



**U.S. ARMY REDSTONE TEST CENTER**

# **JAMI and TENA – A Fusion of GPS and IP**

**ITEA Test Instrumentation Workshop May 14-16, 2019**

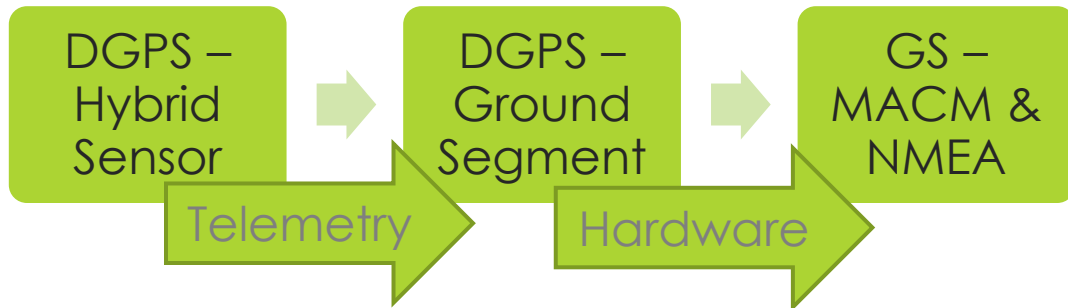
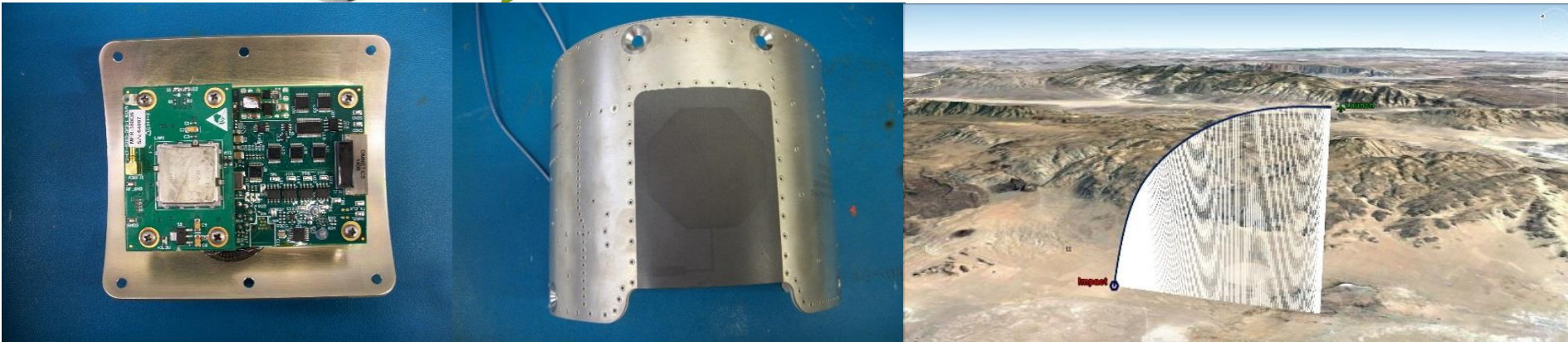
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# JAMI - Joint Advanced Missile Instrumentation

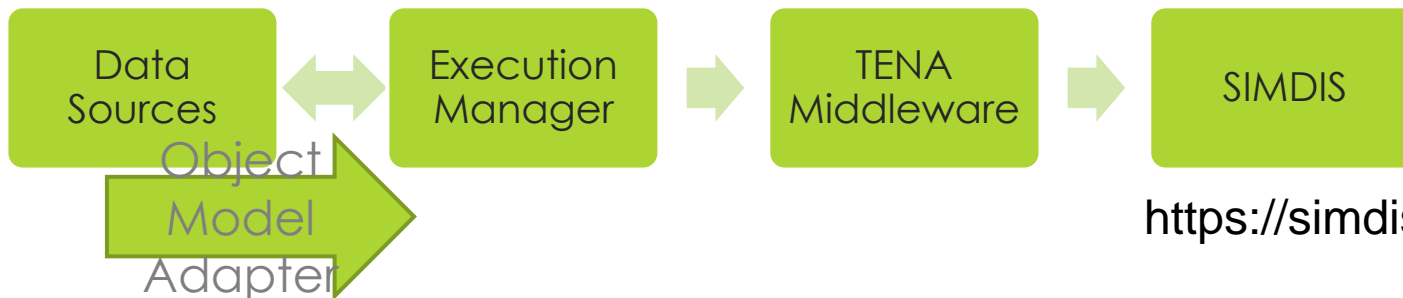
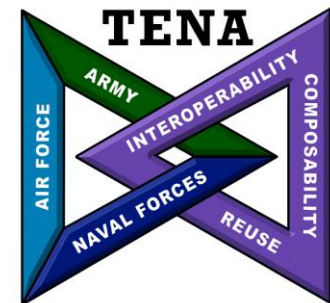
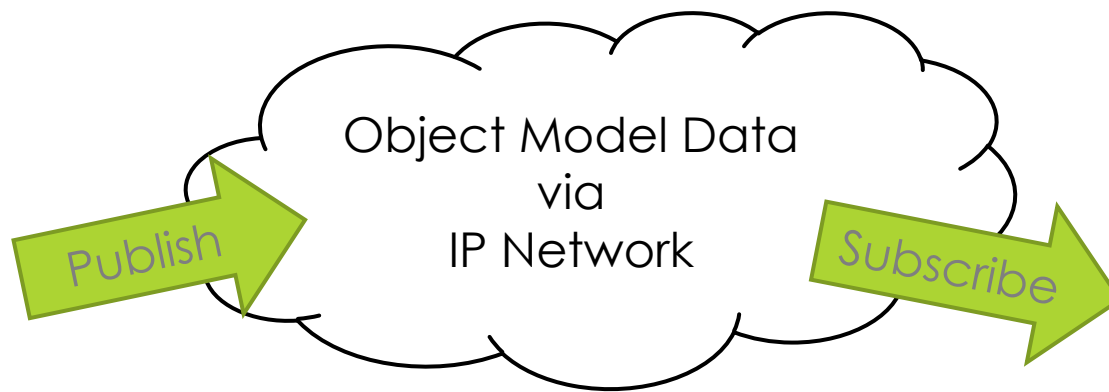
High Dynamic GPS receiver hardware using Differential GPS (DGPS)

Ground Segment adds correction data and creates MACM & NMEA messages



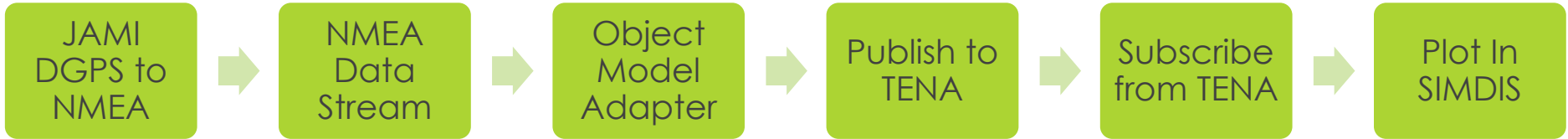
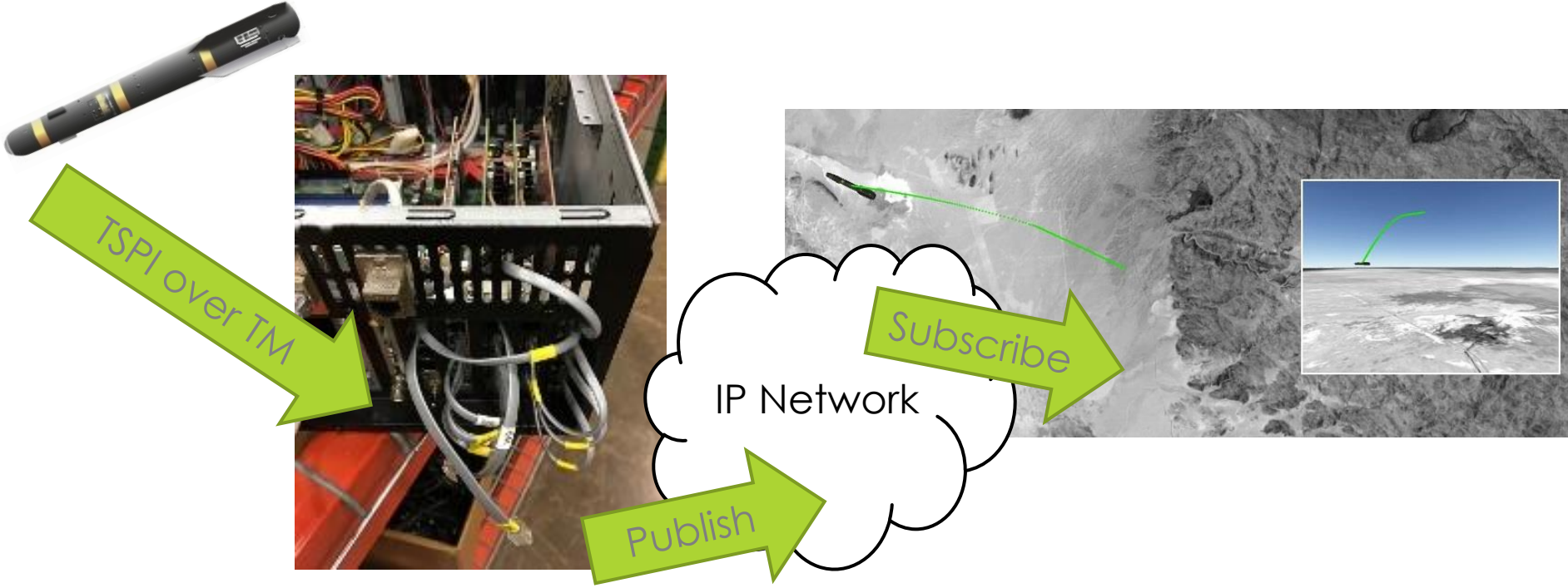
# TENA - Test and Training Enabling Architecture

<https://www.tena-sda.org/>



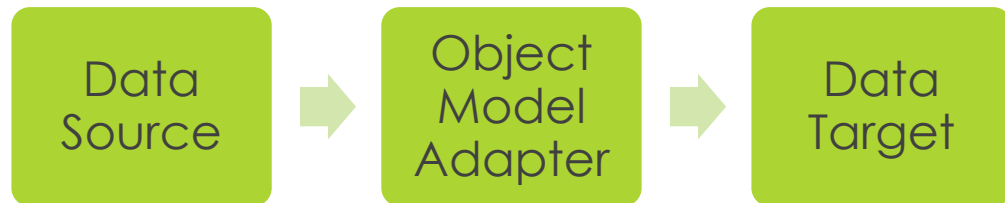
<https://simdis.nrl.navy.mil/>

# The Fusion – JAMI to TENA to SIMDIS

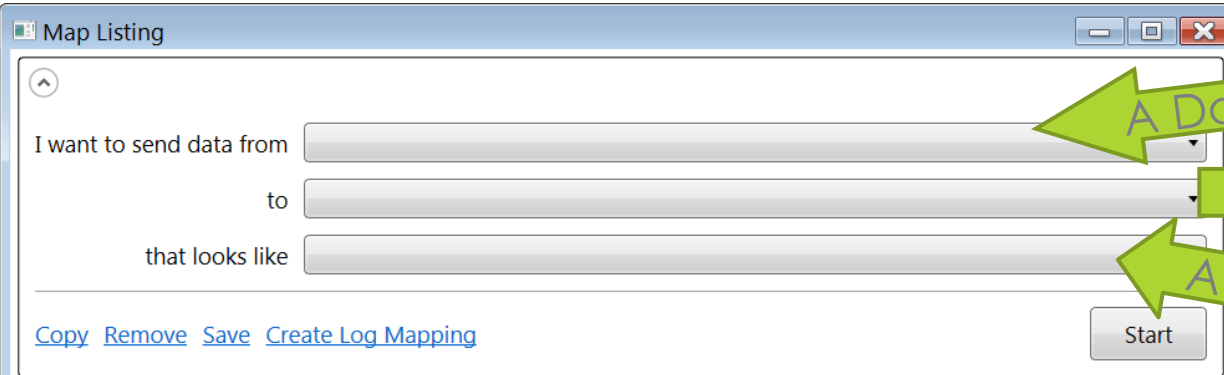


# Description - Object Model Adapter

- ▶ Adapts data from a field from a “data source” to a property of a “data target”
- ▶ A data source could be something like a static file, another application sending messages, or a connected device sending data on a port
- ▶ A “data target” could be something like a log file or another application listening for data



# Usage - Object Model Adapter



I want to send data from

to

that looks like

[Copy](#) [Remove](#) [Save](#) [Create Log Mapping](#)

[Add another mapping](#)  
[Modify plugins](#)

- ▶ The data source is an NMEA data stream over a serial COM port
- ▶ The data target is the TENA network and all the applications listening for TENA messages
- ▶ The Object Model Adapter maps a field from the NMEA data stream to a property of a TENA message

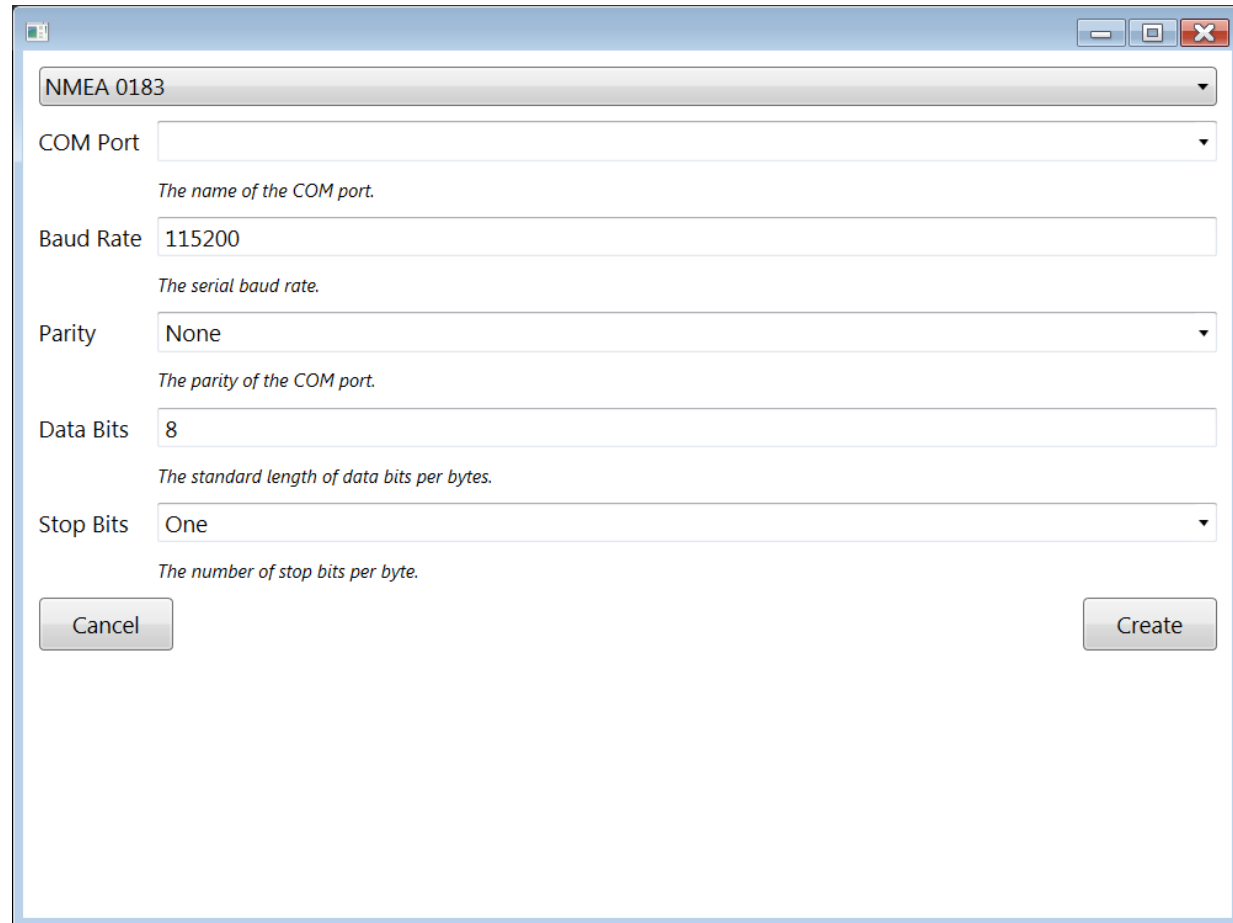
A Data Source

A Data Target

A TENA Object Model

# Usage – Data Source

- ▶ Different data sources have different configuration needs
- ▶ The different available data sources can be selected via the drop down
- ▶ A short description of the configuration property can help assist you when determining how to configure a data source



The image shows a configuration dialog box for a data source. At the top, there is a dropdown menu with "NMEA 0183" selected. Below this are several fields with labels and descriptions:

- COM Port:** A dropdown menu. Description: *The name of the COM port.*
- Baud Rate:** A text input field containing "115200". Description: *The serial baud rate.*
- Parity:** A dropdown menu with "None" selected. Description: *The parity of the COM port.*
- Data Bits:** A text input field containing "8". Description: *The standard length of data bits per bytes.*
- Stop Bits:** A dropdown menu with "One" selected. Description: *The number of stop bits per byte.*

At the bottom of the dialog, there are two buttons: "Cancel" on the left and "Create" on the right.

# Usage – Data Target

- ▶ Configuring a data target is just like configuring a data source
- ▶ Be sure to pay attention to the property descriptors, they can help instruct you on what each property is expecting

Object Model Adapter: Configure Data Target

TENA

Execution Manager Address: localhost  
*The machine name or IP Address of the machine currently running the TENA Execution Manager.*

Execution Manager Port: 55100  
*The port that the TENA Execution Manager is listening to for client connections.*

Listening Address: localhost  
*The machine name or IP Address of this machine. Used to tell other TENA clients how to talk to us. Most of the time, you should never have to change this value.*

Listening Port: 55400  
*The port on this machine to use for incoming TENA subscriptions. Make sure it does not conflict with other programs.*

Self-Host:   
*If selected, the TENA Execution Manager will be started along-side this program.*

Cancel Create



# Usage – TENA Platform Object Model

- ▶ The available object models differ depending on what data target is selected and configured
- ▶ Each object model has a different set of data properties
  - ▶ From TENA, you likely will care most about the TENA Platform object model

The screenshot shows a 'Map Listing' configuration window. At the top, it says 'I want to send data from' followed by a dropdown menu containing 'Counting (00:00:01)'. Below this is 'to' followed by a dropdown menu containing 'TENA (localhost:55100)'. Underneath is 'that looks like' followed by a dropdown menu containing 'TENA Platform', which is highlighted with a green arrow. Below these are several sections, each with a label on the left and a dropdown menu on the right. The sections are: 'Designation' (empty dropdown), 'Transform' (dropdown with 'Identity' selected), and a note: 'The name of the platform. This value is taken as-is as opposed to pulling from the source.'; 'Domain' (empty dropdown), 'Transform' (dropdown with 'Identity' selected), and 'Tags: Required'; 'Affiliation' (empty dropdown), 'Transform' (dropdown with 'Identity' selected), and 'Tags: Required'; 'Damage State' (empty dropdown), 'Transform' (dropdown with 'Identity' selected), and 'Tags: Required'; and 'Position (Latitude)' (empty dropdown), 'Transform' (dropdown with 'Identity' selected), and 'Tags: Required'.

# Usage – Object Model Properties

- ▶ Each property has an input as well as a couple other options associated with it
- ▶ In general, a property has one of two flavors
  - ▶ Some properties are set by just providing a value for them
  - ▶ Other properties are expected to be mapped from the selected data source

The screenshot shows a window titled "Map Listing" with a scrollable content area. At the top, there are three dropdown menus: "I want to send data from" (set to "Counting (00:00:01)"), "to" (set to "TENA (localhost:55100)"), and "that looks like" (set to "TENA Platform"). Below these are five property configuration sections, each with a text input field, a "Transform" dropdown menu (all set to "Identity"), and a "Tags: Required" label. The properties are: "Designation" (with a note: "The name of the platform. This value is taken as-is as opposed to pulling from the source."), "Domain", "Affiliation", "Damage State", and "Position (Latitude)".

# Usage – Object Model Properties

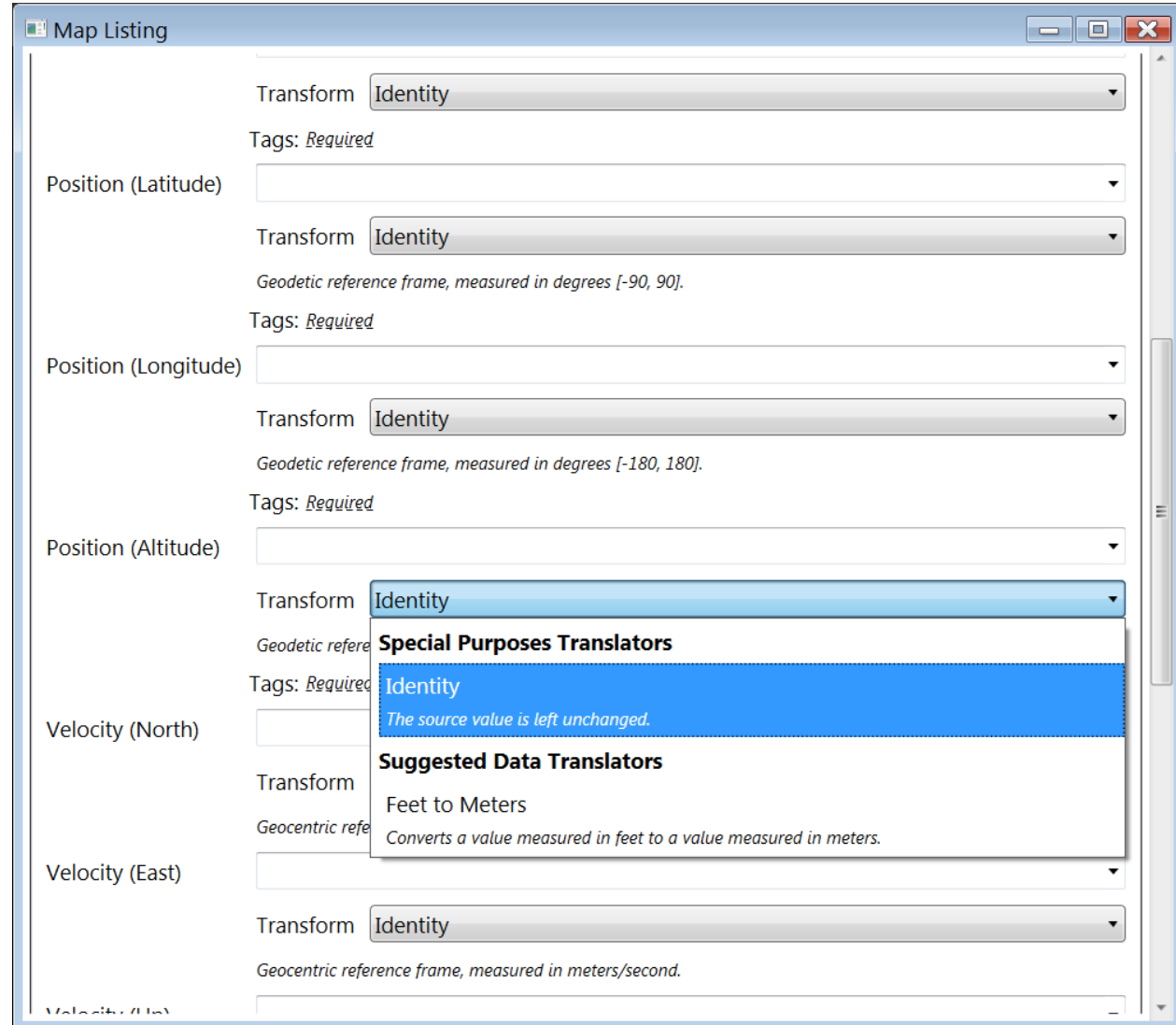
- ▶ Some properties are expected to have one of a fixed set of values
  - ▶ The expected values can be found in the provided drop down
- ▶ The properties which support pulling from the data source will have the data source provided properties in their drop down
  - ▶ This allows you to indicate, for example, mapping latitude from an NMEA source to the latitude property in the TENA platform

The screenshot shows the 'Map Listing' application window with the following configuration options:

- I want to send data from:** Counting (00:00:01)
- to:** TENA (localhost:55100)
- that looks like:** TENA Platform
- Designation:** [Empty text field]
- Transform:** Identity
- The name of the platform. This value is taken as-is as opposed to pulling from the source.*
- Tags:** Required
- Domain:** [Empty dropdown menu]
- Affiliation:** [Open dropdown menu showing options: Unknown, Ground, Air, Surface, Subsurface, Space]
- Damage State:** [Empty dropdown menu]
- Transform:** Identity
- Tags:** Required
- Position (Latitude):** [Empty dropdown menu]
- Transform:** Identity

# Usage – Property Transforms

- ▶ All properties support Transforms
- ▶ Transforms allow you to perform things such as unit conversions when your mapped data source field doesn't match the same unit as the data target
  - ▶ The application does not do unit analysis for you, but it will suggest likely transforms that may be needed
  - ▶ The identity transform doesn't perform any conversion on the source value



# Usage – Active Mapping

- ▶ Clicking the Start button will start the mapping process
- ▶ Each mapped parameter will display status and statistics
- ▶ Transformed values will show the pre-transform and post-transform value

The screenshot shows the 'Map Listing' application window. At the top, there are three dropdown menus: 'I want to send data from' (Counting (00:00:01)), 'to' (TENA (localhost:55100)), and 'that looks like' (TENA Platform). Below these, there are two status indicators: 'Counting (00:00:01) Good Everything seems okay.' and 'TENA EM (localhost:55100) Good'. The main part of the window is a table with columns for Designation, Test, Update Count, Updates/Sec, and Calculating... The table lists various parameters such as Position (Latitude), Position (Longitude), Position (Altitude), Velocity (North), Velocity (East), Velocity (Up), Orientation (Yaw), Orientation (Pitch), and Orientation (Roll). Each parameter has a corresponding 'Update Count' and 'Updates/Sec' value, and a 'Calculating...' status. Below the table, there is a 'Source Parameter Watchlist' section with a text input field and an 'Add' button. At the bottom, there are links for 'Copy', 'Remove', 'Save', and 'Create Log Mapping', along with a 'Processing...' indicator and a 'Stop' button. At the very bottom right, there are links for 'Add another mapping' and 'Modify plugins'.

Designation	Test	Update Count	Updates/Sec	Calculating...
Position (Latitude)	8.000000	1	1 Changes/Sec	Calculating...
Position (Longitude)	8.000000	8	8 Changes/Sec	Calculating...
Position (Altitude)	8.000000	8	8 Changes/Sec	Calculating...
Velocity (North)	8.000000	8	8 Updates/Sec	Calculating...
Velocity (East)	8.000000	8	8 Updates/Sec	Calculating...
Velocity (Up)	8.000000	8	8 Updates/Sec	Calculating...
Orientation (Yaw)	8.000000	8	8 Updates/Sec	Calculating...
Orientation (Pitch)	8.000000	8	8 Updates/Sec	Calculating...
Orientation (Roll)	8.000000	8	8 Updates/Sec	Calculating...

# Questions?