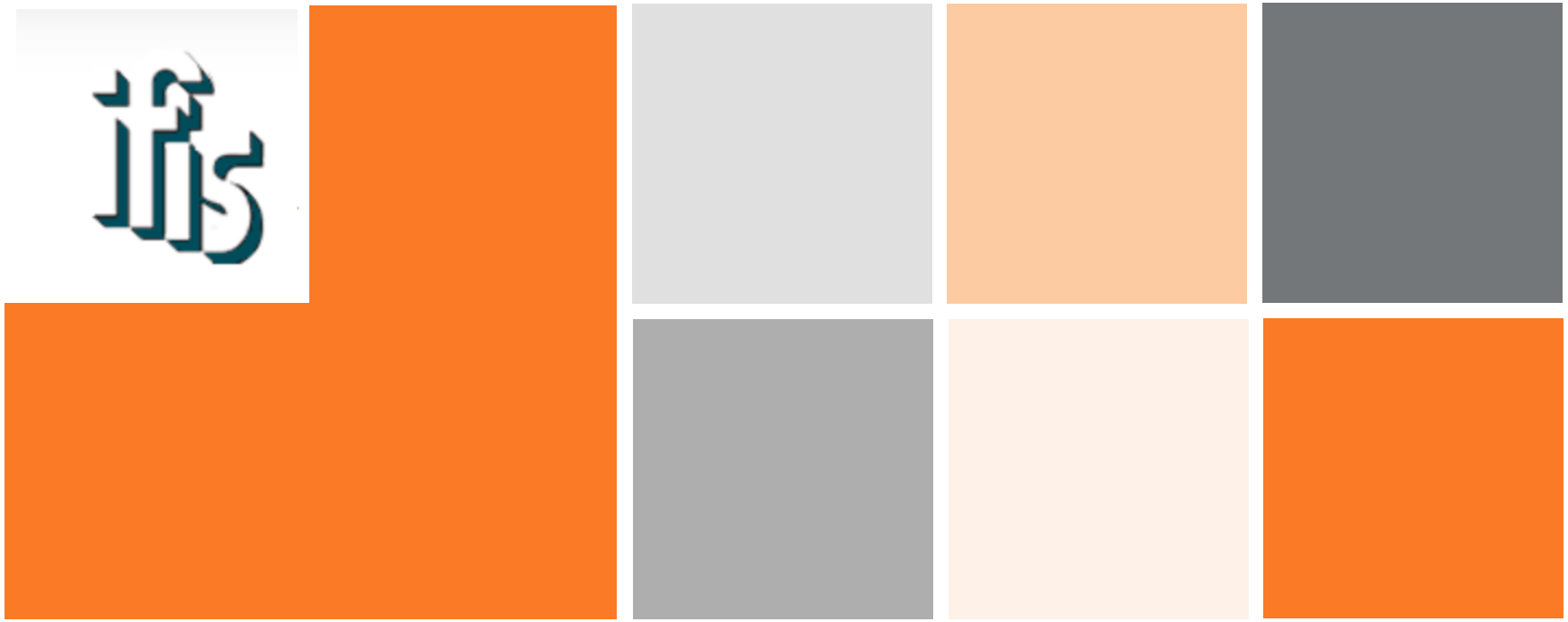
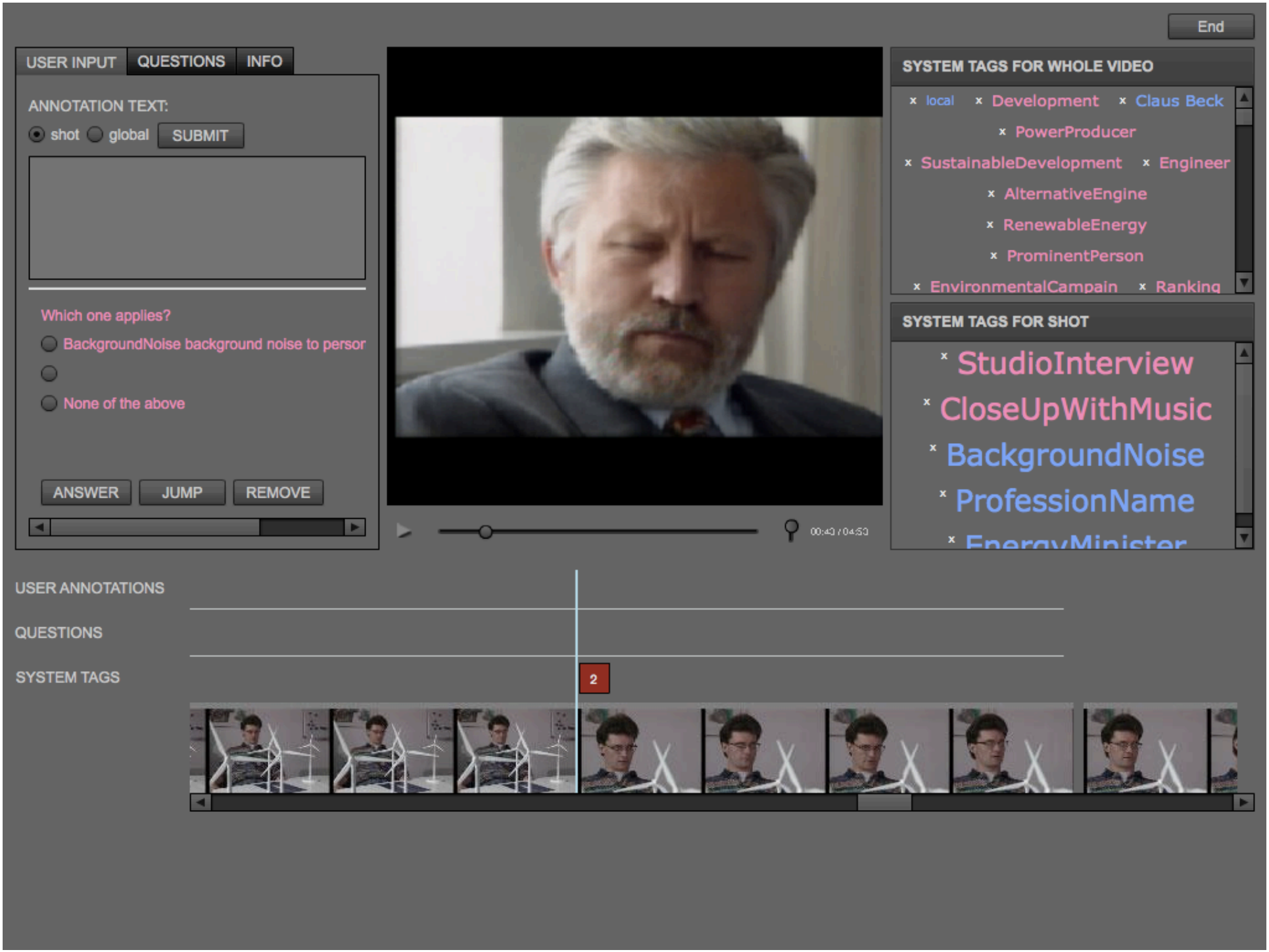


Dealing Efficiently with Ontology-Enhanced Linked Data for Multimedia

HiDeSt 2015, Dresden

Oliver Gries, Ralf Möller, Anahita Nafissi, Maurice Rosenfeld, Kamil Sokolski, Sebastian Wandelt

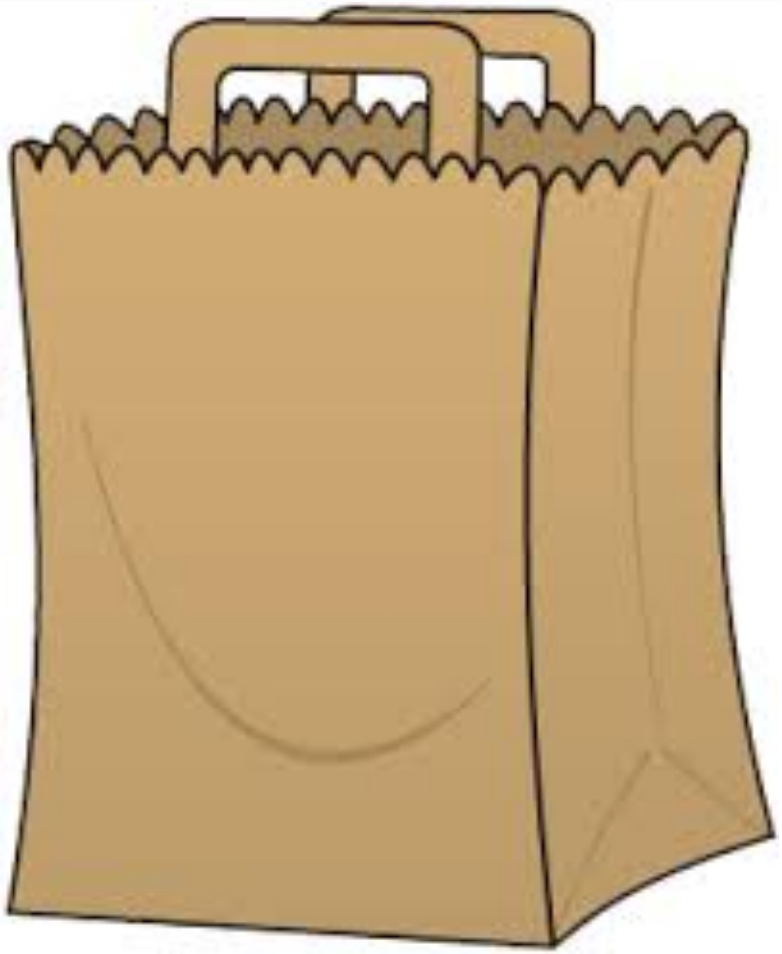
Universität zu Lübeck


End
USER INPUT
QUESTIONS
INFO
ANNOTATION TEXT:
shot
global
SUBMIT
Which one applies?
BackgroundNoise background noise to persor
None of the above
ANSWER
JUMP
REMOVE
SYSTEM TAGS FOR WHOLE VIDEO
local
Development
Claus Beck
PowerProducer
SustainableDevelopment
Engineer
AlternativeEngine
RenewableEnergy
ProminentPerson
EnvironmentalCampain
Ranking
SYSTEM TAGS FOR SHOT
StudioInterview
CloseUpWithMusic
BackgroundNoise
ProfessionName
EnergyMinister
00:43 / 04:53
USER ANNOTATIONS
QUESTIONS
SYSTEM TAGS
2

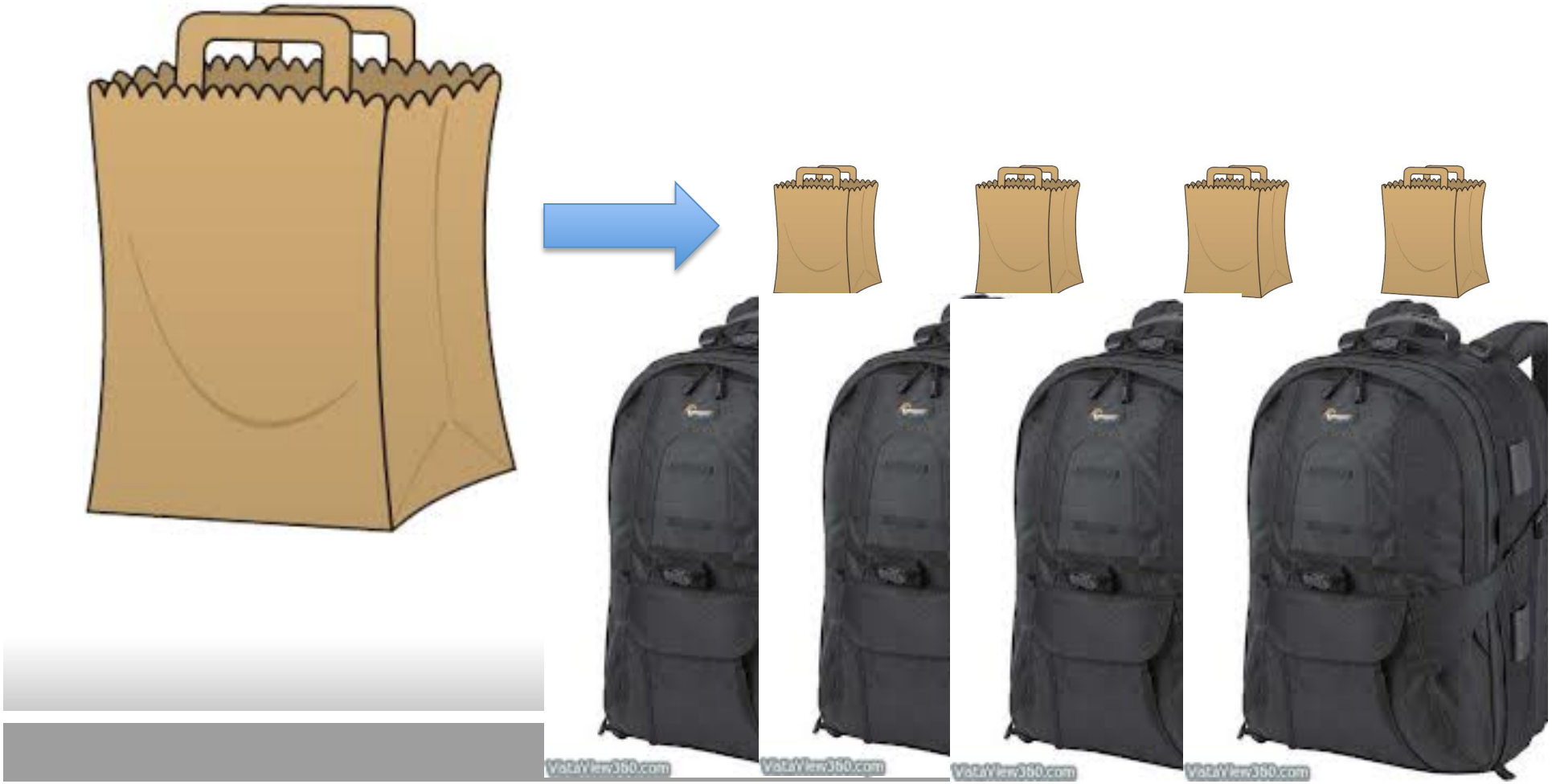
Kill-App for Stream Data Processing

- Automatic video analysis processes
  - produce sets of multimodal descriptions in a data-driven fashion
- Still, analysis results must be extended
  - to better capture what humans associate with videos and videos shots (-> video interpretation)
  - Asynchronous heterogeneous streams of triples (audio, video , video OCR), plus huge domain kb
  - Foci of attention (centered around video shots)

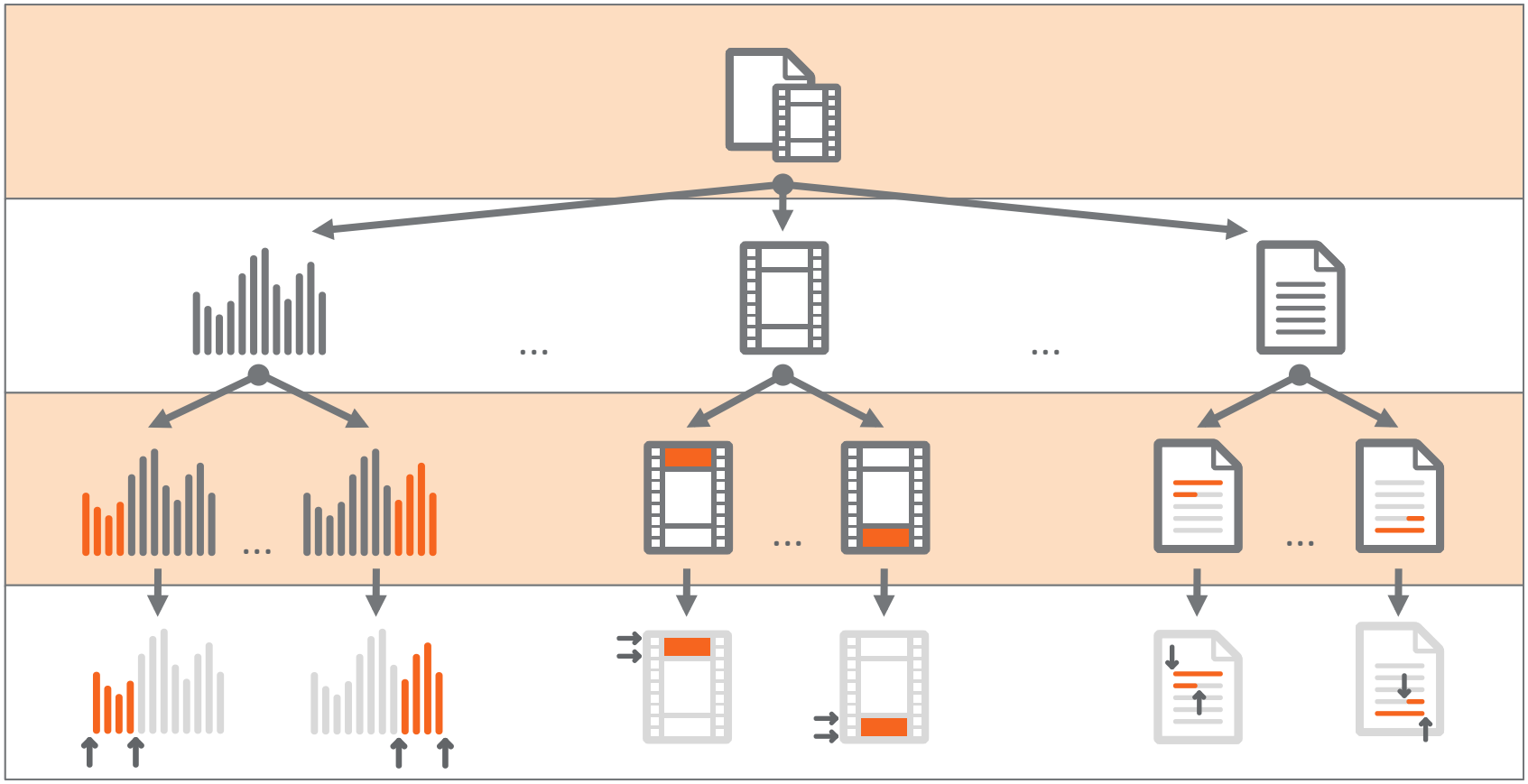
From a window to a bag of triples



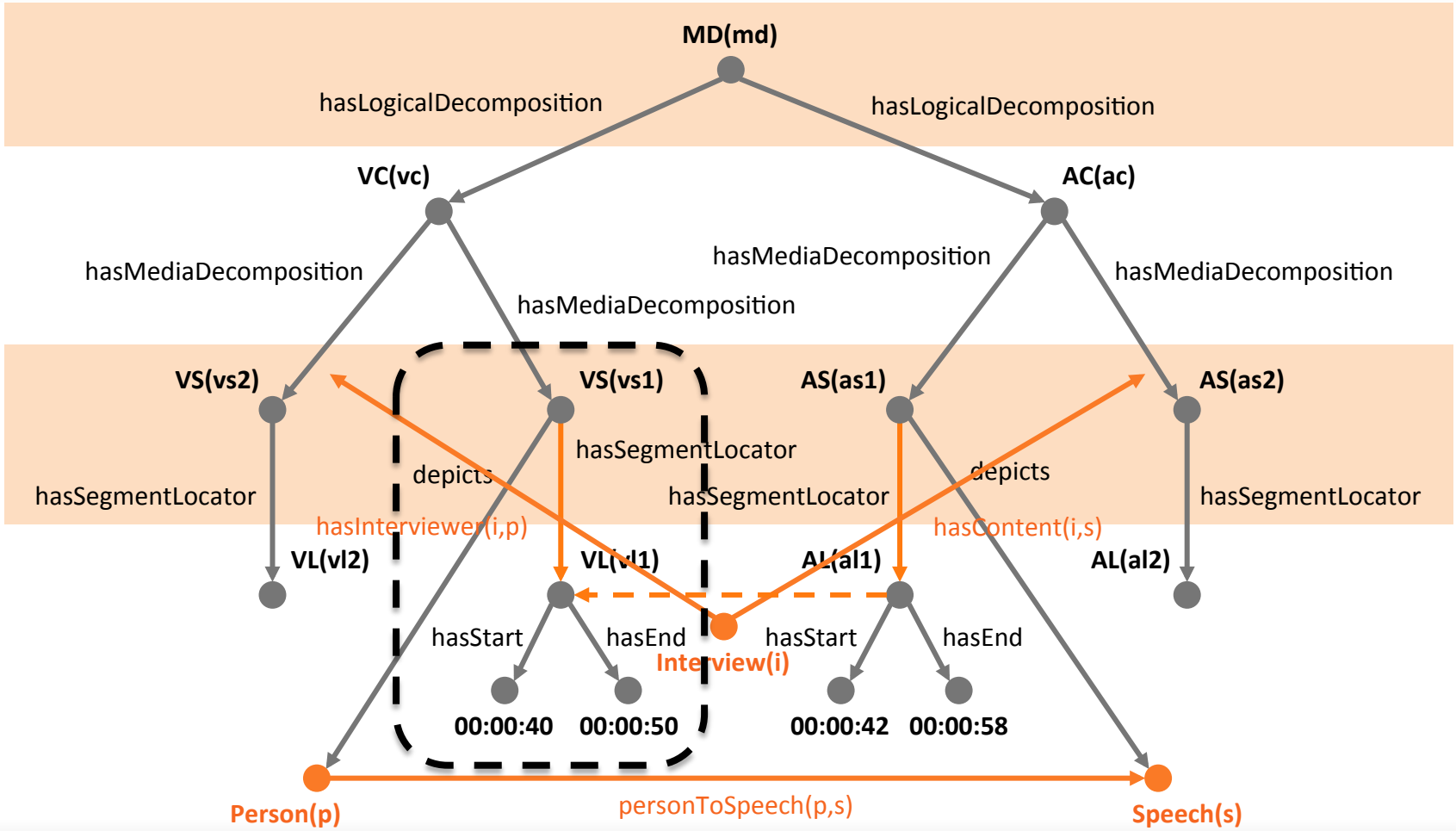
From bags of time-tagged triples to sequences



Prerequisite: Representation of Multimedia Content



Interpretation

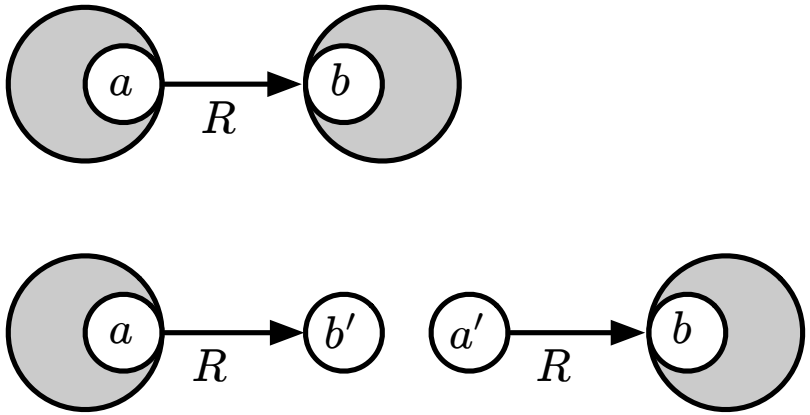


Scalability

- Streams -> windows ->sequences of states
- Each state processed w.r.t. large Abox
- Desideratum: Subdivision of large Aboxes into smaller, meaningful parts
- Solution: Partitioning technique
  - Scalability
  - Window and sequence building

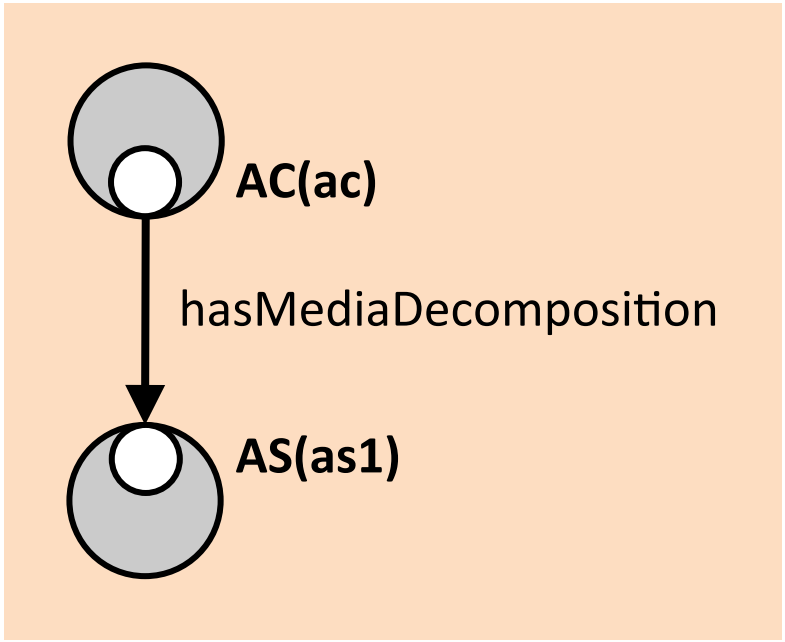
$\mathcal{O}$-Separability

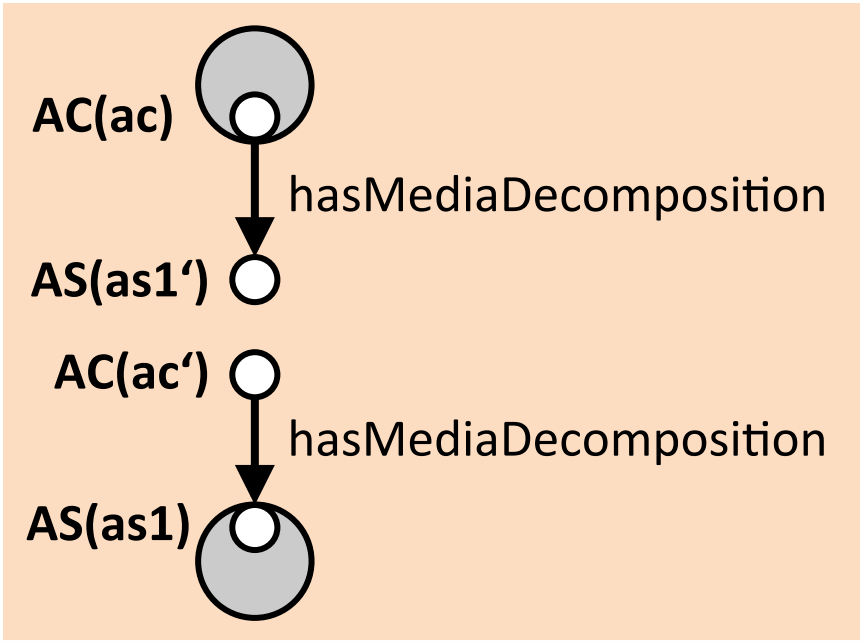
- A role is $\mathcal{O}$-separable with respect to an ontology $\mathcal{O} = (\mathcal{T}, \mathcal{A})$, if semantics for decision problems are preserved when splitting up $R(a, b)$.



Example of $\mathcal{O}$-Separability (1)

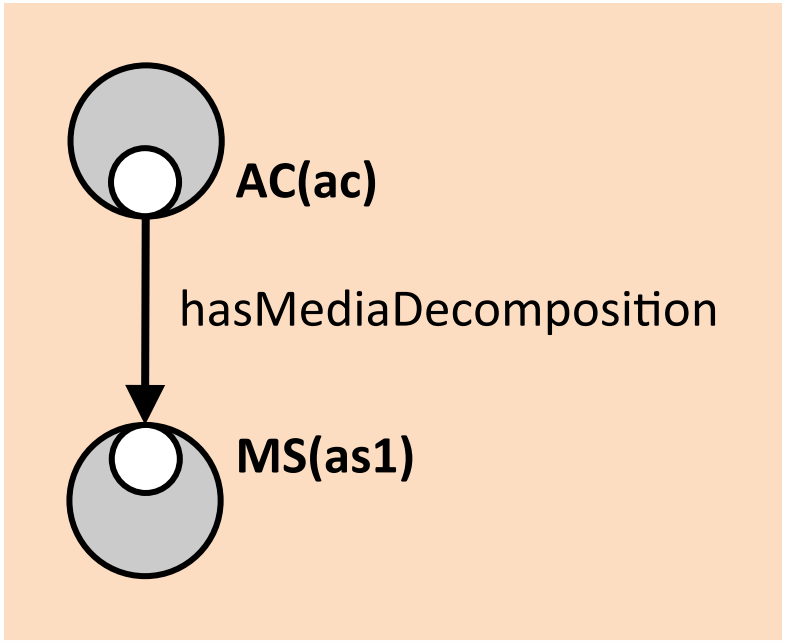
$$\mathcal{T} = \{AudioContent \sqsubseteq \forall hasMediaDecomposition.AudioSegment,$$
$$AudioSegment \sqsubseteq MultimediaSegment\}$$
$$\mathcal{A}_1 = \{AudioContent(ac), AudioSegment(as1)$$
$$hasMediaDecomposition(ac, as1)\}$$

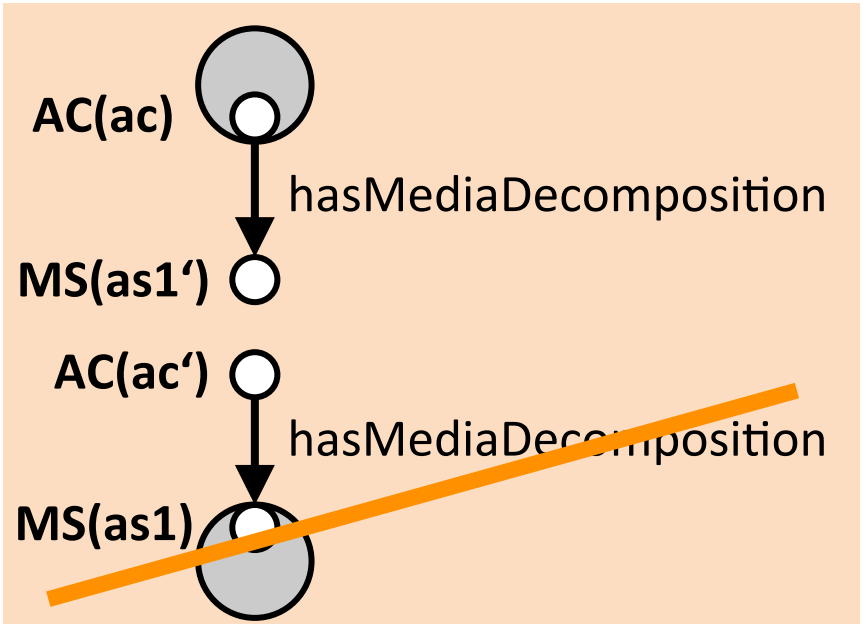




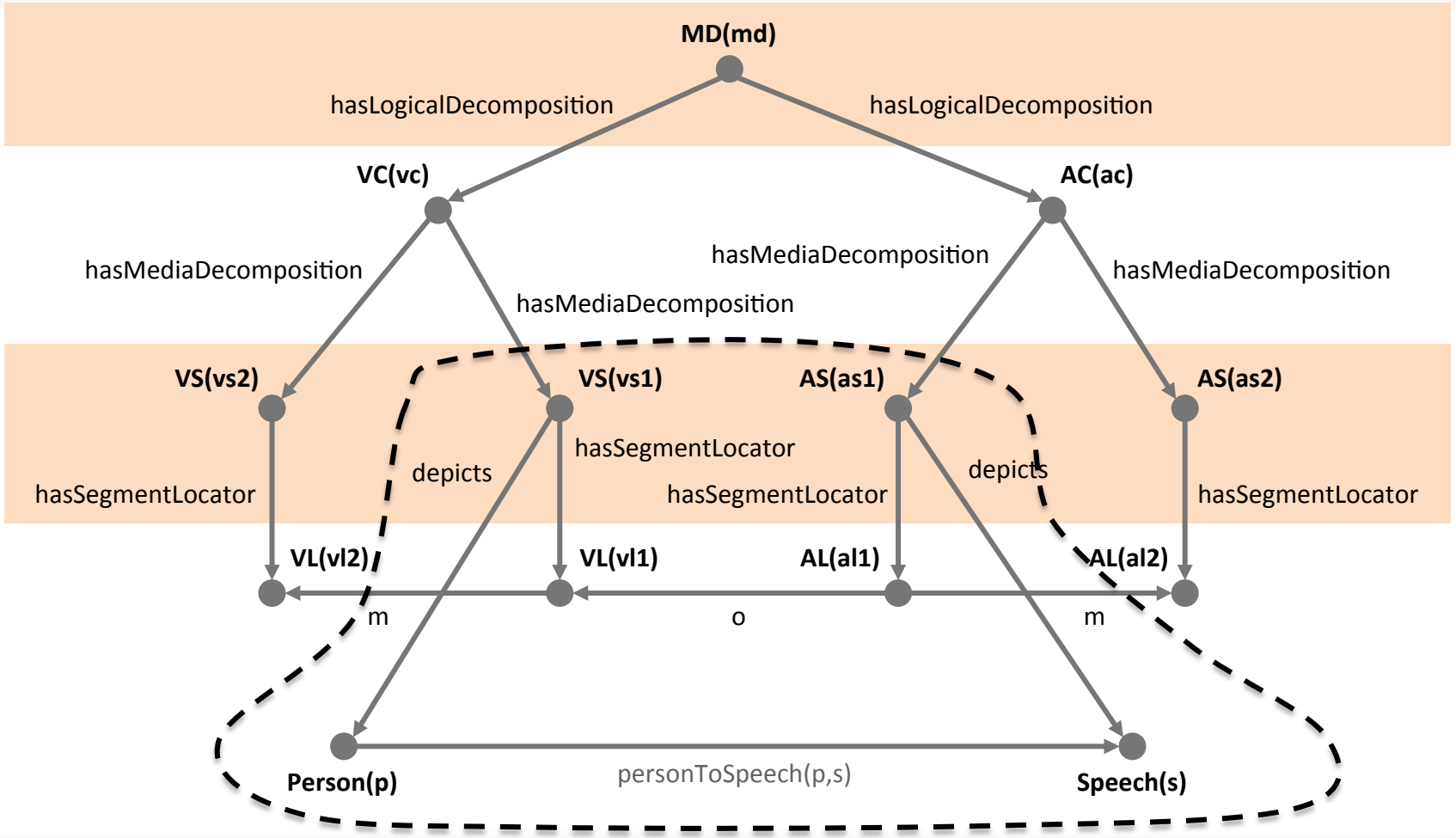
Example of $\mathcal{O}$-Separability (2)

$$\mathcal{T} = \{AudioContent \sqsubseteq \forall hasMediaDecomposition.AudioSegment,$$
$$AudioSegment \sqsubseteq MultimediaSegment\}$$
$$\mathcal{A}_2 = \{AudioContent(ac), MultimediaSegment(as1)$$
$$hasMediaDecomposition(ac, as1)\}$$

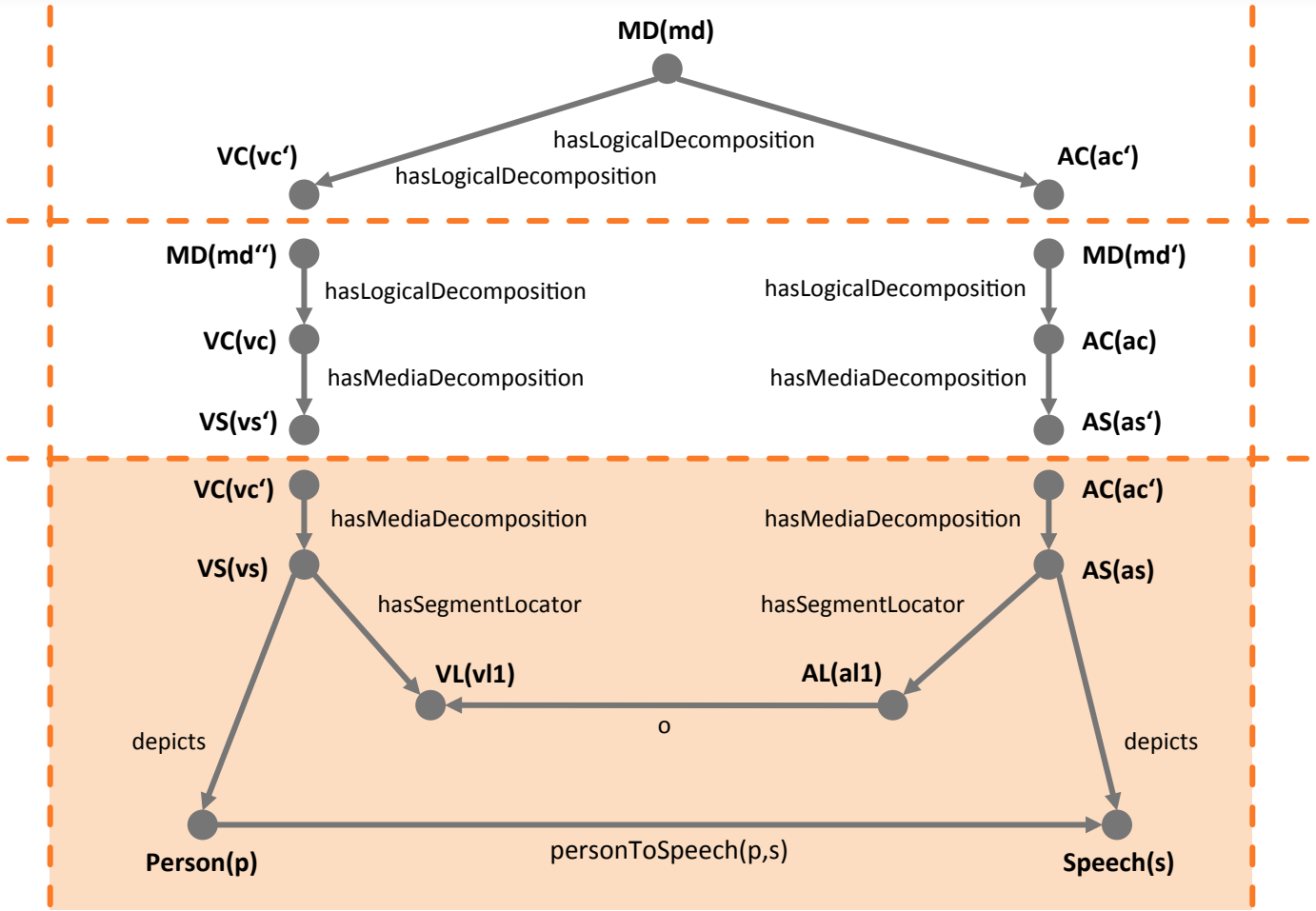




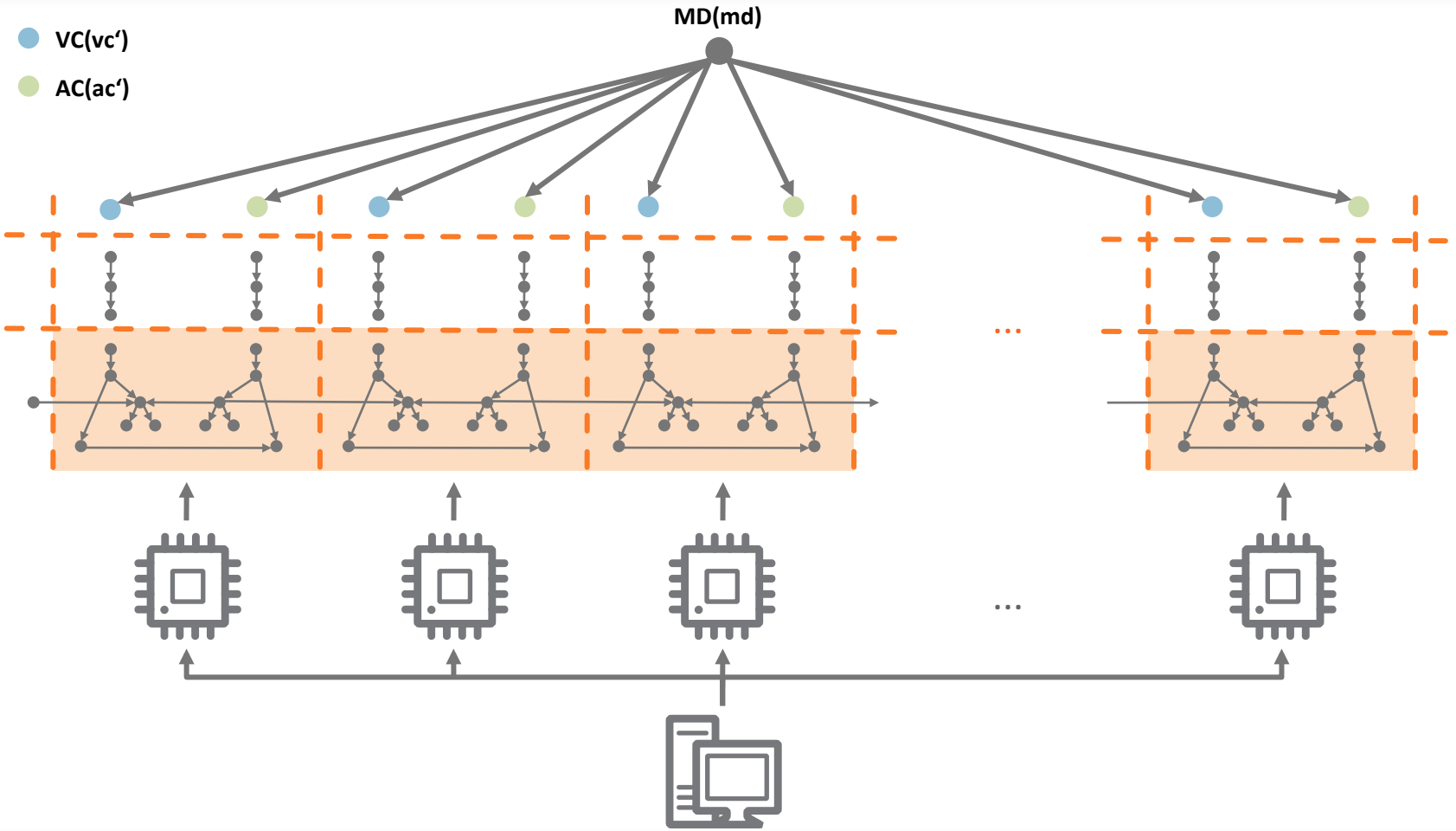
$\mathcal{O}$-Separability



CASAM: Online Processing



Offline Parallel Processing of Windows



Conclusions and Outlook

- Processing of media segments with STARQL
  (-> fusion of streams)
- Automatic generation of islands in the context of multimedia interpretation
  (-> scalability, window building)
- Interpretation/abduction as part of
  -> sequence building
- Representation of discourse
- Islands not only for speed, but also for efficient management of resources (forgetting)

Acknowledgments

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  - European Commission
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