M&S Standards for FMN Workshop Hands-on Exercise

October 2023

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Workshop Agenda
subject to revision

1. Welcome and setup (.5 hour)

2. Refresher summary of MSG-211 RTC (1 hour)

3. C2SIM & NETN HLA standard hands-on internal details (1.5 hour)

   Ontologies, Messages, and information flow

4. Assembling C2SIM Initialization, Orders and Reports (.5 hour)

5. Individuals create tasking orders and run independently (.5 hour)

6. Group runs a collective exercise and group discussion (1 hour)

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Outline

- Assembling a C2SIM Order using Sandbox editor
- Reading a C2SIM Report using Sandbox editor
- Organization of experiments by UserID
- Review and edit of Initialization as a group
- Submitting an existing Order as individuals
- Observing Reports on VRForces and editor
- Presentation on SWORD operation by MASA
- Submitting Order to SWORD and observing results
- Group exercise combining VRForces and SWORD
- Discussion

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Approach

- Verify software on your workstation works

- Verify server works

- View initialization

- Create an order

- Run your order in VRForces

  - Individually and all together

- Run your order in SWORD

  - Also individually and all together

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C2SIM Repository Reminder

- The open source software we will be running is available at

  https://openc2sim.github.io

  - C2SIMGUI

  - c2simVRF interface

  - C2SIM Reference Implementation Server

- SWORD, VRForces and pRTI are commercial products not open source

- The configuration we will use was last used in MSG-201 CWIX 2023

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Ground Truth vs Perceived Truth

- Ground Truth

  - What really happens

  - In real life or in simulation

- Perceived Truth

  - How it is presented to the participant

  - Usually via a C2 System

  - Filtered by physical & electronic communication

  - We don't always get this right when simulating

  - SWORD has it available –will see it in demo

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Your ID Number

- Each workstation in the workshop has been assigned a 2-digit number, 01 to 12 (## below)
- You can find the number at your workstation on a sticky label
- You will be running VRForces##
- With entity (unit) Workshop-V## and Workshop-S##
  - V for VRForces; S for SWORD
- And opposing force entity (cell) OPFOR-V## and OPFOR-S##
- And submitting TestOrder## (which you will edit)
- We expect to see all of these in ground truth via HLA
  - We will be viewing ground truth to see everything that happens
  - For a real exercise perceived truth is appropriate (training audience would not know where the OPFOR is until BLUE units detect them)

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Icons on Desktop

- Red ball with hand: VR Forces 5.0.1a

- Orange square lozenge: Pitch RTI

- Folder: C2SIMGUIv2.13.8

- Folder: Course Slides

- Shortcut: runC2SIMGUI

- Shortcut: runc2simVRF

- In TaskBar: NotePad (to edit text)

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Verify software on your workstation works

- Open C2SIMGUI

- We will be working with C2SIM Orders

  - Click start shortcut icon on desktop

  - Use File menu to load Order

    CWIX-2022 PHASE 3 OPORD Task MOVE-BdeQRF-1.xml

  - Review order text in the left panel vs map

    - Easier if you maximize the GUI (icon in upper left of box)

  - Then load and review Report

    C2simv1.0.1-PositionReport.xml

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HLA with C2SIM

- This Workshop is using software assembled for MSG-201 CWIX 2023

- As part of MSG-201 work for M&S in Federated Mission Networking, we tested C2SIM running with HLA, NETN-FOM and MSaaS

- The VRForces simulators in the Workshop are HLA-linked using the Pitch RTI

- So you should see objects from other simulations on the VRForces screen

- To run with HLA, select the "HLA1516 Evolved" line at top left of VRForces launcher (see next slide) – if VRForces GUI is running, this was already done

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Verify server works

- Change the Server address in the C2SIMGUI Config to 192.168.0.122

  - Restart GUI – you should see the entire OOB on GUI (lower RH screen corner)

- Run c2simVRF interface

  - Click start shortcut icon on desktop (lower RH screen corrner)

  - You should get some unit icons on VRForces GUI

- Send VRForces an Order using the C2SIMGUI

  - Push the TestOrderV##.xml in Orders

    - Each workstation has a unique order

    - They go to the C2SIM server

  - You should see a unit on C2SIMGUI start moving

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VRForces GUI with Unit Icons
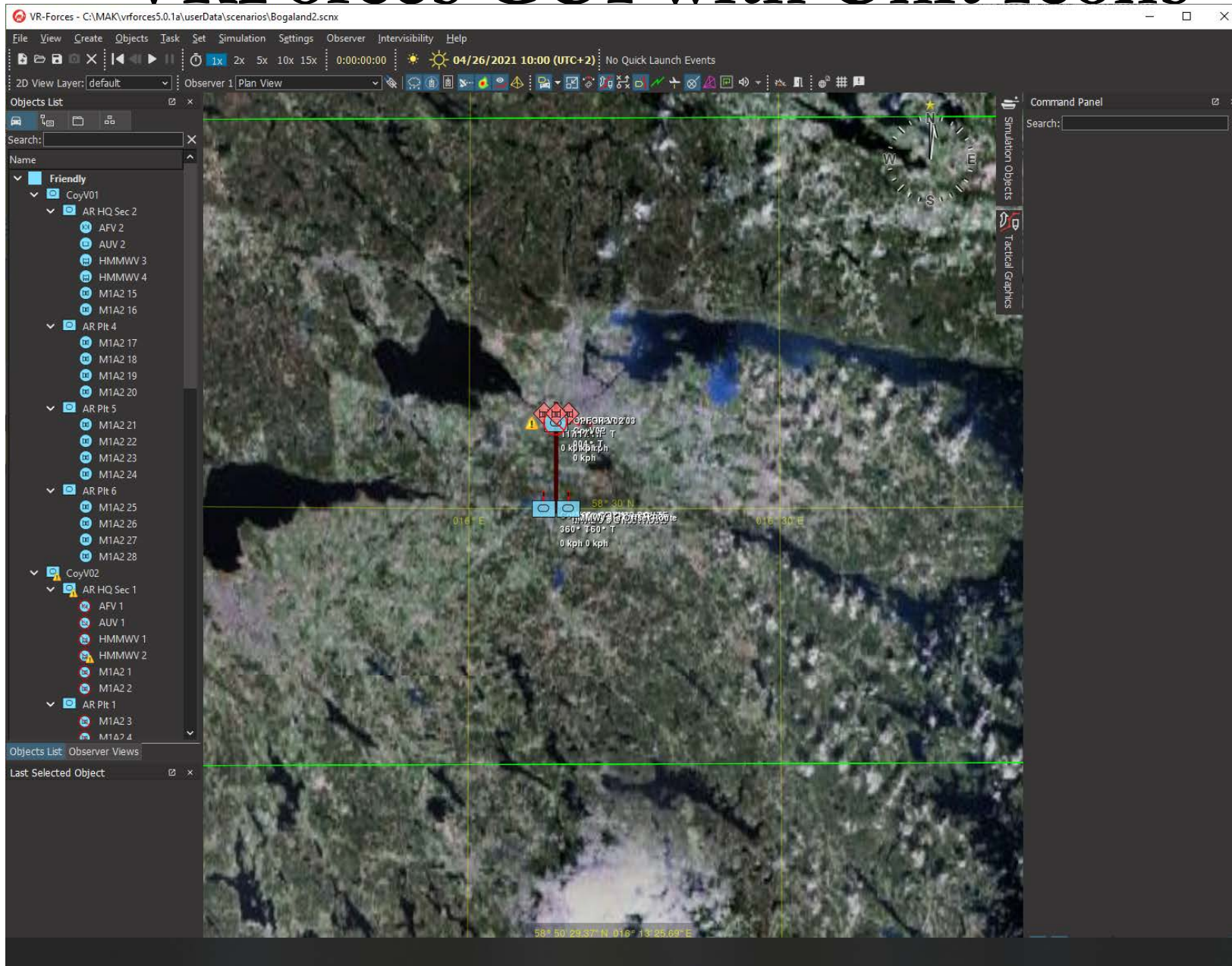
Examine Initialization

- Use the Windows Notepad editor to read file

  - MSG-211-init.xml initialize.xml in C2SIMGUIv2.13.11 Initialize

- Look at the ForceSides

  - Blue force is NATOCoalition; see also OPFOR and Neutral

- Now look at the OPFOR XML descriptions

  - They have DISEntityType "Mobile Irregular"

- And then the friendly force description for your COY-V##

  - It is an Armor Company

- Finally, the SystemEntityList near end of the file

  - Determines which simulator represents your COY-V##

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C2SIM Initialization ForcesSides


```xml
<AbstractObject>
  <ForceSide>
    <Name>NATOCoalition</Name>
    <UUID>00000000-0001-0000-0000-000000000000</UUID>
    <ForceSideRelation>
      <HostilityStatusCode>HO</HostilityStatusCode>
      <OtherSide>00000000-0002-0000-0000-000000000000</OtherSide>
    </ForceSideRelation>
    <ForceSideRelation>
      <HostilityStatusCode>NEUTRL</HostilityStatusCode>
      <OtherSide>00000000-0003-0000-0000-000000000000</OtherSide>
    </ForceSideRelation>
  </ForceSide>
</AbstractObject>
<AbstractObject>
  <ForceSide>
    <Name>WASA</Name>
    <UUID>00000000-0002-0000-0000-000000000000</UUID>
    <ForceSideRelation>
      <HostilityStatusCode>HO</HostilityStatusCode>
      <OtherSide>00000000-0001-0000-0000-000000000000</OtherSide>
    </ForceSideRelation>
    <ForceSideRelation>
      <HostilityStatusCode>NEUTRL</HostilityStatusCode>
      <OtherSide>00000000-0003-0000-0000-000000000000</OtherSide>
    </ForceSideRelation>
  </ForceSide>
</AbstractObject>
<AbstractObject>
  <ForceSide>
```

C2SIM Initialization OPFOR

```xml
<!--RED OPfOR-V00-->
<Entity>
  <ActorEntity>
    <Platform>
      <Vehicle>
        <EntityDescriptor>
          <Side>00000000-0002-0000-0000-000000000000</Side>
          <Superior>00000000-0002-0007-2000-000000000000</Superior>
        </EntityDescriptor>
        <EntityType>
          <APP6-SIDC>
            <SIDCString>SHGPUCAW----RS-</SIDCString>
          </APP6-SIDC>
        </EntityType>
        <EntityType>
          <DISEntityType>
            <DISCategory>2</DISCategory>
            <DISCountry>222</DISCountry>
            <DISDomain>1</DISDomain>
            <DISExtra>0</DISExtra>
            <DISKind>1</DISKind>
            <DISSpecific>0</DISSpecific>
            <DISSubCategory>13</DISSubCategory>
          </DISEntityType>
        </EntityType>
        <Name>OPFOR-V00</Name>
        <UUID>00000000-0002-0007-1000-000000000000</UUID>
        <PhysicalState>
          <EntityHealthStatus>
            <OperationalStatus>
              <OperationalStatusCode>FullyOperational</OperationalStatusCode>
            </OperationalStatus>
          </EntityHealthStatus>
          <Location>
            <GeodeticCoordinate>
              <Latitude>58.58</Latitude>
              <Longitude>16.1</Longitude>
            </GeodeticCoordinate>
          </Location>
        </PhysicalState>
      </Vehicle>
    </Platform>
  </ActorEntity>
</Entity>
```

C2SIM Initialization Friendly Coy

```xml
<!-- Coy V01-->
<Entity>
  <ActorEntity>
    <CollectiveEntity>
      <MilitaryOrganization><Unit>
        <EntityDescriptor>
          <Side>00000000-0001-0000-0000-000000000000</Side>
          <Superior>00000000-0001-0001-1100-000000000000</Superior>
        </EntityDescriptor>
        <CurrentState>
          <PhysicalState>
            <EntityHealthStatus>
              <OperationalStatus>
                <OperationalStatusCode>FullyOperational</OperationalStatusCode>
              </OperationalStatus>
            </EntityHealthStatus>
            <Location>
              <GeodeticCoordinate>
                <Latitude>58.5</Latitude>
                <Longitude>16.12</Longitude>
              </GeodeticCoordinate>
            </Location>
          </PhysicalState>
        </CurrentState>
        <EntityType>
          <APP6-SIDC>
            <SIDCString>SFGPUCI----EUS-</SIDCString>
          </APP6-SIDC>
        </EntityType>
        <EntityType>
          <DISEntityType>
            <DISCategory>5</DISCategory>
            <DISCountry>225</DISCountry>
            <DISDomain>1</DISDomain>
            <DISExtra>0</DISExtra>
            <DISKind>0</DISKind>
            <DISSpecific>0</DISSpecific>
            <DISSubCategory>2</DISSubCategory>
          </DISEntityType>
        </EntityType>
        <Name>CoyV01</Name>
        <UUID>00000000-0001-0001-1101-000000000000</UUID>
        <EchelonCode>COY</EchelonCode>
      </Unit></MilitaryOrganization>
    </CollectiveEntity>
  </ActorEntity>
</Entity>
```

MSG-211-init.xml

C2SIM Initialization System Lists


```xml
    </ScenarioSetting>
    <!-- Assignments of units to simulators -->
    <SystemEntityList>
      <!--V00-->
      <ActorReference>00000000-0001-0001-1000-000000000000</ActorReference> <!-- BDE HQ -->
      <ActorReference>00000000-0001-0001-1100-000000000000</ActorReference> <!-- COY V00 -->
      <ActorReference>00000000-0002-0007-2000-000000000000</ActorReference> <!-- OPFOR Red Parent -->
      <ActorReference>00000000-0002-0007-1000-000000000000</ActorReference> <!-- OPFOR V00 -->
      <SystemName>NPS00</SystemName>
    </SystemEntityList>
    <SystemEntityList>
     <!--V01-->
        <ActorReference>00000000-0001-0001-1101-000000000000</ActorReference> <!-- COY V00 -->
        <ActorReference>00000000-0002-0007-1001-000000000000</ActorReference> <!-- OPFOR V00 -->
        <SystemName>NPS01</SystemName>
    </SystemEntityList>
    <SystemEntityList>
    <!--V02-->
    <ActorReference>00000000-0001-0001-1102-000000000000</ActorReference> <!-- COY V02 -->
    <ActorReference>00000000-0002-0007-1002-000000000000</ActorReference> <!-- OPFOR V02 -->
    <SystemName>NPS02</SystemName>
    </SystemEntityList>
    <SystemEntityList>
    <!--V03-->
    <ActorReference>00000000-0001-0001-1103-000000000000</ActorReference> <!-- COY V03 -->
    <ActorReference>00000000-0002-0007-1003-000000000000</ActorReference> <!-- OPFOR V03 -->
    <SystemName>NPS03</SystemName>
    </SystemEntityList>
```
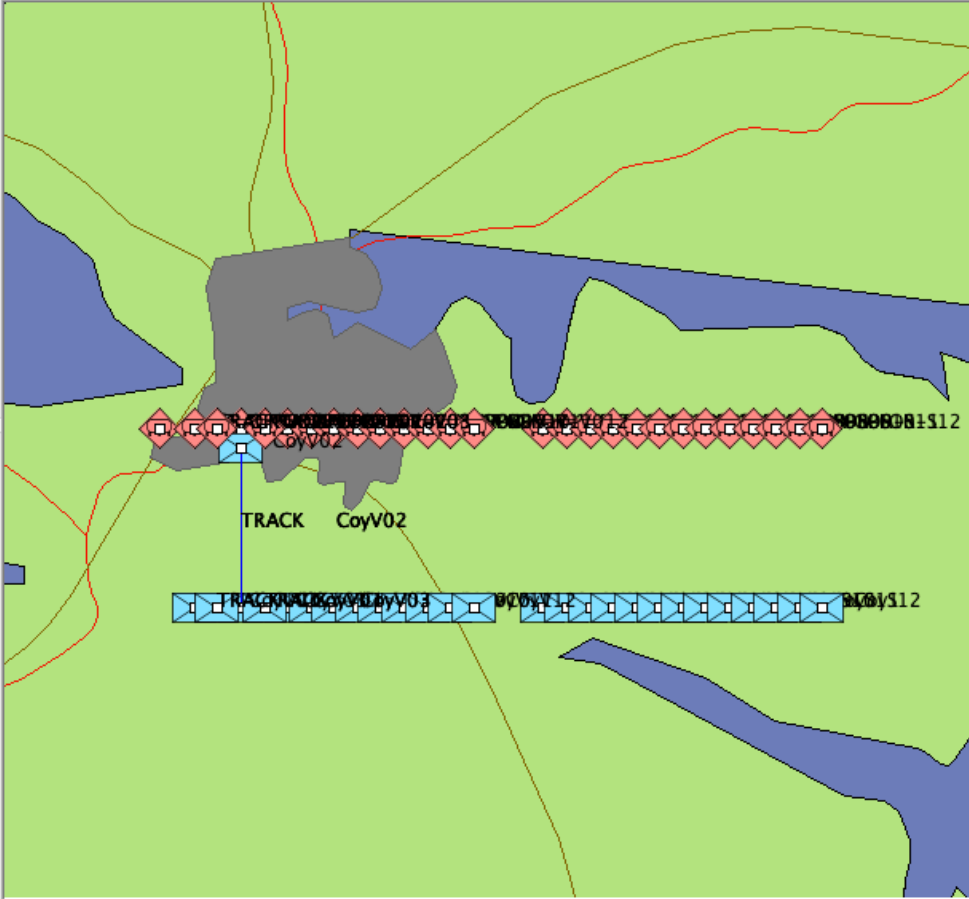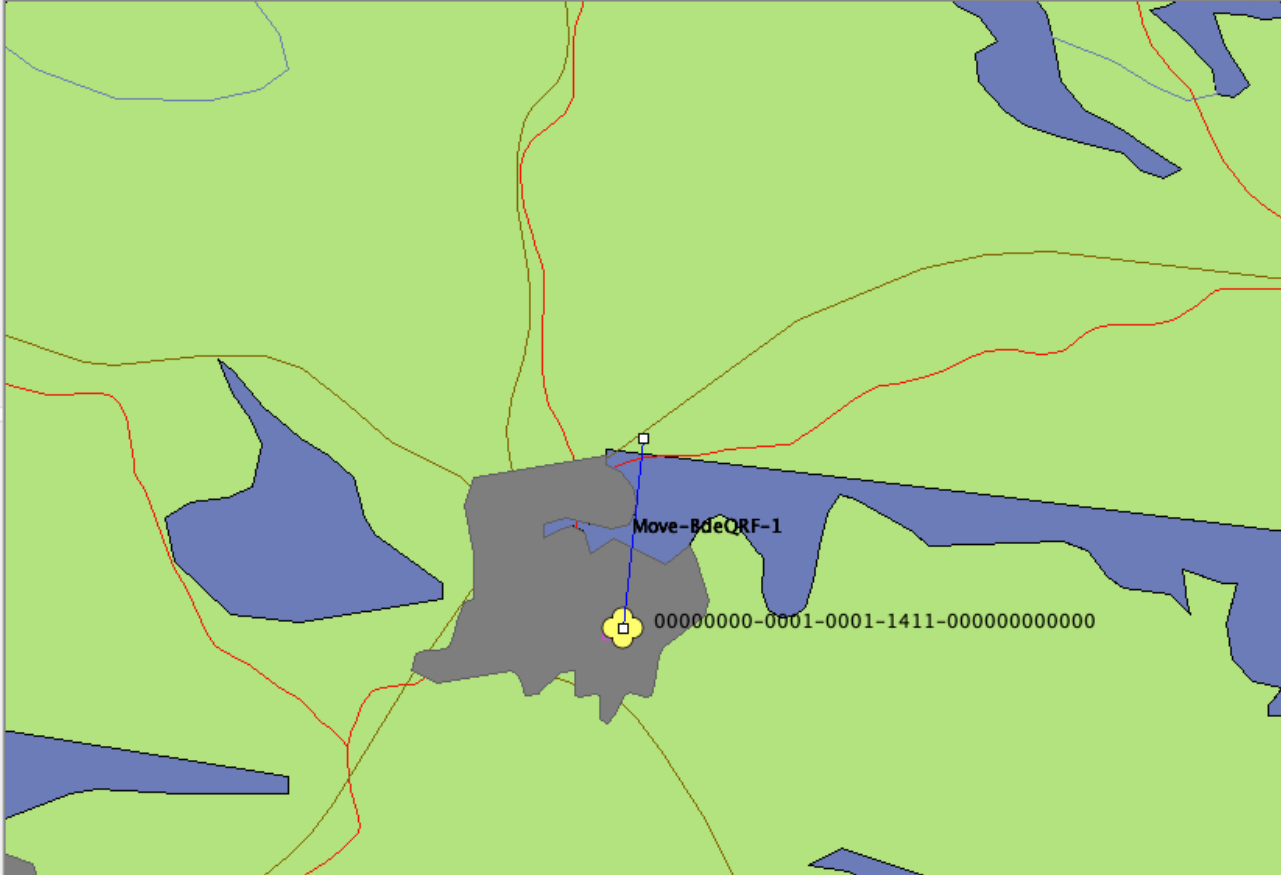
C2SIM GUI With Initialization Icons

Create an Order by Editing

- Use C2SIMGUI config to set AutoDisplayOrders to blank, so other student orders don't get loaded

- Open and Push your TestOrderV## in the C2SIMGUI and observe the resulting reports
  - Positions have been chosen so they do not interfere with each other

- Edit the Location Latitude to 58.52

- Change the RuleOfEngagement in Order to ROEFree
  - (Fire at Will in VR Forces)

- Change last digit of Order ID to 1
  - Each Order UUID is required to be unique

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C2SIM GUI With Order

Run your Order in VRForces

- PushJAXFront so your TestOrder2-V##.xml goes from JAXFront panel to the server

- Your VRForces should respond by moving your unit further

  - Can be run faster-than-real-time but we must all use the same multiplier since we're sharing via HLA

- There will be an OPFOR unit at your destination location

  - Your TestObject should engage when near

  - C2SIMGUI is set to show ground truth for OPFOR

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C2SIM GUI With Report

SWORD Demo

- Dr. Beatriz Garmendia-Doval of MASA participated in C2SIM evaluation with SWORD

    - Also CWIX 2022 & 2023

    - Working with MSCoE Autonomous Systems

- Most recently, she has developed a prototype SWORD implementation of C2SIM v1.0.2

- She will demo SWORD C2SIM for us now

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Run orders in SWORD

- There is also a TestOrder-S##.xml in your workstation

  - Each workstation has a unique UUID in the Order

- You should now be able to Open and Push that Test Order into SWORD and see a sequence of Reports on the map

- When everybody is ready, we'll all run this simultaneously

  - You should see all orders and reports in your GUI even though there is only one SWORD system

- Edit the task latitude to 58.9, change the order ID, and run it again using PushJAXFront

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Work up and run a collective scenario

- As time allows, we will brainstorm an operation involving all systems

- You will copy your Test Order and modify it to play your VRForces' assigned role

- Again, all Orders will run at once in VRForces

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Discussion Session

- What did you learn?

- What was bad about the workshop?

- What needs changed about the workshop?

- Ideas provided:

  - Networked delivery using C2SIM Sandbox (better pre-testing!)

  - Modify C2SIM Server for dynamic unit addition

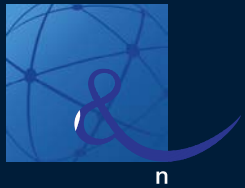 - Integrate better with hybrid course to avoid redundancy

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Thanks for participating!

Special thanks to:
Dr. Beatriz Garmendia-Doval, MASA
Mr. Christian Fitzpatrick, NPS

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