

T O R O N T O

canadā

## Workshop 3

Commences at: 10:50

### SAFTE-FAST Console Tools & Tips

Presented by: Ben Brown

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# SFC Tools & Tips

- Schedules and Events Tables
- Scenarios, Templates and Parameters
- Parameter overriding with 'Station Parameters'
- Data Processing
- Workload
- Augmentation Refresher
- Schedule Editor



# Making the most of Schedules & Events Tables

- **Search** – Find matching text in some or all columns
- **Filter** – Show only rows that match
- **Group** – Organize the data into
  - Combined groups
  - Nested groups
- **Multi-Select** – View Events from multiple Schedules
- **Save as Scenario** – Create data sub-sets for comparison and experimentation

Group by: Base Station X

|   | Schedule ID  | Date (Base) | Route        | Total Duration (Work) | Number of Events | Effectiveness Minimum (Crewing) | Effectiveness Average (Crewing) | Effectiveness Minimum (Critical) | KSS Maximum (Critical) | Samn-Perelli Maximum (Critical) | Reservoir Minimum (Crewing) | Reservoir Minimum (Critical) | % Below Criterion (Crewing) | Wor Max |
|---|--|-------------|--------------|-----------------------|------------------|---------------------------------|---------------------------------|----------------------------------|------------------------|---------------------------------|-----------------------------|------------------------------|-----------------------------|---------|
| ▼ | Base Station: YMX - Montréal - Montreal International (Mirabel) Airport (-4)         |             |              |                       |                  |                                 |                                 |                                  |                        |                                 |                             |                              |                             |         |
| ▼ | Base Station: YOW - Ottawa Macdonald-Cartier International Airport (-4)              |             |              |                       |                  |                                 |                                 |                                  |                        |                                 |                             |                              |                             |         |
| ▼ | Base Station: YVR - Vancouver International Airport (-7)                             |             |              |                       |                  |                                 |                                 |                                  |                        |                                 |                             |                              |                             |         |
| ▼ | Base Station: YWG - Winnipeg / James Armstrong Richardson International Airport (-5) |             |              |                       |                  |                                 |                                 |                                  |                        |                                 |                             |                              |                             |         |
| ▼ | Base Station: YXE - Saskatoon John G. Diefenbaker International Airport (-6)         |             |              |                       |                  |                                 |                                 |                                  |                        |                                 |                             |                              |                             |         |
| ▲ | Base Station: YYZ - Toronto - Lester B. Pearson International Airport (-4)           |             |              |                       |                  |                                 |                                 |                                  |                        |                                 |                             |                              |                             |         |
| ↓ | 98765  | 6/3/17      | YYZ, YHZ,... | 3064                  | 36               | 77.0                            | 90.4                            | 77.0                             | 6.9                    | 5.4                             | 82.3                        | 82.3                         | 0.0                         |         |
| ↓ | 23456  | 6/1/17      | YYZ, EWR,... | 5839                  | 64               | 69.7                            | 92.2                            | 69.7                             | 7.7                    | 6.0                             | 74.8                        | 74.8                         | 17.5                        |         |
| ↓ | 34567  | 6/1/17      | YYZ, YOW,... | 3943                  | 47               | 71.7                            | 83.8                            | 71.7                             | 7.5                    | 5.8                             | 77.0                        | 77.0                         | 44.7                        |         |
| ↓ | 45678  | 6/13/17     | YYZ, EWR,... | 3677                  | 28               | 97.3                            | 98.8                            | 97.3                             | 2.1                    | 1.8                             | 84.7                        | 84.7                         | 0.0                         |         |
| ↓ | 56789  | 6/10/17     | YYZ, YOW,... | 5722                  | 59               | 69.5                            | 91.4                            | 69.5                             | 7.7                    | 6.0                             | 74.3                        | 74.3                         | 20.9                        |         |

Summary Events Graph

⊕ Add Duty ⊕ Add Work ⊕ Add Marker ⊕ Add Sleep ⊗ Delete Selected Event

| Schedule ID | Label        | Start (Base)  | End (Base)    | Crewing                             | Start Station   | End Station   | Effectiveness Average (Crewing) | Effectiveness Start (Crewing) | Effectiveness End (Crewing) | Reservoir Minimum (Crewing) | Reservoir Minimum (Critical) | % Below Criterion (Critical) |
|-------------|--------------|---------------|---------------|-------------------------------------|-----------------|---------------|---------------------------------|-------------------------------|-----------------------------|-----------------------------|------------------------------|------------------------------|
| Contains: ▼ | Con... 621 ▼ | Equals: ▼     | Equals: ▼     | <input type="checkbox"/>            | Contains: ▼     | Contains: ▼   | Equals: ▼                       | Equals: ▼                     | Equals: ▼                   | Equals: ▼                   | Equals: ▼                    | Equals: ▼                    |
| 272829      | 621          | 6/23/17 23:44 | 6/24/17 01:08 | <input checked="" type="checkbox"/> | YMX - Mo...     | YYZ - Toro... | 79.7                            | 83.5                          | 76.1                        | 78.0                        | 78.0                         | 18.3                         |
| 98765       | 621          | 6/5/17 17:11  | 6/5/17 18:44  | <input checked="" type="checkbox"/> | YYT - St. Jo... | YQM - Mo...   | 101.5                           | 101.1                         | 101.6                       | 88.6                        | 88.6                         | 0.0                          |
| 98765       | 621          | 6/5/17 19:13  | 6/5/17 20:41  | <input checked="" type="checkbox"/> | YQM - Mo...     | YMX - Mo...   | 99.8                            | 101.2                         | 97.9                        | 86.6                        | 86.6                         | 0.0                          |
| 171819      | 621          | 6/21/17 16:52 | 6/21/17 18:28 | <input checked="" type="checkbox"/> | YYT - St. Jo... | YQM - Mo...   | 93.0                            | 92.1                          | 94.0                        | 84.6                        | 84.6                         | 0.0                          |
| 171819      | 621          | 6/21/17 18:51 | 6/21/17 20:07 | <input checked="" type="checkbox"/> | YQM - Mo...     | YMX - Mo...   | 95.1                            | 94.5                          | 95.5                        | 82.9                        | 82.9                         | 0.0                          |
| 212223      | 621          | 6/22/17 17:04 | 6/22/17 18:27 | <input checked="" type="checkbox"/> | YYT - St. Jo... | YQM - Mo...   | 95.0                            | 94.1                          | 95.7                        | 84.0                        | 84.0                         | 0.0                          |
| 212223      | 621          | 6/22/17 18:54 | 6/22/17 20:17 | <input checked="" type="checkbox"/> | YQM - Mo...     | YMX - Mo...   | 95.9                            | 96.0                          | 95.4                        | 82.1                        | 82.1                         | 0.0                          |
| 212223      | 621          | 6/26/17 23:02 | 6/27/17 00:11 | <input checked="" type="checkbox"/> | YMX - Mo...     | YYZ - Toro... | 87.6                            | 90.6                          | 84.7                        | 84.7                        | 84.7                         | 0.0                          |



# Making the most of Data Tables – Multi-Select

- Multi-select Schedules to view all related Events
  - Ctrl + Click – individual rows
  - Shift + Click – a consecutive series of rows
  - Ctrl + A – all rows

|   |   | Schedule ID | Date (Base) | Base Station  | Route        | Total Duration (Work) | Number of Events | Effectiveness Minimum (Crewing) | Effectiveness Average (Crewing) | Effectiveness Minimum (Critical) | KSS Maximum (Critical) | Samn-Perelli Maximum (Critical) | Reservoir Minimum (Crewing) | Reservoir Minimum (Critical) | % Below Criterion (Crewing) |
|---|---|-------------|-------------|---------------|--------------|-----------------------|------------------|---------------------------------|---------------------------------|----------------------------------|------------------------|---------------------------------|-----------------------------|------------------------------|-----------------------------|
| ↓ | ⚙ | 98765       | 6/3/17      | YYZ - Toro... | YYZ, YHZ,... | 3064                  | 36               | 0.0                             | 0.0                             | 0.0                              | 0.0                    | 0.0                             | 0.0                         | 0.0                          | 0.0                         |
| ↓ | ⚙ | 12345       | 6/1/17      | YYZ - Toro... | YXE, YQR,... | 5664                  | 78               | 0.0                             | 0.0                             | 0.0                              | 0.0                    | 0.0                             | 0.0                         | 0.0                          | 0.0                         |
| ↓ | ⚙ | 23456       | 6/1/17      | YYZ - Toro... | YYZ, EWR,... | 5839                  | 64               | 0.0                             | 0.0                             | 0.0                              | 0.0                    | 0.0                             | 0.0                         | 0.0                          | 0.0                         |
| ↓ | ⚙ | 34567       | 6/1/17      | YYZ - Toro... | YYZ, YOW,... | 3943                  | 47               | 0.0                             | 0.0                             | 0.0                              | 0.0                    | 0.0                             | 0.0                         | 0.0                          | 0.0                         |
| ↓ | ⚙ | 45678       | 6/13/17     | YYZ - Toro... | YYZ, EWR,... | 3677                  | 28               | 0.0                             | 0.0                             | 0.0                              | 0.0                    | 0.0                             | 0.0                         | 0.0                          | 0.0                         |
| ↓ | ⚙ | 56789       | 6/10/17     | YYZ - Toro... | YYZ, YOW,... | 5722                  | 59               | 0.0                             | 0.0                             | 0.0                              | 0.0                    | 0.0                             | 0.0                         | 0.0                          | 0.0                         |
| ↓ | ⚙ | 6789        | 6/1/17      | YYZ - Toro... | YMX, YQM,... | 6531                  | 53               | 0.0                             | 0.0                             | 0.0                              | 0.0                    | 0.0                             | 0.0                         | 0.0                          | 0.0                         |
| ↓ | ⚙ | 78910       | 6/3/17      | YYZ - Toro... | YYZ, YWG,... | 5369                  | 59               | 0.0                             | 0.0                             | 0.0                              | 0.0                    | 0.0                             | 0.0                         | 0.0                          | 0.0                         |
| ↓ | ⚙ | 891011      | 6/1/17      | YYZ - Toro... | YYZ, YOW,... | 7509                  | 64               | 0.0                             | 0.0                             | 0.0                              | 0.0                    | 0.0                             | 0.0                         | 0.0                          | 0.0                         |
| ↓ | ⚙ | 91011       | 6/13/17     | YYZ - Toro... | YYZ, EWR,... | 3677                  | 27               | 0.0                             | 0.0                             | 0.0                              | 0.0                    | 0.0                             | 0.0                         | 0.0                          | 0.0                         |
| ↓ | ⚙ | 101112      | 6/1/17      | YYZ - Toro... | EWR, BDA,... | 6418                  | 65               | 0.0                             | 0.0                             | 0.0                              | 0.0                    | 0.0                             | 0.0                         | 0.0                          | 0.0                         |
| ↓ | ⚙ | 111213      | 6/1/17      | YYZ - Toro... | YYZ, YOW,... | 4807                  | 55               | 0.0                             | 0.0                             | 0.0                              | 0.0                    | 0.0                             | 0.0                         | 0.0                          | 0.0                         |
| ↓ | ⚙ | 121314      | 6/16/17     | YYZ - Toro... | YYZ, YWG,... | 1517                  | 16               | 0.0                             | 0.0                             | 0.0                              | 0.0                    | 0.0                             | 0.0                         | 0.0                          | 0.0                         |



# Making the most of Data Tables – All Events

- Events table will show all Events from the selected Schedules
- Filter, Group and Sort resulting events table
- Add Schedule ID column to events table to help identify related Schedules

|     | Schedule ID | Date (Base) | Base Station  | Route        | Total Duration (Work) |
|-----|-------------|-------------|---------------|--------------|-----------------------|
| ↓ ⚙ | 98765       | 6/3/17      | YYZ - Toro... | YYZ, YHZ,... | 3064                  |
| ↓ ⚙ | 12345       | 6/1/17      | YYZ - Toro... | YXE, YQR,... | 5664                  |
| ↓ ⚙ | 23456       | 6/1/17      | YYZ - Toro... | YYZ, EWR,... | 5839                  |
| ↓ ⚙ | 34567       | 6/1/17      | YYZ - Toro... | YYZ, YOW,... | 3943                  |
| ↓ ⚙ | 45678       | 6/13/17     | YYZ - Toro... | YYZ, EWR,... | 3677                  |

| Summary   Events   Graph                                |                 |               |               |           |
|---|-----------------|---------------|---------------|-----------|
| ⊕ Add Duty ⊕ Add Work ⊕ Add Marker ⊕ Add Sleep ⊗ Delete |                 |               |               |           |
| Schedule ID   | Label           | Start (Base)  | End (Base)    | Duration  |
| Contains: ▼   | Contains: 621 ▼ | Equals: ▼     | Equals: ▼     | Equals: ▼ |
| 98765   | 621             | 6/5/17 17:11  | 6/5/17 18:44  |           |
| 98765   | 621             | 6/5/17 19:13  | 6/5/17 20:41  |           |
| 6789  | 621             | 6/20/17 17:01 | 6/20/17 18:29 |           |
| 6789  | 621             | 6/20/17 19:02 | 6/20/17 20:20 |           |
| 161718  | 621             | 6/14/17 16:57 | 6/14/17 18:35 |           |
| 161718  | 621             | 6/14/17 18:59 | 6/14/17 20:21 |           |
| 171819  | 621             | 6/21/17 16:52 | 6/21/17 18:28 |           |
| 171819  | 621             | 6/21/17 18:51 | 6/21/17 20:07 |           |



# Making the most of Data Tables – New Scenario

- Multi-selected Schedules can also be copied to a new Scenario for further analysis

Group by: Position\* X

| Schedule ID   | Effectiveness Average (Crewing) | Effectiveness Minimum (Critical) | KSS Maximum (Critical) | Samn-Perelli Maximum (Critical) | Reservoir Minimum (Crewing) | Reservoir Minimum (Critical) | % Below Criterion (Crewing) | Wor Max |
|---------------|---------------------------------|----------------------------------|------------------------|---------------------------------|-----------------------------|------------------------------|-----------------------------|---------|
| Position*: CA |                                 |                                  |                        |                                 |                             |                              |                             |         |
| Position*: FO |                                 |                                  |                        |                                 |                             |                              |                             |         |
| Position*: SO |                                 |                                  |                        |                                 |                             |                              |                             |         |
| 131415        | 82.8                            | 64.9                             | 8.0                    | 6.2                             | 69.4                        | 69.4                         | 43.4                        |         |
| 111213        | 84.5                            | 71.7                             | 7.5                    | 5.8                             | 77.0                        | 77.0                         | 42.0                        |         |
| 101112        | 92.4                            | 69.9                             | 7.6                    | 6.0                             | 74.4                        | 74.4                         | 18.8                        |         |
| 891011        | 94.4                            | 70.3                             | 7.6                    | 5.9                             | 78.1                        | 78.1                         | 11.4                        |         |
| 91011         | 98.8                            | 97.3                             | 2.1                    | 1.8                             | 84.7                        | 84.7                         | 0.0                         |         |
| 50642         | 101.8                           | 100.8                            | 1.0                    | 1.0                             | 88.7                        | 88.7                         | 0.0                         |         |

Context menu options: View/Edit, Delete, Save as Scenario

Tips X

Tips - SOs Only X

Scenario

Name: Tips - SOs Only

Description: The system default for the aviation industry

Configuration

Industry: Aviation

Input Load Type: SAFTE-FAST CSV

Input - Load

SAFTE-FAST CSV: D:\bbrown\Desktop\sample.csv

Period Start: 9/ 6/2019

Crewing Codes





# Making the most of Data Tables – Future Dev

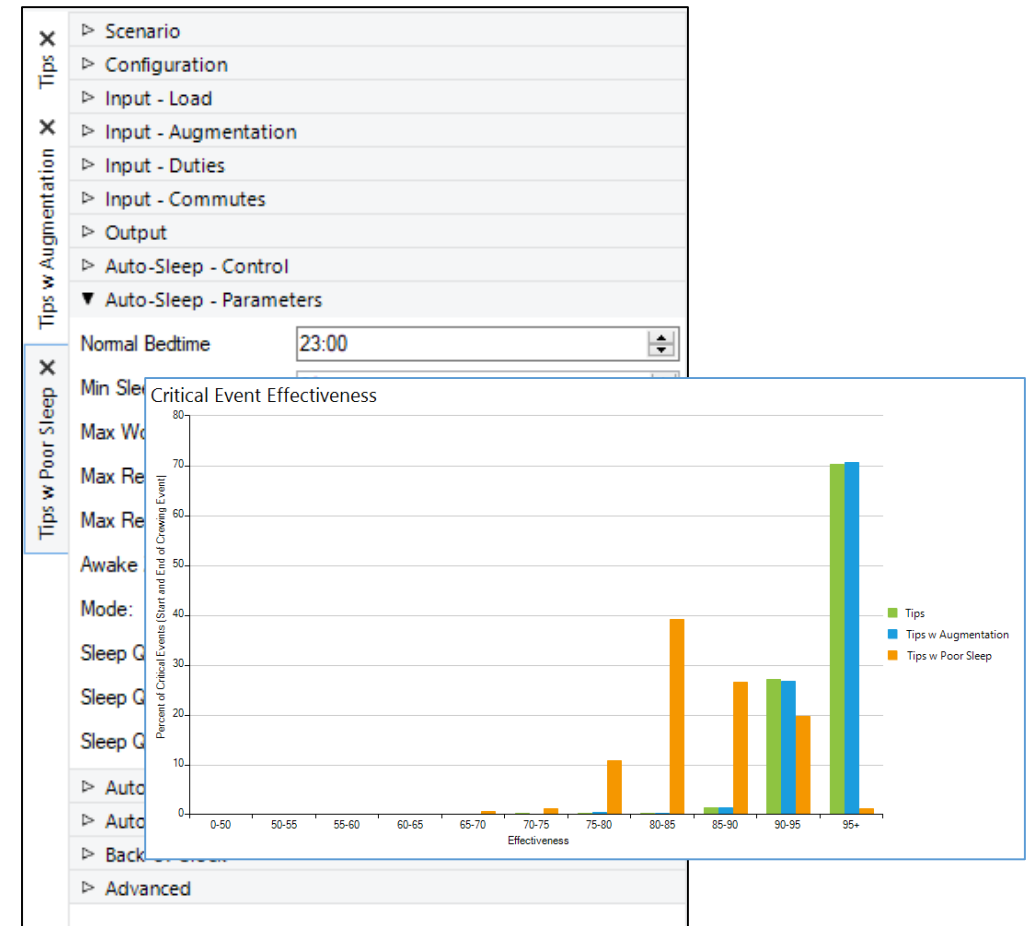
- **SFC Enhancements**

- Additional tools to Select All, Select Group
- Options to launch Schedule Details Editor for Events table
- Export Events table results to CSV
- New reporting tools that exposes “drill-down” data tables
- ???



# Experimenting with Scenarios and Templates

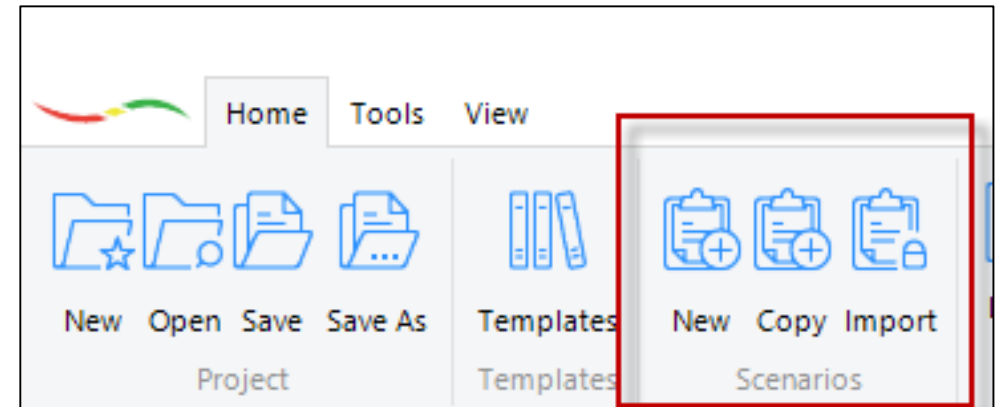
- Scenario is a combination of Parameters and Schedules
- Use Scenarios to compare:
  - The same schedule data with different parameters – How does changing parameter X effect analysis results of a particular set of schedules
  - Different schedule data with the same parameters – How does analysis change from month-to-month schedules





# Experimenting with Scenarios and Templates

- Alternate Scenarios can be added to a Project in number of ways:
  - Add a new Scenario from a Template
  - Copy an existing Scenario from the current Project
  - Importing an existing Scenario from another Project file
  - Create a new Scenario from a Schedule table selection



# Experimenting with Scenarios and Templates

- Example Scenarios
  - Default
  - Default with Aug.
  - Default with Poor Sleep

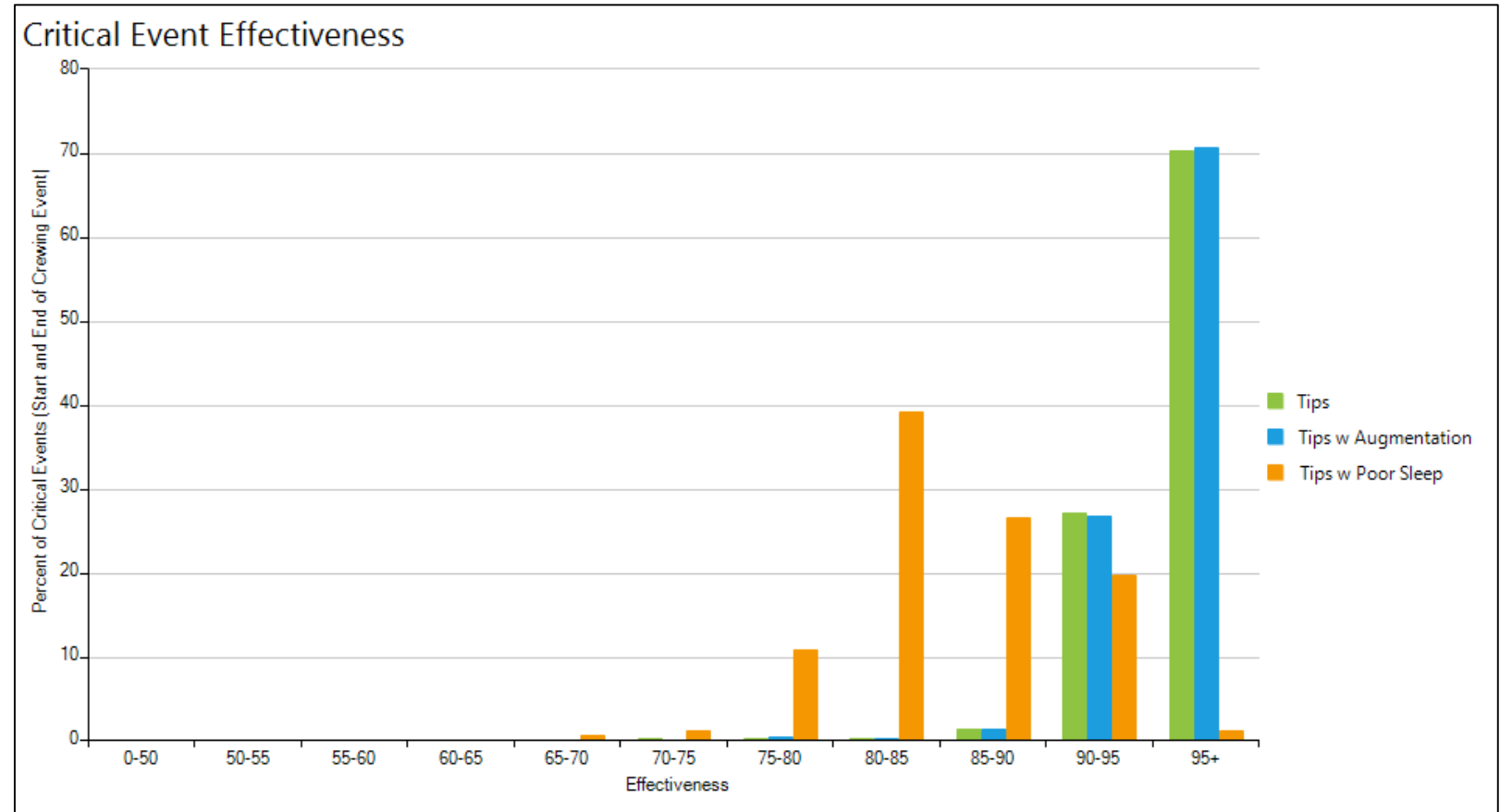
|                       |   |
|-----------------------|---|
| Tips X                | Scenario  |
| Tips X                | Configuration   |
| Tips X                | Input - Load  |
| Tips w Augmentation X | ▼ Input - Augmentation  |
|                       | Enable <input checked="" type="checkbox"/>  |
|                       | Event Rules <input type="text" value="D:300,719;SR:1ID:720,9999;SR:2"/> ...         |
| Tips w Augmentation X | Input - Duties  |
| Tips w Augmentation X | Input - Commutes  |
| Tips w Augmentation X | Output  |
| Tips w Poor Sleep X   | ▼ Auto-Sleep - Control  |
| Tips w Poor Sleep X   | ▼ Auto-Sleep - Parameters   |
| Tips w Poor Sleep X   | ▼ Auto-Sleep - Augmentation   |
|                       | Enable <input checked="" type="checkbox"/>  |
|                       | Sleep Rules <input type="text" value="Rule 1, Duration:C:120, D:3, P:0.75, Q"/> ... |
|                       | Start Exclude <input type="text" value="30"/>                                       |
|                       | End Exclude <input type="text" value="90"/>   |
|                       | Auto-Nap  |
|                       | Back-of-Clock   |
|                       | Advanced  |

|                       |   |
|-----------------------|---|
| Tips X                | Scenario  |
| Tips X                | Configuration   |
| Tips X                | Input - Load  |
| Tips w Augmentation X | ▼ Input - Augmentation  |
| Tips w Augmentation X | Input - Duties  |
| Tips w Augmentation X | Input - Commutes  |
| Tips w Augmentation X | Output  |
| Tips w Augmentation X | ▼ Auto-Sleep - Control  |
| Tips w Augmentation X | ▼ Auto-Sleep - Parameters   |
| Tips w Poor Sleep X   | Normal Bedtime <input type="text" value="23:00"/>                                   |
| Tips w Poor Sleep X   | Min Sleep Duration <input type="text" value="60"/>                                  |
| Tips w Poor Sleep X   | Max Work Day Sleep <input type="text" value="480"/>                                 |
| Tips w Poor Sleep X   | Max Rest Day Sleep <input type="text" value="540"/>                                 |
| Tips w Poor Sleep X   | Max Recovery Nap <input type="text" value="210"/>                                   |
| Tips w Poor Sleep X   | Awake Zone <input type="text" value="13:00"/> to <input type="text" value="20:00"/> |
| Tips w Poor Sleep X   | Mode: <input type="text" value="Modified Local"/>                                   |
| Tips w Poor Sleep X   | Sleep Quality - Home <input type="text" value="Poor"/>                              |
| Tips w Poor Sleep X   | Sleep Quality - Hotel <input type="text" value="Poor"/>                             |
| Tips w Poor Sleep X   | Sleep Quality - Rest <input type="text" value="Poor"/>                              |
| Tips w Poor Sleep X   | Auto-Sleep - Augmentation   |
| Tips w Poor Sleep X   | Auto-Nap  |
| Tips w Poor Sleep X   | Back-of-Clock   |
| Tips w Poor Sleep X   | Advanced  |



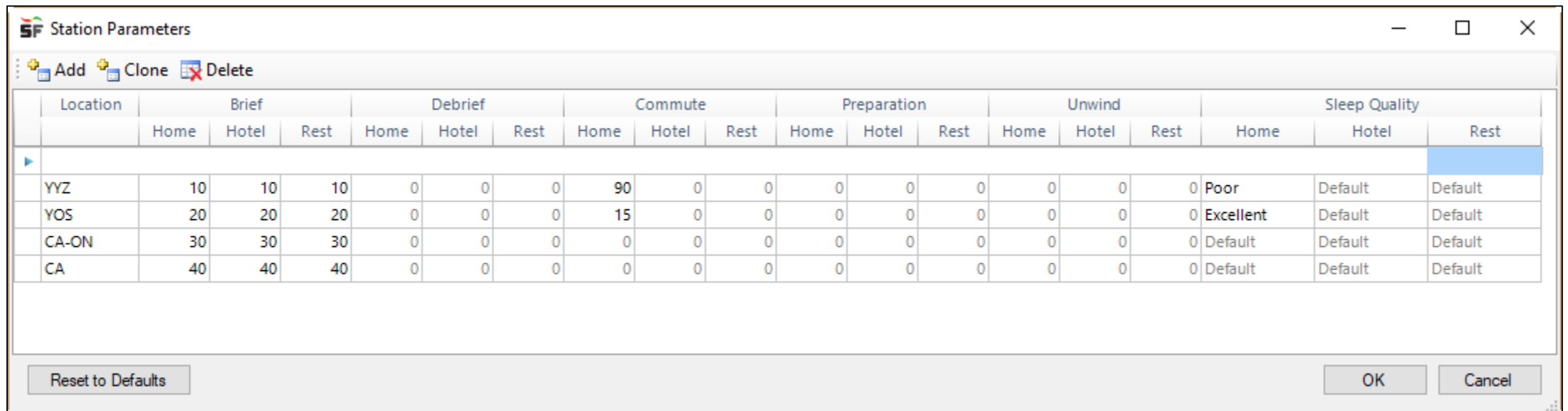
- Example Scenarios
  - Default
  - Default with Aug.
  - Default with Poor Sleep
- Reporting can be used to expose key differences between scenarios and parameter configurations

## Experimenting with Scenarios and Templates



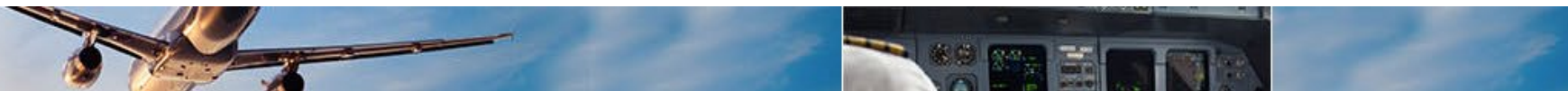
# Station Parameters to override Global Parameters

- Some parameters can be overridden to use location-specific values
  - For each place work/sleep can occur: Home, Hotel, Rest Facility
  - Duty-construction durations: Brief, Debrief, Commute, Prep Unwind
  - Sleep Quality



The screenshot shows a software window titled "Station Parameters" with a toolbar containing "Add", "Clone", and "Delete" buttons. Below the toolbar is a table with columns for Location, Brief, Debrief, Commute, Preparation, Unwind, and Sleep Quality. Each of these categories has sub-columns for Home, Hotel, and Rest. The table contains data for four locations: YYZ, YOS, CA-ON, and CA. A "Reset to Defaults" button is located at the bottom left, and "OK" and "Cancel" buttons are at the bottom right.

| Location | Brief |       |      | Debrief |       |      | Commute |       |      | Preparation |       |      | Unwind |       |      | Sleep Quality |         |         |
|----------|-------|-------|------|---------|-------|------|---------|-------|------|-------------|-------|------|--------|-------|------|---------------|---------|---------|
|          | Home  | Hotel | Rest | Home    | Hotel | Rest | Home    | Hotel | Rest | Home        | Hotel | Rest | Home   | Hotel | Rest | Home          | Hotel   | Rest    |
| YYZ      | 10    | 10    | 10   | 0       | 0     | 0    | 90      | 0     | 0    | 0           | 0     | 0    | 0      | 0     | 0    | Poor          | Default | Default |
| YOS      | 20    | 20    | 20   | 0       | 0     | 0    | 15      | 0     | 0    | 0           | 0     | 0    | 0      | 0     | 0    | Excellent     | Default | Default |
| CA-ON    | 30    | 30    | 30   | 0       | 0     | 0    | 0       | 0     | 0    | 0           | 0     | 0    | 0      | 0     | 0    | Default       | Default | Default |
| CA       | 40    | 40    | 40   | 0       | 0     | 0    | 0       | 0     | 0    | 0           | 0     | 0    | 0      | 0     | 0    | Default       | Default | Default |



- Location matches (in order)
  1. Station Code
  2. Region Code
  3. Country Code
- Codes identified in Stations table

## Station Parameters – Location Matching

The image shows two overlapping software windows from the SAFTEFAST application. The background window is titled "SF Stations" and displays a table of airport information. The foreground window is titled "SF Station Parameters" and displays a table of location matching parameters.

**SF Stations Table:**

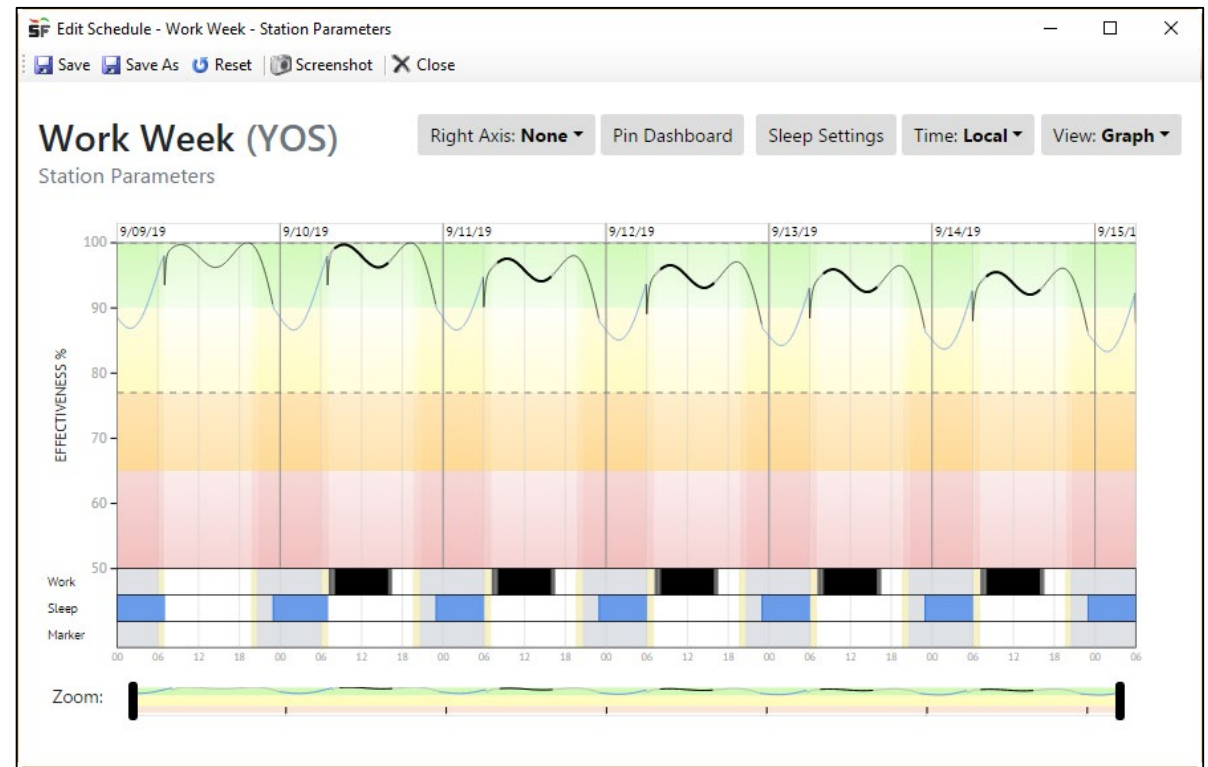
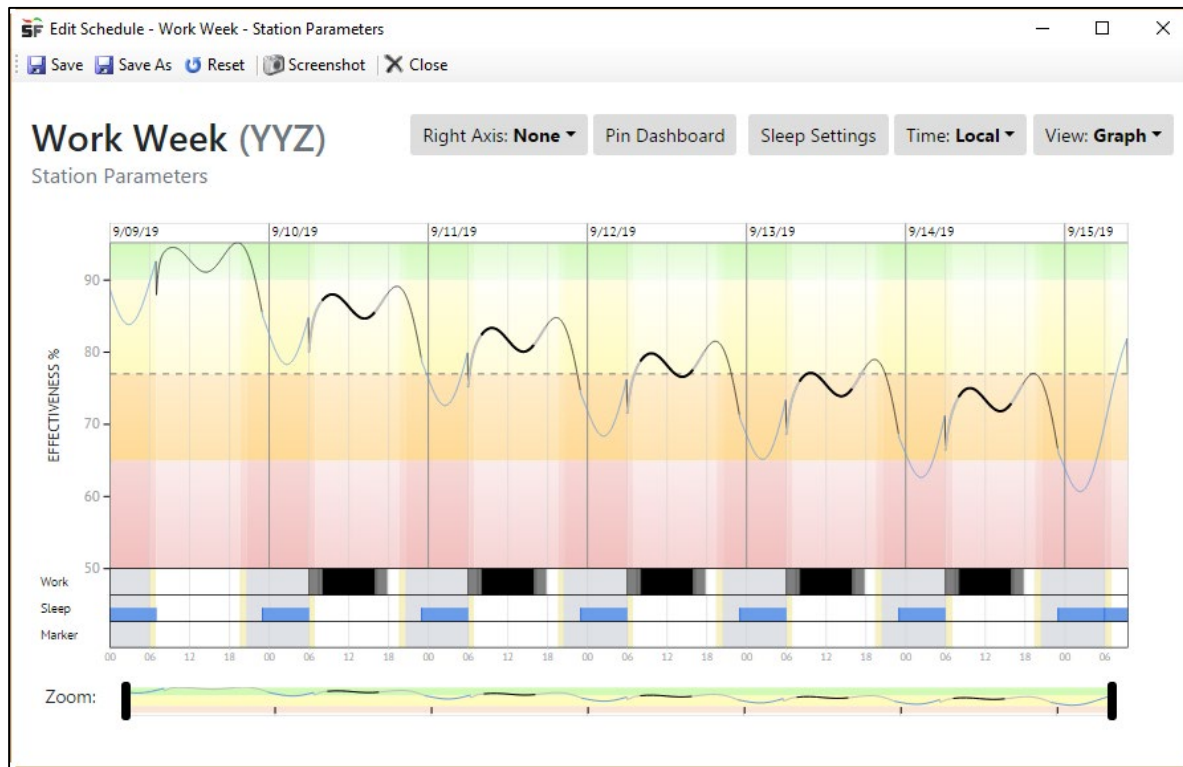
| IATA | ICAO | Aliases | City                 | Region | Country |
|------|------|---------|----------------------|--------|---------|
| YOO  | CYOO |         | Oshawa Airport       | CA-ON  | CA      |
| YOP  | CYOP |         | Rainbow Lake Air...  | CA-AB  | CA      |
| YOS  | CYOS |         | Owen Sound / Bi...   | CA-ON  | CA      |
| YOW  | CYOW |         | Ottawa Macdona...    | CA-ON  | CA      |
| YPA  | CYPA |         | Prince Albert Gla... | CA-SK  | CA      |

**SF Station Parameters Table:**

| Location | Brief |       |      |      | Det |
|----------|-------|-------|------|------|-----|
|          | Home  | Hotel | Rest | Home |     |
| YYZ      | 10    | 10    | 10   | 0    |     |
| YOS      | 20    | 20    | 20   | 0    |     |
| CA-ON    | 30    | 30    | 30   | 0    |     |
| CA       | 40    | 40    | 40   | 0    |     |

# Station Parameters to override Global Parameters

- The exact same schedule data, but in a different station





# Station Parameters – Future Dev

- **SFC Enhancements**

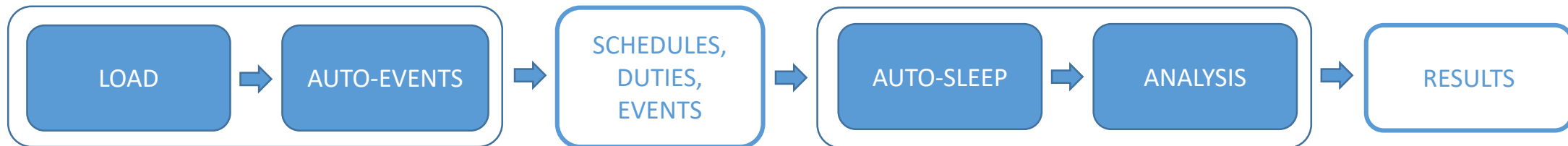
- Matching on more than just Station/Location
  - Dynamic filter build to select any schedule or event property
- Additional parameters to override
- ???



# Data Processing – Stages of Processing

## 4 Stages of SFC Data Processing

































1. Load - Creates Schedules and Events from an external data file
2. Auto-Events - Enhances a schedule's events with additional events
3. Auto-Sleep - Introduces sleep events into a schedule
4. Analysis - Calculates circadian rhythm, sleep reservoir, effectiveness



# Data Processing – Parameter Status

SFC will identify schedules that require data processing after parameters have been modified.

- Load Parameters: File, Codes Include/Ignore, ...
- Auto-Events Parameters: Duty event durations, Augmentation, ...
- Auto-Sleep Parameters: Sleep duration, quality, awake zone, ...
- Analysis Parameters: Phase, rate adjustment, sleep rhythm, ...

|   |   | Schedule ID | Date (Base) | Route    |
|---|---|-------------|-------------|----------|
|  |  | 147488      | 03/02/19    | LIS, GRU |
|  |  | 171694      | 03/02/19    | OPO, EVR |
|  |  | 174870      | 07/02/19    | LIS, JFK |
|  |  | 175851      | 02/02/19    | LIS, FOR |
|  |  | 175869      | 03/02/19    | LIS, MIA |
|  |  | 175877      | 02/02/19    | LIS, GRU |
|  |  | 175919      | 10/02/19    | LIS, MPE |
|  |  | 176396      | 05/02/19    | LIS, MIA |
|  |  | 176404      | 05/02/19    | LIS, GRU |
|  |  | 176412      | 07/02/19    | OPO, EVR |
|  |  | 176420      | 09/02/19    | LIS, GRU |
|  |  | 176438      | 03/02/19    | LIS, GRU |
|  |  | 176446      | 08/02/19    | LIS, CNR |
|  |  | 176453      | 05/02/19    | LIS, FOR |
|  |  | 177089      | 06/02/19    | LIS, GRU |
|  |  | 177246      | 02/02/19    | LIS, LAD |



# Data Processing – Parameter Status

SFC will identify schedules that require data processing after Load or Auto-Events parameters have been modified.



A blue icon will indicate that Load or Auto-Events parameters have changed. Performing a data Load or Refresh Auto-Events will capture the change(s).



A green icon will indicate that the data has been loaded successfully based on Load and Auto-Events parameters at the time.



# Data Processing – Parameter Status

SFC will identify schedules that require data processing after Auto-Sleep or Analysis parameters have been modified.



A blue icon will indicate that an analysis is required after changes to Auto-Events, Auto-Sleep or Analysis parameters. Analyzing the schedule(s) will capture the change(s).

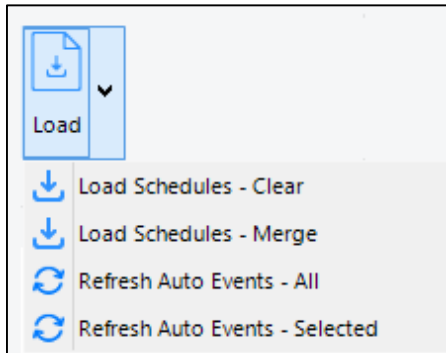
A green icon will indicate that the schedule has been successfully analyzed.

A yellow icon will indicate a warning to the user as a result of performing an analysis. Hovering over the icon will provide the user with further details on the warning.

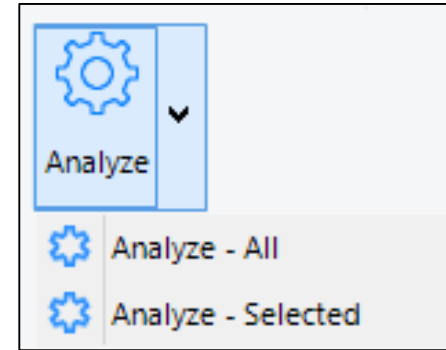
A red icon will indicate an error to the user as a result of performing an analysis. Hovering over the icon will provide the user with further details on the error.



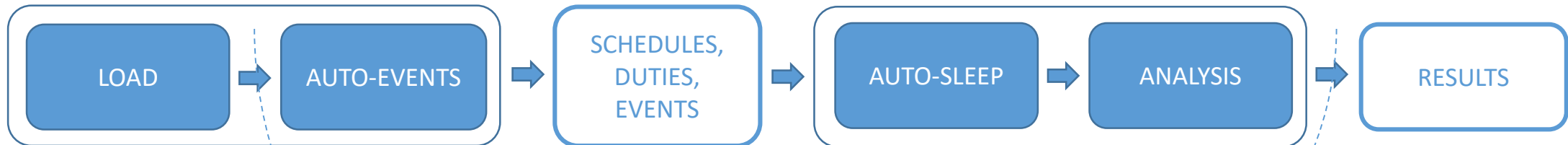
# Data Processing – Stages of Processing



- **Load** – Imports data file AND performs Auto-Events
- **Refresh Auto Events** – Performs Auto-Events on existing schedules



- **Analyze** – Performs Auto-events, Analysis and generates Results on existing schedules



- **Schedule Details Editor** – Performs Auto-events, Analysis and generates Results





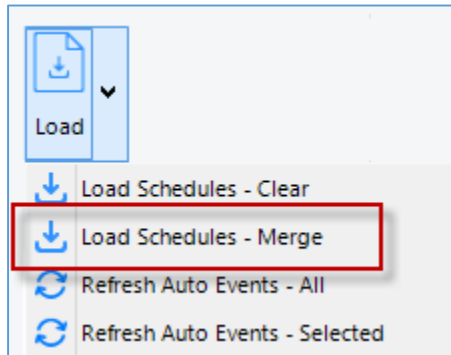
# Data Processing – When it Happens

- **Load**
  - Only when Load button used
- **Auto-Events**
  - After **Load**
  - When Refresh Auto-Events button used
  - Before **Analysis**
- **Auto-Sleep**
  - Before **Analysis**
- **Analysis**
  - When Analyze button is used
  - When Schedule Details Editor is used



# Load Data Merging

- Multiple data files can be loaded into a scenario with the Load Schedules – Merge button



- This tool will combine the datasets of the schedules currently loaded into the scenario, and the schedules contained in the selected data file



# Load Data Merging

- If the incoming data file includes new unique Schedule IDs, they will be added as new schedules in the scenario
- If the incoming data file includes Schedule IDs that already exist in the scenario, the separate lists of Events and Sleep events in the existing schedule will be overridden
- This allows different combinations of
  - Multiple schedule files – Combine Flight and Cabin crew schedules in a scenario
  - Separate events and sleep files – Combine Event and Sleep data in a scenario



# Workload – Location Matching

- Location matches (in order)
  1. Station Code
  2. Region Code
  3. Country Code
- Codes identified in Stations table

SF Stations

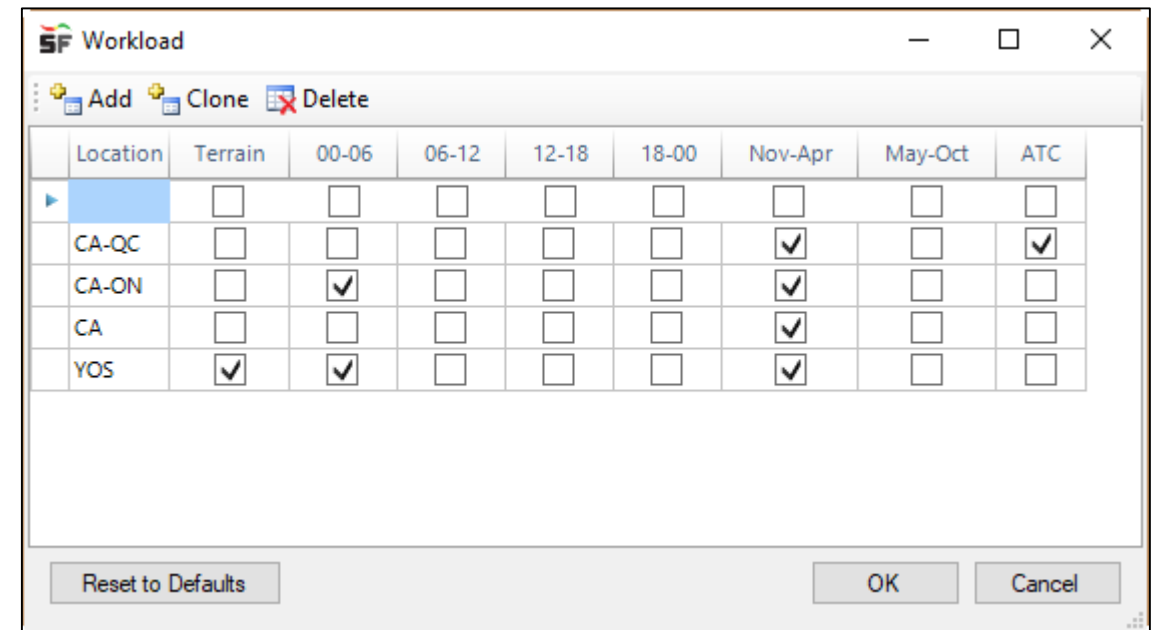
| IATA                 | ICAO | Aliases | City                | Region | Country | Continent | Latitude | Longitude | Offset | Offset DST |
|----------------------|------|---------|---------------------|--------|---------|-----------|----------|-----------|--------|------------|
| Enter text to search |      |         |                     |        |         |           |          |           |        |            |
| YOO                  | CYOO |         | Oshawa Airport      | CA-ON  | CA      | NA        | 43.9228  | -78.895   | -5     | -4         |
| YOP                  | CYOP |         | Rainbow Lake Air... | CA-AB  | CA      | NA        | 58.4914  | -119.408  | -7     | -6         |
| YOS                  | CYOS |         | Owen Sound / Bi...  | CA-ON  | CA      | NA        | 44.5903  | -80.8375  | -5     | -4         |
| YOW                  | CYOW |         | Ottawa Macdo...     |        |         |           |          |           |        |            |
| YPA                  | CYPA |         | Prince Albert C...  |        |         |           |          |           |        |            |

SF Workload

| Location | Terrain                             | 00-06                               | 06-12                    | 12-18                    | 18-00                    | Nov-Apr                             | May-Oct                  | ATC                                 |
|----------|-------------------------------------|-------------------------------------|--------------------------|--------------------------|--------------------------|-------------------------------------|--------------------------|-------------------------------------|
|          | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/>            |
| CA-QC    | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| CA-ON    | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |
| CA       | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |
| YOS      | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |

# Workload - Calculation

- Baseline workload score of 1 applied at first minute and last minute of each Crewing event
- 4 Additional attributes
  - Terrain
  - Time of Day
  - Season
  - ATC (language)
- 0.25 workload score per attribute applied in addition to baseline
- If all 4 attributes enabled and applicable, max score of 2 applied at first minute and last minute of each Crewing event
- Total score accumulates of 72 hours, then decays – Workload score applied more than 72 hours no longer effects current score



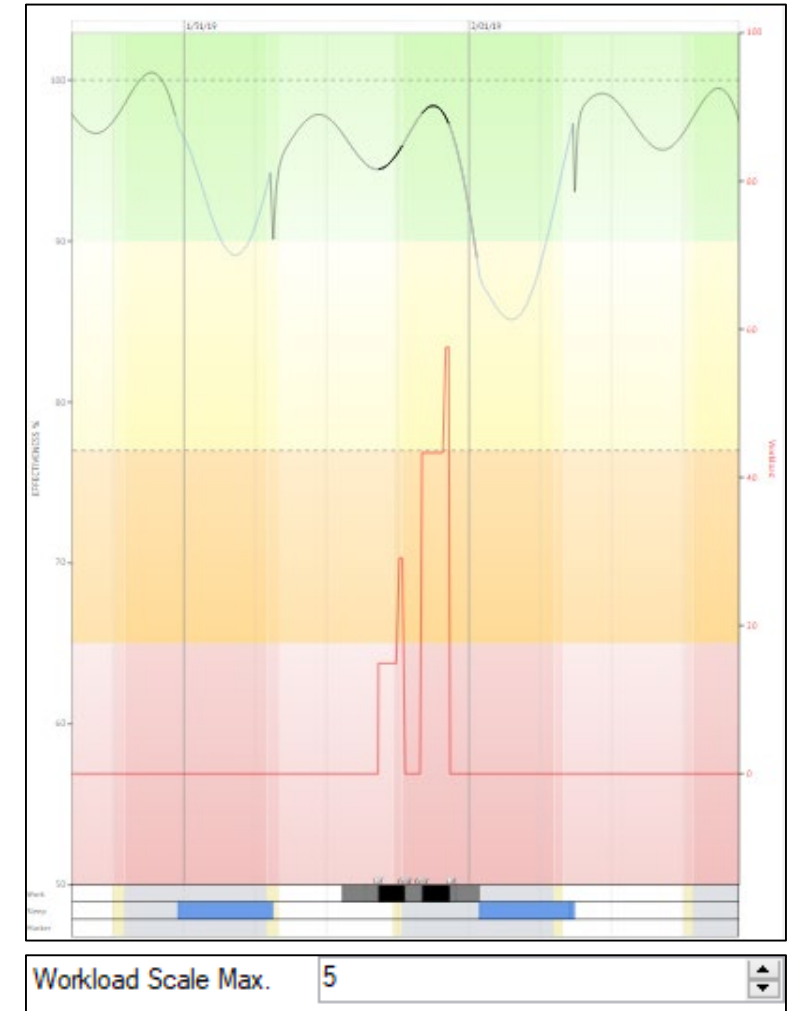
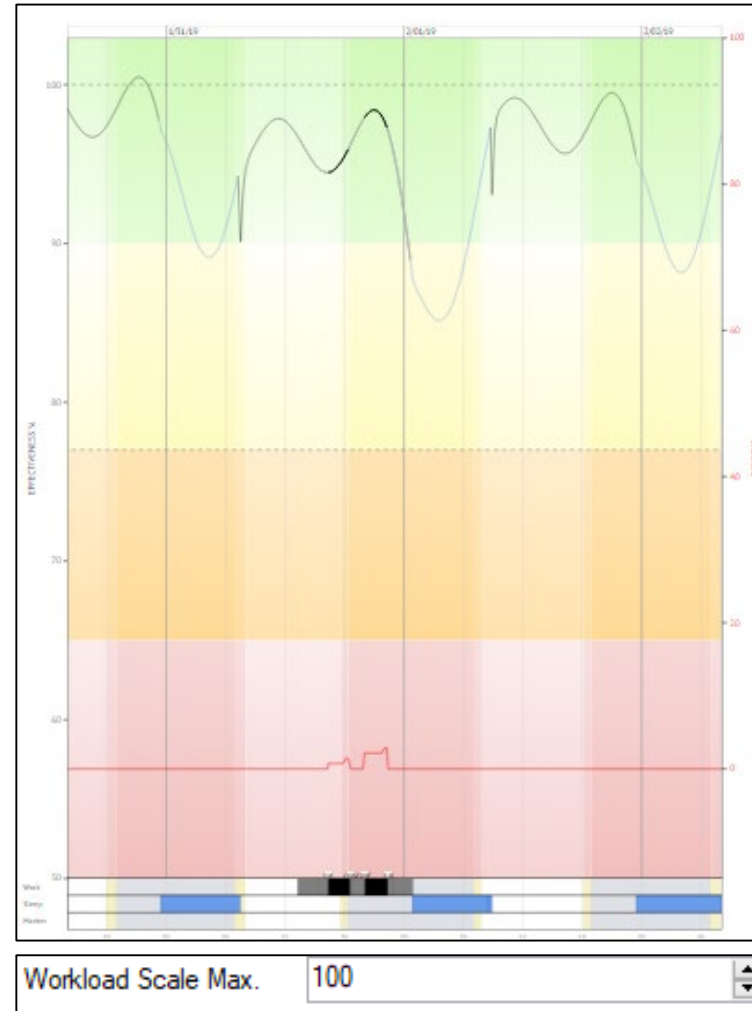
SF Workload

| Location | Terrain                             | 00-06                               | 06-12                    | 12-18                    | 18-00                    | Nov-Apr                             | May-Oct                  | ATC                                 |
|----------|-------------------------------------|-------------------------------------|--------------------------|--------------------------|--------------------------|-------------------------------------|--------------------------|-------------------------------------|
|          | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/>            |
| CA-QC    | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| CA-ON    | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |
| CA       | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |
| YOS      | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |



# Workload – Relative Value

- Maximum workload score is **relative** to crewing event density
- Theoretical maximum workload score
  - A 1 minute crewing event, every 1 minute, for 72 hours
  - All attributes applied
  - **17280**
- Normalization or Re-scaling required
- By default, a practical max score is assumed to be 100
- If in practice your scores are higher or lower than 100, the Workload Scale Max. parameter can be adjusted to fit a percent scale





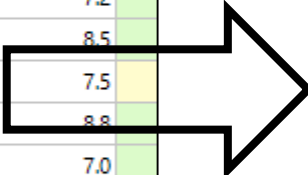
# Workload – Normalization

1. Set Workload Scale Max. parameter to 100 (default value)
2. Perform analysis on typical data set
3. Determine maximum workload score in the scenario
4. Modify Workload Scale Max. parameter to be around 10% higher than the maximum score
5. Perform analysis again
6. Note the increase (or decrease) in relative workload scores, which should now be more evenly distributed on the 100 point scale



# Workload – Normalization

|   |    | Schedule ID | Workload Maximum | Workload Median | Efficiency (C) |
|---|----|-------------|------------------|-----------------|----------------|
| ↓ | ⚙️ | 0350        | 12.8             | 8.0             | Yellow         |
| ↓ | ⚙️ | 2417        | 12.0             | 8.6             | Green          |
| ↓ | ⚙️ | 0239        | 12.0             | 7.9             | Green          |
| ↓ | ⚙️ | 2274        | 11.9             | 7.5             | Yellow         |
| ↓ | ⚙️ | 2436        | 11.7             | 7.2             | Green          |
| ↓ | ⚙️ | 2388        | 11.4             | 8.5             | Green          |
| ↓ | ⚙️ | 0060        | 11.4             | 7.5             | Yellow         |
| ↓ | ⚙️ | 2470        | 11.3             | 8.8             | Green          |
| ↓ | ⚙️ | 2412        | 11.3             | 7.0             | Green          |
| ↓ | ⚙️ | 0432        | 11.0             | 6.7             | Yellow         |
| ↓ | ⚙️ | 0332        | 10.8             | 6.3             | Green          |
| ↓ | ⚙️ | 2180        | 10.8             | 6.3             | Yellow         |
| ↓ | ⚙️ | 0365        | 10.5             | 6.2             | Green          |
| ↓ | ⚙️ | 0384        | 10.5             | 6.1             | Green          |
| ↓ | ⚙️ | 0446        | 10.5             | 6.1             | Green          |
| ↓ | ⚙️ | 2276        | 10.5             | 6.1             | Green          |



Advanced

**Advanced parameters are unlocked.**

Multi-Processor

Stop on Error

Default Sleep Discount

AS1 Look-back Duration

AS1 Look-back Weight

Explicit Sleep Buffer Pre  Post

Buffer Hours Max

Min Sleep Goal Phase

Circ. Delay Rate Adj.

Circ. Advance Rate Adj.

Sleep Rhythm

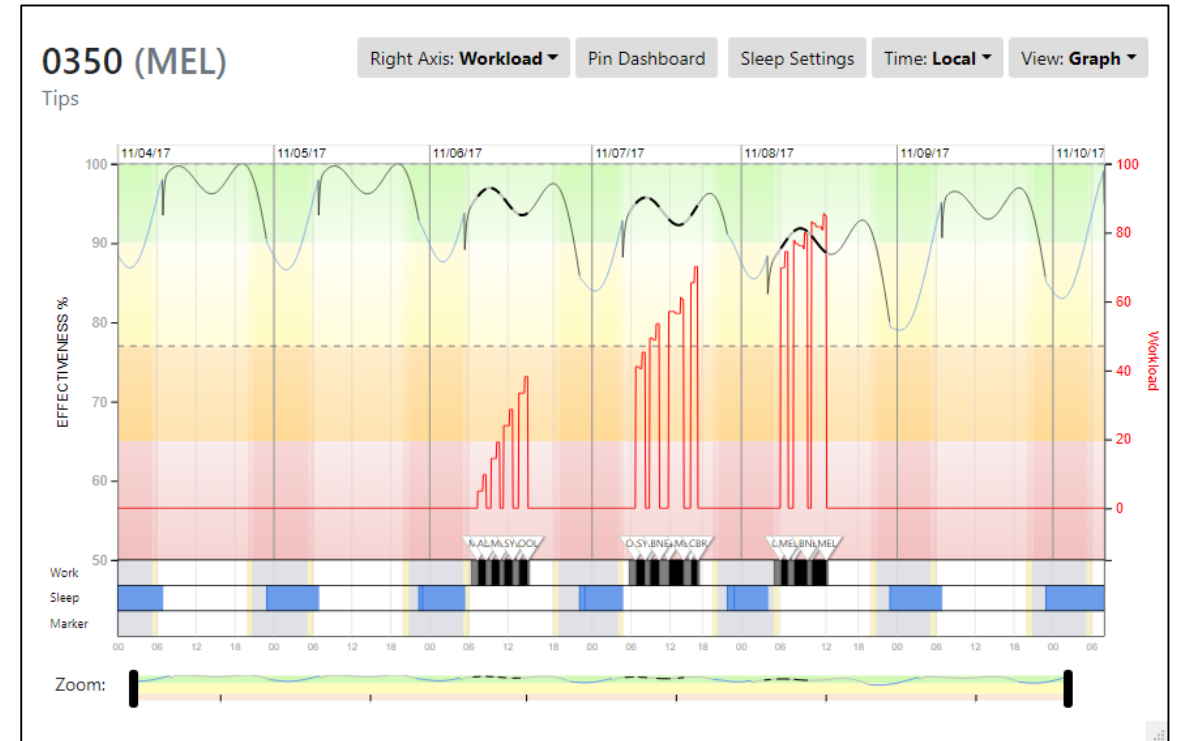
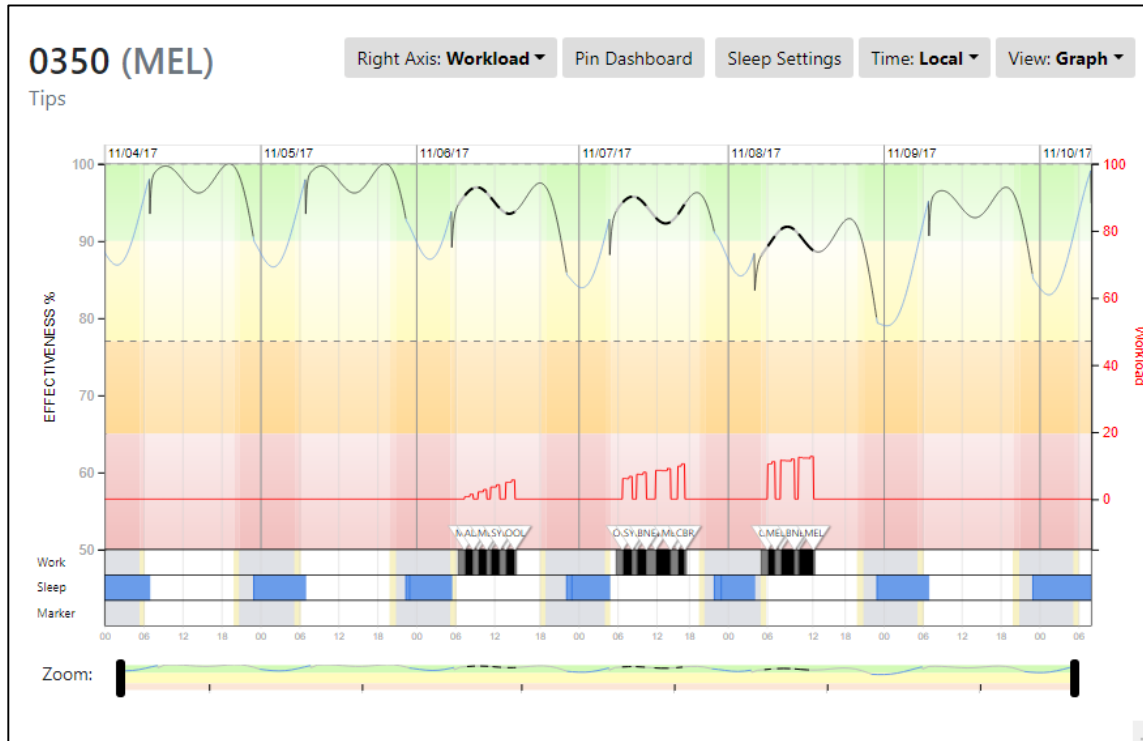
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Workload Scale Max.

|   |    | Schedule ID | Workload Maximum | Workload Median | Efficiency (C) |
|---|----|-------------|------------------|-----------------|----------------|
| ↓ | ⚙️ | 0350        | 85.5             | 53.5            | Yellow         |
| ↓ | ⚙️ | 2417        | 80.2             | 57.1            | Green          |
| ↓ | ⚙️ | 0239        | 80.0             | 52.4            | Green          |
| ↓ | ⚙️ | 2274        | 79.1             | 49.7            | Yellow         |
| ↓ | ⚙️ | 2436        | 78.2             | 47.9            | Green          |
| ↓ | ⚙️ | 2388        | 76.3             | 56.5            | Green          |
| ↓ | ⚙️ | 0060        | 76.1             | 50.0            | Yellow         |
| ↓ | ⚙️ | 2470        | 75.6             | 58.6            | Green          |
| ↓ | ⚙️ | 2412        | 75.5             | 46.7            | Green          |
| ↓ | ⚙️ | 0432        | 73.3             | 44.7            | Yellow         |
| ↓ | ⚙️ | 0332        | 71.9             | 41.7            | Green          |
| ↓ | ⚙️ | 2180        | 71.9             | 41.7            | Yellow         |
| ↓ | ⚙️ | 0365        | 70.1             | 41.1            | Green          |
| ↓ | ⚙️ | 0384        | 70.1             | 40.5            | Green          |
| ↓ | ⚙️ | 0446        | 70.1             | 40.5            | Green          |
| ↓ | ⚙️ | 2276        | 70.1             | 40.5            | Green          |



# Workload – Normalization

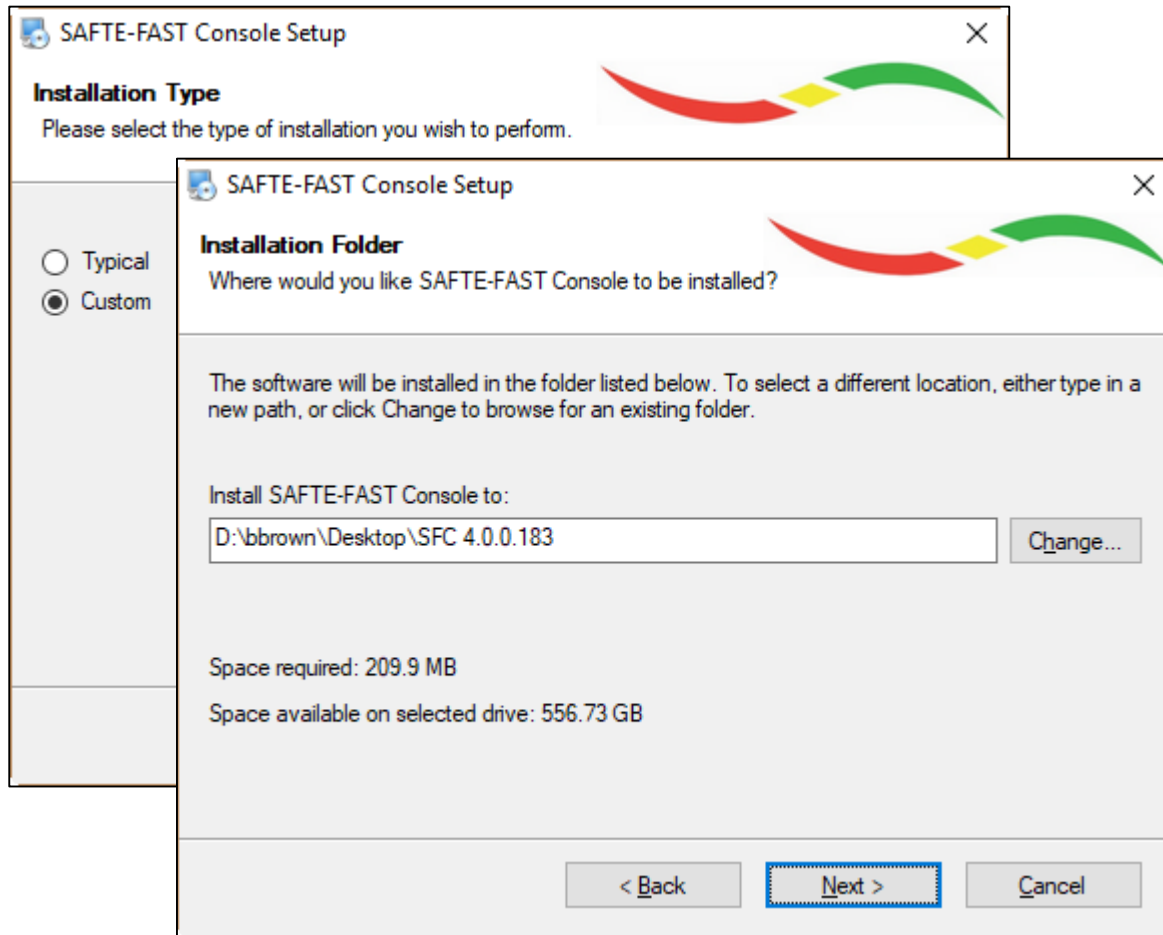


# Workload – Normalization

- Perform normalization on each type of data set
  - Short vs. Long haul
  - Flight vs. Cabin
- Once each template/scenario is using a normalized workload scale, more relevant comparisons can be made across disparate data sets
- Month-to-month comparisons should show more significant differences
  - Greater than 100 implies higher-than-expected workload



# Multiple Version Installations



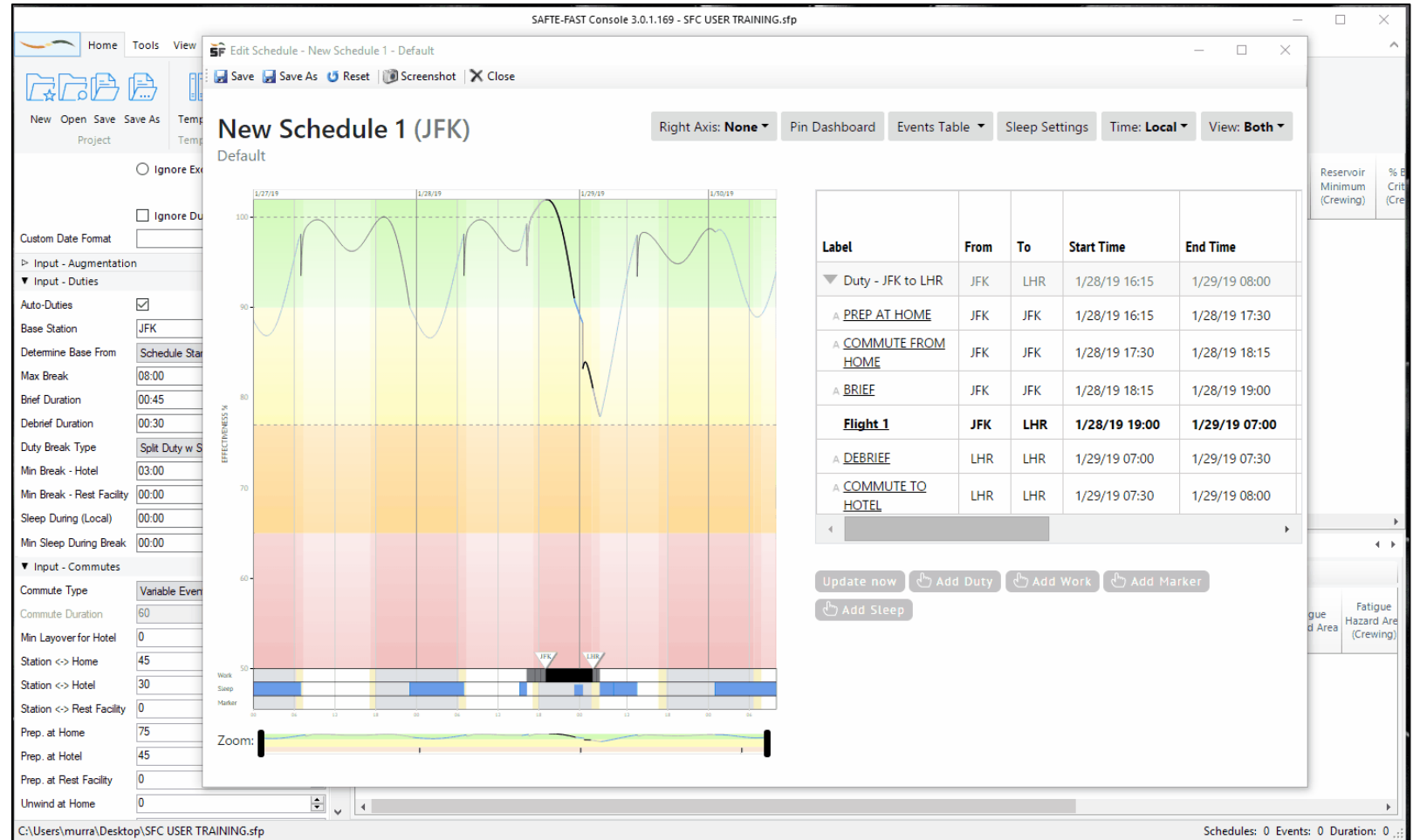
- Desktop shortcut will be created with each installation
- Rename the shortcut to be version specific
- Keep shortcuts organized to easily launch any version
- Only the most recently installed version will appear in Windows Apps & Features list
- Other versions can be removed by deleting the installation folder



# Augmentation Refresher

Multiple sleep periods can be defined and used to model:

- Rest by order
  - 1st rest, 2nd rest, 3rd rest
  - Can be used with Crew Position
- Multiple Rests
  - 2 pilots rest during 1<sup>st</sup> and 3<sup>rd</sup> period
  - 2 pilots rest during 2<sup>nd</sup> and 4<sup>th</sup> period
  - 70% of total rest occurs in 1<sup>st</sup> period and 30% in 2<sup>nd</sup> period for both groups





A large commercial airplane is shown from a low-angle perspective, flying towards the viewer against a dramatic sky with a sunset or sunrise. The sky transitions from a deep orange near the horizon to a clear blue at the top. The airplane's wings, tail, and engines are clearly visible.

The Worldwide Leader in Aviation for  
Fatigue Management Solutions



# Questions?

## Conclusion of Presentation