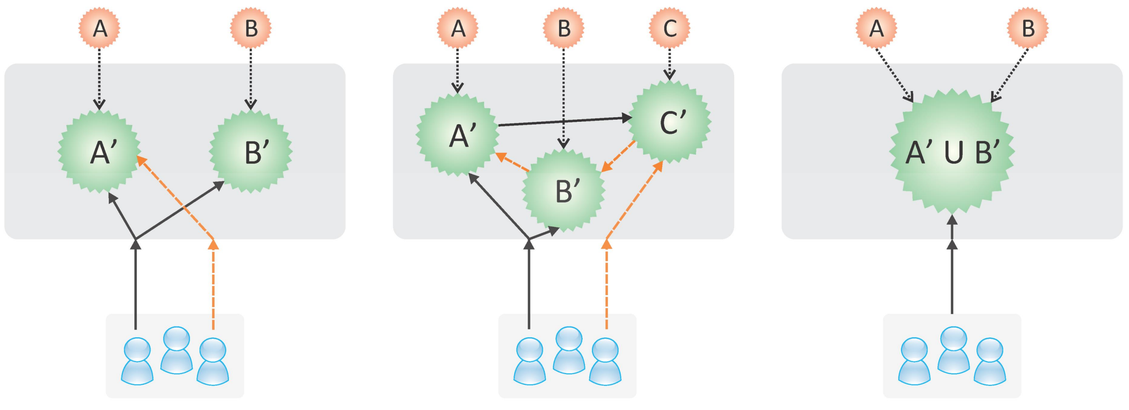
*{t.li, mdv, jap}@cs.bath.ac.uk, t.balke@surrey,ac,uk, ksatoh@nii.ac.jp*

*[1]Department of Computer Science, University of Bath, UK*
*[2]Centre for Research in Social Similautaion, University of Surrey, UK*
*[3]Principles of Informatics Res. Division, National Institute of Informatics, Japan*


## Abstract


Acting under several jurisdictions at the same time is becoming the norm rather than the exception, certainly for companies but also (sometimes without knowing) for individuals. In these circumstances disparities among the different laws are inevitable. Here, we present a mathematical and a computational model of ***interacting legal specifications***, along with a mechanism to find conflicts between them. We illustrate the approach by a case study using European Privacy law.


## Cooperating Legal Specifications



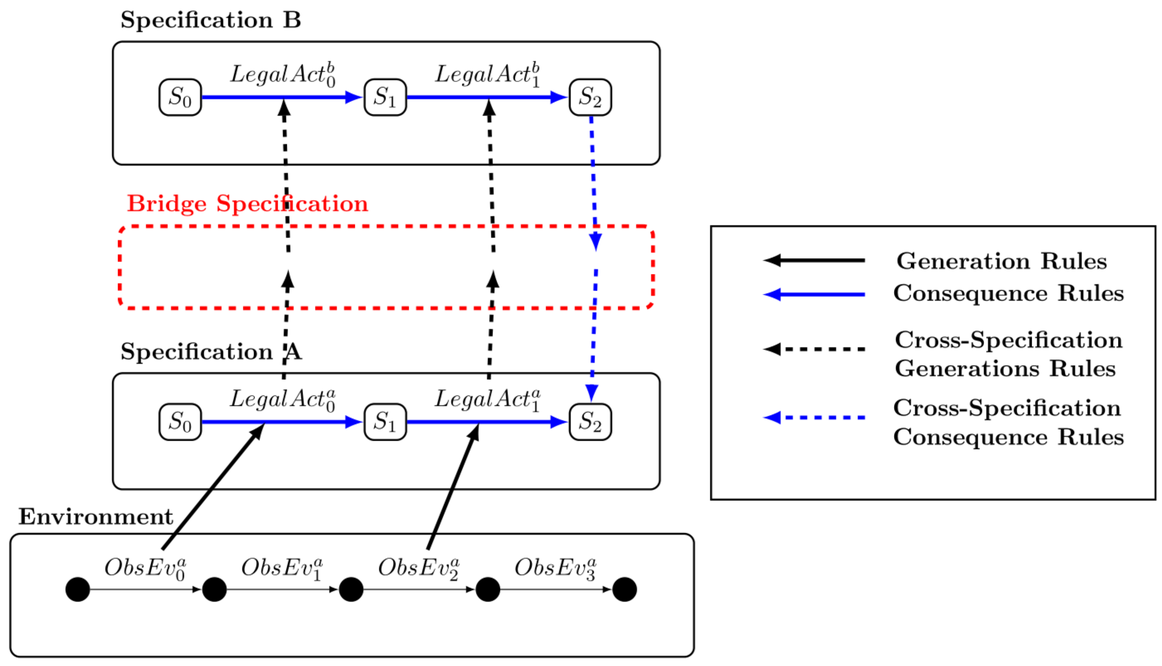

**(a)** **(b)** **(c)**

**Three Forms of Combining Legal Specifications**

**(a) Comparative[2]:** a set of peer legal specifications combined together to form a common governance scope, but states evolve independently.
**(b) Interacting:** an interlinked structure of a set of legal specifications, in which one might change the states of another. *(Focus of this work)*
**(c) Merged:** all the laws of each legal specification are merged to form a completely new specification.

## Interacting Legal Specification

- **Bridge Specification:** separates connecting rules from the main specifications to make individuals oblivious to their interaction partners. Maintaining the flexibility and reusability of the structure.
- **Cross-specification Generation Relation:** an event in one specification triggers one or more events in one or more legal specifications:
  * $\mathrm{G}^x : \mathcal{X}^m \times \mathcal{E}^m \rightarrow \langle 2^{\mathcal{E}_1}, \ldots, 2^{\mathcal{E}_n}, 2^{\mathcal{E}^m} \rangle$
  * generation power: *gpow(source, event, destination)*
- **Cross-specification Consequence Relation:** a state change of one specification may result in a state change of another specification:
  * $\mathrm{C}^x : \mathcal{X}^m \times \mathcal{E}^m \rightarrow \langle 2^{\mathcal{F}_1}, \ldots, 2^{\mathcal{F}_n}, 2^{\mathcal{F}^m} \rangle \times \langle 2^{\mathcal{F}_1}, \ldots, 2^{\mathcal{F}_n}, 2^{\mathcal{F}^m} \rangle.$
  * initiation power: *ipow(source, fluent, destination)*
  * termination power: *tpow(source, fluent, destination)*




## Legal Conflict Detection

**1.** Formalize and model individual legal specifications
**2.** Combine them to form an interacting specification
**3a.** *User-lead detection*
- give a particularly interesting event trace
- trigger states change of all participating specifications.
- obtain combined state model - a sequence of states.

**3b.** *Full-diagnose detection*
- compute all possible event traces
- for each trace, run **3a.**
- obtain combined state model in response to each trace

**4.** find conflicts by comparing fluent values between specifications at each state, by means of the detection program below:

```
weakConflict(SpecX, SpecY, I, F):- holdsat(F,SpecX,I), not holdsat(F,SpecY, I),
                                   ifluent(F,SpecX), ifluent(F,SpecY),
                                   instant(I), spec(SpecX; SpecY).

strongConflict(SpecX, SpecY, I, E):- holdsat(obl(E,D,V), SpecX, I),
                                     not holdsat(perm(E), SpecY, I),
                                    ifluent(obl(E,D,V),SpecX),ifluent(perm(E),SpecY),
                                    instant(I), spec(SpecX; SpecY).
```

## Reference:


[1] M. De Vos, J. Padget, and K. Satoh. Legal modelling and reasoning using institutions. In T. Onoda, D. Bekki, and E. McCready, editors, New Frontiers in Artificial Intelligence, pages 129–140. Springer, 2011.
[2] T. Li, T. Balke, M. De Vos, J. Padget, and K. Satoh. A model-based approach to the automatic revision of secondary legislation. In Proceedings of the Fourteenth International Conference on Artificial Intelligence and Law, ICAIL'13, pages 202–206. ACM, 2013.

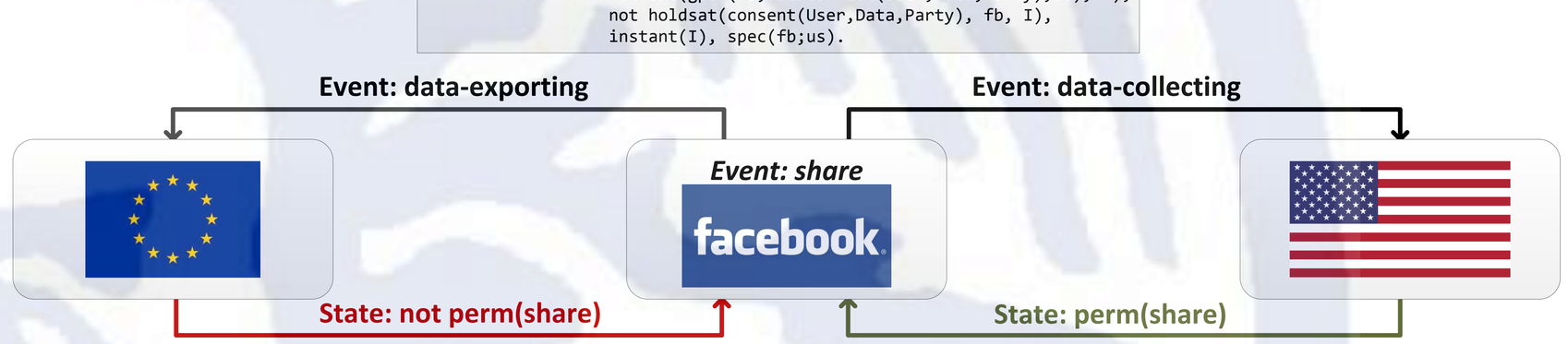

## Example:

**Bridge Specification**

```
occurred(dataExport(User,Data,Party), eu, I):-
                    occurred(iShare(User,Data,Party), fb, I),
                    holdsat(gpow(fb,dataExport(User,Data,Party),eu), I),
                    not holdsat(consent(User,Data,Party), fb, I),
                    instant(I), spec(fb;eu).

occurred(dataCollect(User,Data,Party), us, I):-
                    occurred(iShare(User,Data,Party), fb, I),
                    holdsat(gpow(fb,dataCollect(User,Data,Party),us), I),
                    not holdsat(consent(User,Data,Party), fb, I),
                    instant(I), spec(fb;us).
```

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**EU Priavay Law**

```
initiated(perm(dataExport(User,Data,Party)), eu, I):-
                    holdsat(adeProtected(Data,Party), eu, I)
                    instant(I), spec(eu).
```

**Bridge Specification**

```
initiated(perm(share(User,Data,Party)), fb, I):-
                    holdsat(perm(dataCollect(User,Data,Party)), us, I),
                    holdsat(ipow(us,perm(share(User,Data,Party)),fb), I),
                    instant(I), spec(fb;us).

initiated(perm(share(User,Data,Party)), fb, I):-
                    holdsat(perm(dataExport(User,Data,Party)), eu, I),
                    holdsat(ipow(us,perm(share(User,Data,Party)),fb), I),
                    instant(I), spec(fb;eu).
```

**US Surveillance Law**

```
initiated(perm(dataCollect(User,Data,Party)), us, I):-
                    holdsat(interested(User,Data), us, I),
                    holdsat(securityDep(Party), us, I),
                    instant(I), spec(us).
```


*Tingting Li*
*t.li@cs.bath.ac.uk*
*University of Bath*