

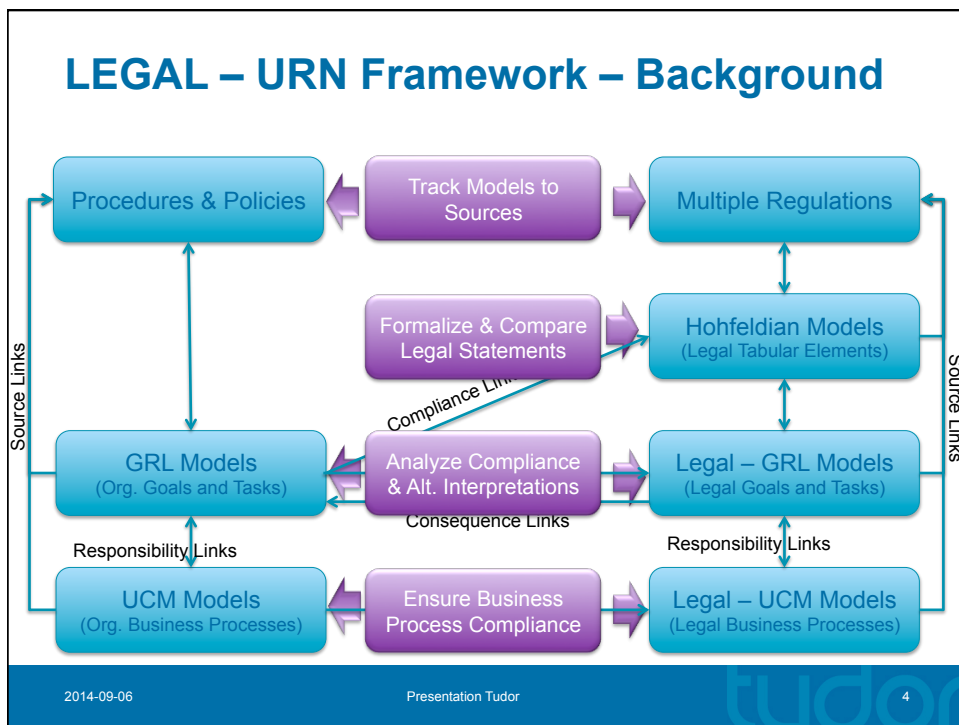
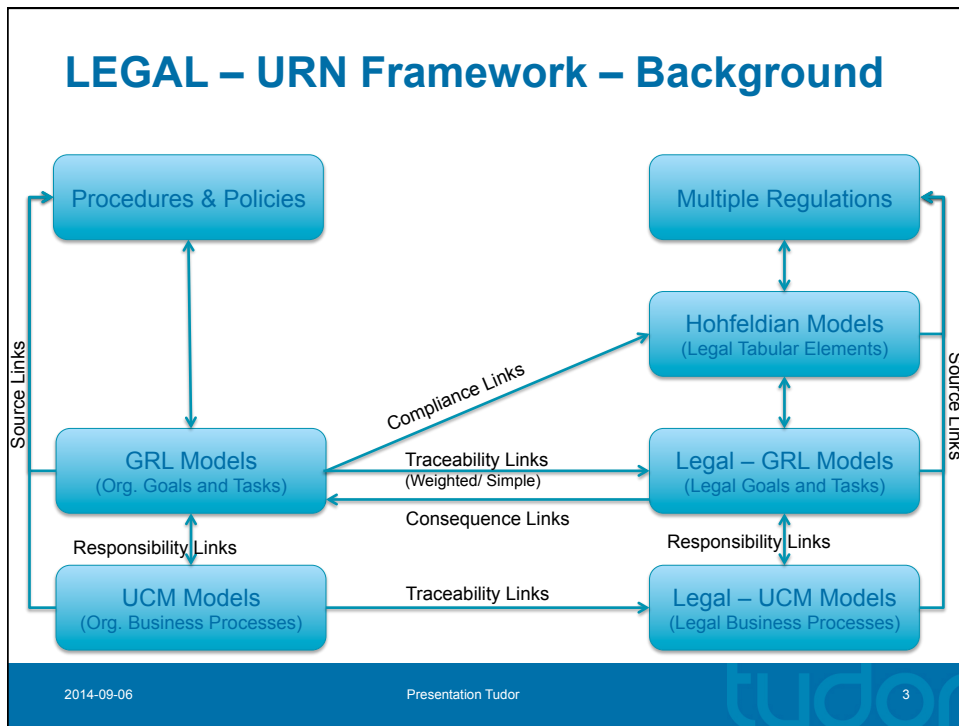
# Goal-Oriented Compliance with Multiple Regulations

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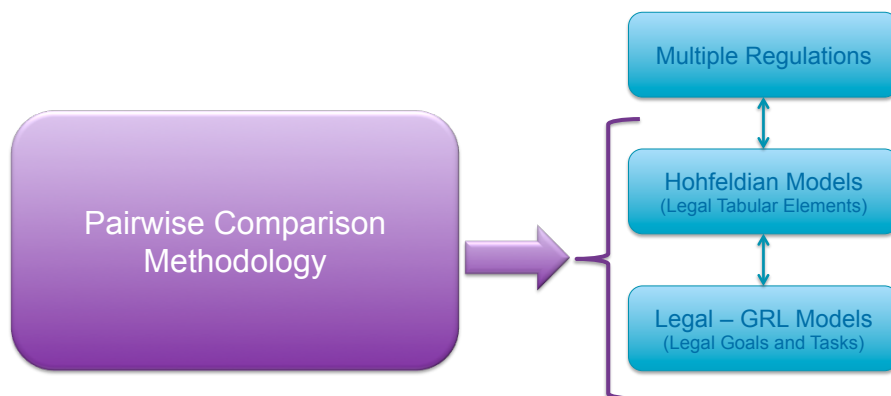
*RE'14, August 27<sup>th</sup> 2014*

## Motivation





## Pairwise Comparison in Legal – URN



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5

## Hohfeldian Model Layer

- **Hohfeldian layer of LEGAL-URN framework includes:**
    - Actor/Subject
    - Modality → maps to Hohfeldian Ontology → transform to Deontic logic
    - Clauses
    - Cross-references
    - Exceptions
    - Preconditions
- 
- **Each of the elements in the Hohfeldian model maps to an element in the Legal - GRL model.**
    - Formal approach for modeling legal statements.

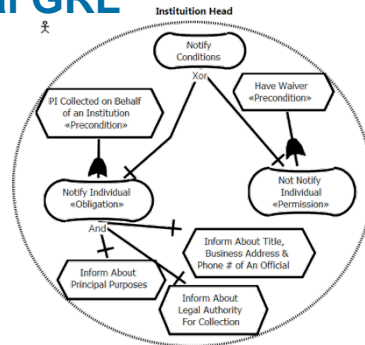
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# Hohfeldian Model – Legal GRL

HOHFELDIAN MODEL	LEGAL-GRL MODEL
SECTION	-
SUBJECT	ACTOR, EXCEPTIONACTOR
MODAL VERB	OBLIGATION, PERMISSION STEREOTYPE
CLAUSE	INTENTIONAL ELEMENT
PRECONDITION	PRECONDITION INTENTIONAL ELEMENT
EXCEPTION	EXCEPTION INTENTIONAL ELEMENT
XREF	CROSSREFERENCE IE



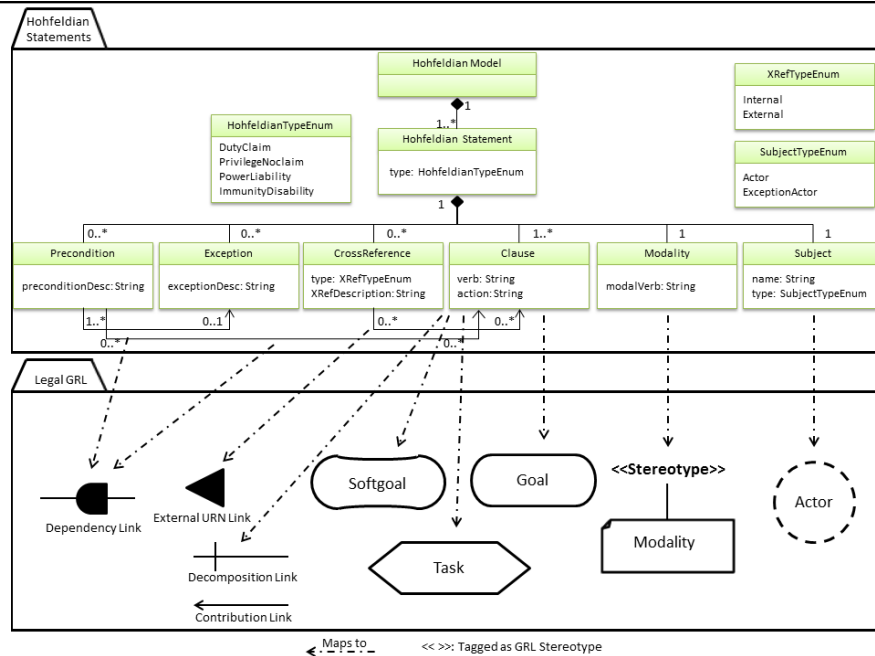
SECTION
ARTICLE #
ACTOR
MODAL VERB
CLAUSE
PRECONDITION
EXCEPTION
XREF

SECTION	Notice to individual
ARTICLE#	FIPPA-39(2)
ACTOR	Head of institution
MODAL VERB	Shall
CLAUSE	Inform individual [...]
PRECONDITION	Where PI is collected on behalf of [...]
EXCEPTION	Notice is waived by responsible minister
XREF	-

a) Hohfeldian Model Structure

b) Hohfeldian Model Example

## Meta-Model (Hohfeldian – Legal - GRL)



## Pairwise Comparison between Two Statements

- Compare: Actors, Modal Verbs, Clauses, Preconditions, Exceptions and XRefs.
- 6 cases for pairwise comparison
  - Case 1 – There is nothing in common between the two statements.
  - Case 2 – Both statements are similar to each other.
  - Case 3 – One statement is complementary to the other statement.
  - Case 3' – One statement is a subset of the other statement.
  - Case 4 – One statement is stricter than the other statement.
  - Case 5 – One statement contradicts the other statement.

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9

## Pairwise Comparison between Two Statements

Statements	Case 1	Case 2	Case 3/3'	Case 4	Case 5
<b>Actor (A)</b>	$\exists i, j: A_i \cap A_j = \emptyset$	$A_i \equiv A_j$	$(A_i \equiv A_j) \vee (A_i \in A_j)$	$A_i \equiv A_j$	$A_i \equiv A_j$
<b>Modal Verb (MV)</b>	-	$MV_i \equiv MV_j$	-	$(MV_j \in Pr) \wedge (MV_i \in Ob)$	$MV_i \zeta MV_j$
<b>Clause (C)</b>	$\forall i, j: C_i \cap C_j = \emptyset$	$\forall i, j: C_i \equiv C_j$	$\forall i, j: (C_i \subseteq C_j) \vee (C_j \subseteq C_i)$	$\forall i, j: C_i \Rightarrow C_j$	$\forall i, j: C_i \zeta C_j$
<b>Precondition (P)</b>	$\exists i, j: P_i \cap P_j = \emptyset$	$\exists i, j: P_i \equiv P_j$	$\exists i, j: (P_i \subseteq P_j) \vee (P_j \subseteq P_i)$	$\exists i, j: P_i \equiv P_j$	$\exists i, j: P_i \zeta P_j$
<b>Exception (Ex)</b>	$\exists i, j: Ex_i \cap Ex_j = \emptyset$	$\exists i, j: Ex_i \equiv Ex_j$	$\exists i, j: (Ex_i \subseteq Ex_j) \vee (Ex_j \subseteq Ex_i)$	$\exists i, j: Ex_i \equiv Ex_j$	$\exists i, j: Ex_i \zeta Ex_j$
<b>XRef (XR)</b>	-	$\exists i, j: XR_i \equiv XR_j$	$\exists i, j: (XR_i \subseteq XR_j) \vee (XR_j \subseteq XR_i)$	$\exists i, j: XR_i \equiv XR_j$	$\exists i, j: XR_i \zeta XR_j$

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10

## Cases 1 & 2 – Pairwise Comparison

- **Case 1 - There is nothing in common between the two.**

HM	PHIPA -22	HCCA - 47
S	Determination of Incapacity	Incapacity
A	HIC	An evaluator
MV	Shall	Shall
C	Do [...] in accordance to [...]	Provide to persons found by evaluator [...]
P	Determines the capacity [...]	in circumstances [...] specified in guidelines
EX	-	-
XR	-	-

- ✓ Model both in Legal-GRL
- ✓ Create links from both Legal-GRL models to Organizational GRL model

- **Case 2 – Both statements are similar to each other.**

HM	FIPPA -25	MFIPPA - 18
S	Transfer of Request	Transfer of Request
A	The Head	The Head
MV	May	May
C	Transfer the request[...] within 15 days after received	Transfer the request[...] within 15 days after received
P	Where institution receives	If institution receives
EX	-	-
XR	-	-

- ✓ Model both in Legal-GRL
- ✓ Create Links between two Legal-GRL models
- ✓ Create Links from one of the Legal-GRL models to Organizational GRL Model

## Cases 3 & 3' – Pairwise Comparison

- **Case 3 – One is complementary to the other.**

HM	FIPPA -44	PRIVACY ACT - 10
S	Personal information banks	Personal information bank
A	A Head	The Head of the government
MV	Shall	Shall
C	Caused to be included in a PI bank all PI under control	Caused to be included in a PI bank all PI under control
P1	Is organized or intended to [...]	Is organized or intended to [...]
P2	-	Has been used, [...]
EX	-	Subsection 1 does not [...]
XR	-	-

- ✓ Model both in Legal-GRL
- ✓ Create Links between the common elements of the two Legal-GRL models
- ✓ Create links from one of the Legal-GRL models as well as the complementary parts of the two Legal-GRL model to Organizational GRL model

- **Case 3' – One is a subset of the other.**

HM	FIPPA -41	PHIPA -29
S	Use Personal information	Personal information bank
A	An Institution	An HIC
MV	Shall	Shall
C	Not used PI [...]	[Not] collect, use or disclose [...]
EX	May use	May collect, use or disclose
P1	It is necessary	Has consent and is necessary
P2	-	Collection, use, disclosure is permitted
XR	-	-

- ✓ Model both in Legal-GRL
- ✓ Create Links between the common elements of the two Legal-GRL models
- ✓ Create links from the superset Legal-GRL model to Organizational GRL model

## Cases 4 & 5 - Pairwise Comparison

- **Case 4 – One statement is stricter than the other.**

HM	FIPPA - 47(2)	PRIVACY ACT – 12 (2)
S	Right of Correction	Right of Correction
A	Every individual	Every individual
MV	Is entitled	Is entitled
C	Requires that any person [...] within the year before the [...]	Requires that any person [...] within two year prior to [...]
P	Who is given access	Who is given access
EX	-	-
XR	-	-

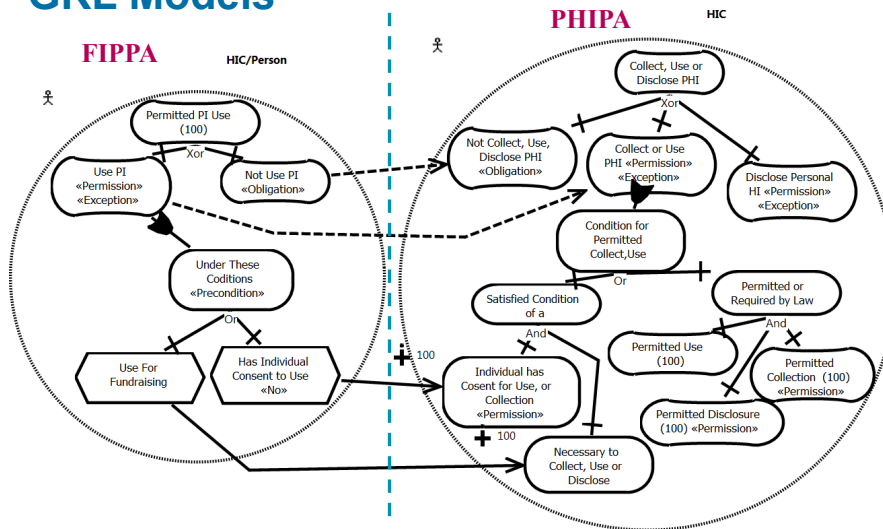
- ✓ Model both in Legal-GRL
  - ✓ Create links between the stricter Legal-GRL model and Organizational GRL model
- OR
- ✓ Be compliant with the less strict one and capture and document consequences

- **Case 5 – One statement contradicts the other.**

HM	PIPEDA – 9 (1)	PRIVACY ACT – 12 (1)
S	When Access Prohibited	Right of Access
A	An organization	An individual
MV	Shall not	Shall
C	Give an individual access to PI	Be given access to any PI
P	If doing it so would reveal PI [...]	-
EX	-	-
XR	-	-

- ✓ Complying with the first statement results in non-compliance with the second one and vice-versa.
- ✓ Need discussion with legal expert to resolve the conflict

## Example Mapping between Two Legal-GRL Models



## Pairwise Comparison Method - Summary

- Pairwise comparison of two Hohfeldian models
- Create New Legal – GRL models
- Create **necessary** links between the two Legal – GRL models
- Create links from **one** of the Legal – GRL models to the organizational GRL model
- Create additional links from the complementary parts of the Legal – GRL models to organizational GRL model
- Re-evaluate compliance of organizational GRL to Legal – GRL
- Improve organizational GRL and business processes.

## Discussion

- **Mitigate Threats to Validity by Incremental Case Studies**
  - Pairwise comparison between PHIPA and 3 other healthcare related regulations in Ontario Canada
  - 6 business processes in a hospital in Ontario, Canada
  - Two reviewers of the results
- **Completeness of pairwise comparison cases**
- **Manual Process for Pairwise Comparison**
  - Time consuming
  - Error Prone
- **Multiple Interpretations of Legal Requirements**
  - Multiple regulations can impact interpretation and add to the interpretation



## Conclusion

- **Proposed a methodology for legal compliance with multiple regulations.**
- **Helped identifying several cases of interaction between multiple regulations.**
- **Provided guidelines on how to evaluate compliance**

## Future (Current) Work

- **Integrating Legal – URN with a Knowledge Management System to**
  - **Automatically identify relevant regulations.**
  - **Extend Hohfeldian model and provide semi-automatic method for tagging legal statements**
- **Semi-automating the pairwise comparison.**
  - **Using text mining methods to compare legal statements**
- **Analyzing the impact of several interpretation on business processes.**

**Thank You!**