Events and Annotations

The Events menu allows searching and visualising events and annotations performed in the different objects (e.g. plants, sensors, experiments) declared in the information system.

Different filters can be applied based on Dates, Type, Description of events or the Concern or Alias object (Fig. 1). As an example, searching for plant 795 (having the URI m3p:/arch/2017/c17000795) in the **Concern** box, results in seven different events describing:

- oevv:Sowing => sowing pf the plant
- **oevv:Thinning** => installation of plant tutors
- oevv:Fertilization => fertilizer application
- oeev:Stacking => installation of plant tutors
- oevv:MoveTo => displacement event
- oevv:StuckPlant => an incident ocurred during imaging
- oevv:Harvesting => harvesting of the plant

Events	
--------	--

Dat	e Range					
		Start Date	a	nd	End Date	
R	efresh wing 1-7 of 7 items.					
#	Туре	Description	Concern	Alias	Date of Event	
	event 🗸			795		
1	oeev:StuckPlant	Plant blocked during imaging (15/5/17 7h). Measured biomass = 406g	m3p:/arch /2017/c17000795	0795/DZ_PG_33/ZM4353 /WW/Rep_4/14_15 /ARCH2017-03-30	2017-05-15T12:00:00+01:00T02:30:45+02:00	۲
2	oeev:Harvesting	Harvesting of the plant	m3p:/arch /2017/c17000795	0795/DZ_PG_33/ZM4353 /WW/Rep_4/14_15 /ARCH2017-03-30	2017-05-15T12:00:00+01:00	۲
3	oeev:Fertilization	Addition of 4 g of fertiliser per pot	m3p:/arch /2017/c17000795	0795/DZ_PG_33/ZM4353 /WW/Rep_4/14_15 /ARCH2017-03-30	2017-04-27T12:00:00+01:00	۲
4	oeev:Staking	Installation of plant tutors (83 g)	m3p:/arch /2017/c17000795	0795/DZ_PG_33/ZM4353 /WW/Rep_4/14_15 /ARCH2017-03-30	2017-04-18T12:00:00+01:00	۲
5	oeev:Thinning	Thinning to 1 plant per pot	m3p:/arch /2017/c17000795	0795/DZ_PG_33/ZM4353 /WW/Rep_4/14_15 /ARCH2017-03-30	2017-04-13T12:00:00+01:00	۲
6	oeev:Sowing	Sowing at PHENOARCH platform	m3p:/arch /2017/c17000795	0795/DZ_PG_33/ZM4353 /WW/Rep_4/14_15 /ARCH2017-03-30	2017-04-06T12:00:00+01:00	۲
7	oeev:MoveTo	Arrival at PHENOARCH platform	m3p:/arch /2017/c17000795	0795/DZ_PG_33/ZM4353 /WW/Rep_4/14_15 /ARCH2017-03-30	2017-04-06T12:00:00+01:00	۲

Detailed information of each event can be displayed including **RDF triples** (Fig. 2). For instance the event http://www.phenome-fppn.fr/id/event/5878e232-c4b8-4fb8-b705-1988540dcfd2 describing the Harvesting of plant 795 is formulated as:

http://www.phenome-fppn.fr/id/event/efb8946f-799d-4c02-b425-3fbf637c122b

Add annotation	Browse Triplestore	
Туре	oeev:Harv	esting
Description	Harvesting) of the plant
Author	http://www	/.phenome-fppn.fr/id/agent/lcabrera
Date of Event	2017-05-1	5T12:00:00+01:00
Concern	m3p./arch	/2017/c17000795
Alias	0795/DZ_	PG_33/ZM4353/WW/Rep_4/14_15/ARCH2017-03-30

http://www.phenome-fppn.fr/id/event/efb8946f-799d-4c02-b425-3fbf637c122b

۶	Add annotation	Add Event		
ho	wing 1-4 of 4 items			
#	Subject		Predicate	Object or Litteral
	Type in some ch	aracters	Type in some characters	Type in some characters
1	annotation:/fcdcb	1ce-8e44-4808-adc4-0515a3edf25f	oa:hasTarget	http://www.phenome-fppn.fr/id/event/efb8946f-799d-4c02- b425-3fbf637c122b
2	http://www.phe b425-3fbf637c12	nome-fppn.fr/id/event/efb8946f-799d-4c02 2b	e-oeev:concern	m3p:/arch/2017/c17000795
3	http://www.phe b425-3fbf637c12	nome-fppn.fr/id/event/efb8946f-799d-4c02 2b	t- rdf:type	oeev:Harvesting
4	http://www.phe b425-3fbf637c12	nome-fppn.fr/id/event/efb8946f-799d-4c02 2b	time:hasTime	instant:/06a68a04-d669-4388-90b2-f6dc3bf206fa

where is of type harvesting (**rdf:type**), concerns plant 795 (**event:concern**), and has and associated time stamp (**time:hasTime**). Details of the timings of the event (**time:inXSDDateTimeStamp**) and its annotation are described in Fig. 3 as:

http://www.phenome-fppn.fr/m3p/arch/2018/tic18_3efdc550-5294-479d-b8ec-ef17e19b2ce6

Ŧ	# Subject	Predicate	Object or Litteral
	Type in some characters	Type in some characters	Type in some character:
1	m3p:/arch/2018/evc18_6851fb51-efa6-44ff-bc4d-bf1cfa98f576	time:hasTime	http://www.phenome-fppn.fr/m3p/arch /2018/tic18_3efdc550-5294-479d-b8ec-ef17e19b2ce6
1	2 http://www.phenome-fppn.fr/m3p/arch /2018/tic18_3efdc550-5294-479d-b8ec-ef17e19b2ce6	rdf:type	time:Instant
00	http://www.phenome-fppn.fr/m3p/arch /2018/tic18_3efdc550-5294-479d-b8ec-ef17e19b2ce6	time:inXSDDateTimeStamp	2017-05-15T12:00:00+01:00
4	http://www.phenome-fppn.fr/m3p/arch /2018/tic18_3efdc550-5294-479d-b8ec-ef17e19b2ce6	dcterms:created	2018-03-28T11:41:16.418771

The harvesting event http://www.phenome-fppn.fr/id/event/5878e232-c4b8-4fb8-b7051988540dcfd2 concerning the plant 795 is associated to the annotation

http://www.phenomefppn.fr/id/annotation/f3fb3f7c-b4a0-4531-b3de-5cfd8b4b2b28`via

oa:hasTarget. Details of the annotation, such as the type **oa:Annotation**, the **oa:bodyValue** '*Harvesting of the plant*' and the time that event was annotated (**dcterms:created**) and the person who did the annotation (**dcterms:creator**) are described below (Fig. 4):

http://www.phenome-fppn.fr/id/annotation/1f6076b9-8699-4327-a575-a71f04c03b3b

ubject	Predicate	Object or Litteral
ype in some characters	[created	Type in some characters
ttp://www.phenome-fppn.fr/id/annotation/1f6076b9-8699-4327-a575- 71f04c03b3b	dcterms:creator	pxPhenome:/id/agent/lcabrera
ttp://www.phenome-fppn.fr/id/annotation/1f6076b9-8699-4327-a575- 71f04c03b3b	rdf.type	oa:Annotation
ttp://www.phenome-fppn.fr/id/annotation/1f6076b9-8699-4327-a575- 71f04c03b3b	oa:bodyValue	Harvesting of the plant

Annotations

Annotations are mainly guided by the **OEEv ontology** and the **Web Annotation Data Model** that allows annotating any object declared in the system and assigning motivation and purpose attributes to annotations (e.g. oa:describing, oa:identifying, oa:linking, oa: replying, etc.).

```
'http://www.w3.org/ns/oa#describing' => 'oa:describing',
'http://www.w3.org/ns/oa#identifying' => 'oa:identifying',
'http://www.w3.org/ns/oa#moderating' => 'oa:moderating',
'http://www.w3.org/ns/oa#assessing' => 'oa:assessing',
'http://www.w3.org/ns/oa#bookmarking' => 'oa:bookmarking',
'http://www.w3.org/ns/oa#classifying' => 'oa:classifying',
'http://www.w3.org/ns/oa#commenting' => 'oa:commenting',
'http://www.w3.org/ns/oa#editing' => 'oa:editing',
'http://www.w3.org/ns/oa#highlighting' => 'oa:highlighting',
'http://www.w3.org/ns/oa#linking' => 'oa:linking',
'http://www.w3.org/ns/oa#neplying' => 'oa:questioning',
'http://www.w3.org/ns/oa#replying' => 'oa:replying',
'http://www.w3.org/ns/oa#tagging' => 'oa:tagging',
```

Annotation



Dublin Core and **foaf** specifications such as *dcterms:created*, *dcterms:creator*, *foaf:Agent* are also used. For instance, the agent *agent:Lcabrera*, is a *Person* member of the group *PHENOARCH-ADMIN* that has a number of attributes such as *firstName*, *LastName*, *mbox*, etc. The Agent *agent:Lcabrera* is the author (dcterms:creator) of the annotation#245 (Fig. 6).

Agent



- time: <http://www.w3.org/2006/time#>
- dcterms: <http://purl.org/dc/terms/>
- agent: <http://www.phenome-fppn.fr/id/agent/>

Annotations and events can be added into any object (e.g. plant, device, experiment, event) by clicking on the **add annotation** and **add event** buttons present in the different menus:

Return to the list Add annota	ation Add event	
Device Alias	par02 s1	
URI	http://www.phenome-fppn.fr/m3p/dyn/2011/sa110038	
Device Type	RadiationSensor	
Related Concept	http://purl.oclc.org/NET/ssnx/meteo/aws#QuantumSensor	
Brand	Skye Instruments	
Model	SKP 215	
Position (X,Y)	Greenhouse Phenodyn	
Position (meter)	(not set)	
Variable	PAR Light:weather station:micromole.m-2.s-1	
Documents		
Register an Ever	nt	
Type *	nt	×
Type * manual calibration 2018-05-15 13:30 Concern * http://www.phenome-fppn.fr/m3pi	ht /dyn/2011/sa110038	~
Type * manual calibration manual calibration 2018-05-15 13:30 Concern * http://www.phenome-fppn.fr/m3pi Description *	ht /dyn/2011/sa110038	Y
Register an Ever Type * manual calibration 2018-05-15 13:30 Concern * http://www.phenome-fppn.fr/m3p Description * My comment]	ht /dym/2011/sa110038	~
Register an Ever Type * manual calibration 2018-05-15 13:30 Concern * http://www.phenome-fppn.fr/m3pi Description * My comment]	ht /dyn/2011/sa110038	↓ ↓
Register an Ever Type * manual calibration 2018-05-15 13:30 Concern * http://www.phenome-fppn.fr/m3p Description * My comment	ht /dym/2011/sa110038	

Use cases

Lodging of plot

The following semantic graph represents how **OEEv** ontology si used for representing a lodging event associated to *plot97* (Fig. 7).

In the example presented here, the *event54* that concerns *plot97* is of type *Lodging* and occurred the "2017-06-29". *event356* is associated to the *ann4807* which is of type *Annotation* and is motivated by describing (*oa:describing*). This annotation, has a creator (*Agent1*), a date of annotation ("2017-08-10") and a body value describing the event ("Plots lodged after the storm").

Lodging of a plot



- Instances are depicted as coloured ellipses.
- Classes are depicted as white rectangles.
- Literals are depicted as white lozenges.
- Relationships and properties are depicted as black lines.

For better legibility objects are labelled with shortened alias names rather than using full URIs:

- plot97: http://www.phenome-fppn.fr/diaphen/2017/o17000097 Agent1: http://www.phenome-
- fppn.fr/id/agent/rchapuis event356: http://www.phenome-fppn.fr/id/event/cafa1c09-2cbf-409f-
- 82f9-9f20496e3eb9 anno480: http://www.phenome-fppn.fr/id/annotation/469bca50-10f9-4deb-
- 9b3a-6ae7476306cb

Note that not all objects and events associated to *plot97* are represented in this graph. Fulls details can be found in the PHIS user interface by searching for plot 97 in the different menus (e.g. **Events**, **Scientific objects**).

The event can be displayed in the web user interface by filtering by lodging and plot97 in the Events menu. Further information can be displayed by clicking on the Browse Triplestore button:

Phenotyping Hybrid Information System	Experimental Organization -	Data - To		🕞 🎗 Llorenç Cabrera-Bosquet
				00
Home / Events / http://www.phenome-fppn.fr/id/event/c4f52303-62af-4	e4c-9e72-4ef4c8c17be5			

http://www.phenome-fppn.fr/id/event/c4f52303-62af-4e4c-9e72-4ef4c8c17be5

Description	Plots lodged after the storm	
uthor	http://www.phenome-fppn.fr/id/agent/rchapuis	
ate of Event	2017-06-29T12:00:00+01:00	
Concern	diaphen:/2017/o17000097	
lias	97/DZ_PG_45/ZM4385/WW/2/DIA2017-05-19	(.)

http://www.phenome-fppn.fr/id/annotation/8ca4a5c2-3b4d-4159-b888-278730f583c0

	Type in some characters	Type in some characters	Type in some characters
1	http://www.phenome-fppn.fr/id/annotation/8ca4a5c2-3b4d-4159-b888-278730f583c0	dcterms:created	2017-07-06T12:00:00+01:00
2	http://www.phenome-fppn.fr/id/annotation/8ca4a5c2-3b4d-4159-b888-278730f583c0	dcterms:creator	pxPhenome:/id/agent/rchapuis
3	http://www.phenome-fppn.fr/id/annotation/8ca4a5c2-3b4d-4159-b888-278730f583c0	rdf.type	oa:Annotation
4	http://www.phenome-fppn.fr/id/annotation/8ca4a5c2-3b4d-4159-b888-278730f583c0	oa:bodyValue	Plots lodged after the storm
5	http://www.phenome-fppn.fr/id/annotation/8ca4a5c2-3b4d-4159-b888-278730f583c0	oa:motivatedBy	oa:describing

Plant blocked in imaging cabin

The following semantic graph represents how **OEEv** ontology is used for representing an incident during imaging acquisition associated to *plant795* (Fig. 10).

In the example presented here, the *event849* that concerns *plant795* is of type *PlantStuck* and occurred the "2017-05-15". *event849* is associated to the *anno86* which is of type *Annotation* and is motivated by describing (*oa:describing*). This annotation, has a creator (*Agent2*), a date of annotation ("2017-05-26") and a body value describing the event ("Fallen plant during imaging").

Plant stuck in cabin



- Instances are depicted as coloured ellipses.
- Classes are depicted as white rectangles.
- Literals are depicted as white lozenges.
- Relationships and properties are depicted as black lines.

For better legibility objects are labelled with shortened alias names rather than using full URIs:

- *plant795*: http://www.phenome-fppn.fr/m3p/arch/2017/c17000795 *Agents*:
- http://www.phenome-fppn.fr/id/agent/lcabrera event849: http://www.phenome-
- fppn.fr/id/event/bcbb7240-34bc-4bc3-8ff3-31911e4b6aa7 anno86: http://www.phenome-
- fppn.fr/id/annotation:4aac3076-b542-4f6e-92e1-9d350dd3eec5

Note that not all objects and events associated to *plant795* are represented in this graph. Fulls details can be found in the PHIS user interface by searching for plant 97 in the different menus (e.g. **Events**, **Scientific objects**).

Suspected seed contamination

The following semantic graph represents how **OEEv** ontology is used for annotating an annomaly detected during data processing (i.e. suspected seed contamination) (Fig. 11).

The *anno338* which is of type *Annotation* and is motivated by tagging (*oa:tagging*) has as target *plant816*. The *anno338* has a creator (*Agent2*), a date of annotation ("2018-05-17 11:02:39") and a body value describing the event ("Suspected seed contamination").

Expert annotation during data processing



- Instances are depicted as coloured ellipses.
- Classes are depicted as white rectangles.
- Literals are depicted as white lozenges.
- Relationships and properties are depicted as black lines.

For better legibility objects are labelled with shortened alias names rather than using full URIs:

- *plant816*: http://www.phenome-fppn.fr/m3p/arch/2017/c17000816
- Agent2: http://www.phenome-fppn.fr/id/agent/lcabrera
- anno338: http://www.phenome-fppn.fr/id/annotation/5b0bd064452b1

Note that not all objects and events associated to *plant816* are represented in this graph. Fulls details can be found in the PHIS user interface by searching for plant 97 in the different menus (e.g. **Events**, **Scientific objects**).

Camera Dysfunction

In this example the target is a RGB camera that suffered a dysfunction (Fig. 12):



As represented in the semantic graph the *RGBcamera5* suffered as *Dysfucntion* the "2017-04-21". The "2017-04-22", image acquisition was stopped in cabin 5 as represented with the event *Stop*. The "2017-04-23" the camera was sent to the factory for *Reparation*. The "2017-05-19", the repaired camera was reinstalled and calibrated before being put in service again, as represented by the *Installation*, *ManualCalibration* and *Restart* **events.**

For better legibility objects are labelled with shortened alias names rather than using full URIs:

- RGBcamera5: http://www.phenome-fppn.fr/m3p/arch/2018/ac180011 event764:
- http://www.phenome-fppn.fr/id/event/dda84a5e-8783-4f60-8d80-d5a3ccb36b25 event778:
- http://www.phenome-fppn.fr/id/event/8be63f29-b3ba-4d0a-b40b-775d6119b167
- event785: http://www.phenome-fppn.fr/id/event/39a5a56a-bec8-4a35-a4dc-35d9c13b480f
- event976: http://www.phenome-fppn.fr/id/event/2ed84816-516f-4621-b7b9-face4acf7de4
- event977: http://www.phenome-fppn.fr/id/event/2ed6d628-c076-42d1-b8ba-014eaade4701
- event978: http://www.phenome-fppn.fr/id/event/05dc3267-9cce-4bce-8175-a7b2e04d663f

Only event types and dates are represented. Full details can be consulted online in the Events or Device menu by searching for *camera* or http://www.phenome-fppn.fr/m3p/arch/2018/ac180011 (Fig. 13).

at	e Range						
	Start [Date	and	End D	ate		
Re	afresh						
ho	wing 1-8 of 8 items.						
ŧ	Туре	Description	Concern	Alias	Date of Event		
	event		/ac180011				
1	oeev.ManualCalibration	Calibration	m3p:/arch/2018/ac180011	camera_top_5	2017-10-31T12:00:00+01:00	۲	
2	oeev:Restart	Restart image acquistion in cabin 5	m3p:/arch/2018/ac180011	camera_top_5	2017-05-19T12:00:00+01:00	۲	
3	oeev.ManualCalibration	Calibration	m3p:/arch/2018/ac180011	camera_top_5	2017-05-19T12:00:00+01:00	•	
4	oeev:Installation	Installation of repaired top camera on cabin 5	m3p:/arch/2018/ac180011	camera_top_5	2017-05-19T12:00:00+01:00	۲	
5	oeev.Reparation	Camera sent to factory	m3p:/arch/2018/ac180011	camera_top_5	2017-04-23T12:00:00+01:00	۲	3
ŝ	oeev:Stop	Stop image acquistion in cabin 5	m3p:/arch/2018/ac180011	camera_top_5	2017-04-22T12:00:00+01:00	۲	<
7	oeev.Dysfunction	Top camera cabin 5 dysfunctioning	m3p:/arch/2018/ac180011	camera_top_5	2017-04-21T12:00:00+01:00	۲	
в	oeev:Start	In service date	m3p:/arch/2018/ac180011	camera_top_5	2016-04-01T12:00:00+01:00	•	

Leaf Sampling

In this example, the sapmling of a leaf of plant 60 is represented (Fig. 14):



The real example concerning leaf http://www.phenome-fppn.fr/m3p/arch/2017/lc17000060 can be consulted online by searching for sampling events in the Events menu:

Supporting Information Notes S2 (Annotations and events).md

E	vents te Range						
		Start Date		and	End Da	ate	
R	efresh owing 1-1 of 1 item.						
#	Туре	Description	Concern	Ali	ias	Date of Event	
	sampling ~			6	60		
1	oeev:Sampling	Sampling ligulated leaf 8 of plant 60 for ABA analysis	m3p:/arch /2017/lc1700	0060 /01	60/DZ_PG_27/ZM4354/WD/Veg_1 1_60/8/ARCH2017-03-30	2017-05-16T12:00:00+01:00 10:51	۲

http://www.phenome-fppn.fr/id/event/b020e89f-3ac7-4eee-baa0-70c3cbec30ce

Add annotation	Browse Triplestore
Туре	oeev.Sampling
Description	Sampling ligulated leaf 8 of plant 60 for ABA analysis
Author	http://www.phenome-fppn.fr/id/agent/Icabrera
Date of Event	2017-05-16T12:00:00+01:00 10:51
Concern	m3p:/arch/2017/lc17000060
Alias	0060/DZ_PG_27/ZM4354/WD/Veg_1/01_60/8/ARCH2017-03-30