A Data Integration Architecture For Smart Cities

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Introduction

- Smart cities
- Heterogeneity in data format and structure
- Low integration between data sources
- Data difficult to access for applications and non-technical users

Research Questions

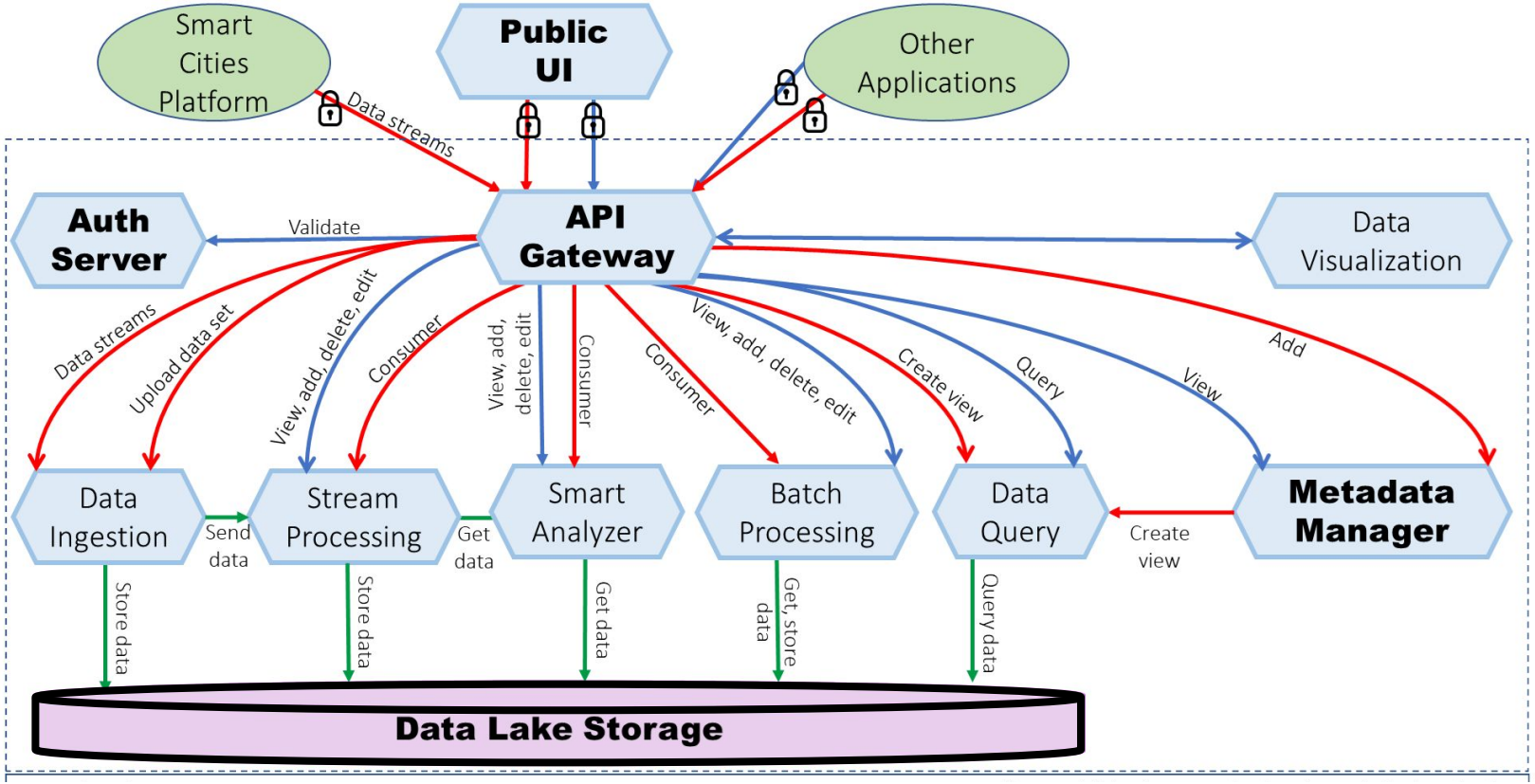
- What are the main challenges and issues identified by the researchers for data integration in smart cities?

- What are the functional and non-functional requirements of a software platform for data integration in smart cities?

Requirements for a Data Integration Platform

	Psyllidis et al. 2015	Consoli et al. 2015	Cheng et al. 2015	Rathore et al. 2016	Hashem et al. 2016	Costa and Santos 2017	Mehmood et al. 2019
Ingestion	X		X	X	X	X	X
Metadata	X	X					X
Processing			X	X	X	X	X
Machine Learning				X	X		
Analysis and Visualization	X					X	X
External Access		X	X		X		
Scalability	X		X	X			X
Availability					X		X
Security and Privacy				X		X	

Proposed Architecture For Data Integration



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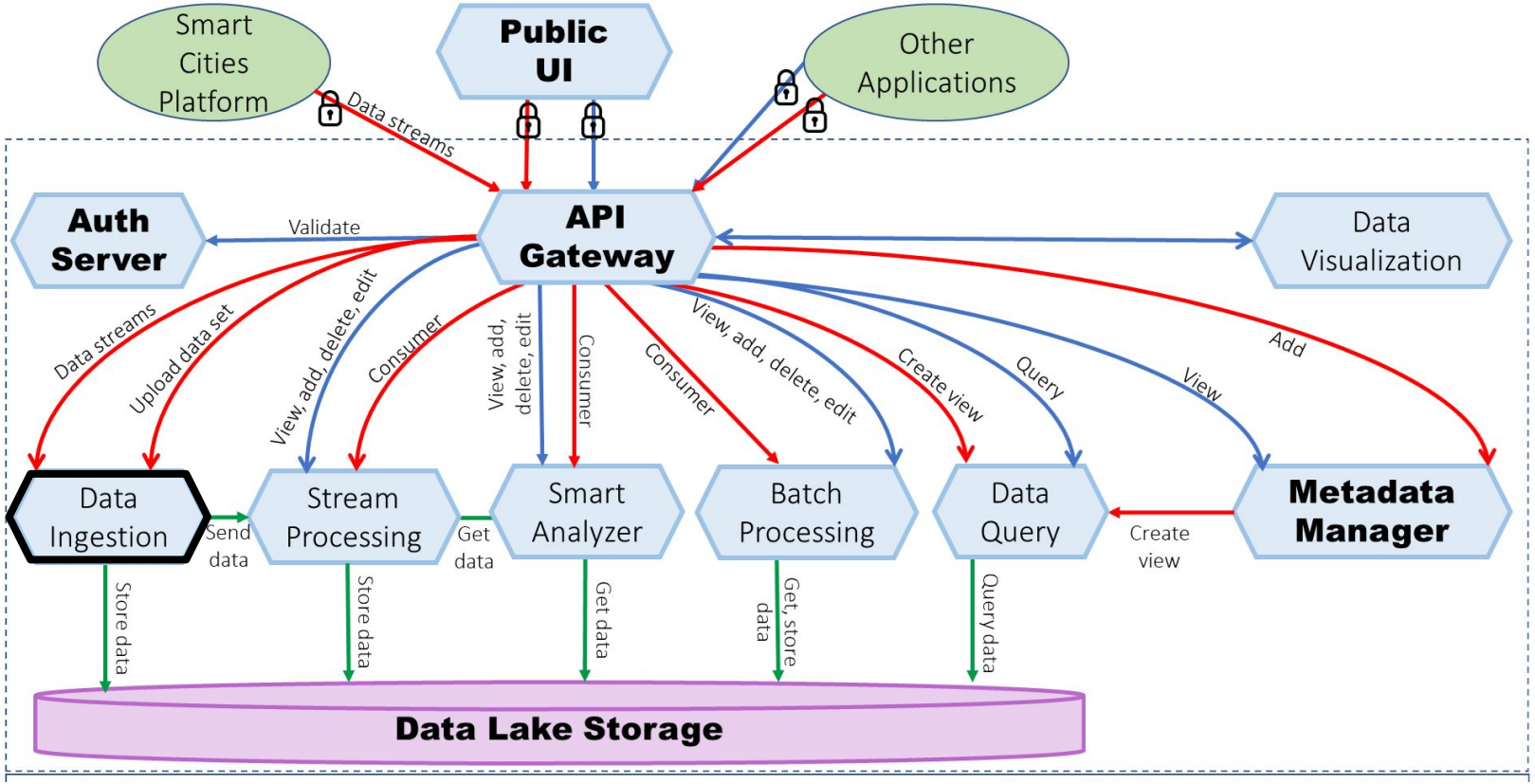

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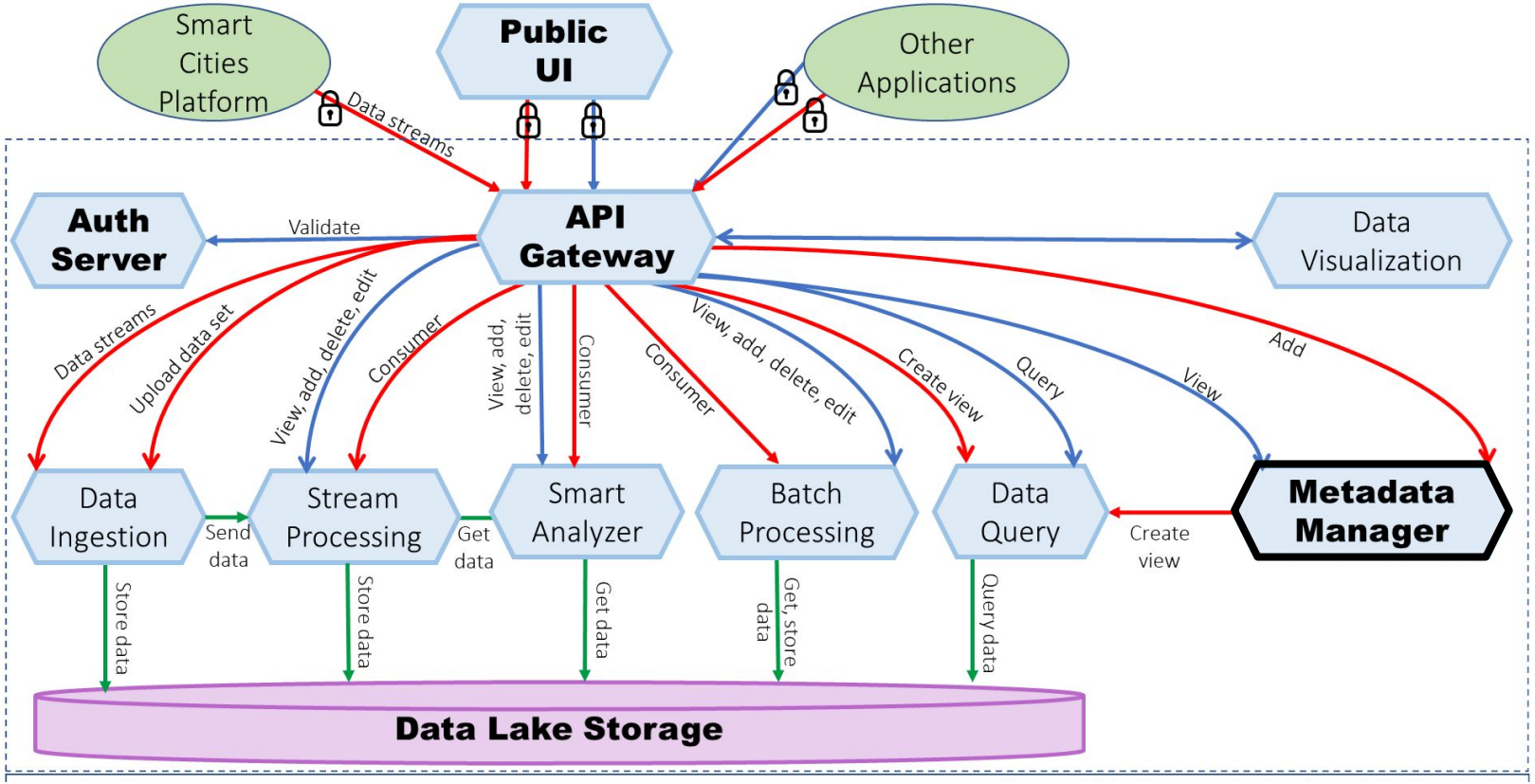

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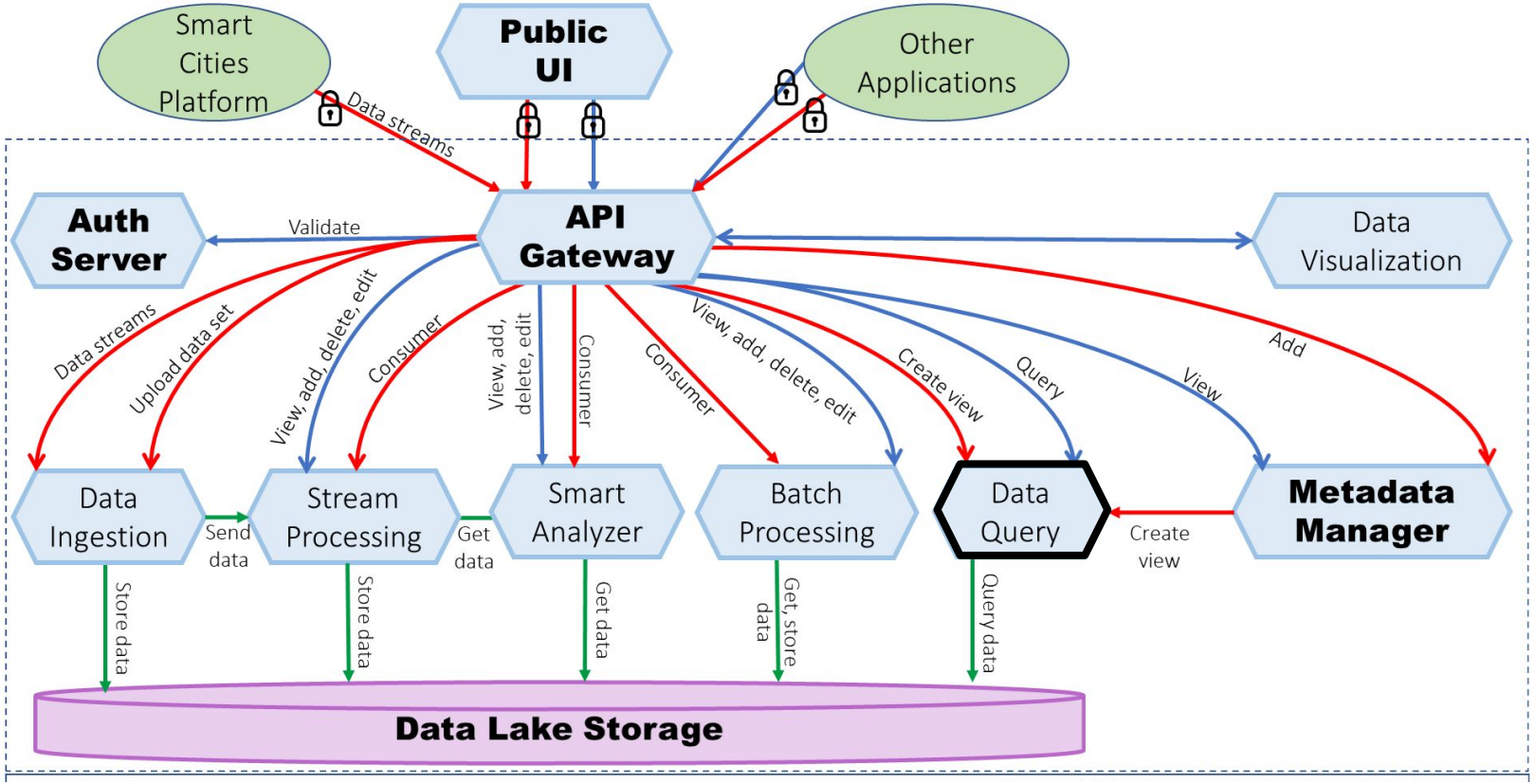

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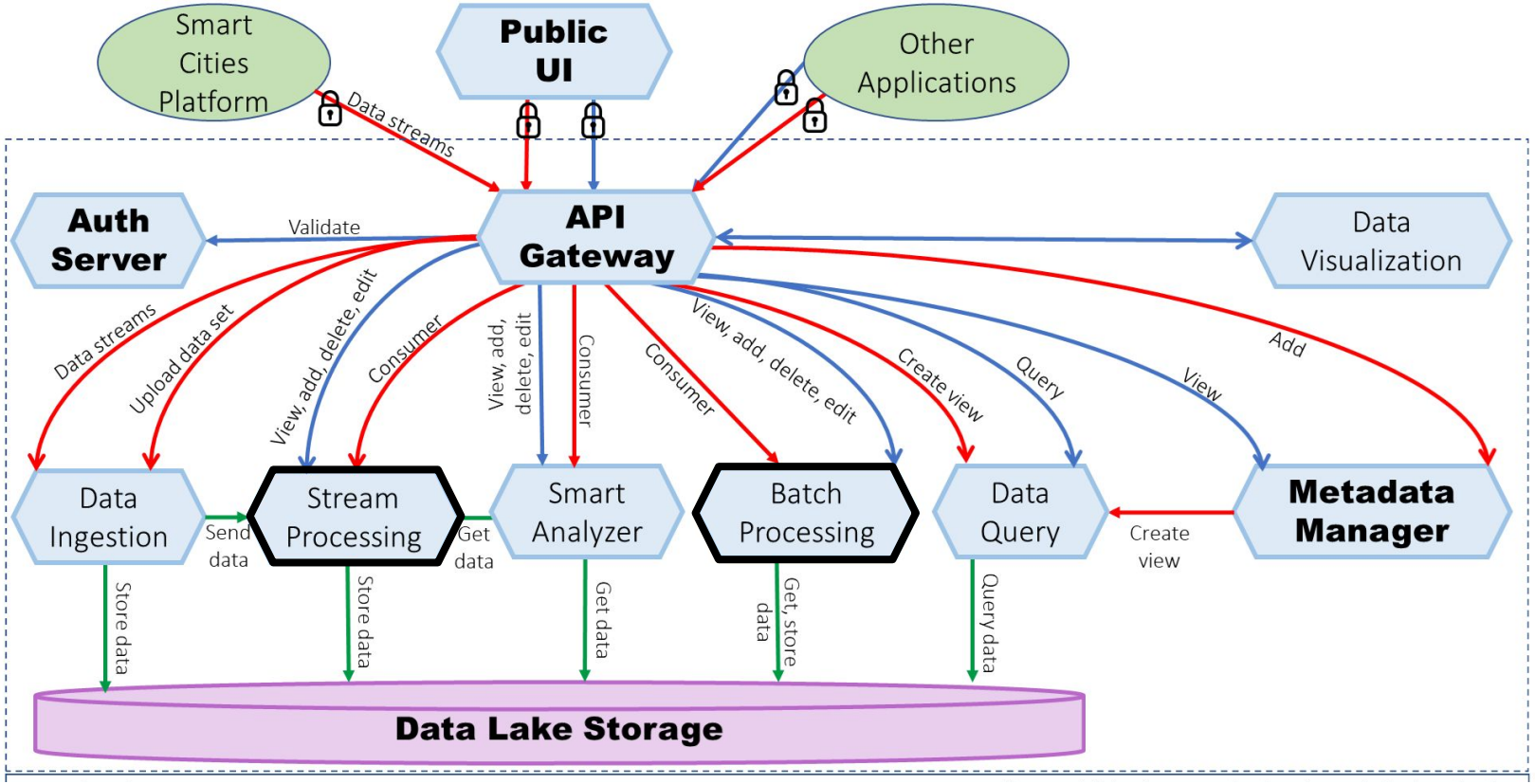

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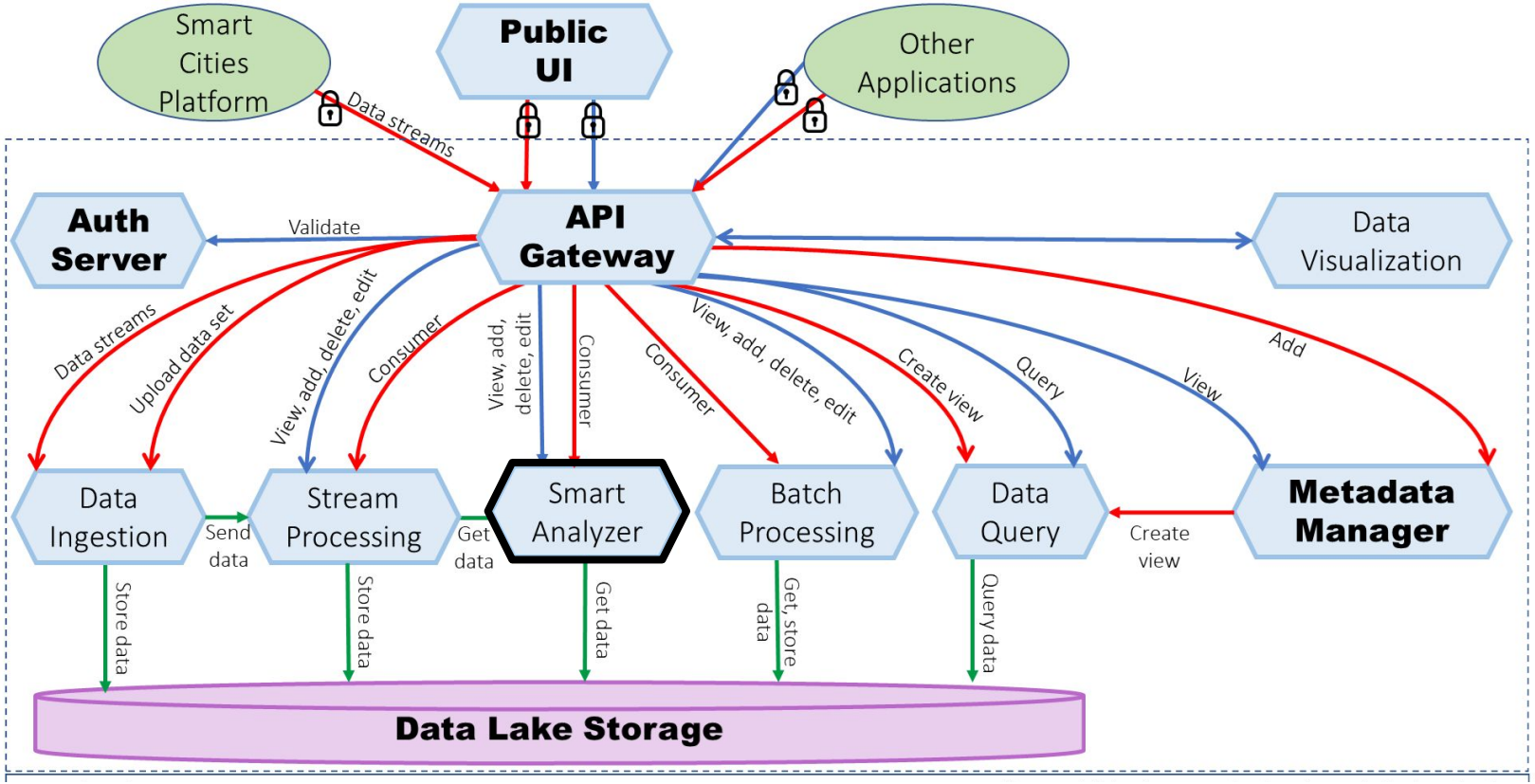

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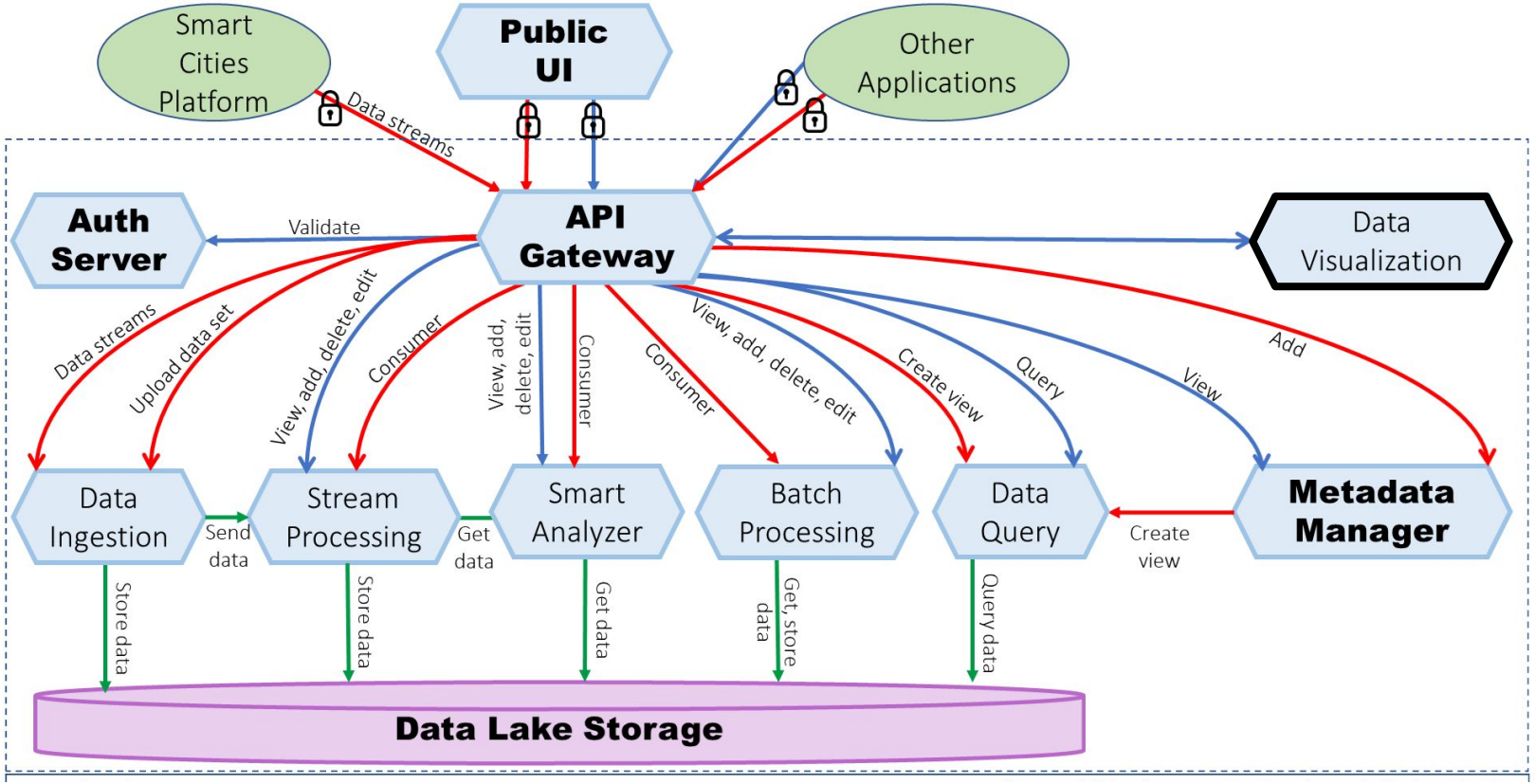

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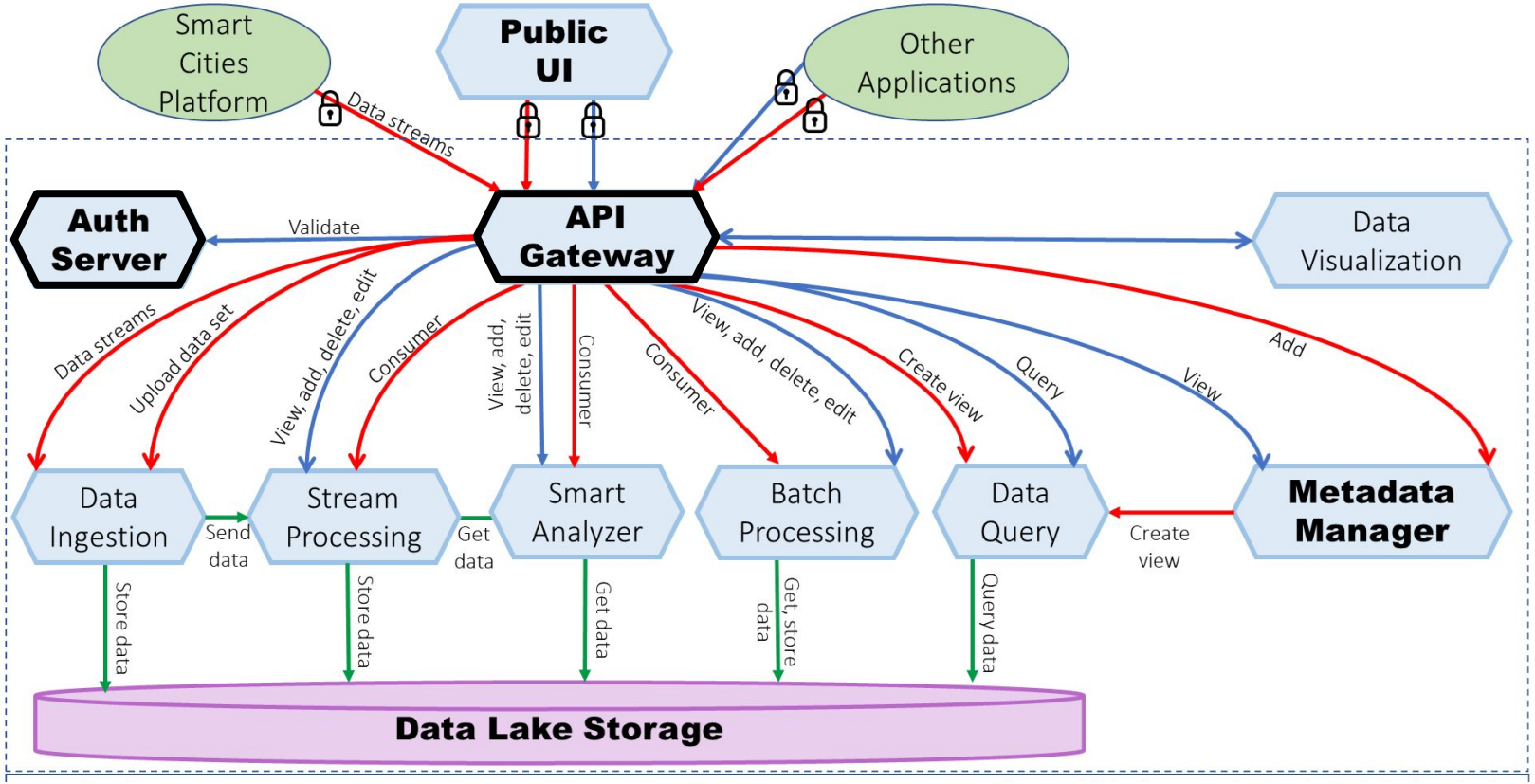

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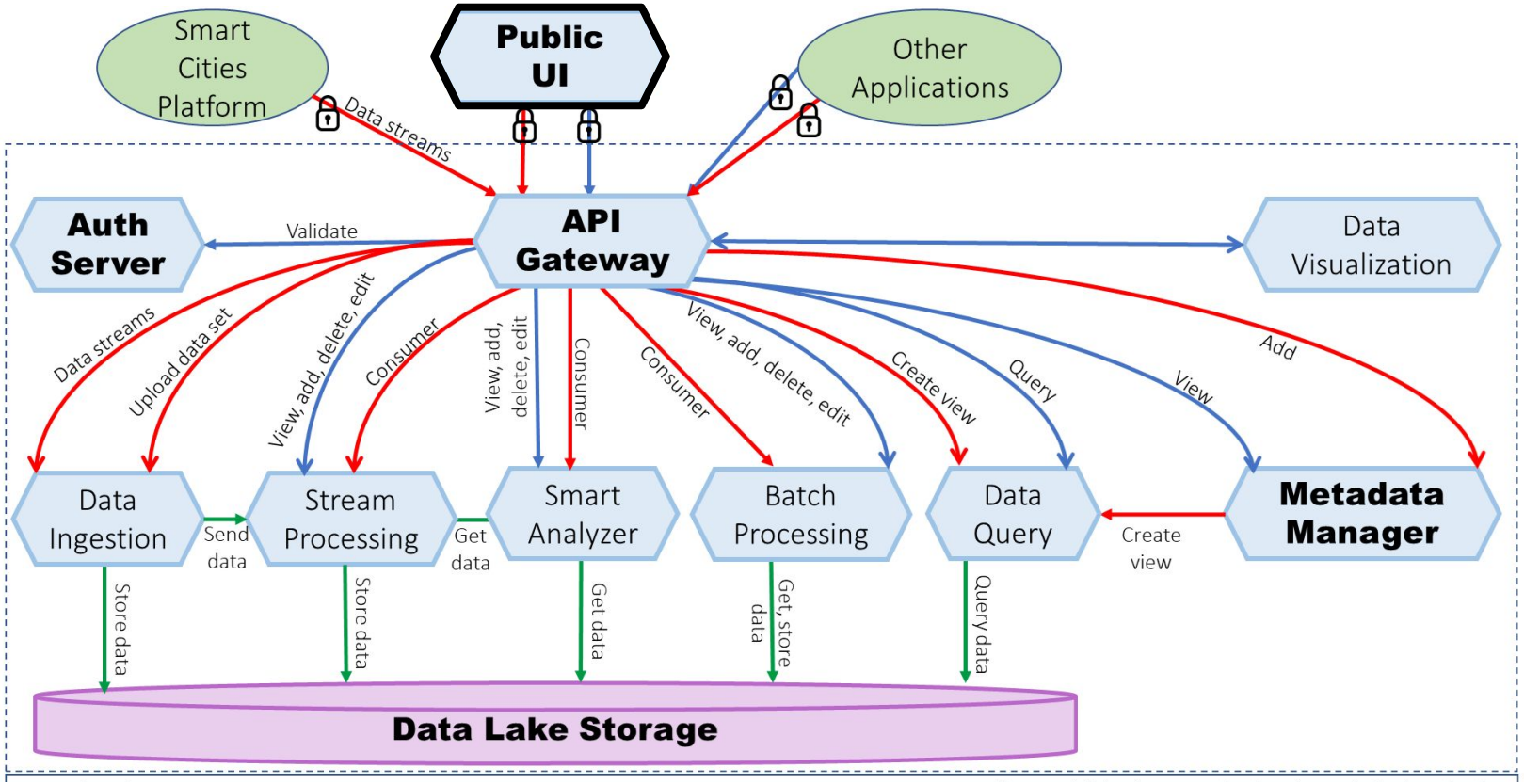

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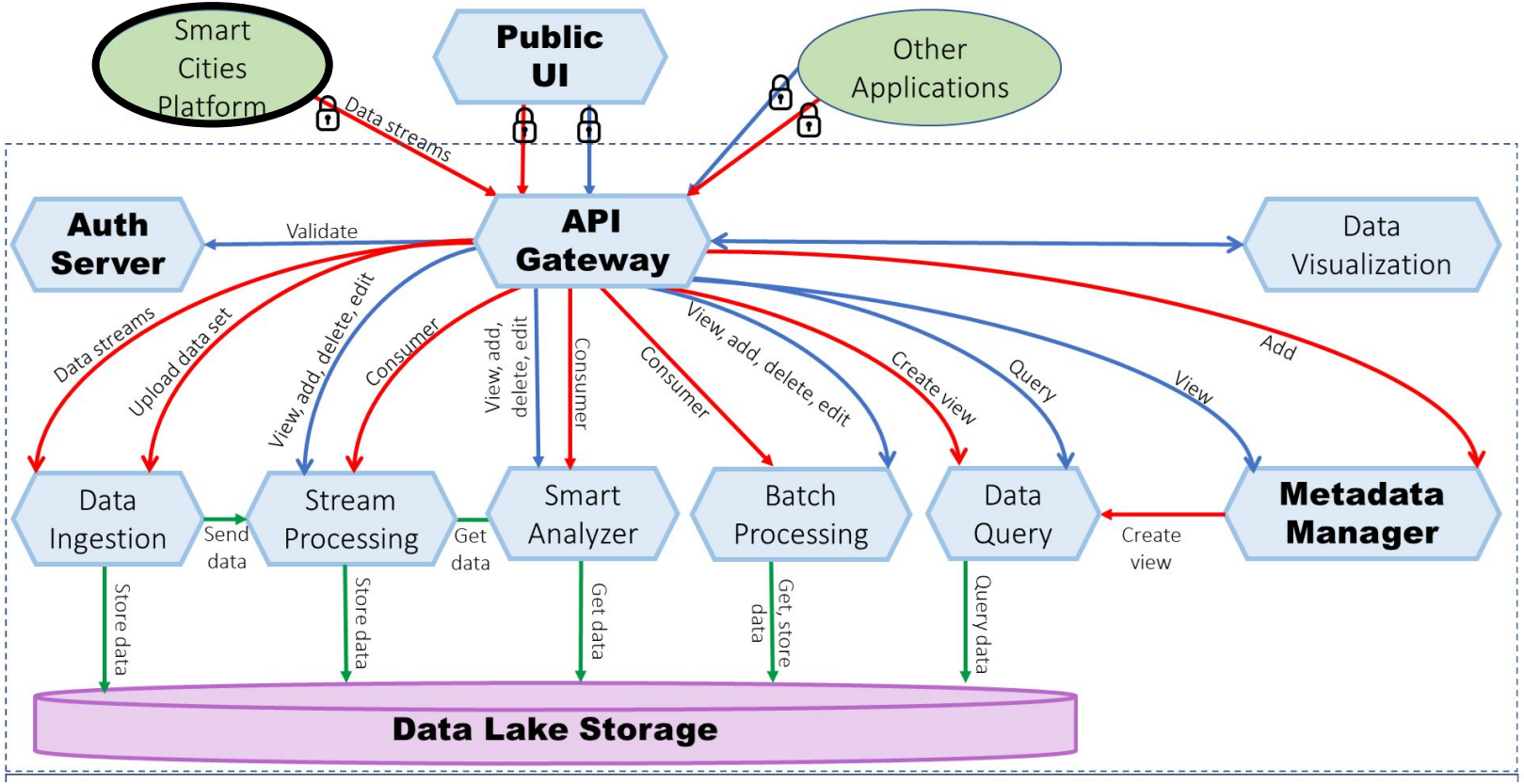

Unique Features

- Single point of access to microservices by external applications
- Authentication and access authorization service
- Centralized interface for the services
- Creation of new data collections based on existing ones
- Compatibilization of data in collections that have suffered structural or semantic changes over time

Performance Evaluation

- Guideline based on the Cloud Evaluation Experiment Methodology (CEEM) [Li et al. 2013]
- Set of experiments designed to:
  - Measure the microservice's performance under normal workloads
  - Identify the maximum number of users and concurrent requests that a single instance can handle
  - Assess the capacity of the microservice to self-adjust to the current workload, increasing or decreasing the number of instances

Contributions

- A panorama of the requirements of data integration for smart cities and state-of-the-art solutions
- A Microservice architecture to integrate smart cities' data
- An (ongoing) implementation of the architecture on top of the InterSCity platform, using open-source tools
- A guideline to evaluate the performance of the architecture under both normal and above-normal workload conditions

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Thank you!!!

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