

## **TECNIPLAST**



Release Note 3.1.0



## RELEASE NOTE 3.1.0

## 1 RELEASE FEATURES

#### FEATURES MARKETING

In this DVC<sup>®</sup> Analytics release 3.1.0 we added new important features, and simultaneously we apply some critical infrastructure changes of the system to manage new capabilities. A more detailed list of the new features is reported below:

### 1.1 FEATURE #1 – IMPROVED USER CREDENTIAL MANAGEMENT

Leveraging on already existing AMAZON cloud technologies, we implemented a critical package to manage user credentials in a more secure way, it is called Amazon COGNITO (<u>https://docs.aws.amazon.com/cognito/latest/developerguide/what-is-amazon-cognito.html</u>).

Thanks to this functionality, now the process of a new user registration follows the below steps: a) Click on the USERS area in the home page in order to be quickly redirect on the "DVC® Analytics user" section,



Here, you can click on the icon (Create User), a new pop-up window appears. In this window, you must enter the email address of the new User and the "Role" (RESEARCHER or FACILITY\_MANAGER)

Faber and	
Enter email	
Role *	Ŧ

b) Once you "Confirm" the information, an invitation email is sent to the new user



c) The new User receives the email and must click on "here" to properly register in the DVC® Analytics



 

 Rispond
 Rispond a tutti
 Qi Mestaggio istaritaneo

 genera 2165/2000 1015
 Browed 2165/2000 1015

 DVC Analytics covcanalytics@dev.dvc.tecniplast.it> DVC Analytics invitation

 A
 Grappe Result - templast 5.p.A

 I caso di problemi di viuulizzatione del messaggio, fare dic qui per visualizzato in un Web browser.



Click here to register in DVC Analytics

d) The new User is redirected to the DVC® Analytics registration page where credential pieces of information are requested:

Sign up	×	
Username *		
Name *		
Surname *		
Email *		
Password *		
Confirm password *		
	Confirm	

- e) Remember that password has some requirements: "Use min 8 characters or more, min one number and one symbol and min one special symbol as [@\$!%\*?&~()\_[]]:"<>,€]"
- f) Once all the information is inserted, you can click "Confirm", and a confirmation pop-up appears.

Thank You! Please check your email to	
activate your subscription	
Username *	
Giorgio_Test	
Name *	
Giorgio	
Surname *	
Rosati	
Email *	
giorgio rosati@tecniplast_it	

g) Now, it is time to validate the email entered for the new User. A confirmation email has been sent to the new User who must accept it to confirm the email address (this is important for password recovery).

DVC Analytics <dvcanalytics@dev.dvc.ted< th=""><th>niplast.it&gt;</th></dvcanalytics@dev.dvc.ted<>	niplast.it>
DVC As a ball of the first second second second second	
DVC Analytics invitation - confirm user creation	
A 📕 Giorgio Rosati - Tecniplast S.p.A.	

Thank you for signing up. Click here to complete your registration.

h) Clicking "here", the process of new user authentication is completed and confirmed.





- i) The new User can now finally login to the DVC® Analytics platform.
- j) In case any user has lost credentials, it is possible to click on the corresponding section "Forgot password?" of the login page:



k) User must enter the Username and then click "Next":



l) A "Verification Code" has been sent to the email address of the User:



Welcome to DVC Analytics. Use 928871 code to update your DVC Analytics account

m) Inserting it in the corresponding field altogether with a new (valid) password, then clicking on "Next", the User can finally login in again (with the new password):





#### 1.2 FEATURE #2 – BASELINE MANAGEMENT

One of the most beneficial ways to use the DVC® system is related to the fact that it collects 24/7 data from any cage and this allows robust comparisons between data collected before a specific treatment/test/operation (or more generically, before the start of any experiment) and after these events.

To better support your analysis, we implemented the possibility to let you create different "baselines" based on the study you are performing and retrieve any established baseline in the "Data Analysis section".

To do so, we added a new section, called "Baselines", under the macro section "Manage Experiment":



Clicking on this button, you are redirected to a page where all the currently available baselines are shown in a recap table:

			<u>ان</u>	<sup>™</sup> <sub>2280</sub> <sup>™</sup> <sub>18</sub>
	<u> ^ « </u> 🕹			
	Baselines Manage baselines			
Name	Description	Metric	Value	<b>9</b> +
jonny		Animal Locomotion index	3.322 %	
GiorgioT2	GiorgioT2 description	Animal Locomotion index	2.611 %	
GuidoStart	10-14 May Notte only	Animal Locomotion index	3.086 %	
píppo	pp	Running Wheel Distance	2,188.247 cm	
baselineTest	test	Animal Locomotion index	2.376 %	
Test_Giorgio	test	Animal Locomotion index	0.003 %	
dfs	sdf	Animal Locomotion index	0.001 %	
baseline	basetine	Animal Locomotion index	0.002 %	Image: Contract of the second seco
			Items per page: 8 💌	1-8 of 8 < >

To create a new one, simply click on the corresponding button <sup>+</sup> and you can now select one (or more) cage(s), a specific time interval, some possible "Day Time Filtration" (None, Light, Night, Custom) and some available "Data Time Aggregation" (Hour, Minute, Custom)

<u>↑ ≪ </u>	
Group 1       Image: Comp 1         Image: Comp 1	
Day Time Filtration Data Time Aggregation Description     Data Time Aggregation       Description     Description       Description     D	
Annuel Latamattero Indate       Image: Annuel Transling Distance         Image: Annuel Transling Distance       Image: Annuel Transling Distance	
	Clear All Save

Finally, selecting the available metric (based on the properties of the cage(s) you selected) you want to calculate the baseline, the system allows you to click on the "Save" button and create the corresponding baseline value related to the above-described selection.

The baseline is created by calculating the AVERAGE of all the data for the selected cage(s) in the selected period.

Then, you have to provide some information (Name, Description, Owner) to add it to the list of the available ones and then finally click on "Confirm".

Add new baseline	
Animal Locomotion ind	lex
7 611 %	
2.011 %	
Name *	
Test_Baseline	
Description	
Test_baseline for demo	o purposes
Owner"	
Giorgio_rest	

Please be aware that it is NOT possible to select multiple metrics to create multiple baselines at once. You have to repeat the process for any single metric for all the metrics you want to create the corresponding baseline.

Now, when a new baseline is created, it is possible to apply it to the "Data Analysis" section.

There is a new button that can be clicked to open a submenu with all the available baselines, divided by the used metrics, whith User's access (FACILITY\_MANAGER User has access to all the created baselines, RESEARCHER User has access only to his/her own baselines):

			A	<u>s</u>	
Group 1	Add Group				
+ XAVIEI Protoco	103 IloMartediB				
Select Cages or Animals					
RUNNING					
OUT-OF-RACK	001 To	Europe/Rome [GMT+02:00]			

All these baselines are disabled until you select the metric you want to apply for the analysis.

+ 🖻	XAV/ER03 Protocolistantedili
Select Cages or Animals	
RUNNING	
TISMISSED	
OUT-OF-RACK	
Event 15/01/2020	Exvert 21/05/2020
Bedding Status Index	
Chart Family	
Animal Locomotion Index	
Animal Locomotion index ( []	
Animal Tracking Distance	
Animal Tracking Speed	2ª
Bedding Status Index	
Running Wheel Distance	0
Running Wheel Rotation	0
Running Wheel Speed	0

From the drop-down menu, it is possible to select the specific baseline you want to apply to the cage selection and proceed with your own analysis:

From  Event 17/05/202	Europe/Rome [GMT+02:0	0] To <b>Event</b> 18/05	Europe/Rome [GMT+02:00]	ŌŌ	Compare To Basetine		
Bedding Status Ind	lex 👻	Animal Locomotion index Test_Baseline 2.611	%   Running Whe	el Distance	<ul> <li>Animal Tracking Distance</li> </ul>	•	
Chart Family	C	hart Type	Time Interval Visualization	Custom	Day Time Filtration	Data Time Aggregation	Environmental Data
Animal Locomotion	n index						

The outcome is the result of the calculation:





### 1.3 FEATURE #3 – SAVE CONFIGURATION

While you are performing your analysis, in case you want to save a specific configuration for easy and fast retrieval in the future, you can easily click on a new section, located on the left bottom of the screen

+ EXISTAN	
Select Capes or Animals	
🛐 RUBRING	
Cismissed	
T OUT-OF-RACK	
From Europe/Rome (Sirf~40.00) To Europe/Rome (Sirf~40.00)	
Event 17/05/2020 01:00 🖹 Event 21/05/2020 00:00 🗎 🙆 🚫 Compare To Baseline	
Animal Leconotion Index	
Bedding Status Index * Test_Baseline 2.611 % * Running Wheel Distance * Animal Tracking Distance *	
Chart Family Chart Type Time Interval Visualization Day Time Filtration Data Time Aggregation Environmental Data	
Lee Com Lee See Constant Control Constant Control Control See Lee Lee Lee Control Cont	
Annual Learnerston Index (1-1)	
and tracing bitses	
A krimit Tracing Speed	
Configuration - Load Save	Clear All Prepare Download Run Analysis

Clicking on "Save" button, the system asks for a "Name" and "Owner" of this configuration (again, FACILITY\_MANAGER user can assign configurations to any registered user, RESEARCHER user only to him/herself):

My own A	nalysis	
Owner *		
Giorgio_T	est	

Clicking "Confirm", the system creates this new configuration that can be easily retrieved whenever you want, simply clicking on "Configurations" and choose the one you want to apply and finally click "Load":

Group 1 E Add Group
+         -           ************************************
Chart Family
Line Dire Line
Activation Locarective index: []_]
Annui Taolog Dezaroa
Annue Tracking Speed
ControlloAsseX-Test1
ControlloAsseX-Test2
ControlloAsseX-Test3
Test_G D
My our Analysis  Serve Clear All Prepare Download Pan Analysis



Last but not least, you can quickly delete any already created configuration, merely clicking on the small icon located nearby and then confirming this decision.

Confirm					
Delete configuration <b>My own</b> Analysis! Are you sure?					
	Cancel	Confirm			

## 1.4 FEATURE #3 – ANIMAL LOCOMOTION (SMOOTHED)

With this new release, we want to introduce a new metric called "Animal Locomotion Index (smoothed)" (ALI<sub>smoothed</sub>) that is an improved version of the historical (and well used by anyone) metric "Animal Locomotion Index" (ALI).

The statistical reason behind is because the smoothed process increases robustness to noise and provides more sensitiveness to the intensity of mice movements.

More specifically, to calculate the minute data aggregation (that is the current smallest data granularity in the DVC® Analytics platform), instead of performing a sample by sample difference (remember that every sample is collected every 250msec), the ALI<sub>smoothed</sub> considers the moving difference between 2 groups of 4 consecutive samples each. In case the module of this difference is above a minimum threshold, the current group of samples is counted as a valid activation.

In general, these 2 metrics are very similar in the patterns of data.

For retro compatibility with already running studies and analysis, both metrics (ALI and ALI<sub>smoothed</sub>) are available, but only new cages will generate ALI<sub>smoothed</sub>. At the same time, it is not possible to have historical data converted to ALI<sub>smoothed</sub> (unless we perform a playback task).

## 2 ENHANCEMENTS

In this section, there are highlighted some current enhancements that are affecting already existing features that are improved by the present new release proposed.

No enhancements for this release.

## 3 BUG FIXES

This section refers to bugs that have been fixed by the current release. There are some potential bugs relating to the overall infrastructure that are not here reported because "invisible" to the final User unless these are not critical bugs that are affecting the overall workflow.

No bug fixes for this release.



## 4 KNOWN ISSUES AND PROBLEMS

There are currently some open bugs/known issues we would like to share with you and let you carefully handle:

# 4.1 OPEN BUG #1 - TEMPORAL AGGREGATION ALWAYS STARTS FROM MIDNIGHT (UTC)

Every time you perform aggregation of data, using the "Data Time aggregation" Custom button, the system starts aggregating data from the midnight (in UTC) (<u>https://en.wikipedia.org/wiki/Coordinated\_Universal\_Time</u>). This fact means that if you are in Central Europe time during summer (CEST), the midnight in UTC corresponds to your 2 am.

- This bug has 2 direct consequences on the system. Let's use a couple of examples to explain the issue:
  - a) If you have set a night of 12 hours and you want to sum up all this period in one unique representative value, you should select the following settings



What you would expect is a single representative point for any night of your time interval. Unfortunately, the outcome is not the desired one because, due to the bug, the system is first "averaging the 12 hours" starting from midnight (referring to UTC) and then applying the "night" filter.

In other words, the logic is flipped around. We will fix the bug soon to apply "Night" filtration first and then the "average calculation of the 12 hours".



b) In case you want to start any analysis from a specific time, let's say, from 9 am and aggregate data every 2 hours, you should select the following settings:

			Data Time	Aggregati	on		
From	Europe/Rome [GMT+02:00]		C24b	5	(A)	Hour 2	
Event	17/05/2020 09:00	iii (	Hour	Minute	Custom	Minute	Hour

What you would expect is a line chart, starting at 9 am and then, a point every 2 hours. Unfortunately, due to the bugged flipped logic, it first applies the 2 hours aggregation, and then it starts from 9 am to show data. If my time zone is CEST, this means that I will have a line chart, for instance, with a data point at 9 am, then 10 am and then every 2 hours (12 pm, 2 pm, 4 pm, etc.).



## 4.2 OPEN BUG #2 – NIGHT TEMPORAL AGGREGATION IN BOXPLOT

Select Cages or Animals	XAVIER01 ProtocolloMarte	diB XAVIER03 ProtocolloMa	rtediß		
RUNNING					
DISMISSED					
🛅 OUT-OF-RACK					
From	Europe/Rome [GMT+02:00]	То	Europe/Rome [GMT+02:00]		
Event 15/01/202	20 16:10 🗎	Event 20/05/2	020 15:02	ō ō	Compare To Baseline
Chart Family	Chart	Туре	Day Time F	iltration	
	Live Heatr		Plot None	Light Night	Custom

If you select multiple cages in the same group, it is possible to apply the "Box Plot" Chart Type.

If you apply for Night "Day Time Filtration", the night is not considered as the "real" night from, for instance, 7 pm to 7 am, but it is calculated as from midnight to 7 am and from 7 pm to midnight. This bug doesn't affect the Light "Day Time Filtration" because it falls all inside the same day of analysis.

# 4.3 OPEN BUG #3 -CUSTOM DATA TIME AGGREGATION AFFECTS SOME METRICS

If you want to aggregate data using a custom aggregation, it provides you the average of the data in the selected period (i.e., if you aggregate by 30min, it gives you the average of the 30min for the metric you chose, starting from the minute aggregation).



This average calculation doesn't fit some available metrics such as Running Wheel distance, Running Wheel rotations, and Individual Tracking distance.

In this case, what the system should provide you are the sum of the data in the corresponding selected period.

Let's explain it with an example.

When you select the standard hour aggregation of a DVC® Running wheel distance data for one entire day, it provides you, hour by hour, how many centimeters have been run by the animal:

1. 75k	Running Wheel Distance (Centimeters cm)	← Group 1 ← Group 1 (samples)
50k 25k	Grup 1 Runfing Wheel Distance Values: \$955 on 17/05/2220 02:00	/
0 51	· · · · · · · · · · · · · · · · · · ·	1210 1210 1200

If you now aggregate data every 2 hours, you would expect the sum of the data in blocks of 2 hours each. Unfortunately, due to the bug, it calculates the average of 2 hours of each block. So, in the total day length, the sum of the 12 blocks of 2 hours each is different compared to the sum of the 24 (standard hours).



## 4.4 OPEN BUG #4 - MISLEADING HEATMAP TOOLTIP INFORMATION

In any Heatmap visualization, if you move the mouse over the chart, the tooltip does not represent the value of the data, but it is the counter of how many minutes have been spent from midnight (i.e., 335 min from midnight, means 05:35 am)



## 4.5 OPEN BUG #5 - MISLEADING LIGHT REM MISSING DATA

If a cage is extracted for several minutes from the DVC® Rack (or more generically, the data are missing for any reason), consequently, the DVC® data are not displayed (because of missing) as well as the associate REM data.

In reality, while the visual representation of the DVC® data is pretty intuitive (data are missing), for the REM data, the empty data block is filled with 2 vertical stripes (grey and white) that are misleading for the User from a REM data visualization perspective.





#### 4.6 OPEN BUG #6 -DIFFERENT HEATMAPS DO NOT RESIZE IN COLOUR

Whenever you select a Heatmap chart, the system auto resizes the color code based on the maximum level reached by the data in the selected period.

L.		
	Group 1	
2020-05-14 2020-05-15 2020-05-16 2020-05-16 2020-05-19 2020-05-19 2020-05-20 2020-05-21		
		.3.3 14.60 14.30 15.00 15.30 14.60 14.50 17.60 17.30 14.60 14.30 14.60 14.30 26.60 26.30 21.60 21.30 22.30 22.30 22.30 2.30 6

On the contrary, if you perform a comparison between multiple groups of cage(s), the system resizes each group independently from the others. In this way, you might end up on false interpretation of the patters of data due to the different scale.

For instance, in the next example, we have 2 different cages in the same period of time:



The bottom cage seems to be less active than the top one.

But if we resize both scales (setting 10 as maximum value to both), we can appreciate a better comparison between the 2 cages.



