Formal Semantics for Modeling Collaborative Business Processes based on Interaction Protocols

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(i) ***A bit of context***

- ✔ In cross-organizational collaborative business processes (CBPs), the focus should be:
  - ✔ on the representation of the information exchange, ***and***
  - ✔ on the representation of the communication aspects.

- ✔ The UP-ColBPIP language models CBPs as ***interaction protocols,***

  i.e., *describing a choreography of business messages based on speech acts.*

- ✔ So, ***decisions and commitments*** between organizations ***can be known from the semantics of the speech acts***.

(ii) ***And the problem***

One of the most important issues in the modeling of CBPs through interaction protocols is ***to know the semantics of speech acts and their appropriate combinations to perform suitable negotiations and commitments***

But…

There are no formal representations for the static aspects of CBPs yet

(iii) ***Goal and contributions (overview)***

Goal

To provide a formal representation of the structural view of CBPs

Contributions

(1) A formal semantics for the Interaction Protocols View of UP-ColBPIP, which considers:

- ✔ the language constructs
- ✔ the speech acts

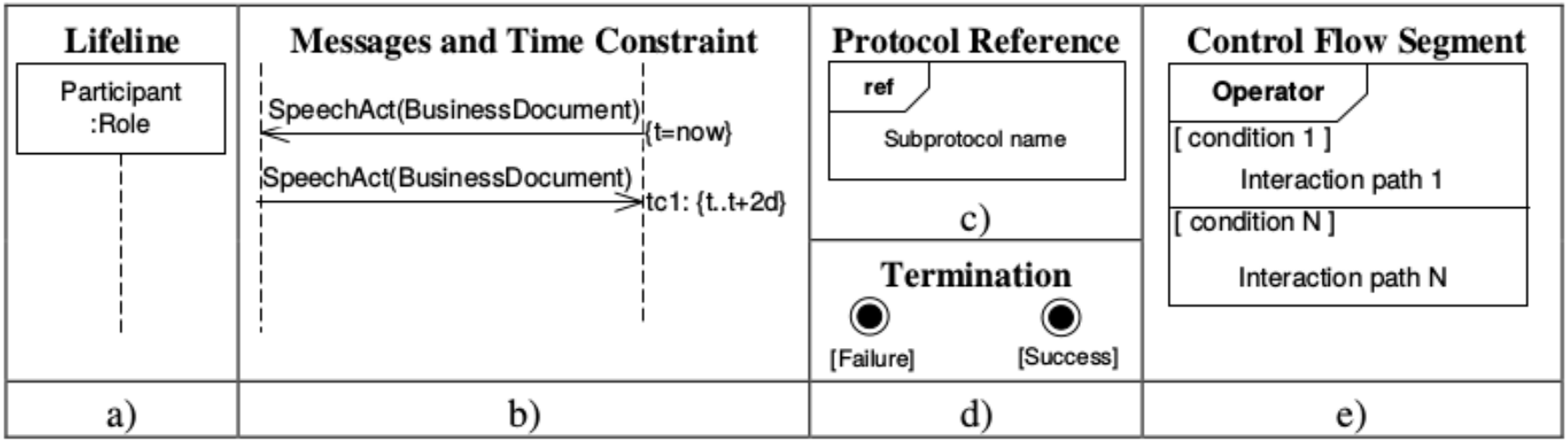
(2) An ontology that implements such a formal model

(iv) ***Background (UP-ColBPIP)***

- ✔ it's a language to model technology-independent collaborative processes based on interaction protocols
- ✔ the coordination and communication aspects of the interactions are represented by enhancing the semantics of business messages by means of the speech act theory
- ✔ No organizations or consortiums provide standard semantics for speech acts.

  UP-ColBPIP applies the FIPA ACL library for this purpose.

(iv) ***Background (UP-ColBPIP)***



Graphical notations of the main interaction protocol elements

(iv) ***Background (OntoUML)***

- ***OntoUML is a language for ontology-driven conceptual modeling*** whose constructs represents the UFO's ontological distinctions and the constraints on how these constructs can be combined.

- ***UFO*** is used to provide useful constraints and modeling guidelines, ***leading to ontologically well-founded conceptual models***.

- the resulting conceptual models consist of a collection of types of individuals in the subject domain, where each of these domain types instantiate types in the UFO (e.g. kind, subkind, role, phase, etc.).

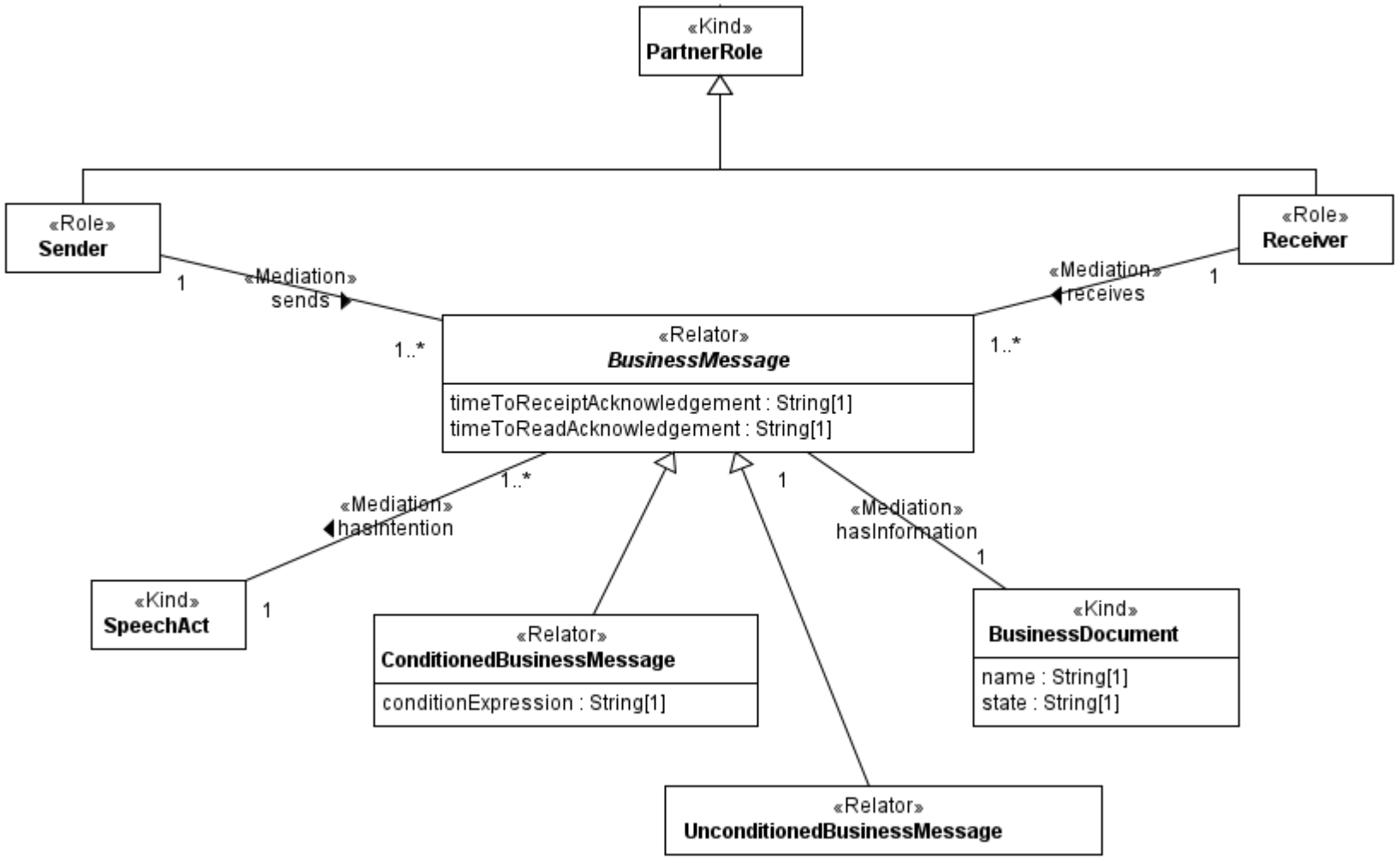
(v) ***Contributions***

- ✔ ***We defined an ontologically well-founded conceptual model*** *of* the Interaction Protocols View of UP-ColBPIP that allows the specification of the behavior of CBPs using interaction protocols, and

- ✔ ***We defined a taxonomy for the standard FIPA-ACL*** which represents the "intention" of a business message among the partners.

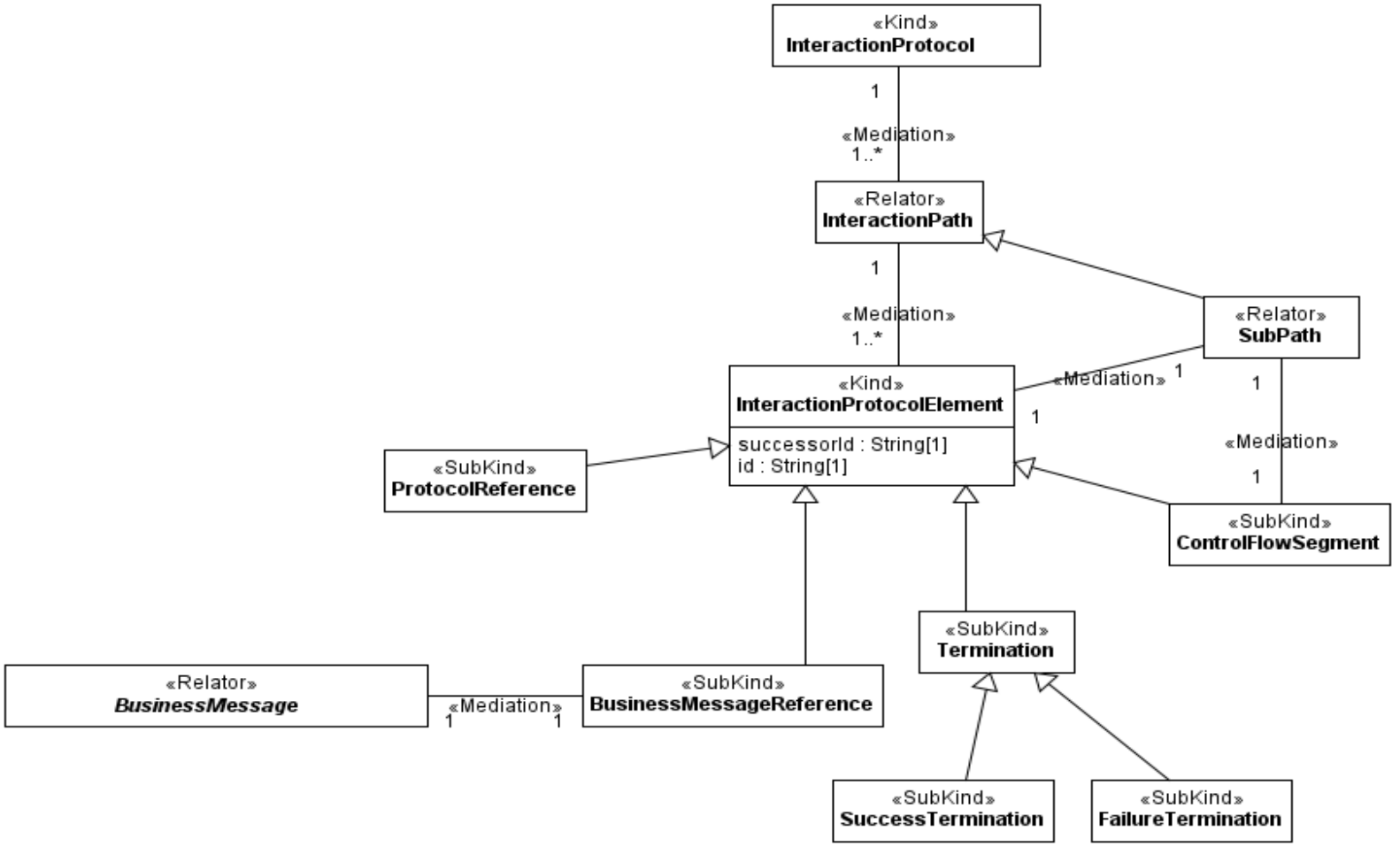
- ✔ **We implement the conceptual model as an OWL ontology**

(v) **Contributions**



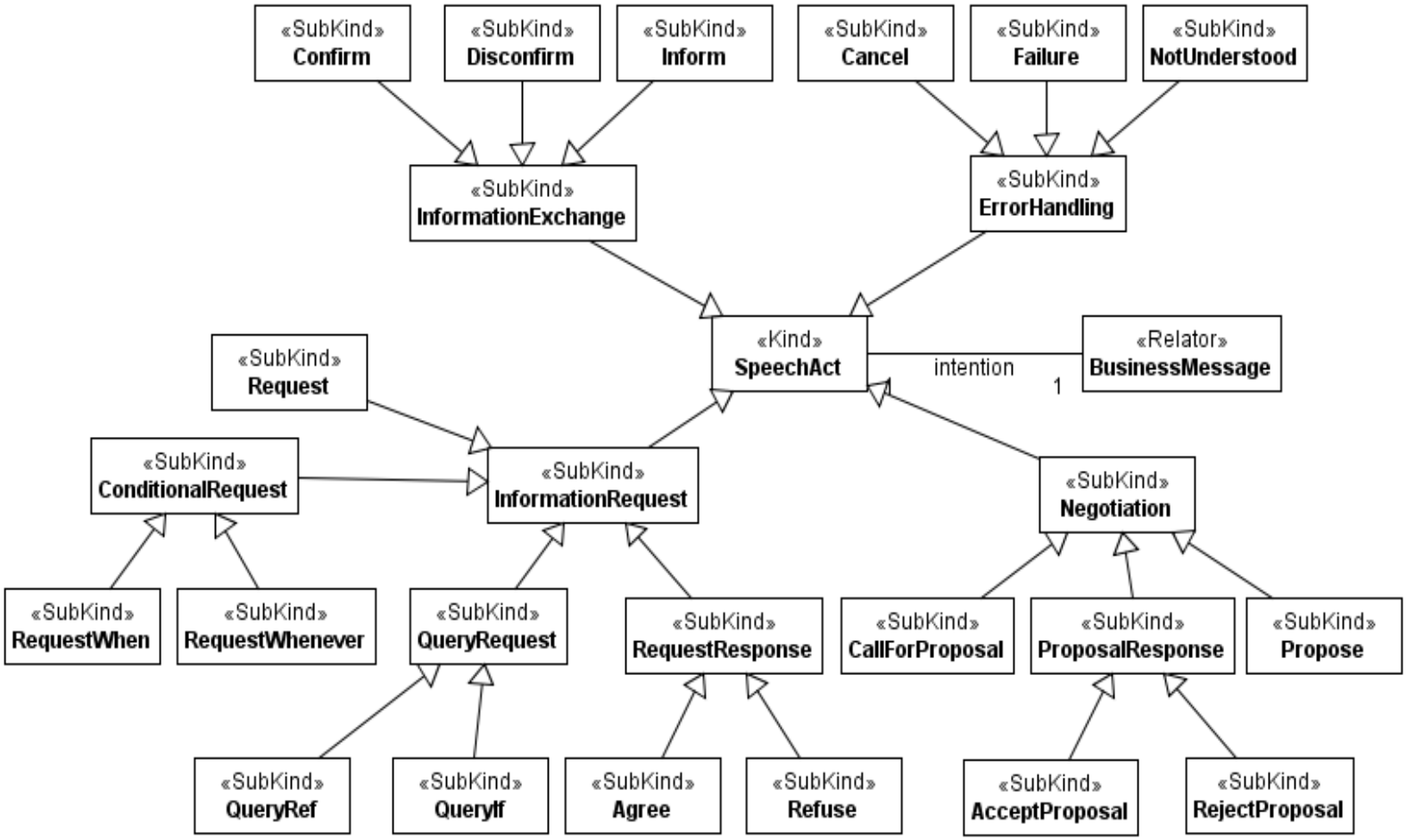
Collaborative business processes of UP-ColBPIP

(v) **Contributions**



Interaction protocol elements of UP-ColBPIP

(v) **Contributions**



Taxonomy of speech acts of FIPA-ACL

(vi) ***Conclusions***

All proposals for ontological formalization of business processes ***focus on the ontological representation of private processes*** in Business Process Diagrams, and they ***do not provide semantics*** for the elements related with the modeling of CBPs ***in terms of process choreographies***.

As opposed…

We present an approach to add semantics to the constructs of the Interaction Protocols View of the UP-ColBPIP language, which allows the definition of queries and the execution of reasoning services over a given instance of the ontology representing a CBP.

(vii) ***Future work***

(1) To build a semantic verification tool that enables the ***semantic analysis of speech act-based messages*** in interaction protocols.

(2) To apply the approach on the ***generation of the private business processes of the organizations from a CBP***, keeping consistency and conformance about the agreed behavior of the collaboration.

(3) To asses a combination ***of property graph processing and structured queries*** for checking structural model properties.

(4) To ***apply the conceptual models proposed in this work to BPMN*** by extending choreography diagrams with interaction protocols and speech acts.

Questions?

Thanks!

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