Dynamic Context-Sensitive Deliberation

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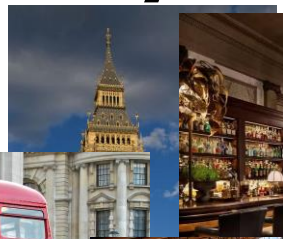
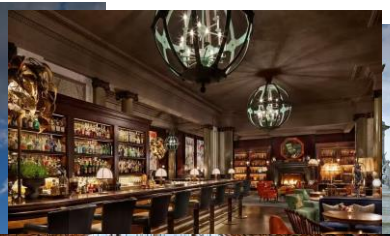
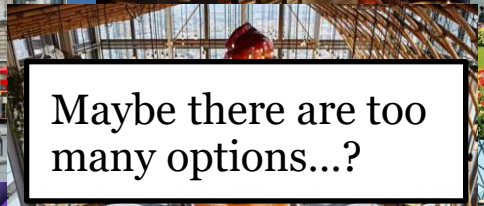
What do you do in London?







Maybe there are too many options...?

Science museum

Natural history museum

ritish Museum

AAMAS 2023 LONDON

ICRA LONDON 2023

MCM LONDON COMIC CON

Take a step back

- What do you do in London?
- More specifically?

What do you do in London?

- When?
- In the evening after MABS?

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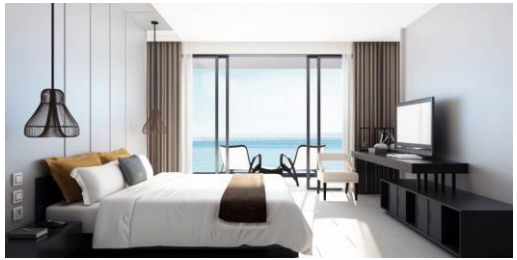
What do you do in London?

- Typical options?



Rest at hotel

Work at hotel

When: Evening after MABS?

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What do you do in London?

- Other typical options?

When: Evening after MABS?

Work at hotel

Rest at hotel

Eat at a restaurant

Go to a bar

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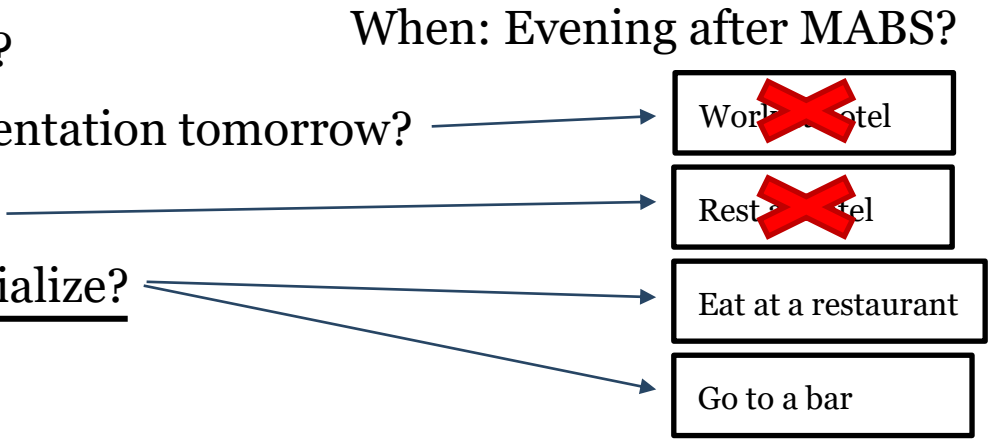
What do you do in London?

- How to choose?
- Perhaps a presentation tomorrow?
- Feeling tired?
- Wanting to socialize?



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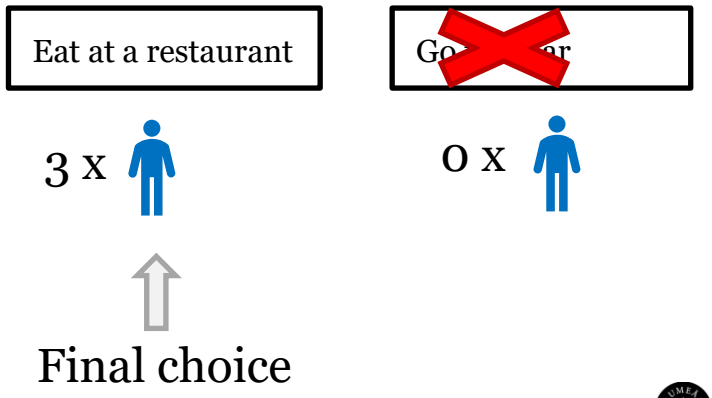
What do you do in London?

- Since we wanted to socialize
- What will the others do?

When: Evening after MABS?

Goal: To socialize



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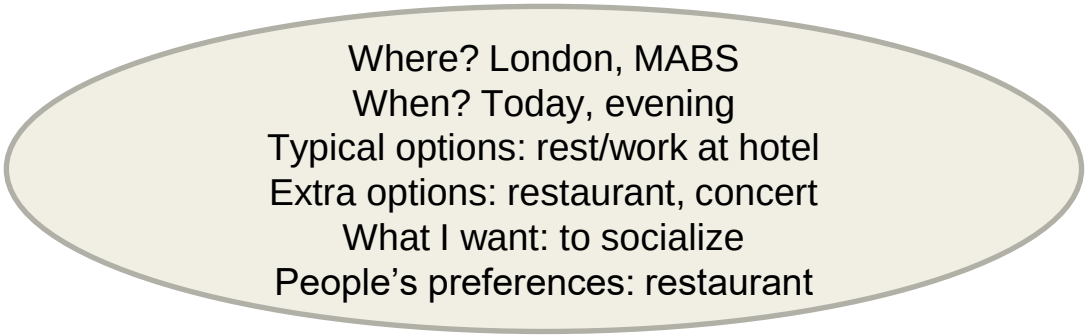
How was the choice made?

- Gradually get information from situation



This is decision context!

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Why context in Agent Simulations?

- Scalability and realism trade-off

1. Simple: e.g. probabilistic

?

Both?

2. Complex: many social aspects

3. Simple by default, more complex by necessity (Kahnemann?)

- What determines this?
- The decision context!

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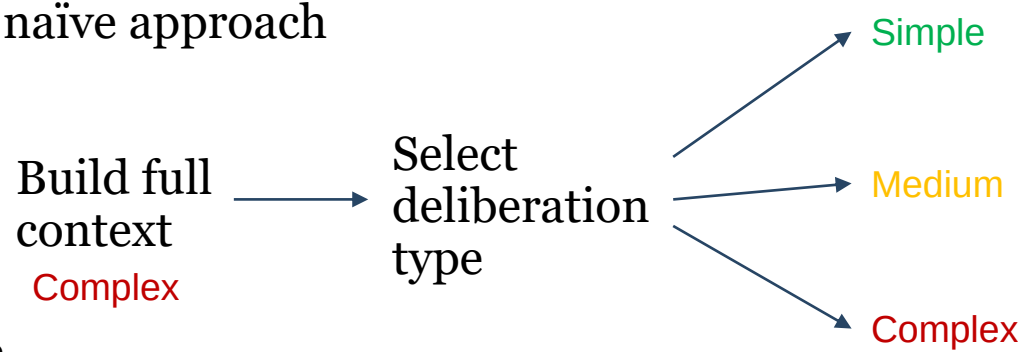
Deliberation with context

- Most naïve approach



- Done?
- NO, complexity moved to context determination
- How?

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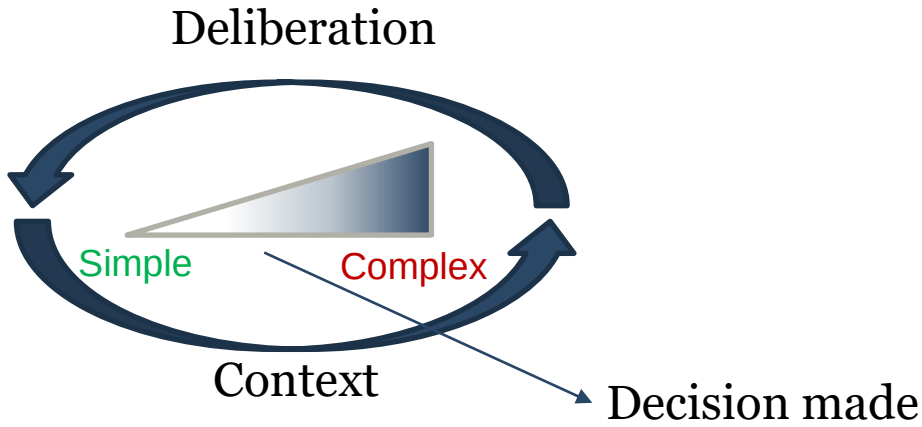
Dynamic deliberation with context



Context is vague

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Handles for context

- CAFCA matrix [1] 3x3
  - a Contextual Action Framework for Computational Agents
- Decision situations for an agent

	Individual	Social	Collective
Automatic	repetition	imitation	joining-in
Strategic	rational choice	game theory	team reasoning
Normative	(institutional) rules	(social) norms	(moral) values

[1] Elsenbroich, C., & Verhagen, H. (2016). The simplicity of complex agents: a Contextual Action Framework for Computational Agents. *Mind & Society*, *15*, 131-143.

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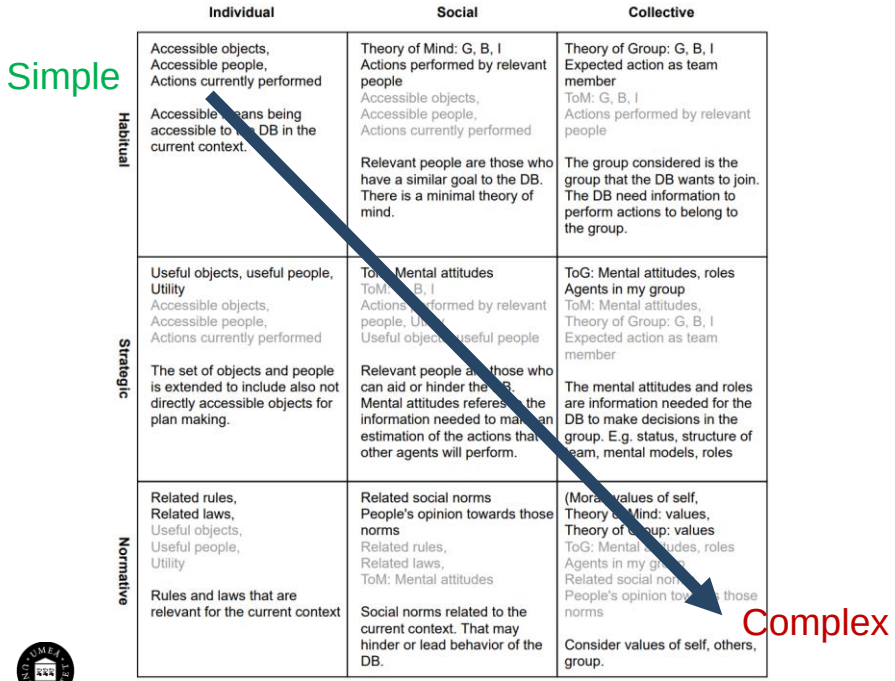
Information relevance in context

- Based on CAFCA
- Relevant information [2]
- Framework components?



[2] Jensen, M., Verhagen, H., Vanhée, L., & Dignum, F. (2022, March). Towards Efficient Context-Sensitive Deliberation. In *Advances in Social Simulation* Cham: Springer International Publishing.

The framework

Abstract & Simple

Deliberation

Meta-deliberation

All social behavior

habits, rules, groups, imitation, social norms, values, needs, motives, social practices, conventions, game theory, etc.

Too much!
Slow

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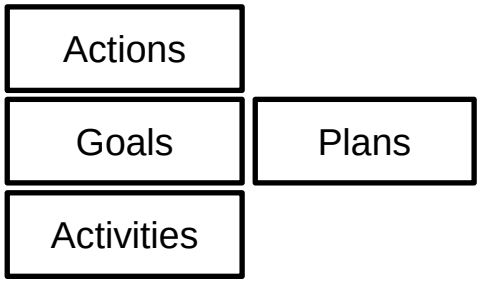
What is the meta-deliberation?

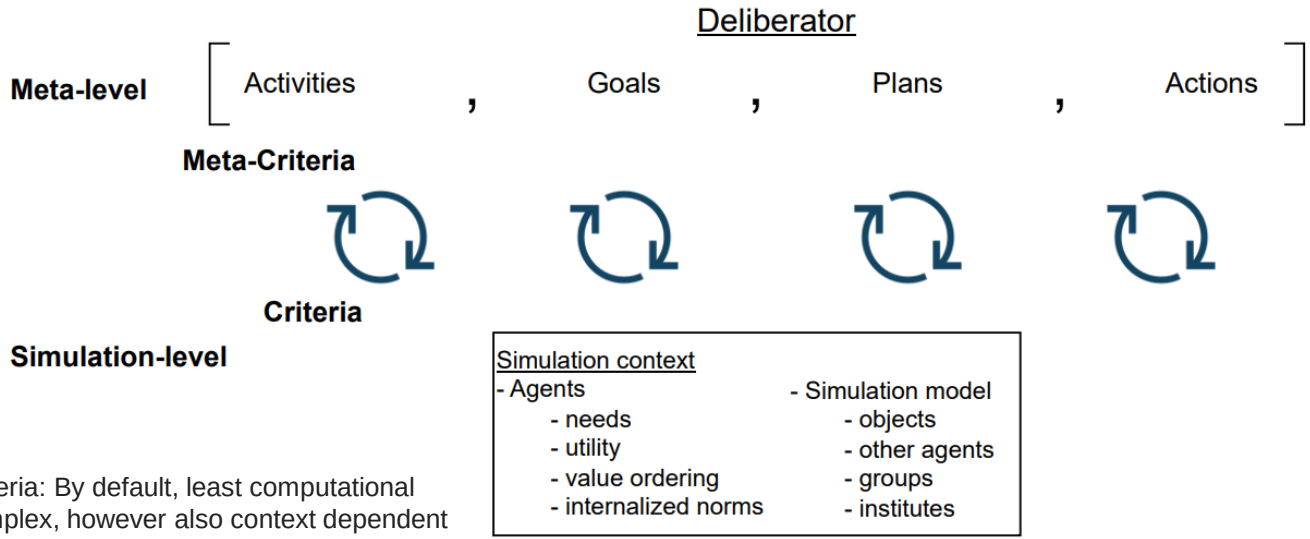
- Tuple of basic elements

1. Output of deliberation
2. Agent wants to achieve
3. Handling context



- Not set in stone

Dynamic Context-Sensitive Deliberation



Criteria: By default, least computational complex, however also context dependent

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[3] Jensen, M., Vanhée, L., Dignum, F.: Dynamic context-sensitive deliberation. In: Multi-Agent-Based Simulation, MABS 2023 (2023)

Example of deliberation

1. Initial state

Deliberator

[Activities , Goals , Plans , Actions]

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Example of deliberation

Meta-criteria:
Expand_actions

Criteria:
Typical actions

2. Filling in the tuple

Deliberator

[Activities , Goals , Plans , Actions]

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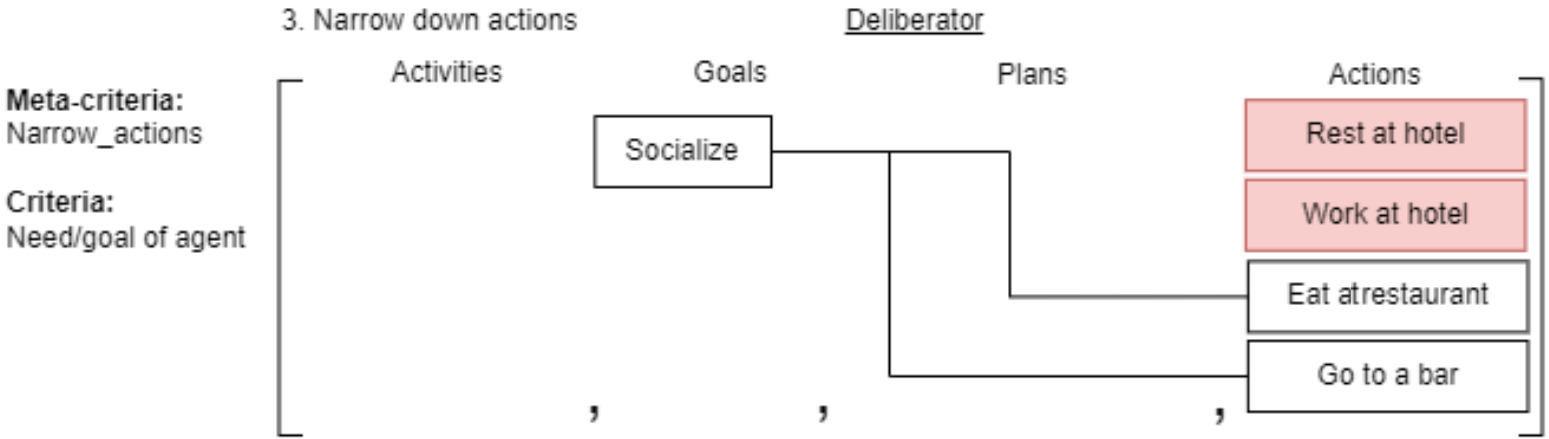
Example of deliberation



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Example of deliberation

Final choice: Eat at a restaurant

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Increase scalability while retain realism?

- MABS paper shows proof-of-concept
- SSC2023 (under review) shows new results

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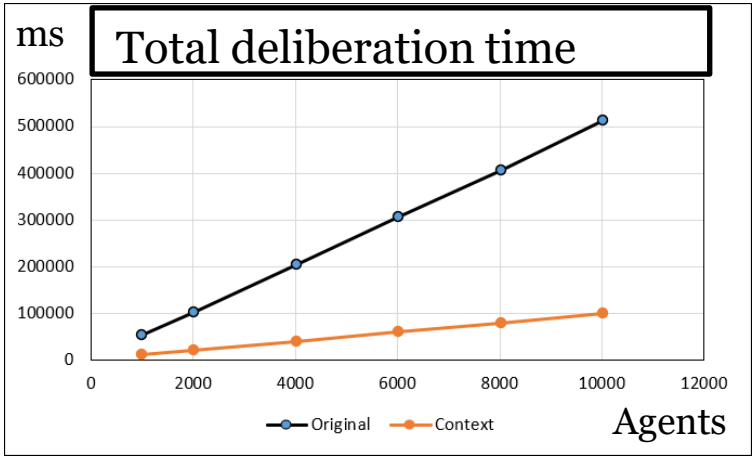
Results from SSC paper (under review)

- Test in large scale model



- Not total execution time

[4 Under review] Jensen, M., Vanhée, L., Dignum, F.: Context-Sensitive Deliberation for Scalability in Realistic Social Simulations - Social Simulation Conference (2023)

Main take aways

- Scalability and realism trade-off
- Complexity by need
  - Requires context
- Dynamic Context-Sensitive Deliberation
  - Increases scalability while retaining realism
  - Potentially increase realism, while retaining scalability (future work)

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The End

- Thank you for attending!
- Questions?

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The end

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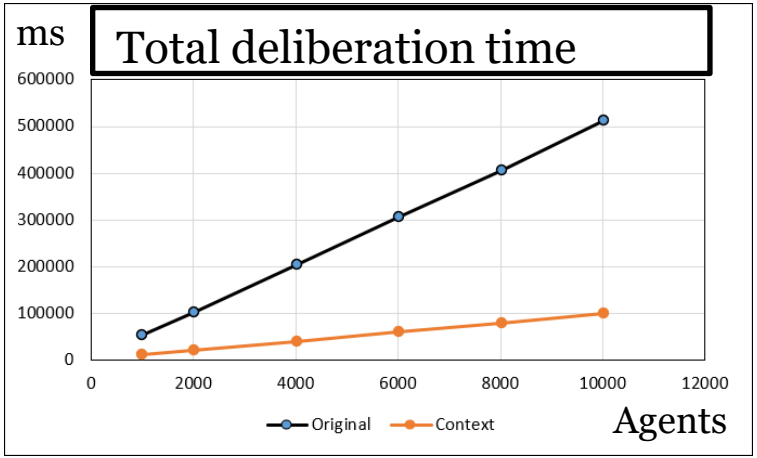
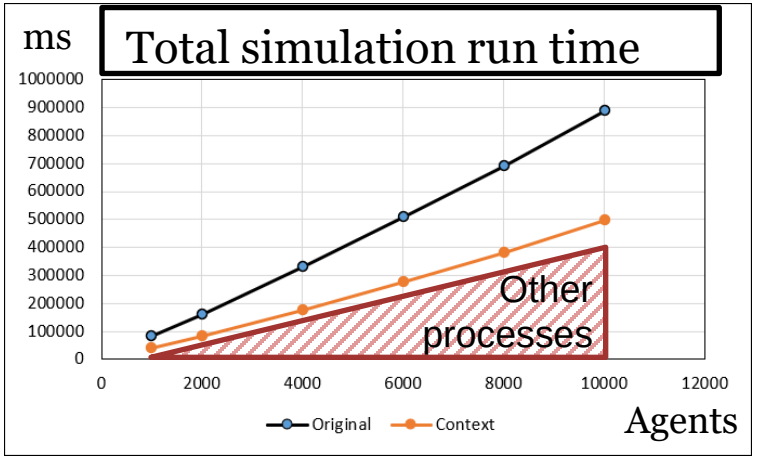
Results from SSC paper

- Test in large scale model





- One piece of puzzle

[4 Under review] Jensen, M., Vanhée, L., Dignum, F.: Context-Sensitive Deliberation for Scalability in Realistic Social Simulations - Social Simulation Conference (2023)