NIVA – NEW IACS VISION IN ACTION

NIVA Innovations: Use Case descriptions

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Innovation 1: Use Case 1A - Earth Observation traffic lights for parcel-based administration

Description of main innovation

Decision support system for Paying Agencies. Uses Sentinel-2 data and LPIS[1] parcel boundaries to monitor crop type and parcel boundaries. The traffic lights are to indicate whether the declared crop is really present on the field: green = observed and declared crop match; yellow = doubt about the match; red = no match.

Why this use case?

Using Remote Sensing data and a DSS (Decision Support System) is cheaper and less time-consuming for a Paying Agency than farm visits.

Who benefits most?

1. The PA: less costs for the OTSC
2. The farmer: less controls on the farm and less mistakes

Preconditions

1. Processed Remote Sensing data must be available
2. Remote Sensing data must be useful and crop recognition algorithms must be of decent quality
3. LPIS parcel boundaries must be available

Main success scenario (example)

1. Farmer or land owner sows a cover crop for winter
2. Farmer enters the crop species, sowing date and other information into IACS
3. Processed remote sensing data from SEN4CAP is imported in the DSS
4. Business rules for red, yellow and green are set and executed on the imported data.
5. The parcel shows green for the sown cover crop; it is recognized and matches the claim of the farmer.
6. Farmer receives according CAP payment if applicable.

[1] Land Parcel Identification System

More information

Title:	EO Traffic lights for parcel based evaluation
Developed by:	OPEKEPE, NEUROPUBLIC
Description of main innovation:	A crop type and area monitoring system (NIVA DSS) that is set up as a decision support system for PAs to make most of capabilities of remote sensing. The NIVA DSS uses inputs from Remote Sensing processing and LPIS parcel boundaries to translate these to traffic-lights (Green = matching observed crop type and declaration; yellow = doubt about the match; red = no match between crop type and declaration). With the DSS a PA or similar operator of a monitoring system, can import processed Remote Sensing data (for example from SEN4CAP or equivalent processing chain), and set business rules for determining red, yellow, and green parcels, executing them on an imported data set, and visualize the results, also on a parcel level. Ultimately the result files can be exported.
Description of main component:	The DSS consists of three main parts: 1. Decision Rule engine: This applies business rules to a Remote Sensing data set, prepared with links to LPIS and parcels, and it allows the configure the precise set up of the business rules; 2. Business Rule engine: This creates the business rules themselves from a set of options and definitions for crops, crop groups, land cover types, combined with color codes 3. Field view: the viewer on the DSS for the operator of the PA, in which the results of the decision rule can be visualized, with different filtering options for presentations and overviews.
Ancillary components:	Data import, Data Export and User Management
Implementation languages:	JavaScript (Angular) , Java, and SQL (PostGreSQL); A complete docker image is available
Test results	A test data set for Greece is developed with the NIVA DSS
Link to Gitlab repository:	https://gitlab.com/nivaeu/uc1a_dss

Innovation 2: Use Case 1B - Models for Soil carbon flux and nitrate leaching

Description of main innovation

Models that calculate carbon flux and nitrate leaching. Agro-environmental indicators for the CAP can be created with these models. The main outcome is a ready carbon indicator tool.

Why this use case?

Environmental impact of agriculture gets a prominent role in the new CAP and environmental indicators are needed. The tool helps to gain insights.

Who benefits most?

The policy makers; these calculators facilitate their need for an accessible monitoring instrument for their environmental indicators.

Preconditions

1. LPIS data available in the right format
2. NDVI time series available in right format
3. Crop must be one of the crops included in the models

Main success scenario (example)

1. User (farmer) performs an environmental action (sows cover crop)
2. Farmer submits claim for cover crop
3. Optional: claim is controlled with other NIVA use case tools
4. PA checks data
5. PA calculates carbon storage with the carbon indicator tool
6. Farmer gets payment

More information

Title:	Agro-environmental indicator calculators: Carbon (Tier1 at parcel level, Tier1 at pixel level, Tier2), Nitrate leaching (Tier1)
Developed by:	ASP, INRAe, IGN
Description of main innovation:	The Carbon calculator estimates empirically the Net Ecosystem Exchange (NEE), i.e. the net annual CO2 fluxes including CO2 absorption by photosynthesis (of catch crops eventually followed by cover crops) and the

	losses associated to plant and soil respiration, at plot scale for cropland. This is one of the components of a carbon budget for the soil, and thus a first step towards calculating the carbon footprint of crop farming and grass land. The approach is based on a relation that has been established between the number of days with active vegetation cover in the cropping year and the NEE (see Ceschia et al. 2010). In this study, the relation has been built based on 15 European sites with 13 different catch crop types (straw cereals including winter wheat, spring wheat, winter barley, spring barley, triticale, rye, maize, sorghum, pea, rapeseed, sunflower, potato, sugar beet) eventually followed by cover crops/weeds/spontaneous regrowth. The calculator is available at 2 levels: Tier1 and Tier 2. While Tier1 is a basic indicator that requires only IACS and Sentinel 2 data , Tier2 is more complex to implement as it requires information on agricultural practices from FMIS at parcel level. The Nitrate leaching calculator Tier1, that is calculated on a couple of consecutive agricultural years, accounts for the effect of the nitrate mineralisation due to the first year crop of and the nitrate uptake of the second year crop. The leaching risk is deduced from the balance between mineralization and uptake.
Description of main component:	The Carbon calculator Tier1 uses parcel data from IACS systems/LPIS and processed NDVI time series from Sentinel 2 Imagery on a parcel basis to calculate the net annual CO_2 fluxes based on indicators per crop and a crop type list. Ancillary components: Farm/Region Aggregation Component, NDVI data processing component IACS data preparation. Results can be calculated for the parcel or can be displayed at pixel level of the raster input. Carbon calculator Tier2 uses as input the results of the net annual CO_2 flux from the Carbon calculator Tier1 and FMIS data at parcel level in order to calculate the Carbon budget. The relevant FMIS data to perform the calculation concerns all carbon import and export at parcel level due to farmer practices: - Import: Type and quantity of fertilizer (t/ha) (compost, manure) - Export: Type and quantity of plant part exported (grain, straw). Generally, the carbon balance can be expressed as: Carbon Balance = Carbon Flux + *a**Import – *b**Export Where *a* and *b* are proportionality parameters that depend on the import and export types. A table of all parameters is provided with the Carbon Tier2 but does not need to be manipulated by the user explicitly.

	The Nitrate leaching calculator Tier1 uses data from IACS systems/LPIS and NDVI data, in a similar fashion that the carbon calculator does. The indicator is calculated at the pixel level. Nitrate mineralization and uptake that depends on the crop sequence (previous crop/crop) is obtained from a table of parameters that is provided with the calculator but does not need to be manipulated by the user explicitly. Nitrate mineralization and absorption due to the presence of catch crop is deduced from the NDVI value during the intercultural period.
Ancillary components:	Farm/Region Aggregation Component, NDVI data processing component (potentially based on SEN4CAP), IACS data preparation
Implementation languages:	Python scripts for the main component
Test results	The scripts for Carbon budget calculator Tier1 at parcel level have been tested for 3 regions in France, one region in Spain and for the whole Netherlands. The application of the scripts is straightforward if LPIS data and NDVI time series are available in the right formats. The scripts for Carbon budget calculator Tier1 at pixel level have been tested for 2 regions in France (Ain and Occitanie). The scripts for Carbon budget calculator Tier2 are ready to be tested in France and in other Member States in the incoming weeks. The scripts for Nitrate leaching calculator Tier1 have been tested for the Occitanie region in France.
Link to Gitlab repository:	"Carbon calculator Tier1 at parcel level is available at: https://gitlab.com/nivaeu/uc1b_tier1_co2 . Carbon calculator Tier1, Tier 2 and Nitrate Tier 1 at pixel level are available at: https://gitlab.com/nivaeu/uc1b_indicators_tool ."

Innovation 3: Use Case 1C - Farmer Performance: FMIS data sharing API

Description of main innovation

Standardized data exchange between IACS and FMIS (Farm Management Information Systems), to compute farm performance indicators.

Why this use case?

FMIS are rich in data and a single point of reference for farmers. Standardizing exchange of data between FMIS and IACS reduces the administrative burden for farmers (no re-entering of data from one system to the other).

Who benefits most?

The farmer benefits, since he does not have to fill in information that is already there in the FMIS. As the information in the FMIS is right, the risk of filling in the wrong information is minimised with the standardised exchange.

Preconditions

1. The farmer uses a FMIS system
2. The farmer must allow to share FMIS data

Main success scenario (example)

1. User (farmer) does farm operations and manually or automatically enters data into FMIS
2. PA uploads data from FMIS into IACS with the open API component
3. PA receives data
4. Farmer receives according CAP payment

More information

Title:	IACS-FMIS data sharing API
Developed by:	ARIB, UT
Description of main innovation:	To compute farm performance indicators, a bi-directional standardized data exchange between Integrated Administration and Control Systems (IACS) and other applications, in particular Farm Management Information Systems (FMIS) type of applications will be established. As farmers keep most of their data in FMIS systems with respect to the crop and livestock management, these are potentially rich resources of relevant data and a single point of reference for

	farmers, avoiding administrative burden of re-entering data for different purposes. Also more and more farmers are switching to FMIS for keeping track of their farms activities or decision support. Currently, exchange of data between IACS and FMIS is mostly manual, file-based and not standardized.
Description of main component:	IACS-FMIS-data-sharing-API component is a REST API micro-service that supports bi-directional data-requests between an IACS and FMIS, implemented on the side of the IACS. The FMIS can request data from IACS through the API, while also IACS can receive data from the FMIS. The data exchanges have been standardized through the adoption of the eCrop standard. A farm ID is used to structure the API requests.
Ancillary components:	In addition to REST API component, which is already available, there are additional components in development phase – database component, farm typology component and farmer performance dashboard component.
Implementation languages:	Nest.js application, runs in Docker container. User interface foor testing the API's– Swagger, with data-exchanges in JSON format, datastructure is based on eCrop standard.
Test results	Functional, integration and system testing has been carried out between an IACS and FMIS system, with data streams validated between applications. Testing results are documented in Confluence. Application of the API requires commitment of and integration with both an IACS and an FMIS.
Link to Gitlab repository:	https://gitlab.com/nivaeu/uc1c-public-api

Innovation 4: Use Case 2: Automatic parcel boundary delineation

Description of main innovation

Algorithms for automatic preliminary parcel boundary detection, based on Sentinel-2 data. Farmers use a GeoSpatial Aid Application (GSAA) to submit parcels, boundaries and crops.

Why this use case?

The automatic detection provides additional data for the farmer's application to avoid errors in the application. This lowers the administrative burden for the farmer and for the Paying Agency.

Who benefits most?

3. The farmer
4. The PA

Preconditions

1. Previous year GSAA parcels spatial data
2. Algorithm is available for each crop or crop group

Main success scenario (example)

1. Farmer does yearly application of crop type, parcel boundary and parcel information.
2. Application form with pre-filled previous year GSAA data enriched with automatically delineated boundaries, early stage crop type classification and automatically copied data from other institutions.
3. Farmer confirms application form during application submission.
4. PA receives correct data with less errors and faster administration process.
5. Farmer faster receives maximum of CAP payment.

More information

Title:	Preliminary parcel boundary automatic delineation
Developed by:	NPA, Sinergise, iTREE
Description of main innovation:	The development of the algorithms for the automatic detection of the parcel boundaries based on Sentinel-2 data. Farmers use a GeoSpatial Aid Application (GSAA) to submit parcels (incl their boundaries) and the crops on the respective parcels to Paying Agencies. Through the Algorithms for automatic detection, farmers will be provided additional data for the application submission to avoid errors in their applications, thereby lowering their

	administrative burden. Also Paying Agencies will get less errors in the farmers' applications, thereby having less administrative burden. The automatic detection of Parcel boundaries is based on pre-processed Sentinel 2 data into grid based 10x10m resolution pixels with indicators like NDVI and the application of deep learning algorithms to learn from past GSAA application parcels.
Description of main component:	Preliminary-parcel-boundary-automatic-delineation component is based on a machine learning model on prepared GSAA parcels in a shapefile and Sentinel 2 data preprocessed to indicators through SEN4CAP or equivalent. Once the imaging data and reference labels (i.e. rasterised GSAA parcels) are prepared, a convolutional deep learning model will be trained to extract from images features relevant to the parcellisation (segmentation) of agricultural fields. Training of the model will aim to maximise the similarity between the output of the network and the reference GSAA delineations.
Ancillary components:	Robot Framework for additional data, GSAA and Sentinel data preparation workflows, early stage crop type classification.
Implementation languages:	Python 3.5+, with the creation of a Python package that includes all required Python dependencies. In addition, docker containers, PostgreSQL and the gdal geospatial processing library are used for data pre- and post-processing
Test results	A test models was trained in Lithuania for data in 2019, with a strong correlation valuations on classification agreement, and subsequently applied for 2020 and 2021 in Lithuania and test regions in Spain, Castilla y Leon and Andalusia.
Link to Gitlab repository:	https://gitlab.com/nivaeu/uc2_fielddelineation

Innovation 5: Use Case 3: Standardize Farm Registry data models across EU

Description of main innovation

Standardizing Farm Registry, using a common Data Model with common definitions and common code lists.

Why this use case?

An internationally standardized Farm Registry allows to share and compare information across Member States. Sharing information helps to learn, innovate and create statistics and indicators.

Who benefits most?

The PA and policy decision makers. When the Farm registry is standardised, it become easier to make reliable comparisons cross borders.

Preconditions

1. PAs of Member States must be willing to adapt their IACS / data models for standardization

Main success scenario (example)

1. PA from country A creates a new indicator
2. PA from country B likes the indicator and starts using it too
3. PAs process data
4. PA/EC or scientist draws easy statistics from both countries and compares them

More information

Title:	Farm Registry
Developed by:	FEGA, CAPDER, TRAGSA & TRAGSATEC
Description of main innovation:	Data structures for storing data as part of an IACS are often different across EU member states, and sometimes within member states due to different regional implementation. A common Farm Registry reference data model and common definitions and common code lists, help to standardize and set the base for a cross border Farm Registry. This provides comparable data from different PA's in order to exchange information and to obtain statistics and indicators. It will also allow sharing innovative components from one IACS system to another, to ensure a faster uptake of innovations at lower costs, as less modifications and adaptations are required. Such a Farm Registry can only be

	adopted if it has the 'buy-in' or community acceptance, to ensure that it can be applied in many different IACS.
Description of main component:	The Farm Registry component is based on a Farm Registry Data Model for agricultural areas and updating and consulting interfaces (web services) to exchange information, and potentially modify, delete or add records. Standard coding and unique identifiers have been implemented to ensure that all objects in the data model can be traced and fully harmonized. Main data types enclosed are farm, farmer, parcel, land use, geometry, variety and crop management related information, with many secondary data types available
Ancillary components:	Data loading, data deletion and data updating as common operations
Implementation languages:	Java (with Maven, Spring, Hibernate & Swagger) for Webservices; PostgreSQL/PostGIS for data storage and JSON for data exchange
Test results	Different tests have been carried out. The data model has been validated conceptually in Spain and Estonia. An implementation with exchange services was tested for the Andalucía region in Spain.
Link to Gitlab repository:	https://gitlab.com/nivaeu/uc3

Innovation 6: Use Case 4A: Geotagged Photo App

Description of main innovation

The Geotagged Photo App allows Paying Agencies to request geotagged photos to resolve queries related to payment claims. For example when a higher resolution is needed to recognize a crop.

Why this use case?

To gather crop or parcel data that cannot be gathered with satellite images only.

Who benefits most?

The farmer benefits, since he has an easy to use tool to show the actual situation in situ.

The Paying Agency does not have to send someone on the spot to be certain.

Preconditions

1. The end user (farmer) must have a smartphone or tablet
2. There must be good GPS/location services where the picture is taken

Main success scenario (example)

5. User (farmer) sends CAP application
6. PA requests a photo of one of the fields because there were doubs about satellite data
7. User uploads geo-tagged photo of the field with app
8. PA receives photo and confirms that the information is correct
9. Farmer receives according CAP payment

More information

Title:	Geotagged photo app
Developed by:	DAFM, TSSG, TEAGASC
Description of main innovation:	The main purpose of the Geotagged Photo app is to allow paying agencies to send requests for geotagged photo's to end users (Farmers/Advisors). The geotagged photos relate to land parcels and the images are needed to resolve queries related to payment claims. Such a geotagged photo can be used when there is more data and information needed about the circumstances on a parcel, when such information cannot be retrieved directly from a satellite data set, due to lack of resolution or cloud cover. To ensure the maximum usability of the geo-tagged photo for the receiving party it is essential that the location of the picture taken is well logged, that the angle and position of the object

	photographed (once or multiple times) is well captured and that the origin of the photo is validated.
Description of main component:	The GeoTagged Photo app (AgriSnap) is developed as a hybrid mobile application, designed to run on both iOS and Android devices. Request recipients can use the application to capture geotagged photos and submit these to the paying agencies. The AgriSnap app is build for user friendliness to ensure that the navigation experience by the farmer is smooth, and the opportunities of getting adequate data are maximized. Data is shared back to an IACS system through a REST API using secure encrypted HTTPS communications.
Ancillary components:	Not applicable
Implementation languages:	Ionic Javascript Framework (including stack below): Capacitor; Angular; SASS; Typescript – Apache 2.0; HTML
Test results	AgriSnap was tested in different rounds with technical tests by the developers to more extensive tests with groups of tester across Ireland. In a second round a group of testers across the EU was recruited to experience the app.
Link to Gitlab repository:	https://gitlab.com/nivaeu/uc4a_geotagapp

Innovation 7: Use Case 4B: Machine Data - “Administration: from field to IACS in 3 steps”

Description of main innovation

A workflow that helps put data from farm machines (tractors, seeders, harvesters) to a format ready for CAP applications by farmers, with help of the farmer’s FMIS system.

Why this use case?

Machinery data can be used to update parcel boundaries, as evidence for monitoring (i.e. mowing or catch crop sowing) which is otherwise very costly. Machinery data is more precise, this will reduce errors.

Who benefits most?

1. The farmer can use info that is already there in his machine and FMIS to prove the actual situation with a high accuracy.
2. The PA receives accurate information on the situation is situ.

Preconditions

- The farmer must work with modern machines that collect data.
- The farmer needs an FMIS system

Main success scenario (example)

1. User (farmer) mows grass
2. Data from tractor is sent to FMIS
3. User uploads data from FMIS into PA software
4. PA receives data
5. Farmer receives according CAP payment

More information

Title:	Machinery data in Farmer’s aid applications
Developed by:	RVO, SEGES, WR
Description of main innovation:	Data from farm machines (e.g. tractors, seeders, harvesters) can be used as a data source for CAP applications by farmers. This data has a high positional and temporal accuracy and thus serves as a source to update the farmer’s agricultural parcel boundaries in GSAA, preferably in a single message. Also, data from specific machines could be used to supply evidence in the

	monitoring process, for example the seeding of a winter cereal. Some measures in current CAP (e.g. mixed seed catch crop) are difficult to control and are therefore laborious and costly, thus using such machine data could lead to a further reduction of the administrative costs and reduction of possibilities for errors for the PA. These uses lead to a decrease of administrative burden for the farmer combined with greater accuracy and is a logical building block in a seamless claim implementation of IACS.
Description of main component:	The NIVA Connector implements a workflow of steps to retrieve data from a farm machine into an FMIS system, and to validate the 'as-applied' data into an eCrop message that can be checked and submitted to the IACS system of the PA. The workflow works with task maps from the FMIS system (e.g. task map shows what is the intention to apply or to cultivate) and the farm machinery operation leads to an 'as-applied' map on the parcel. This data needs to validated and standardized to ensure a seamless delivery into the IACS. The farmer can visualize the data in a web page before submitting.
Ancillary components:	NIVA Connector consists of a front-end and back-end, a create component of the e-Crop message, a validator of the e-Crop message, and a webservice to receive the e-Crop message at the IACS
Implementation languages:	Data exchange in Json, C#.Net and Java, with REST API and PostgreSQL data storage
Test results	In Denmark and NL the workflow of the NIVA connector was tested for the spreading of fertilizer and for the seeding of a winter crop. This test has demonstrated that it is possible to execute such a workflow, and adaptation to different types of machinery is required.
Link to Gitlab repository:	https://gitlab.com/nivaeu/uc4b

Innovation 8: Use Case 5A: Automatic Change detection with Very High Resolution Images (LPIS update)

Description of main innovation

Parcel boundaries can change because of building, roads and other reasons. A deep learning algorithm will detect the parcel boundary changes on orthophotos, comparing them to the current LPIS (Land Parcel Information System).

Why this use case?

Automatic detection of changes saves the farmer and the Paying Agency lots of manual work.

Who benefits most?

1. The farmer
2. The PA

Preconditions

1. The object marking the change in the parcel boundary must be recognized by the algorithm

Main success scenario (example)

1. Parcel boundary changed with a line of trees
2. Algorithm recognizes change
3. Change is pre-filled in the farmers' application
4. Farmer confirms change
5. PA receives data
6. Farmer receives according CAP payment

More information

Title:	Automatic change detection with Very High Resolution Images
Developed by:	DAA, ASP, IGN
Description of main innovation:	Parcel boundaries of agricultural parcels are contained in the Land Parcel Information System (LPIS), and every year a significant number of changes in these parcel boundaries occurs by building, roads, vegetation changes, natural developments. Ideally such changes of parcel boundaries can be automatically detected through deep learning algorithms, saving a lot of manual work for both the farmer and the Paying Agency. Such deep learning algorithms for the detection of changes on orthophotos have been developed for ponds, groups

	of trees, trees in line, unfortified roads and paths, artificial covered surfaces, semi-agricultural natural vegetation & buildings. Similar deep learning models can be develop for other objects to be detected. As part of the workflow of data processing, landscape feature maps are taken into account, as are different rules based on the crops occurring on the parcels.
Description of main component:	NIVA Change Detector is a Deep Learning workflow of different steps, that needs to be trained for a specific geographical context before it can be automatically applied. As input data is uses NDVI time series, ortho photo's, Digital Terrain Model, and Digital Surface Model, existing definition of Agricultural Parcels, and landscape feature map.
Ancillary components:	GIS operations and data preparation of RS and ortho-photo data
Implementation languages:	Python (PyTorch) and GDAL with data exchanges in GDAL compatible format, and GIS tools are required for validation and cross checking
Test results	All algorithms have been tested in test regions in France and Denmark, on about similar areas. In the testing up to 70% of vegetative and 80% of building objects could be recognized. The preparation of the training data is crucial to the success, and requires some time. Also experience in working with deep learning models is required.
Link to Gitlab repository:	https://gitlab.com/nivaeu/uc5a_daa_segmentation https://gitlab.com/nivaeu/uc5a_ign_alertcreation https://gitlab.com/nivaeu/uc5a_ign_maskdetection

Innovation 9: Use Case 5B: Seamless claim: *Click and pay*, a Smart Contract application

Description of main innovation

Click-and-Pay re-routes the traditional payment application. A Digital Contract is connected to the existing IACS distributed dossiers/ledgers so that farmers do not need to submit the yearly application.

Why this use case?

Submitting payment applications is burdensome for both farmer and PA: it takes a long time to fill, and requires very complex validations at the PA side.

Who benefits most?

1. The farmer
2. The PA

Preconditions

1. Monitoring elements must be in place
2. Data must be of good quality
3. Data must be validated by the PA
4. Farmer/user has an existing ledger/dossier

Main success scenario (example)

1. The farmer has an existing dossier (ledger) from earlier years
2. PA connects digital contract
3. Contract is updated with monitoring results for another year (automatic?)
4. PA validates results
5. Farmer validates results
6. CAP payments are done.

More information

Title:	Click and Pay
Developed by:	AGEA, e-GEOS, ABACO, CREA
Description of main innovation:	With the current CAP Regulation, every farmer must prepare and submit an aid application, or payment claim, for each relevant area and animal measure. These applications are burdensome for the farmer and need go through complex validity checks to proceed to a payment, or potentially to apply a

	sanction. Frequently, handling costs surpass the average value of a CAP subsidy. The Click-and-Pay innovation is to demonstrate a re-routing of the traditional application journey. In the Click-and-Pay application journey, a Digital Contract (i.e. digital terms & conditions to receive a payment) is connected to the existing IACS distributed ledgers, so that farmers will not need to submit the yearly application, since the Paying Agency (PA) already has access to necessary data through official databases. The processing of payments will be based on dossier and monitoring results, becoming quicker and less burdensome. Such smart contracts require validation of source data of the PA and routines for data validation have been implemented.
Description of main component:	The Click-and-Pay Component implements a digital contract approach where claims (digital contracts) are based on information available in IACS ledgers and monitoring procedures/rules. It consists of a list of agreements/contracts the farmer can select from and commit to. It then shows those that have been activated by beneficiaries. Through information from the Farm Dossier, GSAA, LPIS and Entitlements registry, the list of contracts offered to the farmer is generated, and the farmer can active/select contracts based on his preference, and check the progress status based on the underlying data until it reaches a status where payments are done. The PA can also update the Entitlements Registries.
Ancillary components:	The NIDAS-component allows to classify the fitness for purpose of data based on its data source and customized rules; it reduces times and effort for diagnosis and recovery of data misalignments, as well as it reduces the onset of anomalies and disputes with users since it provides information about the suitability and certification of data to IACS sub-systems. The software, of which the primary language is Python, is built upon a Model-View-Controller (MVC) architecture.
Implementation languages:	PostgreSQL, Java, vue.js-typescript, with JSON data exchange
Test results	A set of user stories and walk-throughs are available, and the system has been deployed with sets of test users. These have demonstrated that the workflows are successful and contracts can be implemented.
Link to Gitlab repository:	nivaeu / uc5b_nidas · GitLab nivaeu / uc5b_seamless_claim · GitLab nivaeu / uc5b_seamless_claim_webapp · GitLab