PSM Training ECHO

OmniSense Analysis

PSM Training Modules

These training modules are one component of the PSM Training System Documentation:

OmniSense Live Training

1. Setup
2. Database Setup
3. Live Operations
4. Pebble Watch & Application
5. Base Line Fitness Testing

OmniSense Analysis Training

1. Overview
2. Graph Options
3. Log Data
4. Reports
5. Fitness Considerations
6. Analysis Impacts
7. Readiness
8. Fitness Test Analysis
9. Software Utilities

See also the PSM Training User Guide for a general overview of the system, components and software.

Support: support@zephyrtech.zendesk.com

PSM Training Modules

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PSM Training Modules

Overview

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PSM Training Modules

Overview

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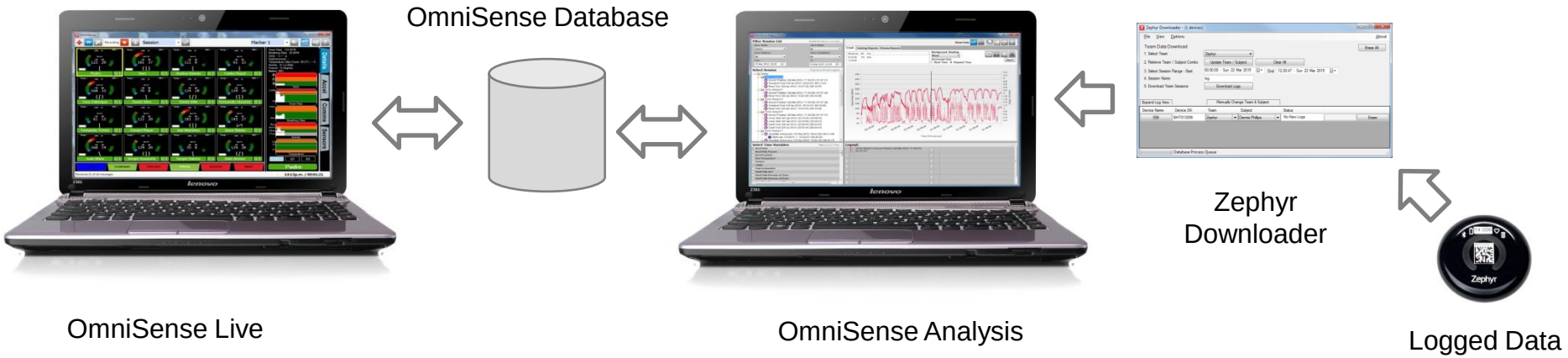

- Both Live and Analysis modules send and receive data from the OmniSense database
- The database is a single file, *polling.fdb*, located at *C:\Program Files (x86)\Zephyr\OmniSense\Database\DbFile.* At each upgrade install, the existing database is backed up before a new instance is created and populated with any existing data.
- The database contains
  - All subject & team data
  - All device data and who devices are assigned to
  - All session data
- The database is populated either by receiving data over ECHO from OmniSense Live, by BioModule Log data imported via OmniSense Analysis, or external .zsf session files also imported via OmniSense Analysis
- OmniSense Live and Analysis can run at the same time, but a refresh button must be used in Analysis to update to latest data

Database Rules

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- Subject names must be unique (no duplicates).
- The hierarchy for displaying session data in OmniSense Analysis is
  - Team (or “No Team Assigned”)
    - Subject
      - Session Data
        - Subsession data
- Subjects are listed under the *last team they were assigned to*.
- If the subject has never been assigned to a Team (possible if log data is imported), they are listed as ‘No Team Assigned’.
- Team names can be deleted and recreated as necessary.
- Sessions can be *Archived* – they are saved as an external .zsf file, and are deleted from the database. The external zsf file can be re-imported at will. Use this function to ‘de-clutter’ a database and speed up database loading time.

If a subject is deleted from the database, all of their sessions are deleted and cannot be recovered. If you re-use the name, you will be prompted to ‘reactivate’ a deleted subject, but their old data will no longer be available.

Recording Logic

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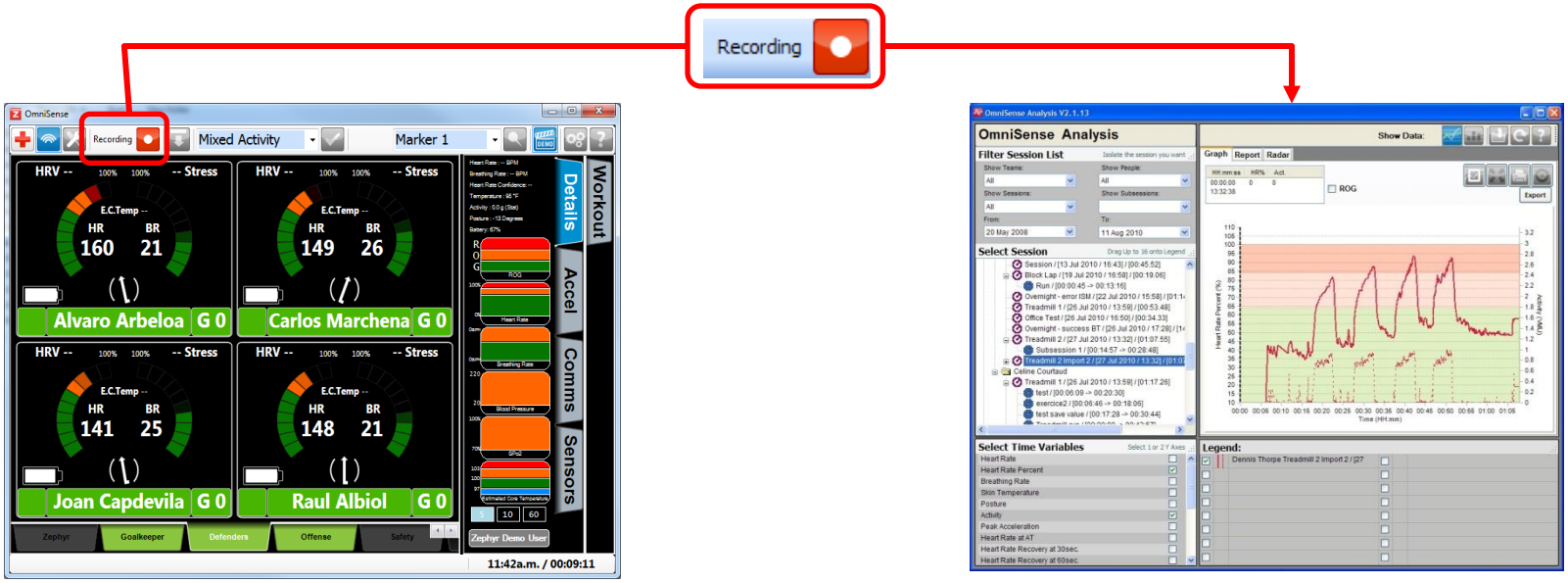

OmniSense Live

OmniSense Analysis

- Data must be recorded in the Live module (or logged internally in BioModules) for later display in the Analysis module
- Recording is the default state when Live mode is engaged
- Analysis and Live modules can run simultaneously, but data must be refreshed manually in the Analysis module

Recording Logic

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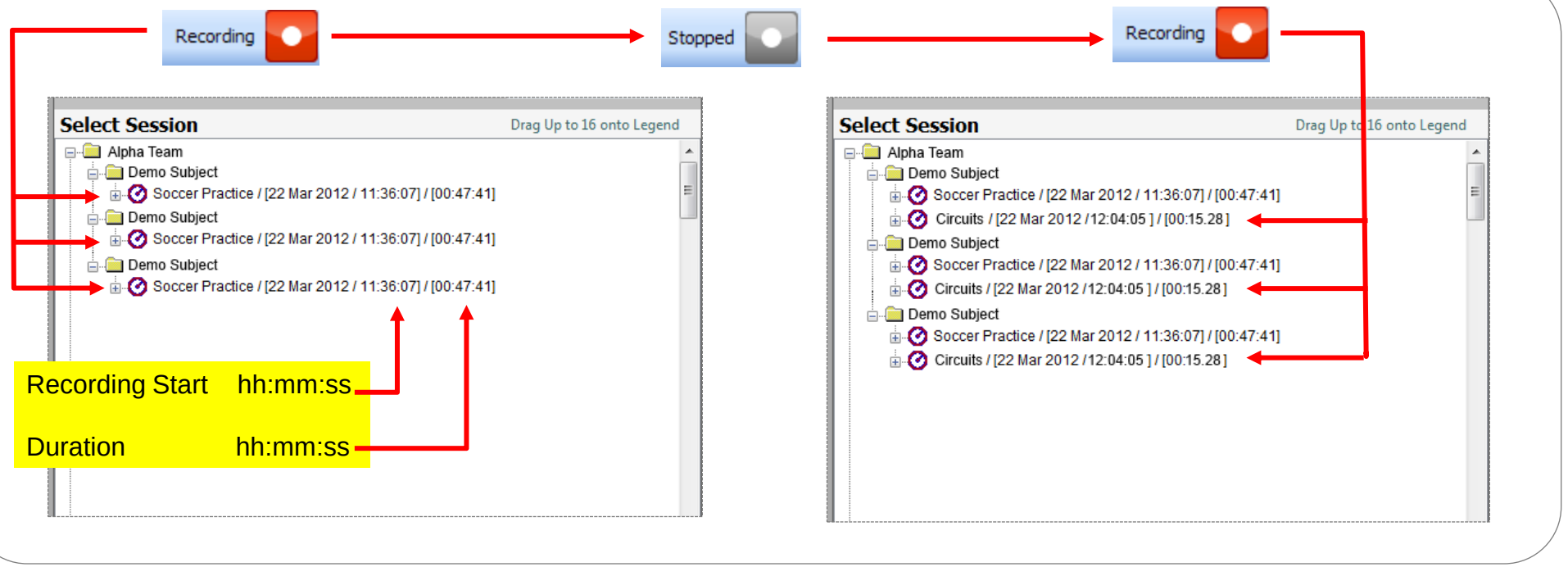

- Each time the Record button is pressed in a continuous session in the Live Module, new individual subject sessions are created in the database for each subject deployed

- These are displayed as individual subject sessions in Analysis

PSM Training Modules

Session Naming

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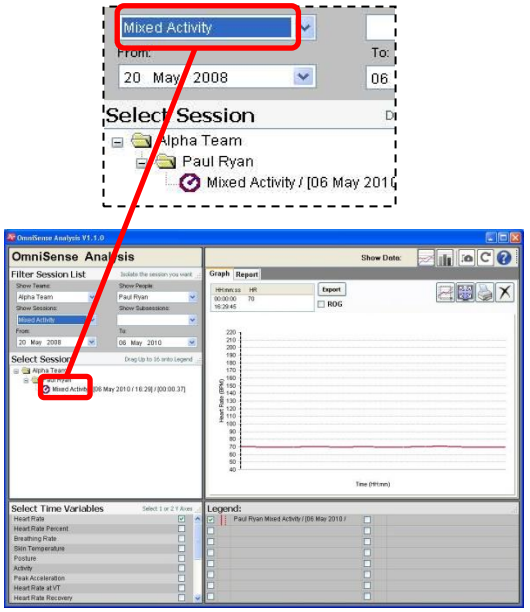
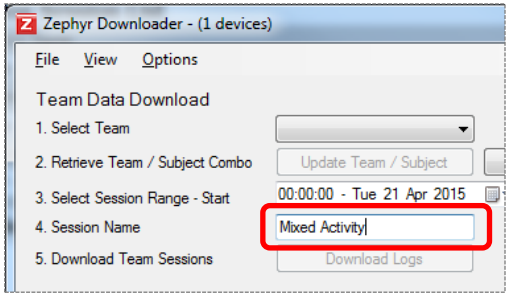
Session Names in OmniSense Live



Filter Data using Session Names



Set Session Name when importing Logs

Rename a Session in Analysis

- Custom Session names make for easy filtering of data for display in Analysis

- Session Names can be created in OmniSense Live, in the Zephyr Downloader when importing Log data, or by renaming sessions in Analysis itself

- Session Name list can be populated in OmniSense Live > Preferences 

PSM Training Modules

Workflow

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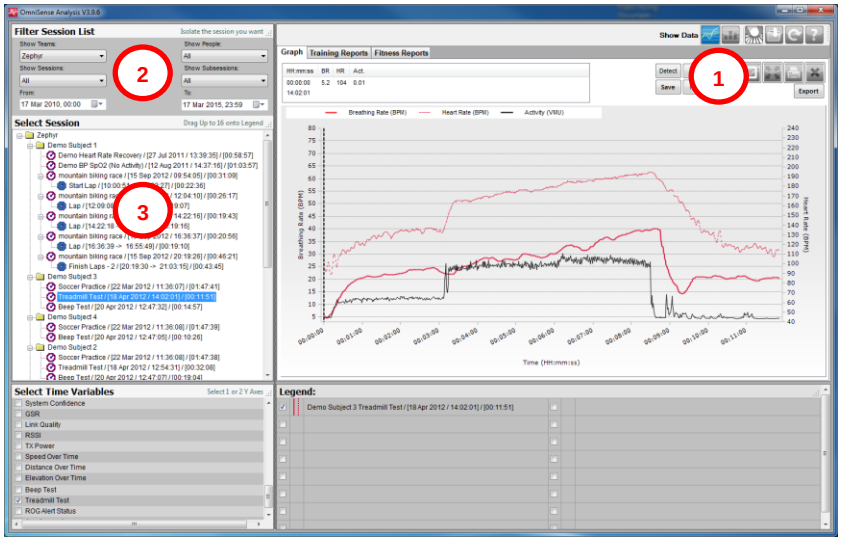
2. Use filter pull downs to populate Session tree. Date defaults to today's date.

3. Drag and drop or double-click selected sessions to populate Legend.

4. Select 2 variables to display on graph. 3 display for Treadmill or Beep Test.



1. Select graph type:
Time (line)
Summary (bar)

•Time Graphs:

- First parameter selected: left vertical axis, solid trace
- Second parameter selected: right vertical axis, dashed trace

•Reports – select the Reports tabs, see module on reports

Training Reports

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Graph Types

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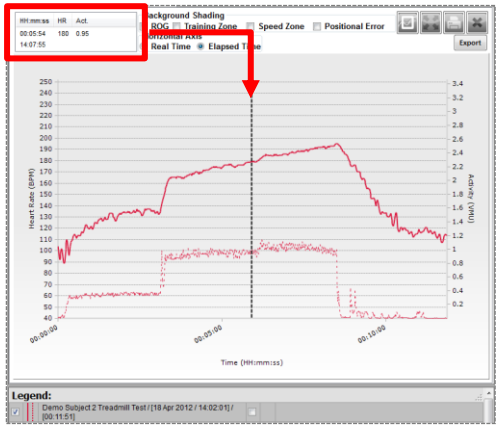
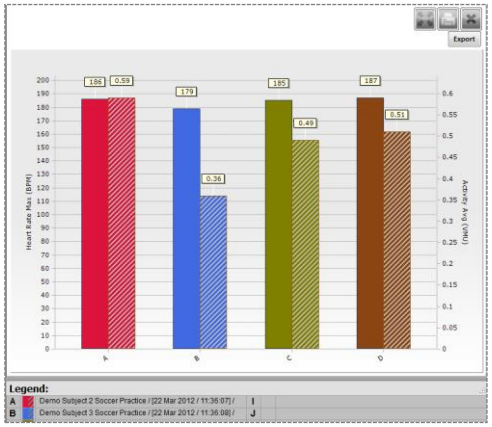
Drag vertical cursor to see exact values

Left axis: 1st parameter selected ——

Right axis: 2nd parameter selected. ------



Time Graph



Summary Graph

Time Data – line graph, two traces per subject	Summary Data – histogram (bar chart)
• Drag vertical cursor for exact values displayed above graph	• Average, Max Min or Total values, dependent on parameter
• Show variability over time	• Show historical trends over multi sessions
• Compare any 2 parameters (or HR, BR + Activity if a fitness test)	• Compare up to 16 subjects
• Automatic Analysis of fitness tests	
• Compare up to 16 subjects	
• Real or elapsed time horizontal axis	

Filter Sessions

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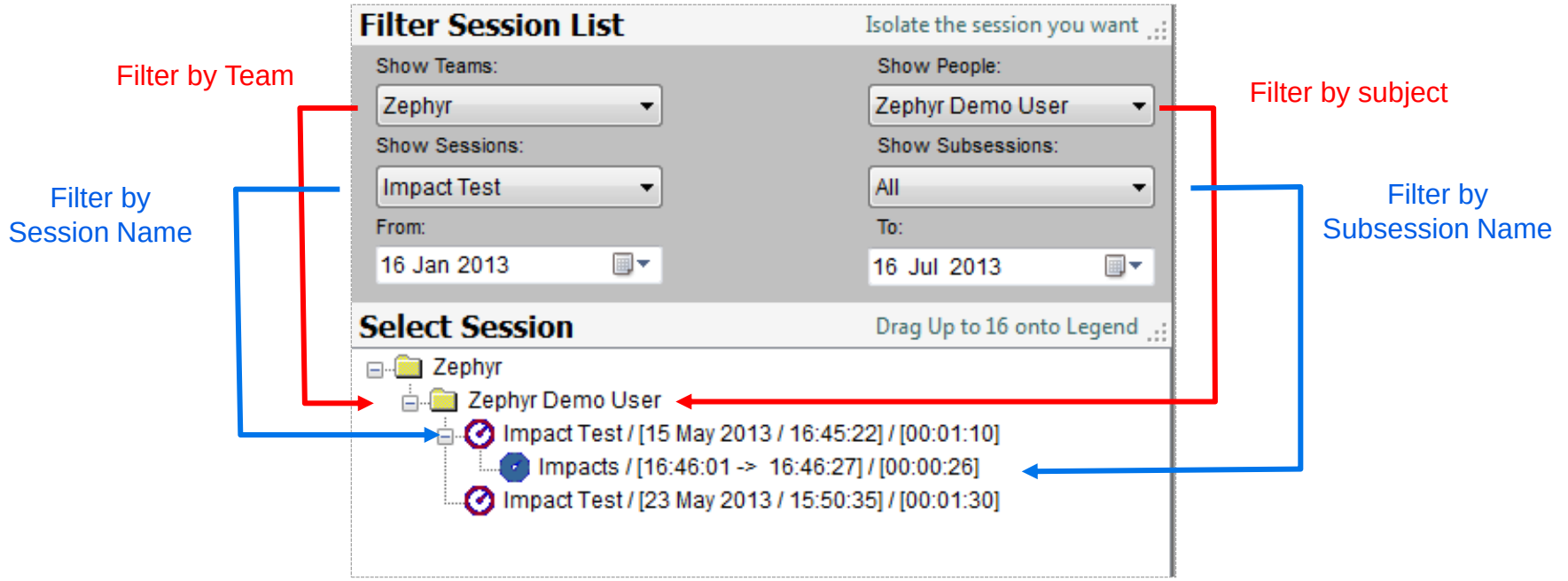

- Effective naming of sessions at time of recording in OmniSense Live will make for faster filtering when retrieving data
- The *From* date field defaults to today's date
- To access demonstration data, set the *From* field to Jan 2012

Select Session

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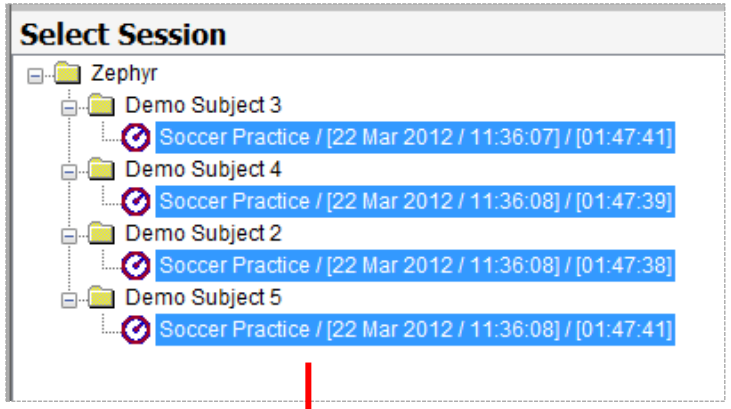
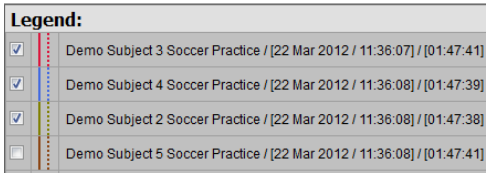


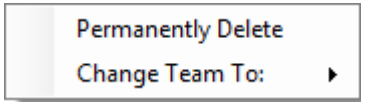
Double-click on a Session or click-and-drag to move it to the ***Legend***



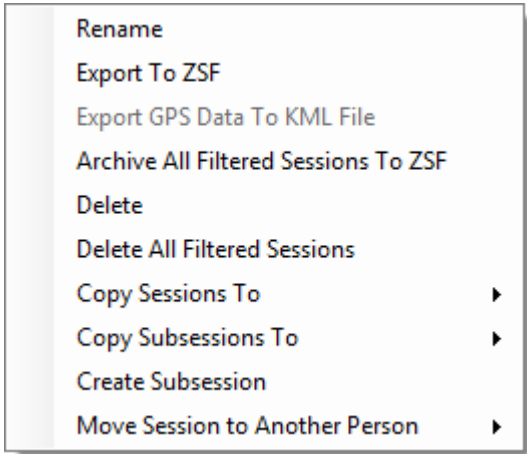
Right-click context menu options

Team

Subject



Session



- Use the filtered sessions to populate the Legend for Graph display, or the Reports pane

- Hold the Control Key and click to select multiple sessions

Legend

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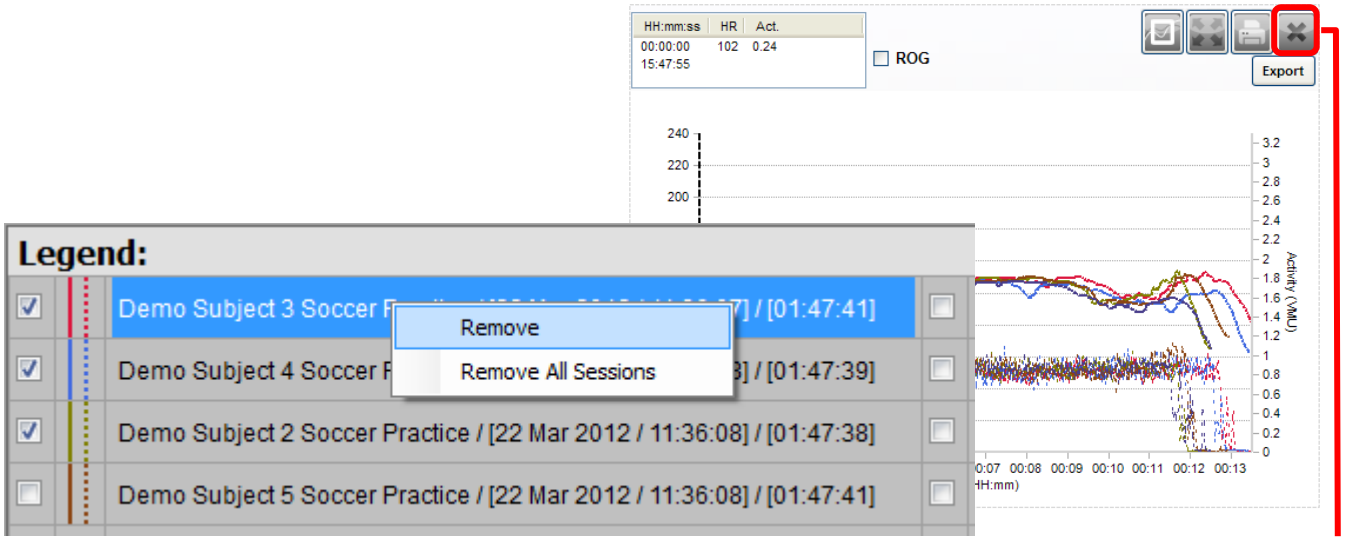
Use check boxes to hide or display a session trace on the graph



Click 'X' to clear all data

Select a Session and right-click to remove

- Use the filtered sessions to populate the Legend for Graph display, or the Reports pane

- Hold the Control Key and click to select multiple sessions

Select Variables

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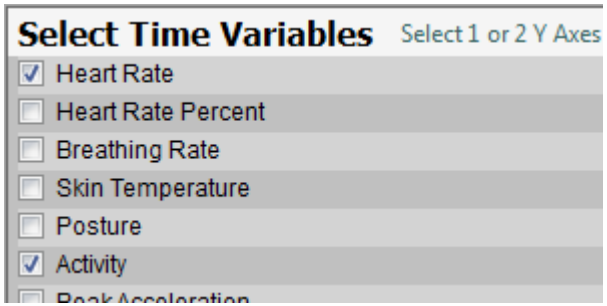
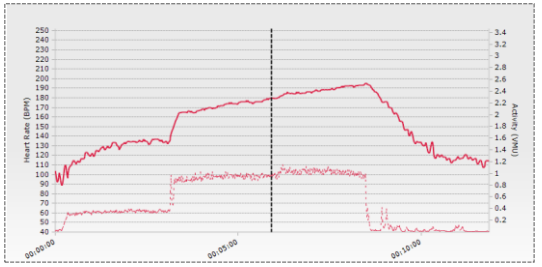
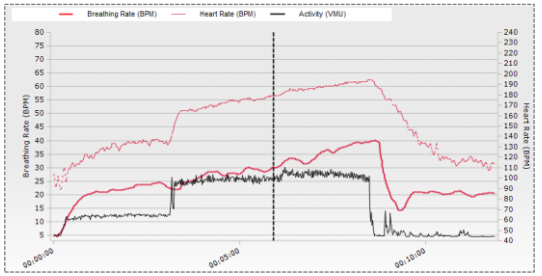


Two variables selected



Treadmill/Beep Test selected:
HR + BR + Activity displayed



Select 2 variables, or 1 only for Beep/Treadmill Test

1st variable selected = **left** vertical axis
solid trace ——

2nd variable selected= **right** axis
dashed trace - - - - - -

- If a variable is de-selected, any remaining variable displays against the **left** vertical axis

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Graph Options

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Background Shading - ROG

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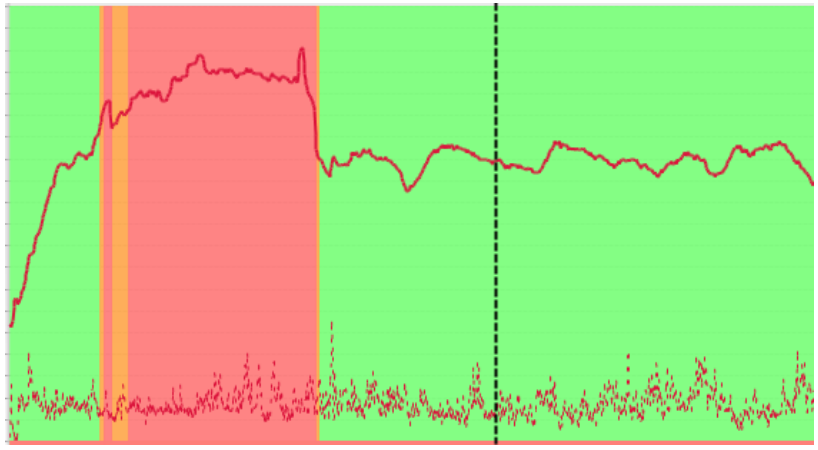
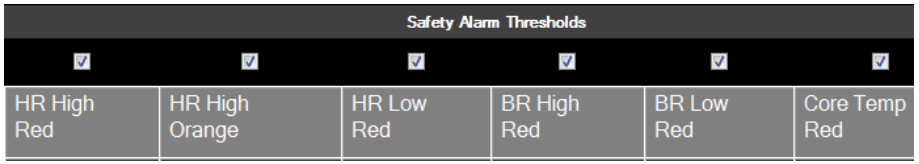
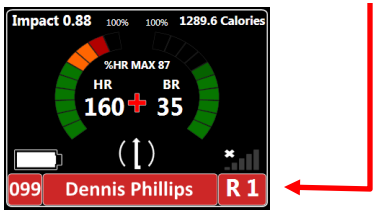




ROG status is determined by the Safety Alarm thresholds set in the Setup > Subject screen in OmniSense Live. It is displayed as Subject Status ROG in the Live BioGauge.



- Background Options apply to Time Data graphs only – not Summary Data
- Default is a plain, uncolored background

Background Shading – Training Zone

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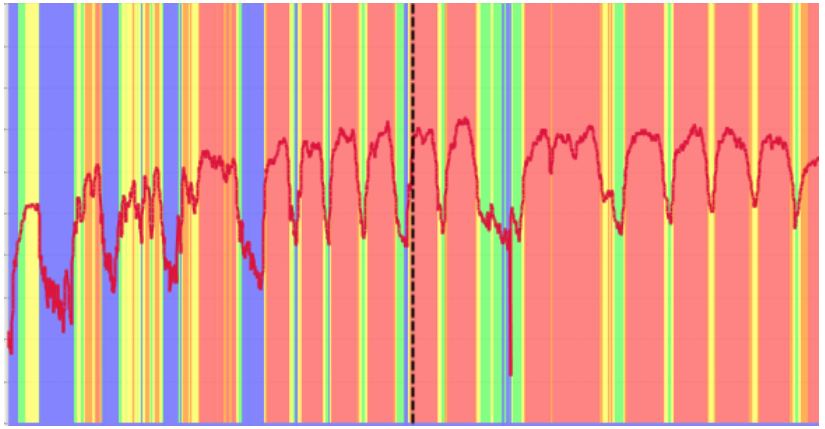

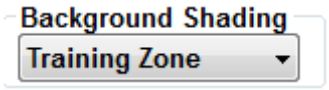

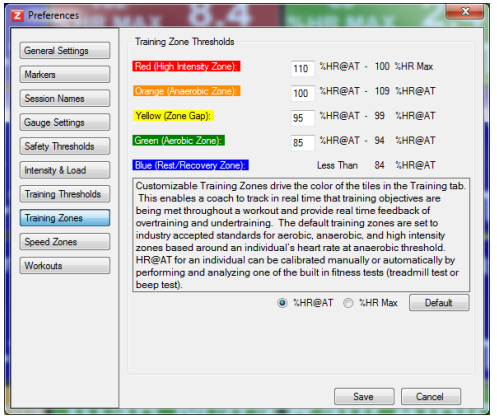

Training Zones are ranges of HR_{max} or HR@AT set in Preferences in OmniSense Live

- Training Zone shading will correlate closely with Heart Rate, as shown in the example, which displays HR only

Background Shading – Speed Zone

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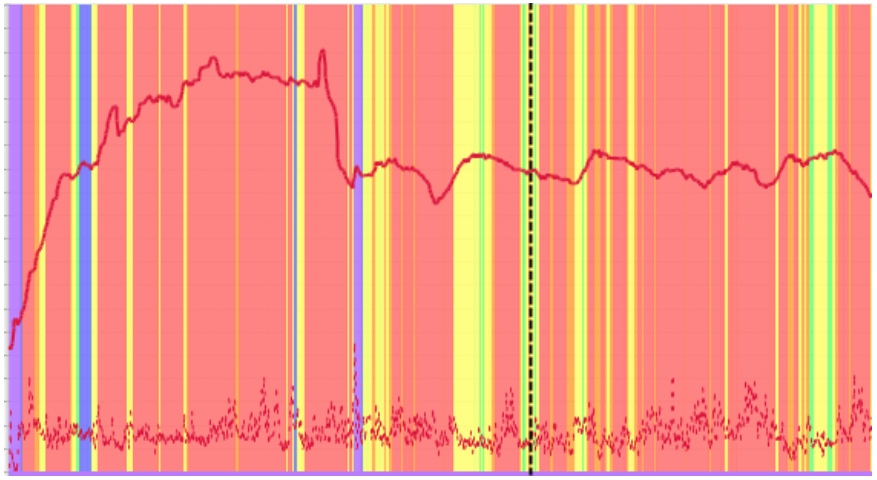

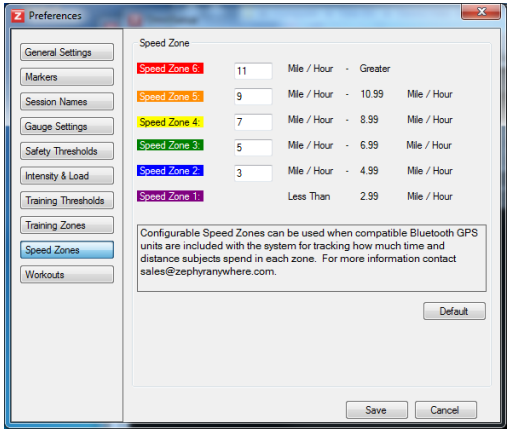

Speed Zones are ranges of kph or mph set in Preferences in OmniSense Live

- Speed Zone background will only display for sessions which incorporate GPS data – either recorded from OmniSense Live or imported from BioModule log data into OmniSense Analysis. Sessions which contain no GPS data will display an un-colored background. See the Training Module on Log Data for more information.

Real/Elapsed Time

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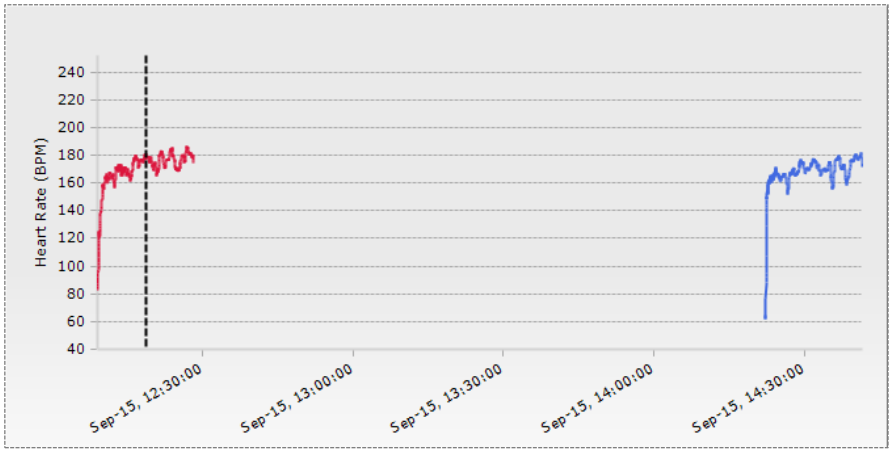

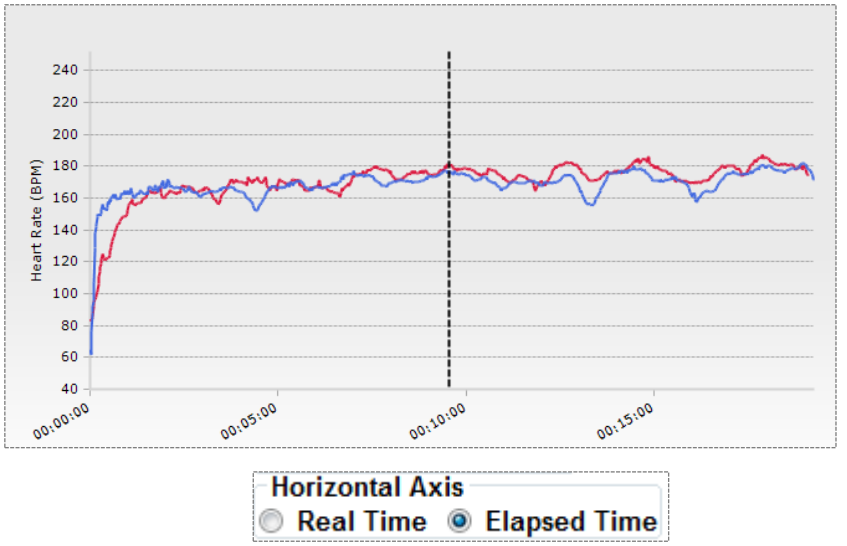

Two Sessions which don't overlap in Real Time – they are two hours apart.

- Elapsed Time comparison allows overlay of similar sessions which have occurred at a different minute, hour or day.
- The example shows two laps of the same circuit. In Real Time, they don't overlap, so can't be compared directly.
- In Elapsed time, both sessions Start Times are shifted to 00:00:00
- If Elapsed Time data is exported from Analysis, the original timestamp data is replaced with new timestamps starting at 00:00:00 for all sessions exported.

Subsession Overview

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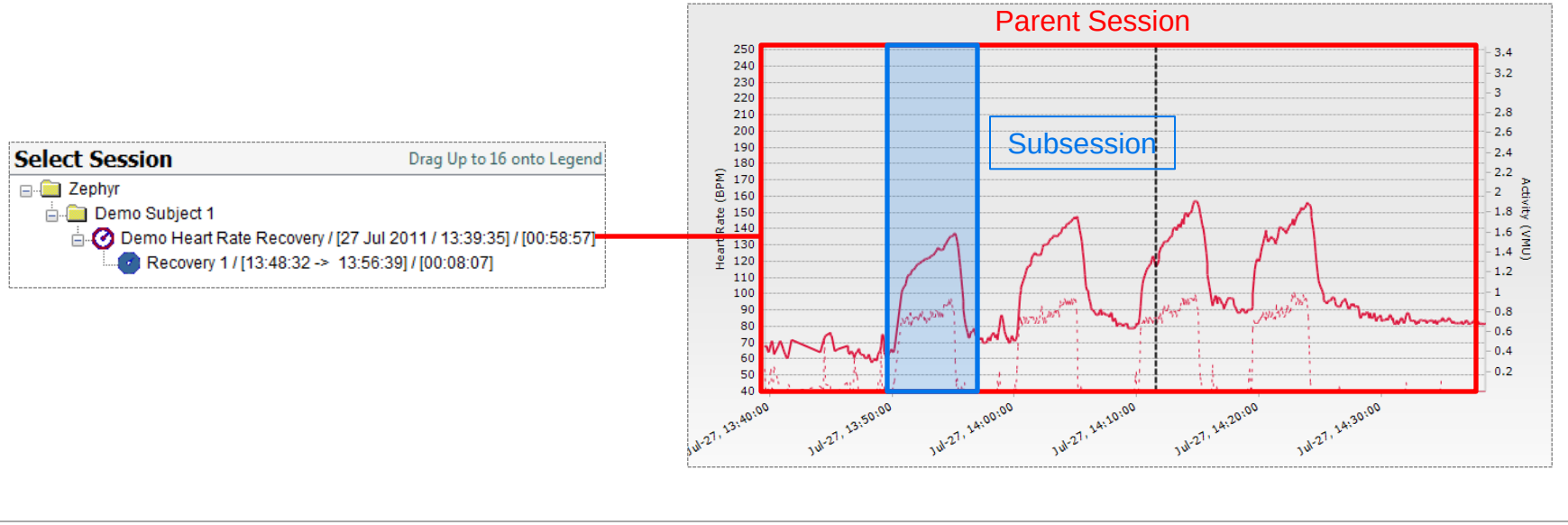

- Creating subsessions allows you to isolate a smaller component of a parent session, or trim off unwanted data to exclude from graphs or reports
- If a parent subsession is deleted from the database, all subsessions are also deleted
- You cannot make a subsession from a subsession
- Multiple subsessions may overlap within a parent session.

Create a Subsession

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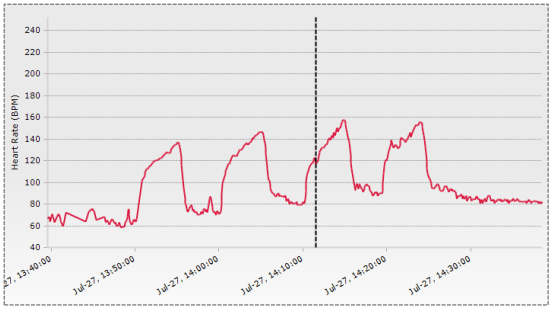
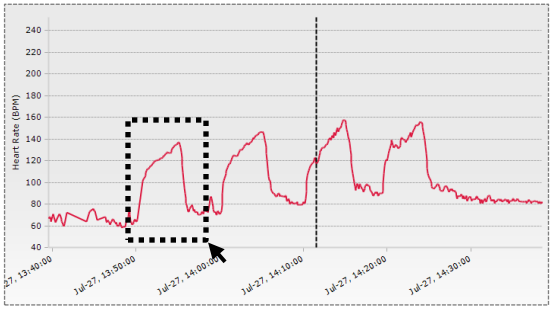
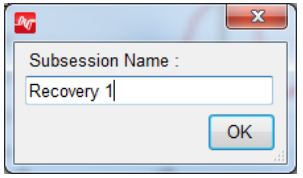


Display Sessions and parameters as needed

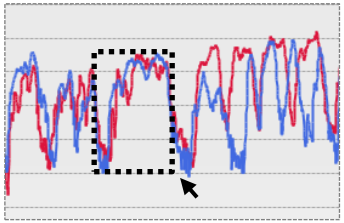
Select subsession button

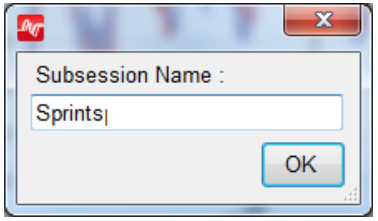


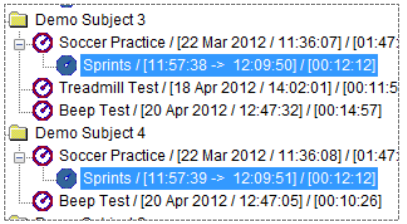
Use mouse arrow to draw a rectangular frame for the subsession. Both vertical and time axes will truncate automatically when the subsession displays on its own



Rename the subsession in the dialogue







If more than one session is graphed when a subsession is framed, then a separate subsession is created for each parent session.

Subsessions by Wizard

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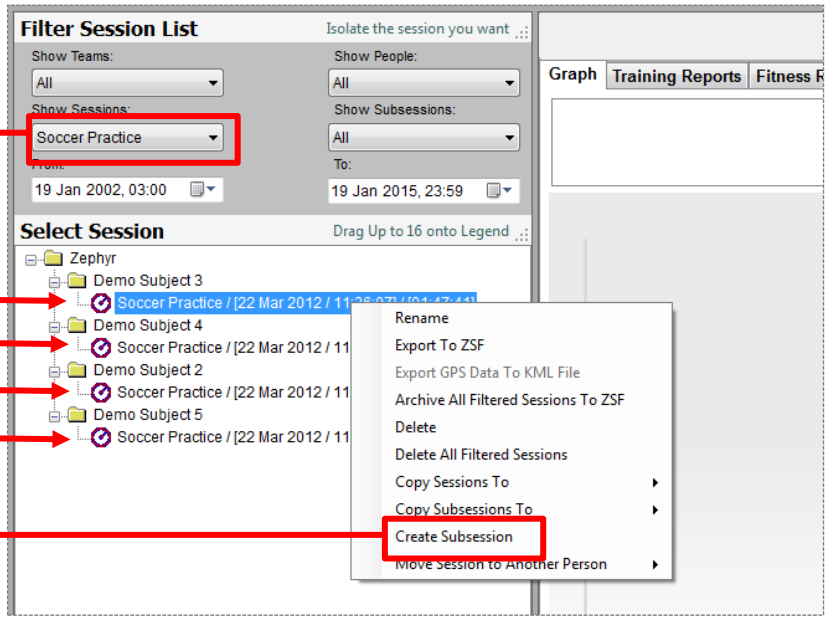
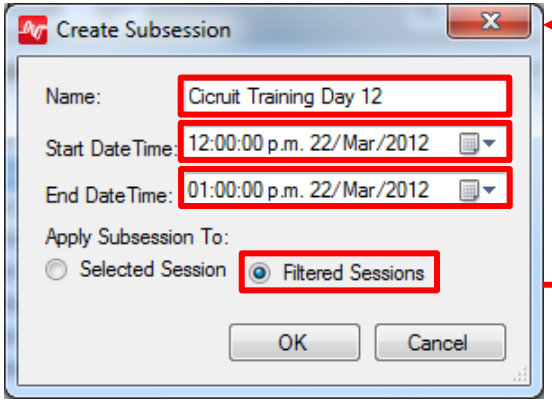
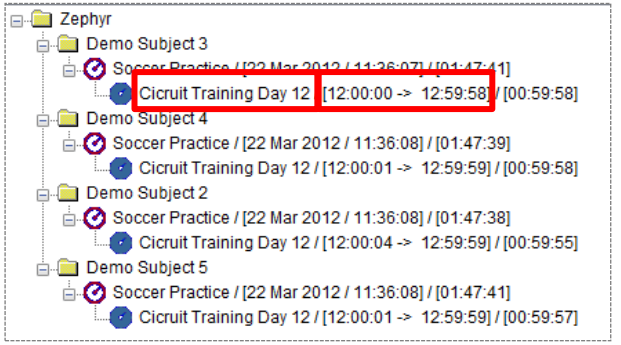
- Best used to make multiple subsessions where Start & End times are known
- Use *Show Sessions* to display only those session you want to use
- Right-click to show context menu
- Use subsession dialogue & edit as needed. Give subsessions a meaningful name. Check *Filtered Sessions*







Time Graph Zoom & Pan

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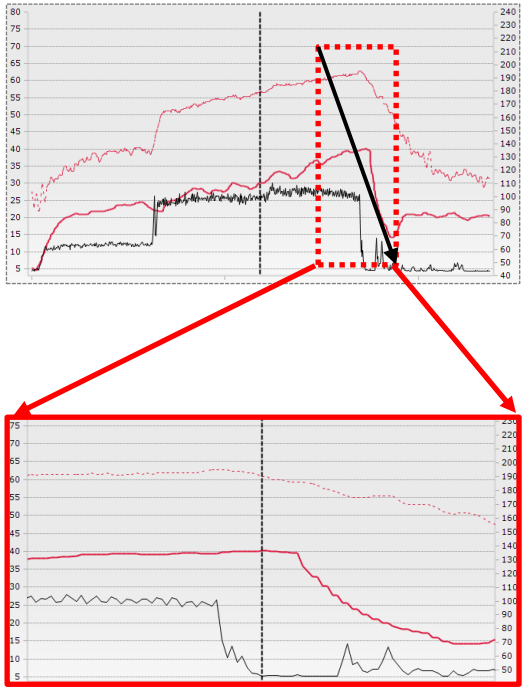
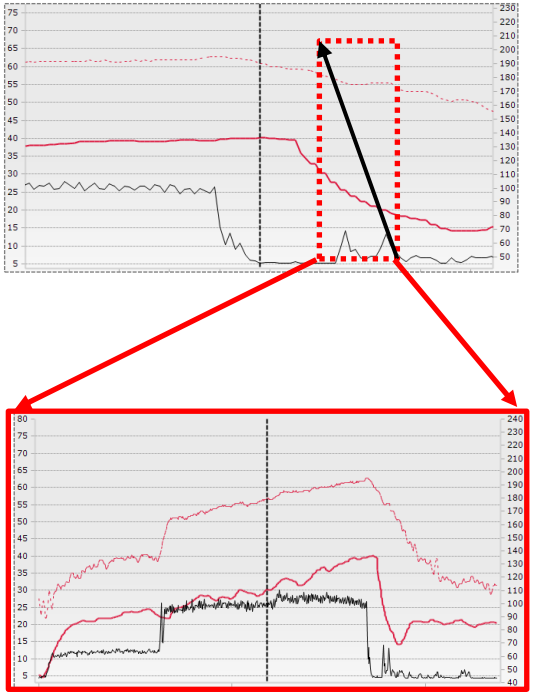


Drag a frame top left to bottom right round any section of a time graph to zoom in

Right click and use mouse cursor to drag graph in any direction for closer inspection. The axis markers will adjust automatically



Drag any frame bottom right to top left h to zoom out

Time Graph Cursor Values

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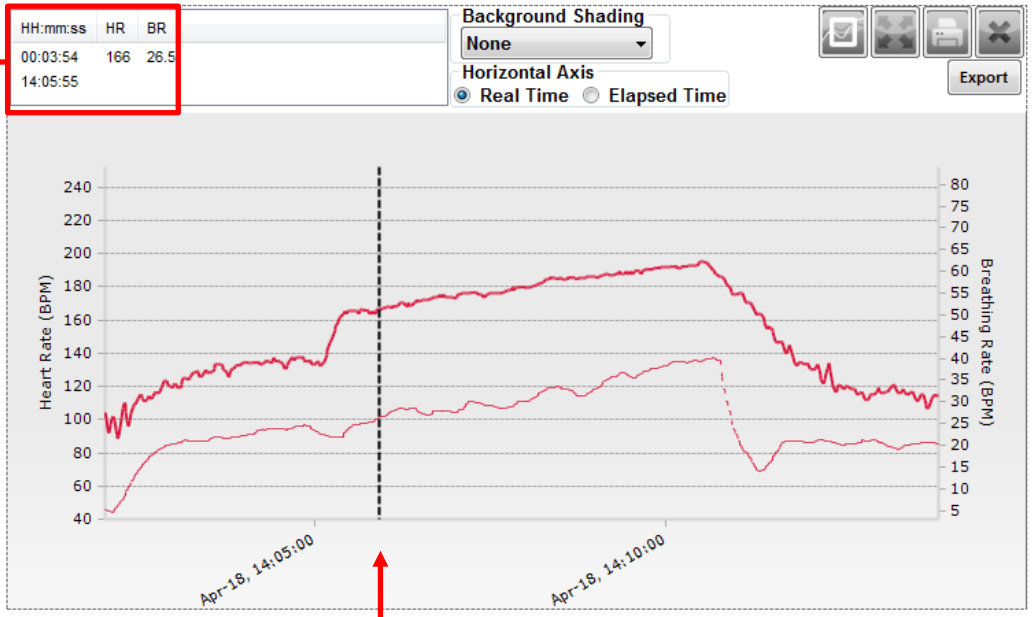
Real Time timestamp
Elapsed Time timestamp
Primary Session Variables



Drag the vertical cursor to display primary parameter value

Print Graph

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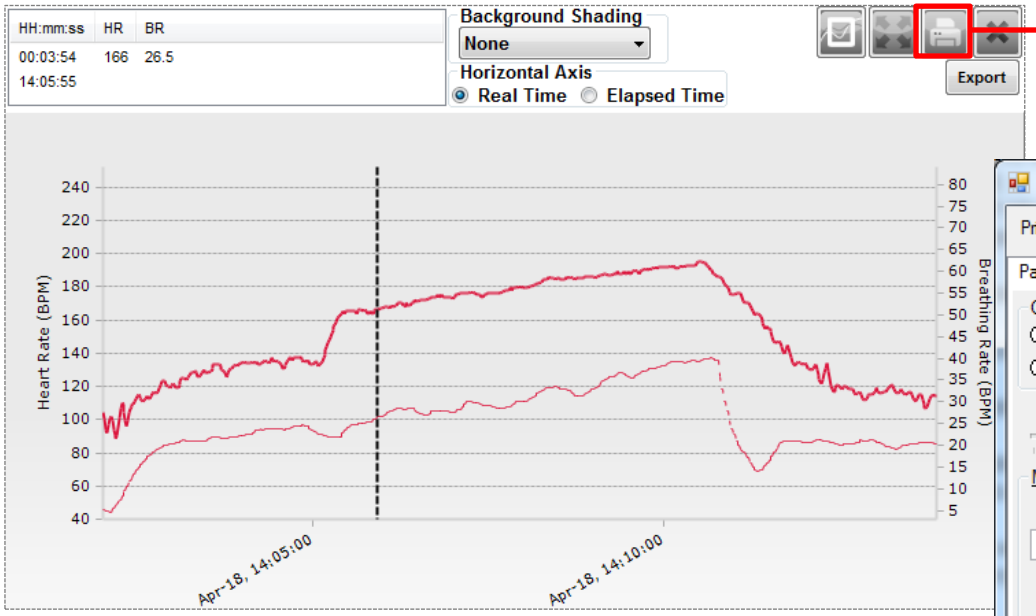
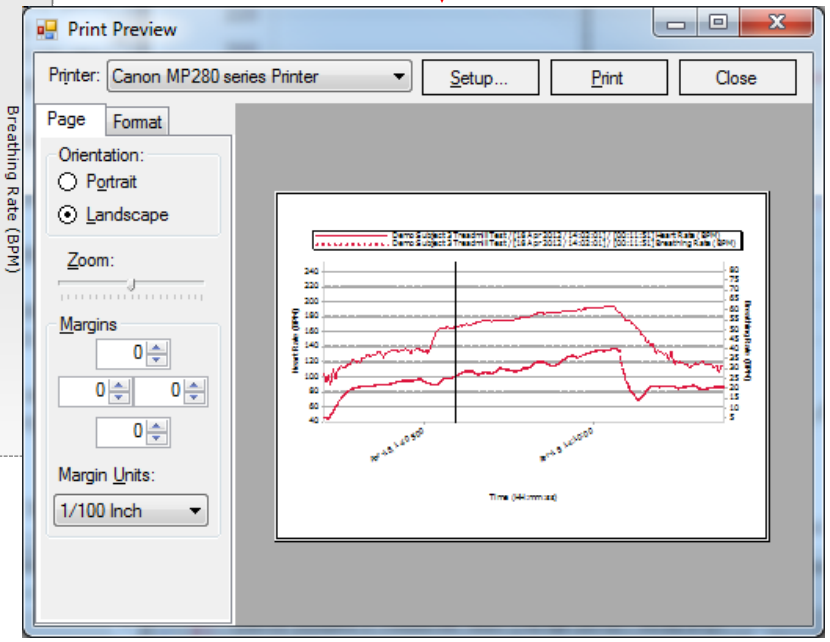
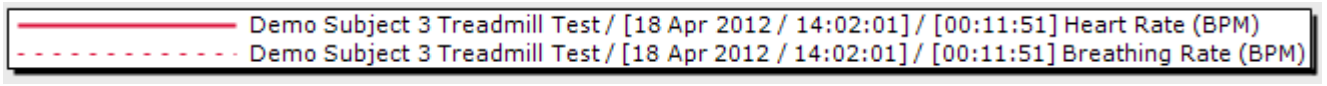




- The Time or Summary graph will print exactly as displayed i.e. if zoomed-in
- A legend will identify sessions and parameters



Fullscreen

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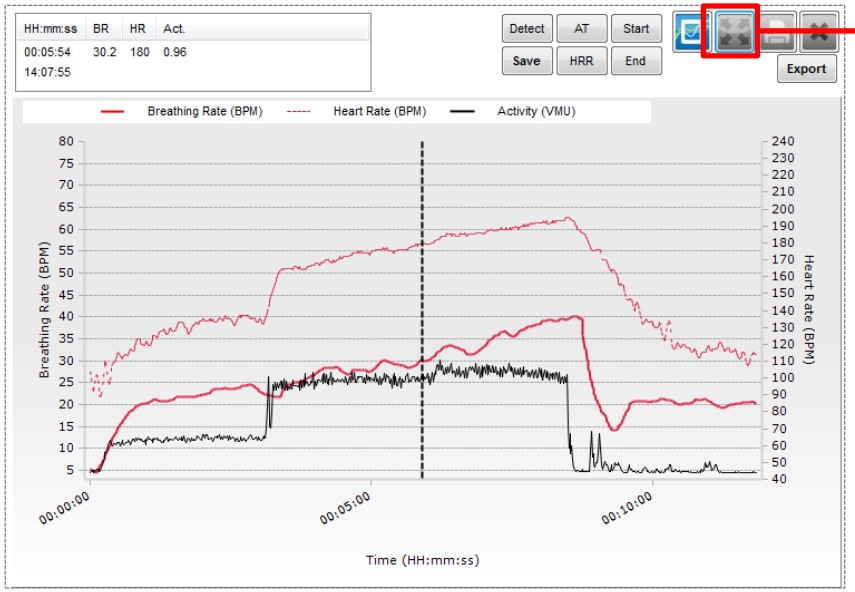

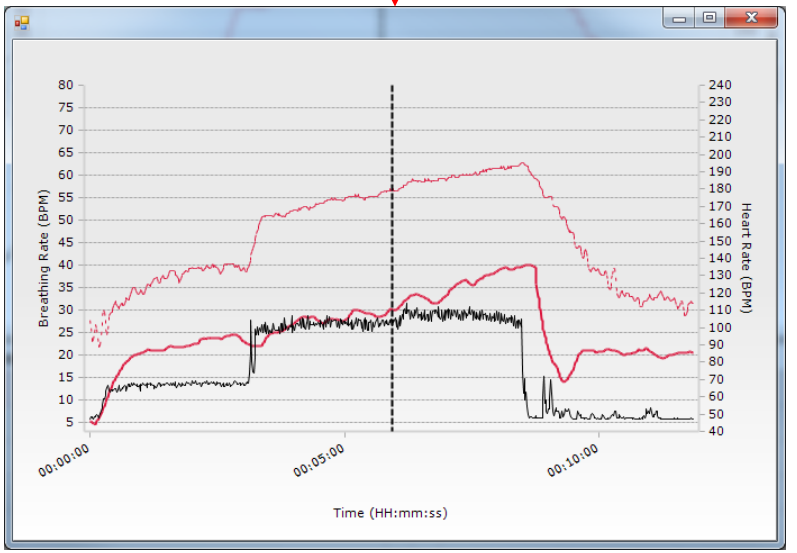

- The full-screen button will display the graph contents only in a separate, resizable window.
- Zoom and Pan are still active in this window

Export Data - ZSF

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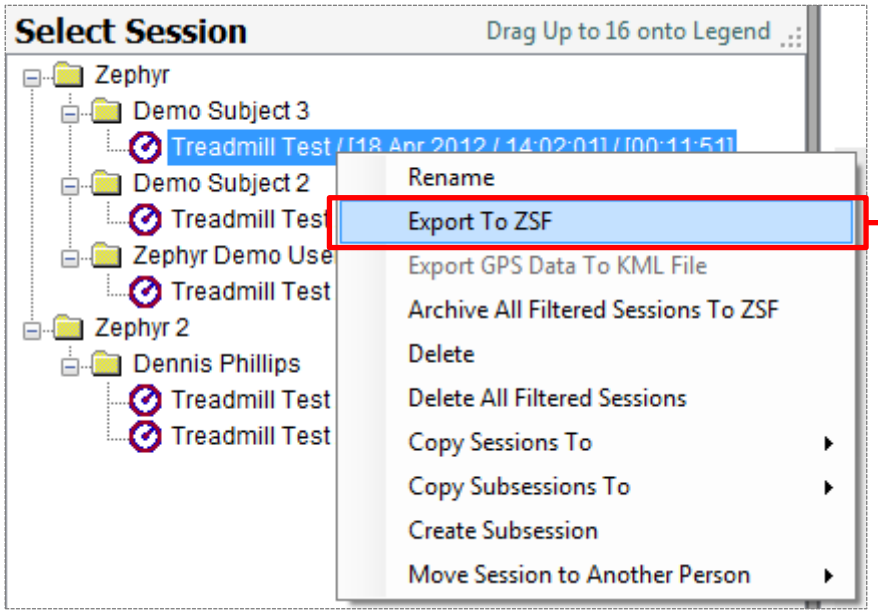
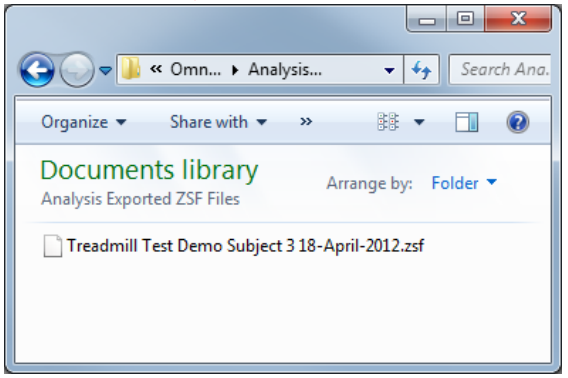
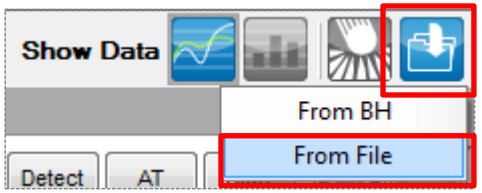




- *Right* click a session for a context menu
- Select *Export to ZSF* (Zephyr Serial Format)
- Browse, name the .zsf file and save in your preferred location.
- A ZSF file can only be opened by reimporting it back into an instance of Analysis from the Import Menu button
- Use to archive a single session, or to send to another user for their use



Export Data – External File

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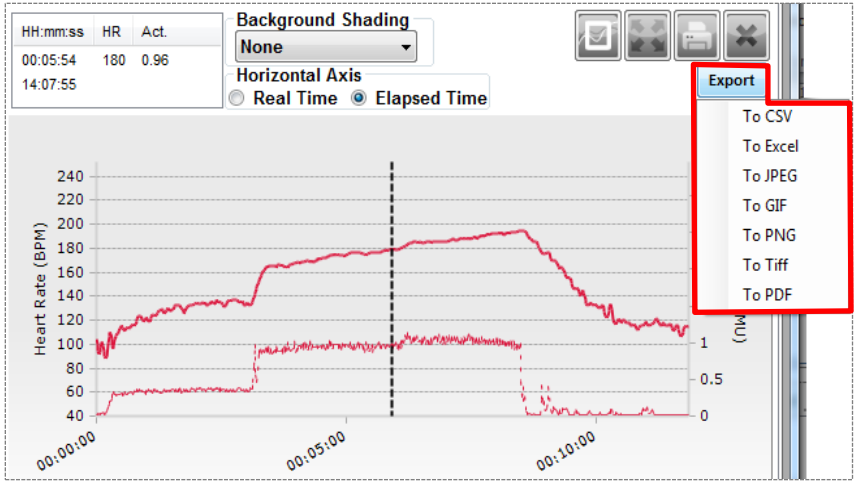

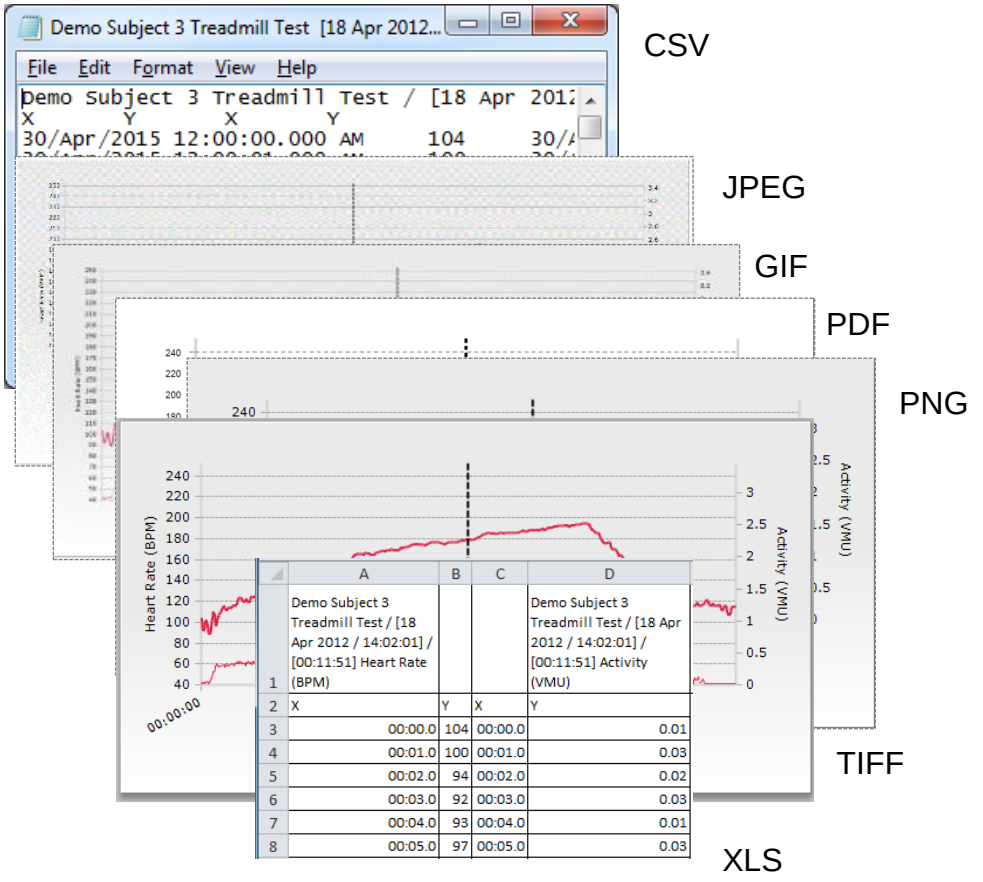

- Export to the selected format
- Image files show Markers; csv and Excel files do not

PSM Training Modules

Log Data

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PSM Training Modules

Overview

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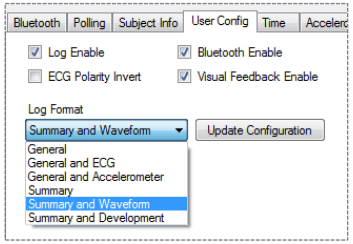
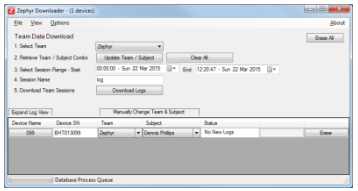


Set Log format with Zephyr Config Tool.

GPS

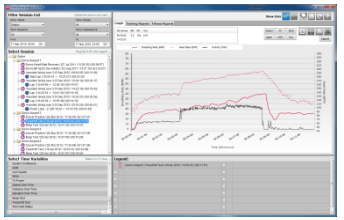
Bluetooth



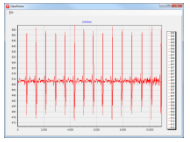
Zephyr Downloader in OmniSense Analysis

OmniSense Database

OmniSense Analysis



Summary Logs



Summary and Waveform Logs

External Files for: ECG & Accelerometer Waveforms & KML (Google Earth)

Summary	1 Hz Data [Default logging format]
Summary & Waveform	Additional 250 Hz ECG + 100Hz Accelerometry, 1 Hz GPS
Summary & Development	Additional 1KHz ECG + 50Hz Accelerometry . *No* GPS.

- Log Download time increased by a factor of 5x approximately for Summary and Waveform logs
- Waveform data can ONLY be accessed via External Files with 3rd party application, and not via OmniSense Analysis
- BioModule must be configured to Summary & Waveform logging to record GPS data

Checklist

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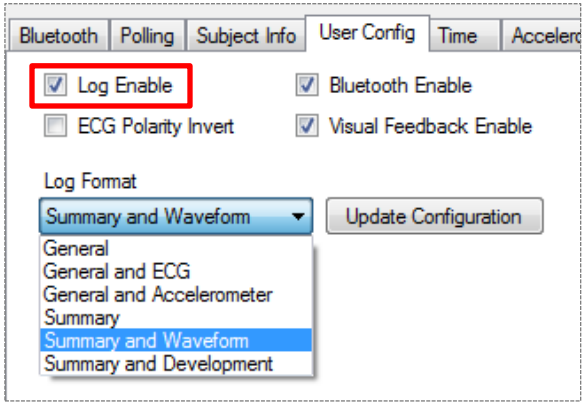
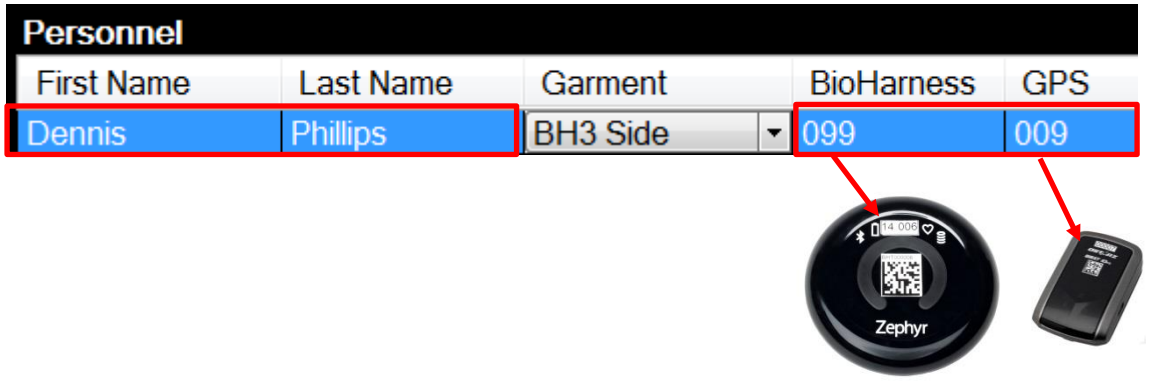


Zephyr Config Tool
Confirm *Log Enable* is checked
Set Log format



If the BioModule hasn't yet been added to the OmniSense database via OmniSense Live > Setup, then a message will prompt you to do this before downloading any logs.

1. BioModule must be configured to log (*Log Enable*) in correct format.
2. Log format: *Summary* for general use, *Summary and Waveform* if optional GPS is used
3. For automatic log download using the Zephyr Downloader, the subject should use the BioModule and optional GPS they are currently assigned in OmniSense Live, otherwise Team and Subject must be assigned or updated manually in the Downloader settings

A BioModule / GPS combination must have been used previously in a live ECHO session, to Bluetooth-pair the BioModule and GPS, otherwise the BioModule must be configured manually

Manually Pair BioModule & GPS

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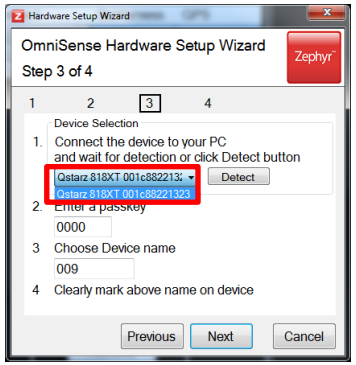
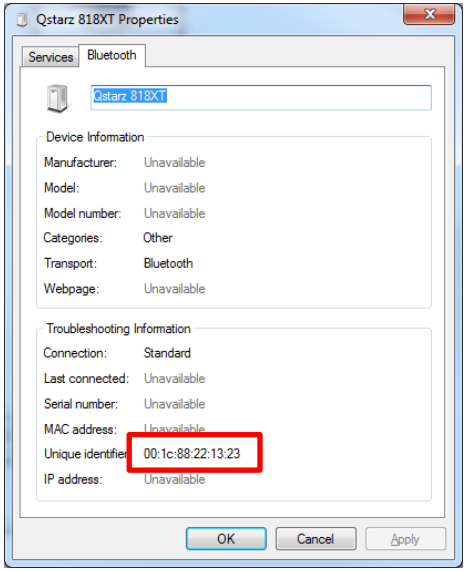
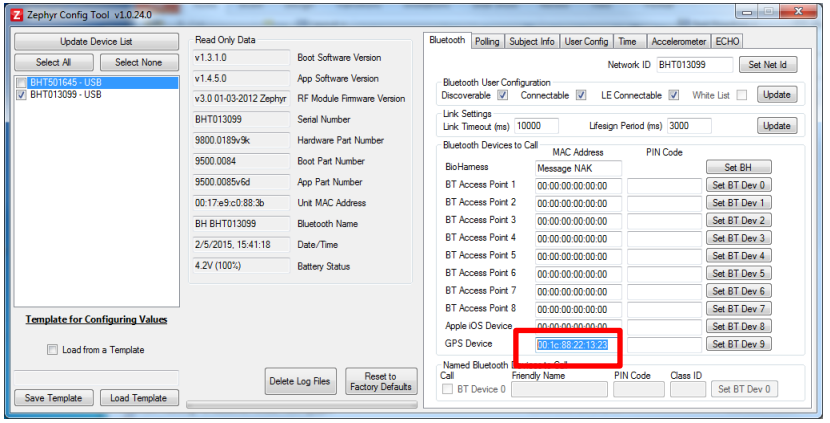


Add Hardware Wizard: GPS



Windows: Add Device



Zephyr Config Tool – manually setting GPS MAC Address

- GPS MAC Address [00:1c:88:22:13:23 in example] must be configured using the Zephyr Config Tool
- MAC Address is shown in Add Hardware Wizard after GPS is detected over Bluetooth
- MAC Address can be determined from Windows > Devices and Printers > Add Device after GPS detected over Bluetooth by PC
- The MAC address remains set in the BioModule after it's powered off, unless updated
- Use of the BioModule and a different GPS in an ECHO system will configure for the new GPS

Zephyr Downloader Overview

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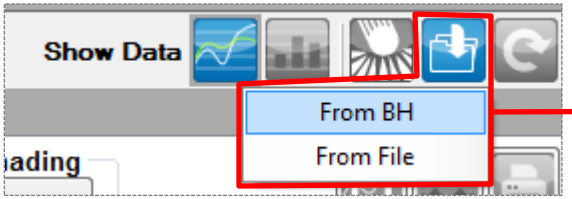
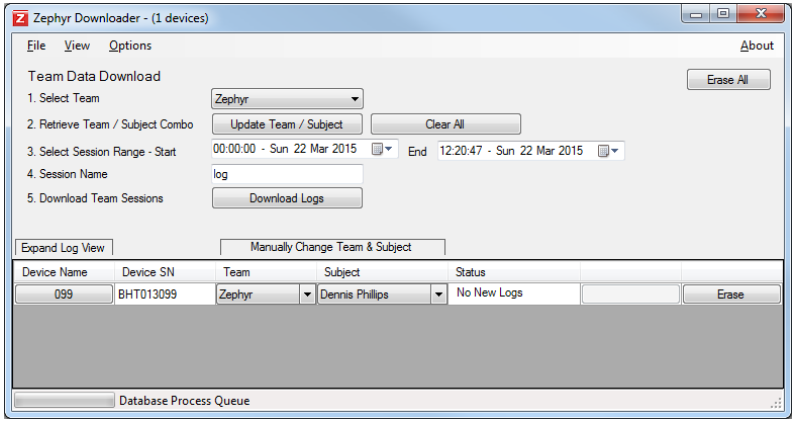


Start from Analysis Toolbar

Connect cradle or case to PC



- The Downloader will not download any logs already existing in the database for the assigned subject.
- The Downloader has a single-select menu option which will automatically download all devices logs to currently-assigned subjects – see next section
- BioModule **green** LED will flash while logs are downloading
- For devices in a system case, the Downloader will download up to 20 logs by USB, and any remaining BioModules automatically over Bluetooth
- Logs remain in the device unless specifically erased
- Oldest logs are overwritten when the device memory is full

BioModule Logging Capacity & Download Times

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Log Format	Total Logging Capacity (Hours)	Approximate Download Time (per hour of data) - Bluetooth	Approximate Download Time (per hour of data) - Bluetooth
General	500	1 min	
General and ECG	140	3 min	
General and Accelerometer	280	2 min	
Summary	450	1 min	12 min
Summary and Waveform	55	5 ½ min	1 h 30 min
Summary and Development	30	12 min	

- Download times are for a single device. 4 devices will download in parallel over USB. Remaining devices are queued.
- General, General and ECG & General and Accelerometer are legacy log formats used by the BioHarness BT 2.0.
- The Summary format is an extended format compared to General.
- The *BioHarness Log Descriptions* document describes each format in detail.

Changing the Log Format in a BioModule erases all existing logs. Download old logs first if they are important.

Downloader Menu Options

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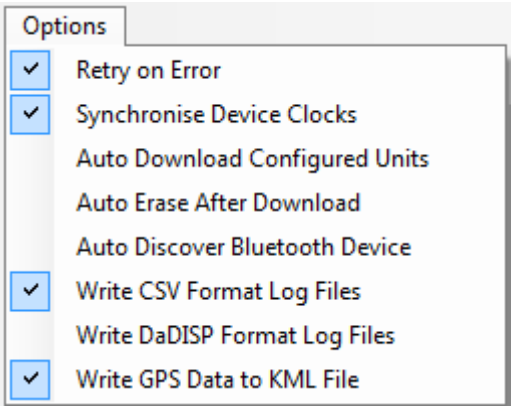
Retry on Error	Retry download if a memory corruption is encountered
Synchronize clocks	Set BioModule clocks to PC time. Clocks are also set over the air when a live ECHO session is started.
Auto Download	Will automatically download any new logs to the subject to whom the BioModule is assigned to in the database. The fastest method of downloading new logs.
Auto Erase	Erase old logs on download. New logs overwrite old logs when memory is full.
Auto Discover	Detect and queue/download new logs over Bluetooth – use when large numbers of BioModules contain logs. BioModules must be charging.
Write CSV	Write an external csv file. All files go to ..\My Documents\BioHarness Test Logs\Team Name\Subject Name. The only way to generate ECG and 100Hz Accelerometer data
Write DaDISP	Write .DAT/.HED data files to the same location as above, for use with the 3rd party DaDISP Data Analysis Application
Write KML	Write .kml files to the same location as above. GPS must have been used in conjunction with the BioModule.



Auto Download Preconfigured BioModules

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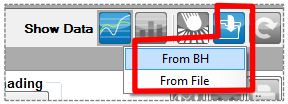
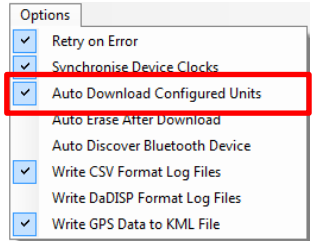
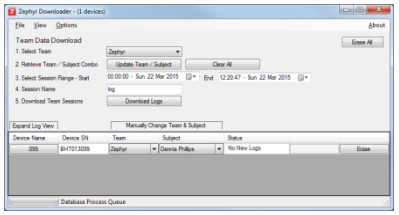
Locate all BioModules in System case or charge cradles



Open Zephyr Downloader



Check menu option *Auto Download Configured Units*



All new logs will be downloaded automatically with no further input

Preconditions

- All BioModules are assigned to a Team which is *currently deployed in Live mode* – the data will be associated with the subject the BioModules are currently assigned to
- The logs are downloaded on the day they are recorded (otherwise Session Start Time will have to be selected manually)
- Selecting the menu option *Auto Download Configured Units* (it is unchecked by default) will cause all new logs to be downloaded automatically
- If *Auto Discover Bluetooth Device* is also checked, all BioModules in the case not marked in USB-enabled bays will have logs downloaded over Bluetooth.

Zephyr Downloader Wizard

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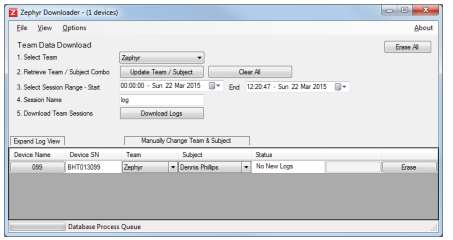
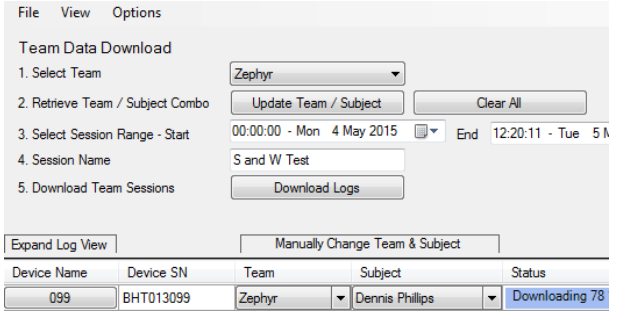
Zephyr	1. Select Team – if subject not in a team, their name must be entered manually from the Subject column pulldown
Update Team / Subject	2. Retrieve Team/Subject – based on BioModule numbers, the Wizard will populate the Subject Names column automatically. These can be corrected individually if needed. Use Clear All button to start again.
00:00:00 - Mon 4 May 2015	3. Session Range – defaults to midnight at start of current day. Use to exclude sessions if there are logs you do not want to download
Circuit 1	4. Name session – use for later filtering in Analysis. Name can be changed later in Analysis if needed.
Download Logs	5. Download all logs from all devices as per criteria set in 1 – 4.
Zephyr Dennis Phillips	Team & Subject – use to over-ride any device if the automatically-populated values need changing, or a subject is not in a Team.
Device Name 099	Manual Log selection download using the legacy log downloader. Not active if subject not known. See next page.





The Wizard is designed to retrieve Team/Subject combinations from the database based on BioModules currently assigned in Live. If a subject is not in a Team, then the individual 'No Team Assigned' & Subject Names must be populated manually

Manual Log Downloader

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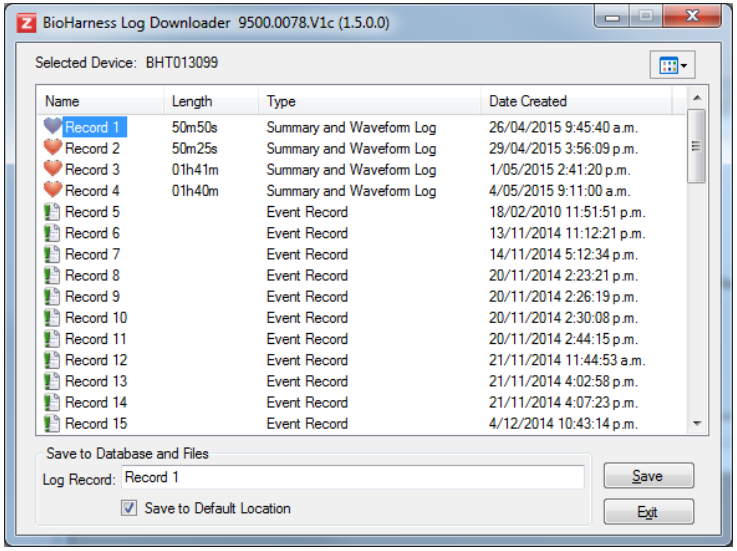

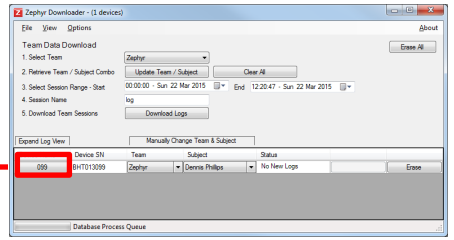

The legacy BioHarness Log Downloader can be used to select any individual log. Rename in the *Log Record* field and save to any location, as well as into the OmniSense database.

The Log Downloader shows logs, their format and duration. Default location (checked) is ../My Documents/BioHarness Test Logs/Team Name/…
External CSV files are generated by default.

PSM Training Modules

Reports

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PSM Training Modules

Overview – Individual Fitness Report

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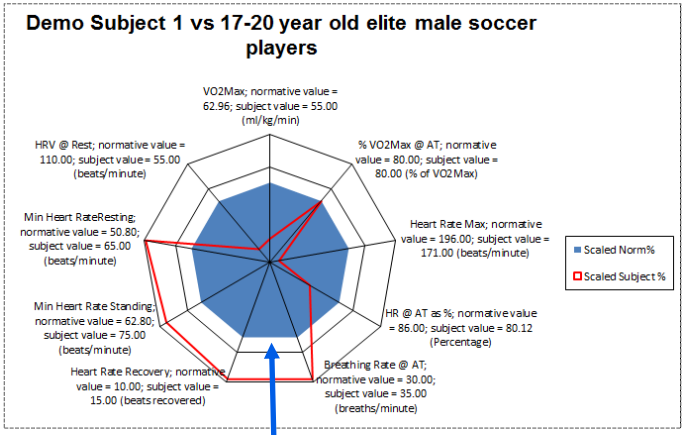
VO_2 max
%VO_2 max@AT
HRmax
HR@AT
HR@AT as %HRmax
BR@AT
HR Recovery 30sec
HRmin Standing
HRmin Resting
BRmin Resting
HRV@Rest

Fitness Parameters

Demo Subject 1	Scaled Subject %	Scaled Norm %	Min	Max	Subject	Normative	Description
VO2Max	0.15	0.50	51.62	74.30	55.00	62.96	VO2Max; normative value = 62.96; subject value = 55.00 (ml/kg/min)
% VO2Max @ AT	0.50	0.50	71.00	89.00	80.00	80.00	% VO2Max @ AT; normative value = 80.00; subject value = 80.00 (% of VO2Max)
Heart Rate Max	0.06	0.50	167.80	224.20	171.00	196.00	Heart Rate Max; normative value = 196.00; subject value = 171.00 (beats/minute)
HR @ AT as % of HRMax	0.29	0.50	72.20	99.80	80.12	86.00	HR @ AT as %; normative value = 86.00; subject value = 80.12 (Percentage)
Breathing Rate @ AT	0.78	0.50	21.00	39.00	35.00	30.00	Breathing Rate @ AT; normative value = 30.00; subject value = 35.00 (breaths/minute)
Heart Rate Recovery	0.78	0.50	1.00	19.00	15.00	10.00	Heart Rate Recovery; normative value = 10.00; subject value = 15.00 (beats recovered)
Min Heart Rate Standing	0.75	0.50	38.50	87.10	75.00	62.80	Min Heart Rate Standing; normative value = 62.80; subject value = 75.00 (beats/minute)
Min Heart Rate Resting	0.79	0.50	26.50	75.10	65.00	50.80	Min Heart RateResting; normative value = 50.80; subject value = 65.00 (beats/minute)
HRV @ Rest	0.11	0.50	39.80	180.20	55.00	110.00	HRV @ Rest; normative value = 110.00; subject value = 55.00 (beats/minute)

Report in table format



Data as a radar plot. Axes are scaled so the comparison data is a blue polygon.

Available Comparison Data:

- Fire Fighters
- Military Special Forces
- Elite Soccer Players (Male 17 – 20)
- College Basket Ball (Female)

NormativeFF.xls
NormativeMilitarySF.xls
NormativeSoccerPlayersMale.xls
NormativeWCollegeBasketball.xls

- Fitness Reports depend on fitness parameters *already held in the OmniSense database* for each subject.
- These may have been entered manually or populated automatically through Fitness Test analysis on a maximal fitness test session recorded using OmniSense Live (see module *Baseline Fitness Testing*)
- Reports can be printed or exported as an Excel Spreadsheet

Create Individual Fitness Report

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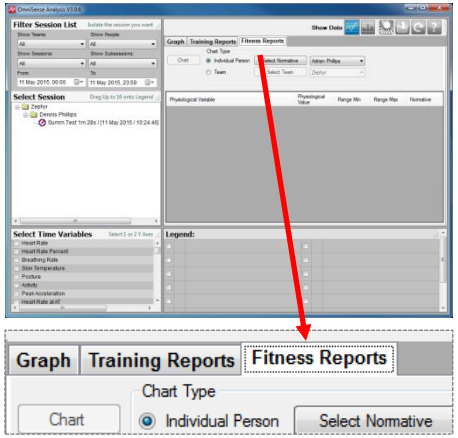
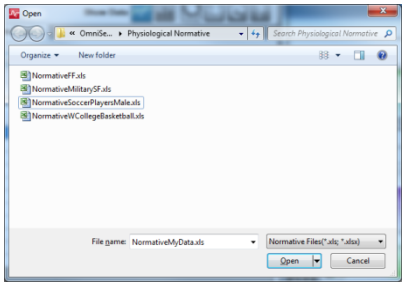
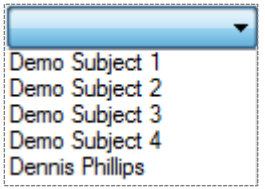


1. Select Fitness Report Tab, Check *Individual Person*

Select Normative

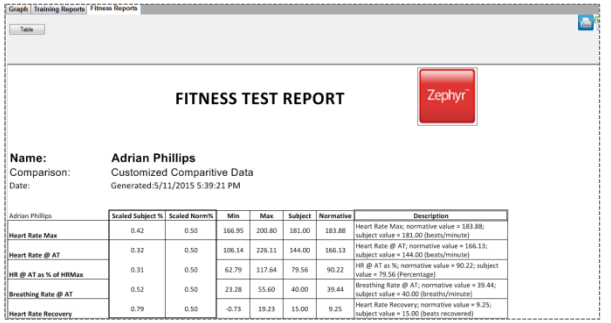


2. Use *Select Normative* to browse to normative .xls files. These can be copied and customized to suit.



3. Select desired subject from the list

Chart



4. Select *Chart* to display the report. Scroll down for radar plot. Use to export to an external file.

- Normative files represent optimal fitness data for comparison in the table and radar plots
- Any fitness parameters which have no value for the selected subject are omitted from the report, but the initial table displayed may be edited before selecting the Chart button, if values are known for missing parameters.

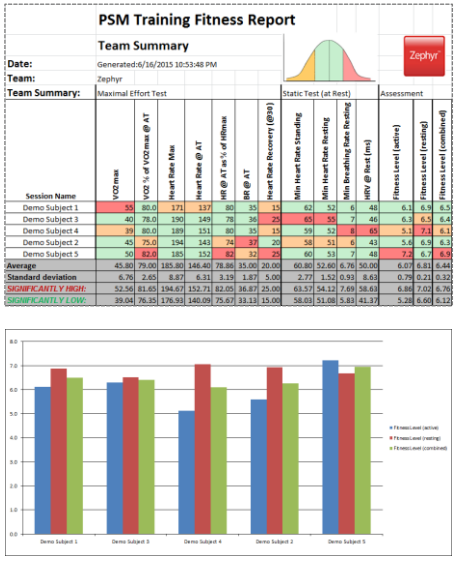
PSM Training Modules

Overview – Team Fitness Report

Back to Main Index

Fitness Parameters
VO_2 max
%VO_2 max@AT
HRmax
HR@AT
HR@AT as %HRmax
BR@AT
HR Recovery 30sec
HRmin Standing
HRmin Resting
BRmin Resting
HRV@Rest
Fitness Level

For entire team


PSM Training Fitness Report

Team Summary

Date: Generated:6/16/2015 10:53:48 PM

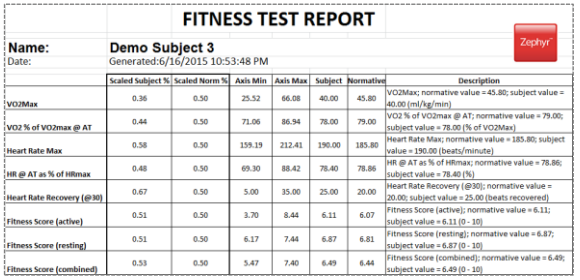
Team: Zephyr

Team Summary: Maximal Effort Test | Static Test (at Rest) | Assessment

Session Name	VO2max	VO2 % of VO2max @ AT	Heart Rate Max	Heart Rate @ AT	HR @ AT as % of HRmax	BR @ AT	Heart Rate Recovery (@30s)	Min Heart Rate Standing	Min Heart Rate Resting	Min Breathing Rate Resting	HRV @ Rest (ms)	Fitness Level (active)	Fitness Level (resting)	Fitness Level (combined)
Demo Subject 1	55	80.0	171	137	80	35	15	62	52	6	48	6.1	6.9	6.5
Demo Subject 3	40	78.0	190	149	78	36	25	65	55	7	46	6.3	6.5	6.4
Demo Subject 4	39	80.0	189	151	80	35	15	59	52	8	65	5.1	7.1	6.1
Demo Subject 2	45	75.0	194	143	74	37	20	58	51	6	43	5.6	6.9	6.3
Demo Subject 5	50	82.0	185	152	82	32	25	60	53	7	48	7.2	6.7	6.9
Average	45.80	79.00	185.80	146.40	78.86	35.00	20.00	60.80	52.60	6.76	50.00	6.07	6.81	6.44
Standard deviation	6.76	2.65	8.87	6.31	3.19	1.87	5.00	2.77	1.52	0.93	8.63	0.79	0.21	0.32
SIGNIFICANTLY HIGH:	52.56	81.65	194.67	152.71	82.05	36.87	25.00	63.57	54.12	7.69	58.63	6.86	7.02	6.76
SIGNIFICANTLY LOW:	39.04	76.35	176.93	140.09	75.67	33.13	15.00	58.03	51.08	5.83	41.37	5.28	6.60	6.12

Session Summary in table format + Individual Fitness Level Bar charts

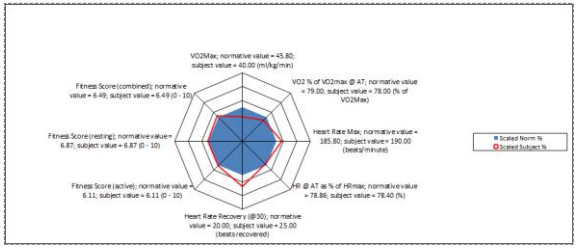
For each subject


FITNESS TEST REPORT

Name: Demo Subject 3

Date: Generated:6/16/2015 10:53:48 PM

	Scaled Subject %	Scaled Norm %	Axis Min	Axis Max	Subject	Normative	Description
VO2Max	0.36	0.50	25.52	66.08	40.00	45.80	VO2Max; normative value = 45.80; subject value = 40.00 (ml/kg/min)
VO2 % of VO2max @ AT	0.44	0.50	71.06	86.94	78.00	79.00	VO2 % of VO2max @ AT; normative value = 79.00; subject value = 78.00 (% of VO2Max)
Heart Rate Max	0.58	0.50	159.19	212.41	190.00	185.80	Heart Rate Max; normative value = 185.80; subject value = 190.00 (beats/minute)
HR @ AT as % of HRmax	0.48	0.50	69.30	88.42	78.40	78.86	HR @ AT as % of HRmax; normative value = 78.86; subject value = 78.40 (%)
Heart Rate Recovery (@30)	0.67	0.50	5.00	35.00	25.00	20.00	Heart Rate Recovery (@30); normative value = 20.00; subject value = 25.00 (beats recovered)
Fitness Score (active)	0.51	0.50	3.70	8.44	6.11	6.07	Fitness Score (active); normative value = 6.11; subject value = 6.11 (0 - 10)
Fitness Score (resting)	0.51	0.50	6.17	7.44	6.87	6.81	Fitness Score (resting); normative value = 6.87; subject value = 6.87 (0 - 10)
Fitness Score (combined)	0.53	0.50	5.47	7.40	6.49	6.44	Fitness Score (combined); normative value = 6.49; subject value = 6.49 (0 - 10)



Individual parameters in table format + Radar plot against team average values (blue polygon)

- As for individual reports, data is based on values already existing in the database
- Fitness Level on a 1 – 10 scale is established using an algorithm which uses VO_2max, HR@AT and HRR as inputs.
- The polygon on the radar plots represent the group average value for each parameter. It shows individual performance against the group normative.

Create Team Fitness Report

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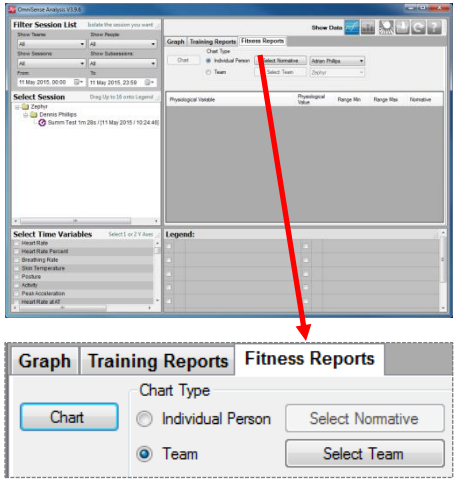
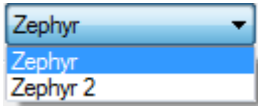
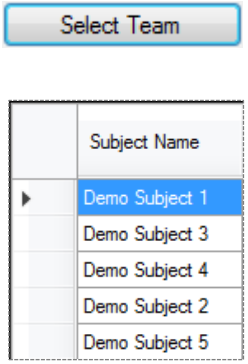


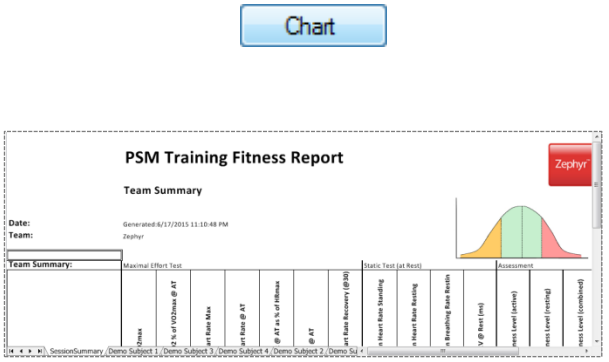
1. Select Fitness Report Tab, Check *Team*



2. Select Team from pull down list



3. Use Select Team button to populate table



4. Select *Chart* to display the multi-tab report.
Use to export to an external file.

- Any fitness parameters which have no value for the selected subject are omitted from the report, but the initial table displayed may be edited before selecting the Chart button, if values are known for missing parameters.
- Use the tabs below the display in Analysis or the exported spreadsheet to select Session Summary or Individual reports.

PSM Training Modules

Training Reports - Overview

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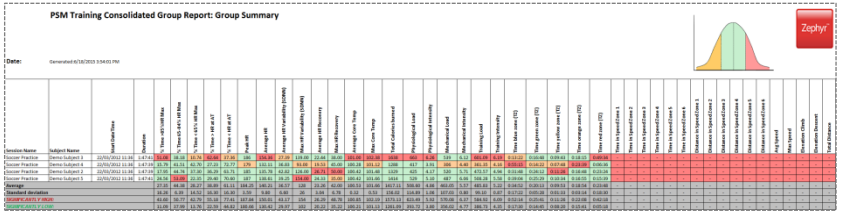
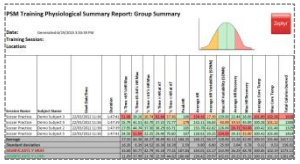
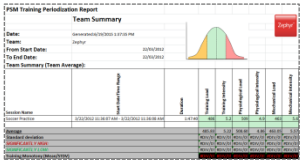
Group Consolidated Summary

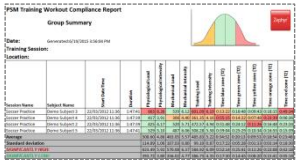




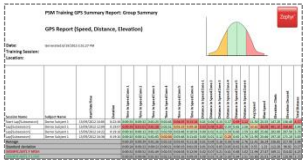
Physiological Summary Report



Periodization Report



Workout Compliance Report



Summary GPS Report

All reports feature a Session Summary as well as individual tables and radar plots for each subject

- The Group Consolidated Summary is the super-set of all data.
- Other reports are subsets of this data, for more specific analysis
- Once exported as an Excel spreadsheet, reports can be edited, and unwanted parameters removed from tables and radar plots.

PSM Training Modules

Report Parameters

Back to Main Index

Start Time	ALL	*Start time of session*	Max Core Temp		
Duration	ALL	*Duration of session*	Total Calories burned		*Calculated from ACSM formula*
%Time >85%HRmax		*% Time above 85%*	Physiological Load/Intensity		*See Fitness Considerations module*
%Time 65-84%Hrmax			Mechanical Load/Intensity		*See Fitness Considerations module*
%Time <64%HRmax		*% Time below 64%*	Training Load/Intensity		*See Fitness Considerations module*
%Time > HR at AT		*%Time above HR at Anaerobic Threshold*	Time in Workout Zones		*Zones configured in OmniSense Live*
%Time < HR at AT		*%Time below HR at Anaerobic Threshold*	Time in Speed Zones		*Zones configured in OmniSense Live GPS data*
Peak HR		*Peak heart rate*	Distance in Speed Zones		*Zones configured in OmniSense Live GPS data*
Average HR			Average Speed		*GPS data*
Average HRV		*Peak heart rate variability*	Maximum Speed		*GPS data*
Max HRV			Elevation Climb		*GPS data*
Average HRR		*Average heart rate recovery (30sec)*	Elevation Descent		*GPS data*
Max HRR			Total Distance		*Total distance travelled*
Average Core Temp					

Physiological Summary Report

Periodization Report

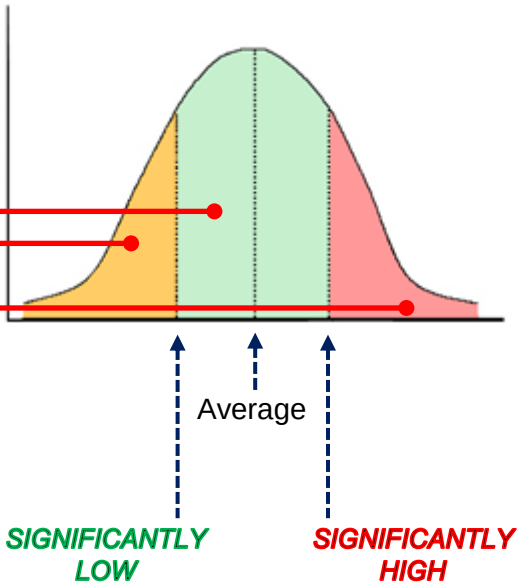
Workout Compliance Report

Summary GPS Report

Report Table Coloring

Back to Main Index

Duration	% Time >85%HR Max	% Time 65-84% HR Max	% Time < 65% HR Max	% Time > HR at AT	% Time < HR at AT	Peak HR	Average HR	Average HR Variability (SDNN)	Max HR Variability (SDNN)
1:47:41	51.08	38.18	10.74	62.64	37.36	186	154.36	27.39	139.00
1:47:39	15.79	41.51	42.70	27.23	72.77	179	132.11	36.83	93.00
1:47:39	17.95	44.74	37.30	36.29	63.71	185	135.78	42.82	126.00
1:47:41	24.56	53.09	22.35	29.40	70.60	187	138.61	39.25	154.00
Average									128.00
Standard deviation									25.99
SIGNIFICANTLY HIGH:									153.99
SIGNIFICANTLY LOW:									102.01



- The *SIGNIFICANTLY LOW* and *SIGNIFICANTLY HIGH* thresholds are one standard deviation above and below the average value for the group
- Any green cell value is within one standard deviation of the group average
- Any orange cell value is less than one standard deviation below the group average
- Any red cell is more than one standard deviation above the group average

PSM Training Modules

Create A Group Summary Report

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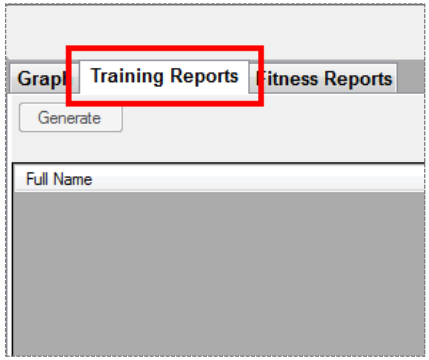
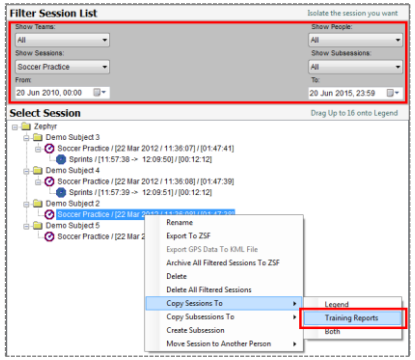
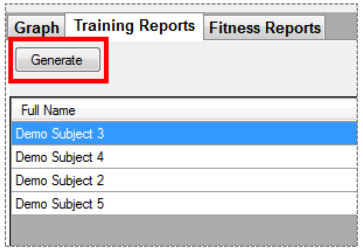


1. Select *Training Reports* Tab

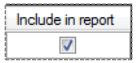


2. Use filters to populate *Select Session* panel with desired subjects & sessions.

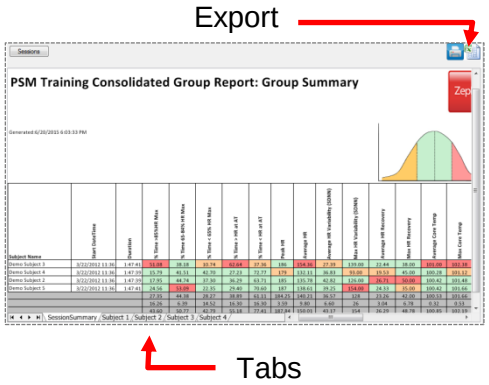
*Right-click a session and select *Copy Sessions To* > *Training Reports* to populate the report panel.



3. Select *Generate* > *Group Consolidated Summary*



Uncheck in table to remove session from final report



4. View the multi-tab report, or use the icon to export as a spreadsheet for editing.

- The Group Consolidated Report shows all available parameters (physiological, training, workouts & GPS) available from the database.
- *Individual sessions can be dragged from the *Select Session* panel to the *Training Reports* Panel

PSM Training Modules

Edit A Group Summary Report

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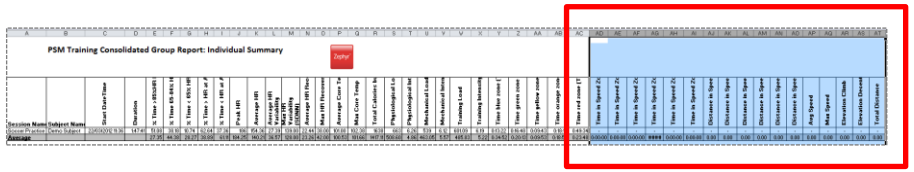
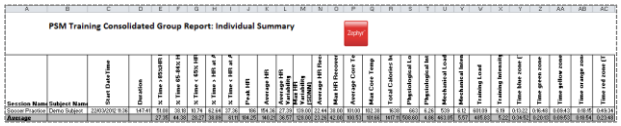
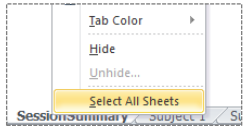


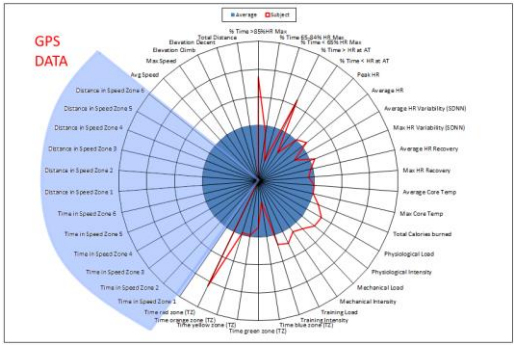


The sessions shown have no GPS data in the Subject tab, selected in blue.

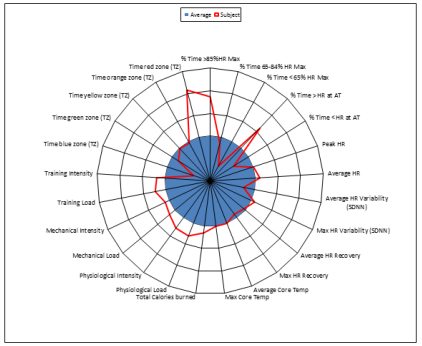
Delete the selected columns to simplify the subject radar plots.



Right-click a spreadsheet tab and select *Select All Sheets* to delete from all simultaneously



Subject radar plot with unwanted GPS segment



Simplified radar plot with GPS data removed

- The default Consolidated report contains <u>all</u> parameters supplied by the BioModule and OmniSense Analysis
- Export the report to a spreadsheet and edit (delete columns) to remove unwanted parameters
- Remove *any* unnecessary columns in a subject tab to customize your report.

PSM Training Modules

Create A Periodization Summary Report

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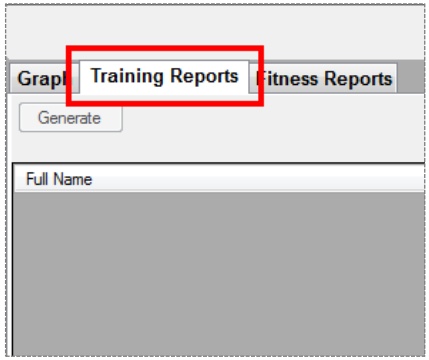
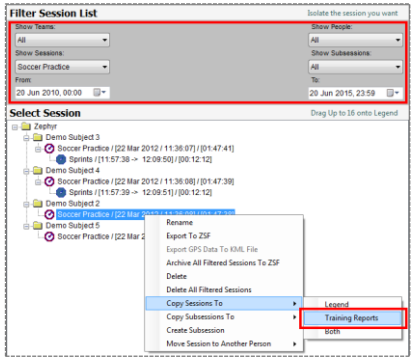
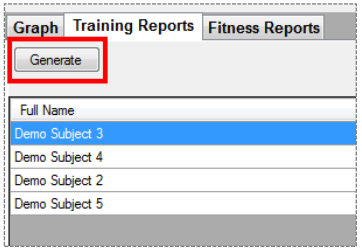


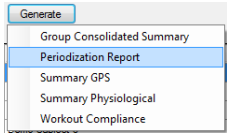
1. Select *Training Reports* Tab



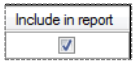
2. Use filters to populate *Select Session* panel with desired subjects & sessions.

*Right-click a session and select *Copy Sessions To* > *Training Reports* to populate the report panel.

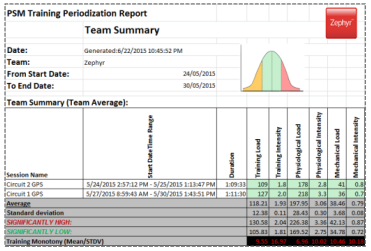




3. Select *Generate* > *Periodization Report*



Uncheck in table to remove session from final report



Tabs

4. View the multi-tab report, or use the icon to export as a spreadsheet for editing.

- The Periodization Report shows load & intensity parameters only (Physiological, Mechanical & Training).
- *Individual sessions can be dragged from the *Select Session* panel to the *Training Reports* Panel.
- Parameters are shown in table and bar chart format.

PSM Training Modules

Periodization Report

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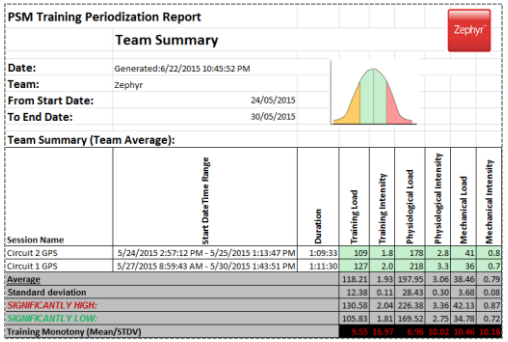
Session Summary: Sessions aggregated by *Session Name*



PSM Training Periodization Report

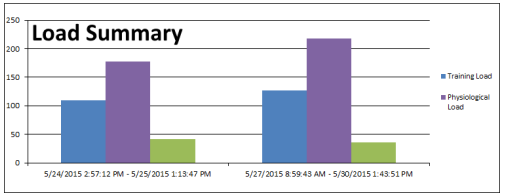
Team Summary

Date: Generated:6/22/2015 10:45:52 PM
Team: Zephyr
From Start Date: 24/05/2015
To End Date: 30/05/2015

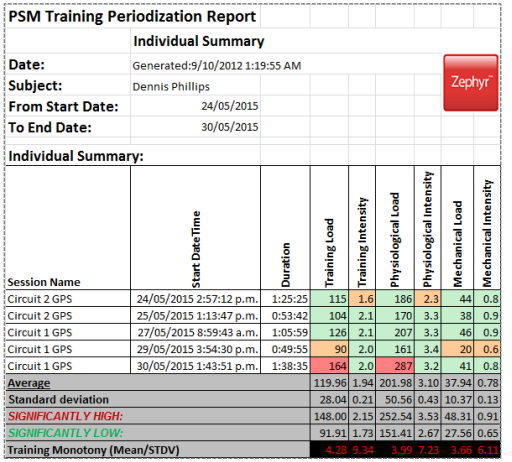
Team Summary (Team Average):

Session Name	Start Date/Time Range	Duration	Training Load	Training Intensity	Physiological Load	Physiological Intensity	Mechanical Load	Mechanical Intensity
Circuit 2 GPS	5/24/2015 2:57:12 PM - 5/25/2015 1:13:47 PM	1:09:33	109	1.8	178	2.8	41	0.8
Circuit 1 GPS	5/27/2015 8:59:43 AM - 5/30/2015 1:43:51 PM	1:11:30	127	2.0	218	3.3	36	0.7
Average			118.21	1.93	197.95	3.06	38.46	0.79
Standard deviation			12.38	0.11	28.43	0.30	3.68	0.08
SIGNIFICANTLY HIGH:			130.58	2.04	226.38	3.36	42.13	0.87
SIGNIFICANTLY LOW:			105.83	1.81	169.52	2.75	34.78	0.72
Training Monotony (Mean/STDV)			9.55	16.57	6.96	10.02	10.46	10.18

Bar charts show average Load & Intensity, for all subjects, all sessions



Individual Subject: Each session itemised



PSM Training Periodization Report

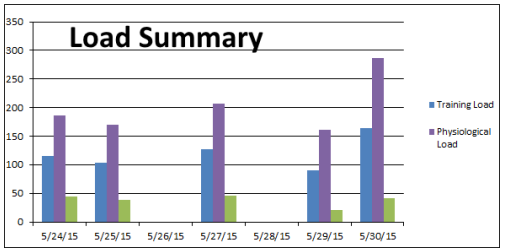
Individual Summary

Date: Generated:9/10/2012 1:19:55 AM
Subject: Dennis Phillips
From Start Date: 24/05/2015
To End Date: 30/05/2015

Individual Summary:

Session Name	Start Date/Time	Duration	Training Load	Training Intensity	Physiological Load	Physiological Intensity	Mechanical Load	Mechanical Intensity
Circuit 2 GPS	24/05/2015 2:57:12 p.m.	1:25:25	115	1.6	186	2.3	44	0.8
Circuit 2 GPS	25/05/2015 1:13:47 p.m.	0:53:42	104	2.1	170	3.3	38	0.9
Circuit 1 GPS	27/05/2015 8:59:43 a.m.	1:05:59	126	2.1	207	3.3	46	0.9
Circuit 1 GPS	29/05/2015 3:54:30 p.m.	0:49:55	90	2.0	161	3.4	20	0.6
Circuit 1 GPS	30/05/2015 1:43:51 p.m.	1:38:35	164	2.0	287	3.2	41	0.8
Average			119.96	1.94	201.98	3.10	37.94	0.78
Standard deviation			28.04	0.21	50.56	0.43	10.37	0.13
SIGNIFICANTLY HIGH:			148.00	2.15	252.54	3.53	48.31	0.91
SIGNIFICANTLY LOW:			91.91	1.73	151.41	2.67	27.56	0.65
Training Monotony (Mean/STDV)			4.28	9.34	3.99	7.23	3.66	6.11

Bar charts show calendar progression of Load & Intensity



- Report designed for use with Workout Sessions, selected in OmniSense Live

- In the *Session Summary* tab, sessions are grouped by *Session Name*
- Individual Subject tabs show the calendar progression of a subject's workout levels.

PSM Training Modules

Create A Summary GPS Report

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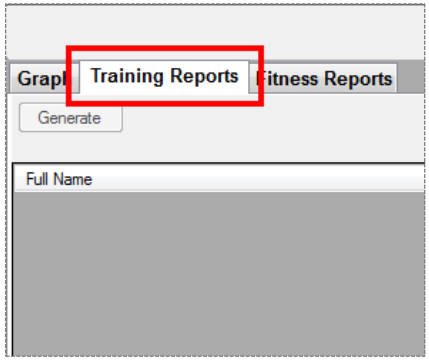
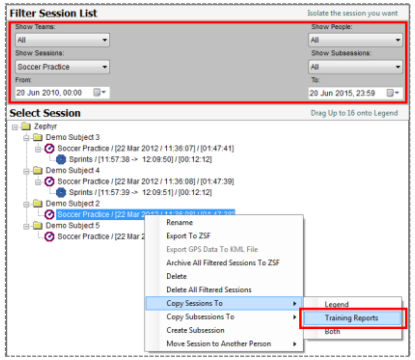
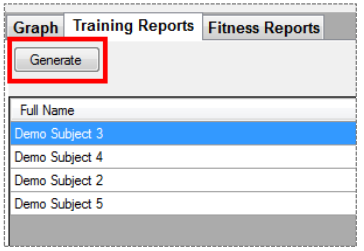


1. Select *Training Reports* Tab

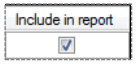


2. Use filters to populate *Select Session* panel with desired subjects & sessions.

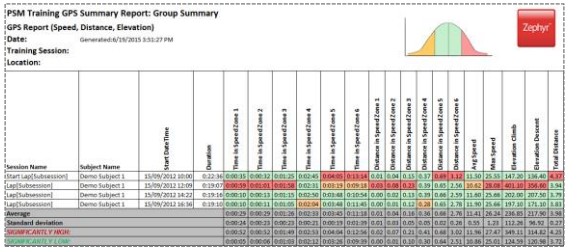
*Right-click a session and select *Copy Sessions To* > *Training Reports* to populate the report panel.



3. Select *Generate* > *Summary GPS Report*



Uncheck in table to remove session from final report



4. View the multi-tab report, or use the icon to export as a spreadsheet for editing.

- The Summary Report shows speed, distance & elevation parameters only.
- *Individual sessions can be dragged from the *Select Session* panel to the *Training Reports* Panel.
- Session Summary is table only. Subject tabs show table and a radar plot comparing individual vs group average data.

Summary GPS Report

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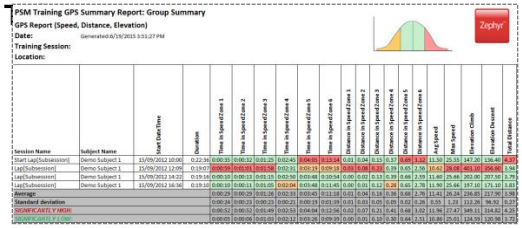
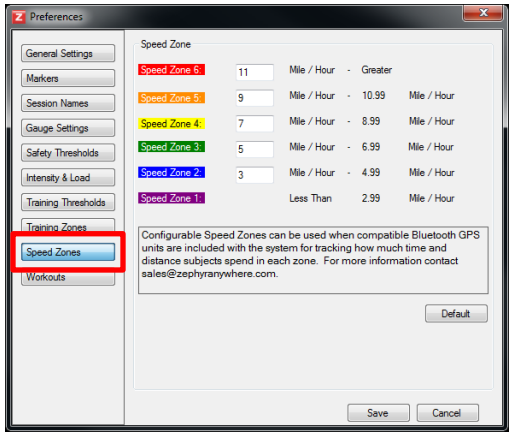
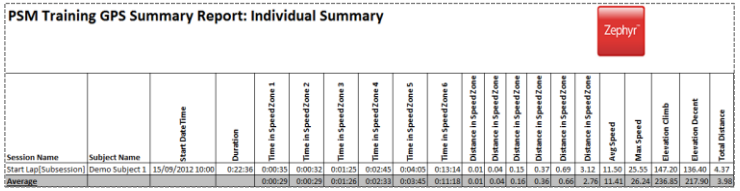
Session Summary



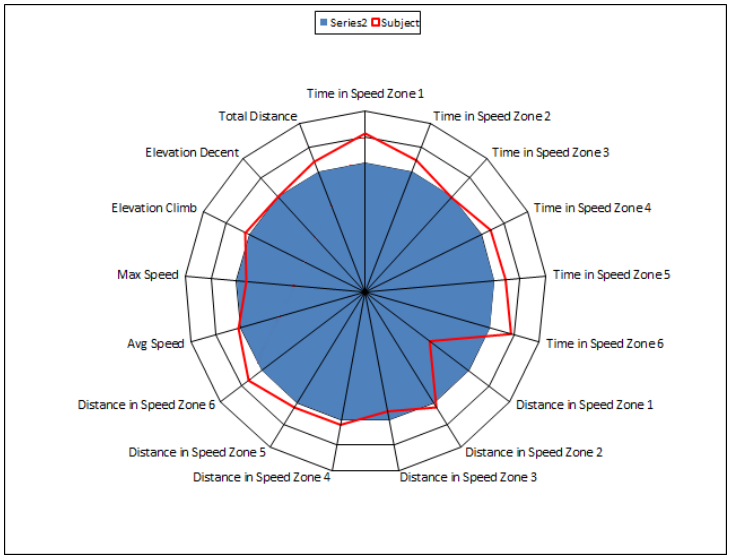


Speed Zones are configured in OmniSense Live > Preferences

Individual Subject Tabs:
Each session itemised



Subject radar plots show individual data (red line) vs group average (blue polygon)



PSM Training Modules

Create A Summary Physiological Report

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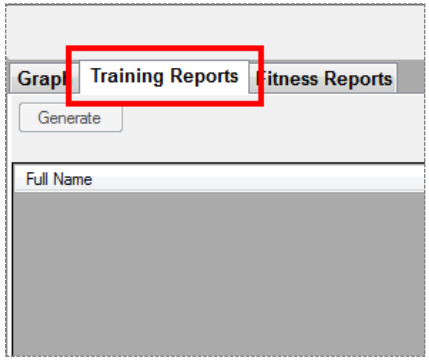
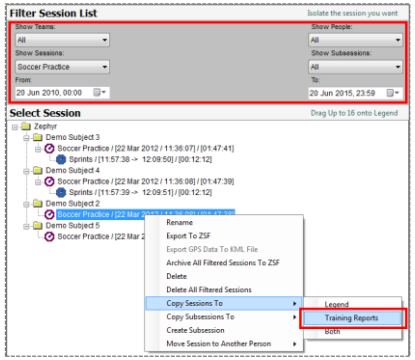
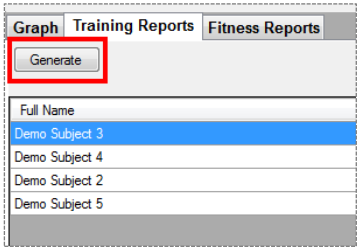


1. Select *Training Reports* Tab

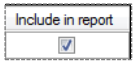


2. Use filters to populate *Select Session* panel with desired subjects & sessions.

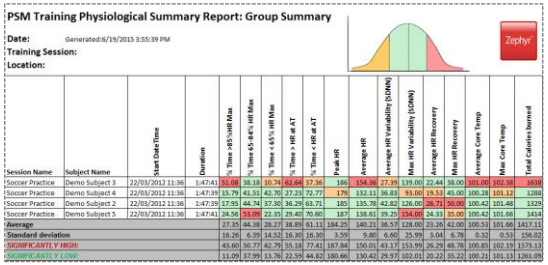
*Right-click a session and select *Copy Sessions To* > *Training Reports* to populate the report panel.



3. Select *Generate* > *Summary Physiological Report*



Uncheck in table to remove session from final report



4. View the multi-tab report, or use the icon to export as a spreadsheet for editing.

- The Summary Physiological Report shows HR-related, temperature and calories parameters only.
- *Individual sessions can be dragged from the *Select Session* panel to the *Training Reports* Panel.
- Session Summary is table only. Subject tabs show table and a radar plot comparing individual vs group average data.

Summary Physiological Report

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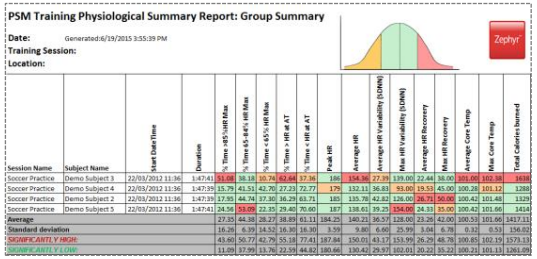
Session Summary Tab:



PSM Training Physiological Summary Report: Group Summary

Date: Generated:6/19/2015 3:55:39 PM
Training Session:
Location:

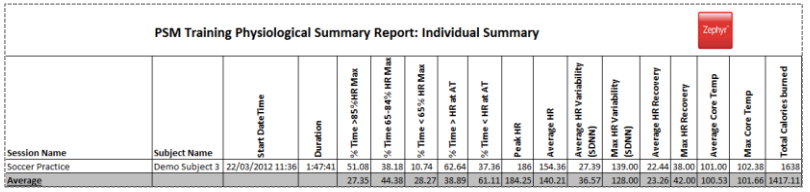
Session Name	Subject Name	Start DateTime	Duration	% Time >85%HR Max	% Time 65-84% HR Max	% Time < 65% HR Max	% Time > HR at AT	% Time < HR at AT	Peak HR	Average HR	Average HR Variability (SDNN)	Max HR Variability (SDNN)	Average HR Recovery	Max HR Recovery	Average Core Temp	Max Core Temp	Total Calories burned
Soccer Practice	Demo Subject 3	22/03/2012 11:36	1:47:41	51.08	38.18	10.74	62.64	37.36	186	154.36	27.39	139.00	22.44	38.00	101.00	102.38	1638
Soccer Practice	Demo Subject 4	22/03/2012 11:36	1:47:39	15.79	41.51	42.70	27.23	72.77	179	132.11	36.83	93.00	19.53	45.00	100.28	101.12	1288
Soccer Practice	Demo Subject 2	22/03/2012 11:36	1:47:39	17.95	44.74	37.30	36.29	63.71	185	135.78	42.82	126.00	26.71	50.00	100.42	101.48	1329
Soccer Practice	Demo Subject 5	22/03/2012 11:36	1:47:41	24.56	53.09	22.35	29.40	70.60	187	138.61	39.25	154.00	24.33	35.00	100.42	101.66	1414
Average				27.35	44.38	28.27	38.89	61.11	184.25	140.21	36.57	128.00	23.26	42.00	100.53	101.66	1417.11
Standard deviation				16.26	6.39	14.52	16.30	16.30	3.59	9.80	6.60	25.99	3.04	6.78	0.32	0.53	156.02
SIGNIFICANTLY HIGH				43.60	50.77	42.79	55.18	77.41	187.84	150.01	43.17	153.99	26.29	48.78	100.85	102.19	1573.13
SIGNIFICANTLY LOW				11.09	37.99	13.76	22.59	44.82	180.66	130.42	29.97	102.01	20.22	35.22	100.21	101.13	1261.09

The displayed parameters are a subset of those displayed in the Consolidated Report, and relate to:

- Time in the zones delimited by 65% and 85% of HR_{max}
- Time above and below HR @ AT
- Peak & Average HR
- Peak and Average HRV
- Peak & Average HRR
- Peak & Average Est. Core Temp.
- Total Calories burned

Note that <u>all</u> of the above parameters are HR-determined

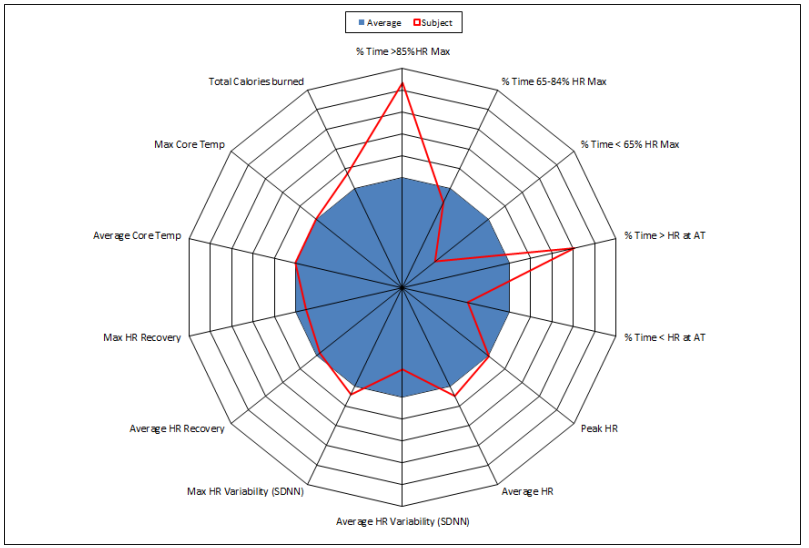
Individual Subject Tabs: Each session itemised



PSM Training Physiological Summary Report: Individual Summary

Session Name	Subject Name	Start DateTime	Duration	% Time >85%HR Max	% Time 65-84% HR Max	% Time < 65% HR Max	% Time > HR at AT	% Time < HR at AT	Peak HR	Average HR	Average HR Variability (SDNN)	Max HR Variability (SDNN)	Average HR Recovery	Max HR Recovery	Average Core Temp	Max Core Temp	Total Calories burned
Soccer Practice	Demo Subject 3	22/03/2012 11:36	1:47:41	51.08	38.18	10.74	62.64	37.36	186	154.36	27.39	139.00	22.44	38.00	101.00	102.38	1638
Average				27.35	44.38	28.27	38.89	61.11	184.25	140.21	36.57	128.00	23.26	42.00	100.53	101.66	1417.11

Subject radar plots show individual data (red line) vs group average (blue polygon)



PSM Training Modules

Create Workout Compliance Report

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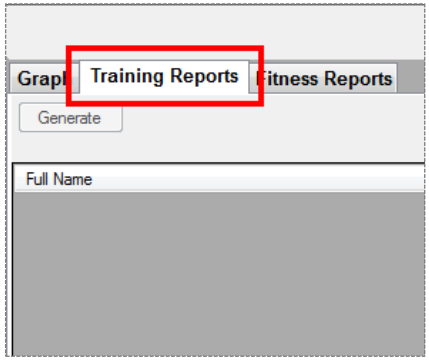
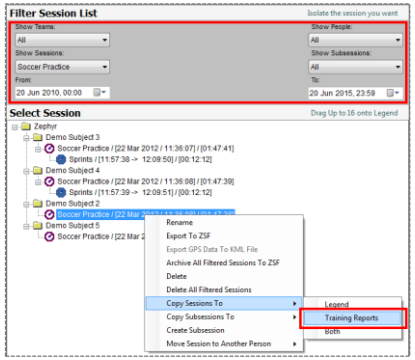
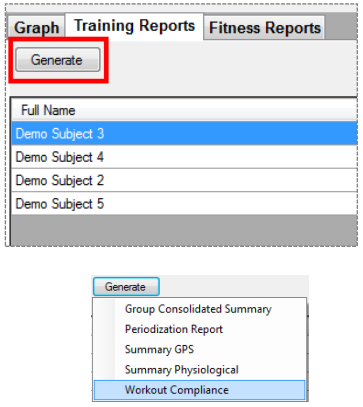


1. Select *Training Reports* Tab

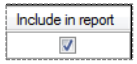


2. Use filters to populate *Select Session* panel with desired subjects & sessions.

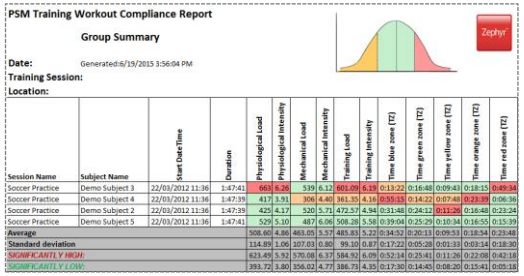
*Right-click a session and select *Copy Sessions To* > *Training Reports* to populate the report panel.



3. Select *Generate* > *Summary Physiological Report*



Uncheck in table to remove session from final report



4. View the multi-tab report, or use the icon to export as a spreadsheet for editing.

- Workout Compliance Report shows Intensity and Loading parameters, as well as time in Workout Zones configured in OmniSense Live.
- *Individual sessions can be dragged from the *Select Session* panel to the *Training Reports* Panel.
- Session Summary is table only. Subject tabs show table and a radar plot comparing individual vs group average data.

Workout Compliance Report

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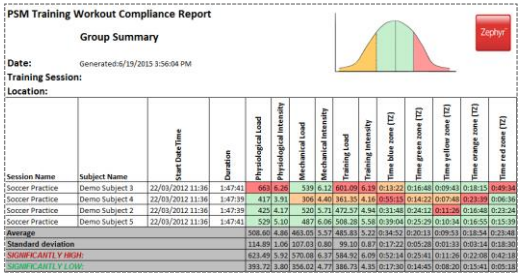
Session Summary Tab:



PSM Training Workout Compliance Report

Group Summary

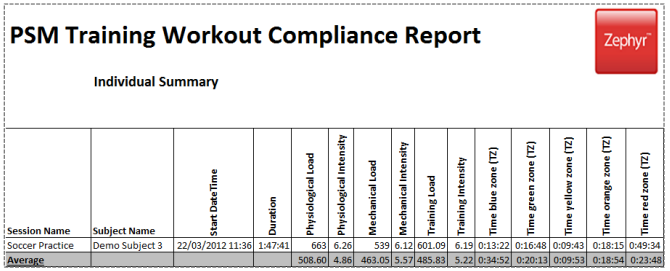
Date: Generated:6/19/2015 3:56:04 PM

Training Session:

Location:

Session Name	Subject Name	Start DateTime	Duration	Physiological Load	Physiological Intensity	Mechanical Load	Mechanical Intensity	Training Load	Training Intensity	Time blue zone (TZ)	Time green zone (TZ)	Time yellow zone (TZ)	Time orange zone (TZ)	Time red zone (TZ)
Soccer Practice	Demo Subject 3	22/03/2012 11:36	1:47:41	663	6.26	539	6.12	601.09	6.19	0:13:22	0:16:48	0:09:43	0:18:15	0:49:34
Soccer Practice	Demo Subject 4	22/03/2012 11:36	1:47:39	417	3.91	306	4.40	361.35	4.16	0:55:15	0:14:22	0:07:48	0:23:39	0:06:36
Soccer Practice	Demo Subject 2	22/03/2012 11:36	1:47:39	425	4.17	520	5.71	472.57	4.94	0:31:48	0:24:12	0:11:28	0:16:48	0:23:24
Soccer Practice	Demo Subject 5	22/03/2012 11:36	1:47:41	529	5.10	487	6.06	508.28	5.58	0:39:04	0:25:29	0:10:34	0:16:55	0:15:09
Average				508.60	4.86	463.05	5.57	485.83	5.22	0:34:52	0:20:13	0:09:53	0:18:54	0:23:48
Standard deviation				114.89	1.06	107.03	0.80	99.10	0.87	0:17:22	0:05:28	0:01:33	0:03:14	0:18:30
SIGNIFICANTLY HIGH:				623.49	5.92	570.08	6.37	584.92	6.09	0:52:14	0:25:41	0:11:26	0:22:08	0:42:18
SIGNIFICANTLY LOW:				393.72	3.80	356.02	4.77	386.73	4.35	0:17:30	0:14:45	0:08:20	0:13:41	0:05:18

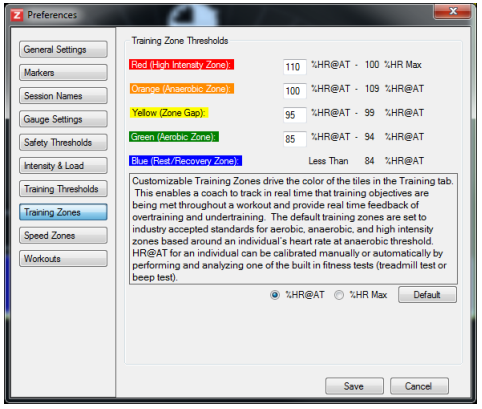
Individual Subject Tabs:
Each session itemised



PSM Training Workout Compliance Report

Individual Summary

Session Name	Subject Name	Start DateTime	Duration	Physiological Load	Physiological Intensity	Mechanical Load	Mechanical Intensity	Training Load	Training Intensity	Time blue zone (TZ)	Time green zone (TZ)	Time yellow zone (TZ)	Time orange zone (TZ)	Time red zone (TZ)
Soccer Practice	Demo Subject 3	22/03/2012 11:36	1:47:41	663	6.26	539	6.12	601.09	6.19	0:13:22	0:16:48	0:09:43	0:18:15	0:49:34
Average				508.60	4.86	463.05	5.57	485.83	5.22	0:34:52	0:20:13	0:09:53	0:18:54	0:23:48

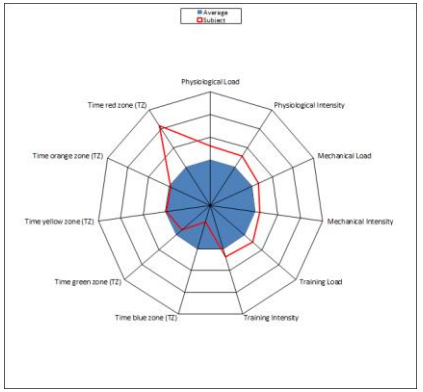


Load & Intensity Parameters are the same as the Periodization Report, with additional Time in Training Zones, set in Live:

Red:	High intensity
Orange	Anerobic
Yellow:	Zone Gap
Green:	Aerobic
Blue:	Recovery

Zone limits are % of HRmax or %HR@AT

Subject radar plots show individual data (red line) vs group average (blue polygon)



PSM Training Modules

Fitness Considerations

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Physiological Intensity & Load

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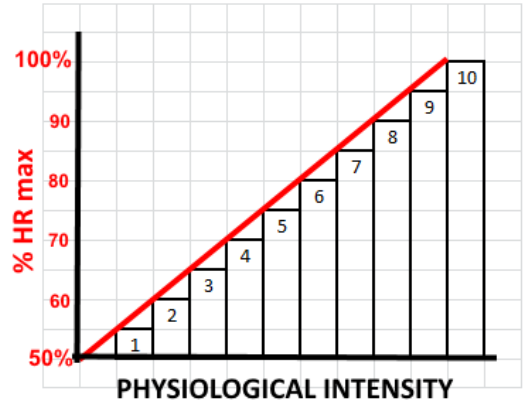

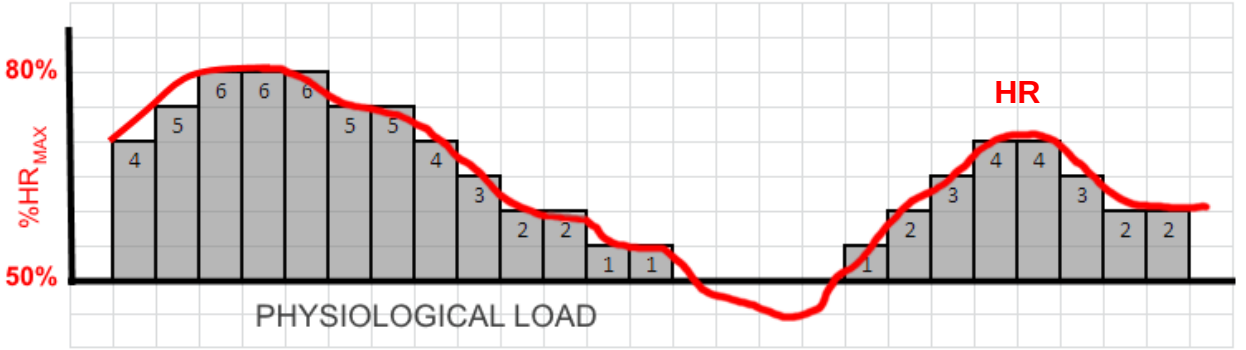

Intensity 10 = 100% HR_{max}
Intensity 1 = 50% HR_{max}

Linear scaling in between
Calculated once per second
Below 50% HR_{max}, Intensity = 0

Physiological Load = (Sum of Physiological Intensities) / 60

[Divide by 60 as Intensity is measured in 1/60 minute epochs]

Load increases continuously during a session: longer session = higher load

- Physiological Intensity is measured on a scale of 1 – 10, related to subject maximum heart rate. Below 50% HR_{max}, P.I. = 0
- Physiological Load is the total sum of physiological intensities, divided by 60
- Average Physiological Intensity per session = Physiological Load / Session time in minutes

Mechanical Intensity & Load

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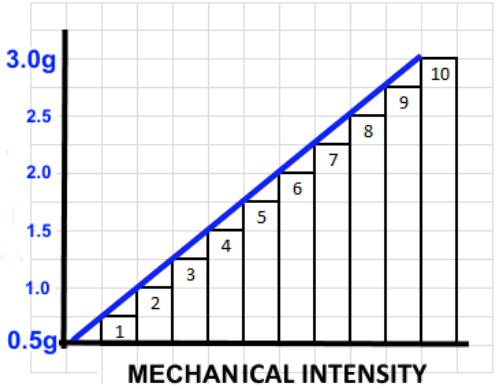

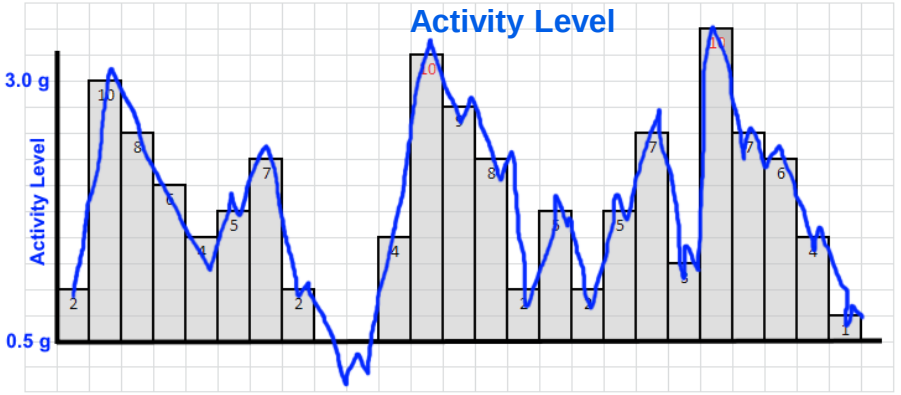

Intensity 10 = 3.0 g
Intensity 1 = 0.5 g

Linear scaling in between
Calculated once per second
Below 0.5, Intensity = 0

Mechanical Load = (Sum of Mechanical Intensities) / 60

[Divide by 60 as Intensity is measured in 1/60 minute epochs]

Load increases continuously during a session: longer session = higher load

- Mechanical Intensity is measured on a scale of 1 – 10, related to subject Activity Level. Below 0.5 g, M.I. = 0
- Mechanical Load is the total sum of mechanical intensities, divided by 60
- Average Mechanical Intensity per session = Mechanical Load / Session time in minutes

Physiological, Mechanical & Training Intensity and Load

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	Intensity	**Load**
Physiological	An index of cardiovascular output	Cumulative effort of the cardiovascular system
Mechanical	An index of musculoskeletal output	Cumulative effort of the musculoskeletal system
Training	Average of Physiological + Mechanical Intensities An index of combined output	Average of Physiological + Mechanical Loads Total cumulative effort of the body

- Aerobic, plyometric and similar training will have a high physiological intensity
- Weight and other relatively static training methods will have a lower mechanical intensity, as measured by the BioModule, whose accelerometers are measuring whole body movement.

Physiological vs Mechanical Intensity

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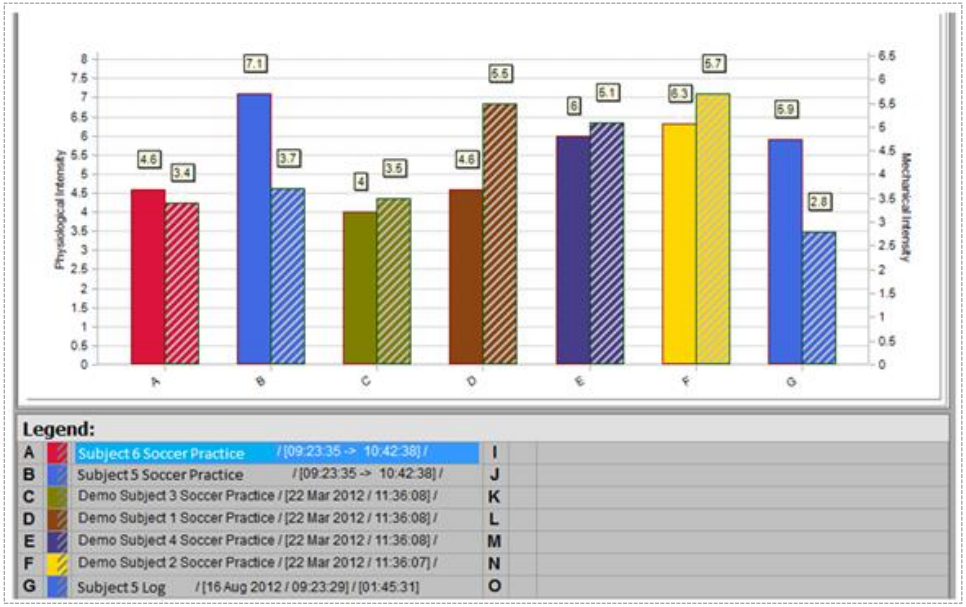
Left Axis

☑ Physiological Intensity



Right Axis

☑ Mechanical Intensity

- High average Mechanical Intensity with low relative Physiological Intensity is a good indicator of efficiency and useful when comparing multiple people doing similar activities.
- For example, Subject D (brown) has Physiological Intensity 4.6 and Mechanical Intensity 5.5 for the session. This subject is more efficient than subject B (blue, left) whose Physiological Intensity is 7.1 and Mechanical Intensity of 3.7.
- Subject D's heart is working less hard, for more mechanical results, than subject B's (or A or G) is.

Physiological vs Mechanical Load

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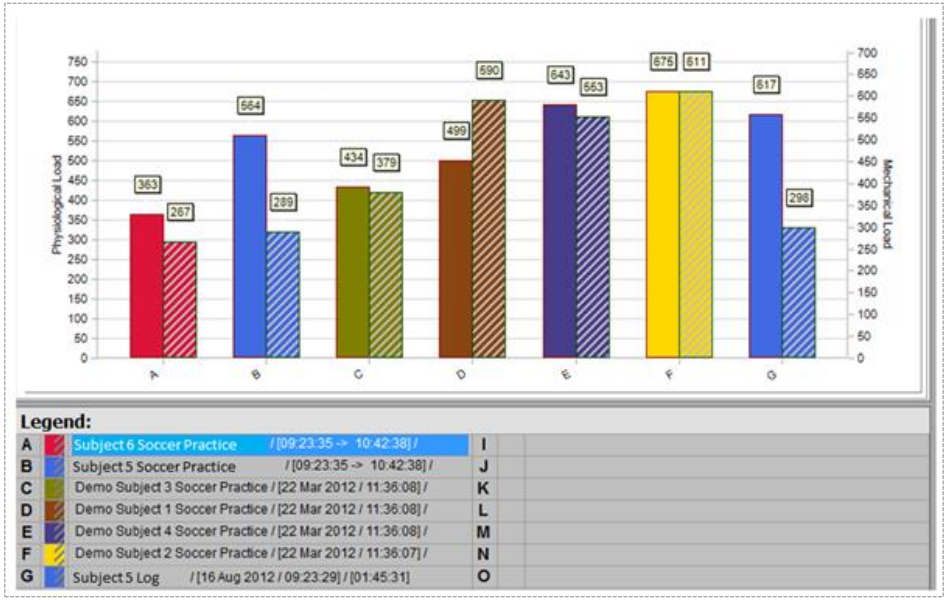
Left Axis

Physiological Load



Right Axis

Mechanical Load

- Load is the summation (or area under the curve) of the corresponding intensity value plotted over time
- It provides a measure of the overall conditioning value or impact of the session
- High physiological load with low mechanical load can be an indicator of anxiety or inefficiency – assuming the session involves running or movement. Subjects B and G (both blue) show this possible indication.

Training Load & Intensity

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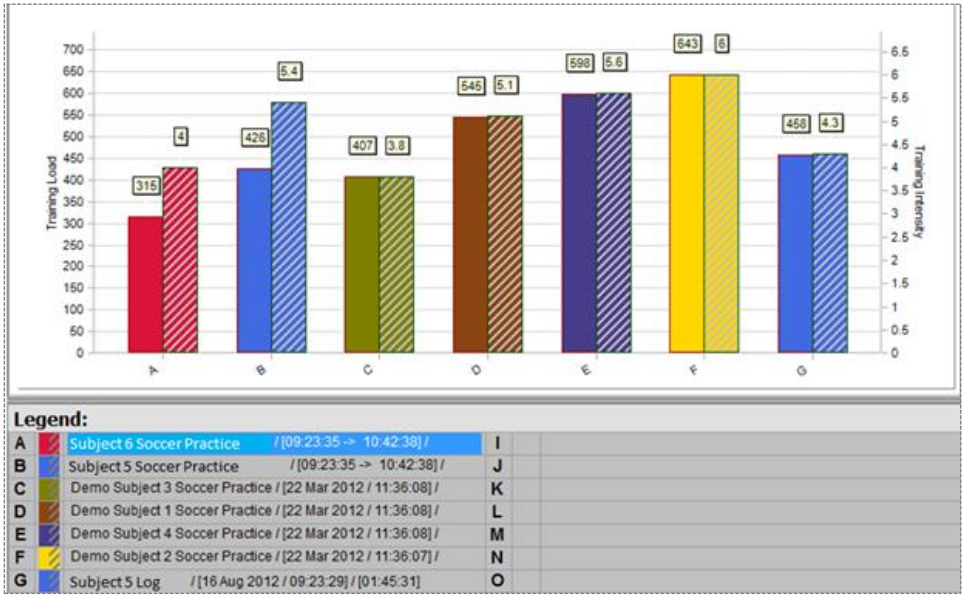
Left Axis

Training Load ☑



Right Axis

Training Intensity ☑

- Training Load & Intensity provide a metric that is a combination of the physiological and Mechanical components for the most simplified summary of overall training value & impact of the workout session.

Recovery & Fatigue

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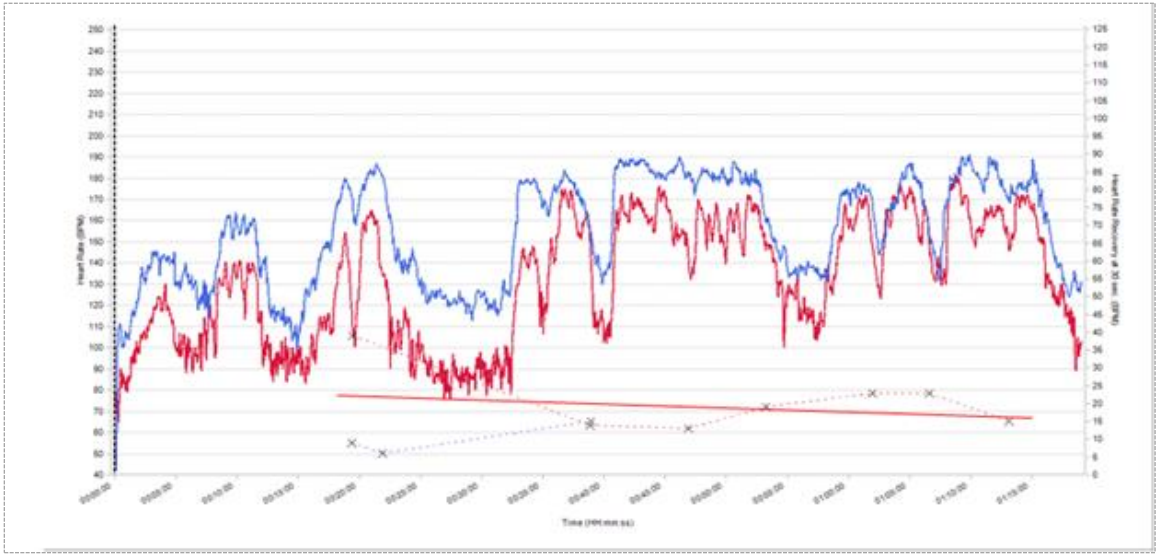
Left Axis

Heart Rate



Right Axis

Heart Rate Recovery at 30sec.

- HRR 30 recordings are triggered when an athlete has exceeded an activity threshold and HR threshold for a set period of time, and then become inactive for 30 seconds to take a recovery measurement
- Blue Subject 5 rarely stopped long enough for an HRR 30 recovery measurement t be taken.
- Red subject 6 HRR30 trend line shows only a very slight fatigue slope (recovery becomes slightly less as the session proceeds), which indicates that the subject is well conditioned and not pushed to fatigue. A steeper trend line may indicate the onset of fatigue.

Recovery & Fatigue

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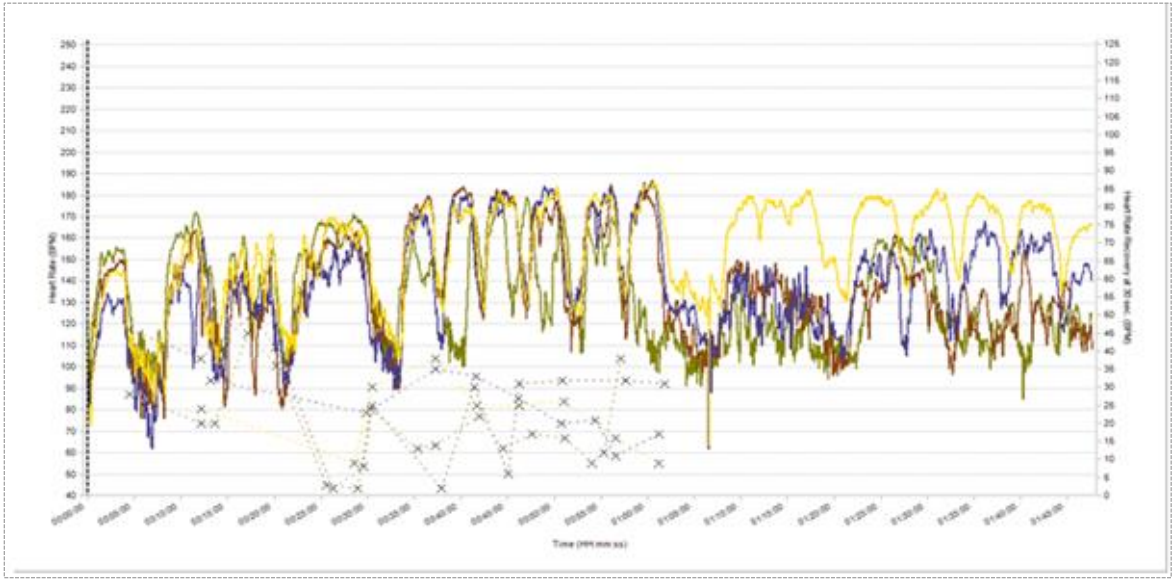
Left Axis

Heart Rate



Right Axis

Heart Rate Recovery at 30sec.

- In the second half of this session, less recovery time was allowed, so automatic HRR 30 calculations are less frequent.

Safety & Core Temperature

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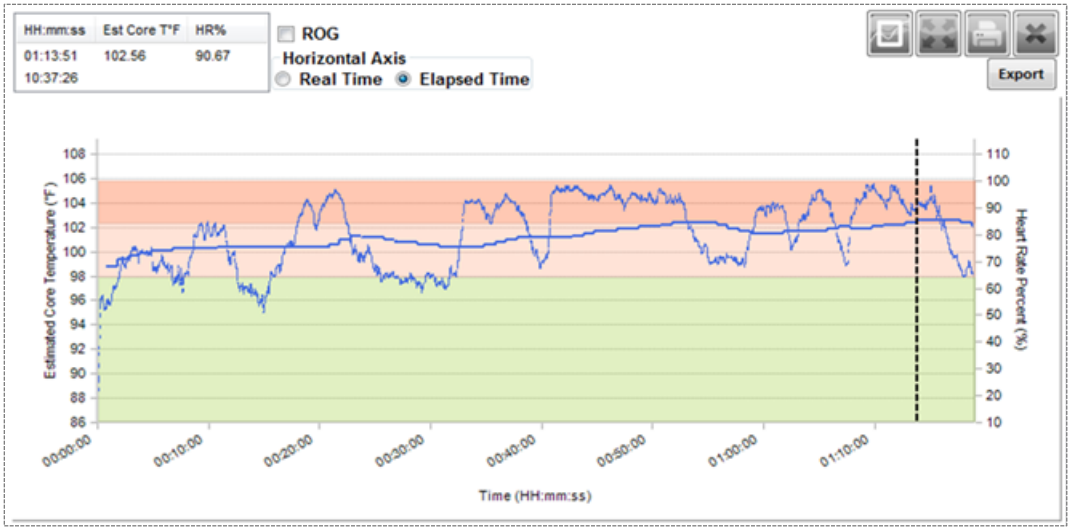
Left Axis

Estimated Core Temperature



Right Axis

Heart Rate Percent

- This plot shows the subject Heart Rate % (& of Maximum Heart Rate) and Estimated Core Temperature over time.
- At the end of the session the vertical cursor location shows his core temperature reached a max of 102.56 whjich is at the low end of potential heat stress.
- Beyond 103 to 104, there would be safety concerns.

Safety & Core Temperature

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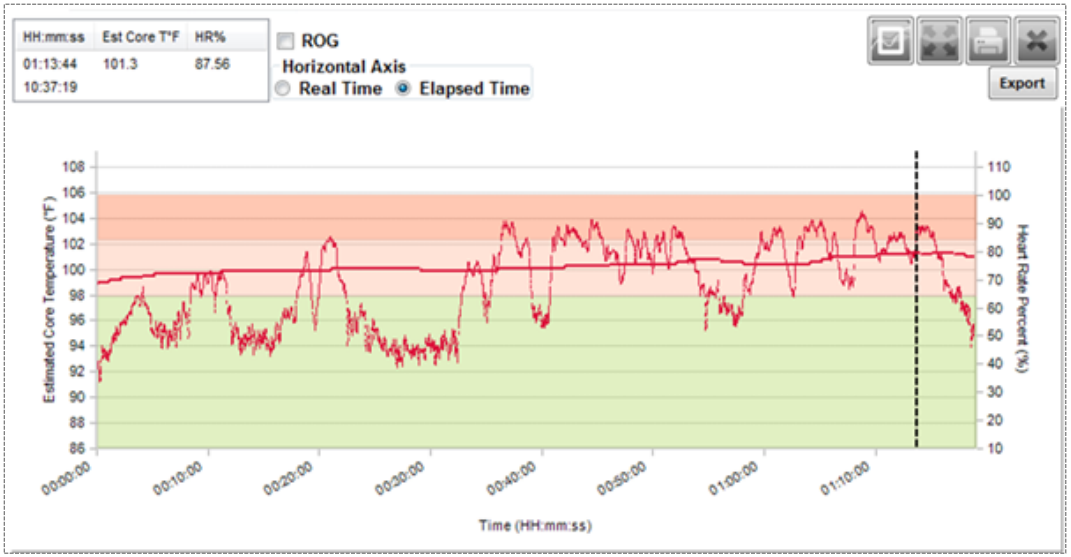
Left Axis

Estimated Core Temperature



Right Axis

Heart Rate Percent

- The subject's temperature never reached an alarming level (Max 101.3) because he was able to recover periodically.

Time in HR Zones

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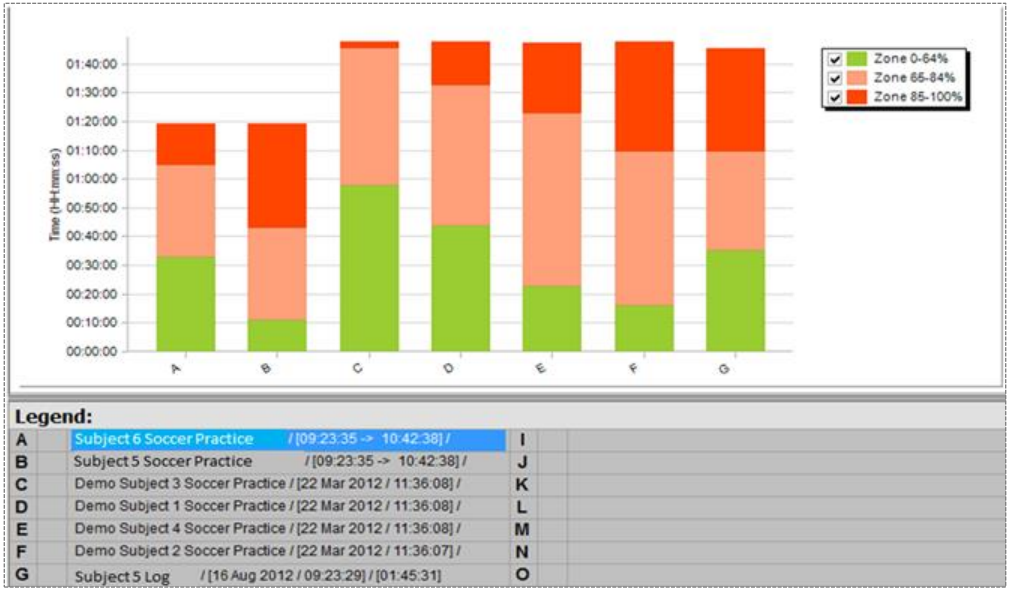


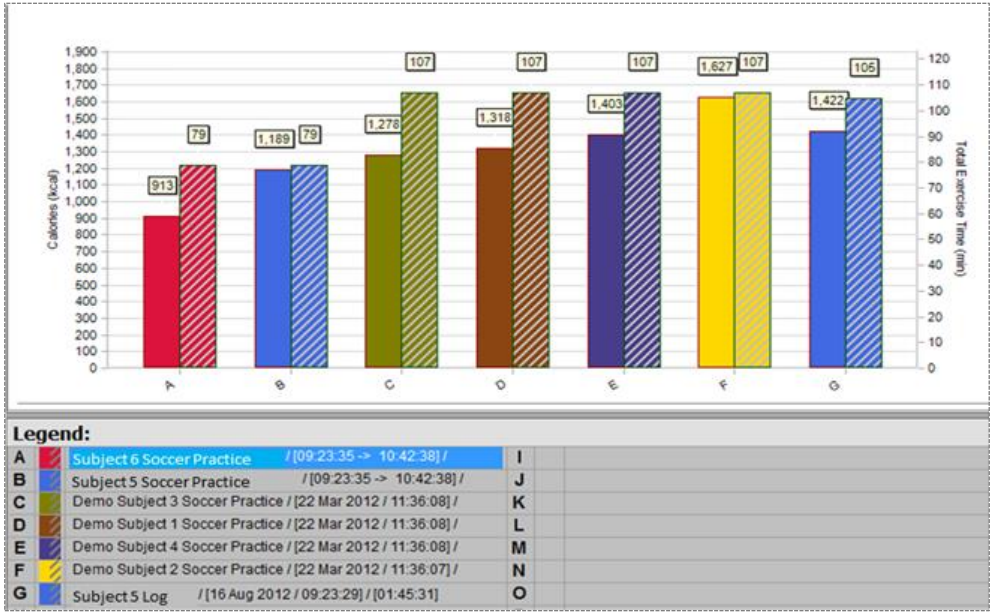
- This Summary Variable shows the time spent from 0 – 64% HR_{max} (green), 65 – 85% (orange) and 85 – 100% (red)
- Maximum heart rate should be measured along with other fitness parameters and calibrated in the software by running through a fitness test as described in the *Baseline Fitness Testing* module
- Subject 5 is included twice (bar B and bar G). Bar G is the log data imported later from his BioModule, with post session recovery data removed. You can do this by creating a subsession, described in the *Analysis Graph Options* module.

Caloric Expenditure

Back to Main Index

Left Axis

Calories	☑



Right Axis

Exercise Time	☑

- This graph shows a measure of calories burned and total session duration, which can be useful in figuring dietary replenishment needs.

Physiological Strain & Stress Indicators

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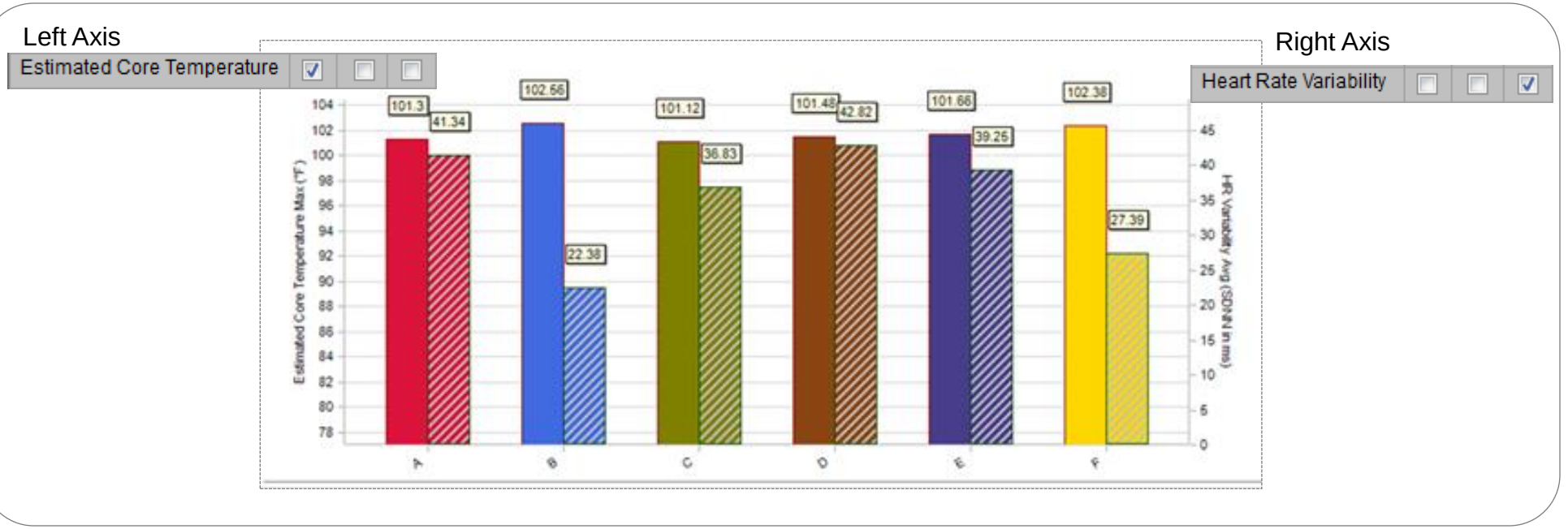

- Estimated Core Temperature (Max) and Heart Rate Variability (Avg) can both be interpreted as measures of physiological strain.
- A low HRV is an indication of stress, fatigue and dehydration, and also relates to heat stress
- Elevated Core Temperature (estimated) is also an indication of heat stress and should be monitored carefully on a hot intense practice session.

HR_{avg} and HRR Indicating Stress & Anxiety

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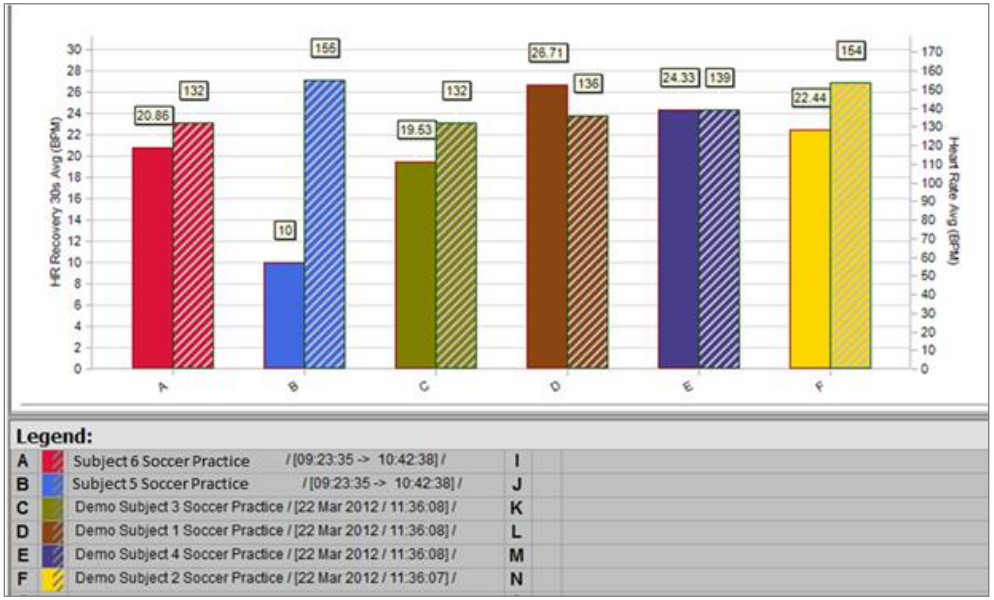
Left Axis

HR Recovery 30s



Right Axis

Heart Rate

- Summary graph of average heart rate recovery in 30 seconds (drop in beats per minute after stopping an ‘interval’ of high intensity activity), against average heart rate for the session.
- A low average recovery value indicates either a high level of anxiety, as in for bar B, and could also indicate a lower level of fitness in other csaes.

PSM Training Modules

Impacts

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Accelerometry Overview

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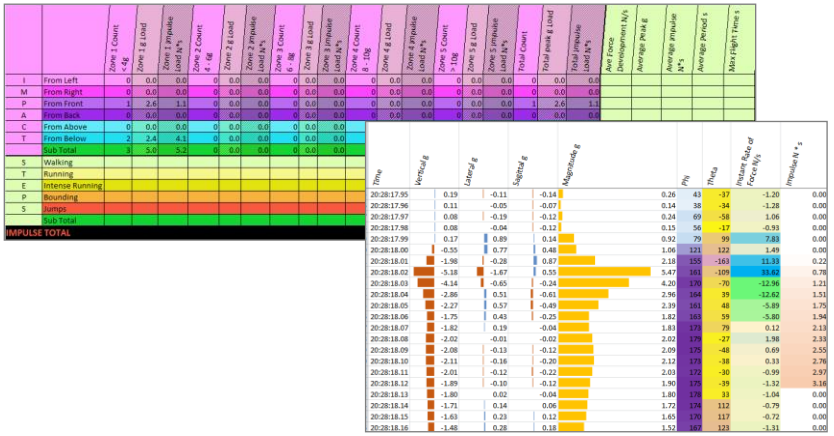
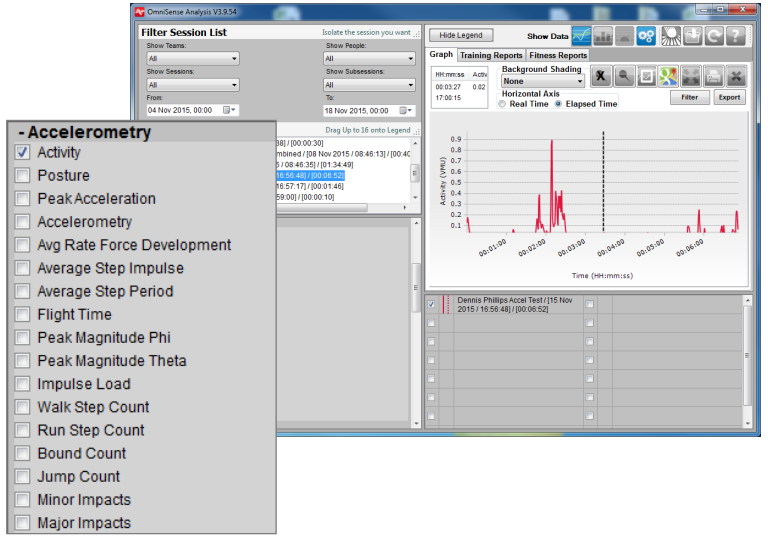
- Analysis of Accelerometer data is available in two components:



An Impact AccelPro report generated by the Impact Processor Tool



Time and Summary Variables in Analysis

Types of Impulse

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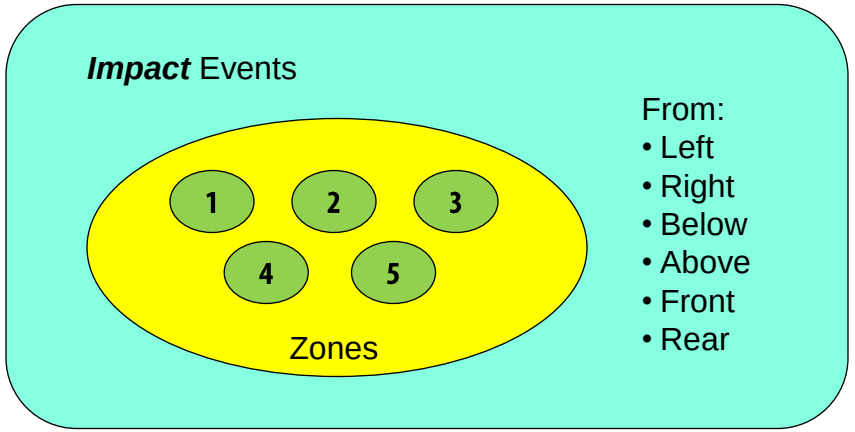
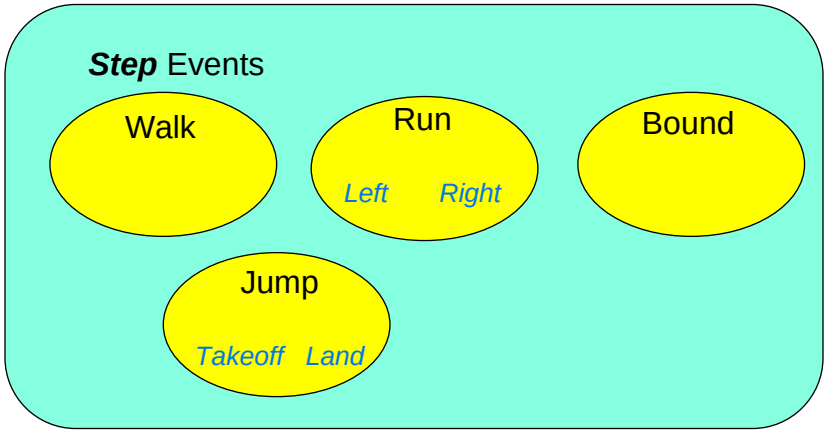




- The Zephyr BioModule samples X/Y/Z accelerometer data at 100 Hz and performs on-board analysis. An *Impulse* is any event which results in a signature in the accelerometer data.

- Zephyr proprietary algorithms can analyze the signature of each impulse and classify it. The two major categories are:
  - An ***Impact*** resulting from a collision between the subject and an object (including the ground) or another subject
    - Impacts are classified into *Zones of Severity*, dependent on the Peak Accelerometer Magnitude value detected during the impulse
  - A ***Step*** – forces detected by the BioModule resulting from voluntary movement of the subject
    - Categorized into *walking*, *bounding* and *running* steps
    - *Jumps*, having a recognized takeoff and landing

- The algorithms analyze magnitude, duration and direction of each impulse. They calculate the intervals between successive impulses in order to characterize their type

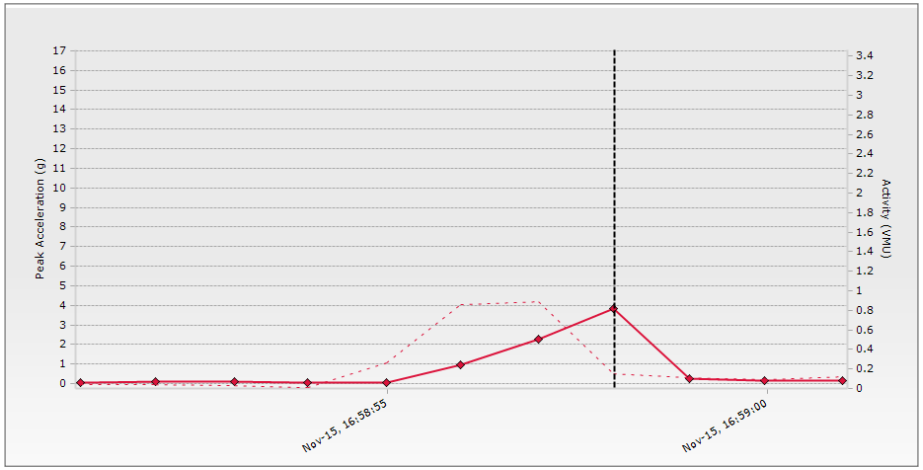
- Some parameters e.g. Step Period are averaged over the 10 previous detected Step impulses

Accelerometer Data

Back to Main Index

- All* accelerometer-based data (step count, etc etc) is reported once per 1 / 2.5 / 5 seconds**, but is based on analysis of data sampled at 100Hz – transmitted at 50Hz, logged at 100Hz.

100 Hz X / Y / Z accelerometer data of an impulse signature (a jump)



Peak Acceleration and Activity level for the same event. Values are calculated for each 1 – second epoch from the 100 Hz data.

- Except the *Accelerometry* parameter. This data is activated in Live in the Accel side panel. The  button activates the Accelerometer data packet to transmit X/Y/Z data for the selected BioModule

** Dependent upon ECHO mode setting in OmniSense Live

Time & Summary Variables

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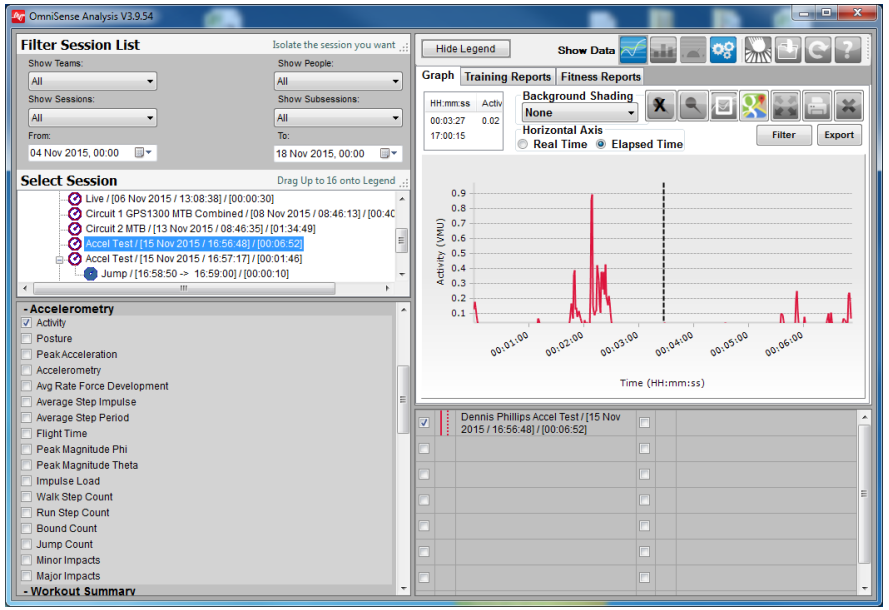
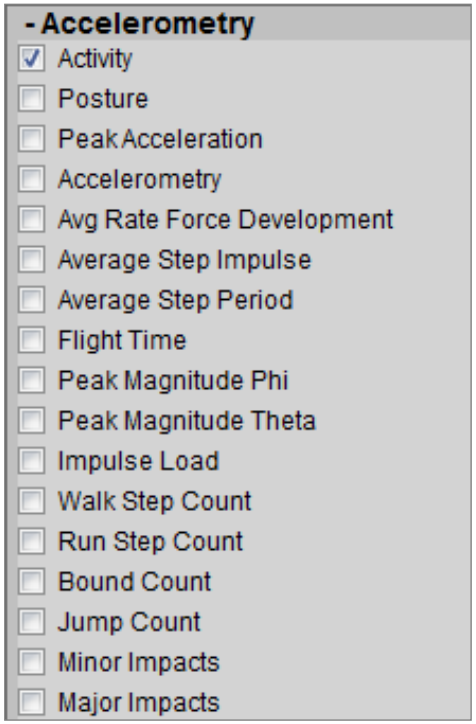
- As of OmniSense 4.0, BioModule Firmware version 1.4.12.0 now performs on-board accelerometer analysis, and new accelerometer parameters are available both in the Live BioGauge and directly in Analysis without the need to create an impact report



Select the desired parameters and display as Time or Summary variables



AccelPro Impact Report

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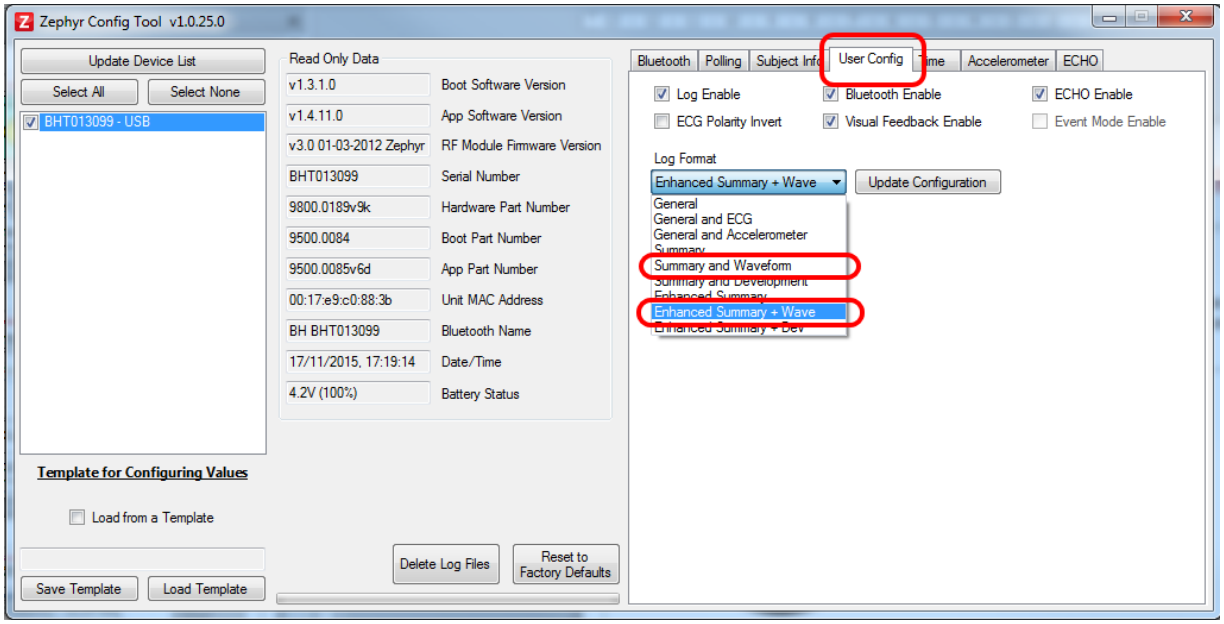
- The Report uses BioModule Log data, which much first be generated using the Zephyr Downloader in the Analysis module
- The BioModule must be configured to log in *Summary & Waveform* or *Enhanced Summary & Waveform* format to record 100Hz accelerometer data



- Use the Zephyr Config Tool > User Config tab to set logging to Summary & Waveform or Enhanced Summary & Waveform
- The Tool is located at Windows Start > All Programs > Zephyr > OmniSense > Tools

Download Logs

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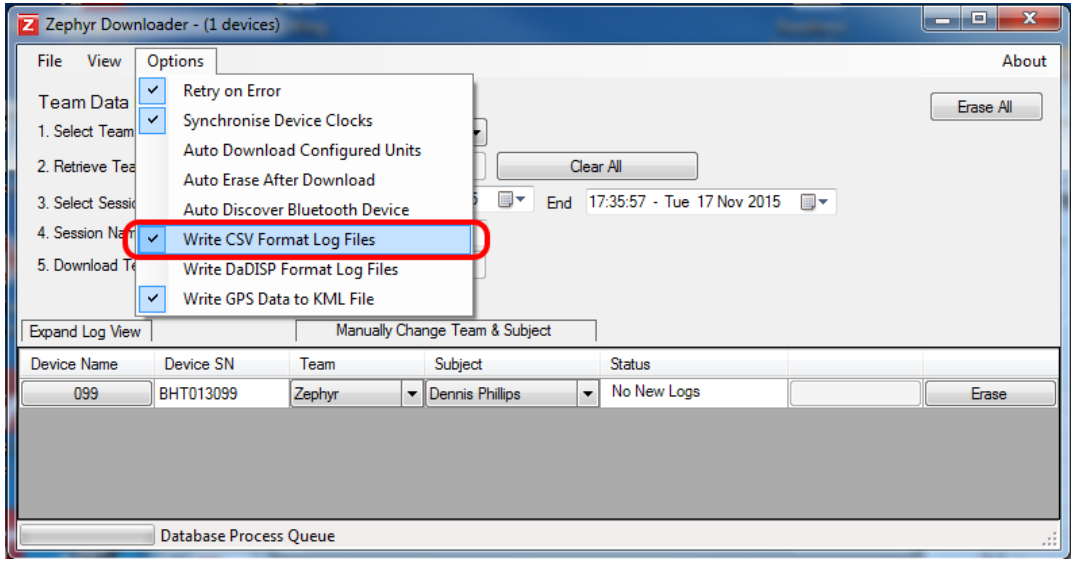
- Log data must be downloaded by the Zephyr Downloader, and an external csv accelerometer file generated. The Impact Processor Tool uses the external file for its analysis

Start Downloader from the Analysis toolbar



- When downloading logs, make sure that the *Write CSV Format Log Files* option is checked in the Options menu

Impact Report Tool

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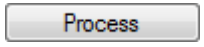
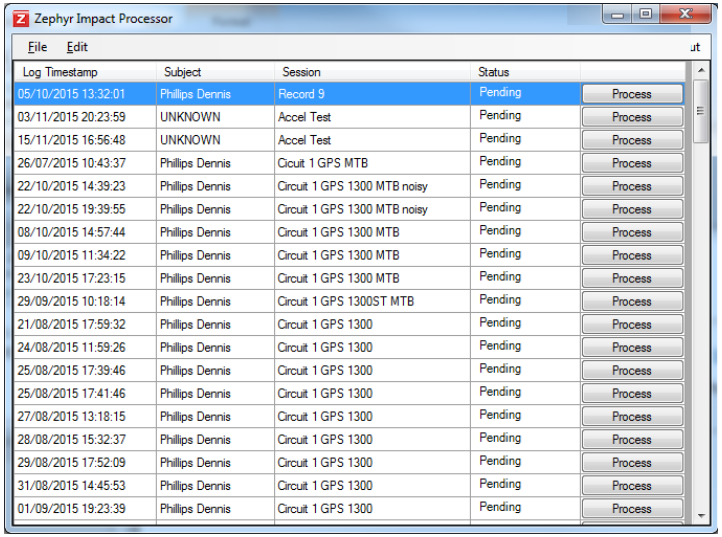
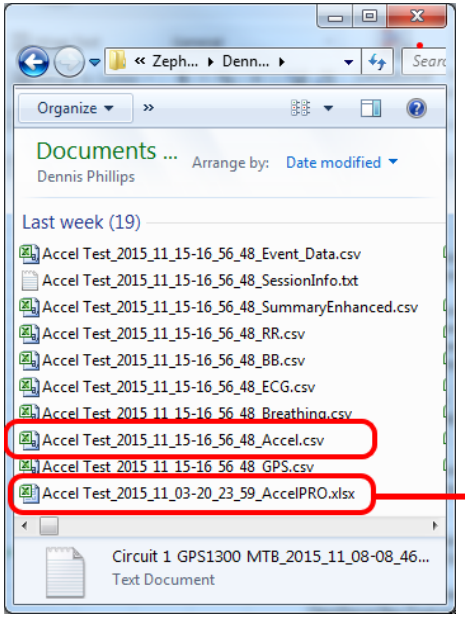
- The Impact Report Tool scans `../My Documents/BioHarness Test Logs/..` for *_accel.csv files generated by the Zephyr Downloader

Start Impact Processor from Analysis Toolbar



Select *Process* for the required files





- Only _accel.csv files not yet processed will show on the Impact Processor dialogue
- The Impact Processor generates a *Session_Name_YYYY_MM_DD_hh_mm_ss_AccelPro* file in the same location as the original

Impact Zones of Severity

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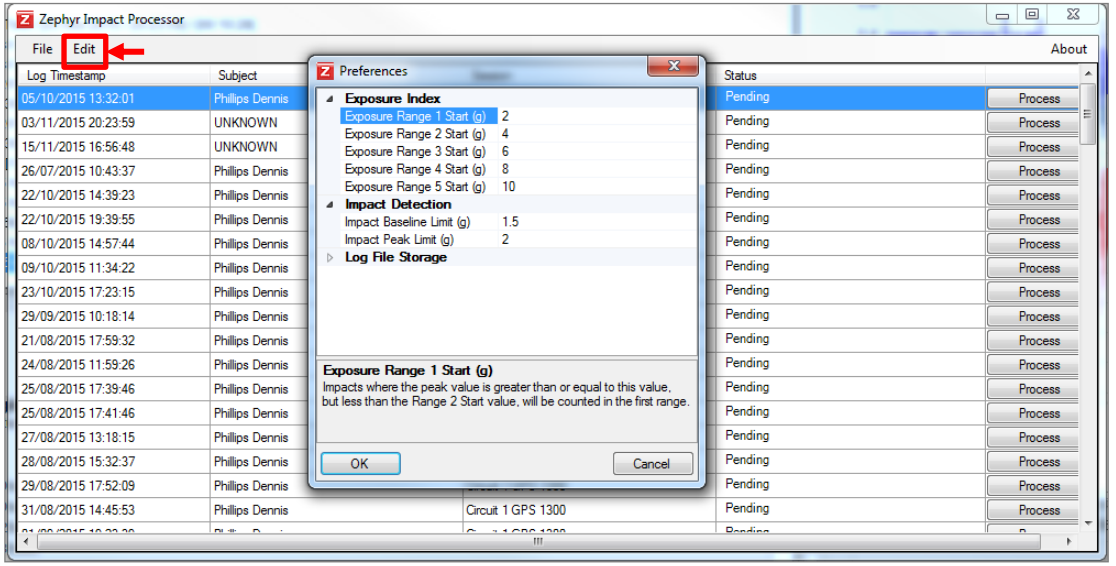
Analysis
Impact Processor



- Zones of Severity in the Report are configurable, and set in Processor Edit > Preferences dialogue
- Set the Impact Zone ranges specific to your activity
- Impact Peak g values below the configured *Impact Baseline Limit* will be ignored

Impact Report – Summary

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		Zone 1 Count < 4g	Zone 1 g Load	Zone 1 Impulse Load N*s	Zone 2 Count 4 - 6g	Zone 2 g Load	Zone 2 Impulse Load N*s	Zone 3 Count 6 - 8g	Zone 3 g Load	Zone 3 Impulse Load N*s	Zone 4 Count 8 - 10g	Zone 4 g Load	Zone 4 Impulse Load N*s	Zone 5 Count > 10g	Zone 5 g Load	Zone 5 Impulse Load N*s	Total Count	Total peak g Load	Total Impulse Load N*s	Ave Force Development N/s	Average Peak g	Average Impulse N*s	Average Period s	Max Flight Time s	Average L Period / Average R Period (VALID FOR RUNNING ALONG A STRAIGHT PATH)
I	From Left	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0						
M	From Right	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0						
P	From Front	1	2.6	1.1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	2.6	1.1						
A	From Back	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0						
C	From Above	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0						
T	From Below	2	2.4	4.1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	2	2.4	4.1						
	Sub Total	3	5.0	5.2	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	3	5.0	5.2						
S	Walking																324	471.8	943.5	0.571	1.46	2.912	0.580		
T	Running																87	368.6	260.8	11.018	4.24	2.998	0.363		
E	Intense Running																1	4.9	1.6	13.221	4.94	1.614			
P	Bounding																7	40.5	25.3	15.992	5.79	3.609	0.497		
S	Jumps																2	15.8	7.7	0.618	7.92	3.847	0.655	0.730	
	Sub Total																421	901.8	1238.9		2.14	2.943			
IMPULSE TOTAL																	424	906.8	1244.1						

- Report divides impulse events into Impacts (top) and Steps (below)
  - Impacts are classified into Zones, defined on previous page
    - Zone count and Impulse Load are given for each zone, and a total for all impacts
  - Steps are categorized by type
    - Count, Total Peak G load & Impulse Load are given for each step type
  - Total count of all impulses (Impacts + Steps), total Peak g Load and Total Impulse load are given for all impulses (in black)

Impact Report – Impulse Data Lines

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Time of Peak	Magnitude g	Impulse N*s	Duration s	Rise Time s	Fall Time s	30 ms Rate of Force Development N/s	30 ms Rate of Force Decline N/s	Time since last Peak s	Phi Peak	Theta Peak	Classification	Type	Orientation
20:26:48.59	1.41	3.24	0.28	0.00	0.01	0.48	-0.60	0.77	161	180	Step	Walk	
20:26:50.06	1.33	2.36	0.20	0.00	0.00	0.30	-0.36	1.47	168	172	Step	Walk	
20:26:50.84	1.23	1.41	0.12	0.00	0.00	0.35	-0.25	0.78	170	159	Step	Walk	
20:26:52.73	0.97	4.80	0.50	0.00	0.00	0.03	-0.05	1.89	167	-97	Step	Walk	
20:26:54.01	2.64	7.95	0.43	0.01	0.03	1.13	-2.59	1.28	162	-16	Step	Takeoff	
20:26:54.59	7.35	4.08	0.12	0.03	0.07	22.61	-15.15	0.58	160	-72	Step	Landing	
20:26:55.47	0.94	1.52	0.16	0.00	0.00	0.02	0.03	0.88	170	-162	Step	Walk	
20:26:56.58	1.04	4.35	0.45	0.00	0.00	0.27	-0.13	1.11	171	167	Step	Walk	
20:26:57.82	2.47	9.83	0.58	0.04	0.05	0.90	-2.73	1.24	168	-46	Step	Run	
20:26:58.40	5.30	4.75	0.17	0.02	0.04	15.62	-8.12	0.58	158	-58	Step	Run	

- Detailed data is displayed for each detected impulse

Time of Peak – a hyper link to the Streamed Data	Time since the last impulse
Peak Magnitude in g	Classification (Impact or Step)
Duration – will determine how many lines highlight in the streamed data	Type (Impact Zone or step type)
Rise & Fall times	Orientation – direction of impact (from above, below etc)
30ms (before the peak) rate of Force Development	

Impact Report – Accelerometry Stream

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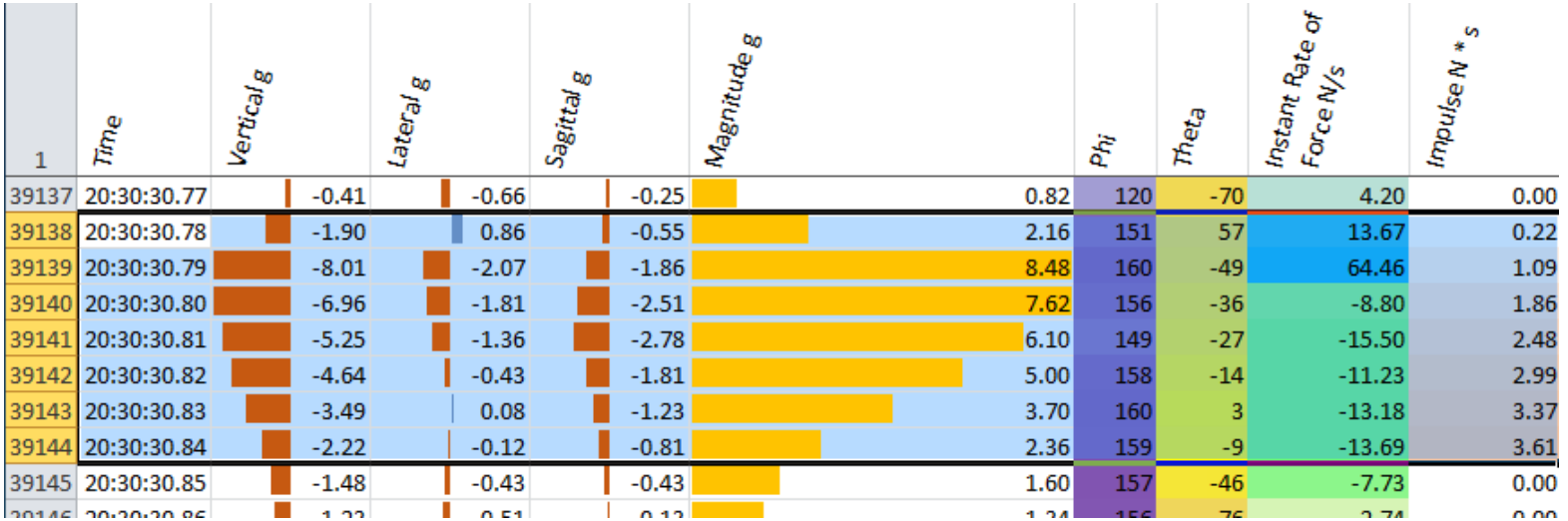

1	Time	Vertical g	Lateral g	Sagittal g	Magnitude g	Phi	Theta	Instant Rate of Force N/s	Impulse N * s
39137	20:30:30.77	-0.41	-0.66	-0.25	0.82	120	-70	4.20	0.00
39138	20:30:30.78	-1.90	0.86	-0.55	2.16	151	57	13.67	0.22
39139	20:30:30.79	-8.01	-2.07	-1.86	8.48	160	-49	64.46	1.09
39140	20:30:30.80	-6.96	-1.81	-2.51	7.62	156	-36	-8.80	1.86
39141	20:30:30.81	-5.25	-1.36	-2.78	6.10	149	-27	-15.50	2.48
39142	20:30:30.82	-4.64	-0.43	-1.81	5.00	158	-14	-11.23	2.99
39143	20:30:30.83	-3.49	0.08	-1.23	3.70	160	3	-13.18	3.37
39144	20:30:30.84	-2.22	-0.12	-0.81	2.36	159	-9	-13.69	3.61
39145	20:30:30.85	-1.48	-0.43	-0.43	1.60	157	-46	-7.73	0.00

- Hyperlinks in the 1st column of the Data Lines tab locate the corresponding event in the 100Hz X/Y/Z streamed data.

Time of Peak	Instant Rate of Force Development
Accelerometer Magnitude	Impulse Load N s
Phi & Theta – vertical & horizontal impact angles	

PSM Training Modules

Readiness

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PSM Training Modules

Overview

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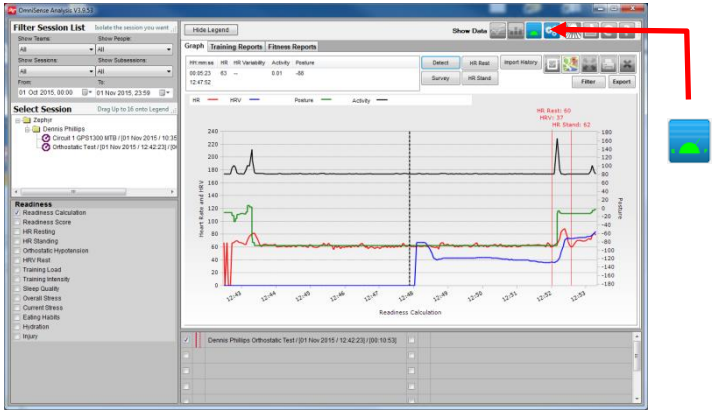
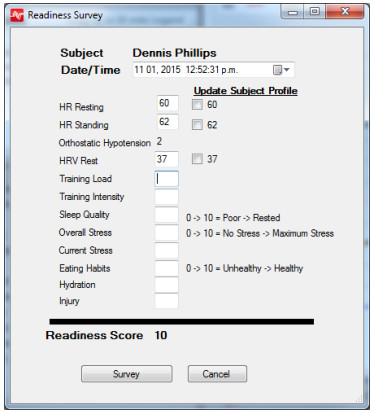
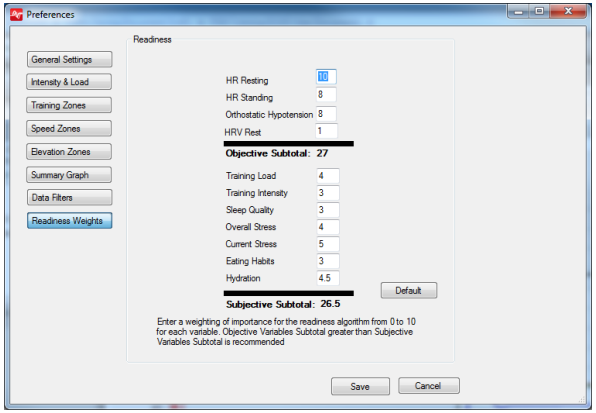


Readiness Pane Showing Orthostatic Test Analysis



Readiness Survey



Readiness Weighting in Preferences

- Readiness is measured on a 0 – 10 scale. 10 = optimal readiness
- Subjects perform an orthostatic hypotension test to establish resting HR and HRV, and standing HR
- Subjects complete a subjective survey, rating a number of factors on 1 -10 scales (Factor weightings can be set in Preferences)
- A Zephyr proprietary algorithm calculates a Readiness estimate
- Readiness History can be imported and displayed
- A future implementation will include an Android application to allow users to take an orthostatic test and complete a survey at home, with results emailed automatically to a data coordinator

Orthostatic Hypotension Test

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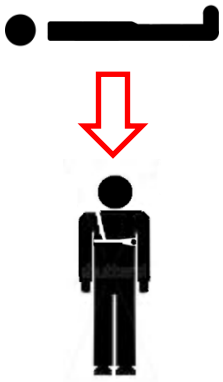
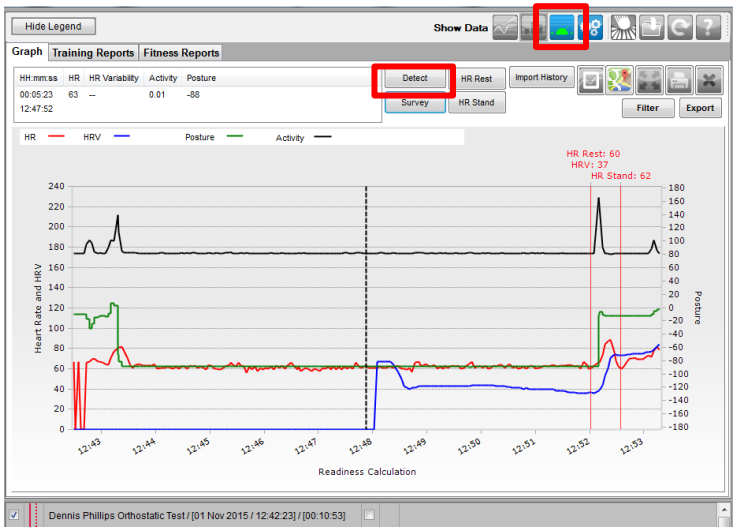


Orthostatic Hypotension Test

Readiness pane in Analysis



- Orthostatic Test – subject lies down in a comfortable quiet location for 9 minutes, then stands for 1 minute. Record results in Live, or log data on BioModule and import to Analysis.
- Import the session data into the legend, select the Readiness toolbar button , then Detect the detect button to analyze and detect resting HR & HRV, and standing HRV. Place the graph vertical cursor in required location and use manual buttons to update detected values if necessary
- Select the survey button Survey to display the survey dialogue

Readiness Survey

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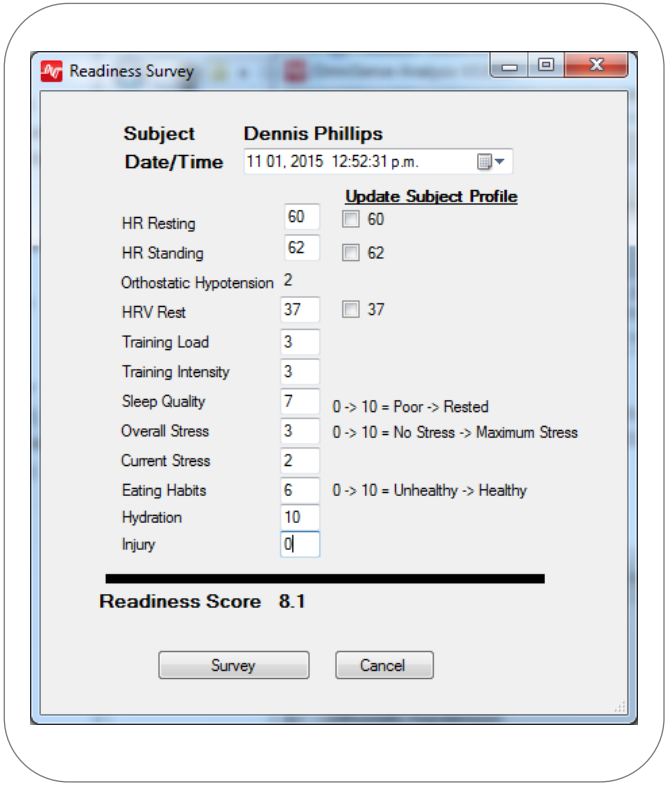
- Use the Survey button to display the dialogue
- Result from the current orthostatic test are already populated
- Orthostatic tension value = change in HR from resting to standing
- Complete the survey and answer on a subjective 1 – 10 scale

Training Load	Average in previous 10 days on 1 – 10 scale
Training Intensity	Average in previous 10 days on 1 – 10 scale
Sleep Quality	0 – 10 subjective or scaled based on an external 3rd party system
Overall Stress	0 = no stress, 10 = completely stressful
Current stress	0 = no stress, 10 = completely stressful
Eating Habits	0 = poor, 10 = optimal
Hydration	0 = dehydrated, 10 = hydrated
Injury	0 = unable to perform, 10 = no injury



- Individual weighting scaling factors can be customized in the Analysis > Preferences > Readiness dialogue

Display Readiness History

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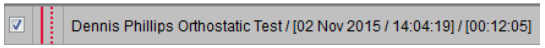
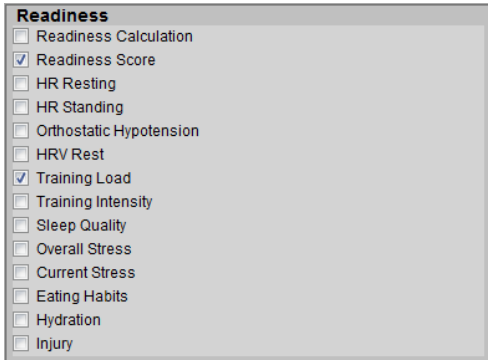
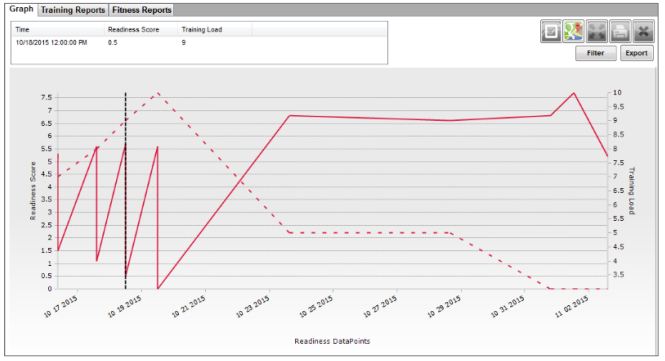
1. Select a date range in the *Filter Session List*. (This can be adjusted later)



2. Populate the Legend with a session – (any session will suffice to trigger data display)



3. Selected desired parameters from Readiness pane



4. Readiness History will display

- Readiness history and parameters are displayed in the Readiness panel, accessed by the Readiness button on the toolbar

Import External History

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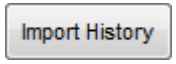
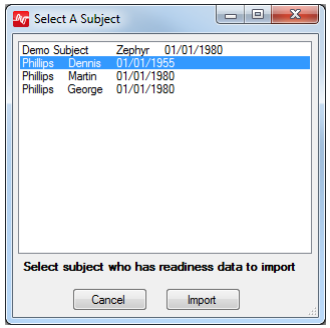
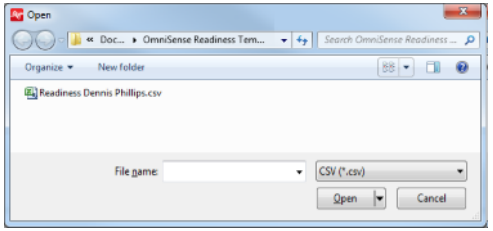


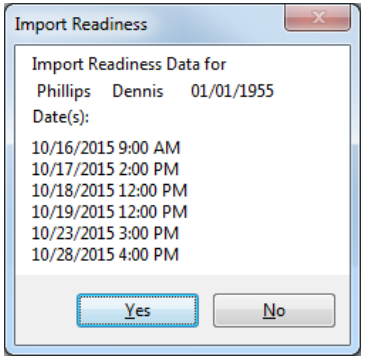
1. Select the Import History button



2. Select a subject



3. Browse and locate the external .csv file containing history. A template will be provided by Zephyr for recording data.



4. Confirm the records to be imported. Records, once imported, remain in the OmniSense database. The external file can be updated at any time.

- Import of external readiness data is intended to support an Android application which will be available for a future implementation. Subjects will perform an orthostatic test a and complete a survey at home, and results will be emailed to a desired recipient. This receiver updates the subject history file manually. A file template will be provided by Zephyr for this purpose. It will be a .csv file, editable in Microsoft ® Excel.

PSM Training Modules

Fitness Test Analysis

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PSM Training Modules

Overview

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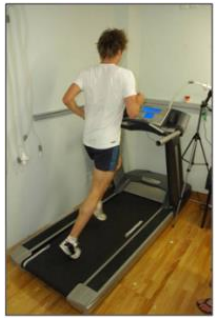
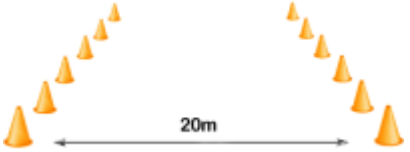
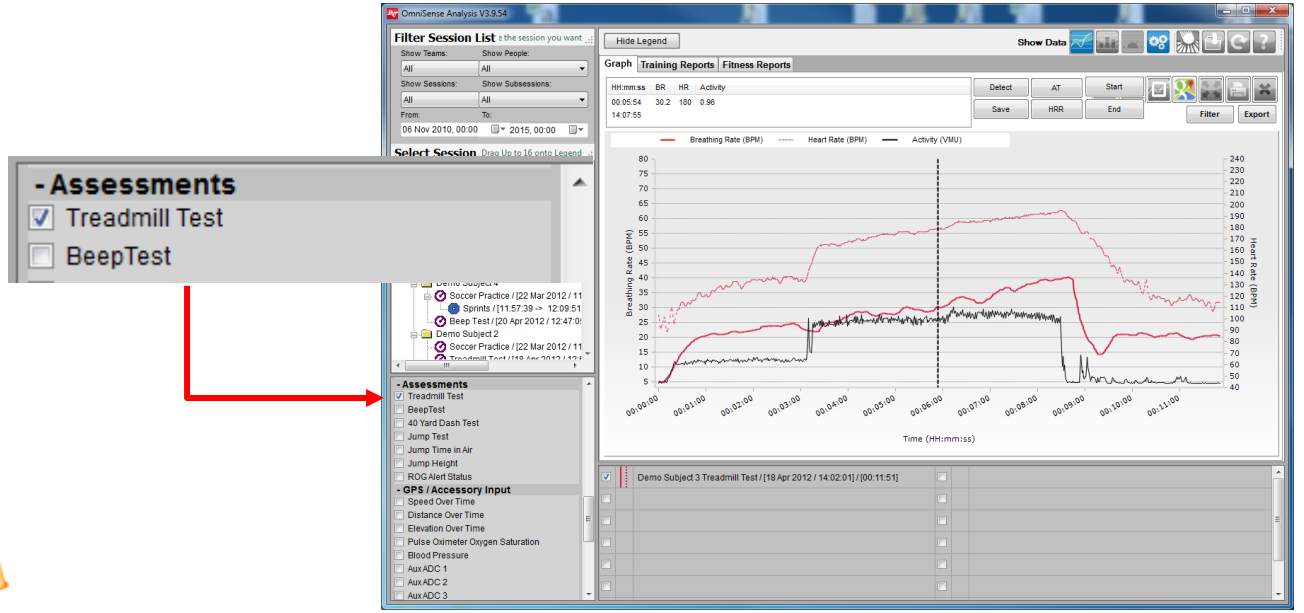


Treadmill Test / Beep Test





- OmniSense can perform automatic and manual analysis of ramped maximal fitness tests to establish and save fitness parameters to the database:
- HR_{max}, HR @ AT, HRR, VO_2max, BR @ AT, %VO_2max @ AT, Fitness Level

Automatic Analysis

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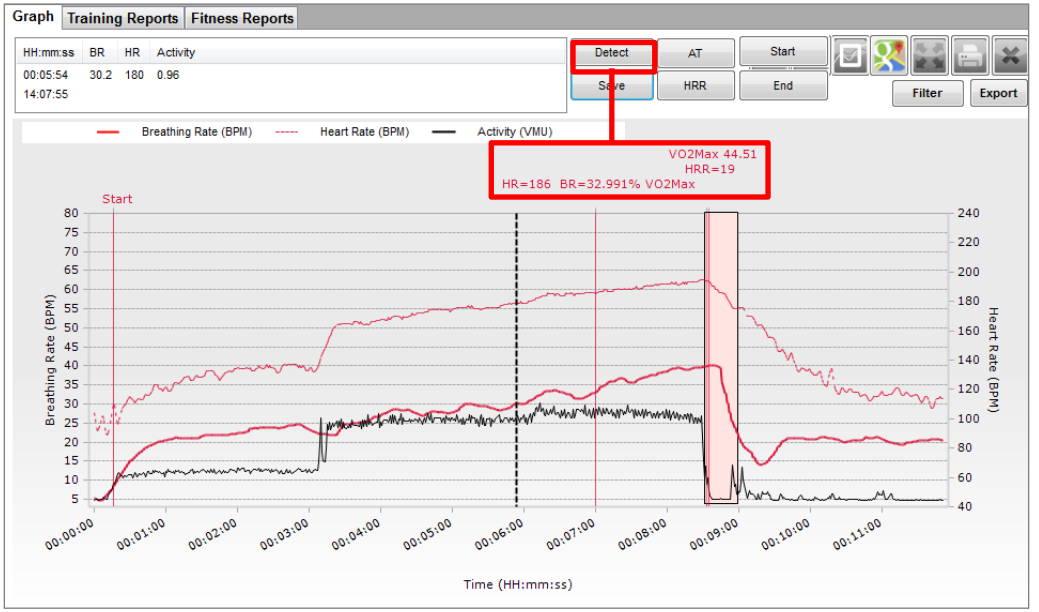

- Load the Fitness test analysis into the legend and select *Treadmill Test* or *Beep Test* from the Assessments list
- Use the Detect button – OmniSense will attempt to determine the AT threshold, maximum HR and HRR 30-second value. These will be displayed on the graph.
- If automatical analysis cannot detect these values, or they need to be adjusted, then set thepoints manually, as shown on the next slide

Manual Analysis

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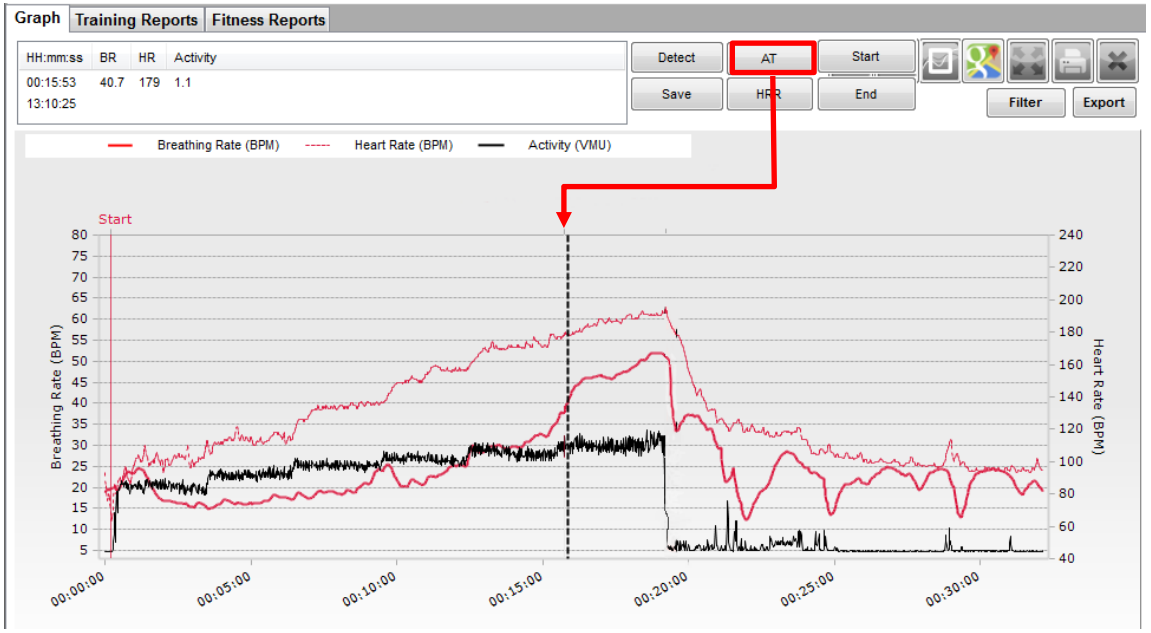

- Position the graph vertical cursor on the start and end of the test, perceived AT threshold and Max HR points successively, and use the *Start*, *End*, *AT*, and *HRR* buttons to mark the relevant parameters, or relocate those obtained automatically

Manual AT Estimation

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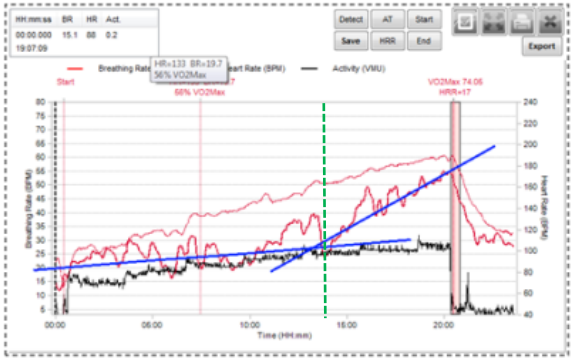
Automatic detection has wrongly placed the AT threshold at the 56% VO_2max level



The eye can perceive a trend in the BR (thick red) data – a slowly increasing rate, followed by a more rapidly increasing rate.

The blue lines show the trends.

AT should be placed where they intersect.

Al alternative method is to look for the major upswing in BR which raises it above 40 bpm (horizontal blue) and keeps it there.

The blue circle marks the major inflection which finally pushes BR above 40 bpm

Save Analysis Results

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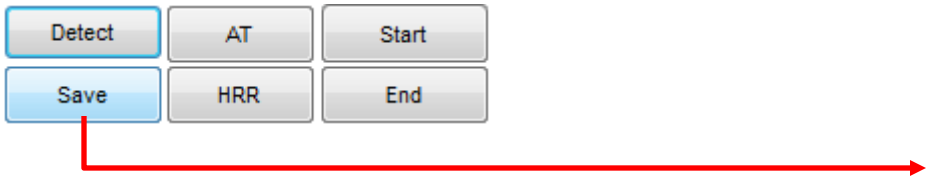

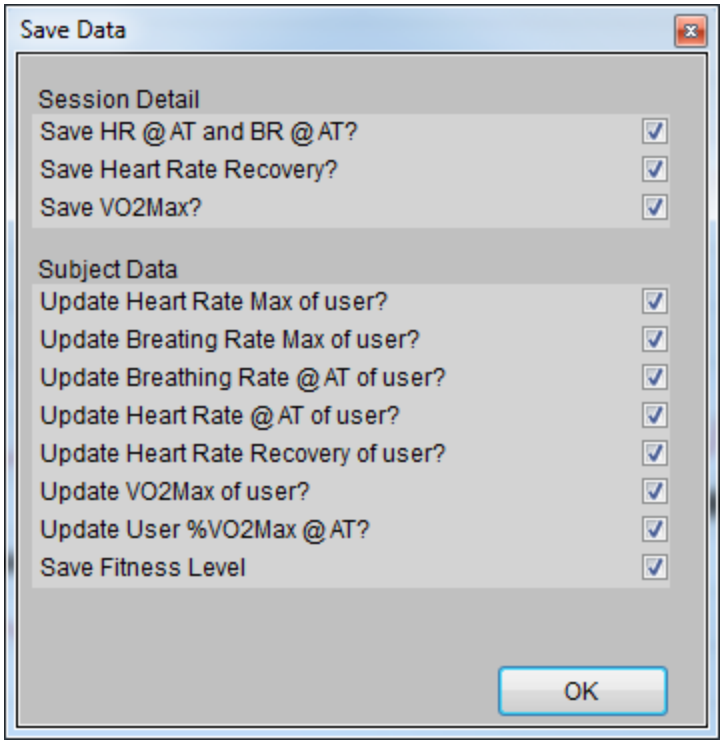

Session Detail:

- AT, HR_{max} and HRR markers will be saved with the session, and will always display when the test results are re-displayed

Subject Data:

- Details will be saved into the OmniSense Database
- Max values saved will be reflected in 100% deflection on subject BioGuage in Live
- VO_2max will be displayed in Fitness Reports

PSM Training Modules

Software Utilities

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Locate OmniSense Tools

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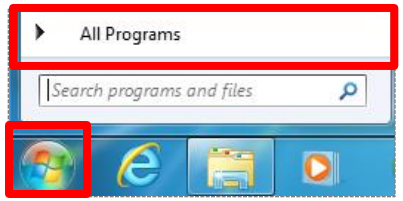
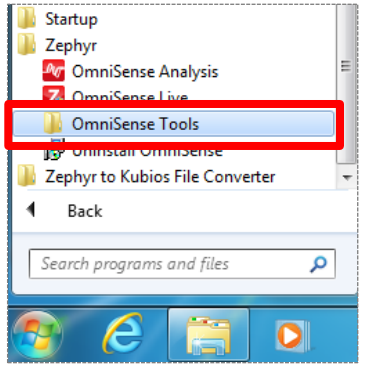
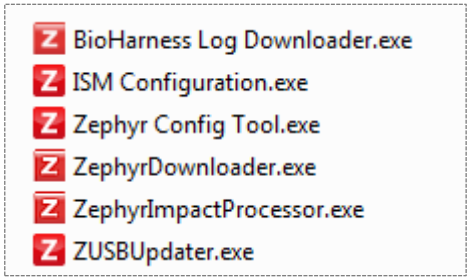
A number of tools are installed with OmniSense, located at `C:\Program Files (x86)\Zephyr\OmniSense\Tools`



Windows *Start* *> All Programs*



Select
Zephyr > OmniSense Tools



Select desired .exe – *some tools are accessed from the Analysis toolbar.*

Tools accessed from OmniSense Analysis Toolbar

- BioHarness Log Downloader – Manually display/download logs from a single BioModule.
- Zephyr Downloader – auto-download logs from multiple BioModules.
- Zephyr Impact Processor – Analysis Accelerometer data from BioModules.

Tools accessed directly from this folder

- ISM Configuration – legacy tool for configuring ISM BioModules, which are now discontinued.
- Zephyr Config Tool – for manual configuration of one or more BioModules.
- Zephyr USB Updater – update firmware of one or more BioModules.

OmniSense Analysis Tools

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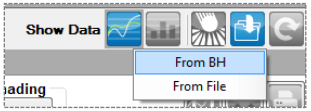
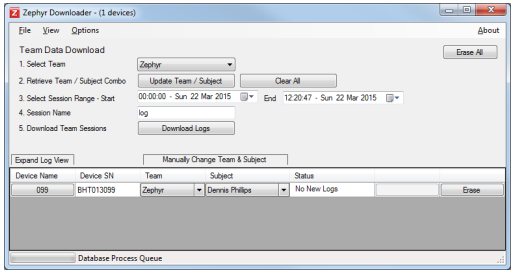
These tools are accessed directly or indirectly from the OmniSense Analysis Toolbar

Zephyr Downloader



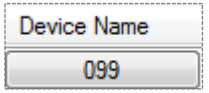


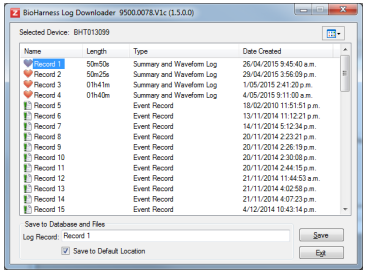
Import Log Files from Multiple BioModules

- Wizard or manual workflow
- Import to database
- Export to External files

See Module Analysis – Log Data

BioHarness Log Downloader



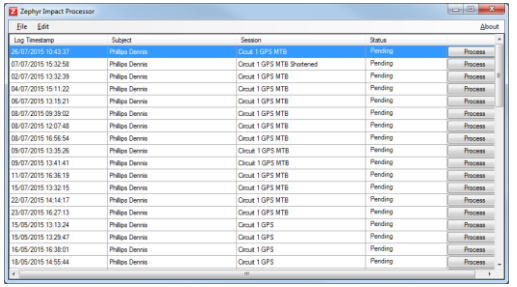


Import Log Files from a single BioModule

- Manual log selection
- Display all logs in device
- Import to database
- Export to External files

See Module Analysis – Log Data

Impact Analysis Tool



Generate Analysis Reports from selected BioModule Log Files

See Module Analysis – Impacts

Standalone Tools

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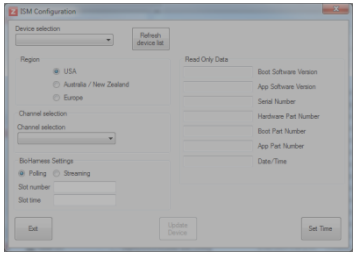
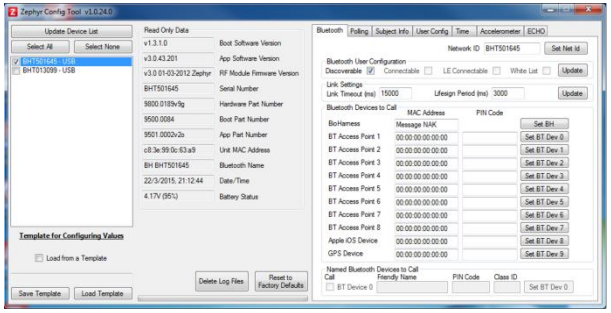
These tools are accessed directly or indirectly OmniSense > Tools directory.

ISM Configuration.exe



Legacy Tool for configuring ISM BioModules.

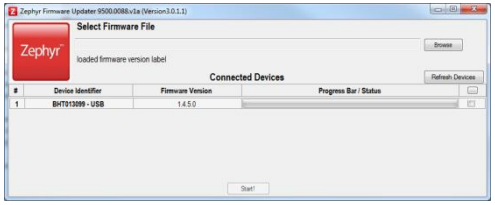
Zephyr Config Tool.exe



Manually Configure BioModule(s):

- Bluetooth & ECHO Connectivity
- GPS Pairing
- Set subject parameters
- Logging Modes
- Internal clock time
- Accelerometer mapping for garment type
- ECHO settings

ZUSBUpdater.exe



Manually Configure BioModule(s):

- Update firmware version

Zephyr Config Tool

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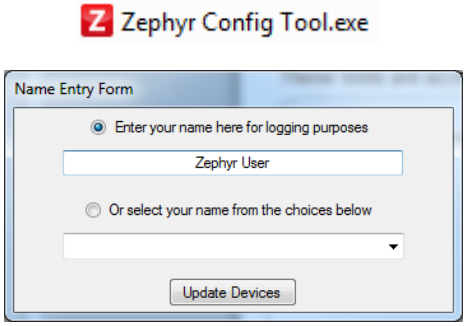
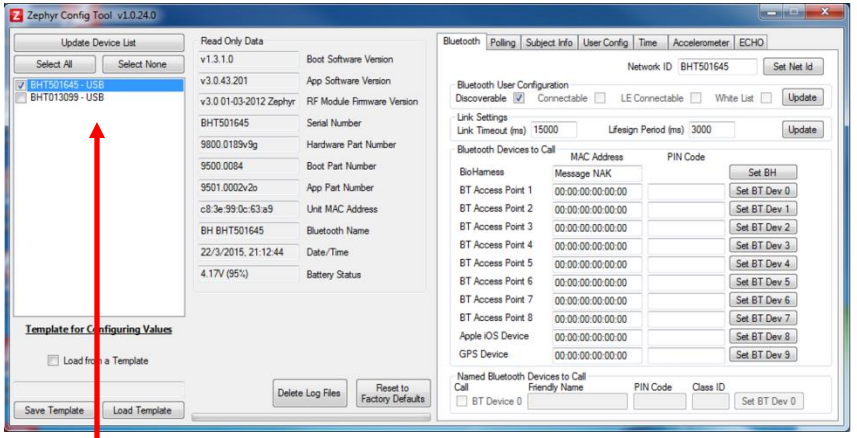
These tools are accessed directly or indirectly from the OmniSense > Tools directory.

Connect BioModules in cradle or case to PC.



Enter a name or select a previous name from pulldown. This updates a log .csv file at C:\ProgramData\Zephyr



Detected BioModules

- Manually change BioModule settings with care. Changing some settings may cause the device to stop working or give invalid data.
- A PSM ECHO system resets some BioModule settings over-the-air on start-up. This may cause some manual settings (e.g. GPS address & device clock time) to be overwritten.

Config - Single or Multiple BioModules

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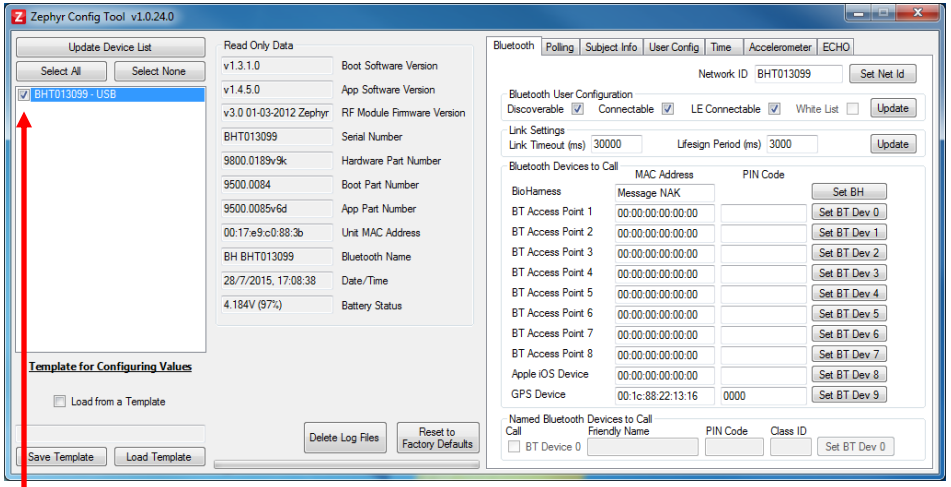
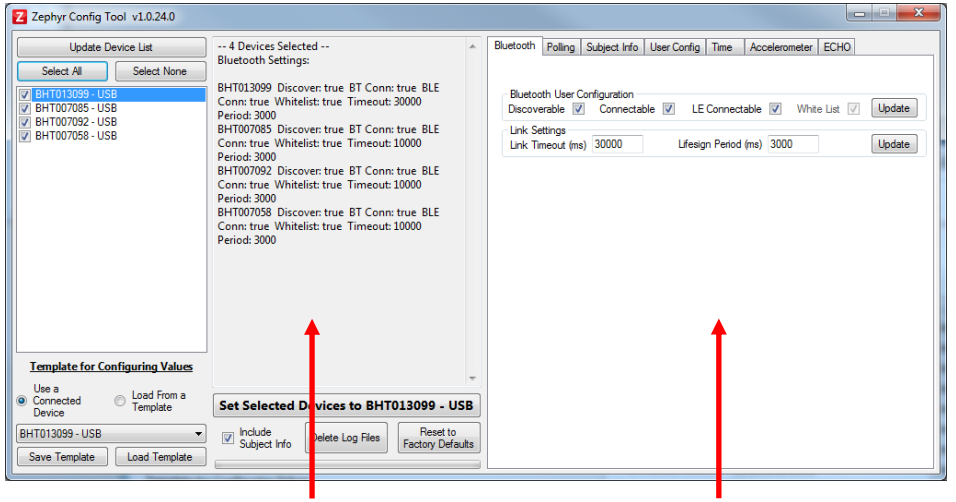
The Config Tool display will vary, depending on how many BioModules are connected.

Single device connected



Multiple devices connected



Select device by checkbox

Both sides of Config Tool fully populated

Properties listed separately for each BioModule

To edit a property on the left, *deselect* all BioModules except that to be edited.

Properties common to each BioModule connected

Config – Read Only Data

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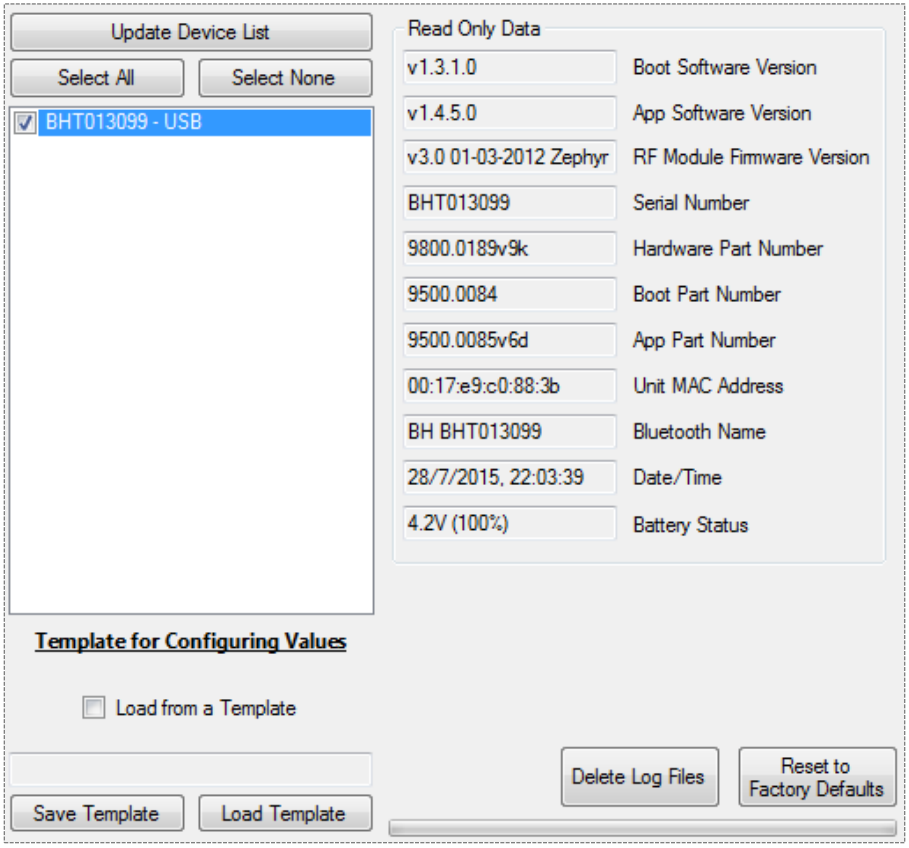

Boot Software Version	Not user updateable
App Software Version	Device firmware – can be updated with ZUSBUpdater
RF Module Firmware	Not user updateable
Serial & Part Nos.	Zephyr internal part numbers
Unit MAC Address	Bluetooth Address
Bluetooth Name	Name when detected over Bluetooth
Date/Time	Internal device time – does not update in real time
Battery Status	4.2V = 100%, 3.6V = 0%
Delete Log Files	Delete all logs in device
Reset To Factory Defaults	Reset all parameters
Save, Load Template	Use templates for rapid configuration o0f multiple devices with the same settings.

Config – Bluetooth

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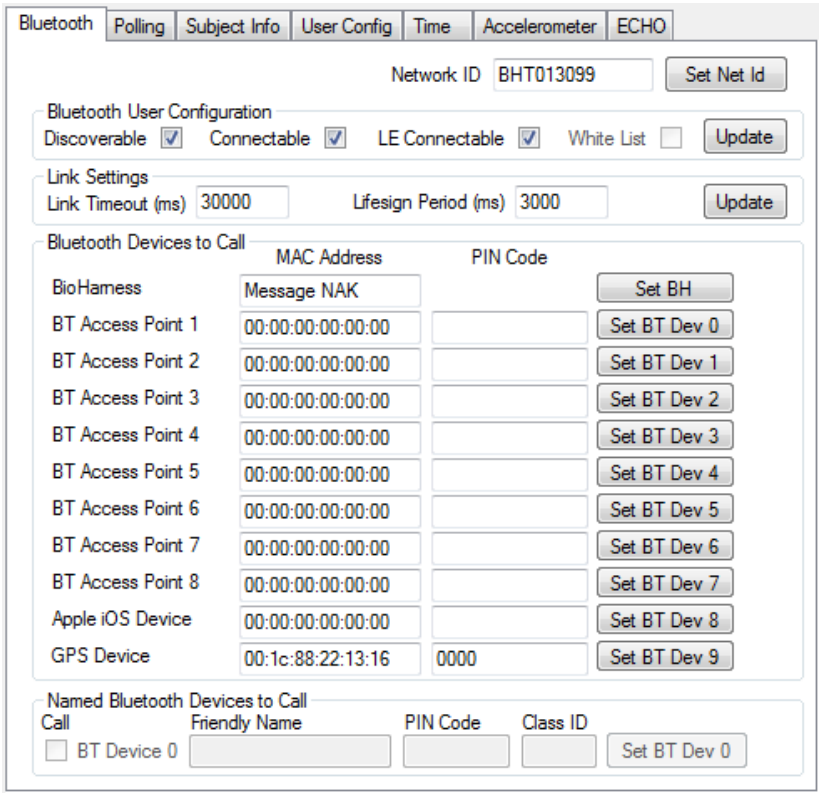

Network ID	Device ID when detected over Bluetooth
Discoverable	Make device discoverable or ‘hide’ from BT detection
Connectable	Enable Bluetooth Connectivity
LE Connectable	Enable Bluetooth Low Energy Connectivity, if device supports it.
Link Timeout, Lifesign Period	Default settings will ensure BioModule never terminates BT connection
BioHarness	Not used to configure BioModule
BT Access Point #	Legacy Settings for older BT access Point systems (out of production)
Apple iOS Device	Not Implemented
GPS Device	For Manual Pairing with GPS. This is normally configured automatically over ECHO.
Named Bluetooth Device To Call	Not used in PSM ECHO systems

Config – Polling / Subject Info

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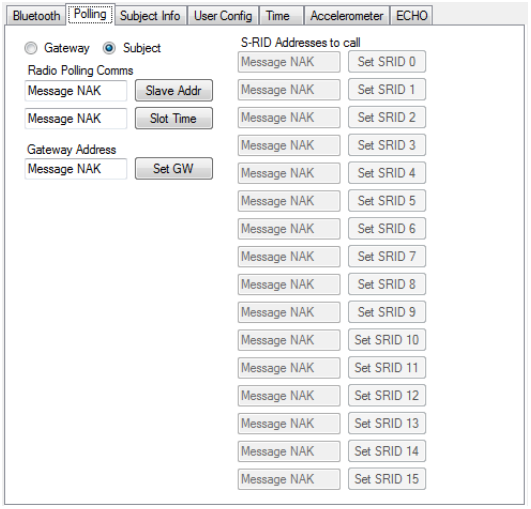

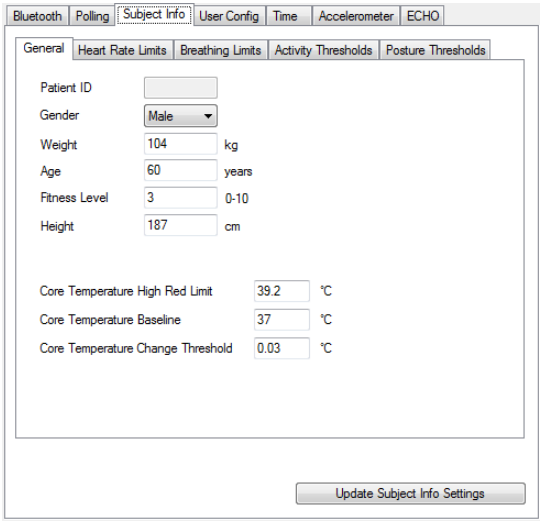

- Polling Tab is not used for PSM ECHO systems
- Subject Info Parameters are used to configure various parameters in the Subject Status algorithms. They are populated over-the-air by an ECHO system and should not be edited manually

Config – User Config

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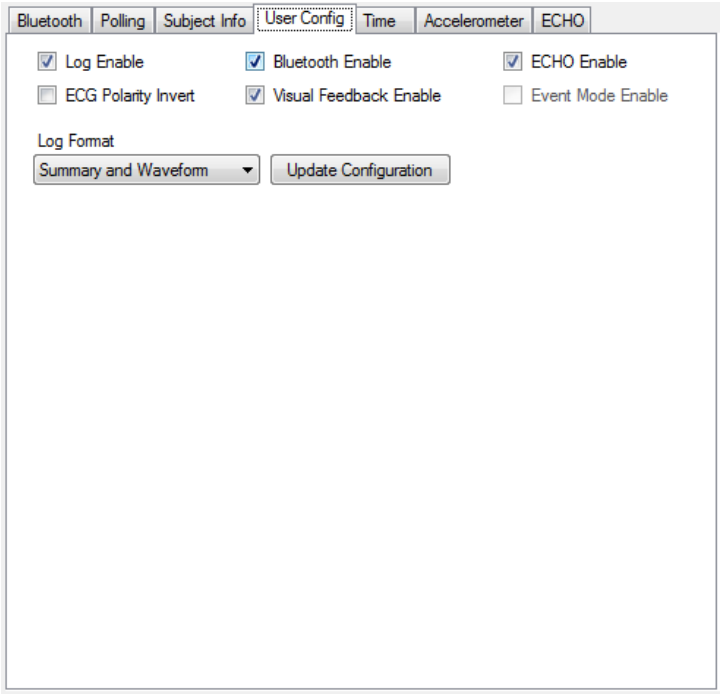
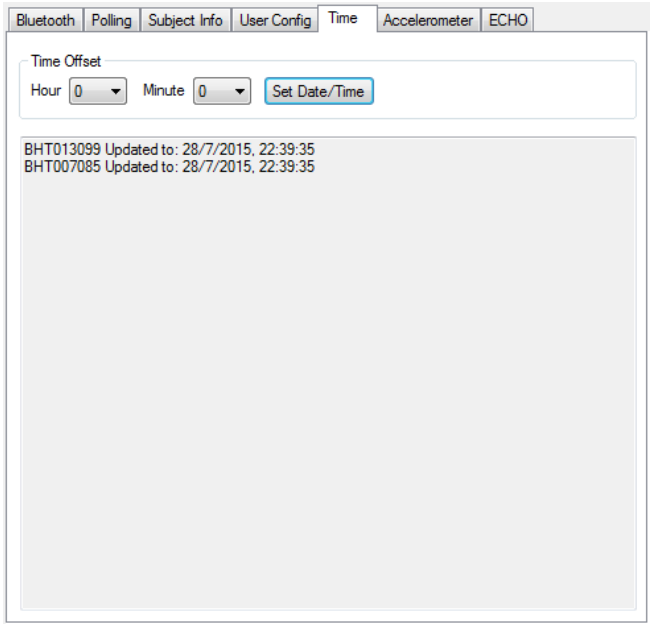


Log Enable	Enable Logging (checked by default)
Bluetooth Enable	Enable Bluetooth transmit
ECHO Enable	Enable ECHO transmit
ECG Polarity Invert	Invert the ECG waveform
Visual Feedback Enable	If unchecked, all LEDs turn off after 30 seconds
Event Mode Enable	For non-PSM systems
Log Format	General / +ECG / +Accelerometer – legacy log formats for BioModule 2.0 Summary / + Waveform / + Development for BioModule 3.0 – default Summary, Summary + Waveform required for GPS logging
Update Configuration	Save any updated settings

Config – Time

Back to Main Index



Time Offset	Add an offset if required
Set Date Time	Use to set the device clock, with or without an offset.

Time Auto-set

BioModule clocks are automatically set to local PC time under two conditions:

- On Startup of OmniSense Live in a PSM ECHO system
- When the device logs are read by the Zephyr Downloader in OmniSense Analysis (this can be turned off in the Downloader options menu)

If a BioModule is used directly in logging mode after being powered off, resynchronize the clock manually using the Config Tool, or by using OmniSense Live in ECHO mode, otherwise there maybe an offset of more than 1 second from real time.

Config – Accelerometer

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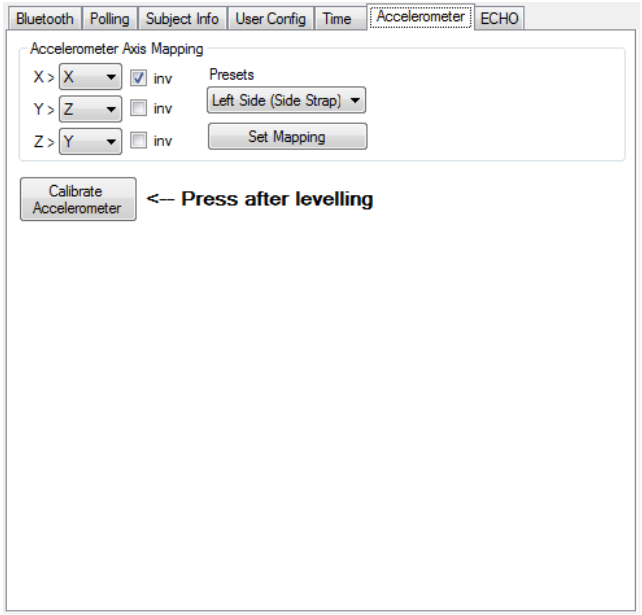
Calibration presets allow a BioModule to be reconfigured for a different garment type, which may have a different device orientation.



Presets	Set to required garment type
Set Mapping	Use to commit a new settings
Calibrate Accelerometer	Use to zero-reset accelerometer orientation. See warning below.

- BioModule Axis orientation is described in the BioModule Data Sheet.
- The inv option was designed to allow flexibility for future garment designs.

Device accelerometers are factory calibrated and should *never* normally require recalibration. Recalibrating may create an offset in device orientation. It should only be attempted on a calibrated horizontal surface. Device should be reset to factory defaults on left panel of Config Tool first.

Config – ECHO

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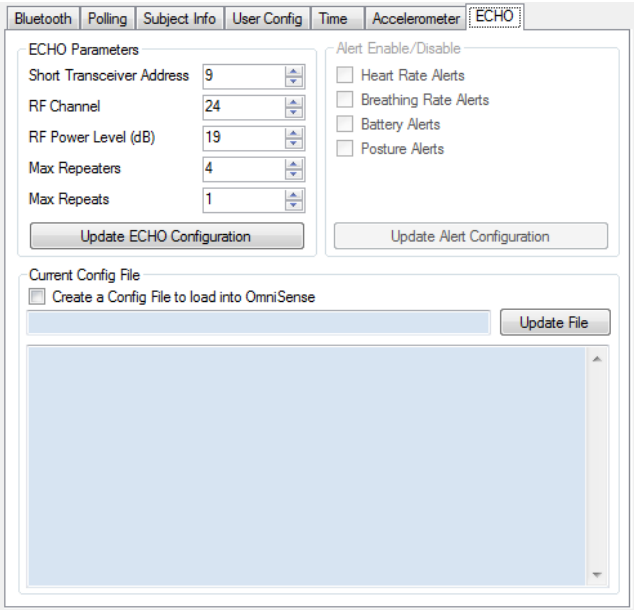

Short Transceiver Address	Should be different for each BioModule in a PSM system. Assigned on shipment.
RF Channel	Must be same as ECHO Gateway and all repeaters. Do not change.
RF Power Level	Set to 19 (maximum)
Max Repeaters	Set to 4
Max Repeats	Set to 1
Alerts	Disabled (not for PSM systems)
Config File Panel	Used by Zephyr before shipping a PSM system to generate a config file to allow new users to add large numbers of BioModules to their database, without having to add each BioModule individually.

No two BioModules in a PSM system should have the same Short Transceiver Address, otherwise a conflict may occur. No data, or the wrong data, may be received from either device.

ZUSBUpdater Tool

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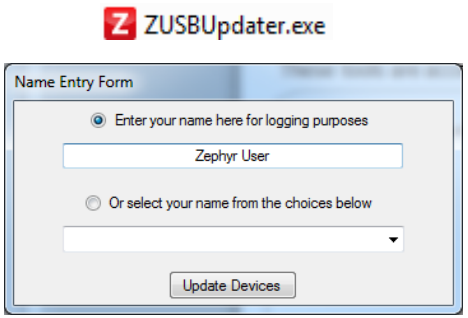
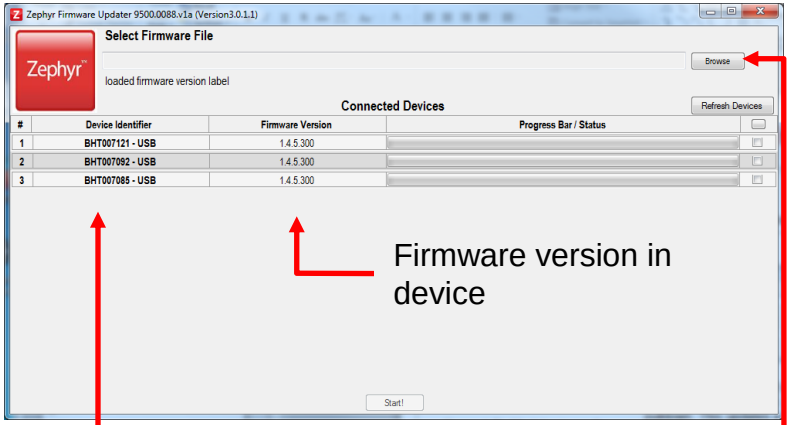
This tools are accessed directly from the OmniSense > Tools directory.

Connect BioModules in cradle or case to PC.



Enter a name or select a previous name from pulldown. This updates a log .csv file at C:\ProgramData\Zephyr



Confirm you have the correct firmware version for your device. In some instance the wrong firmware may be loaded, and the device will not work in your system, until the correct version is loaded.
The _1G, _2G and _3G suffixes in firmware image file names refer to different versions of the BioModule.

Update Firmware

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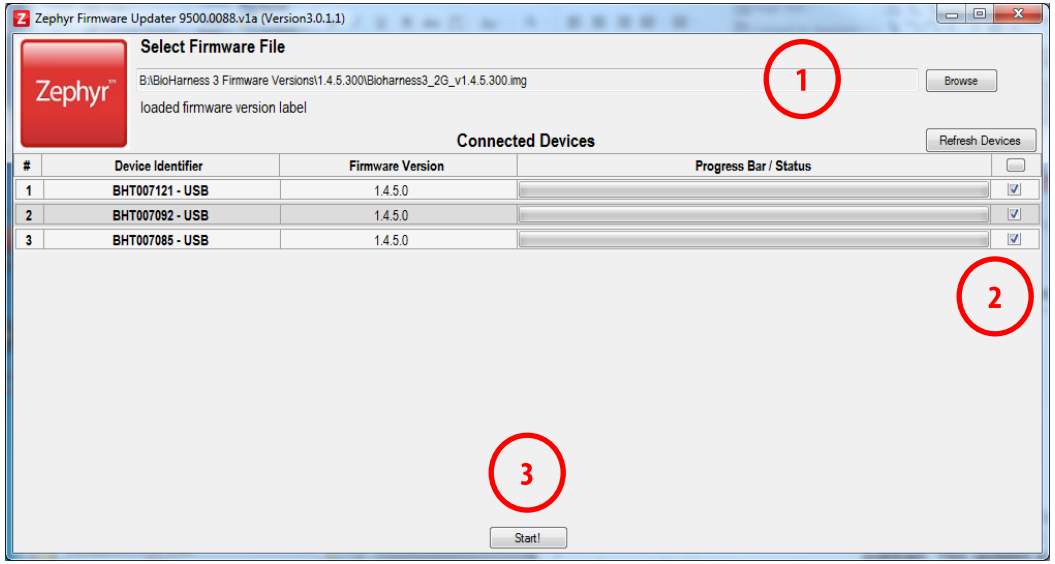
This tools are accessed directly from the OmniSense > Tools directory.



Red & Green LEDs flash while firmware is updating

1. Browse you computer to locate the correct firmware image file (type *.img)
2. Check the boxes for those devices to be updated.
3. Click *Start* – red & green LEDs will flash while firmware is updating.
4. Retry if not successful first time.