



iImagine UC5: FlowCam phytoplankton identification

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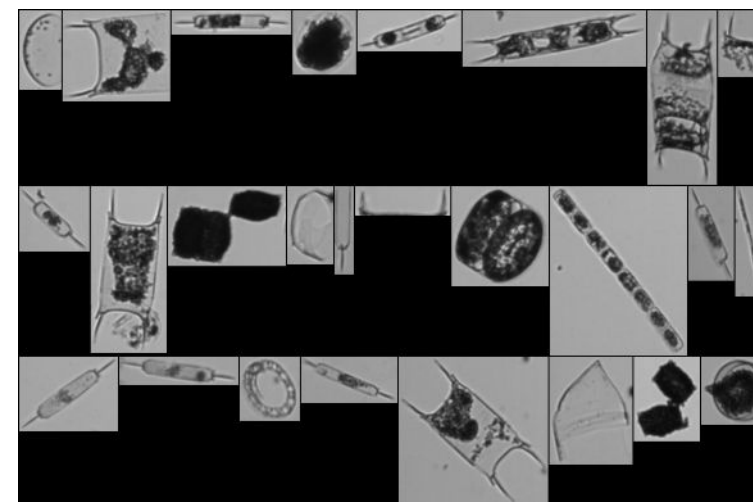
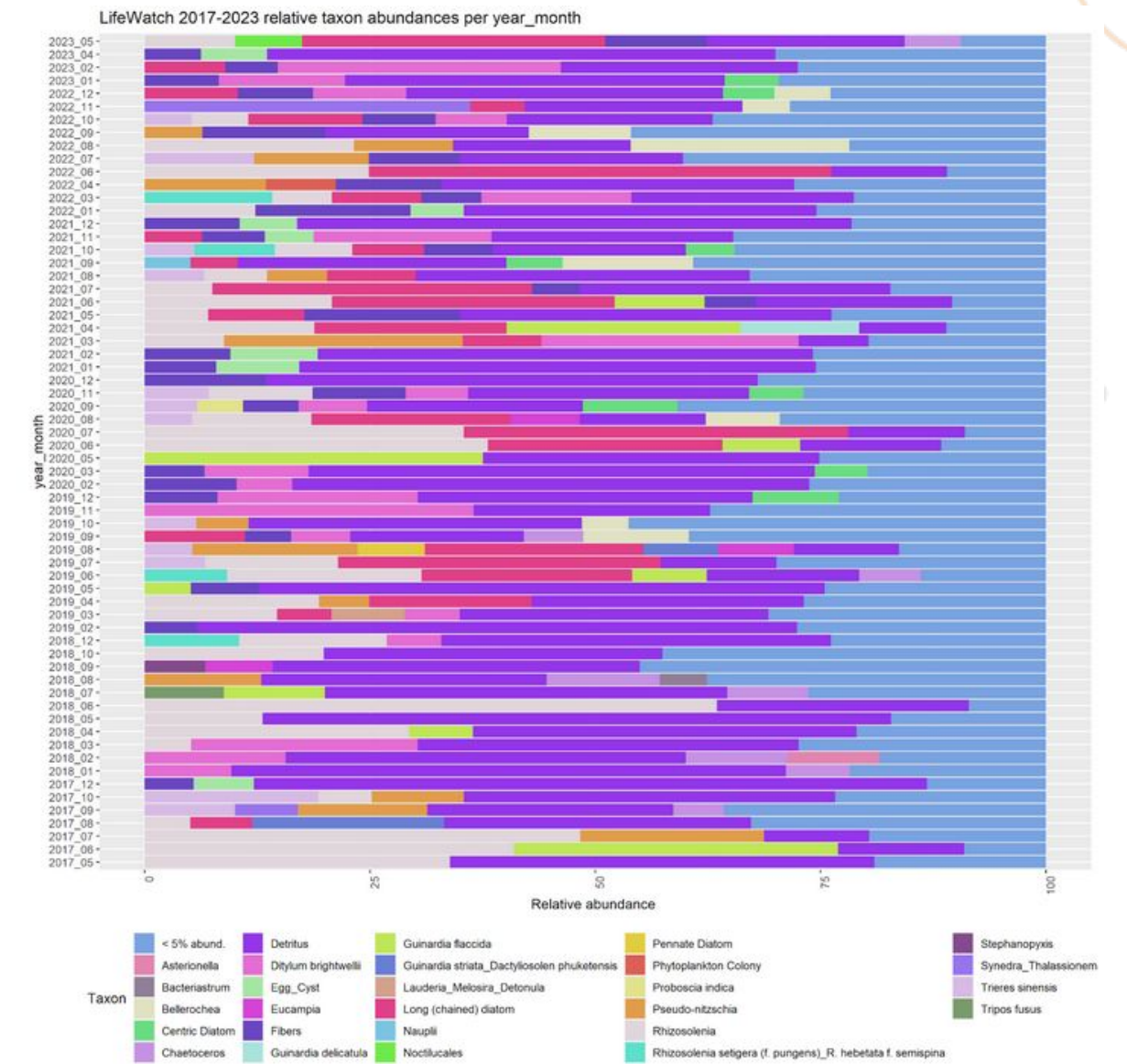
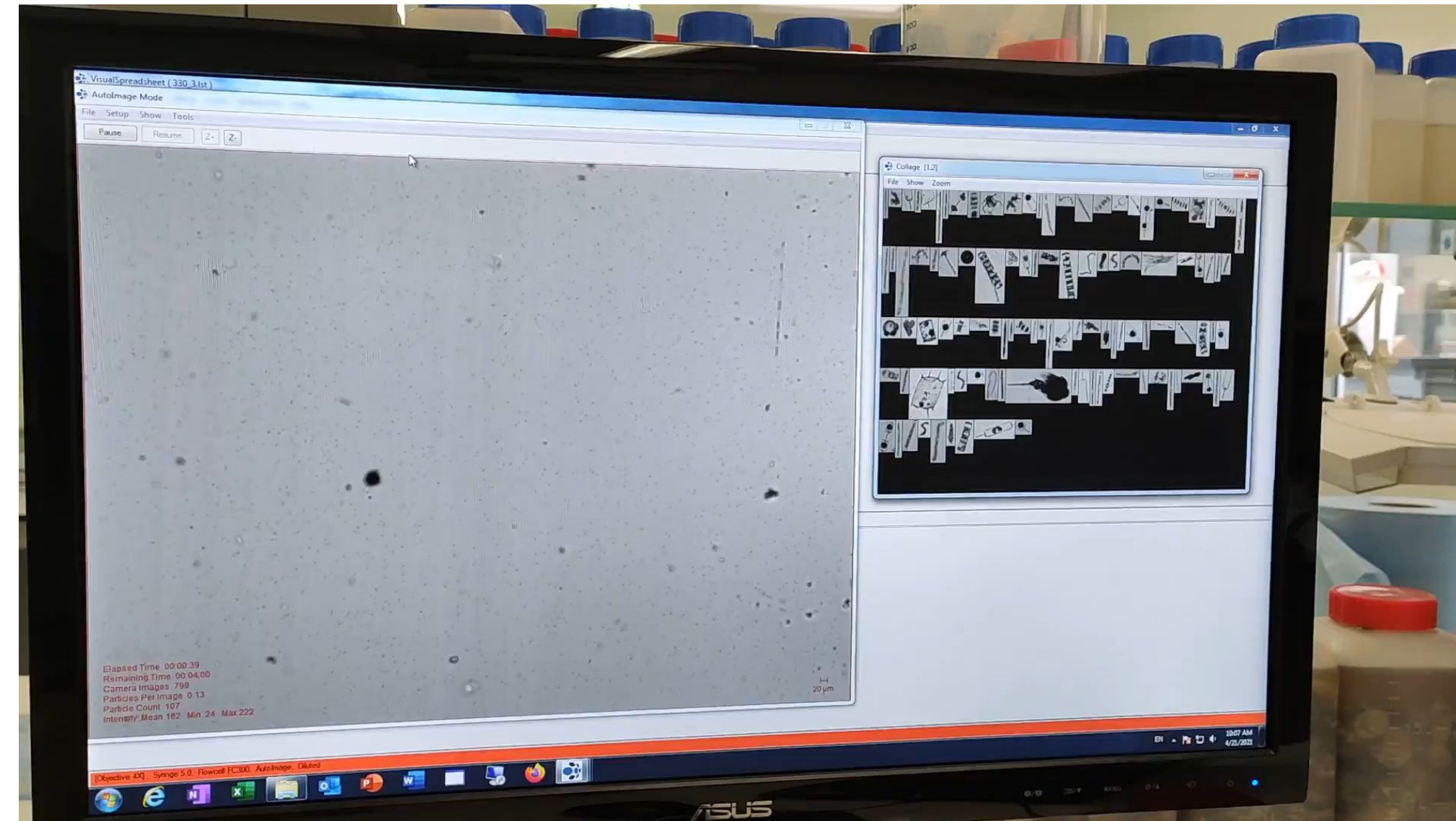
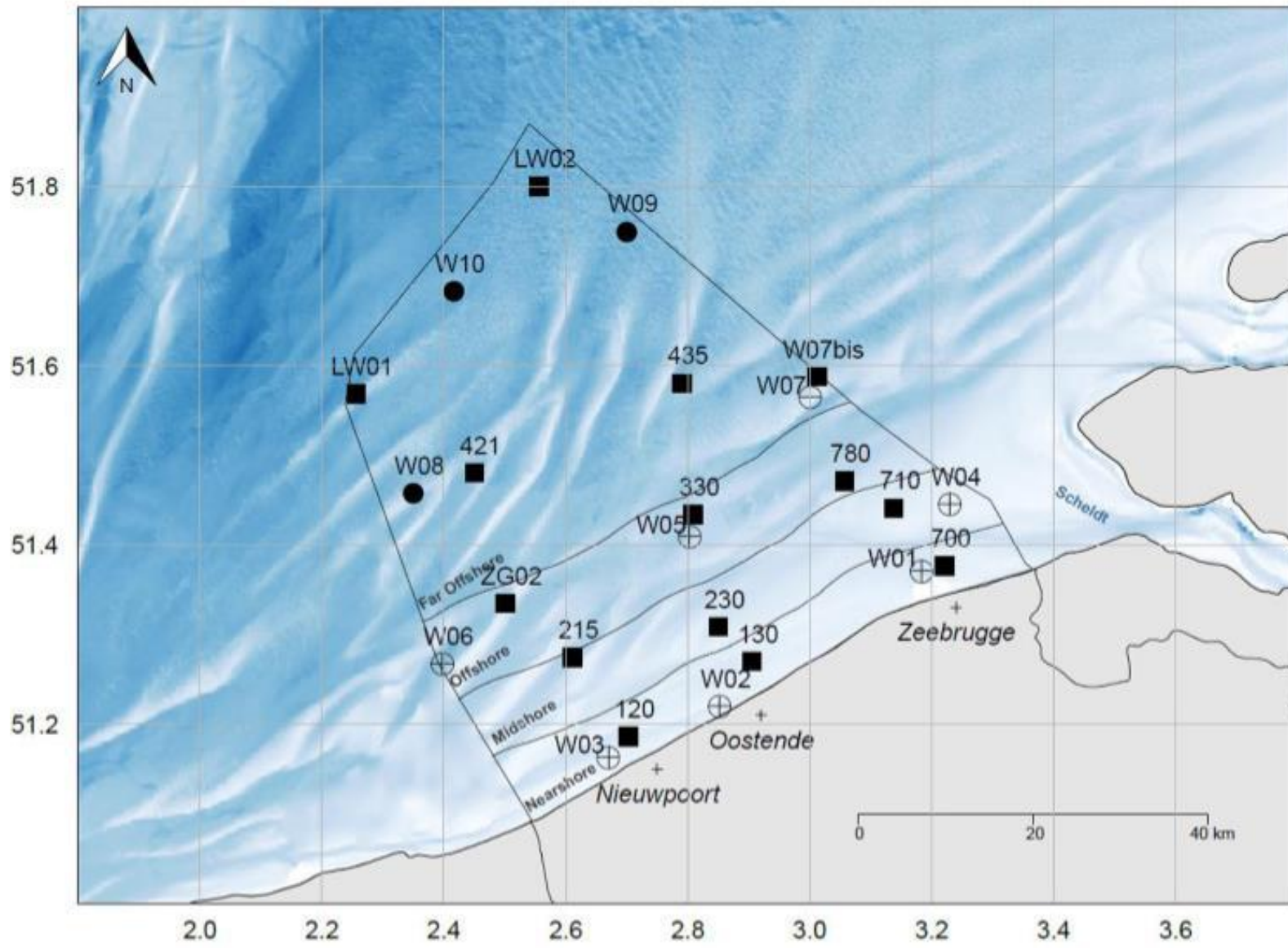
Flanders Marine Institute (VLIZ)

iImagine RP1 review
December 5th 2023



iImagine T3.5 State of the art UC5

To establish an operational service on the iImagine platform for ingestion, storage, analysis and processing of FlowCAM images for determining taxonomic composition of phytoplankton samples.





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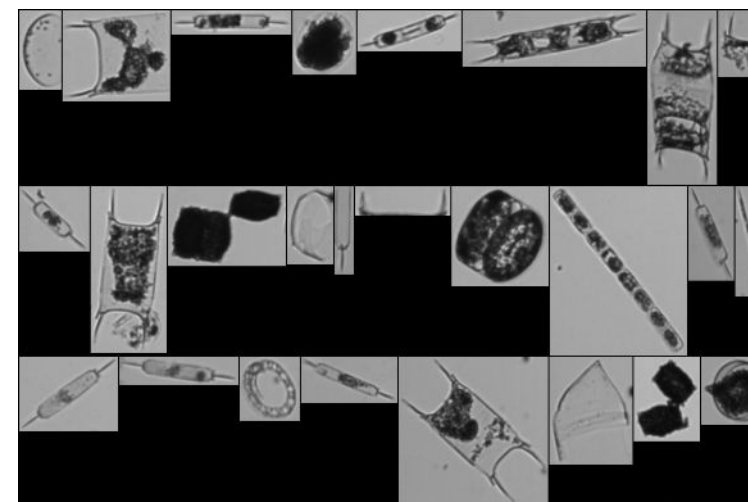
Starting point

5 years of biomonitoring data

- +1,2M images + metadata (sampling, lab processing, image parameters, classification, environmental)
- Classifiers and metadata (stats + config)
- Initial training set

Aggregated biological result data => archival in longterm repositories

In-house: database, hardware, tools, scripts, annotated images

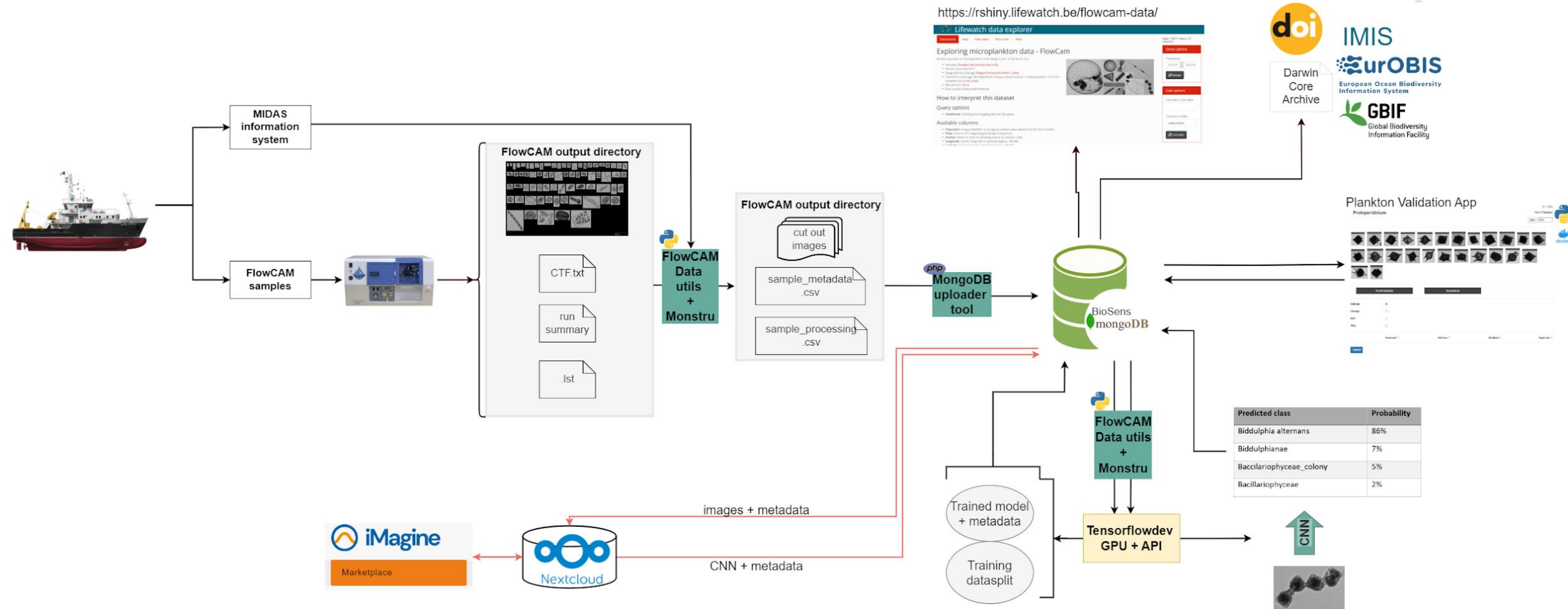


Aim

- Optimise existing data ingestion pipeline from sensor to database
- Improve current metadata & data output formats towards compliance with community-based standards and vocabularies
- Improve the service to incorporate the context input and increase the classification accuracy
- Extend the training dataset by identification of additional particles currently grouped under a rest class
- Prepare the data and processing components for connection, synchronization and migration to enable access from the iImagine platform



T3.5 Service architecture





iImagine First year progress and developments



- Data increase (1.2M => 1.8M images)
- Taxonomic review (incl. rest class correction & sorting)
- Service support to 4 affiliated and external users with lab protocols and image processing pipelines



- Prepare database for connection: restructuring and reformatting, improvement of data processing tools
- Prototype module development on iImagine platform
 - Scripted uploading trainingset to Nextcloud
 - DL model code repository connected to iImagine platform
 - Updated outdated modules



iImagine Experience with the iImagine platform

The screenshot shows the iImagine marketplace dashboard. The main content area displays the 'Phytoplankton species classifier (VLIZ)' module. The page includes a header with the iImagine logo and 'Marketplace' button, a sidebar with 'Other links' (Identity and Access, iImagine AI platform documentation, Project page), and a main content area with the following details:

Module	Build status	License	Created
Phytoplankton species classifier (VLIZ)	build passing	MIT	2023-08-10

Identify the species level of Plankton

Phytoplankton species classifier is an application to classify phytoplankton, features DEEPaaS API.
Provided by VLIZ (Flanders Marine Institute)

Categories

- docker
- api-v2
- vo.imagine-ai.eu

Additional Resources

Get the code

- Github
- Dockerhub

Get the data

- Dataset

The iImagine platform dashboard is a service provided by CSIC, co-funded by iImagine

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- User friendly
- Clear documentation and tutorials
- Efficient user support communication and follow-up
- Continuous improvement through regular updates
- Adequate storage space and computing resources for current needs



iImagine User stories and planning year 2 & 3



US1: User retrains existing model on new training set + runs predictions (e.g. sediment researcher) [85% completed]

- Low experience level user uses model
- Improving user interface and documentation

US2: User can assess need for additional post-prediction validation [50% completed]

- Exploring class-based thresholds based on metrics (e.g. 95% cut-off for certain group)
- Notebooks to visualize metrics, cut-off ratios and confusion matrices
- Define cut-offs for groups



US3: User of different instrument versions can use our training set through image transformation and augmentation (e.g. grey scales) [25% completed]

- Experiment with different image transformation and augmentation
- Performance assessment

Other related tasks and developments planned:

- UI/UX: Continuous improvement and development



imagine-ai.eu



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