



EXPRI, Agent EXPRI: Licence to Explain

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King's College London

EXTRAAMAS 2020

Multi-user Privacy

Such *et al.*, 2017
Wisniewski *et al.*, 2012



 Friends

 Friends
of friends

Privacy regards the information we disclose about ourselves but also whatever others can disclose about us.

 Private

Public 



 Private

Multi-user Privacy

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Friends



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96% of the participants to a large-scale study reported a **Multi-user Privacy Conflict** (MPC):

- In 75% of the cases approach “all-or-nothing”.
- In 50% of the cases co-owners do not even complain.
- 70% of the conflicts was solved - general collaborative attitude.
- Sometimes there are no acceptable solutions.

Multi-user Privacy

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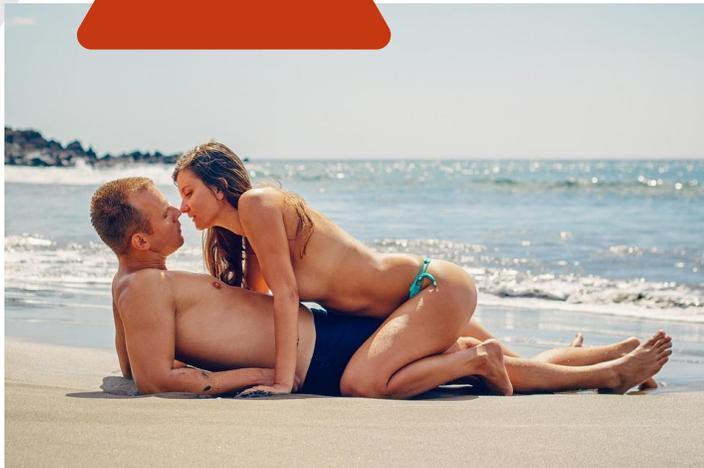
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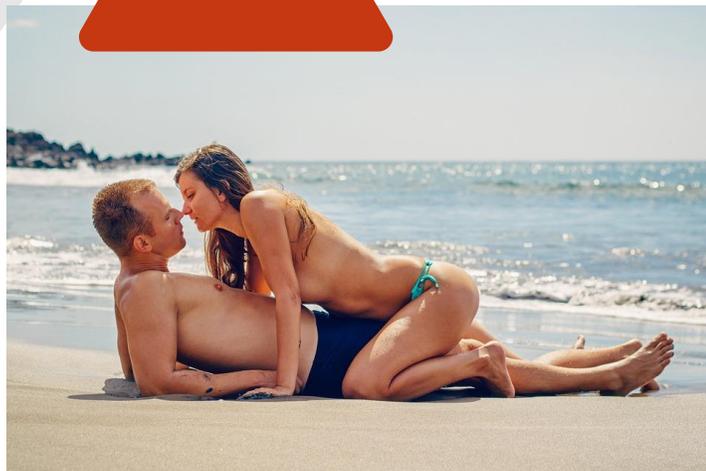
Research to support and incentivise the search of a **compromise**.

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CONFLICT!



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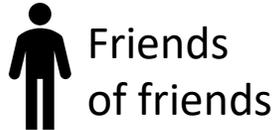
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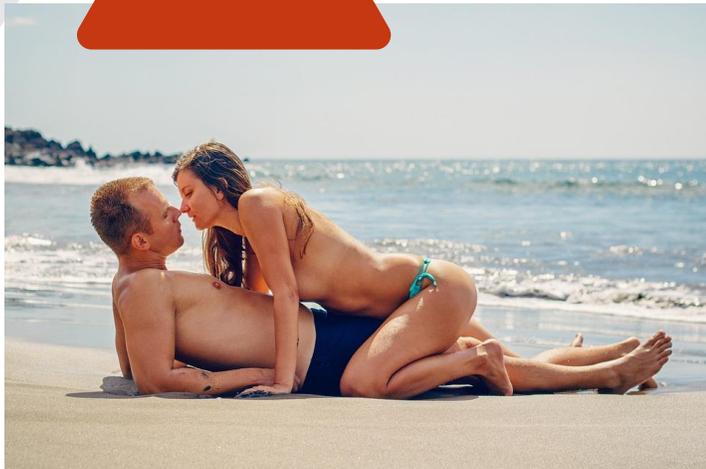
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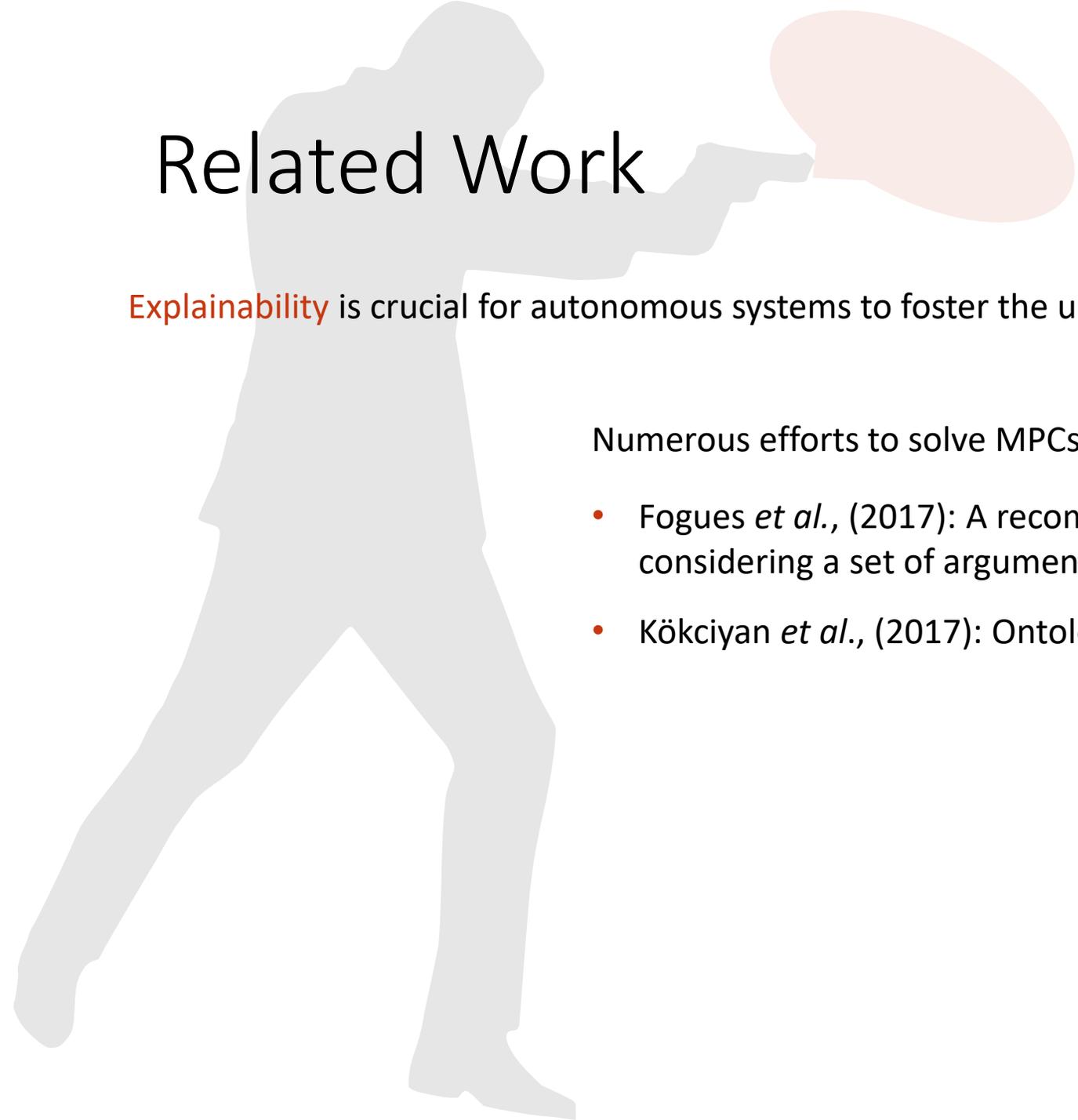
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Related Work



Fogues *et al.*, (2017)

Kökciyan *et al.*, (2017)



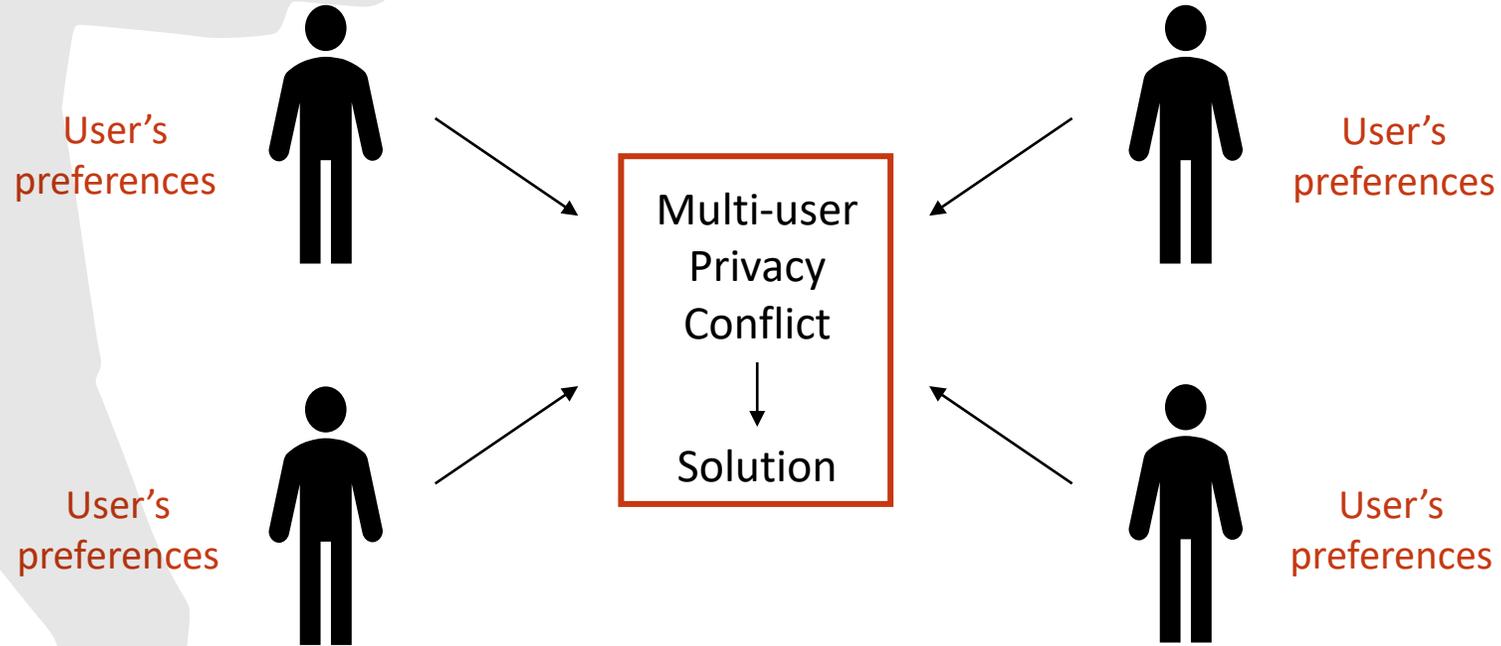
Explainability is crucial for autonomous systems to foster the users' trust

Numerous efforts to solve MPCs in the literature, but lack of explainability

- Fogues *et al.*, (2017): A recommendation system identifies the solution by considering a set of arguments
- Kökciyan *et al.*, (2017): Ontologies, semantic rules and persuasion dialogues

The Agent Architecture

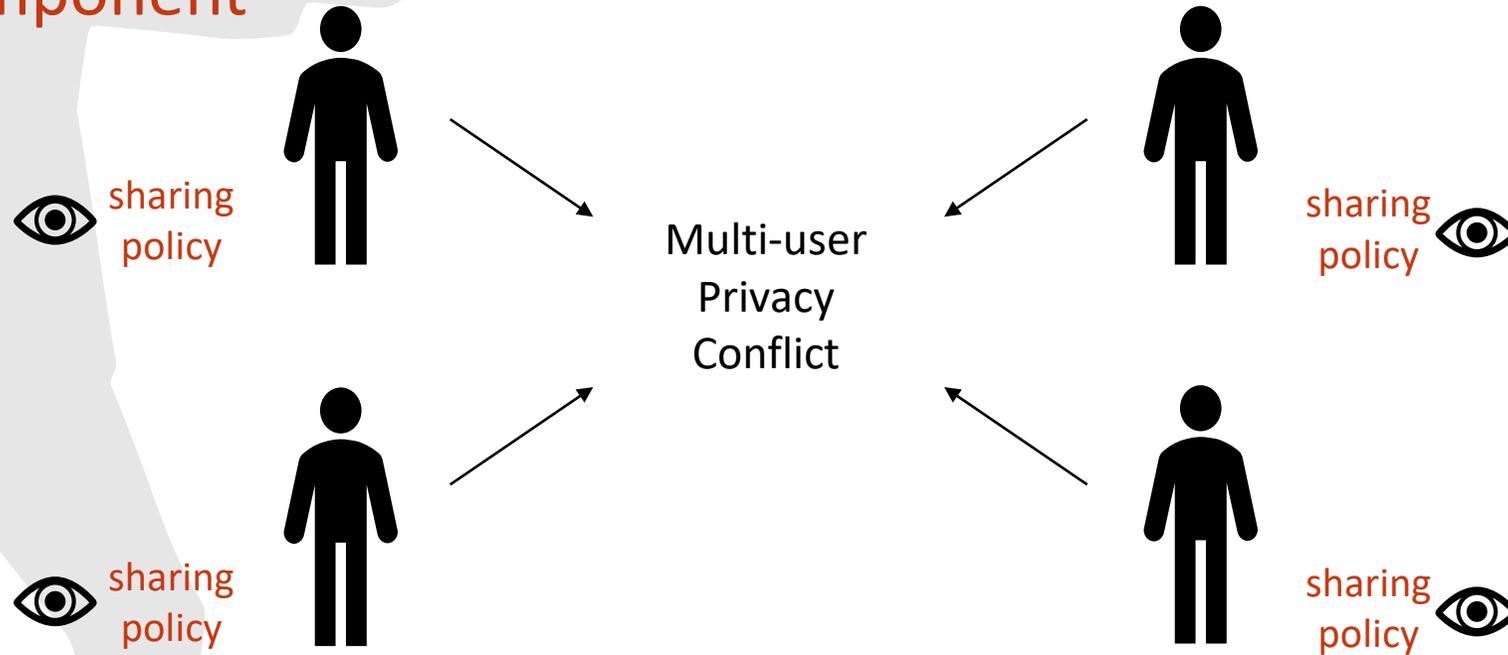
EXPRI



The agents *Ag* act on behalf of their users, according to their preferences, in order to identify a compromise acceptable for everyone.

The Agent Architecture

Utility Component

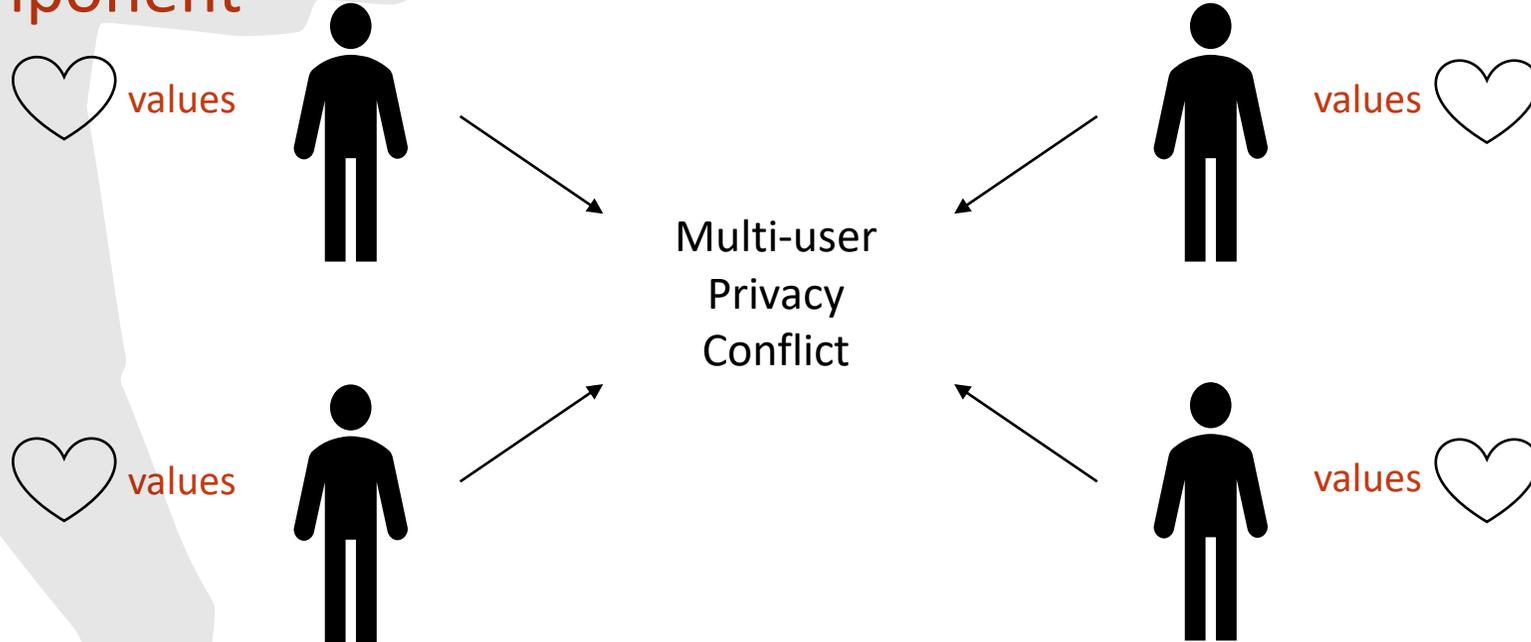


The preferred sharing policy is elicited for each user $k \in Ag$ and compared with each candidate solution in SP . Each $sp \in SP$ can generate for each user a gain or a loss in utility:

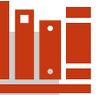
utility: $u_{k,sp}$

The Agent Architecture

Value Component



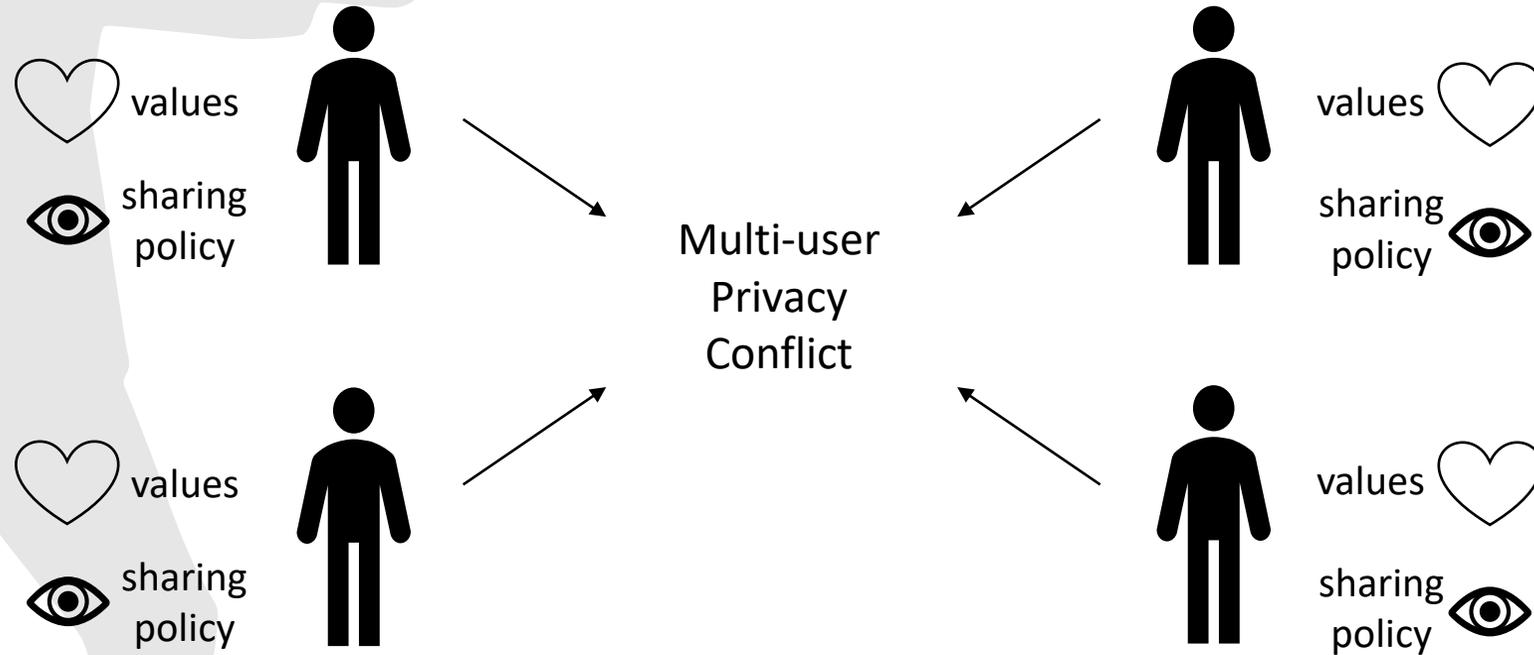
Schwartz, 2012
Mosca *et al.*, 2019



According to the Schwartz Theory of Basic Values, we define the user's morality according to 4 value-directions. We interpret the value-direction in the MPC context and we evaluate whether the values of the user $k \in Ag$ are promoted by selecting each candidate solution:

value promotion: $v_{k,sp}$

The Agent Architecture



Each agent $k \in Ag$ computes for each candidate solution $sp \in SP$ the **individual score** that represents the user's appreciation of the solution in terms of utility and value promotion. The individual scores are aggregated into the **collective score** for each $sp \in SP$:

$$s_{k,sp} = u_{k,sp} \cdot v_{k,sp}$$

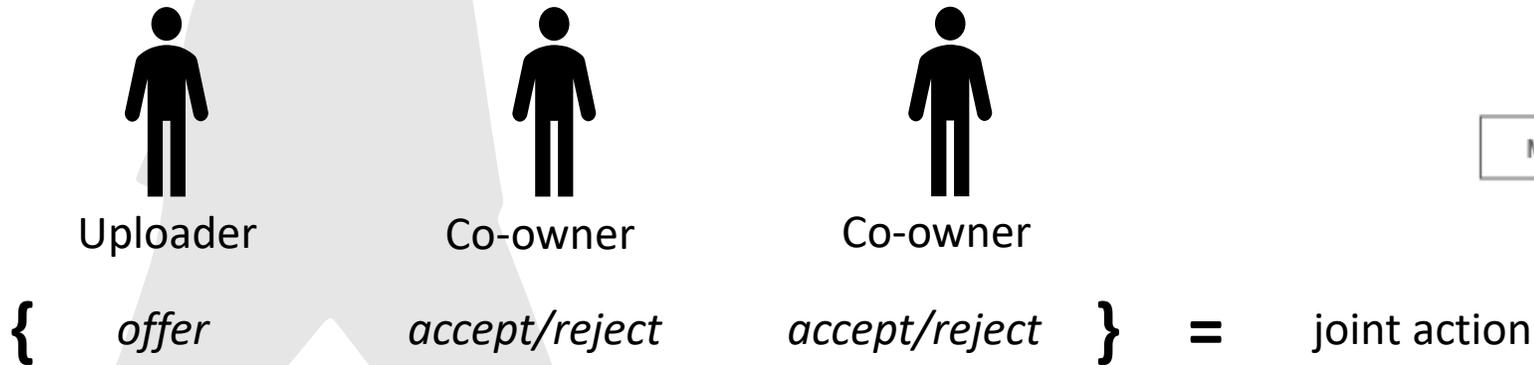
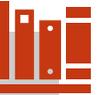
$$s_{sp} = \sum_{k \in Ag} s_{k,sp}$$

Explainable Agents

Cognitive Process

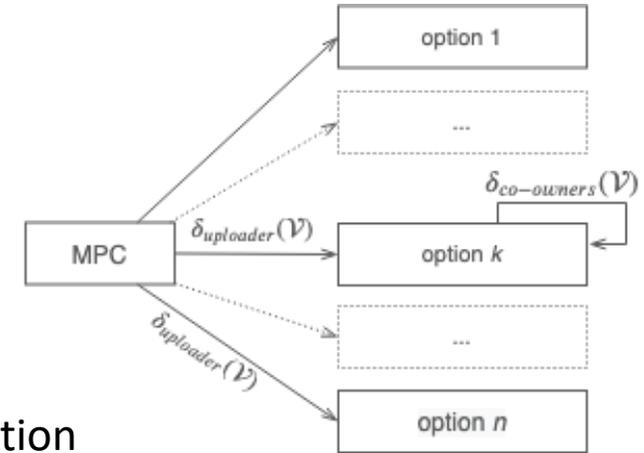
Miller, 2018

Atkinson and Bench-Capon, 2007



Value-based arguments and critical questions supporting/challenging each individual action

Practical reasoning techniques and computational argumentation



AS-U: *Given the current conflict, I should offer the sharing policy sp , that will be accepted by the co-owners and therefore will solve the conflict, that will provide the score s_{sp} and that will promote my values V .*

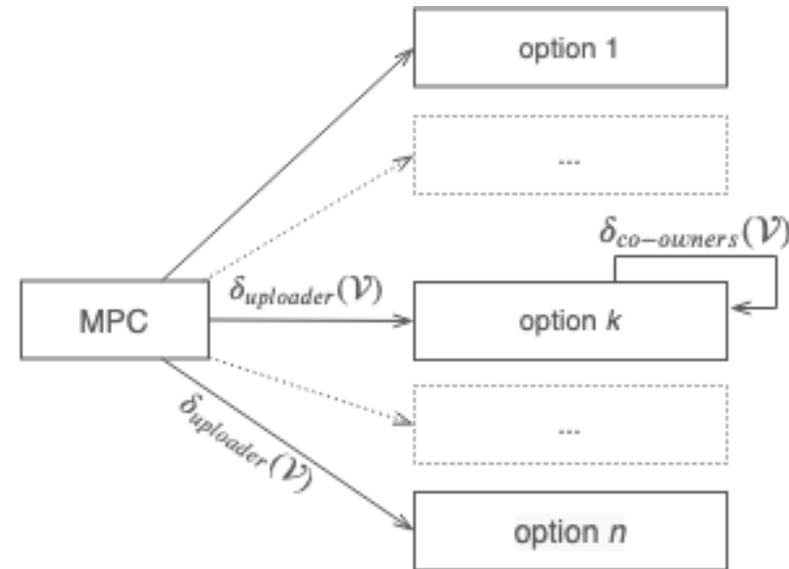
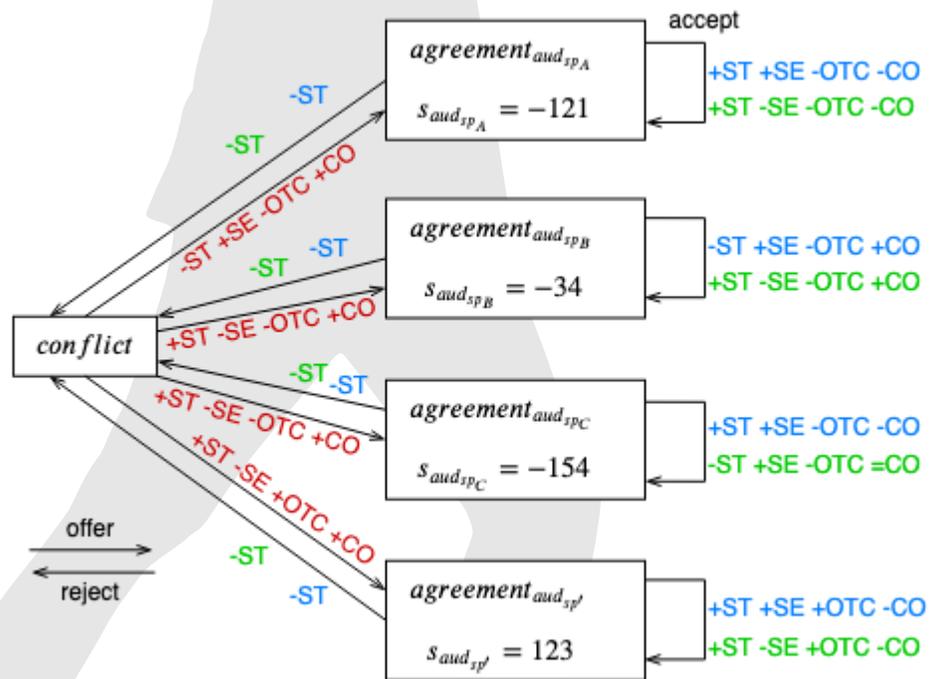
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Atkinson and Bench-Capon, 2007



1. Problem Formulation



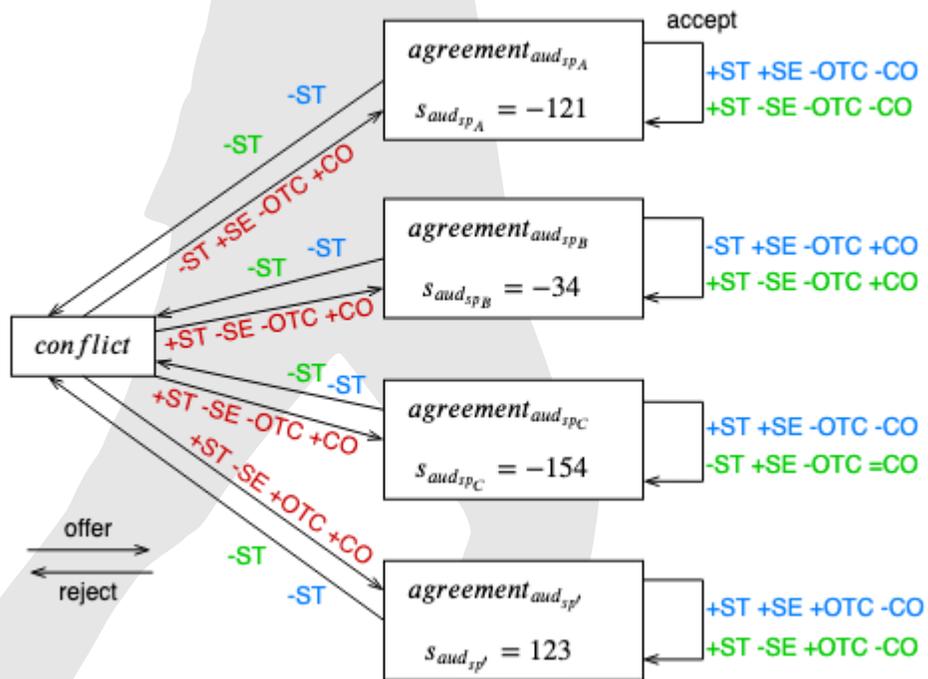
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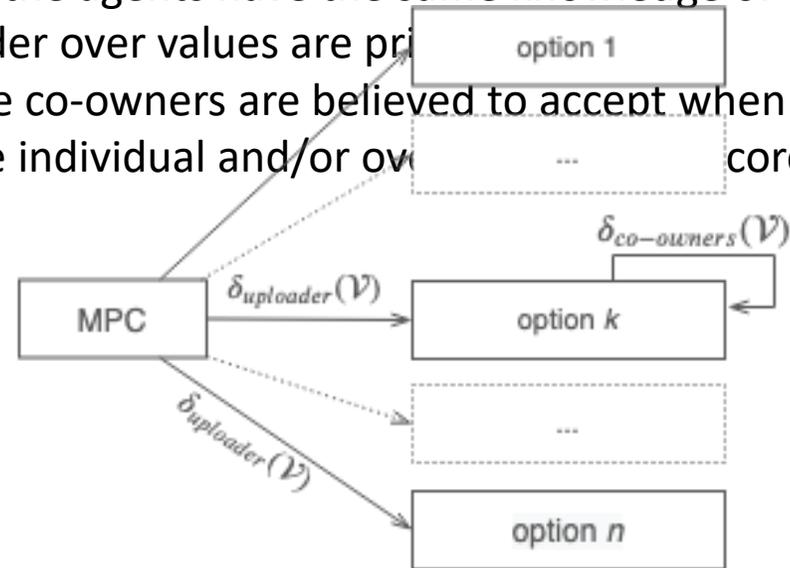


1. Problem Formulation



2. Epistemic assumptions:

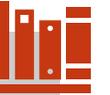
- All the agents have the same knowledge of the system (only the order over values are prioritized)
- The co-owners are believed to accept when the offer matches the individual and/or overall core



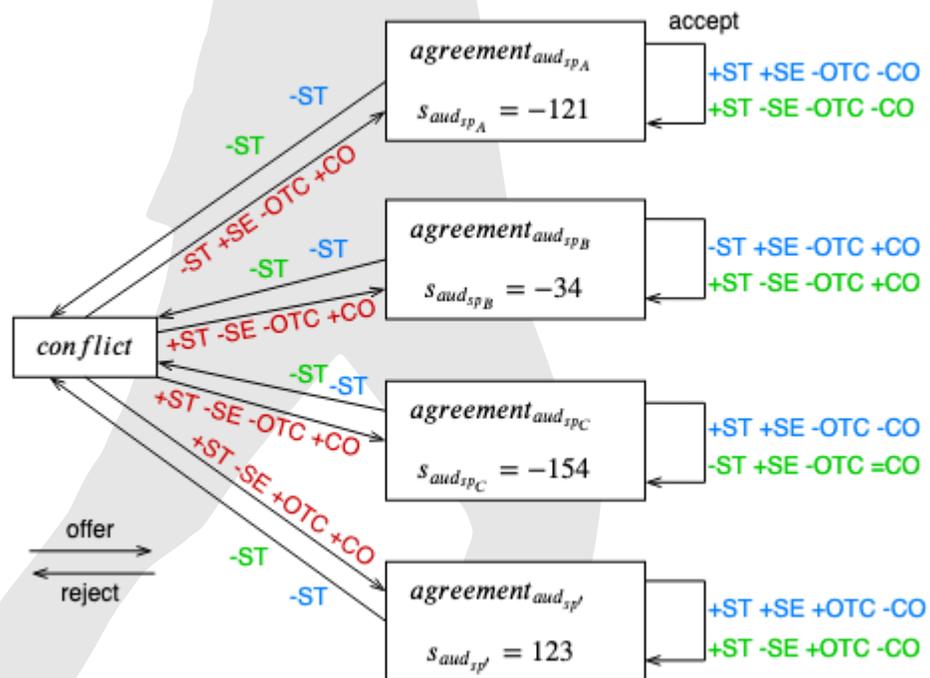
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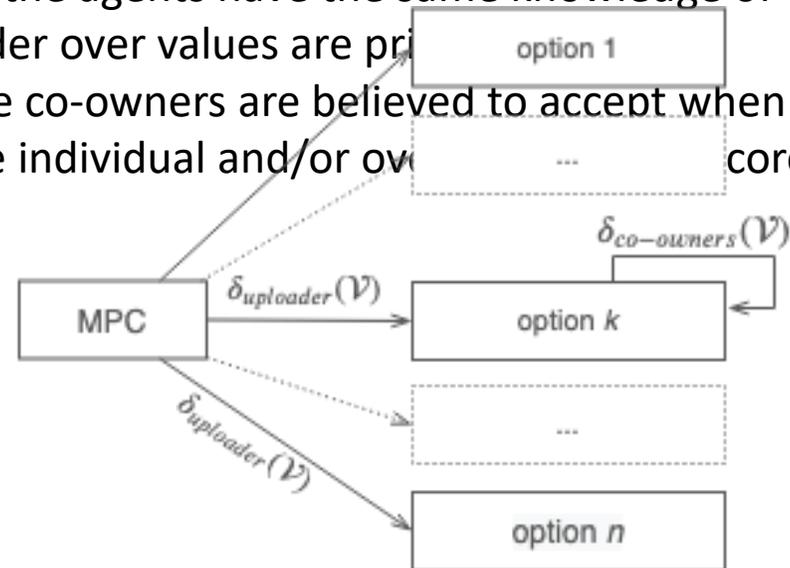


3. Choice of Action

AS-U and AS-C, and their critical questions, allow the creation of an argumentation framework, that provides the justification for action.

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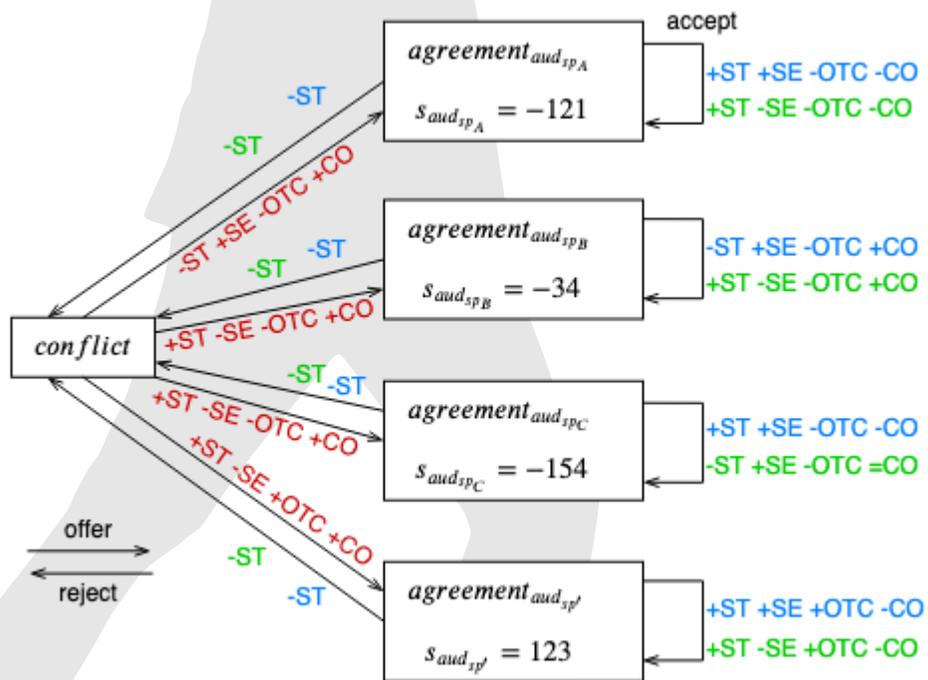
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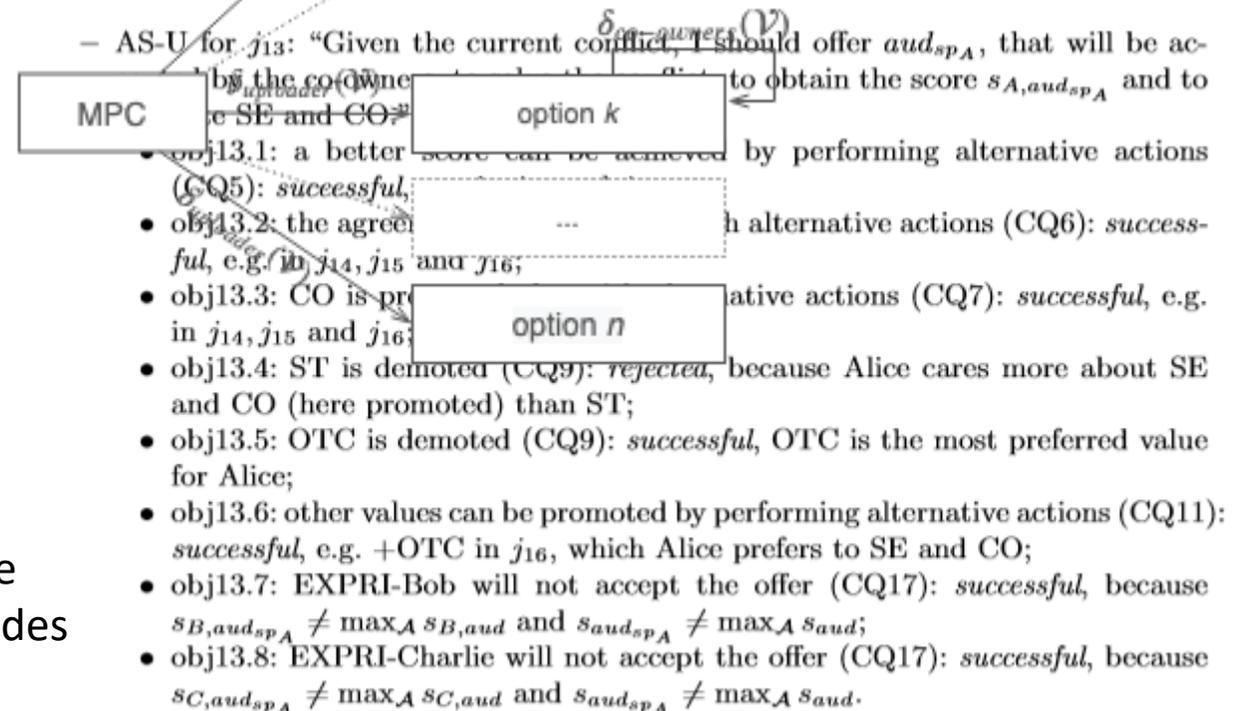


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Explainable Agents

Social Process

Miller, 2018



Tailored explanations



Contrastive explanation



Explaining conflicts

Explainable Agents

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Tailored explanations



Contrastive explanation



Explaining conflicts

Given the disagreement with Bob and Charlie about how to share your picture, to offer sp' is your most convenient action, because it would allow you to compromise with your friends (remember that openness-to-change is your most preferred value).

Why shouldn't I offer sp_A instead?

Because you could get a better score than the one guaranteed by sp_A (obj13.1), openness-to-change would be demoted (obj13.5), and because Bob and Charlie would most likely reject your offer (obj13.7 and obj13.8).

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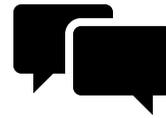
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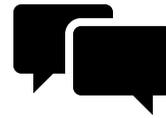
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Discussion



- Explainability crucial for autonomous systems
- Explainability given by cognitive and social processes
- EXPRI's cognitive process guaranteed by performing practical reasoning
- EXPRI's social process to be further studied

References

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Thank you for your attention! Please contact me for any questions: francesca.mosca@kcl.ac.uk