



ATLAS Webinar | +++  
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# Integrating AI-based Behaviour Analysis

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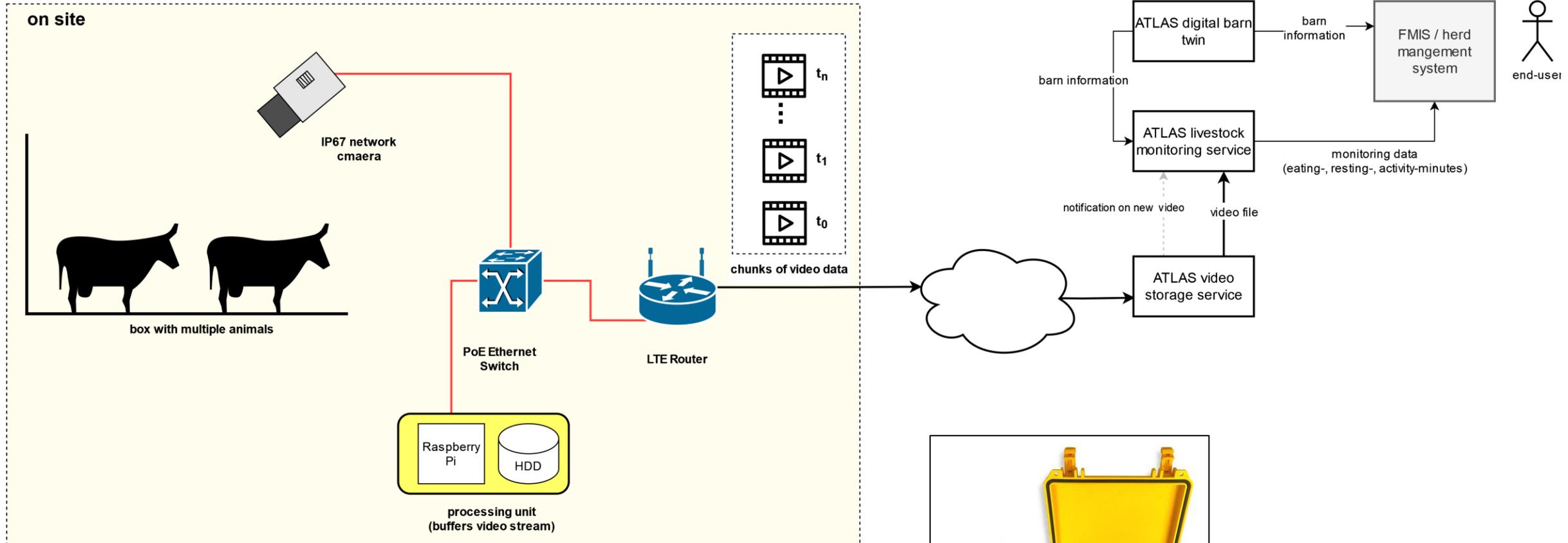


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# Behaviour Analysis

- ATLAS Service implementing the livestock\_monitoring template
  - Eating minutes
  - Resting minutes
  - Activity
- Behaviour analysis with video and AI in our case
  - The service template is **agnostic**, any sensor setup can be used
- Service delivers time series for the defined activities
  - queryable by start- and end time, and resolution
  - Integration with the digital barn twin

# System Overview



**ATLAS**  
AGRICULTURAL INTEROPERABILITY  
AND ANALYSIS SYSTEM



# Video Storage Service

- Cloud storage for large amount of video data
- Each camera comes with a unique client id
- Notification URL can be passed
  - URL gets called when a new video arrives



<b>list_videos</b> <i>mandatory</i> endpoint	
GET	/videos List available videos
<b>get_video</b> <i>mandatory</i> endpoint	
GET	/videos/{id} Retrieve information on a specific video.
<b>download_video</b> <i>mandatory</i> endpoint	
GET	/download/{id} Download a specific video.
<b>subscribe</b> <i>optional</i> endpoint	
POST	/callback register a notification url, that will be invoked when a new video is available for download
<b>unsubscribe</b> <i>optional</i> endpoint	
DELETE	/callback cancel a previously created subscription
<b>list_subscriptions</b> <i>optional</i> endpoint	
GET	/callback list the current subscriptions
<b>internal</b>	
GET	/upload Get help for video upload endpoint
POST	/upload Upload a video file

# Analysis Service

```
{
  "type": "eating",
  "unit": "number_of_animals",
  "timeseries": [
    {
      "date": "2023-01-12T14:02:00.000Z",
      "confidence": 0.5,
      "value": 15
    },
    {
      "date": "2023-01-12T14:22:00.000Z",
      "confidence": 0.7,
      "value": 10
    },
    {
      "date": "2023-01-12T14:42:00.000Z",
      "confidence": 0.7,
      "value": 13
    }
  ]
}
```

## livestock\_monitoring API 1.0.0 OAS3

[https://raw.githubusercontent.com/atlasH2020-templates/livestock\\_monitoring/v1/oas](https://raw.githubusercontent.com/atlasH2020-templates/livestock_monitoring/v1/oas)

The data returned by the service describes the activity of a group of animals or individual animals inside a pen

[Terms of service](#)

[Contact the developer](#)

[Apache 2.0](#)

### timeseries\_activity *Mandatory* Endpoint

[GET](#) /livestock/timeseries Get Livestock Monitoring Activity Entry

### timeseries\_capabilities *Mandatory* Endpoint

[GET](#) /livestock/timeseries/capabilities Get information on which type of timeseries can be returned by the service

### aggregated\_activity *Mandatory* Endpoint

[GET](#) /livestock/aggregated Get aggregated Livestock Monitoring Activity values

### discrete\_events *Optional* Endpoint

[GET](#) /livestock/discrete\_events Get Livestock Discrete Event Entry

### discrete\_events\_capabilities *Mandatory* Endpoint

[GET](#) /livestock/discrete\_events/capabilities Get information on which type of discrete events can be returned by the service

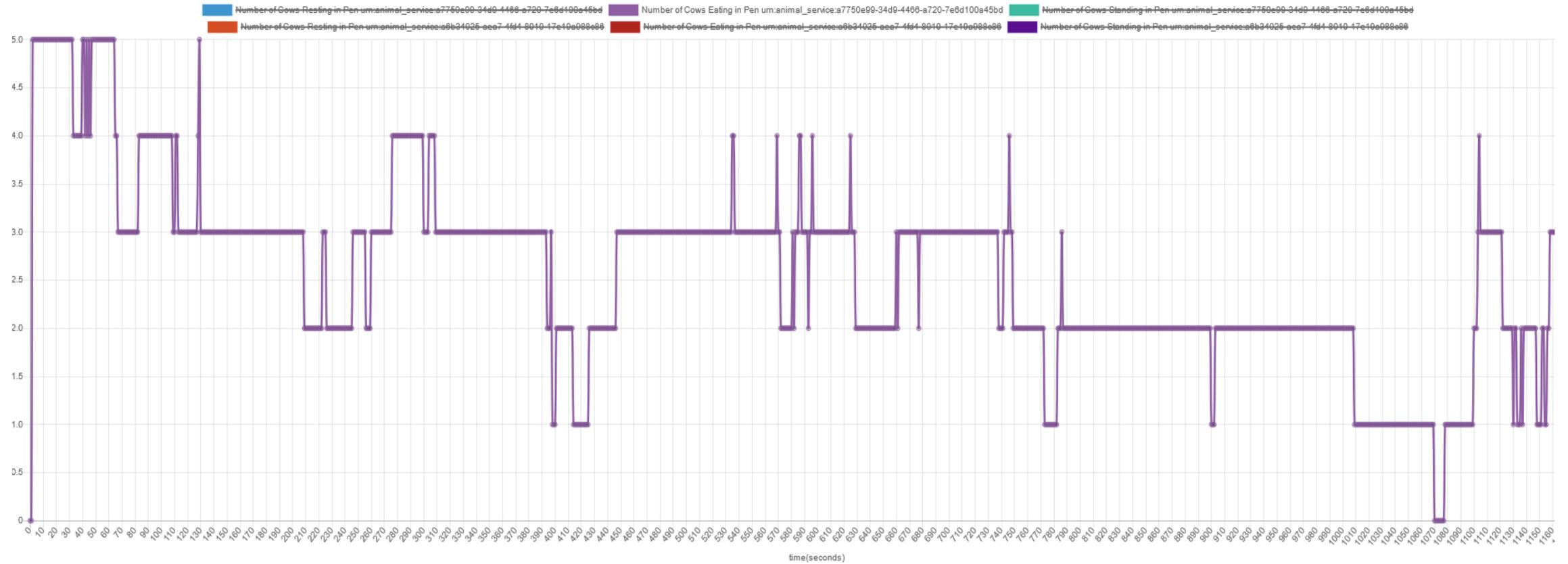
# AI-based measurement - Video



# Behaviour Analysis using CNNs

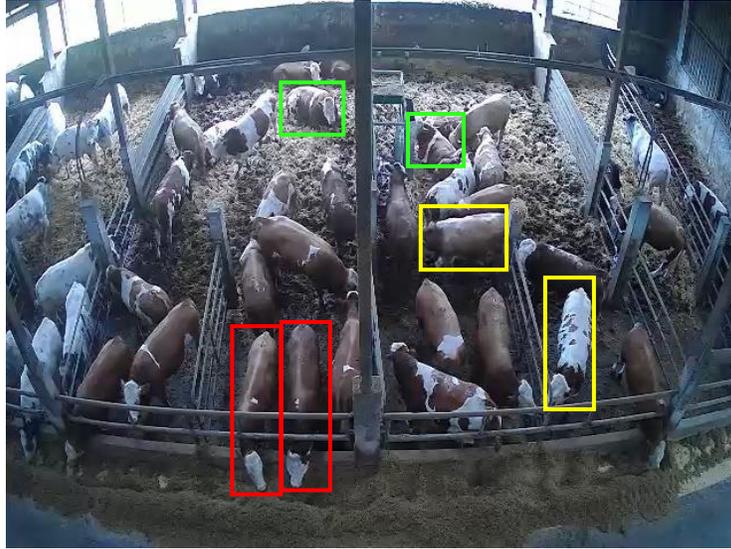
LIVESTOCK VIEW

Livestock Video Visualization



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# Training of the AI System



- Yolo v4 with Deep SORT
  - Transfer Learning approach
- Annotation of ca. 1.000 images needed



# Analysis Service Configuration

Client IDs  
Choose the client

Pen URNs  
Choose the pen

Pen ID  
0

Submit

Pen Urn	Animal Species	Client ID	Pen ID
urn:animal_service:9822d5a5-286a-4287-8dd4-c679286cdde1			None
urn:animal_service:93ab1e5b-01af-4150-a538-4c014fe9d17b			None
urn:animal_service:df3f6fd5-6a78-4b55-b398-bfb595afe719			None
urn:animal_service:df3f6fd5-6a78-4b55-b398-bfb595afe718			None
urn:animal_service:5bfb5b03-b040-4686-b26a-7b9a10f53fe0			None
urn:animal_service:a6b34025-aea7-4fd4-8010-17e19a988c86	cattle	a349d9ad-cc28-4c57-8887-1ee2cd20b593	1
urn:animal_service:1b9d6637-f327-48fd-a6da-4f5c9df0705b	cattle	None	None
urn:animal_service:a7750e99-34d9-4466-a720-7e6d100a45bd		a349d9ad-cc28-4c57-8887-1ee2cd20b593	0



# Analysis Service Configuration

- Configuration of image coordinates to pen-id
- Masking of non-relevant areas



# Conclusion

- Integration into the whole workflow is crucial and possible with ATLAS
- Video and AI has advantage of scalability
  - Training is needed
- Prototype system to demonstrate technology integration
  - Data transfer of large video data is still an issue
  - Edge computing is probably the solution



# Thank you!

<https://www.atlas-h2020.eu>

<https://github.com/atlasH2020>

<https://github.com/atlasH2020-templates/>

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