

Towards understanding mobility in museums

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How many feathers
does this bird have?

- A) Less than 1000
- B) Between 1000 and 5000 😊
- C) More than 5000

- Motivation
- Requirements
- Solution
 - Museum Graph Model
 - Mobility Model Management
 - Architecture Overview
- Conclusion and Outlook



Museums as ecology:

- Exhibits
- Spaces
- People
- Sensors
- Data

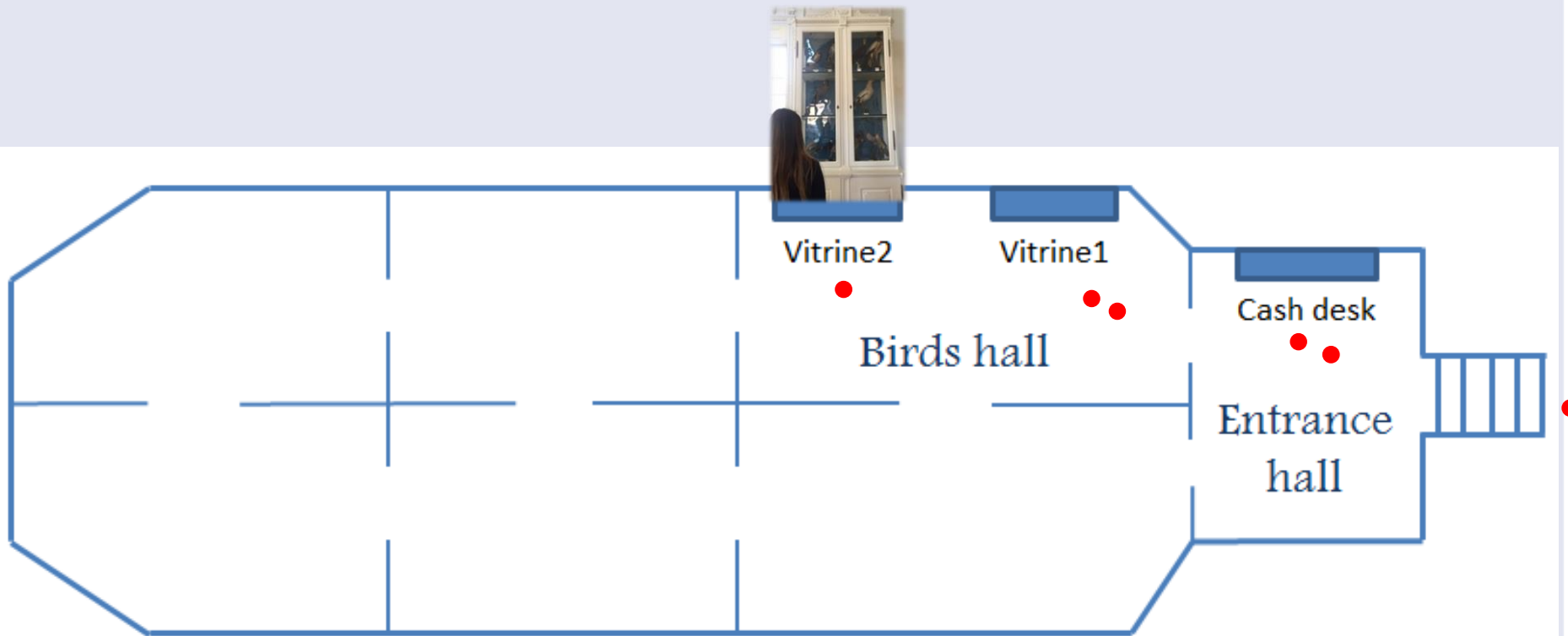
Understanding mobility



Understanding mobility

- Data mining techniques provide valuable insight
- Results of such techniques might not be understood
- Curators want to increase visitor experience in the museum
- How can we provide understandable knowledge for ... ?
 - ... Curators
 - ... Visitors

Museum with entrance hall and birds hall



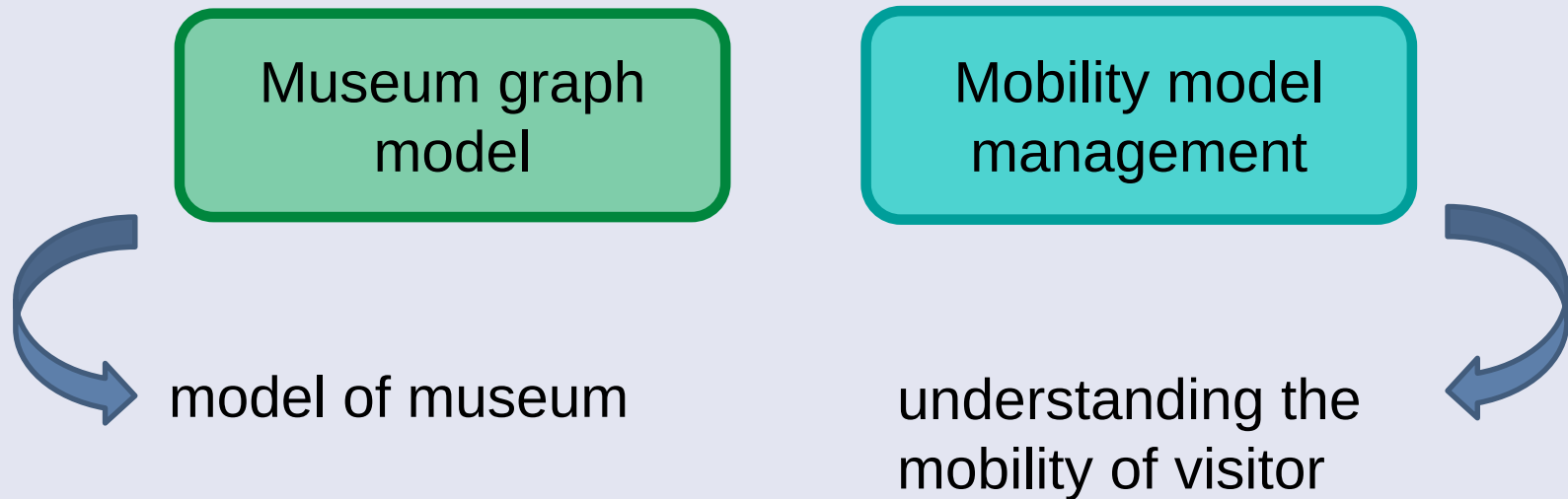
Curators needs

- A model of whole museum (dynamic)
- Understand the mobility of visitors

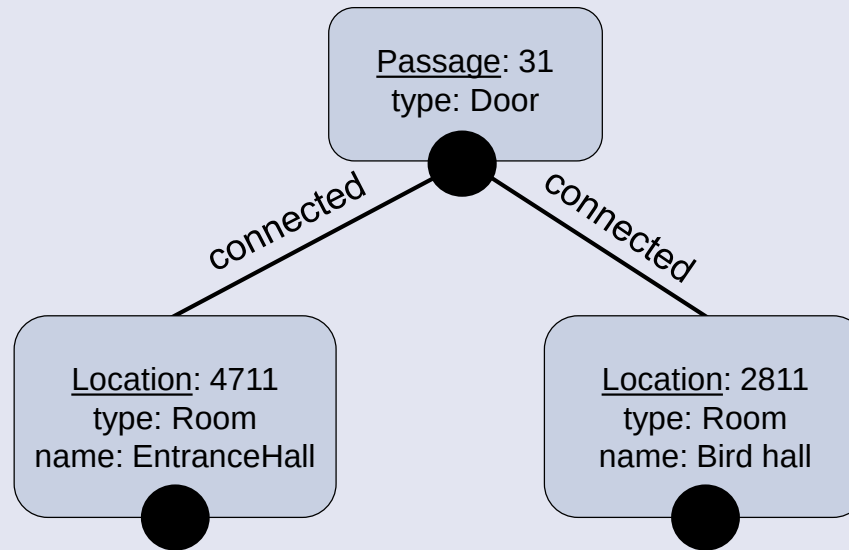
Proposed applications

1. Museum graph editor
 - Based on graph database
2. Curator decision support
3. Mobile museum guide
 - Trajectory data mining

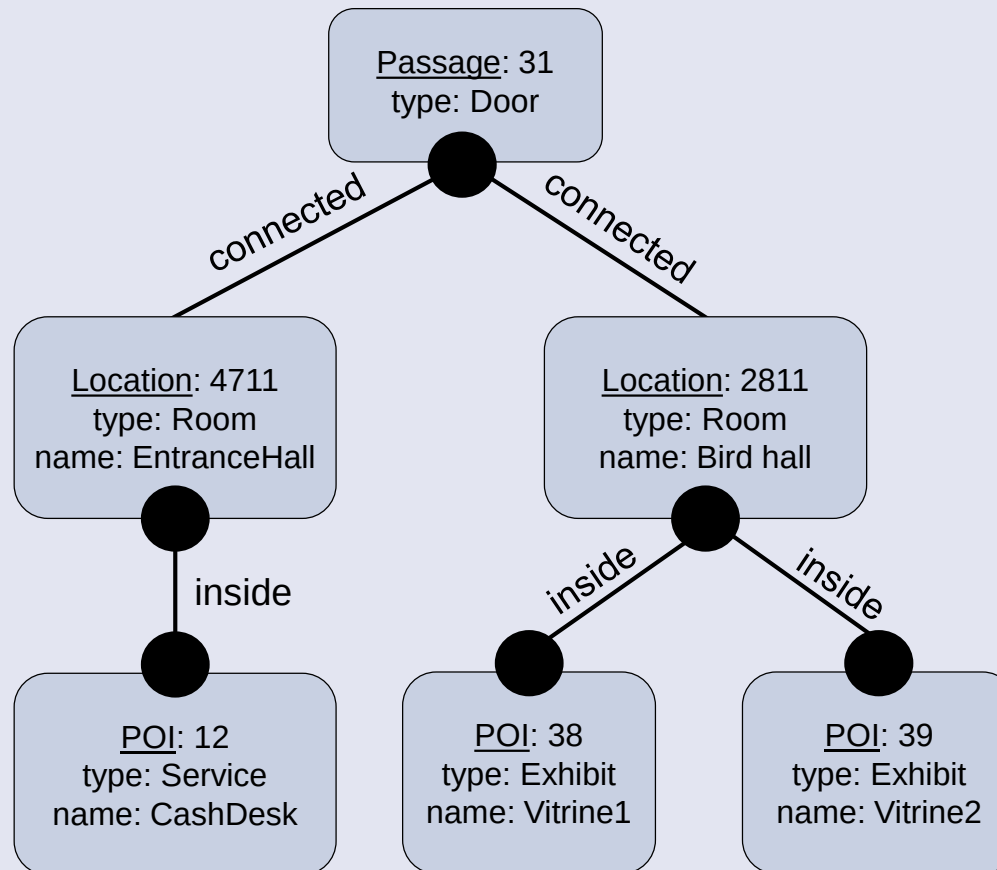
Main components of proposed architecture



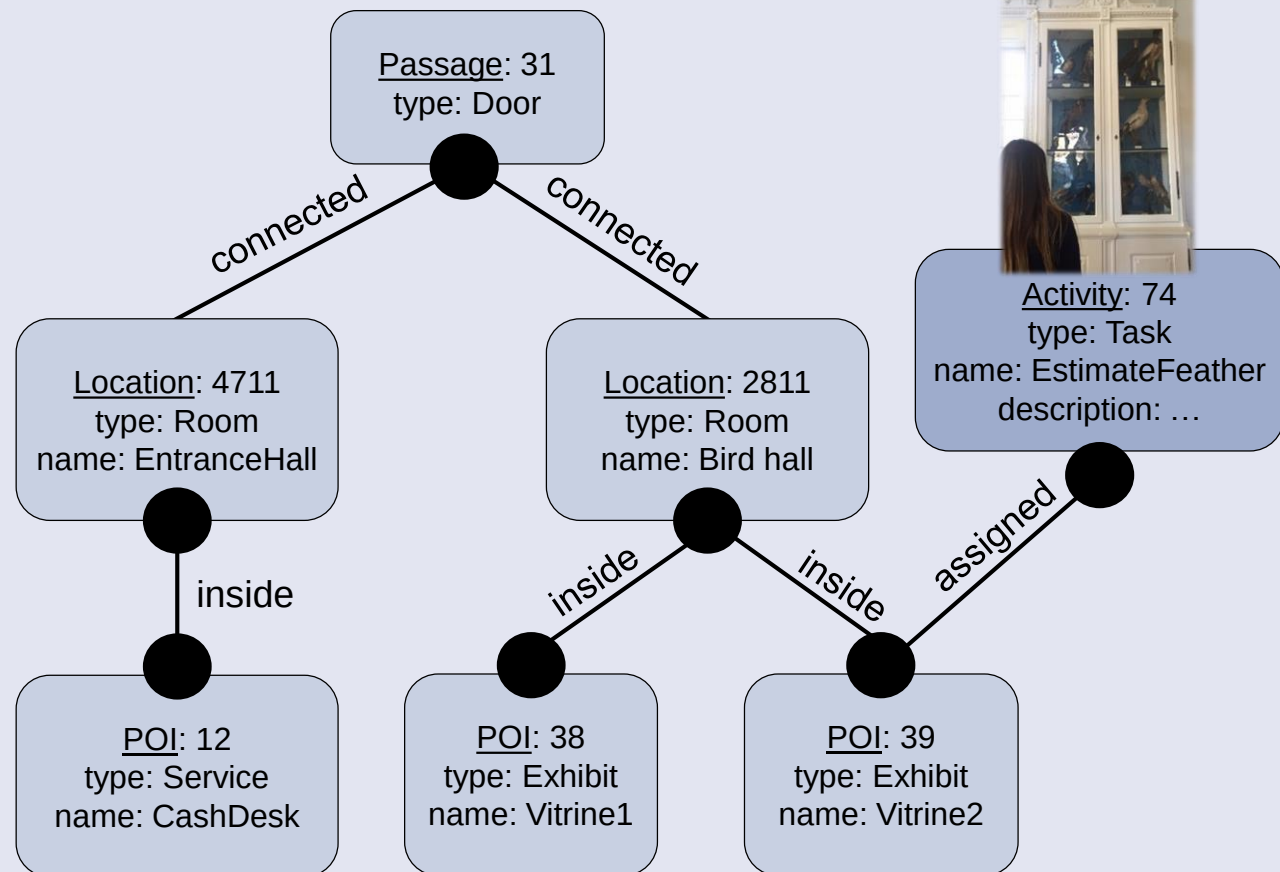
Sub-Graph representing the feather example (1)

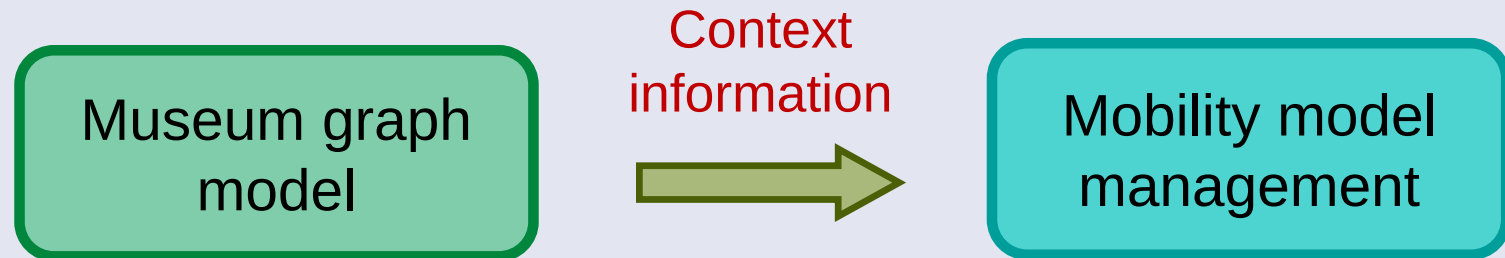


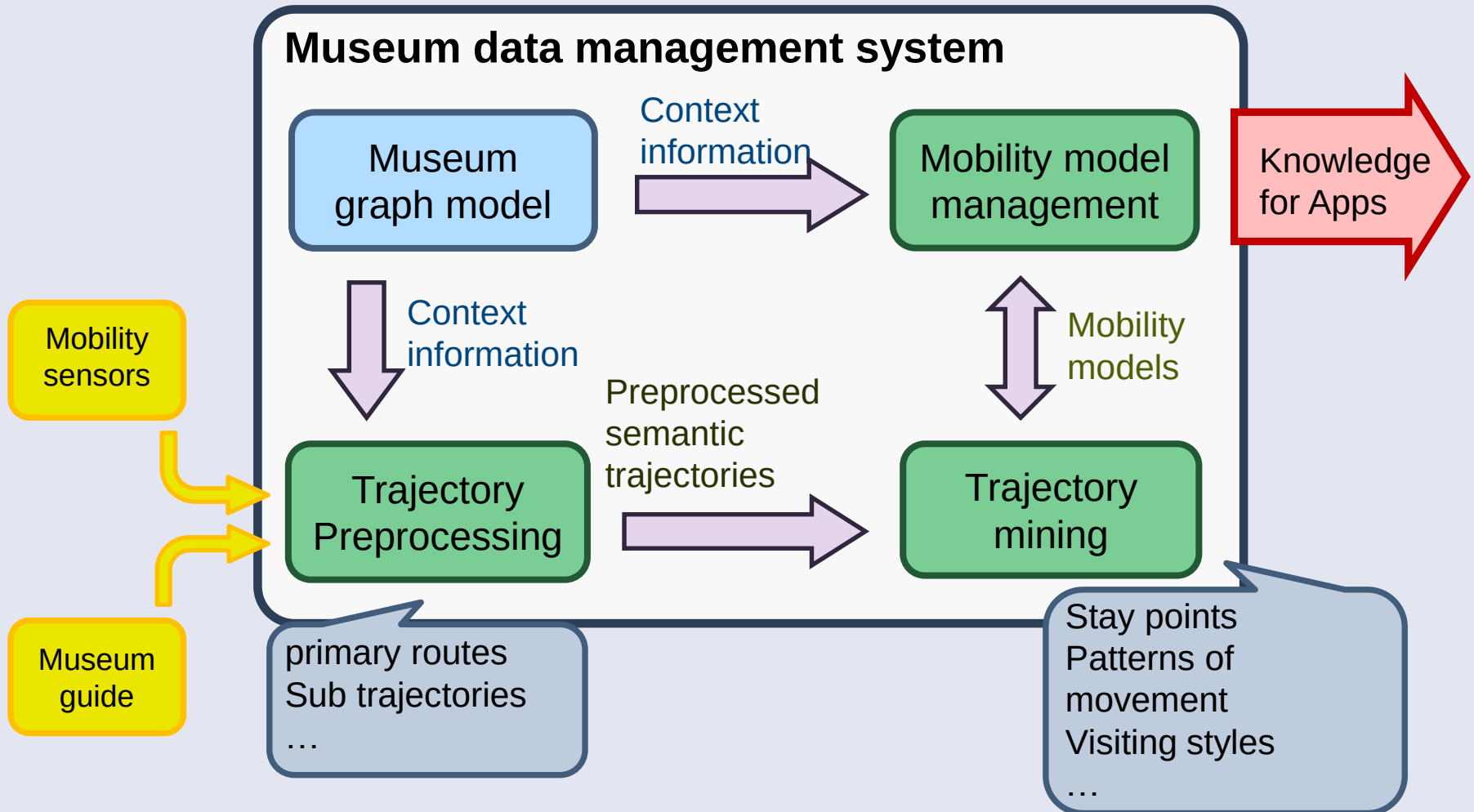
Sub-Graph representing the feather example (2)



Sub-Graph representing the feather example (3)







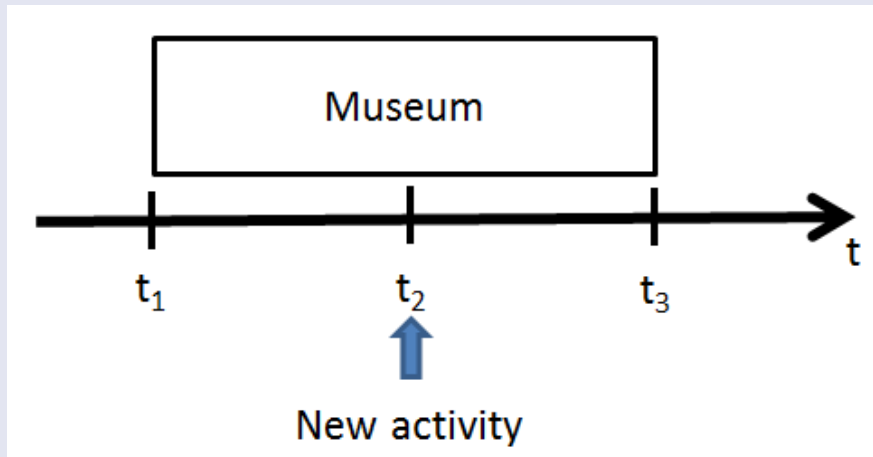
Trajectory mining task

Trajectory mining task in museum environment:

- Different mining tasks
 - Common stay points detection
 - Classification
 - Clustering
- Route-based trajectory mining
- Incremental techniques
 - Window
 - Time
 - Space

Current approach of curators in some museums:

Data sets we can learn from

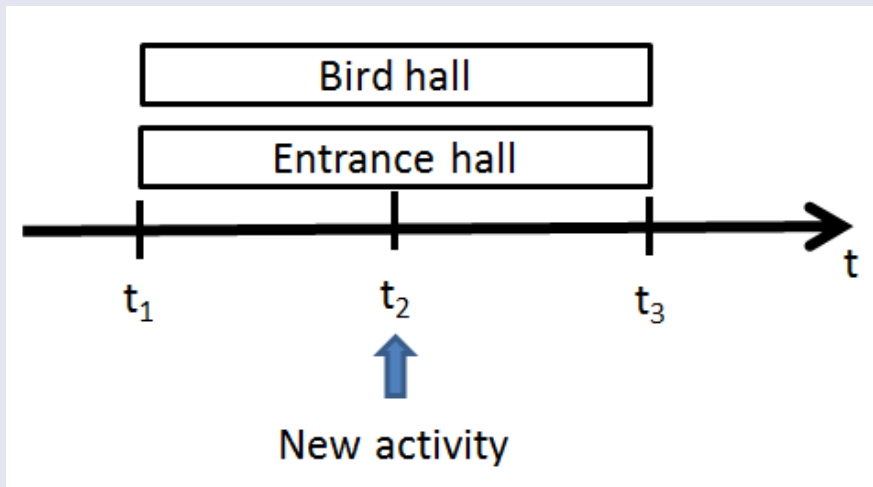


Number of museum visitor

Number of visitors	20
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Spatial windows (to understand local effects)

Data sets we can learn from

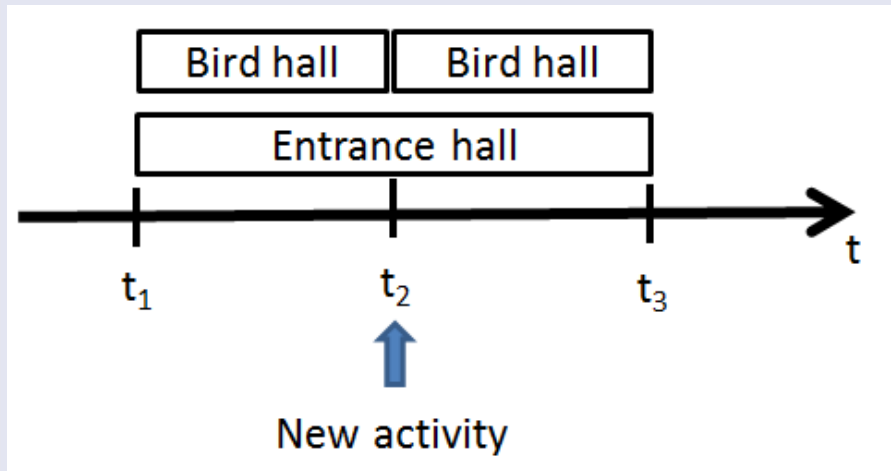


Number of visitor per stay point (SP)

Location name	SPs t_1 --- t_2
Cash desk	20
Vitrine 1	8
Vitrine 2	3

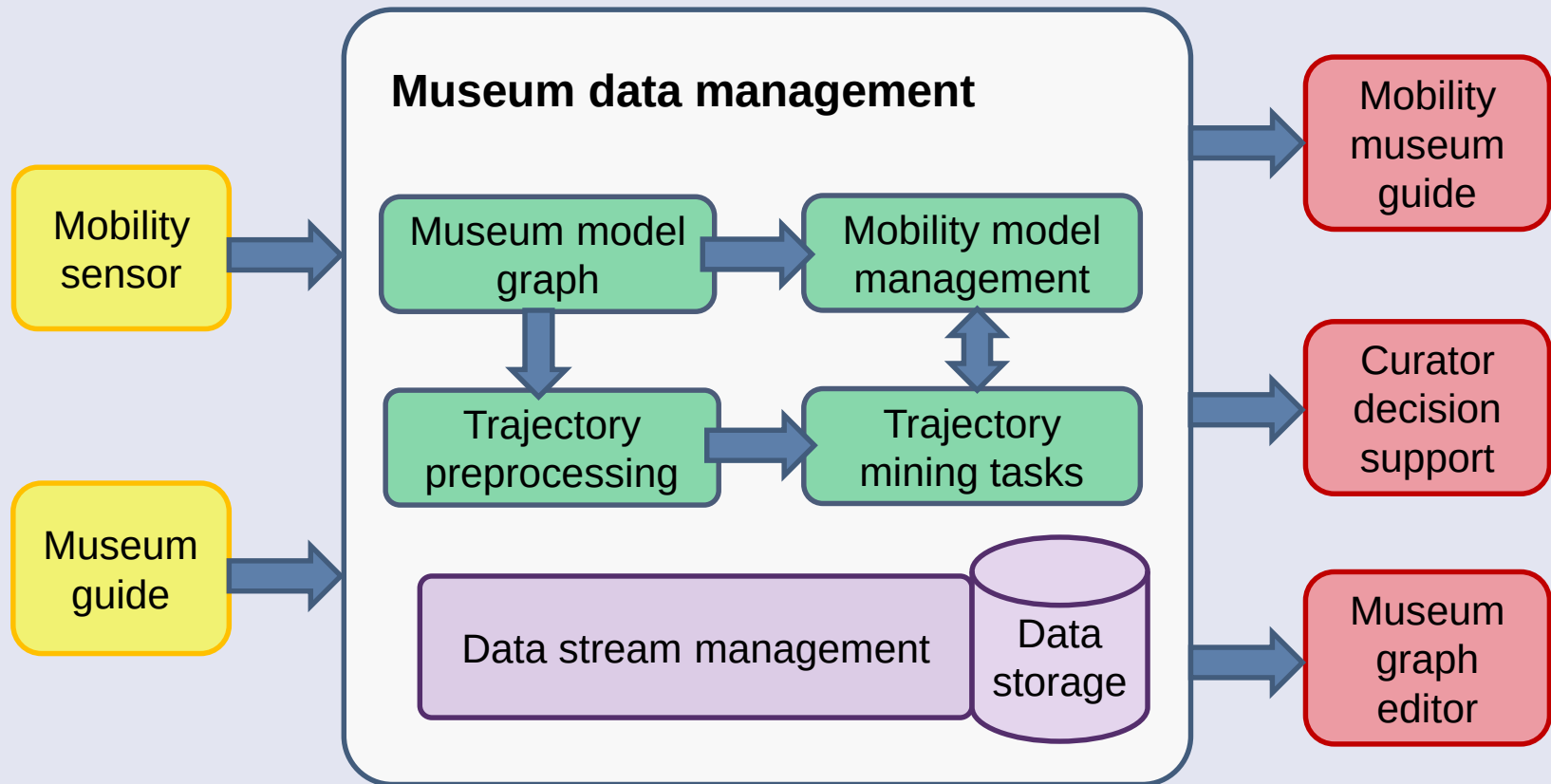
Spatio-temporal windows (to understand changes)

Data sets we can learn from



Number of visitor per stay point (SP)

Location name	SPs $t_1 \text{ --- } t_2$	SPs $t_2 \text{ --- } t_3$
Cash desk	20	
Vitrine 1	8	8
Vitrine 2	3	12



- Proposed an architecture to support three applications which considers:
 - Dynamic graph model
 - Semantic trajectories
 - Different mobility models
 - Manage knowledge
 - Mining on a local level
 - Time
 - Space
- Evaluate and extend graph model
- Extend mobility model
- Ensure consistent knowledge across applications

Questions?